AN OBSERVATIONAL STUDY TO EXPLORE THE ASSOCIATION OF PRAKRITI AND DIABETIC RETINOPATHY

THESIS

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By

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CERTIFICATE OF THE SUPERVISOR

It is certified that work entitled **"AN OBSERVATIONAL STUDY TO EXPLORE THE ASSOCIATION OF PRAKRITI AND DIABETIC RETINOPATHY"** is an original research work done by **PRADEEP K.** under my supervision for the degree of **Doctor of Philosophy** in **SHARIR KRIYA** to be awarded by Tilak Maharashtra Vidyapeeth, Pune. To best of my knowledge this thesis

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Undertaking

I, **PRADEEP K.** is the PhD. Scholar of the Tilak Maharashtra Vidyapeeth in **AYURVEDA–SHARIR KRIYA** subject. Thesis entitled **"AN OBSERVATIONAL STUDY TO EXPLORE THE ASSOCIATION OF PRAKRITI AND DIABETIC RETINOPATHY"**, Solemnly affirm that the thesis submitted by me is my own work. I have not copied it from any source. I have gone through extensive review of literature of the related published / unpublished research works and the use of such references made has been acknowledged in my thesis. The title and the content of research is original. I understand that, in case of any complaint especially plagiarism, regarding my PhD research from any party, I have to go through the enquiry procedure as decided by the Vidyapeeth at any point of time. I understand that, if my PhD thesis (or part of it) is found duplicate at any point of time, my research degree will be withdrawn and in such circumstances, I will be solely responsible and liable for any consequences arises thereby. I will not hold TMV, Pune responsible and liable in any case.

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Contents

Abstract

The word *Prakriti* comes from Pra + Kriti (to produce or to act). Pra suggests that the "beginning", "commencement" or "source of origin" and Kriti suggests that "to perform" or "to form". *Prakriti* is one amongst the foremost vital ideas represented in writing and it's set at the time of conception. it's the whole psychoneurotic designer of a person that starts to require the form in mother's uterus. Thus generated *Prakriti* helps in understanding the health and illness state of a person and helps in maintaining health and conjointly for treatment once pathological. The formation of *Prakriti* is influenced by several factors like pre-natal, post-natal factors, kala etc.

Study of *Prakriti* and its association with diseases has been described since the Vedic period. According to Ayurveda, pharmacogenomics is *Prakriti* based medicine. Personalized medicine approach is well employed by Ayurvedic physicians in diagnosis and treatment. In Ayurveda, it is explained that when the dushya (dosha), desa, rtu (season), and *Prakriti* are the same the disease it difficult to cure. If we can understand the *Prakriti* of an individual we can predict the disease prognosis and advice the patient to control the ahara and vihara so that he can control the occurrence of the particular disease or can delay the complication of that particular disease. Now a day's lifestyle disorders have been increased over communicable diseases of the past. So lifestyle modifications are more needed than any other medications. Ayurveda emphasizes more on dinacharya and rthu charyas for the maintenance of good health. But we know that today's faster life, stress, change in food habits, lack of exercise etc is a major cause of lifestyle diseases, even though all the individuals have got a particular *Prakriti* which is prone to some particular disease.

Key words : Diabetic Retinopathy, Prakriti

Diabetes mellitus has in recent times, gained importance as one of the most common non-communicable diseases which contributes to death and disability worldwide. Retinopathy is a major complication of diabetes which is an end-organ response to a systemic disease, presenting one of the many micro-vascular and macro-vascular diabetic complications. As the prevalence of diabetes is increasing day by day, the complications are also getting increased. In India, the prevalence of retinopathy among diabetic patients is found to be 34.6%. Many of the research shows that in diabetic patients even with strict glycaemic control the complications like retinopathy is not under control. So some other factors like genetical predisposition may be the cause for the disease. In Ayurveda, *Prakriti* has got an important role in the causation of the disease. In this study, it is tried to observe the role of *Prakriti* in the causation of retinopathy among diabetic patients.

Review of Literature

Importance of *Prakriti*

The word *Prakriti* has been derived from "*Prakarshena karoti iti Prakriti*" The word *Prakriti* is derived from Pra + Kriti (to create or to act). *Prakriti* is one of the most important concepts described in ayurveda and it is decided at the time of conception. It is the complete psychosomatic architect of an individual which starts to take shape in the mother's womb. Thus generated *Prakriti* helps in understanding the health and disease state of an individual and helps in maintaining health and also for treatment when diseased. The word *Prakriti* has varying meanings in different contexts like

1. *Svabhava* Nature
2. *Eashwara* God
3. *Kala* Time
4. *Yadrischa* Spontaneity

5. *Niyati* Rule, Destiny, Fate

6. *Parinama* Transformation, Change

Retinopathy is the microangiopathy occurring the retinal blood vessels due to retinopathy. Retinopathy is classified according to the presence and absence of abnormal new blood vessels

a) Non-proliferative retinopathy

b) Proliferative retinopathy.

Non – proliferative retinopathy

Micro-aneurysms are perhaps the earliest sign of retinopathy and are most frequently found temporal to the fovea. They appear as bright red dots unless occluded by lumina thickening or obstructed by erythrocytes. They vary in number, and also vary from 10 to 100 μm in size are rounded when young and irregular when old. They leak fluid and protein across their walls and contribute to the formation of retinal oedema. The life span of micro-aneurysms are estimated to range from a few months to several years. Micro-aneurysms ought to be around 30μm in diameter to be visualized with the ophthalmoscope and small micro-aneurysms may be indistinguishable from the small dot haemorrhages. Red spots with the largest dimension of less than 125μm, or larger spots with smooth round borders or showing a central light reflex, were to be read as micro-aneurysms in the early treatment. Hard exudates are irregular, yellow-white deposits of lipid material thought to be caused by neuron degeneration in the retina. The deposits are not known to be located in the inner and outer plexiform layers of the retina, due to leakage of plasma lipoproteins across the incompetent retinal capillaries or micro-aneurysms. They vary widely in number and size and are most commonly seen within the vascular arcades, they may be discrete and clustered and may be arranged in a linear or circinate pattern. The circinate patterns usually harbor a cluster of micro-vascular lesions within them. Hard exudates are

usually accompanied by micro-aneurysms but are consistently associated with adjacent or more widespread retinal oedema seen as retinal whitening and thickening, they sometimes form large plaques resulting in sub-retinal fibrosis, or locate themselves at the fovea or in the sub-retinal space, when they can damage the photoreceptors.

Proliferative Retinopathy

The normal retinal circulation is resistant to neovascular stimuli, and negligible endothelial cell proliferation takes place in the adult retinal vessels. The initial stimulus for retinal neo-vascularisation is ischemia or hypoxia that leads to upregulation of growth factors, integrins, and proteinases resulting in the formation of new vessels that penetrate the internal limiting membrane and grow into vitreous. Areas of capillary non-perfusion as shown by fluorescein angiography, characterize this ischemia. New retinal vessels are tubes of endothelial cells with ill-formed basement membrane and occasional pericytes. New vessels are accompanied by fibroblasts and glial cells(astrocytes and Muller cells) and grow on the surface of the retina as epi-retinal neo-vascular membranes. Epiretinal membranes in retinopathy are composed of neo-vascular channels with glial cells, fibroblasts, lymphocytes, monocytes, basement membrane, and variable amounts of collages. The epi-retinal membranes (retinitis proliferns) can shrink, and lead to tractional retinal detachment. If this detachment involves the macula, the patient experiences severe vision loss. Vitreous detachment, which is more common and occurs at an earlier age in diabetics, can cause traction on the new vessels leading to pre-retinal or vitreous haemorrhages.The precise stimulus for the subsequent pre retinal neo-vascularisation that characterizes proliferative retinopathy remains uncertain, but retinal hypoxia has been proposed to cause neo-vascularization and rubeosis irides from adjacent retinal vessels. Hypoxia causes upregulation of angiogenic growth factors that causes endothelial cell proliferation. While several candidate molecules have been suggested for this role, including basis fibroblast growth

factor, insulin-like growth factor, angiopoietin-2 and platelet-derived growth factor, recent evidence supports the vascular endothelial growth factor (VEGF) as an important modulator of proliferative retinopathy

Methodology

As we all know the prevalence of diabetes is increasing day by day and the patients with diabetic complications are also getting increased. One of the major complication of diabetes is retinopathy. By analyzing the *Prakriti* of the individuals with retinopathy we can assess which type of *Prakriti* individuals is getting this disease more, so that we can predetermine the occurrence of retinopathy in diabetic patients with that particular *Prakriti*. And also it will help to assess which type of retinopathy that particular *Prakriti* individual is prone to. By modifying the ahara and vihara we can control the occurrence of retinopathy in diabetic patients.

Methodology is a key part of research. In this study which is an observational study is done to find any association of *Prakriti* in the causation of diabetic complication i.e. retinopathy. Here diabetic patients with more than 10 years duration was selected and their *Prakriti* was assessed using a software developed by C-DAC Pune (ayusoft) and screened for retinopathy using ophthalmoscopy . If patients were already diagnosed with retinopathy there *Prakriti* was assessed using the same software.

Aim

To explore the association of *prakriti* in the occurrence of diabetic retinopathy.

Objectives

1. To explore the association of *achakshushya ahara* and diabetic retinopathy.

2. To explore the association of *achakshushya vihara* like watching television and diabetic retinopathy.

Definition of terms

Diabetic patients: Already diagnosed diabetic patients with more than 10 years duration.

Prakriti : *Tridosha prakriti* is considered here. A valid tool was used to assess *Prakriti*. AYU-SOFT SOFTWARE OF C-DAC, Pune.

Materials and Methods

Source of data

Patients with diabetes with more than 10 years duration were included in this study.

Research design

Observational study

Study setting OPD and IPD of Govt Ayurveda College Tripunithura, Ernakulam Kerala

1. The study was conducted in already diagnosed diabetic patients with more than 10 years duration
2. A valid questionnaire was used to assess the *prakriti* of each participant – Ayusoft of C- DAC, Pune
3. Ophthalmoscopy and vision testing was used to diagnose retinopathy
4. A questionnaire Regarding chronicity of diabetes, their occupation, *Ahara, Vihara*, Family History, Drug History were prepared and were analysed

5. The collected data were statistically analysed to find the relationship between *Prakriti* and retinopathy

6. Relationship of *Prakriti* in the causation of retinopathy in diabetic patients was studied by the concepts of Ayurveda.

Population

Diabetic patients with more than 10 years duration.

Method of data collection

Sampling procedure

Consecutive Sampling.

Sample size

Prevalence of Retinopathy = 34.6 %

So

p = 34.6%

q = 100 – 34.6

= 65.4

Relative Precision (d) = 20%

prevalence = 34.6.

therefore, d = 6.92

Alpha error, $z\alpha$ at 5% (0.05) = 1.96

$$\text{Sample size } n = \frac{(z\alpha)^2 \times p \times q}{d^2}$$

$$= \frac{1.96 \times 1.96 \times 34.6 \times 65.4}{6.92 \times 6.92}$$

= 182 subjects

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Duration of the study

24 months.

Inclusion criteria

1. Diabetic patients (Type I and Type II) with more than 10 years duration
2. Age in between 30 to 60 years
3. Both gender.

Exclusion criteria

Patients with systemic disorders other than Diabetes.

Instruments intended to be used

1. A valid questionnaire to assess *prakriti* was used.
2. Ophthalmoscopy and vision testing was used to diagnose retinopathy
3. A questionnaire Regarding chronicity of diabetes, their

occupation, *Ahara, Vihara*, Family History, Drug History were prepared and were analysed.

AYUSOFT of C-DAC, Pune

AyuSoft software was purchased from Centre for Development of Advanced Computing (C-DAC), Pune, Department of Information Technology, Ministry of Communications and Information Technology (MCIT), India. *Prakriti* assessment by AyuSoft was performed using weightage configuration. There are 85 questions related to the anatomy, physiology, and psychology. Weightage ranging from 1 to 10 is provided for every question to predict the dosha (manifestation of each trait in a given *prakriti*). Traits related to physical or anatomical features have been assigned higher weightage cut-off as it remains stable throughout the life. In contrast, physiological and psychological factors vary with respect to the habitat and hence lesser weightage was assigned. The *prakriti* can be determined for all age groups and the weightage configuration can be modulated accordingly within the software by clinicians and thus aids in the assessment of *prakriti*. All questionnaires define the character of the dosha dominance and report cumulative dominance in percentage within anatomical, physiological, and psychological parameters.

Questionnaire

A Questionnaire regarding chronicity of diabetes, occupational history, ahara, vihara etc. was given to assess other variables.

Ophthalmoscopy and vision testing

Ophthalmoscopy is a test that allows a health professional to see inside the fundus of the eye and other structures using an ophthalmoscope. It is done as part of an eye examination and may be done as part of a routine physical examination. It is crucial in determining the health of the retina, optic disc, and vitreous humour.

Ophthalmoscopy is done as part of a routine physical or complete eye examination. It is used to detect and evaluate symptoms of various retinal vascular diseases or eye diseases. In patients with diabetes mellitus, regular ophthalmoscopic eye examinations (once every 6 months to 1 year) are important to screen for retinopathy as visual loss due to diabetes can be prevented.

Plan of analysis

According to Data collected the results were evaluated and the significance of the study was assessed using basic statistical analysis (descriptive statistics) and the association of *prakriti*, occupation, *ahara* and *vihara* in the causation of retinopathy were assessed by descriptive statistics and appropriate tests – chi square test was done.

Observation and Analysis

In this study, patients with a diabetic history of more than 10 years were selected and *prakriti* was assessed and ophthalmoscopy was done to diagnose retinopathy. Their *ahara, vihara*, stress, hypertension, control of diabetes and dietary modification, exercise, sleep were assessed. The observations obtained are given below in tables, the chi-square test was done to find any association. Regression analysis is also done to find the contribution of each variable in the causation of retinopathy.

Diabetes and *Prakriti*

Among the total patients selected *Kaphaprakriti* patients were more, and *Vataprakriti* patients were less. We know that diabetes is a disease caused by *kapha* medhodushti. So *kaphaprakriti* individuals are more prone to get diabetes. Also, we know that diabetes is a metabolic syndrome which causes derangement of agni so that *pittaprakriti* people are also prone to diabetes. In this study, it was found that *vataprakriti* individuals with diabetes are less compared with *kapha* and *pittaprakriti* individuals.

Prakriti and Retinopathy

It was found that 67% of the *kaphaprakriti* diabetic patients were having retinopathy, 51 % of the *pittaprakriti* diabetic patients were having retinopathy and 38% of the *vataprakriti* diabetic patients were having retinopathy. Since the total *vata* predominant diabetic patients were less compared to *kapha* and *pittaprakriti*. To be more precise it was found that *kaphapittaprakriti* individuals with diabetes were mostly affected with retinopathy, the second was *pittakaphaprakriti* individuals, *vatapittaprakriti* were less affected. When we compare within retinopathy it was found that 49.2 % were *kapha* predominant *prakriti*, 36.9% were *pitta* predominant and the remaining 14.9% were *vata* predominant which shows that *kapha* predominant *prakriti* persons were more affected compared to *vata* predominant patients.

Types of retinopathy and *Prakriti*

Among the total retinopathy patients selected non-proliferative retinopathy were 184 and proliferative were 71. In that non-proliferative retinopathy patients, 116 were *kaphaprakriti*, 64 were *pittaprakriti* and 4 *vataprakriti*. Among the proliferative group it was found that 30 patients was *pittaprakriti*, 34 *vataprakriti* and 7 were *kaphaprakriti*.

Duration of Diabetes and Retinopathy

It was found that diabetic patients with 10-15 years of duration were more affected. Even if the duration of diabetes is increased they were less affected, which shows that if the patient is prone to get retinopathy, it will occur within 10-15 years after that the chance is less. In total population, the occurrence of diabetes between age group 30-50 is more, so the complication may be occurring after 10 years. Among the patients selected with more than 10 years of diabetic history, it was found that 58% of the diabetic patients developed retinopathy.

Controlled / uncontrolled diabetes and retinopathy

Among the patients selected it was found that 4% of patients were with controlled diabetes and the remaining 96% of the patients were with uncontrolled diabetes. it was found that most of the patients with retinopathy were not in strict glycaemic control. The blood glucose level was not under control even by medication. This may be another cause for the causation of retinopathy. In many studies, it was proved that uncontrolled diabetes may lead to the causation of retinopathy, but in some studies, it was explained that even with tight glycaemic control retinopathy occurred after 10 years history of diabetes.

Age Group and Retinopathy

It was found that patients of age group 50-60 years were found to be more prone to retinopathy. It may be due to the duration of diabetes, and we can see that in this study most of the patients selected were in the age group 40-60 years.

Retinopathy and Sex

It was observed that among the total patients selected, 62.8% of the retinopathy patients were male and 43.1% were female. Even though we can't conclude that male diabetic patients were more prone to retinopathy, it may be because more male patients were included in this study. But previous researches showed that male patients have more chance of retinopathy compared with females.

Types of Retinopathy and Blood Pressure

Most of the retinopathy patients were found to be hypertensive also. Among the 189 NPDR patients 154 patients were found to be hypertensive also. And among the 71 PDR patients, 55 were having high

hypertension. It was found that Retinopathy has got an association with blood pressure.

Stress and Retinopathy

It was found that 235 patients among 255 retinopathy patients were having average stress and some patients were more stressful. So we may say that stress is also a complimenting factor for retinopathy.

Sleep and Retinopathy

Most of the patients were found to be having average sleep, may be because most of the patients were in the age group 49-60. 5.5 % were having good sleep and 8.4% were found to be having less sleep.

Bowels and Retinopathy

In this study most of the patients were under medication either Allopathic or Ayurveda, It may be the cause that most of the patients were having normal bowels.

Other Complications and Retinopathy

Among the patients selected, 5% were found to have neuropathy along with retinopathy. We know that neuropathy and retinopathy have got similar pathology i.e. microangiopathy. So retinopathy patients may also develop neuropathy in the future. In this study, it was found that some of the patients (10.8%) with retinopathy were having diabetic neuropathy also.

Exercise and Retinopathy

It was found that retinopathy patients were doing less exercise. Lack of exercise may be leading to hyperglycaemia thus causing retinopathy. We know that diabetes is a disease-causing *kapha* medo dushti, retinopathy

is also due to *kaphadushti*, individuals without exercise have *kaphadushti* and uncontrolled blood glucose level which again leads to retinopathy.

Watching TV and retinopathy

Among the 255 retinopathy patients, 237 patients were watching TV regularly. We know that Watching TV is an *achakshushya* vihara which will adversely influence the visual health and which will augment the eye diseases. So watching TV will enhance the causation of retinopathy among diabetic patients.

Retinopathy and diet control / uncontrolled

It was found that most of the patients with retinopathy were with uncontrolled diet pattern. This may be the cause for an increase in blood glucose level thus leading to retinopathy.

Diet and retinopathy - CURD

We can see that among the total patients with retinopathy, 154 patients were taking curd often and 26 patients daily. We know that curd is an *achakshushya* diet which enhances the causation of retinopathy.

Diet and retinopathy - BAKERY

Among the 255 retinopathy patients 165 patients were using bakery items daily and 88 patients often. Bakery items are also considered among the achakshushya ahara since they will deteriorate the agni.

Diet and Retinopathy – COFFEE

Among the 255 retinopathy patients, 75 patients were taking coffee daily and 89 patients taking coffee often. Drinking coffee was found to enhance the causation of retinopathy. We can say that coffee is *achakshushya*.

Regression Analysis

Regression analysis is a powerful statistical method that allows us to examine the relationship between two or more variables of interest. Here independent variables like *Prakriti*, sex, age, duration of diabetes, stress, sleep and *achakshshya vihara* like watching TV, *ahara* like curd, bakery, coffee regularly lead to the causation of retinopathy which was the dependent variable.

Discussion

It was observed that *kapha* predominant *prakriti* is more affected, compared to *pitta* and *vataprakriti* individuals. Among the total diabetic patients with 10 years and more duration, 42% were of *kapha* predominant *prakriti* individuals and 41% *pitta* predominant *prakriti* individuals and the remaining 17% of individuals were *vata* predominant *prakriti*. We can also see that these patients were following ahara and vihara which increases *kapha* and *pitta* thus leading to retinopathy.

We know that diabetes which is similar to prameha is caused by *kapha medo dushti*. In retinopathy (NPDR) the main pathology is the walls of the blood vessels in the retina weakens, When it progresses from mild to severe, more blood vessels become blocked, and swelling of nerve fibres occurs. Sometimes the central part of the retina begins to swell causing macular oedema. In (PDR) proliferative retinopathy, the damaged vessels close off, causing the growth of new abnormal blood vessels in the retina and jelly-like substance fills the centre of the eye. In this study, both *kapha* predominant and *pitta* predominant *prakriti*s were more affected.

It was found that among the total 255 retinopathy patients 184 patients were having NPDR and 71 were PDR. 116 patients with NPDR were *kaphaprakriti*, 64 were *pittaprakriti* and 4 patients were *vataprakriti*. In the PDR group, 30 patients were *pittaprakriti*, 34 patients were with *vataprakriti*

and 7 patients with *kaphaprakriti*. From the properties of three doshas, we may say that in NPDR patients, the properties of *kapha* like snigdha, guru, mrtsna, sthira, slakshna properties caused the retinal blood vessels to get weakened and blocked. Acharya had explained while describing *Sukhasadhya roga lakshanas* that when *dusya, desa* (locality), *rtu* (seasons) and *prakriti* (constitution) are not identical, the disease is curable. Retinopathy is a complication of diabetes which is a disease caused by *kaphadushti*. And we can say that it is a disease affecting the upper part of the body which is a *kaphasthana*. Since eyes are said to be the seat of *pitta*, *pitta* also has a role in the causation of retinopathy. When we see the symptoms of PDR and when we consider the gunas of *pitta* we can see that there is leakage from the blood vessels in PDR which may be due to the gunas like *sara* (flowing), *drava* (liquid), *snighdha* (unctuous), *tikshna* (sharp) and *ushna* (hot). *Kaphaprakriti* individuals with *kaphamedodusti* (diabetes) who indulge in *kapha* increasing *aharas* and *viharas* will be more prone to get retinopathy (NPDR). *Vataprakriti* and *pittaprakriti* individuals with uncontrolled diabetes who indulge in activities which increases *pitta* and *vata* are also prone to retinopathy (PDR). So *kaphaprakriti* individuals and *pittaprakriti* individuals are at high risk of getting affected with retinopathy.

Diabetes (prameha) which starts from *kaphadushti*, later it is *pitta* predominant and at the end stage, it is *vata* predominant. Like that in retinopathy also, in the early stages, it is *kapha* predominant (NPDR) and then *Pitta* predominant (PDR) and later on it is *vata* predominant where retinal detachment occurs. Here we can see that the transformation of NPDR to PDR is faster in *pittaprakriti* individuals compared to *kaphaprakriti* individuals. When we see the aetiology of *kapha* vitiation, we can see that eating foods which are *madhura* (sweet), *Amla* (Sour) and Lavana (salty) and *snigdha* (oily), *Guru* (heavy), *Abhishyanda* (Slimy) and *Seeta* (cold) causes vitiation of *kapha*. *Viharas* like lack of exercise, day sleep and *ajeerna* (indigestion) causes *kapha* vitiation. Here we can see those *kaphaprakriti* individuals indulging in *kapha* vitiating *aharas* and *viharas* in a disease with *kapha dushti*

leading to a complication which is also *kaphapradhana* (NPDR). If the individual again follows the same lifestyle it will cause the next *dosha* ie *pitta* vitiation (PDR) and *vata* vitiation (Retinal detachment or degeneration). If the individuals who indulge in *aharas* which is *Katu* (pungent), *Amla* (sour), *Lavana* (salty), *Tikshna* (sharp), *Ushna* (hot) and *Vidhahi* (burning) causes *pitta* vitiation. If the *prakriti* of the individuals is also *pittaprakriti* it will enhance the vitiation thus causing *pitta* pradhana disease, if *pittaprakriti* individuals affected with diabetes who indulge in *pittakopaaharas* and *vihara* there is more chance to retinopathy especially proliferative retinopathy.

Patient with diabetes who is *kaphaprakriti* or *pittaprakriti* should avoid *kapha* vitiating and *pitta* vitiating *aharas* and *viharas*. We know that diabetes or *prameha* is a disease with *kaphamedodushti*, if the patient continues with the same *aharas* and *viharas* without controlling the blood sugar level, this will lead to complications like retinopathy where the first dosha to vitiate is *kapha* (leakage, exudates and oedema), and if the patient continues the same regimen then *pittadosha* gets vitiated (retinal hemorrhage) and at the end, *vata* gets vitiated (retinal detachment).

We can see many similarities in *prameha nidana* and *netra roga nidanas* like *amla rasa, suktaranala. masha, kulatha, vega vinigraha*. It is srotodusti in *raktavaha srotas* of the retina which causes *sanga* (occlusion of retinal blood vessels), *siragrandi* (aneurysms), *athipravrti* (neo-vascularisations), and *vimarga gamana* (retinal haemorrhage).

In this study, it was found that male patients were more affected compared to females. Previous studies regarding retinopathy and sex showed that male patients are more prone to retinopathy. When considering the age group, 49-60 were the more affected group compared to other age groups. And while considering the chronicity of diabetes 10-15 years were more affected. In Ayurveda Samhitas, it is explained that those who follow *achakshushya ahara* like, *ushna ahara, utklesha ahara, abhishyandi ahara, virudha ahara, asathmya ahara, adhyasana* are prone to get affected with

eye diseases. Those *ahara's* which vitiates *pitta* and *abhishyandkara* cause eye diseases. In this study, it was found that patients with diabetes ho followed such type of *ahara's* ended up in retinopathy. 154 patients were taking curd often and 26 patients daily. Curd is an *achakshushya* diet which augments the causation of retinopathy. Among 255 patients with retinopathy 165 patients were using bakery items daily and 88 patients were using often. Bakery items are also considered among the *achakshushya* ahara since they will deteriorate the agni. Derangement of agni causes an increase in blood sugar level as well as retinopathy. Among the 255 retinopathy patients 75 patients were taking coffee daily and 89 patients taking coffee often. Drinking coffee is found to enhance the causation of retinopathy. We can say that coffee is *achakshushya* since it causes derangement of agni and it also increases the blood pressure thus increasing the chance of retinopathy.

Other factors like Stress, Blood pressure, Exercise, Watching TV etc, were contributing to the causation of retinopathy. We know that watching TV is *achakshushya* since it will give overstrain to the eyes, in this study, it was found that among the 255 retinopathy patients 237 patients have watched TV regularly more than 3 hours a day. Most of the patients with retinopathy were not doing any sort of exercise. And most of the patients were having average stress at home or in the workplace which contributed to the causation of retinopathy. Among the 189 NPDR patients 154 patients were found to be hypertensive also. And among the 71 PDR patients, 55 were having hypertension. This shows hypertension also contributes to retinopathy. Regression analysis shows that the variables *prakriti*, age, sex, duration of diabetes, chronicity, watching TV, lack of exercise, food which deranges agni like bakery items, burd, boffee, bypertension, btress are some of the factors which contribute to the causation of retinopathy among diabetic patients.

SUMMARY

- Diabetes is a disease with *kaphamedodushti*, So *kaphaprakriti* individuals are prone to diabetes.
- *Vataprakriti* individuals are less affected by diabetes, if affected they are prone to get complications earlier.
- Retinopathy is a disease with *kapha* and *pitta dosha* vitiation. So *kaphaprakriti* and *pittaprakriti* individuals are prone to retinopathy.
- If diabetic patients follow ahara and vihara which increases *kapha dosha* and *pitta dosha*, retinopathy is more likely to occur.
- Retinopathy is more likely to occur in patients who follow *achakshushya ahara* like *ushna ahara, abhishyandi ahara, utklesha ahara,* etc.
- Diabetes is a metabolic syndrome, so ahara which causes derangement of agni also leads to complications eg., food items like bakery, coffee etc
- Retinopathy is more likely to occur in patients with diabetes who follow *vihara* like watching TV and lack of exercise etc.
- Retinopathy is more likely to occur in patients with diabetes who are stressful, hypertensive etc

CONCLUSION

This study shows that *prakriti* has got an association in the causation of diabetic complication ie; retinopathy. From the tables in the analysis part, it is clear that diabetic patients with *kapha pradhana* and *pitta pradhana prakriti* are more prone to retinopathy. So they should avoid *ahara*

and *vihara* which vitiates *kapha* and *pitta*. It is clear from the observations that diabetes is less affected in *vata pradhana prakriti* individuals, so they are less prone to the complication ie; retinopathy. While treating retinopathy patients the line of treatment should be to pacify the *kapha dosha* and *pitta doshas*. Along with *prakriti* other factors like *ahara, vihara*, hypertension, stress, sleep pattern also will contribute to the occurrence of retinopathy. Since this study was done to find the association of *prakriti* and retinopathy only a few factors other than *prakriti* were included. Many more factors may be contributing to the causation of retinopathy which was behind the scope of this study. In this study, we found that hypertension, stress, age, chronicity of diabetes, control of diabetes, diet control, sex, diet such as curd, bakery, coffee, *vihara* like watching TV, lack of exercise contributing to the occurrence of retinopathy. So while treating retinopathy we should consider all these factors. And we can also advise the diabetic patients to avoid the *ahara* and *vihara* which is *achakshushya* so that they can control or delay the occurrence of retinopathy.

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DM	DiabetesMellitus
DR	DiabeticRetinopathy
NPDR	NonProliferativediabeticretinopathy
PDR	ProliferativeRetinopathy
ETDRS	EarlyTreatmentDiabeticRetinopathyStudy
WESDR	WisconsinEpidemiologicStudyofDiabetic
DCCT	RetinopathyDiabetesControlandComplicationsTrial
UKPDS	UnitedKingdom ProspectiveDiabetesStudy
APEDS	TheAndraPradeshEyeDiseaseStudy
CURES	ChennaiUrbanRuralEpidemiologyStudy
C-DAC	CentreforDevelopmentofAdvancedComputing
CYP2C19	CytochromeP4502C19
RA	Rheumatoid Arthritis
HLADRB1	Humanleukocyte antigen DRB1 beta chain
EGLN1	Eglninehomolog1.
PGM1	Phosphoglucomutase1
SNP	SingleNucleotidePolymorphs

INTRODUCTION

The word *Prakriti* comes from *Pra* + *Kriti* (to produce or to act). *Pra* suggests that the "beginning", "commencement" or "source of origin" and *Kriti* suggests that "to perform" or "to form". *Prakriti* is one of the foremost important ideas explained in text and it's set at the time of conception. It's the complete psychoneurotic designer of an individual that starts in mother's womb. *Prakriti* thus generated helps in understanding the health and illness state of an individual and helps in maintaining health and collectively for treatment once pathological. The formation of *prakriti* is influenced by several factors like prenatal factors, post-natal factors, *kala* etc[1].

Prakriti has an important role in the maintenance of health as well as in causing diseases. We know that a person having predominant *doshic* constitution following the same *dosha* vitiating *ahara* and *vihara* and also if the *kala*, *desha* etc. are also favourable for the causation of the disease, there is a high chance of getting

that particular *doshic* predominant disease[2] . Most of the diseases have *dosha* predominance, so people having that *dosha* predominant *prakriti* is more prone to get affected by the disease, for example, *kapha dosha* predominant *prakriti* people are more susceptible to get *kapha dosha* predominant diseases.

Study of *Prakriti* and its association with diseases has been described since the Vedic period. According to Ayurveda, pharmacogenomics is treatment according to *prakriti* of the individual. Personalized medicine approach is well employed by Ayurvedic physicians in diagnosis and treatment. In Ayurveda, it is explained that when the *dushya* (*dosha*), *desa, rtu* (season) and *prakriti* are the same then the disease is difficult to cure[3]. If we can understand the *prakriti* of an individual we can predict the disease prognosis and advice the patient to control or modify the ahara and vihara so that he can prevent the occurrence of the particular disease or can delay the complication of that disease. Nowadays lifestyle disorders have been increased compared to communicable diseases of the past. So lifestyle modifications are more needed than any other medications. Ayurveda emphasizes more on *dina charya* and *rthu charyas* for the maintenance of good health. Today's faster life, stress, change in

food habits, lack of exercise etc are the major cause of lifestyle diseases, even though all the individuals have got a particular *prakriti* which by nature is prone to some that *dosha* predominant disease.

Diabetes mellitus in recent times has gained importance as one of the most common non-communicable diseases which contributes to death and disability worldwide. Retinopathy is a major complication of diabetes which is an end-organ response to a systemic disease, and it presents as one of the many microvascular and macrovascular diabetic complications. The prevalence of diabetes is increasing day by day, the complications also are on an increasing trend. In India, the prevalence of retinopathy among diabetic patients is found to be 34.6%. Many types of research show that in diabetic patients even with strict glycaemic control the complications like retinopathy is not under control. So some other factors like genetical predisposition may be the cause for the disease. In Ayurveda, *prakriti* has got an important role in the occurrence of the disease. This study attempts to observe the role of *prakriti* in the occurance of retinopathy among diabetic patients.

Diabetic retinopathy is a disease occurring the retinal musculature, which affects the vision. It is one among the major

complications of diabetes, the other two being neuropathy and nephropathy. Many epidemiological studies have been conducted on diabetic retinopathy like *Early Treatment Diabetic Retinopathy Study (ETDRS), Wisconsin Epidemiologic Study of Diabetic Retinopathy(WESDR), Diabetes Control and Complications Trial (DCCT), the United Kingdom Prospective Diabetes Study(UKPDS)* etc.

The prevalence of retinopathy in southern India, among diabetic patients from four population-based studies, using different methods in the detection of retinopathy was between 10.5% and 26.2%[4]. The Andra Pradesh Eye Disease Study (APEDS) reported a 22.4% prevalence of diabetic retinopathy, detected and graded by ophthalmoscopy, in self-reported urban diabetics identified and stratified from population clusters. The Chennai Urban Rural Epidemiology Study (CURES) that included self-reported and newly diagnosed diabetics, reported a prevalence of 17.6% using a 4-field photography based grading system. A door-to-door survey of a rural population sample conducted by Aravind Eye Hospital found 26.2% of self-reported diabetic patients to have retinopathy, detected by ophthalmoscopy.

In some studies, it was found that the duration of diabetes is the key factor for the complication like retinopathy, but in some studies, it was found that duration of diabetes has nothing to do with the causation of complications. Some studies say that there is a chance for retinopathy after 10 years of duration of diabetes, but in other studies even with strict glycaemic control patients with diabetes are moving towards complications like retinopathy. So some other factors like genetic factors or lifestyle factors etc may be complimented for the causation of diabetic retinopathy. In this study, an effort has been made to find the association of *Prakriti* in the occurrence of diabetic retinopathy.

Ayurveda emphasizes on *tridosha* theory, and when *dosha*s are vitiated it causes a disease which can be managed by *ahara* and *vihara* having opposite *gunas* of that particular *dosha*s. If the *prakriti* of an individual and the vitiated *dosha* and the *dosha* predominance of the particular disease are same, it is difficult to manage that disease. Diabetes is a lifestyle disorder which can be altered by lifestyle modification, diabetic retinopathy also can be controlled by lifestyle modification. So when the *prakriti* of an individual is assessed it will be easy to predict the causation/prognosis of the disease

outcome, so that we can advise the patient to avoid certain *ahara* and *vihara* so that the disease can be held under control or can be easily managed.

Ayusoft is a software developed by C-DAC Pune which is a validated tool to assess the *prakriti*. In this software 83 questions to assess the *prakriti* have been employed which covers the Anatomical, Physiological and Psychological features. This will help to assess the *prakriti* scientifically. This study will help to advise diabetic patients with particular *prakriti* to follow particular *ahara* and *vihara* so that the occurrence of the complications can be controlled or delayed.

By assessing the *prakriti* it will also help in the treatment of diabetic retinopathy. *Kapha prakriti* people with diabetic retinopathy can be treated with drugs that pacify the increased *kapha dosha*. Similarly, *pitta* predominant individuals can be treated with *pitta samana oushadas* and *kriyakramas*.

Chapter 1

REVIEW OF LITERATURE

1.1. IMPORTANCE OF PRAKRITI

The word *Prakriti* has been derived from "*Prakarshena karoti iti Prakriti*". *Prakriti* is one of the foremost vital ideas delineated in Ayurveda samhitas, and it is determined at the time of conception. It is the entire psychosomatic designer of a person that starts from the mother's uterus. This generated *prakriti* helps in understanding the health and wellness state of a person and helps in maintaining health and also for treatment once pathological.

The word *prakriti* has varied meanings in different contexts like

1. *Svabhava* - Nature
2. *Eashwara* - God
3. *Kala* - Time
4. *Yadrischa* - Spontaneity
5. *Niyati* - Rule, destiny, fate
6. *Parinama* - Transformation, change

Acharya Susrutha denotes *prakriti* by using the term *Avyaktha*. According to him, the unmanifest is the causative source of all beings, causeless, characterized by *satwa, rajas* and *tamas*, having eight forms and manifesting cause of the entire universe. It is one and location of many souls as the sea is of watery streams. This *prakriti* is eternal, causeless and omnipresent.

Susrutha has also used the term *prakriti* to denote the *ashtaprakriti* which include the *avyaktha*, *mahath*, *ahankara*, and five *thanmatra*.

The predominance of *dosha* at the time of fertilization determines the *prakriti* of a person. The enhanced *doshas* present in the *sukra* (male gamete) and *arthava* (female gamete) at the time of

conception, continues to remain throughout life, from birth to death without causing any disease. In Ashtanga Sangraha, Vaghbata says, at the time of commencement of life, by the union of *sukra* and *arthava*, the *doshas* which are predominant confer their character to *garbha* (foetus). Just as the venom of a poisonous organism is harmless to it, there arises three kinds of *prakriti-hina* (poor), *madhya* (moderate) and *uthama* (best). *Samadhatuprakriti* arising from the combination of all three *doshas* in equal proportion is ideal. *Dwidoshaja prakriti* arising from the combination of any two of the *doshas* are bad. Thus *prakriti* is that which constitute the physical as well as psychological makeup of an individual.

Prakriti is a non-pathological humoral (*dosha*) status which is inherent in the individual from birth to death, which becomes distinct since the time of fertilization mediated by maternal and paternal activities.

All individuals will be influenced by the *doshas* or will be having the features of these *doshas*. But we consider an individual as *vataprakriti*, *pittaprakriti*, or *kaphaprakriti* according to the predominance of features of *doshas* found in them. These individuals

are prone to get diseases according to their *prakriti*, i.e., *vata prakriti* individual is more prone to get *vata* predominant diseases if he is following a *vata* vitiating lifestyle. If we know our *prakriti* we can change our lifestyle for maintaining the *doshas* in equilibrium, so that health is maintained.

1.1.1 Factors responsible for the formation of *prakriti*

Prakriti of an individual takes shape in the mother's womb at the time of conception, due to the dominance of *doshas* in *sukra*, and *shonita*[5]. According to *Shodashabhuta Siddhanta Sukra, Shonita, Rasa and Atma* these four factors compose the *Garbha*[6].

The *sukra* and *shonita* are derived from father and mother respectively. Hence these are named as paternal and maternal factors. The *rasa* supplied by the mother gives nutrition. *Atma* along with *manas* and *buddhi* enters the uterus depending on the deeds of his or her previous life. The above-mentioned four factors come from different sources and get congregated to produce *Garbha*. These factors are composed of *Mahabhutas*, among them *Akasha* is *Vibhu*. So while transmigrating four *Bhuthas* except *Akasha*, takes part. Thus totally sixteen factors come from different sources for the formation

of embryo[7]. *Satmyaja* and *Satvaja* factors also contribute to the constitution of different organs of the body. *Prakriti* which is formed by the combination of parental and individual factors is genetic in origin and termed as *Garbhakalina prakriti*. The *prakriti* imbibed in an embryo is subjected to various environmental factors, which may also influence and make an alteration to form *jatakalina prakriti*. While describing the *prakriti*, Charaka has enumerated 4 factors responsible for its formation viz.

1. *Sukra*shonita *prakriti*
2. *Kalagarbhashaya prakriti*
3. *Maturahara Vihara prakriti*
4. *Mahabhutavikara prakriti*

Each of these has its due effect not only on the shape or structure of the human body but also on human behaviour. All these factors can be grouped under three headings.

a) Parental factors

b) Individual factors

c) Environmental factors

1.1.2 Parental Factors

Sukrashonita prakriti mentioned by Charaka is nothing but the parental, factors, which forms the *Prakriti*. Even though *Sukra* and *Shonita* both are considered as *Panchabhautika*, mainly *Sukra* is *Saumya* and *Shonita* is *Agneya*. Both in their pure form are responsible for the production of the foetus. *Tridoshas* are biological entities of *Mahabhutas*, which are the derivatives of *Trigunas*. Hence both *Sukra* and *Shonita* contain *Tridoshas* as well as *Trigunas*, which are inherited from parents. Status of *Sukra* and *Shonita* depends on the status of the parents. If there is any defect in *Beeja* (Sperm and Ovum), *Beejabhaga* (Chromosomes) and *Beeja Bhagavayava* (Genes), it leads to congenital defects in progeny[8].

Modern science also believes that each sperm and ovum contains 23 pairs of chromosomes containing genes made up of D.N.A.molecules. These transfer the characters of parents to the child. Hence there is some similarity in the body built and characters of the parents and their respective children. The child represents the dominant characters of every part of the parents[9]. The contributions from the father and mother through *Sukra* and *Shonita* respectively at the time of conception, the environment both physical as well as

psychological provided by the mother during pregnancy, form the basis of procreation and growth of the foetus. Among the two similar characters derived from mother and father, the more dominant one gets its expression in the child, while the recessive one is dormant but continued to be carried in the genetic material.

Atmaja Bhavas*: Atmaja bhavas* directly related to *atma* are *yoni* (taking birth in such womb), self-realization, *chetana* (consciousness), *ayu* (life span), whereas those related to the higher-order psyche are *iccha* (liking), *dvesha* (disliking), *sukha* (desire for happiness), *dukha* (sorrow) and *prayatna* (efforts).

Satvaja bhavas**:** *Satvaja bhavas* are factors derived from *satva*-psych/mind. The psychological endowment of the child is determined by the psychological state of mother and father during pregnancy and *purva janmakrita karma* (actions performed in a previous life). These factors are *bhakti* (liking), *moha* (attachment), *gambeerya* (seriousness), *bhaya* (fear), *sheela* (conduct), *tyaga* (detachment), *tikshnata* (sharpness), *krodha* (anger), *shoucha* (purity), *matsara* (strong desire), *mriduta* (softness), *tandra* (drowsiness), *dvesha* (enmity), *shourya* (valour), *smriti* (memory), *utsaha* (enthusiasm).

Matraja Bhavas: *Twak* (skin), *mamsa* (flesh), blood, *medas* (fat*)*, *nabhi (*umbilicus), *hridaya* (heart), *kloma*, *yakrit* (liver), *pleeha* (spleen), *basti* (bladder), *purishadhana (* rectum), *kshudrantr*a (mecentry), *vapavahana (*omentum) are inherited by the maternal side.

Pitraja Bhavas*: Kesha* (hair), *nakha* (nails), *loma* (small hair of the body), *danta* (teeth), *asthi* (bones), *sira* (vessels), *snayu* (muscles), *dhamani* (arteries) are inherited by paternal inheritance in an individual.

Satmyajabhavas (congenial factors): *Satmya* is elucidated as use of regimen and diet which is interconnected with the body. Importance of *Satmyajabhava* can be ascertained from the fact that if *asatmya* things are not taken, then couples do not become infertile and also fetus is not defective. The *Satmyaja* factors are *Arogya*, *Analasya*, *Alolupa*, (freedom from diseases, laziness, and greed), *svara* (excellence of voice), *varna medha*, *indriya prasada* (clarity of senses), *ojus*, *ayu* (life), *bala* (strength).

1.1.3 Environmental factors

Environment plays a greater role in the modification of

Prakriti. The *Kalagrabhasaya prakriti* and *Maturaharavihara prakriti* mentioned by Charaka can be considered as environmental factors which influence in the alteration of genetic *prakriti*. *Kalagarbhashaya prakriti* is defined by the commentator Gangadhara as the *Prakriti* of *Garbha*shaya during the periods like *Kaishora*, *Youvana*, *Tarunya* and *Praudha* of the mother[10].

Prakriti is divided into 3 stages:

- *Sambhoga Kala* (Time of Cohabitation)
- *Garbhadharana Kala* (Season of Fertilization)
- Age of Parents (Status of *Doshas* in the uterus at different ages)[11].

The period in which the sperm and ovum unite is known as *Sambhogakala*. This period is again divided into 2 parts as *Nindya* and *Anindyakala*. First three days of menstruation, Agastya Star day, *Sandhyakala*, *Pratahkala*, *Madhyaratri*, *Madhyahna* are *Nindya* periods. *Ritukala* is *Anindya* period i.e. 12 days from the fourth day of menstruation. This period is a safe period for fertilization[12]. Posture during cohabitation also influences in the variation of *doshas*[13]. If the cohabitation is done in proper posture mentioned, the *doshas* will be

in their proper place and help in fertilization to get good progeny. *Adana* and *Visarga* are the two seasons wherein *doshas* undergo *vriddhi* and *kshaya* by the influence of these seasons[14]. Hence the season also plays a vital role in influencing the *doshas* at the time of fertilization. Age of the parents is also responsible for the natural variation of *doshas* in the body, which influences *Sukra* and *Shonita*. *Prakriti* derived from the diet and regimens of the mother during the period of menstruation, before and after cohabitation, during pregnancy, after delivery is defined as *Maturahara Vihara Prakriti*[15].

In the fourth month of embryonic growth, the heart is endowed with consciousness. During this period the sense organs are said to be developed. By this time both physical and mental activities of the foetus manifests. The foetus remembers the happenings of his or her past existence. This condition is known as *Dauhrida*[16]. The mother's desire during this period is merely a reflection of the desire of her child. Therefore, a pregnant woman should be given whatever she wants during this time. If the longings are not fulfilled, this may result in foetal deformity[17], but care should be taken while satisfying the desires of the mother, not to give the things, which are harmful to the mother or foetus. If the longings are

satisfied, then she may give birth to a healthy, strong and virtuous child with long life span[18]. From the longings of the pregnant woman, one can also predict the behaviour of the offspring[19]. Even after delivery, the diet and regimen followed by the mother affect the physical as well as mental health of the child. Different physical and mental factors directly affect the quantity and quality of the mother's milk.

1.1.4 Factors derived from *Panchamahabhootas*

The different *panchamahabhootas* contribute to many factors of the body constitution, they are -

Akasa mahabhoota	*Shabda*, *Srotra*, *Laghuta*, *Sukshmata*, *Viveka.*
Vayu mahabhoota	*Sparsa*, *sparsanendriya*, *rukshta*, *prerna*, *dhatuvyuhana*, *cheshta.*
Agni mahabhoota	*Rupa*, *darshan*, *prakasa*, *pachana*, *ushnata*.
Ap mahabhoota	*Rasa*, *rasanendriya*, *sheeta*, *mriduta*, *snehana*, *kleda*

Parthiva mahabhoota *Gandha, ghrana, gourav, sthairya, mrtutva.*

1.1.5 Description of *prakriti* in various Samhitas

Elaborative description of *prakriti* with its clinical importance is provided in various Samhitas of Ayurveda as follows;

प्रक्रुति स्वभाव इथ्युच्यते

(Chakrapani) *prakriti* means inherent property.

Intensified status of *dosha* remaining constant from birth till death.

शुक्रशोणित संयोगे भवेत दोष उतकटः
प्रक्रुतिर्जायते तेन तस्य मे लक्षणम श्रुणु

(Narasimha)

State of the existence of *dosha* in *sukra* and *arthava* during their union produces certain characteristic features in an individual known as *prakrti*.

शुक्रास्रक् गर्भिणीभोज्यचेष्टा गर्भाशेषु ।
सः स्या दोषोऽधिकस्तेन प्रक्रुतिः सप्तधोदिता ।

State of existence of *dosha* in *Sukla, Asruk, Garbhini – Bhojya, Cheshta, Garbhasaya, Rithu* determinative in deciding the 7 *prakriti* [20].

शुक्रर्त्थवस्थौर्जन्मादौ विषेणेव विषक्रिमे
तैशच तिस्रः प्रक्रुतयो हीन मध्योतम प्रुथक
समधातु समस्थासु त्रेष्ठा निन्द्या द्विदोषजः

By the *doshas* which are present in the *sukra* and *arthava* at the time of commencement of life, there arise three kinds of *prakrti* just like poisonous worms arise from poison; they are the *hina*, the *madhya* and the *uttama* from each of the *doshas* respectively. That constitution arising from an equal proportion of all of them is the samadhatu *prakrti*, which is ideal; those arising from a combination of two *doshas* are denounced[21].

1.1.6 Factors influencing *Prakriti*

Acharya Charaka mentioned six factors, which influence *Prakriti*, among them, three are considered as *Sthayibhava* or *Asanchari Bhavas,* the influence of which exists throughout life. They are *Jatiprasakta, Kulaprasakta* and *Pratyatmaniyata*. Other three factors are considered as *Asthayibhavas* or *Sanchari Bhavas*, the influence of which is variable. They are *Deshanupatini, Vayonupatini, Kalanupatini*. Here the word "*Prasakta*" indicates permanence and the word "*Anupatini*" indicates variable factor. The letter "*Cha*" used in between these factors (*jadiprasaktha kulaprasaktha cha* ……)

indicates their superimposition as they are inseparable or their influence cannot be analyzed separately.

The brief description of these factors is as follows:

***Jati Prasakta*: -** Race is as used in a classificatory sense, a group of people characterized by the possession of certain inherited physical features. Eg. Mongolian, European etc. Caste plays an important role in moulding the personality of an individual. It is observed that persons belonging to a certain community are usually hygienic and engaged more in devotional activities. Persons belonging to a certain community are more business-minded and show interest in trades and related activities.

***Kula Prasakta*: -** The character and conduct of a family always reflect upon the temperament of the offspring. Ayurveda count both *Jatiprasakta* and *Kulaprasakta* under hereditary factors. Hence both of them are also responsible for the individual variations among the persons. But practically it is difficult to assess, how far these factors influence. Because even despite being born in a high caste and good family if the surroundings are not conducive for proper development, the influence of these factors will nullify.

***Pratyatmaniyata*: - (**Characteristic features of specific individuals) Each individual has some unique character, which is different from others. Though two individuals are of same *Jati, Kula, Desha, Vaya* etc. still they may not be of the same characters, similarly even if their *Sara, Samhanana, Pramana, Satmya* etc. may be similar, still there may be difference in personality. This variation which is characteristic of each individual is known as "*Pratyatmaniyata*" which holds well in case of twins.

***Deshanupatini*: -** Desha plays a determining role in the composition of *prakriti*. In ayurveda, great stress has been made on the *desha* factor in the context of *prakriti*, *vyadhi* and growth of *dravyas*. So the examination of desha are essential to understand the nature of the person[22]. Influence of *desha* on *sharira* as well as *satwa* is highlighted by *acharya charaka* and *sushruta.*

Variations in the body structure, colour and habits are seen due to the influence of *desha*. In Ayurveda *desha* has been classified into 3 kinds (1) *anupa* (2) *jangala* (3) *sadharana*. These divisions have been made based on climatic and soil conditions of a particular place. The region where the rains are heavy and water remains

accumulated, the surface is very high or low, the rivers are in abundance, the wind is cold, the mountains and vegetation are in abundance, and such land is called *anupa*. The persons belonging to this land are by nature tender, but of huge structure and they have more tendencies to develop *kaphaja* and *vatajavikaras.*

The land which is of even surface, where the rains are less, the water sources are also not in abundance, thorny and small trees are grown and where warm wind prevails such land is called *jangama desha* and the people of this region are more strong and thin and they are more predisposed to *vata*ja and *pittaja* diseases. If we find the mixed characteristics of *jangama* and *anoopa desha*, that region is called *sadharana desha*. Variation in the colour of skin can be found depending on *desha* eg. Japanese and Chinese have yellow skin; people of Africa have dark skin. If a fair-skinned person lives in a hot region for a long time, then gradually there will be alteration in his colour.

***Kalanupatini*:-** Acharyas have laid great stress on time factor in many contexts, for example in the occurrence of diseases and their treatment, seasonal regimen, dietic regulations and its metaphysical existence. Birth of a person at a time or season when

people obviously increase strength, excellent qualities of sperm and ova of parents also influences the *prakriti* of an individual. It means that proper development and strength of body and mind is according to the seasons and the age.

***Vayonupatini*: -** Age factor also influences the makeup of the individual. Age is defined in Ayurveda as that state of *Sharira*, which especially depends upon *kalapramana* (passage of time). Lifespan is broadly divided into 3 stages viz.

1) *Bala* 2) *Madhya*

3) *Jirna*[23].

Charaka says that a person should be examined concerning his age, which represents the state of his body depending upon the length of the time that has passed. During *balyavastha* various organs of the body are not well developed. There is tenderness, the individual cannot tolerate difficulties, there is incomplete strength and mostly *kapha* is predominant. In the later stage of childhood, the person is said to be yet developing his body tissues and is generally of undetermined psychic disposition till he is of thirty years of age.

Madhyavastha (Middle age) covers up to the age of sixty years wherein a man has attained the balance of strength, energy, manhood, courage, understanding, retention of memory, speech and wherein a man is of strong and with well determined psychic disposition of compact body elements and the predominance of *pitta dosha*, which remains up to sixty years.

While in *jirnavastha* (old age) body tissues, sense organs, strength, energy, manhood, valour, understanding, retention, memory, speech and discrimination begin to decay, the elements of the body disintegrate and the *vata* element predominates and there is a gradual wearing down of the body till the age of hundred years.

1.1.7 Classification of *Prakriti* in general

All Acharyas in their respective texts classified individuals according to their *prakriti* or *svabhava*. About the seat of *prakriti*, it is divided into two main types:

1. *Dehaprakriti*
2. *Manasaprakriti*

Deha prakriti has again subdivided 7 types depending on

the dominance of *Doshas*.

a. *Vatala*

b. *Pittala*

c. *Sleshmala*

d. *Vatapittala*

e. *Vata Sleshmala*

f. *Pitta Sleshmala*

g. *Sama dosa Prakriti*

Sushruta has classified *dehaprakriti* into 5 types according to dominancy of *mahabhutas* because the entire body is composed of *mahabhutas*.

1. *Parthivaprakriti*

2. *Apyaprakriti*

3. *Agneyaprakriti*

4. *Vayaviyaprakriti*

5. *Nabhasaprakriti*

This can be concise into 3 types since the *doshas* are

produced from *Mahabhutas*. *Parthiva* and *Apyaprakriti's* can be included in *slesmaprakriti*, *agneya* in *pittala* and *vayaviya, nabhasaprakritis* in *vatalaprakriti.*

As per the dominance of *trigunas, vagbhata* has classified *manasaprakriti* into 7 groups.

1. *Satwika*
2. *Rajasika*
3. *Tamasika*
4. *Satva-raja*
5. *Rajo-tama*
6. *Satva-tama*
7. *Samagunaprakriti*

Due to the influence of environmental factors, *prakriti* is again divided into 7 types as mentioned earlier.

a. *Jatiprasakta*
b. *Kulaprasakta*
c. *Deshanupatini*

d. *Kalanupatini*

e. *Vayonupatini*

f. *Balanupatini*

g. *Pratyatmaniyata*

Based on the preponderance of particular *dhatu*, Charaka has divided the human body typology into seven types as follows –

a. *Rasasara (twaksara)*

b. *Raktasara*

c. *Mamsasara*

d. *Medasara*

e. *Asthisara*

f. *Majjasara*

g. *Sukrasara*

This classification has a unique importance in *dashavidha pariksha* (Tenfold examinations) of an individual for accessing the status of *dhatus*. Some times 8th type is also considered as *Satwasara* indicating his mental status.

Vata prakriti from Ashtanga Hrudaya

प्रायोऽत एव पवनाध्युषिता मनुष्या दोषात्माकाःस्फुटितधूसरकेशगात्राः ।
शीतद्विषश्चलधृतिस्मृतिबुद्धिचोष्टासौहार्ददृष्टिगतयोऽप्रलापाः ।। ८५ ।।
अल्पवित्तबलजीवितनिद्राः सन्नसक्तचलजर्जरवाचः ।।
नास्तिका बहुभुजः सविलासा गीतहासमृगयाकलिलोलाः ।। ८६ ।।
मधुराम्लपटूष्णसात्म्यकाङ्क्षाः कृशदीर्घाकृतयः सशब्दयाताः ।
न दृढा न जितेन्द्रिया न चार्या न च कान्तादयिता बहुप्रजा वा ।। ८७ ।।
नेत्राणी चैषां खरधूसराणि वृत्तान्यचारूणि मृतोपमानि ।
उन्मीलितानीव भवन्ति सुप्ते शैलद्रुमांस्ते गगनं च यान्ति ।। ८८ ।।
अधन्या मत्सरध्माताः स्तेनाः प्रोद्वृद्दपिण्डिकाः ।
श्रृगालोष्ट्रध्राखुकाकानूकाश्च घातिकाः ।। ८९ ।।

Vata prakrti persons generally have hair and body which are cracked and lustreless, they hate cold, are unsteady in respect of courage, memory, thinking, movement, friendship, vision and gait; talk more and irrelevant, possess little of wealth, strength, the span of life and sleep; their voice is obstructed, interrupted, unsteady or harsh, they are atheists, gluttons, pleasure-seeking; desirous of music, humour, hunting or gambling; desirous of habituation to sweet, sour, salty and hot foods; are lean and tall in shape, produce sound during walking; are not steadfast, cannot control their senses, not civilised, not liked by women, not have many children; their eyes are dry, lustreless, round, unpleasant and resemble those of dead; lids kept open while sleeping;

they dream as though roaming on the mountains, dwelling on trees and moving in the sky. They are non-magnanimous, bloated with jealousy, of stealing nature and having bulged calves; they resemble animals such as dog, jackal, camel, vulture, rat and crow[24].

***Vataprakriti* from Sarngadhara Samhita**

अल्पकेशाः कृशा रूक्षो वाचालश्चलमानसः।
आकाश्चारी स्वप्नेषु वातप्रकृतिको नरः ।

Persons who have scanty hairs, dry and thin body, who are very talkative, of unsteady mind, dream as moving in the air are of *vataprakrti* [25].

***Vataprakriti* from Susruta Samhita**

तत्र वातप्रकृतिः जागरूकः शीतद्धषी दुर्भगः स्तेनो मत्सर्यनार्यो गान्धर्वचित्तः स्फुटितकरचरणोऽतिरुक्षश्मश्रुलखकेशः क्रोधीदन्धनखखादी च भवन्ति ।। ६३ ।।

अधृतिरदृढसौहृदः कृतघ्नः कृशपरुषो धमनीततः प्रलापी ।
द्रुतगतिरटनोऽनवस्थितात्मा वियदपि च गच्छति सम्भ्रमेण सुप्तः ।। ६४ ।।

अव्यवस्थितमतिश्चलजृष्टिर्मन्दरत्रधनसञ्चयमित्रः ।
किञ्चिदेव विलपत्यनिबद्धं मारुतप्रकृतिरेष मनुष्यः ।। ६५ ।।

वातिकाश्चाजगोमायु-शशाखूष्ट्रशुनां तथा ।
गृधाकाकखरादीनाम् अनूकैःकीर्तिता नराः ।। ६६ ।।

The person of *vatika* constitution is excessively wakeful, averse to cold, unlucky, thief, jealous, uncultured, music loving, has

cracked hands and feet, scanty and rough beards, moustaches, nails and hairs and grinds teeth. He is impatient with fickle friendship, ungrateful, lean, rough, with prominent veins, talkative, fastly moving, frequently travelling, with unsteady body, mind and eyes, has a small collection of gems, wealth and a few friends, sometimes talks irrelevant; in the dream, he flies in the sky. Those having *vatika* constitution resemble, in character, goat, jackal, rabbit, rat, camel, dog, vulture, crow, ass etc[26].

Vataprakriti from Charaka Samhita

वातस्तु रूक्षलघुचलवहुशीघ्रशीतपरुषविशदः । तस्य रौक्ष्याद्वातला रूक्षापचिताल्पशरीराः प्रततरूक्षक्षामसन्नसक्तजर्जरस्वरा जागरूकाश्च भवन्ति, लघुत्वालघुचपगतिचेष्टाहारव्याहाराः चलत्वादनवस्थितसन्ध्यक्षिभ्रूहन्वोष्ठजिह्वाशिरः स्कन्धपाणिपादाः, बहुत्वाद्वहुप्रलापकण्डरासिराप्रतानाः, शीघ्रत्वाच्छ्रीघ्रसमारम्भ क्षोभविकाराः शीघ्रत्रासरागविरागाः श्रुतग्राहिणोऽल्पस्मृयश्च, शैत्याच्छीतासहिष्णावः प्रततशीतकोद्वेपकस्तम्भाः, पारुष्यात् परुषकेशस्मश्रुरोम नखदशनवदनपाणिपादाः, वैशद्यात् स्फुटिताङ्गावयवाः सततसन्धिशब्दगामिनश्च भवन्ति; त एवं गुणयोगद्वातलाः प्रायेणाल्प बलाश्चाल्पा युषश्चाल्पापत्याश्चाल्पायुषश्चाल्पसाधनाश्चाल्पधनाश्च भवन्ति।।

Vatala type of constitution:

Vata is dry, light, mobile and abundant in quantity, swift cold, rough and non slime.

1. Dry - dryness, emaciation and dwarfness of the body; long drawn, dry low broken, ob- structed and hoarse voice; always keeping awake
2. Light - light and inconsistent, action, food and movement
3. Mobile - unstable joints-eyes, eyebraws, jaws, lips, tongue, head, shoulder, hands and legs
4. Abundance - talkativeness, abundance in tendons and veins
5. Swift - Quick in initiating actions, getting irritated and the onset of morbid manifestations; quick in affliction with fear, quick in likes and dislikes
6. Cold - intolerence for cold things; often getting afflicted with cold; shivering and stiffness
7. Rough - roughness in the hair of the head, face and other parts of the body, nails, teeth, face, hands and feet
8. Non-slime - cracking of the limbs and organs, production of cracking sound in joints when they move.

Due to all these properties of *vata dosha*, person of *vata prakriti* is physically weak, has fewer children, short span of life, get fewer facilities for living, and crooked minded [27].

***Vataprakriti* from Ashtanga Samgraha**

स्वदोषगुणानुरोधातप्रकृतिस्तनुरूक्षस्तब्धल्पाङ्गदन्नखरोमनेत्रस्वरः
शीतद्विड्वध्दपिण्डिकः सशब्दसन्धिगामी
शीघ्रारम्भक्षोभग्रहणविस्मरणश्चलधृतिमतिगतिदृष्टिस्वभावसौहार्दस्तेनोऽनार्यो
मत्सर्यचितेन्द्रियः प्रियगान्धर्वेतिहासहासविलासकलहमृगयोद्यानयात्रः
रित्रग्धोष्णमधुराम्ललवणात्रपानङ्क्षोपशयश्च भवति ।। ६ ।।
अपि च ।
अल्पवित्तबलजीवितनिद्रः क्षामवाग्धमनिसन्ततगात्रः ।
दुर्भगोऽतिबहुभुग्बहुभाषी नास्तिकः स्फुटितकेशकराङ्घ्रिः ।। ७ ।।
किञ्चिदुन्मिषितदुर्मुखसुप्त स्त्रस्यति क्रथति खादति दन्तान् ।
शुष्करूक्षविषमासु सरित्सु व्योम्निशैलशिखरेषु च याति ।। ८ ।।

Features of *Vataprakriti* person are -

Body structure is thin and dry. Such person bears thin, rough, and small teeth, nails, body hairs, eyes and voice. He dislikes cold. His calf muscles are hard and small in size. He walks with creaking joints. His reactions are qiuck, he is short tempered, gets cool fast. He has better grasping power and has short memory. He has average or low courage, intellegence, gait, sight, habits and cordiality. He indulges in stealing and uncivilized behaviour. He is jeal- ous and keeps no control over his senses. He is fond of music, stories, humour, luxury, quarrel, hunting and walking in gardens. He desires all the comfort from such things. He is fond of unctuous, hot, sweet, sour, salty foods and

drinks. He makes himself home with such things. Further; he possesses little wealth, strength. His life span is short and he is wakeful. He has feable voice, bears prominent network of veins on his skin. he is ugly. He eats too much too much food too frequently. He is talkative, and an atheist. He possesses cracked hairs, hands and feet. He sleeps with his eyes and mouth slightly open. He is a coward. He snores and grinds his teeth during sleep. He dreams of walking across dried and uneven rivers; of flying in the sky and on mountain peaks[28].

***Pittaprakriti* from Susrutha Samhitha**

पित्तप्रकृतिस्तु स्वेदनो दुर्गन्धः
पीतशिथिलाङ्गस्ताम्रनखनयनतालुजिह्वौष्ठपाणिपादतलो दुर्भगो
वलीपलितखालित्यजुष्टो बहुभुगुष्ण द्वेषी क्षिप्रकोपप्रसादो मध्यमबलो
मध्यमायुश्च भवति ।। ६७ ।।
मेधावीनिपुणमितिर्विगृह्य वक्ता तेजस्वी समितिषु दुर्निवारवीर्यः ।
सुप्तः सन् कनकपलाशकर्णिकारान् सम्पश्येदपि च हुताशविद्यदुल्काः ।।
६८ ।।
न भयात् प्रणमेदनतेष्वमृदुः प्रणतेष्वपि सान्त्वनदानरुचिः ।
भवतीह सदा व्यथितास्यगतिः स भवेदिह पित्तकृतप्रकृतिः ।। ६९ ।।
भुजङ्गोलूकगन्धर्व-यक्षमार्जारवानरैः ।
व्याघ्रर्क्षनकुलानूकैः पेत्तिकास्तु नराः स्मृताः ।। ७० ।।

The person of *paithika* constitution sweats profusely, has a foul smell, pallor and slackness in body, coppery nails, eye, palate,

tongue, lips, palm and soles; unlucky, affected with wrinkles, greying of hairs and baldness, eats a lot, is averse to heat, becomes angry and then calms quickly, has moderate strength and life-span. He is intelligent, sharp, contending, debator, brilliant and of uncontrollable power in battles. In sleep, he dreams of gold, flowers of *palasa* and *karnikara* and also fire, lightning and meteor. He never submits by fear, is harsh, but compassionate and charitable to those with *paittika* constitution. Those having *paittika* constitution resemble, in character, snake, owl, *gandharva, yaksha*, cat, monkey, tiger, bear and mongoose[29].

***Pittaprakriti* from Sarngadhara Samhita**

अकाले पलितैर्व्याप्तो धीमान स्वेदी च रोषणः ।
स्वप्नेषु ज्योतिषां दृष्ट्वा पित्तप्रकृतिको नरः ।।

Persons who have premature grey hairs, who are very intelligent, very angry, sweat profusely and see a fire in dreams are *pitta* prakrti[30.]

***Pittaprakriti* from Ashtanga Hrudaya**

पित्तं वह्निरवह्निजं वा यदस्माप्तित्तोदिकस्तीक्ष्णतृष्णाबुभुक्षः ।
गौरोष्णाङ्गस्ताम्रहस्ताङ्घ्रिवक्रः शूरो मानी पिङ्गकेशोऽल्परोमा ।। ९० ।।
दयितमाल्यविलेपनमङ्डनः सुचरितः शुचिराश्रितवत्सलः ।

विभवसाहसबुद्धिबलान्वितो भवति भीषु गतिद्विषतामपि ।। ९१ ।।
मेधावीप्रशिथिलसन्धिबन्धमांसो नारीणामनभिमतोऽल्पशक्रकामः ।
आवासः पलित तरङ्गनीलिकानां भुङ्क्तेऽन्नं मधुरकषायतिक्तशीतं ।। ९२ ।।
धर्मद्वेषी स्वेदनः पूतिगन्धिर्भूर्युच्चारक्रोधपानाशनेर्भ्यः ।
सुप्तः पश्येत्कर्णिकारान्पलाशान् दिगदाहोल्काविद्युरकानलांश्च ।। ९३ ।।
तनूनि पिङ्गानि चलानी चौषां तन्वल्पपक्ष्माणि हिमप्रियाणि ।
क्रोधेन मद्येन रवेश्च भासा रागं व्रजन्त्याशु विलोचनानि ।। ९४।।
मध्यायुषो मध्यबलाः पण्डिताः क्लेशभीरवः ।
व्याघ्रर्क्षकपिमार्जारयक्षानूकाश्च पैत्तिकाः ।। ९५ ।।

Pitta is the fire itself or born from fire; hence persons having a predominance of *pitta*, have a very keen thirst and hunger, are white and warm in the body; coppery red palms, soles and face; are brave and proud; have brown and scanty hair; are fond of women, garlands, perfumes, are of good behaviour, clean, affectionate to dependents, desirous of grandeur, adventure, have mental power of facing fear and enmity; highly intelligent, possess less sexual desire, posses grey hair, wrinkles and blue patches on the skin; consume food which is sweet, astringent, bitter and cold; hate sunlight and heat; perspire heavily, emit a bad smell from body; expel faeces frequently, have more anger, eating, drinking and jealousy; while in sleep dream of *karnikara, palasa*, forest fire, meteor, lightening/thunder bolt, bright sunrays and fire their eyes are thin, brown, unsteady with thin and few eyelashes; eyes desirous of cold comfort, becoming red very quick

by anger, drinking wine and exposure to sunlight. Persons of *pitta prakrti* are of medium life span, medium strength, highly learned, afraid of discomfort and resemble (in behaviour) animals like tiger, bear, ape, cat and yaksha[31].

Pittaprakriti **from Charaka Samhita**

पित्तमुष्णं तीक्ष्णं द्रवं विस्रमम्लं कटुकं च । तस्यौष्ण्यात्
पित्तलाभवन्त्युष्णासहा, उष्णामुखाः, सुकुमारावदातगात्राः
प्रभूतपिप्लवङ्गतिलपिडकाः, क्षुत्पिपासावन्तः,
क्षिप्रवलीपलितखालित्यदोषाः तीक्ष्णाग्नयः, प्रभूताशनपानाः
क्लेशासहिष्णवो, दन्तशूकाः, द्रवत्वाच्छिथिलमृदुसन्धिमांसाः,
प्रभूतसृष्टस्वेदमूत्रपूरीषाश्च; विस्रत्वात् प्रभूतपूतिकक्षास्यशिरः शरीरगन्धाः
कटम्लत्वादल्पशुक्रव्यवायापत्याः त एवं गुणयोगात् पित्तला मध्यबला
मध्यायुषो मध्यज्ञानविज्ञानविज्ञानवित्तोपकरणवन्तश्च भवन्ति ।। ९७ ।।

Attributes of *Pitta* Manifestations

Pitta is hot, sharp, liquid, of fleshy smell, sour and pungent.

1. Hot intolerance for hot things, having hot face tender and clear body of port wine mark, freckles, blackmoles excessive hunger and thirst; quick advent of wrinkles, graying of hair and baldness; presence of some soft and brown hair in the face, head and other parts of the body.
2. Sharp sharp (demonstration of) physical strength,

strong digestive power, intake of food and drink in large quantity , inability to face difficult situations and glutton habits

3. Liquor looseness softness of joints and muscles, voiding of sweat, urine and feces in large quantity
4. Fleshy smell putrid smell of axilla, mouth head and body in excess
5. Pungent and sour, insufficiency of semen, sexual desire and tastes procreation.

By virtue of the above mentioned qualities, individual with *pitta* Prakruti is endowed with moderate strength, moderate span of life, moderate spiritual and materialistic knowledge, wealth and the accessories of life[32].

***Pittaprakriti* from Ashtanga Samgraha**

पित्तप्रकृतिरुष्णगौरगात्रस्ताम्ननखनयनजिह्वौष्ठपाणिदतलः
शिथिलसन्धिबन्धमांसः करभकपिलविरलमृदुकेशरोमा
मध्यबलायुरल्पशुक्रव्यवायापत्यः शूरोऽभिमानी
शीघ्रवलीखलतिपलितपिप्लुव्यङ्गक्षुत्पिपासो मेधावी दुर्भगः
स्वादुतिक्तकषायशीताभिलाषोपशयश्च भवति ।। ९ ।।
अपि च ।
दयितमाल्यविलेपनमण्डनः सुचरितः शुचिराश्रितवत्सलः ।

विभवसाहसबुद्धिबलान्वितो भवति भीषु गतिरद्विषतामपि ।। १० ।।
धर्मद्वेषी स्वेदनः पूतिगन्धिर्भूर्युच्चारक्रोधपानाशनेर्ष्यः ।
सुप्तः पश्येत् कर्णिकारान् पलाशान् दिगदाहोल्काविद्युदर्कानलांश्च ।। ११ ।।

The person of *pitta prakriti* has warm body and shows fair complexion. His nails, eyes, tongue, lips, palms and soles are coppery red. His joints and muscles are placid. Hairs on the head and on the body are curved, tawny, spares and soft. He possessess medium strength. His life span is average or medium. He is weak in his sexual capacity and quantity of his semen is lesser. He has fewer children. He is brave, proud. He developes wrinkles nad baldness, and graying of hairs in early age. He has moles and pigmented birthmarks.He cannot bear hunger and thirst. He usually is highly intelligent. He is not very pleasant looking. He desires sweet, bitter, astringent and cold foods, drinks, and is contended with them.

Further; he is very fond of women, garlands, anointing and make up with perfumes; is of cultured behaviour, intelligence and strength; protects the frightened (persons) though an enemy; dislikes sunlight, perspires heavily; has bad smell, high pitched voice, great anger, great desire for drinking and eating; is very jealous, sees red colored flowers like *karnikara* and palasa, forest fires, meteors

lightnings, blazing sun and flaming fire etc. in dreams[33].

Kaphaprakriti from Ashtanga Hridayam

श्लेष्मा सोमः श्लेष्मलस्तेन सौम्योगूढस्निग्धश्लिष्टसन्ध्यस्थिमांसः ।
क्षुत्तृड्दुःखक्लेशघर्मैरतप्तोप्रबुद्ध्यायुक्तः सात्विकः सत्यसन्धः ।।
प्रियंगुदूर्वाशरकाण्डशस्त्रगोरोचनापद्मसुवर्णवर्णः।
प्रलम्बबाहुः पृथुपीनवक्षामहाललाटो घननीलकेशः ।।
मृद्वंगः समसुविभक्तचारुदेहोबृहत्वोजोरतिरसशुक्रपुत्रभृत्ययः ।
धर्मात्मा वदति न निष ुरं च जातुप्रच्छन्नं वहति दृढं चिरं च वैरम् ।।
समदद्विरदेन्द्रतुल्ययातोजलदाम्भोधिमृदंगसिंहघोषः ।
स्मृतिमानभियोगवान् विनीतोन च प्राल्पे प्यतिरोदनो न लोलः।।
तिक्तं कषायं कटुकोष्णरूक्षंअल्पं स भुंक्ते प्रबलवांस्तथा पि ।
रक्तान्तसुस्निग्धविशालदीर्घसुव्यक्तशुक्लासितपक्ष्मलाक्षः।।
अल्पव्यहारक्रोधपानाशनेहःप्रज्यायुर्वित्तो दीर्घदर्शी वदान्यः ।
श्राद्धो गंभीरःस्थूललक्षःक्षमावान्आर्यो निद्रालुर्दीर्घसूत्रः कृतज्ञः।।
ऋजुर्विपश्चित्सुभगःसुलज्जोभक्तोगुरूणांस्थिरसौह्मदश्च ।
स्वप्नेसपद्मान्सविहंगमालांस्तोयाशयान्पश्यतितोयदांश्च।।
ब्रह्मरुद्रेन्द्रवरुणतार्क्ष्यहंसगजाधिपैः ।
श्लेष्मप्रकृतयस्तुल्यास्तथासिम्हाश्वगोवृषैः ।।

Kapha prakrti persons are mild, unctuous and well-knit joints and muscles; are not much troubled by hunger, thirst, unhappiness, strain and heat; endowed with intelligence, right attitude and truthfulness; possess colour like that of *priyangu, durva, sarakanda, sastra, gorochana, padma* or *suvarna*; have long arms, big and elevated chest, wide forehead, thick and blue hair, soft, even,

well defined and good looking body, of great vigour, sexual powers, desire in tastes, more of semen, children and attendants; are of righteous, benevolent nature, do not speak harsh and abusively; harbour enmity, concealed and deep for a long time; their gait is like that of an elephant in a rut; their voice like the roaring of clouds, ocean, drum or lion; possess good memory, perseverance, humbleness.

They do not weep much even in childhood; are not greedy, consume food which is bitter, astringent, pungent, hot, dry and less in quantity and remain strong; their eyes are red at the angles, unctuous, wide, long with well designed white and black spheres and more eyelashes; have less of speech, anger, desire for drink, food and activities; endowed with more longevity, wealth, foresight and generosity; have faith, dignified, greatly charitable; of forgiving nature, civilized; drowsy, slow, grateful, straightforward, learned, pleasant to look at, bashful, obedient to elders and of fast friendship; dreams reservoirs of water full of lotus and rows of birds and clouds. They resemble Brahma, Rudra, Indra, Varuna, Tarkshya, hamsa, Gajadhipa, lion, horse and bull[34].

***Kaphaprakriti* from Sarngadhara Samhita**

गंभीरप्रबुद्धिः स्थूलांगः स्निग्धकेशो महाप्रलः
स्वप्ने जलाशयलोकी श्लेष्मप्रकृतिको नरः

Persons who are steady in mind, healthy physique, smooth-haired, very strong, see water reservoirs in dreams are *kapha prakrti*[35].

***Kaphaprakriti* from Susruta Samhita**

श्लेष्मप्रकृतिस्तु दूर्वेन्दीवरनिस्त्रिंशार्द्रारिष्टकशरकाण्डानामन्यतवर्णाः
सुभगः प्रियदर्शनो मधुरप्रियः कृतज्ञो धृतिमान् सहिष्णुरलोलुपो
बलावांश्चिरग्राही दृढवैरश्च भवति । ७१ ।।
शुक्लाक्षः स्थिरकुटिलातिनीलकेशो लक्ष्मीवान् जलदमृदङ्गसिंह घोषः ।
सुप्तः सन् सकमलहंसचक्रवाकान् सम्पश्येदपि च जलाशयान् मनोज्ञान्
।। ७२ ।।
रक्तान्तनेत्रः सुविभक्तगात्रः स्निग्धच्छविः सत्वगुणोपपन्नः ।
क्लेशक्षेमो मानयितो गुरूणां ज्ञेयो बलासप्रकृतिर्मनुष्यः ।। ७३ ।।
दृढशास्त्रमतिः स्थिरमित्रधनः परिगण्य चिरात् प्रददाति बहु ।
परिनिश्चितवाक्यपदः सततं गुरुमानकारश्च भवेत् स सदा ।। ७४ ।।
ब्रह्मरुद्रेन्द्र वरुणैः सिंहाश्वगजगोवृषैः ।
तार्क्ष्यहंससमानूकाः श्लेष्मप्रकृतयो नराः ।। ७५ ।।

The person of *kapha*ja constitution has complexion similar to the colour of one of these – durva, indivara, sword, fresh nimba fruit and stalk of sara; is lucky, handsome, sweet-loving, grateful,

patient, tolerant, greedless, strong, with delayed acquisition and stable enmity. He is glorious and has white eyes, firm, curly and bee-black hairs. In dreams, he experiences lotus, swan, cakravaka and beautiful lakes. The person with *kapha*ja constitution has reddish corners of eyes, well-defined organs, unctuous lustre and predominance of satwa quality. He is tolerant of difficulties and respectful to teachers and elders. Such a person should be deemed as having *kapha*ja constitution. Firm in scriptural knowledge and views, with stable friends and wealth, donating plenty after long consideration, always precise in choosing sentences and words, he is ever respectful to teachers and elders. They resemble Brahma, Rudra, Indra, Varuna, lion, horse, elephant, bull, garuda and swan[36].

***Kaphaprakriti* from Ashtanga Samgraha**

कफप्रकृतिस्तु दूर्वेन्दीवरशरकाण्डान्यतमवर्णः
समसुविभक्तरित्रग्धस्थिरसुकुमारश्लिष्टमांससन्धिबन्धः परिपूर्णचारुगात्रो
महाललाटोरुबाहुर्व्यक्तसितासितप्रसत्रायतविशालपक्ष्मलाक्षः
सिंहमृदङ्गघनघोषः
क्षुत्पिपासोष्णुर्बह्वोजोबलशुक्रव्यवायापत्यश्चिरोशोषमाल्यानुलेपनो
दृढप्रच्छत्रवैरः पेशलः सत्यवादी स्मृतिवान् धृतिमानलोलुपे
बाल्येऽप्यरोदनः कटुतिक्तकषायोष्णारूक्षेच्छोपयशयश्च भवति ।। १२ ।।

अपि च ।

अल्पव्याहारक्रोधपानाशनेहः प्राज्ञायुर्वित्तो दीर्घदर्शी वदान्यः ।
श्राद्धो गम्भीरः स्थूललक्षः क्षमावानार्यो निद्रालुदीर्घसूत्रः कृतज्ञः ।। १३ ।।
ऋजुर्विपश्चित्सुभगः सलज्जो भक्तो गुरूणां दृढसैहृदय्यः ।
स्वप्ने सपद्मान् सविहङ्गमालांस्तोयाशयान् पश्यति तोयदांश्च ।। १४ ।।

The person of *kapha prakrti* will be of the colour of durva, indivara, sarakanda and such others (slight green, blue and black)*;* his body is proportionate, well divided, unctous (greasy), stable, tender with well knit muscles and joints, all parts fully developed; is good looking, with broad forehead, long legs and arms; eyes with distinct white and black areas, beautiful broad forehead, long legs and arms; eyes with distinct white and black areas, beautiful, broad, wide and with good eye-lashes; voice resembles that of lion or a drum, is capable of withstanding hunger, thirst, and heat; possesses good amount of ojas (velour), strength semen, sexual capacity, and offspring; is skillful(dexterous) speaks truth; is of good memory, courage and not attached too much(to anything)*;* not crying even doing childhood, desirous od pungent, bitter astringent, hot and dry (foods, drinks etc) and finds comfort with them.

Further, he is less in talk, anger drinking, eating and physical activity but great in life- span and wealth; is far sighted, speaks kindly;

is faithful, dignified, very generous, pardons others, highly cultured; sleeps more is perseverant, grateful; possess straight thoughts and intelligents; is good looking, bashful, devoted to teachers; very cordial and friendly with all, dreams of seeing ponds, and rivers full of water, lotus, lines of birds and clouds[37].

***Kaphaprakriti* from Charaka Samhita**

श्लेष्मा हि स्निग्धश्लक्ष्णमृदुमधुरसारसान्द्रमन्दस्ति मितगुरुशीतविज्जलाच्छः । तस्य स्नेहच्छ्लेष्मलाः स्निग्धाङ्गाः, श्लक्ष्णत्वाच्छ्लक्ष्णांङ्गाः मृदुत्वादृष्टिसुखसुकुमारावदातगात्राः, माधुर्यान् प्रभूतशुक्रव्यपायापत्याः, सारत्वात् सारसंहतस्थिरशरीरः, सान्द्रत्वादुपचितपरिपूणसर्वाङ्गा;, मन्दत्वान्मन्दचेष्टाहारव्याहाराः, स्तैमित्यादशीघारम्भक्षोभविकाराः, गुरुत्वात् साराधिष्ठितावस्थितगतयः, शैत्यादल्पक्षुत्तृष्णासंतापस्वेददोषाः, विज्जलत्वात् सुश्लिष्टसारसन्धिबन्धनाः तथाऽच्छत्वात् प्रसन्नदर्शनाननाः प्रसन्नस्निग्धवर्णस्वराश्च भवन्ति। त एवं गुणयोगाच्छ्लेष्मला बलवन्तो वसुमन्तो विद्यावन्त ओजस्विनः शान्ता आयुष्मन्तश्च भवन्ति ।। ९६ ।।

Manifestations *Kapha* is unctous, smooth, soft, sweet, firm, dense, slow, stable, heavy, cold, viscous and clear.

1. Unctuous unctousness of organs.
2. Smooth smoothness of organs.
3. Soft pleasing appearance, tenderness and clarity of complexion.

4. Sweet increase in the quantity of semen, desire for sex act and number of procreation.
5. Firm firmness, compactness and stability of the body.
6. Dense plumpness and roundedness of all organs.
7. Slowslow in action, intake of food and movement.
8. Stable slowness in initiating actions, getting irritated and morbid manifestations.
9. Heavy non slippery and stable gait with the entire sole of the feet pressing against the earth.
10. Coldlack of intensity in hunger, thirst, heat and perspiration.
11. Viscous firmness and compactness in joints.
12. Clear happiness in the look and face; happiness and softness of complexion and voice.

By virtue of the above mentioned qualities, a *kapha* prakruti person is endowed with the excellence of strength, wealth, knowledge, energy, peace and longevity[38].

1.1.8 Clinical utility of *Prakriti*

Even a well-versed physician, in the knowledge of disease and treatment, will not be able to treat the disease properly if he does not try to enter into the heart of the patient by the light of his knowledge[39]. Man differs from one another, though the identical twins look alike physically, there are some differentiating characters in them. The sons and daughters of the same parents are not identical with each other in their physical strength, intellectual development, spiritual bent in behaviour, temperament and reaction to various conditions of the environment. Thus the establishment of one's *prakriti* is necessary to separate one individual from the other.

Persons having different types of *prakriti* are exposed to some specific diseases and these need some specific therapeutic measures. For a better way of diagnosis and treatment of disease, the determination of *prakriti* is a must.

The study of *prakriti* and other factors related to it is of utmost importance for those who wants to be an Ayurveda physician. Study of individuals, whether healthy or diseased, according to *prakriti* is specially conducted to determine the impact of causative factors

responsible for the psychosomatic disturbance in the static or dynamic form of the human body as well as to determine the prognosis of the elements, e.g. if *vata*la person suffers from *vataja* disease it is difficult to treat. If he suffers from *pitta* or *kaphaja* diseases it is easy to treat[40].

Hitakara substance to one person may be *Ahitakara* to the other. Hence the knowledge of *prakriti* is essential for the better physiological attainment because to know the pathology, perfect knowledge of physiology is required. Study of an individual is necessary to arrive at a correct diagnosis of the case and to follow-up the future course of a disease in terms of vitiated psychosomatic *doshas*. Vagbhata has recommended the thorough study of *Prakrityadi* ten factors with their minutest details while investigating the patients[41]. Other Acharyas also gave prime importance to the examination of *prakriti*. *Prakriti* determination of an individual plays an important role in the aetiology of diseases. If an individual of *Vataja* temperament takes *vata* provoking factors, he will be prone to *vata* disease.

For the investigation of the various causes of the diseases, a very close study of *prakriti* is necessary. If *Prakriti* is investigated

and fixed up, it is easy to follow-up the case to know and verify where there exists any relation in environmental factors and food which upset the *doshas* in a particular individual. *Prakriti* also has its impact on the *Agni* system and *Koshta* of an individual e.g. *Agni* and *koshta* of *kapha*ja persons are *manda* and *madhyama* respectively[42]. *Bala* and *Ayu* of an individual are also decided by the study of his *prakriti* e.g. *vataprakriti* persons have less strength and very short life span[43]. The present position of the person can be predicted by the study of his *prakriti*. *Vatala* persons are described to be possessing meager resources of, money and material. The human constitution has an important role to play in the prevention of the progression and complication of a particular disease. The ultimate prognosis may vary in persons of different *Prakriti*. If *prakriti* is kept in mind the appropriate treatment can be given which may improve the course of the disease and reduce complications and the final prognosis may be changed. The selection of drug, drug response, deciding doses etc. need due consideration of constitution. The constitutional study helps in the prevention of diseases in time. Hence the whole concept of health, disease and treatment are based on the constitution. An important aspect of the study of *prakriti* is the relative susceptibility

of persons of different *prakriti* to different types of diseases. As reported by Dubey and Singh (1970)[44], Vatika persons are relatively more susceptible to infectious diseases like pulmonary tuberculosis, rheumatic fever and anxiety disorders etc. Similarly, *paittika* persons usually suffer from hypertension, ischemic heart diseases, rheumatoid arthritis, while *slaishmika* persons are more likely to suffer from obesity and allied lipid disorders, osteoarthritis etc.

Prakriti has a necessary role in the maintenance of health and further in causing of diseases. We all know that an individual having predominant *doshic* constitution following identical *dosha* vitiating *ahara* and *vihara*, and conjointly if the *kala, desha,* etc. also are favourable for the causing of the illness, then there's a high likelihood of obtaining that exact doshic predominant illness. All diseases have some *dosha* predominance, thus individuals having that *dosha* predominant *prakriti* is vulnerable to get affected by the illness, as an example *kapha dosha* predominant *prakriti* individuals are prone to get *kaphaja rogas*.

1.1.9 *Prakriti* and lifestyle

Prakriti and lifestyle are natural phenomena as well as occur

essentially. All the physiological process are directly controlled by *vata*, *pitta* and *kapha* and *mansika doshas* (functional psychic factors) thus by the predominant *dosha* is a particular type of *prakriti.* The principles of maintaining a proper well-being of the body and lifestyle are two folds the observance of personal, moral, seasonal conduct and for maintaining way of life it must be opposite to *prakriti* of an individual as the objective of the science is establishing equilibrium of the body. *Prakriti* based guidelines for diet and lifestyle result in healthy tissues and homeostasis of *doshas*. Every healthy individual should know about his/her *prakriti*, so that one can know which are the healthy lifestyle and eating habits for him, by adopting which he can maintain his healthy state and prevent any disease which may come. For e.g., if a person is found to have *pitta* predominant *prakriti* he is advised all those food stuffs which produce more heat in the body. It is because he is having already increased heat in the body and by taking more heat producing regimens he may acquire many disease. This can be done only if we know the *prakriti*. By knowing the *prakriti* one will know about the strength of a person to combat with the lifestyle diseases. Out of rest six types, *prakriti* with one *dosha (prakriti* formed from one body humor) have better resistance than

two *dosha prakriti* (*prakriti* formed from two body humors). *Vata-pitta-kapha prakriti* is susceptible to disease in decreasing order. In general by knowing our *prakriti* we can be aware of the do's and don'ts for daily routine and to be in healthy state we can be aware of, what type of disorders or ailments our body can have in future, so that we can change our lifestyle[45].

1.1.10 Previous Research works in *Prakriti*

Vata, *pitta*, and *kapha prakriti* are found to have unique metabolic activities. According to Ayurveda, *kapha* is slow, *pitta* is fast, and *vata* is considered to have variable metabolism. Various studies have tried to establish correlation between specific *prakriti* types and different metabolic activities occurring in the body. Recently, a study reported that body mass index (BMI) in *vata-pitta prakriti* was significantly less as compared to *kaphapitta prakriti* and the *vatapitta prakriti* individuals were found to be having maximum platelet aggregation[46]. One of the associations of *Tridoshas* has been hypothesized by Hankey (2005) in which it was suggested that the peptide coenzyme A, which occurs in all cells across all species preserved through evolution and is associ- ated with lipid metabolism, is linked with the *Tridoshas* at the cellular level[47]. One more study

describes the concept of *Prakriti* in aging stating that the *pitta* predominance *prakriti* type individuals have high basal metabolic rate (BMR) and energy consumption leading to tissue destruction and premature aging and average life span, while *kapha* predominance *prakriti* type have a tendency to delayed manifestation of aging and longer life span[48].

A research study demonstrated probable genomic basis for metabolic differences attributed by *prakriti* and concluded that *pitta prakriti* are fast metaboizers and *kapha* ones are slow and are influenced by different doses of CYP2CI9 substrates[49]. Thus it was apparent from this study that fast and slow metabolism was one of the major differentiating phenomena with respect to correlations between CYP2C19 genotypes and *prakriti*. Another research work explained connection between Ayurveda *Tridosha* system with psychological and endocrinological components of a human being and suggests possible biomarkers related to the three body types[50]. According to this research work, the genopsycho-somatotyping of humans as comprised by the *Tridosha* theory of Ayurveda is mediated by certain nuclear receptors; mainly those related to androgen, T-cells, and thyroxine which are related to *pitta* (mesomorphic or andrus),

kapha (endomorphic or thymus), and *vata* (ectomorphic or thyrus), respectively[51]. *Prakriti* or a person's constitution of his/her *tridoshas* also has a clear link to the susceptibility one has for chronic diseases. Based on the properties of the three body types, the predominance of *kapha* body types for gaining weight is quite well known[52]. This propensity to gain weight and for obesity is in turn linked with a number of chronic lifestyle diseases such as heart disease, hypertension, and diabetes; all of which are increasingly viewed collectively as metabolic syndrome. Similarly looking at the properties of *pitta* body type it can be predicted that such individuals can have a propensity to develop ulcers, bleeding disorders, and skin disorders more common[53]. *Vata* body types can have propensity to develop neurological problems, dementia, movement and speech disorders, arrhythmias, and related chronic diseases as well[54]. However, of the three body types, classical texts suggest that *vata* type individuals will have maximum propensity for chronic lifestyle related disease[55].

A recent study have discovered *vatakapha* body type is significantly correlated with diabetes mellitus, hypertension, and dyslipidemia with highest levels of inflammatory markers such as IL6, TNF alpha, hsCRP, and HOMA IR. These inflammatory markers were

also found to be higher in *kapha* body type[56]. Thus the patterns of association that might be expected from Ayurvedic *prakriti* theory have been shown to have clear links with certain chronic disease conditions. In addition to obesity and related disorders of heart, blood pressure, and diabetes, *Doshas* have been linked to other types of chronic disease as well such as rheumatoid arthritis (RA)[57]. Juyal *et al*., (2012) discovered that inflammatory genes were more associated with *vata* subgroup of patients, while oxidative stress pathway genes were more observed in *pitta* and to some extent *kapha* subgroup. This study delineated the fact that there were discreet pathways for the same disease for RA etiology in different *prakriti*-based sub-groups which according to them took us closer to validating concepts of *prakriti* and personalized medicine as defined by Ayurveda[58]. Links of *prakriti* has also been made with aging and cancer. Purva and Meena (2011) in their paper outlined the fact that the aging process was associated with the *prakriti* of an individual with the *pitta* predominant individuals supported by *vata* being prone to premature aging since they have increased BMR and this tends to destroy the tissues faster compared to the other two *doshas*.

1.1.11 *Prakriti* and Genomics

The concept of *prakriti* and its relationship with genomics was hypothesized over a decade ago[59]. Subsequent studies have attempted to correlate *prakriti* classification with genetic information and association of single nucleotide polymorphisms (SNPs) in HLA DRB1[60], CYP2C19[61], EGLN1[62] inflammatory and oxidative stress related genes[63], CD markers for various blood cells[64], DNA methylation alterations[65] and risk factors of cardiovascular or inflammatory diseases have been reported[66].

A study has convincingly correlated genomic variations with the classification of *prakriti.* In this study, genome-wide SNP (single nucleotide polymorphism) analysis (Affymetrix, 6.0) of 262 well-classified male individuals (after screening 3416 subjects) belonging to three *prakritis* were performed. It was found that 52 SNPs were significantly different between *prakritis*, without any confounding effect of stratification, after 10^6 permutations. Principal component analysis (PCA) of these SNPs classified 262 individuals into their respective groups (*vata*, *pitta* and *kapha*) irrespective of their ancestry, which represent its power in categorization. Further validation of the finding with 297 Indian population samples with known ancestry found that

PGM1 correlates with phenotype of *pitta* as described in the ancient text of Caraka Samhita, suggesting that the phenotypic classification of India's traditional medicine has a genetic basis; and its *prakriti*-based practice in vogue for many centuries resonates with personalized medicine[67].

1.2. ANATOMY OF EYE

The eye is the primary organ of vision. The two eyeballs are located in the orbit, it takes up about one-fifth of the orbital volume. The remaining space is taken up by the extraocular muscles, fascia, fat, blood vessels, nerves and the lacrimal gland.

The eye is an extension of the central nervous system embryologically. It shares many common anatomical and physiological properties with the brain. Both are protected by bony walls, have firm fibrous coverings and dual blood supply to the essential nervous layer in the retina. The eye and brain have internal cavities perfused by fluids of like composition and under equivalent pressures. it is not

surprising that similar disease processes affect the eye and central nervous system since the retina and optic nerve are outgrowths from the brain.

The eye has 3 layers or coats, 3 compartments and contains 3 fluids.

The 3 coats of the eye are

a) Outer fibrous layer – cornea, sclera, lamina cribrosa

b) Middle layer - iris, ciliary body, choroids

c) Inner nervous layer - pigment epithelium of the retina, retinal photoreceptors, retinal neurons.

The three compartments of the eye are

a) Anterior chamber- space between the cornea and the iris diaphragm

b) Posterior chamber – triangular space between the iris anteriorly, the lens and zonule posteriorly, and the ciliary body.

c) Vitreous chamber- space behind the lens and zonule.

The three intraocular fluid are

a) **Aqueous humour** – a watery, optically clear solution of water and electrolytes similar to tissue fluids except that aqueous has a low protein content normally.

b) **Vitreous humour –** transparent gel consisting of a three-dimensional network of collagen fibres with the interspaces filled with polymerised hyaluronic acid molecules and water. This fills the space between the posterior surface of the lens, ciliary body and retina.

c) **Blood** – in addition to its usual functions, blood contributes to the maintenance of intraocular pressure. The choroid contains most of the blood in the eyes. The choroidal blood flow represents the largest blood flow per unit tissue in the body. The degree of desaturation of efferent choroidal blood is relatively small which indicates that the choroidal vasculature has got functions beyond retinal nutrition. The choroid serves as a heat exchanger for the retina, it absorbs energy as light strikes the retinal pigment epithelium. Clinically, the eye is considered to be composed of two segments.

Anterior segment – all structures from the lens forward. Posterior segment – all structures posterior to the lens.

Outer layer

The cornea is the anterior one-sixth of the fibrous layer of the eye. The posterior five-sixths are formed by the sclera and lamina cribrosa. The cornea is transparent, whereas the sclera is white, which is continuous within it. The junction of cornea and sclera is called the limbus. The cornea has 5 layers

1. Epithelium and its basement membrane
2. Bowman's layer
3. Stroma
4. Descemet's membrane
5. Endothelium

In the region of the limbus, the epithelium on the outer surface of the cornea becomes continuous with that of the conjunctiva, a thin, loose transparent non-keratinising mucous membrane that covers the anterior part of the sclera, from which it is separated by loose connective tissue. Above and below, the conjunctiva is reflected

into the inner surface of the upper and lower lids. This mucous membrane, therefore, lines the posterior surface of the eyelids and there is a mucocutaneous junction on the lid margin. Although the conjunctiva is continuous, it can be divided descriptively into 3 parts, palpebral, bulbar and fornix.

The sclera consists of irregular lamellae of collagen fibres. Posteriorly, the external two-thirds of the irregular lamellae of collagen fibres. Posteriorly, the external two-thirds of the sclera becomes continuous with the dural sheath of the optic nerve, the inner one-third of the sclera becomes the lamina cribrosa. These nerve fibres pass from the retina to the optic nerve. The sclera is thickest posteriorly and thinnest in the insertions of the recti muscles. There is a layer of loose connective tissue deep to the conjunctiva, overlying the sclera, called the episclera.

Middle Layer

The middle layer is highly vascular, which is called the uvea, is heavily pigmented as well. The anterior part of the uvea forms the bulk of the iris body. The posterior part of the uvea is called the choroid. The iris is the most anterior part of the uvea. It is a thin circular disc perforated centrally by the pupil. Contraction of the iris sphincter

muscle constricts the pupil, while contraction of the dilator papillae muscle dilates the pupil. The ciliary body is part of the uveal tissue and is attached anteriorly to the iris and the sclera.

Posteriorly it is continuous with the choroid and retina. The ciliary body is also referred to as the intermediate uvea. The ciliary body is triangular in cross-section. The anterior side of the ciliary body is the shortest, the borders of the anterior chamber give origin to the iris. The outer side of the triangle lies against the sclera. The inner side is divided into two zones

a) The pars plicata

b) The pars plana.

The pars plana is continuous with the choroid and retina. The choroid consists of the following;

- Bruch's membrane
- The choriocapillaries
- A layer of larger choroidal blood vessels
- Pigmented cells

Inner Layer

The inner layer of the eye, which lines the vascular uvea, is the neurosensory layer. This layer forms the retina posteriorly, but anteriorly it comes to line the inner surface of the ciliary body and iris as a two-layered pigment epithelium. These same layers of the retina, which is composed of outer pigment epithelium and an inner sensory part, which contains the rods and cones, bipolar cells and ganglion cells. The ora serrata is the junction of the retina and the pars plana form a scalloped border. The photoreceptor cells are present on the external side of the sensory retina. The relationship of the retinal elements can be understood by the formation of the optic cup. As the single-cell layer optic vesicle invaginates to form the two cell layered optic cup, the initially superficial cells become the inner layer of the cup. The Retinal Pigment Epithelium develops from the outer layer of the cup, facing the photoreceptors across the now obliterated cavity of the optic vesicle.

1.3. PHYSIOLOGY OF THE EYE

The primary function of the eye is vision, ie to form a clear image of objects. These images are transmitted to the brain through the optic nerve and the posterior visual pathways, the various tissues of the eye are designed to facilitate this function.

The Eyelids

Functions include

(1) protection of the eye from mechanical trauma, extremes of temperature and bright light

(2) maintenance of the normal precorneal tear film, which is important for the maintenance of corneal health and clarity.

Normal closure of the eyelids requires an intact nerve supply to the orbicularis oculi muscles. Eyelid opening is affected by the levator palpebrae superioris supplied by the 3rd cranial nerve.

The Cornea

The primary function of the cornea is refraction. To perform this function, the cornea requires the following properties

- Transparency
- Smooth
- Spherical curvature of proper refractive power
- Appropriate index of refraction

Corneal transparency is attributed to anatomical and physiological factors.

Anatomically the absence of keratinisation of the epithelium, tight packing of epithelial cells, mucous layer providing smooth lubricated surface, homogeneity of membranes, regular arrangement of the corneal lamella, paucity of corneal stromal cells- which are flattened within lamellae, interspaces, absence of blood vessels.

Physiologically the active dehydration of the cornea occur through Na+/HCO_3- metabolic pump located in the corneal endothelium. This dehydration is provided by the physical barrier provided by the corneal epithelium and endothelium.

The Aqueous humour

The Aqueous humour is an optically clear solution of electrolytes that fills the space between the cornea and the lens. Normal volume is 0.3 ml. Its function is to nourish the lens and cornea. The aqueous is formed by active secretion and ultrafiltration from the ciliary processes in the posterior chamber. The fluid enters the anterior chamber through the pupil, circulates in the anterior chamber and drains through the trabecular meshwork into the canal of schlemm, the aqueous veins and the conjunctival episcleral veins. The aqueous normally contains a low concentration of proteins, but a higher concentration of ascorbic acid compared to plasma. Inflammation of the anterior uvea leads to leakage of proteins from the iris circulating into the aqueous.

The vitreous body

The vitreous consists of a three-dimensional network of

collagen fibres with the interspaces filled with polymerised hyaluronic acid molecules, which are capable of holding large quantity of water. The vitreous does not normally flow but is percolated slowly by small amounts of aqueous. There is liquefaction of the jelly with age, with bits breaking off to form floaters. This degeneration occurs at an earlier age in myopes.

The Lens

The lens, like the cornea, is transparent. It is avascular and depends on the aqueous for nourishment. It has a thick elastic capsule, which prevents molecules from moving into or out of it. The lens continues to grow throughout life, new lens fibres being produced from the outside and moving inwards towards the nucleus with age. The lens is comprised of 65% water and 35% protein. The water content of the lens decreases with age and the lens becomes less pliable. The lens is suspended from the ciliary body by the zonule, which arises from the ciliary body and inserts into the lens capsule near the equator.

The ciliary body

The ciliary body is a mass of smooth muscle, which runs circumferentially inside the globe and is attached to the sclera. It

consists of two main parts;

a) Longitudinal fibres

b) Circular fibres

The Retina

This is the “photographic film “ of the eye that converts light into electrical energy for transmission to the brain. It consists of two main parts,

1) The neuroretina – all layers of the retina that are derived from the inner layer of the embryological optic cup.
2) The Retinal pigment epithelium-derived from the outer layer of the optic cup

There are two main types of photoreceptors in the retina – the rods and cones. Rods and cones are named for the different appearance of their outer segment, which is the distal end of the photoreceptor next to the pigment epithelium. The outer segments of cones are tapered or cone-shaped whereas those of rods are cylindrical or rod-shaped. Transduction of light into an electrical signal

occurs in the outer segment. The inner segment contains the cell nucleus, golgi complex, and many mitochondria. At its proximal end, the photoreceptor expands into a bulblike synaptic terminal.

Photochemistry of vision

The first step in visual transduction is the absorption of light by a photopigment (visual pigment). Photopigments are coloured proteins in outer segment membranes that undergo structural changes upon light absorption. They initiate the events that lead to the production of a receptor potential. The single type of photopigment in rods is called rhodopsin. A cone contains one of three different kinds of photopigments, thus three types of cones. All visual photopigments contain two parts a glycoprotein known as opsin and a derivative of vitamin A called retinal. Vitamin A derivatives are formed from carotenoids, the plant pigment that gives carrots their colour. Retinal is the light-absorbing portion of all visual photopigments.

In the darkness, retinal has a bent shape called cis retinal, which fits into the opsin portion of the photopigment. When cis-retinal absorbs light, it straightens out to a shape called trans retinal. This cis-trans conversion is called isomerisation and it is the first step in

visual transduction. Forming a visual image begins with isomerisation of photopigments in particular rods and cones. After retinal isomerizes, several unstable intermediates form and disappear.

In about a minute, trans retinal completely separates from opsin. The final products look colourless, so the whole process is called bleaching of photopigment.

In the darkness, an enzyme called retinal isomerase converts trans back to cis retinal. When cis retinal binds to opsin, it forms a functional photopigment. Resynthesis of a photopigment is called regeneration.

1.4. ANATOMY AND PHYSIOLOGY ACCORDING TO AYURVEDA

Nayana budbuda should be understood as two *angula* (4cm)in-depth, measurement of ones own thumb in width (thickness), two and a half *angula* (5 cm) in circumference; is round, resembles the nipple of a cow and arising from (comprising of) all the *bhutas* (five primary elements – *prthvi, ap, teja, vayu* and *akasha*) and their qualities (properties)[68].

In this *netrabudbuda* (eyeball), *pala* (muscles of the eye) is made of *bhuva* (*prthvi bhuta*), *rakta* (blood) is made of *agni* (*tejasbhuta*), *krsna* (black portion of the cornea) is made of *vata* (*vayu bhuta*), *sita* (white portion of sclera) is of *jala* (*ap bhuta*), *asrumarga* (channels of tears or lacrimal ducts) is of *akasa* (*akasa bhuta*)[69].

It is said that krsnamandala is one-third of the length of the eye and *dristi* (the portion of vision or pupil) is one-seventh part of *krisnamandala* (cornea) say the experts of the eye[70].

In the eye, *mandala* (areas/ spheres), *sandhi* (joints/ fornices) and *patala* (layers/sheath) are in successive order five, six and six in number respectively; *pakshma* (areas of hairs /eyelashes) *vartma* (area of eyelids), *sveta* (area of white portion/ sclera), *krisna* (area of black portion/ cornea) and *drishti* (area of sight/ pupil) are the five *mandalas* (areas); four of these are located respectively in preceding order from the centre and one at the end[71].

Sandhi (joints/fornices) present in the eyes are the one between *pakshma* (eyelashes) and *vartma* eyelids); another between *vartma* and *sukla* (sclera); another between *sukla* and *krisna* (cornea); another between *krisna* and *drishti* (pupil); one at *kaninaka* (inner canthus) and the sixth at *apanga* (outer canthus)[72].

Two patala of the two eyelids (one in each) and another four *patala* are present in the eye; the most dreadful disease *timira* (blindness) happens in these.

The external *patala* (outermost layer) is the seat of *tejas*

(heat vis-a-vis *pitta*) and *jala* (water/*kapha*); the second *patala* is the seat of *pisita* (muscles), the third is the seat of *medas* (fat), the fourth is the seat of *asthi* (bone); thickness of this *patala* (layers) is equal to one-fifth of the *drishti* (size of the pupil)[73].

Qualities of *sira* (veins and arteries), *kandara* (ligaments), *medas* (fat), *kalaka* (bone of the eye sockets) and *sleshma* (kapha) are the chief factors to bind the eye[74].

1.5. DIABETIC RETINOPATHY

Diabetic retinopathy is a vascular disease which affects the retina of patients with diabetes mellitus. It is the most common cause of blindness affecting the people between the age group 20-60. The likelihood of developing the disease depends upon the duration of diabetes. Type 2 diabetes has an insidious onset and can go unnoticed for years. As a result, patients may already have developed DR at the time of diagnosis. Type 1 diabetics, on the other hand, are diagnosed early in the course of the disease, and they typically do not develop retinopathy until years after the diagnosis is made, the risk of developing retinopathy increases after puberty.

1.5.1 Risk factors of Retinopathy

1. **Duration of diabetes:** After prolonged diabetes, almost all patients develop some retinopathy; duration of diabetes is indeed one of the most reliable markers for chronic complications. In WESDR study 20% of younger-onset diabetes developed some retinopathy after 3 to 4 years of diabetes. In type 2 patients with a similar duration of diabetes, 30% showed retinopathy.

2. **Hyperglycemia:** Several epidemiological and other studies have provided evidence that hyperglycemia is strongly associated with the presence, development or progression of diabetic retinopathy. But some interventional studies found that blood glucose control did not have a beneficial effect on retinopathy, and that retinopathy could worsen with tight glycaemic control. The beneficial effect of intensive glycaemic control in reducing the incidence and progression of diabetic retinopathy in patients with type 1 and type 2 diabetes was conclusively demonstrated by two important clinical trials, the **United Kingdom Prospective Diabetes Study (UKPDS)** and **the Diabetes Control and Complications Trial (DCCT).** In the DCCT, the incidence and progression of retinopathy were reduced by 76% and 54% respectively in the intensive therapy

group, compared with the conventional group. There was some initial worsening of retinopathy in the tightly controlled group as observed in earlier studies, but this trend was reversed, with sustained long-term benefits from the third year onwards. In the UKPDS, the patients assigned to intensive glucose control had a 25% risk reduction in micro-vascular endpoints, including the need for retinal photocoagulation. Both the studies showed that glycaemic control was protective for all levels of control, but a glycaemic threshold below which a reduction in micro-vascular complications was absent, could not be found. Currently, the recommendation is for the maintenance of glucose levels as near normal as possible. However, there is an added risk of hypoglycemia associated with tight glycaemic control, which must be adjusted according to individual patient's tolerance.

3. **Endogenous/Exogenous Insulin:** In WESDR study type 1 diabetes with nearly undetectable levels of plasma C-peptide (a measure of endogenous insulin secretion) was associated with more frequent and severe retinopathy, compared to non- insulin-dependent type 2 patients. However, after controlling for other characteristics associated with retinopathy in type 2, there was no correlation between C-peptide levels and severity of retinopathy.

Similarly, dosage or type of exogenous insulin was not shown to affect the severity of retinopathy in type 2 patients whose C-peptide levels were at least 0.3mmol/dL. The level of glycaemia was found to be more important than the aetiology of retinopathy.

4. Age: In persons with younger-onset diabetes in WESDR (Wisconsin Epidemiologic Study of Diabetic Retinopathy) prevalence of retinopathy was positively associated with age, although this is probably because of the high correction between age and duration of diabetes. In those of older onset, the association was less consistent, with a marked increase in the frequency of retinopathy in those younger than 50 years of age, but the little relationship between age and retinopathy thereafter.

5. Sex: Proliferative diabetic retinopathy was more commonly seen in males with the younger onset of diabetes than females but 10 years of incidence and progression were not significantly different.

6. Genetic factors: The relationship between genetic factors and the prevalence and incidence of retinopathy has been inconsistent. Data from studies in South Indian patients suggested

that there was a genetic predisposition to proliferative diabetic retinopathy in type 2 diabetes patients. This predisposition was thought to be determined by polymorphism of the heavy chain immunoglobulin genes located on chromosome 14. There have been reports of positive relationship between the presence of some HL antigens and the absence of others. It seems that both genetic and environmental confounders exist for the expression of diabetic retinopathy.

1.5.2 Classification of Diabetic Retinopathy

The **Early Treatment Diabetic Retinopathy (ETDRS)** study classified Non-Proliferative Diabetic Retinopathy (NPDR) as mild, moderate, severe, and very severe. Proliferative Diabetic retinopathy (PDR) was divided into early proliferative and proliferative with high-risk characteristics. Macular oedema, a common component in both groups was described separately, and the features defined under one category do not have that described in the next higher category.

Mild NPDR – The presence of at least one microaneurysm

Moderate NPDR- The presence of haemorrhages or micro-aneurysms judged to be greater than depicted on the standard

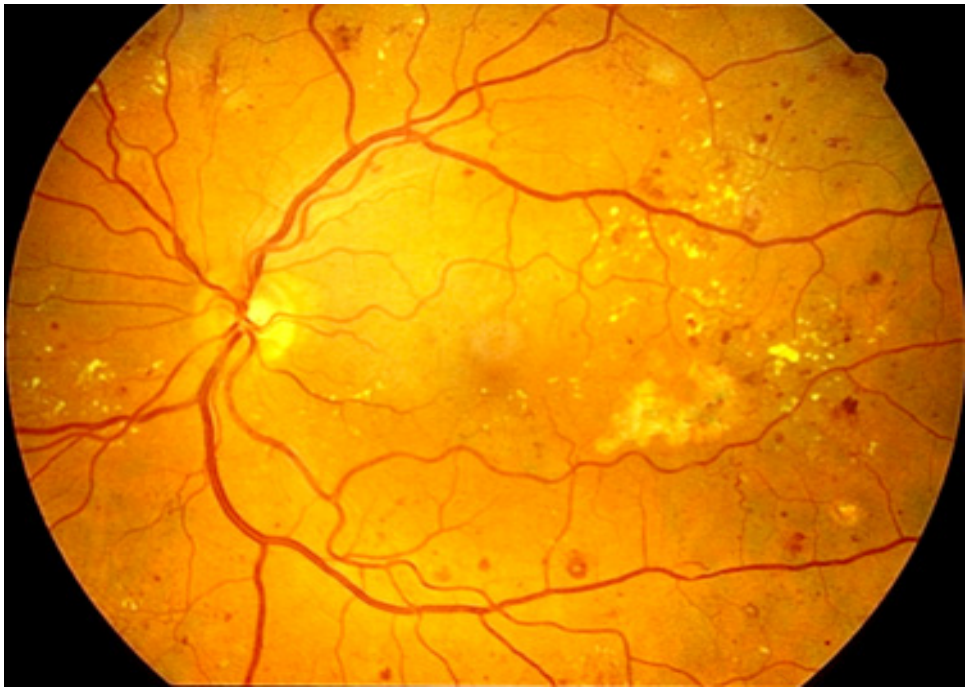


Fig. 1. Non proliferative Diabetic Retinopathy

photograph provided for comparison, or the definite presence of cotton-wool spots, venous beading and intra-retinal micro-vascular abnormalities.

Severe NPDR – When the haemorrhages or micro-aneurysms are as defined for moderate NPDR, but present in all four quadrants, or when venous beading is present in two or more quadrants or intra-retinal micro-vascular abnormalities are greater than that seen in the relevant standard photograph.

Very severe NPDR – The presence of two or more features

that characterize severe NPDR.

Non-proliferative Retinopathy

1. Vascular changes
2. Exudative changes
3. Hemorrhagic changes

Vascular changes

1. Loss of pericytes

The earliest histological change in diabetic retinopathy is the selective loss of intramural pericytes in retinal capillaries. Kuwabara and Cogan developed a technique of “trypsin digest” in 1960 to examine the flat mounts of retinal vasculature of diabetic donor eyes[75]. Formaldehyde fixed retinas can be digested with solutions containing the enzyme trypsin to remove neuronal and glial elements leaving behind on the network of retinal vessels which could be then spread flat, mounted on a microscopy slide, stained and examined with a light microscope. In such digest preparations from diabetic subjects, one can recognize pericytes drop out as empty balloon-like spaces bulging from the capillary wall. These are known as pericytes “ghosts”. In the normal retinal capillary, the pericytes,

endothelial ratio is 1:1 and this ratio becomes less than one due to selective pericyte drop out in diabetes.

It is not clear how the pericytes are lost in early diabetic retinopathy. An immuno-cytochemical study showed the presence of aldose reductase in pericytes only, and not in endothelial cells of human retinal vessels. This would explain the accumulation of sorbitol in pericytes resulting in the death of these cells. However, this finding has not been confirmed by others, and the investigators have found aldose reductase activity in both retinal endothelial cells and pericytes. The auto-regulation of the retinal capillary bed is diminished in diabetes and may be related to the loss of contractile pericytes. While both oxidative stress and the accumulation of advanced glycation end products appear to promote the apoptosis of retinal micro-vascular cells, and antioxidants of advanced glycation end-products inhibitors ameliorate diabetic retinopathy. it is not clear why the selective apoptosis of pericytes occurs first. It has been proposed that endothelial cell apoptosis takes place after, or simultaneously with the pericyte apoptosis.

One important consequence of pericyte loss in diabetes

may be uninhibited endothelial cell proliferation. It has been shown that co-culture of endothelial cells and pericytes or smooth muscle cells results in inhibition of endothelial cell proliferation, and this inhibition requires contact between endothelial cells and pericyte processes and is possibly mediated by transforming growth factor (TGF b). Normally, direct contact between pericytes and endothelial cells are made through fenestrate in the thick basement membranes in the retinal capillaries.

2. Capillary micro- aneurysms

This is the earliest clinical lesion in diabetic retinopathy. Capillary micro- aneurysms, which are clinically seen as red dots, are more easily demonstrated by fluorescein angiography as hyper fluorescent dots. Pathologically these micro-aneurysms can be seen in retinal digest preparations as focal dilatations of the retinal capillaries. Both fluorescein angiography and retinal digest preparations show more micro-aneurysms than are seen clinically. Micro-aneurysms can be seen as saccular outpouchings from the capillary wall on either side of the capillary network. Thickened basement membranes have been observed in the walls of micro-aneurysms. These are the sites of increased leakage resulting in

haemorrhages, hard exudates and retinal oedema. Micro-aneurysms may be hyper-cellular and a-cellular.

Hypercelluar micro-aneurysms arise because of focal areas of retinal endothelial cell proliferation as a result of pericyte death. Pericytes in contact with the endothelium in cell culture have been shown to exert an anti-proliferative effect on the endothelial cells probably through the secretion of transforming growth factor-beta (TGF_b). With pericyte death, this anti-proliferative effect is lost, and there is a focal proliferation of endothelial cells. The pathogenesis of micro-aneurysms is unclear. It is thought to be arising from focal, weak points in the capillary wall following the loss of capillary pericytes. Pericytes are contractile cells like smooth muscle cells and contain actin fibrils. The contractile function of pericytes has been demonstrated in vitro, and this contractility is responsible for the tonus of the retinal microvasculature and the auto-regulation of the blood flow. The auto-regulation of the retinal capillary bed is decreased in diabetes and the vessel wall dilates focally resulting in the formation of micro-aneurysms.

3. Thickening of capillary basement membrane

Thickening of the micro-vascular basement membrane has

been observed in retinal capillaries and choriocapillaris of diabetes. In addition to marked thickening of the basement membrane, “swiss cheese” like vacuolization and deposition of fibrillar collagen in a homogenous pattern of basement membrane collagen are also observed. Basement thickening is the earliest anatomic lesion in several vascular beds in structures such as the retina, cerebral cortex, renal glomerulus and skeletal muscle in diabetics. It is interesting that the capillary basement membrane thickening is seen in vessels of the retina and cerebral cortex of diabetics, whereas the lesions like micro-aneurysms a-cellular capillaries and pericyte ghosts are present in the retinal vessels only, and not in the cerebral cortex vessels. Other proteins like fibronectin and enactin have been also reported to be present in basement membranes. Basement membrane provides the scaffold to the cellular layer and thus maintain the structural integrity of the tissues. The other functions of the basement membranes include regulation of permeability, cell proliferation, and ability to bind various growth factors such as the fibroblast growth factor.

Several experimental pieces of evidence indicate that the “ sorbitol pathway” is involved in the early changes of diabetic

retinopathy including capillary basement membrane thickening. It has been observed that rats fed on a diet high in galactose, another hexose, metabolized in the same way as glucose by the enzyme aldose reductase, but not by other pathways, develop capillary basement membrane thickening and other basement membrane abnormalities similar to those occurring in diabetic patients. Such capillary basement membrane abnormalities do not occur if sorbinil, an aldose reductase inhibitor, is administered simultaneously with the high galactose diet. Other biochemical pathways like enzymatic or non-enzymatic glycation may be implicated in this process. Quantitative electron microscopic immuno-cytochemical studies shown that there is an increase in collagen IV and lamina without any change in the relative concentration of the core protein of the HSPG in the basement membrane of the retinal vessels of galactosaemia rats, resulting in increased basement membrane thickening. The fibrillar collagen seen in thickened basement membrane has been shown to stain for collagen III which is not present in the normal basement membrane. it is postulated that the biochemical alterations in the retinal, micro-vascular basement membrane affects the state of differentiation of the overlying cells and their proliferative ability.

4. Capillary acellularity

With the advancement of micro-vascular lesions in diabetic retinopathy, there occurs complete loss of all cellular elements from retinal micro-vessels. A-cellular capillaries comprising basement membrane tubes devoid of endothelial cells and pericytes are non-functional and appear as dark spaces on a fluorescein angiogram.

Exudative changes

The hard exudates seen clinically are derived from the serum, and breakdown of the glial and neuronal products in the outer plexiform layer. Soft exudates, better-termed cotton wool spots are not the result of exudation. Macular oedemais evident pathologically as multiple cystoid spaces in the outer plexiform and inner nuclear layers of the retina and contain fluid that is probably extracellular.

Hemorrhagic changes

The different types of retinal haemorrhages clinically, and their histological location in retinal layers are.

Dot and blot hemorrhages	—	Hemorrhage in inner nuclear layer and outer plexiform layer

Flame shaped hemorrhages	—	Small hemorrhages in nerve fibre layer
Globular hemorrhages	—	Hemorrhages in the middle retinal layer
Confluent hemorrhages	—	Hemorrhages in all retinal layers
Pre-retinal hemorrhages	—	Hemorrhages on the vitreal side of the inner limiting membrane.

Early PDR – The presence of new vessels, The changes in pre proliferative retinopathy include increased retinal haemorrhages, cotton wool spots, venous beading and intra-retinal micro-vascular abnormalities (IRMA). These changes represent increasing ischemia and a 4-2-1 rule has been developed to define the severe non-proliferative retinopathy as severe intra-retinal haemorrhages in all four quadrants, or venous bleeding in two quadrants, or moderate IRMA in at least one quadrant. The IRMAs represent dilated capillaries or shunt vessels, which have not yet penetrated the inner limiting membrane. Cotton wool spots are micro-infarcts due to coagulative necrosis of the nerve fiber layer of the retina. The micro-infarction produces aggregates of ruptured and

enlarged axons, called cytoid bodies, which are clinically described as cotton wool spots. The changes in pre proliferative retinopathy follow the diffuse ischemia due to capillary closure in the retinal microvasculature. Micro thrombi formation due to increased platelet aggregation, increased leucocytosis, decreased protacyclin, probably set the stage for this wide spread ischemia.

Proliferative Retinopathy

The normal retinal circulation is resistant to neo-vascular stimuli, and negligible endothelial cell proliferation takes place in the adult retinal vessels. The initial stimulus for retinal neo-vascularisation is ischemia or hypoxia that leads to up-regulation of growth factors, integrins, and proteinases resulting in the formation of new vessels that penetrate the internal limiting membrane and grow into vitreous. Areas of capillary non-perfusion as shown by fluorescein angiography, characterize this ischemia. New retinal vessels are tubes of endothelial cells with ill-formed basement membrane and occasional pericytes. New vessels are accompanied by fibroblasts and glial cells (astrocytes and Muller cells) and grow on the surface of the retina as an epiretinal neo-vascular membrane. The epiretinal membrane in diabetic retinopathy is composed of neo-vascular channels with glial

cells, fibroblasts, lymphocytes, monocytes, basement membrane, and variable amounts of collagens. The epiretinal membrane (retinitis proliferns) can shrink, and lead to tractional retinal detachment. If this detachment involves the macula, the patient experiences severe vision loss. Vitreous detachment, which is more common occurring at an earlier age in diabetics, can cause traction on the new vessels leading to pre-retinal or vitreous haemorrhages.

The precise stimulus for the subsequent pre-retinal neo-vascularization that characterizes proliferative diabetic retinopathy remains uncertain, but retinal hypoxia has been proposed to cause neo-vascularization and rubeosis irides from adjacent retinal vessels. Hypoxia causes upregulation of angiogenic growth factors that causes endothelial cell proliferation. While many candidate molecules have been suggested for this role, including basis fibroblast growth factor, insulin-like growth factor, angiopoietin-2 and platelet-derived growth factor, recent evidence supports the vascular endothelial growth factor (VEGF) as an important modulator of proliferative diabetic retinopathy

High-risk PDR – The presence of new vessels on the disc (NVD) one-third to one half-disc area in size, or NVD with pre-retinal or vitreous hemorrhage.

The different studies on prevalence and incidence of diabetic retinopathy are heterogeneous in terms of the type of diabetes, duration of diabetes, ethnicity, methods of examination, definitions used, and grading of retinopathy. Among the large, longitudinal, population-based studies using standardized grading and documentation systems, the most rigorous has been **Wisconsin Epidemiologic study of diabetic retinopathy**. In WESDR patients diagnosed to have diabetes mellitus before 30 years of age had the highest prevalence of any retinopathy, proliferative diabetic retinopathy, and macular oedema, whereas the older onset group had the lowest rates. In both groups, the prevalence of diabetic retinopathy strongly correlated with the duration of diabetes.

Two clinic-based Indian studies estimated the prevalence rates of retinopathy in type 2 patients to be 34.1% and 37% respectively. It was found that persons who have diabetic retinopathy are 29 times more likely to become blind than are non- diabetic persons of similar age and gender.

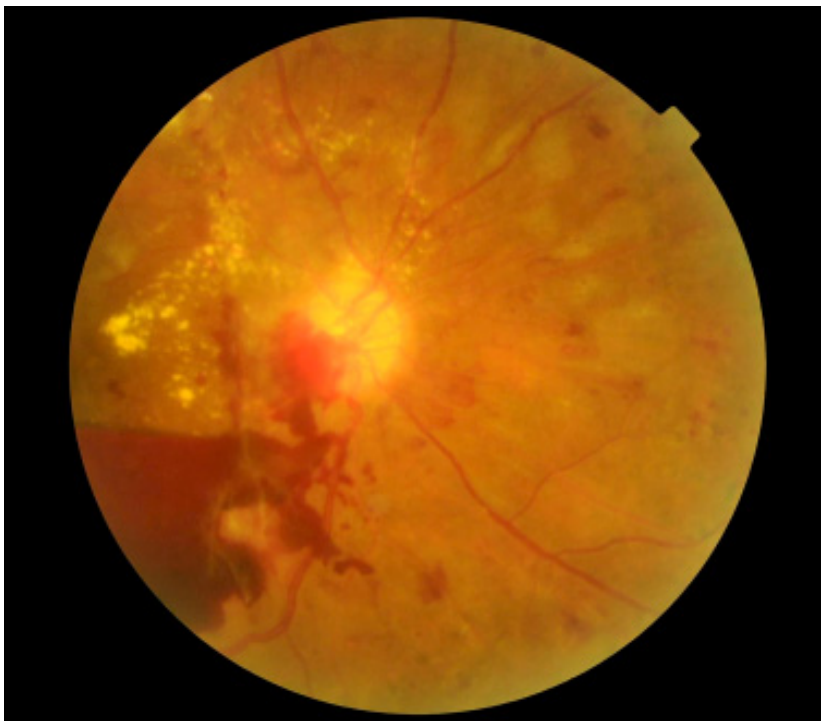
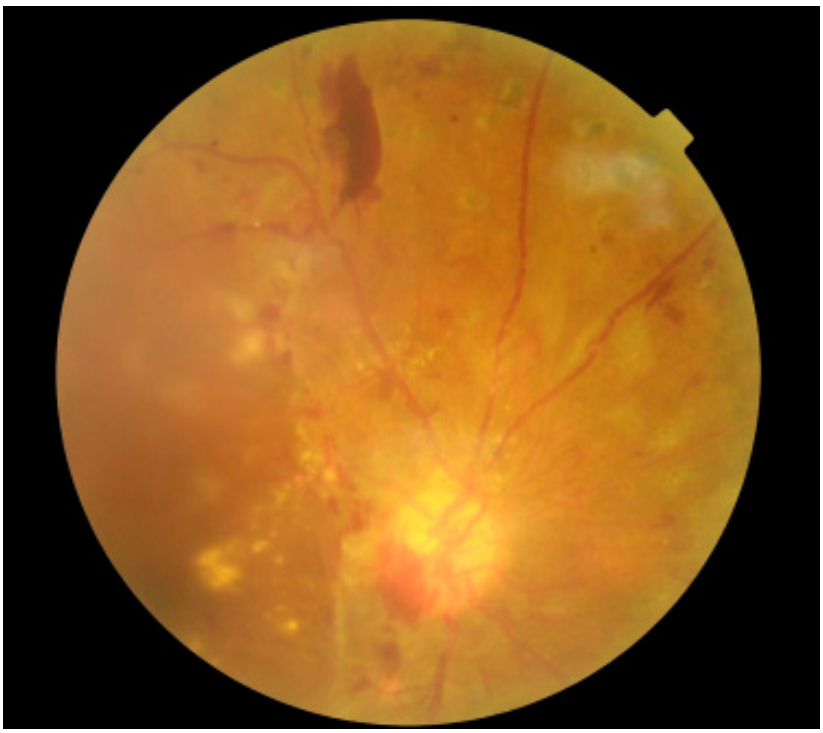


Fig. 2 Proliferative Diabetic Retinopathy



1.5.3 Pathogenesis of Diabetic Retinopathy

Genetic predisposition and Hyperglycemia is associated with a variety of pathophysiological events identified in the progression of diabetic retinopathy. To date, several major mechanisms are thought to induce retinal stress in Diabetic Retinopathy, including,

1) the polyol pathway
2) non-enzymatic glycation
3) activation of Protein Kinase C (PKC)
4) genetic factors
5) inflammation
6) oxidative stress

all of which have been implicated in the development of microvascular damage and retinopathy.

Although a multitude of pathogenic mechanisms has been proposed, the dysfunctional biochemical, and molecular pathways that lead to the initiation and progression of diabetic retinopathy are still an enigma. The pathogenesis of diabetic retinopathy is presently

considered to be a result of the concerted action of biochemical, hemodynamic, endocrine, and cytokinetic factors.

Rheological Factors

In type 1 and type 2 diabetes, rheological abnormalities have been implicated in the onset and progression of microangiopathy with particular reference to diabetic retinopathy. This theory of pathogenesis proposed by Farhaeus in 1921[76] and developed by little, takes into account complex abnormalities of blood viscosity, platelet and erythrocyte aggregation, fibrinolysis, coagulation and oxygen fixation by hemoglobin. Leukocyte activation and adherence play an important role in the pathogenesis of diabetic retinopathy. Alteration in retinal blood flow could decrease pressure gradients across retinal capillaries owing to stenotic or constricted arterioles resulting in activated leucocytes becoming wedged in capillaries and obstructing retinal micro vessels[77]. Even though diabetic retinopathy is generally not considered as an inflammatory disease, it has been demonstrated that leukocytes adhere to the retinal vascular endothelium. When the role of coagulation factors was studied in patients with diabetic retinopathy, both C-reactive protein (CRP) and fibrinogen, which are involved in coagulation and

plasma-viscosity regulation, were increased in patients with mild to severe retinopathy.

Hemodynamic and plasma factors

Numerous changes occur in the retinal vasculature in the early stages of diabetic retinopathy, before the appearance of Pathological changes. The functional changes in the retinal vasculature result in an increased and heterogeneous distribution of retinal blood flow. Remarkably, human retinal circulation is a closed vascular system. It has been proposed that hyperglycemia in humans, induces an initial reduction in retinal blood flow followed by a gradual increase. The exact mechanisms underlying the biphasic blood flow are not completely understood but certain hypotheses have been postulated[78]. Increased blood flow could cause shear stress, resulting in damage to endothelial cells. The human retina possesses the intrinsic autoregulatory capacity, which maintains the blood flow despite changing perfusion pressures. Constant hyperglycemia results in impairment of this intrinsic autoregulatory mechanism[79]. There are two classes of regulating factors that mediate blood flow in the retina. These factors either inhibit or stimulate the underlying smooth muscle cells and pericytes and include the

a) **Endothelium-derived relaxing factors**: Nitric oxide, prostacyclin, endothelium-derived hyperpolarizing factor.

b) **Endothelium-derived contracting factors**: Endothelin and cyclogenase hyperglycemia.

The hypothesis of four major biochemical pathways, which explains the mechanism of diabetic eye diseases starting from hyperglycemia-induced vascular injury have been recently reviewed[80]. Specific biochemical pathways linking hyperglycemia to diabetic retinopathy were proposed;

a) The polyol pathway

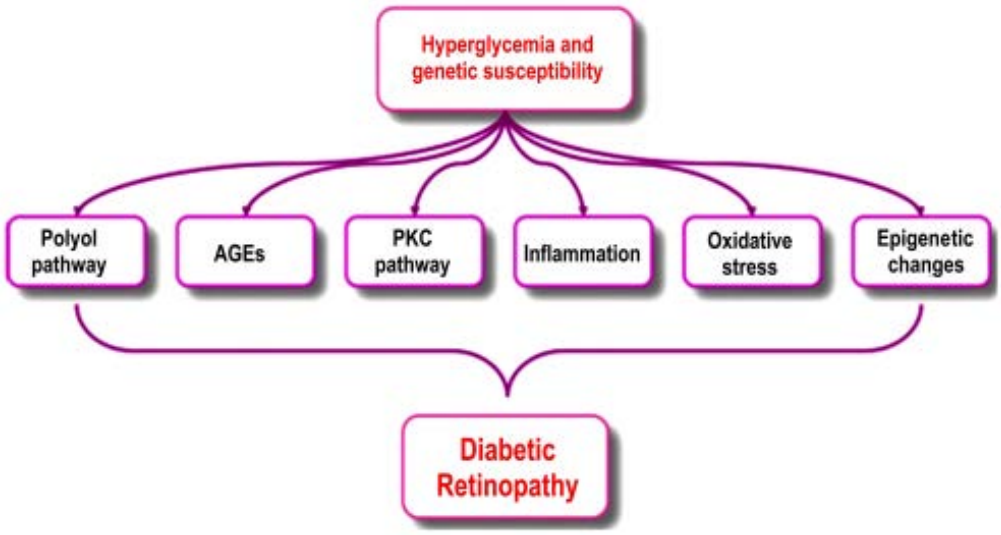
b) Non-enzymatic glycation of proteins

c) Glucose auto-oxidation and oxidative stress

d) Hyperglycemic pseudo hypoxia

e) Enhanced activation of protein Kinase C

There has been much debate about the initiating factors in diabetic retinopathy with lack of glycaemic control being considered as one of the main factors in the pathogenesis of diabetic retinopathy.



This initiates events such as basement membrane thickening, pericyte drop out and retinal capillary non-perfusion leading to hypoxia. Many trials have demonstrated that intense control of hyperglycemia helps to minimize or prevent diabetic retinopathy.

Increased Polyol Pathway

Most cells in the body require insulin for glucose entry. However, insulin is not required for the transport of glucose into the endothelial cells of the retina, kidney, and nervous tissue. There is, therefore, a free interchange of glucose from the extracellular to the intracellular environment regardless of the presence of insulin or its action. Any excess glucose is promptly metabolized to sorbitol by the enzyme aldose reductase and then to fructose, which diffuses out of the retinal endothelial cell. Aldose reductase has a low affinity for

glucose at normal glucose concentrations and metabolism of glucose by the polyol pathway accounts for a very small percentage of glucose metabolism under euglycemic conditions. However, in the hyperglycemic state, excess glucose enters the polyol pathway, resulting in excess sorbitol production and fructose formation. These changes are associated with a concomitant decrease in nicotinamide adenine dinucleotide phosphate (NADPH). Depletion of NADPH contributes to the increased intracellular formation of reactive oxygen species through reduced glutathione levels, leading to oxidative stress, and resultant diabetes-related vascular damage.

Increased protein Kinase C (PKC) Activation

The PKC family is a large group of structurally related enzymes that require phosphotidylserine/diacylglycerol/ free fatty acids, and or Ca^{2+} ions in addition to Mg^{2+} for their activation. PKC isoforms are activated by the lipid second messenger diacylglycerol, synthesized from increased intracellular glucose. This leads to decreased tissue blood flow because of reduced production of nitric acid, which is a potent vasodilator. Protein Kinase C also enhances vascular permeability and neo-vasularisation in the eye through the expression of vascular endothelial growth factor (VEGF). Increased

PKC levels influence many cellular functions by altering collagen synthesis, stimulating hormones and stimulating growth factor receptor recycling. Activation of PKC also alters the expression of endothelium-derived vasoactive factors such as Endothelin-1, which have been identified in many retinal cells including the capillary endothelial cells and pericytes leading to vasoconstriction and retinal ischaemia.

Hexosamine pathway

Activation of the hexosamine pathway by hyperglycemia may result in various changes in both gene expression and in protein function that together contribute to the pathogenesis of diabetic complications. Recent studies have reported that hyperglycemia could cause diabetic vascular complications by shunting glucose into the hexosamine pathway leading to hyperglycemia induced and fat-induced insulin resistance and induction of synthesis of growth factors.

Oxidative stress

Oxidative stress, an imbalance between the generation of reactive oxygen species and antioxidant defense capacity of the body is closely linked with ageing and many diseases including

cardiovascular diseases, diabetes and diabetic complications. Several mechanisms may cause oxidative insult in diabetes and its associated complications, although their exact contributions are not entirely clear. Oxidative stress mechanisms in ocular tissues have been hypothesized to play a role in diseases such as glaucoma, cataract, uveitis, age-related macular degeneration and various forms of retinopathy.

Hormonal factors

Recent evidence suggests that diabetic retinopathy is the consequence of a complex hormonal dysfunction, which is related to insulin-dependent up and downregulation of growth factors, to which metabolic, haemodynamic, endocrine, paracrine, and autocrine mechanisms contribute. Various hormones, including the sex hormones, the insulin-like growth factors and growth hormones may influence the later stages of diabetic retinopathy. Retinopathy rarely occurs before puberty, suggesting that changes in sex hormones may influence the development of this condition.

1.5.4 Growth factors in Diabetic Retinopathy

It is well accepted that hypoxia plays an important role in the initiation of the angiogenic process in the retina. The growth factors

include fibroblast growth factor, insulin derived growth factor, platelet-derived growth factor, tumor necrosis factor and interleukins. These growth factors act in synergy to mediate the steps of angiogenesis, including protease production and endothelial cell proliferation.

1.5.5 Genetic influences on diabetic retinopathy

The importance of hyperglycemia in the pathogenesis of diabetic retinopathy is now unquestioned after the results of the three landmark international multicentre trials. Genetic factors appear to have an important role in initiating diabetic retinopathy, knowledge of the physiology and pathophysiology of diabetic retinopathy has led to a hypothesis that genes could influence the development of retinopathy, however, no definite conclusions can be made.

1.5.6 Diabetic retinopathy and Ayurveda

Diabetic retinopathy can be correlated with *Timira, Kacha and linganasha* according to Ayurveda, by observing various symptoms and stages of diabetic retinopathy like non-proliferative, proliferative etc and according to the dosha involvement it can be considered as *vataja, pittaja, kaphaja, rakthaja* and *sannipatha* and the treatment can be done accordingly.

When the doshas moving in the siras get localised in the first patala, the person sees the objects hazy, though it is visible, with no other obvious reason[81].

When they spread to the second *patala*, the person sees the objects which are not present, sees near objects with great effort and the small and distant objects are not seen at all; understands distant objects as present nearby [82].

When the *doshas* are localized in the form of a circle, the patient sees circular shapes in all things; when localized in the centre of the *drishti* he sees one object as two when they are localized at many places, he sees one object as many; when the *doshas* get into the area of vision, small objects are seen big [83].

When localised below, he does not see nearby objects; when localised above, distant objects are not seen; when localised at sides, objects present in the sides are not seen. All these are known as the disease - *Timira*[84].

When the doshas get localized in the third *patala, kacha* occurs, in which he sees objects present above but not those present below, objects are seen as covered by thin cloth, the area of vision,

assumes the colour related to the *dosha* and gradually the vision diminishes[85].

When *kacha* is neglected, the doshas get localised in the fourth *patala* resulting in *Linganasa*, by covering the whole area of vision[86].

In *vatika timira*, the person sees objects as though covered by thin cloth, unsteady, dirty, slightly red, sometimes and some other times as clear and clean; sees webs, hairs, mosquitoes and rays of light in front of his eyes.

When *kacha* is developed, the area of vision is slightly red, the person sees the face of others as noseless, sees the moon, lamp etc as many, understand curved things as straight; *kacha* when grows older, makes the sight of objects as though covered with dust andsmoke, of well defined red colour, widespread or small in size and loss of vision. This stage is *Linganasa*[87].

Increased vata causes constriction of *siras* of *drishti*, in drawing of the *drishti mandala*, resulting in *gambhira drishti*[88].

In *paittika timira*, the person sees flashes of light, glow-worm and burning lamp etc, objects appear as deep blue like the feather of the peacock and *tittiri*. In *kacha*, the organ of vision appears as *kachaneela*, so the person sees objects in the same colour; the sun, moon, fire, mirage and rainbow as surrounded by haloes. In *linganasa*, the drishti is blue like that of a bee, incapable of seeing and is unctuous. It is known as *hrasva drishti* and the person sees only very little. When the organ of vision becomes yellow and the person sees the objects as yellow coloured, then the condition is termed as *pittavidagdha drishti* [89].

In *kaphaja timira*, the person sees the objects as unctuous, white, like that of a conch shell, moon, flowers of kunda and as though covered with *kumuda*. In *kacha*, the moon, the sun the flame etc appear lusterless and as though covered with cloth. In linganasa, the organ of vision is white so also the objects are seen, solid *kapha* which is unctuous getting localized in the organ of vision causes loss of vision, like a drop of water standing on a lotus leaf, vision is unsteady, shrinks when there is heat during the day and expands when there is a shade (during the night) the objects are seen white like the conch, *kunda* and the moon, lily and rock crystal[90].

In *raktaja timira*, the organ of vision is red and the person sees the objects as though in darkness. In *kacha*, the organ of vision is either red or black and the objects are seen similarly. In *Linganasa* also, the organ and the objects seen are similar in colour, lusterless and there is a loss of vision also[91].

In timira caused by the combination of two and three *doshas*, the symptoms of the doshas involved are present; in *timira*, the objects are seen sometimes clear and sometimes as covered; and in remaining (*kacha* and *linganasa*) objects are seen as having either many colours or red[92].

Chapter 2

METHODOLOGY

Aim and Objectives

Aim

1. To explore the association of prakriti in the occurrence of diabetic retinopathy

Objectives

1. To explore the association of achakshushya ahara and diabetic retinopathy.
2. To explore the association of achakshushya vihara like watching television and diabetic retinopathy.

The prevalence of diabetes is increasing day by day and patients with diabetic complications are also getting increased. One of the major complications of diabetes is retinopathy. By analyzing the *prakriti* of the individuals with diabetic retinopathy we can assess which type of *prakriti* individuals is getting affected by this disease more so that we can predetermine the occurrence of retinopathy in diabetic patients with that particular *prakriti.* And also it will help to assess which type of retinopathy that particular *prakriti* individual is prone to. By modifying the *ahara* and *vihara* we can control the occurrence of retinopathy in diabetic patients.

The methodology is a key part of research. This observational study is done to find any association of *prakriti* in the occurrence of diabetic complication i.e. retinopathy. Here diabetic patients with more than 10 years duration were selected and their *prakriti* was assessed using a software developed by C-DAC Pune (Ayusoft) and screened for diabetic retinopathy using ophthalmoscopy. If patients were already diagnosed with diabetic retinopathy, their *prakriti* was assessed using the same software.

2.1 Definition of terms

Diabetic patients: Already diagnosed diabetic patients with more than 10 years duration.

Prakriti*: Tridosha prakriti* is considered here. A valid tool was used to assess *prakriti. AYUSOFT SOFTWARE OF C-DAC, Pune.*

2.2 Materials and Methods

2.2.1 Source of data

Patients with diabetes of more than 10 years duration were included in this study.

2.2.2 Research design

Observational study

2.2.3 Study setting

OPD and IPD of Govt Ayurveda College, Tripunithura, Ernakulam, Kerala

2.2.4 Population

Diabetic patients with more than 10 years duration

2.3 Ethics

2.3.1 Institutional Ethics Committee

Ethical clearance was obtained from the institutional Ethical Committee of Govt Ayurveda College, Tripunithura (Appendix 4).

2.3.2 Informed consent

Informed consent obtained from all the participants (Appendix 3).

2.4 Method of data collection

2.4.1 Sampling procedure

Consecutive Sampling.

2.4.2 Sample size

Prevalence of Diabetic Retinopathy = 34.6 %

So

p = 34.6%

q = 100 – 34.6

= 65.4

Relative Precision (d) = 20%

prevalence = 34.6.

therefore, d = 6.92

Alpha error, $z\alpha$ at 5% (0.05) = 1.96

Sample size n = $\frac{(z\alpha)^2 \times p \times q}{d^2}$

= $\frac{1.96 \times 1.96 \times 34.6 \times 65.4}{6.92 \times 6.92}$

= 182 subjects

==========

2.4.3 Duration of the study

24 months.

2.4.4 Inclusion criteria

1. Diabetic patients (Type I and Type II) with more than 10 years duration.
2. Age between 30 to 60 years
3. Both gender.

2.4.5 Exclusion criteria

Patients with systemic disorders other than diabetes.

2.3.6 Instruments intended to be used

1. A valid questionnaire to assess *Prakriti* was used.
2. A questionnaire Regarding chronicity of diabetes, their occupation, *Ahara*, *Vihara*, Family History, Drug History were prepared and was analysed.
3. Ophthalmoscopy and vision testing was used to diagnose diabetic retinopathy.

2.3.6 .1 AYUSOFT of C-DAC PUNE

AyuSoft is a validated computer-assisted questionnaire

software developed by C-DAC, Pune, Dept. of Information Technology, Ministry of Communications and Information Technology (MCIT), India. It is a decision support system comprising of Ayurvedic encyclopaedia, data mining tool, constitution assessment, disease diagnostic and treatment and person information management system.

This software facilitates Ayurvedic research, diagnosis and treatment catering to the need of various users such as academicians, students, researchers, practitioners, hospitals etc. It consists of a one-gigabyte repository of Ayurvedic data, including applications for physiological and psychological constitution assessment, disease diagnostics and treatment based on symptoms and causative factors. It also consists of personal information management, wherein records can be maintained for each patient's case details.

The software converts Ayurvedic classical texts into comprehensive, authentic, intelligent and interactive knowledge repositories with complex analytical tools. It is a comprehensive interactive and intelligent software system to assist medical practitioners and researchers for the application of basic principles of Ayurveda.

Besides the digitalization of most of the fundamental principles of Ayurveda, the software is designed to help in clinical practice for proper documentation and retrieval of cases and thus covers all practical needs from patient registration to case detailing. The software comprises of systematic examination tools as per classical Ayurvedic guidelines and offers an easily accessible and searchable database from a wide source of Ayurvedic books

Applications of AyuSoft

- Constitution and dhatu sara assessment.
- Disease diagnostics and treatment.
- Diet and lifestyle advice.
- Multimedia based encyclopedia with glossary.
- Textual and graphical analytical report tools
- Personal information management system.
- Data Mining Tool for Complex Queries

Different tools in '*VaidyaSanmitra*' application of this software can be used in various clinical situations including constitution assessment, which is explained here in detail.

Prakriti Vichaya **tool- for** ***prakriti*** **assessment**

This tool helps in the assessment of physical and psychological constitution based on which diet and lifestyle advice is also suggested. *'Prakruthivichaya*' tool being useful in quantitatively expressing the *dosha* dominance provides an effective and quantitative instrument to assess the *prakriti* of individuals.

Questionnaire for *prakriti* assessment

- The questionnaire is based on the classical guidelines regarding of *prakriti* assessment.
- Extensive questionnaire specific to age group and gender is provided. It covers history, anatomical, physiological and psychological assessment with practical options to each question.
- Questions are of two types. By default, it will display the main type of questions. If needed, check the supportive radio button to get the supportive type of questions.
- A total number of questions are 83 including main and supportive questions.

- Gender-based: -83 questions for males and 81 questions for females have given.

Two additional questions regarding beard and moustache hair and amount of semen are provided for males.

To help the physician in analysis, questions have been again divided into three groups – anatomy, physiology and psychology. At the end of the analysis session, the physician will get results in these groups also. Number of questions in this group,

Anatomy	-	32 questions
Physiology	-	40 questions
Psychology	-	11 questions

The help menu has been provided in the software for eliciting the correct answers from the participants.

The validity of the tool

- It is a validated tool through multicentre national level trials
- Subgroup specific quantitative analysis provides a better understanding of constitution parameters.

Installation of *prkrthi vichaya* application gives access to '*Vaidya Sanmitra'* under which person registration, person selection, person modification etc.can be done for *prakriti* analysis using '*manushavrtta'* tool.

Person Registration

- This helps in registering new persons.
- All information once saved can be referred to later visits.
- Mandatory fields are displayed with asterisk mark (*) which includes first name of the person, gender, date of birth, marital status, country of birth, present address line, present and permanent address state and country; education and date of registration.
- A case number can be assigned for participants undergoing *prakriti* assessment.

Person Selection

- The purpose of person selection is to start the visit of the registered person.
- Only registered persons can be selected. Searching

a person can be done based on any one of the following criteria PIN, first name, last name, case number, or date of registration.

Person Modification

- If any modification is needed in personal details, it can be done by selecting a person and clicking 'Modify Person' button. The details of a person except for gender and case number can be modified, which are entered at the time of registration.

Weightage Configuration

- Options of each question have weightage from 1 to 10. Based on these weightages, the system analyzes the individual's *prakrthi*.
- The physician also has been provided with the option to change the weightage if required.
- Once the weightage is changed, it gets applied to all the participants and analysis as per the modified weightage will be displayed.
- If weightages are changed after the assessment is done, while assessing the *prakriti* for the same person,

the system will provide an option to save the old analysis or recalculate it according to new weightages.

- 'Default' button is used to assign the system-defined weightages.

The assumption for weightage:

- The characteristics, which are exclusive for a particular *prakr*thi are given maximum weightage. E.g. broad forehead *(mahalalaata)* for *Kapha prakriti*, conspicuous veins, ligaments and tendons *(Bahu kandaraasiraaprataana*) for *Vata prakriti, profuse* urine (*prabhootamootrata)* for *Pitta prakriti.*
- Physiques being stable, the factors regarding physique are given more weightage. Physiology, though quite consistent for that individual, variations are possible and hence misguiding answers are likely. Hence it is given less weightage than physique.
- In the case of psychological characters, it may find very difficult to bring the person to give the exact or true answer. Hence *manasa bhava* in *doshaprakriti* assessment is given even lesser weightage.

Technical aspects

- *AyuSoft* is available in a desktop, intranet and internet versions. The desktop version requires good computer speed and space for optimum usage of software and cannot be used by individuals who do not have adequate ayurvedic knowledge due to the usage of Sanskrit terminology. To use the Sanskrit font plugin component should be installed. It is possible to save the various reports generated in *AyuSoft* through various applications.
- According to the need, individual application or full suit software can be purchased and installation can be done with a single CD containing the individual application or combination of individual applications.

Specifications of the computer (Software and hardware configurations required for *AyuSoft*

Platform required – Windows operating system (supports windows vista, windows7, windows8 and windows 10).

Components - Minimum requirement

- Memory - 4GB RAM
- Hard disc 2GB free space for software +100MB (peruse with one patient)
- Miscellaneous Keyboard, Mouse, CD-ROM drive, VGA card with colour monitor, USB drive
- Other services Microsoft Word 2000, Excel 2000, version 6.0 and above.

2.3.6.2 Questionnaire

A Questionnaire regarding chronicity of diabetes, occupational history, ahara, vihara etc. was given to assess other variables.

2.3.6.3 Ophthalmoscopy and vision testing

Ophthalmoscopy is a test that allows a health professional to see inside the fundus of the eye and other structures using an **ophthalmoscope**. It is done as part of an eye examination and may be done as part of a routine physical examination. It is crucial in determining the health of the retina, optic disc, and vitreous humour.

Ophthalmoscopy is done as part of a routine physical or

complete eye examination. It is used to detect and evaluate symptoms of various retinal vascular diseases or eye diseases such as glaucoma. In patients with diabetes mellitus, regular ophthalmoscopic eye examinations (once every 6 months to 1 year) are important to screen for diabetic retinopathy as visual loss due to diabetes can be prevented.

The visual acuity test is used to determine the smallest letters you can read on a standardized chart (Snellen chart) or a card held 20 feet (6 meters) away. Special charts are used when testing at distances shorter than 20 feet (6 meters). Some Snellen charts are video monitors showing letters or images.

2.3.7 Data Collection

1. The study was conducted in already diagnosed diabetic patients with more than 10 years duration.
2. A valid questionnaire was used to assess the *prakriti* of each participant – *Ayusoft of C-DAC pune*
3. Ophthalmoscopy and vision testing were used to diagnose diabetic retinopathy
4. A questionnaire regarding chronicity of diabetes, their

occupation, *ahara*, *vihara*, family history, drug history were prepared and was analyzed.

5. The collected data were statistically analyzed to find the relationship between *prakriti* and diabetic retinopathy.
6. Relationship of prakriti in the occurance of retinopathy in diabetic patients was studied by the concepts of Ayurveda.

2.3.8 Plan of analysis

According to Data collected the results were evaluated and the significance of the study was assessed using basic statistical analysis (descriptive statistics) and the association of *prakriti*, occupation, *ahara* and *vihara* in the causation of diabetic retinopathy were assessed by descriptive statistics and appropriate tests - Chi-Square test was done.

Chapter 3

OBSERVATION AND ANALYSIS

In this study, patients with a diabetic history of more than 10 years were selected and *prakriti* was assessed and ophthalmoscopy was done to diagnose retinopathy. Their *ahara, vihara*, stress, BP, control of diabetes and dietary modification, exercise, sleep were assessed. The observations obtained are given below in tables, the chi-square test was done to find any association. Regression analysis is also done to find the contribution of each variable in the occurance of retinopathy.

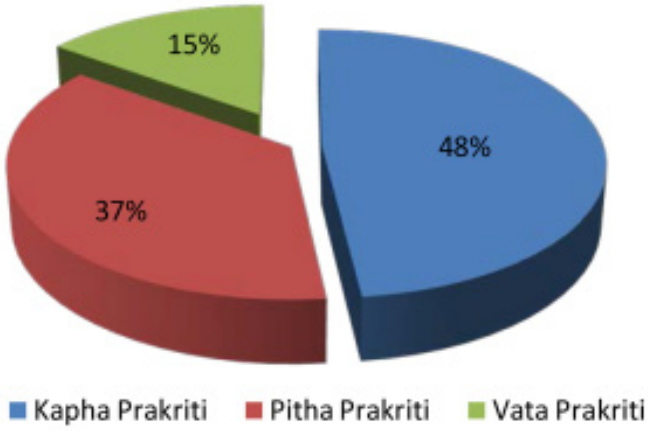
Table No. 3.1. Diabetes and *Prakriti*

Prakrithi	Frequency	Percent	Cumulative %
Kapha	184	41.8	41.8
Pitha	182	41.4	83.2
Vata	74	16.8	100
Total	**440**	**100**	

Among the total patients selected *kapha prakriti* patients were more, and *vata prakriti* patients were less. We know that diabetes is a disease caused by *kapha medhodushti*. So *kapha prakriti* individuals are more prone to get diabetes. Also, we know that diabetes is a metabolic syndrome which causes derangement of *agni* so that *pitta prakriti* people are also prone to diabetes. In this study, it was found that *vata prakriti* individuals with diabetes are less compared with *kapha* and *pitta prakriti* individuals

Table No. 3.2. *Prakriti* and Diabetic Retinopathy

Prakriti		Diabetic Retinopathy		Total
		No	**Yes**	**Total**
KAPHA	Count	61	123	184
	% within *Prakriti*	33.20%	66.80%	100.00%
	% within Diabetic Retinopathy	33.00%	48.20%	41.80%
PITHA	Count	88	94	182
	% within *Prakriti*	48.40%	51.60%	100.00%
	% within Diabetic Retinopathy	47.60%	36.90%	41.40%
VATA	Count	36	38	74
	% within *Prakriti*	48.60%	51.40%	100.00%
	% within Diabetic Retinopathy	19.50%	14.90%	16.80%
Total	Count	185	255	440
	% within *Prakriti*	42.00%	58.00%	100.00%
	% within Diabetic Retinopathy	100.00%	100.00%	100.00%



Graph 3.1. Prakriti and Diabetic Retinopathy

It was found that 67% of the *kapha prakriti* diabetic patients were having diabetic retinopathy, 51 % of the *pitta prakriti* diabetic patients were having diabetic retinopathy and 38% of the *vata prakriti* diabetic patients were having retinopathy. Since the total *vata* predominant diabetic patients were less compared to *kapha* and *pitta prakriti.* To be more precise it was found that *kapha pitta prakriti* individuals with diabetes were mostly affected with retinopathy, the second was *pittakapha prakriti* individuals, *vatapitta prakriti* were less affected. When we compare within retinopathy it was found that 49.2 % were *kapha* predominant *prakriti*, 36.9% were *pitta* predominant and the remaining 14.9% were *vata* predominant which shows that *kapha* predominant *prakriti* persons were more affected compared to *vata* predominant patients.

Table No. 3.3. Chi-square Test - *Prakriti* and Diabetic retinopathy

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.267[a]	2	0.006
Likelihood Ratio	10.374	2	0.006
Linear-by-Linear Association	8.021	1	0.005
N of Valid Cases	440		

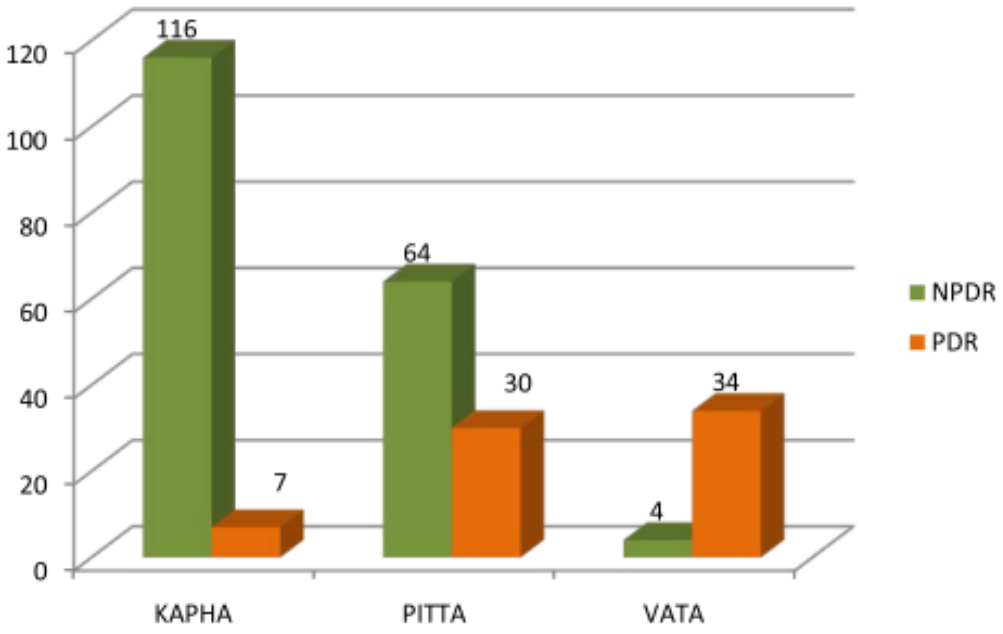
Chi-Square test shows a association between *prakriti* and the occurance of diabetic retinopathy, Since the p-value is <0.05 the association was significant. Here we can see the association of *prakriti* in the occurance of the disease which was the main aim of this study.

Table No. 3.4. Types of retinopathy and *prakriti*

		Prakriti			
		Kapha	***Pitta***	***Vata***	**Total**
TYPES	No Retinopathy	61	88	36	185
	Expected count	77.4	76.5	31.1	185
	% within Types	33.00%	47.60%	19.50%	100.00%
	% within *prakriti*	33.20%	48.40%	48.60%	42.00%
	% of Total	13.90%	20.00%	8.20%	42.00%

		Prakriti			
		Kapha	***Pitta***	***Vata***	**Total**
NPDR	Count	116	64	4	184
	Expected Count	76.9	76.1	30.9	184
	% within TYPES	63.00%	34.80%	2.20%	100.00%
	% within *PRAKRITI*	63.00%	35.20%	5.40%	41.80%
	% of Total	26.40%	14.50%	0.90%	41.80%
PDR	Count	7	30	34	71
	Expected Count	29.7	29.4	11.9	71
	% within TYPES	9.90%	42.30%	47.90%	100.00%
	% within *PRAKRITI*	3.80%	16.50%	45.90%	16.10%
	% of Total	1.60%	6.80%	7.70%	16.10%
Total	Count	184	182	74	440
	Expected Count	184	182	74	440
	% within TYPES	41.80%	41.40%	16.80%	100.00%
	% within *PRAKRITI*	100.00%	100.00%	100.00%	100.00%
	% of Total	41.80%	41.40%	16.80%	100.00%

Among the total retinopathy patients selected non-proliferative retinopathy were 184 and proliferative were 71. In that non-proliferative retinopathy patients, 116 were *kapha prakriti*, 64 were *pitta prakriti* and



Graph 3.2. Types of retinopathy and prakriti

4 *vata prakriti.* Among the proliferative group it was found that 30 patients were *pitta prakriti*, 34 *vata prakriti* and 7 were *Kapha prakriti.*

Table No. 3.5. Chi-square Test - Types of retinopathy and *prakriti*

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.093E2[a]	4	0.000
Likelihood Ratio	114.995	4	0.000
Linear-by-Linear Association	4.644	1	0.031
N of Valid Cases	440		

Chi-square test shows an association between the types of retinopathy and *prakriti* since the p-value is <0.05.

Table No. 3.6. Duration of Diabetes and Retinopathy

Duration		Diabetic Retinopathy		Total
		No	Yes	
10-15 years	Count	142	255	397
	% within Duration of Diabetes	35.80%	64.20%	100.00%
	% within Diabetic Retinopathy	76.80%	100.00%	90.20%
15(+) - 20 years	Count	43	0	43
	% within Duration of Diabetes	100.00%	0.00%	100.00%
	% within Diabetic Retinopathy	23.20%	0.00%	9.80%
Total	Count	185	255	440
	% within Duration of Diabetes	42.00%	58.00%	100.00%
	% within Diabetic Retinopathy	100.00%	100.00%	100.00%

It was found that diabetic patients with 10-15 years of duration were more affected. Even if the duration of diabetes is increased they were less affected, which shows that if the patient is prone to get retinopathy, it will occur within 10-15 years after that the chance is less. In total population, the occurrence of diabetes between age group 30-50 is more, so the complication may be occurring after 10 years. Among the

patients selected with more than 10 years of diabetic history, it was found that 58% of the diabetic patients developed retinopathy.

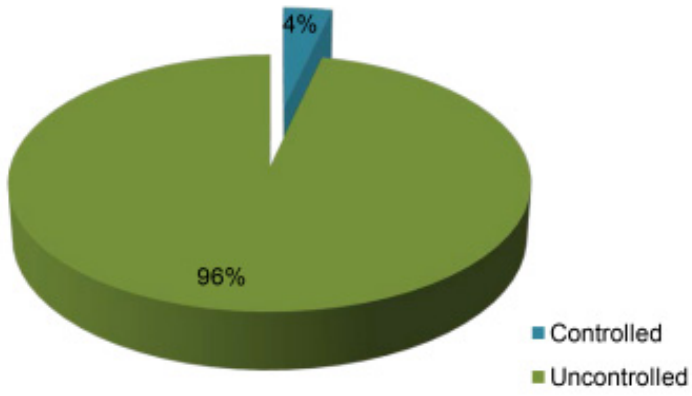
Table No. 3.7. Chi Square Test - Duration of Diabetes and Retinopathy

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	65.690[a]	1	0
Continuity Correction[b]	63.08	1	0
Likelihood Ratio	81.04	1	0
Linear-by-Linear Association	65.541	1	0
N of Valid Cases	440		

The table shows that p-value is less than 0.05, which shows that there is a significant association between duration of diabetes and retinopathy.

Table No. 3.8. Controlled / uncontrolled diabetes and retinopathy

	Frequency	Percent	Cumulative %
Controlled	16	3.6	3.6
Uncontrolled	424	96.4	100
Total	440	100	



Graph 3.3. Controlled/ uncontrolled diabetes and retinopathy

Among the patients selected it was found that 4% of patients were with controlled diabetes and the remaining 96% of the patients were with uncontrolled diabetes. it was found that most of the patients with retinopathy were not in strict glycaemic control. The blood glucose level was not under control even by medication. This may be another cause for the occurance of diabetic retinopathy. In many studies, it was proved that uncontrolled diabetes may lead to the occurance of retinopathy, but in some studies, it was explained that even with tight glycaemic control retinopathy occurred after 10 years history of diabetes.

So some other factors may be leading for the occurance of diabetic retinopathy, it may be genetical factors, *prakriti.*

Table No. 3.9. Family history of diabetes

Frequency	Percent	Valid %	Cumulative %
440	100%	100%	100%

It was found that most of the patients were having a family history of diabetes.

Table No. 3.10. Family History of Diabetic retinopathy

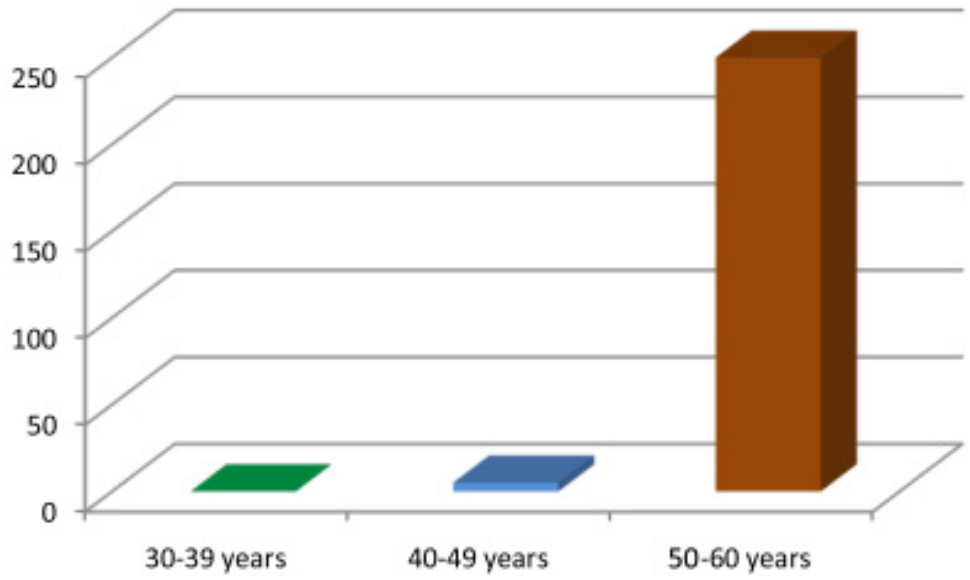
Family H/O		Diabetic Retinopathy		Total
		No	Yes	
Yes	Count	185	255	440
	% within Family H/o	42.00%	58.00%	100.00%
	% within Diabetic Retinopathy	100.00%	100.00%	100.00%
Total	Count	185	255	440
	% within Family H/o	42.00%	58.00%	100.00%
	% within Diabetic Retinopathy	100.00%	100.00%	100.00%

It was found that most of the patients with retinopathy were having a family history of diabetic retinopathy.

Table No. 3.11. Age Group and Diabetic Retinopathy

Age Group		Diabetic Retinopathy		Total
		No	Yes	
30-39 years	Count	5	0	5
	% within Age group	100.00%	0.00%	100.00%
	% within DR	2.70%	0.00%	1.10%
40-49 years	Count	15	5	20
	% within Age group	75.00%	25.00%	100.00%
	% within DR	8.10%	2.00%	4.50%
50-60 years	Count	165	250	415
	% within Age group	39.80%	60.20%	100.00%
	% within DR	89.20%	98.00%	94.30%
Total	Count	185	255	440
	% within Age group	42.00%	58.00%	100.00%
	% within DR	100.00%	100.00%	100.00%

It was found that patients of age group 50-60 years were found to be more prone to retinopathy. It may be due to the duration of diabetes, and we can see that in this study most of the patients selected were in the age group 40-60 years.



Graph 3.4. Age Group and Diabetic Retinopathy

Table No. 3.12. Chi Square Test - Age Group and Diabetic Retinopathy

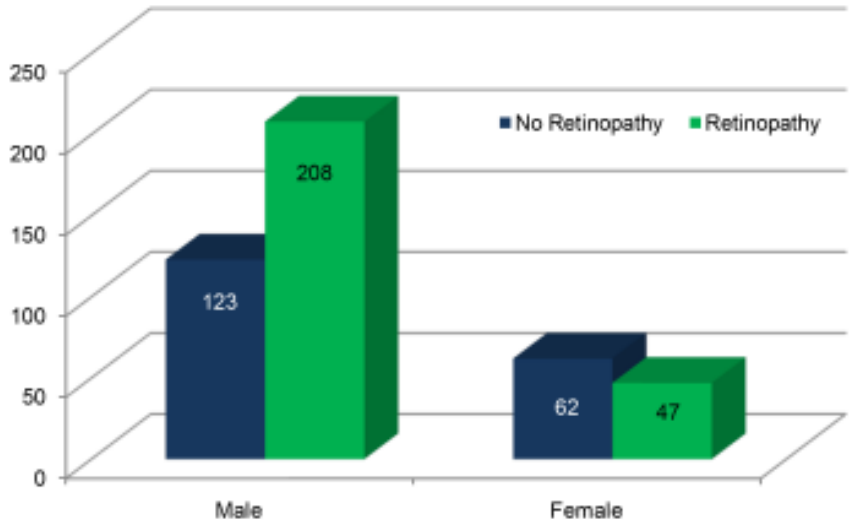
Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.696[a]	2	0
Likelihood Ratio	18.514	2	0
Linear-by-Linear Association	16.551	1	0
N of Valid Cases	440		

Chi-Square test shows a association between age and the occurance of retinopathy Since the p-value is <0.05 the association was significant. As age advances and duration of diabetes were more, there is more chance of getting retinopathy.

Table No. 3.13. Diabetic retinopathy and Sex

Prakriti		Sex		Total
		Male	**Female**	**Total**
No	Count	123	62	185
Retinopathy	Expected Count	139.2	45.8	185
	% within DR	66.50%	33.50%	100.00%
	% within SEX	37.20%	56.90%	42.00%
	% of Total	28.00%	14.10%	42.00%
Retinopathy	Count	208	47	255
	Expected Count	191.8	63.2	255
	% within DR	81.60%	18.40%	100.00%
	% within SEX	62.80%	43.10%	58.00%
	% of Total	47.30%	10.70%	58.00%
Total	Count	331	109	440
	Expected Count	331	109	440
	% within DR	75.20%	24.80%	100.00%
	% within SEX	100.00%	100.00%	100.00%
	% of Total	75.20%	24.80%	100.00%

It was observed that among the total patients selected, 62.8% of the retinopathy patients were male and 43.1% were female. Even though we can't conclude that male diabetic patients were more prone to retinopathy, it may be because more male patients were included in this



Graph 3.5. Diabetic retinopathy and Sex

study. But previous researches showed that male patients have more chance of retinopathy compared with females.

Table No. 3.14. Chi Square Test - Diabetic retinopathy and Sex

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.087[a]	1	0		
Continuity Correction[b]	12.29	1	0		
Likelihood Ratio	12.961	1	0		
Fisher's Exact Test				0	0
Linear-by-Linear Association	13.057	1	0		
N of Valid Cases[b]	440				

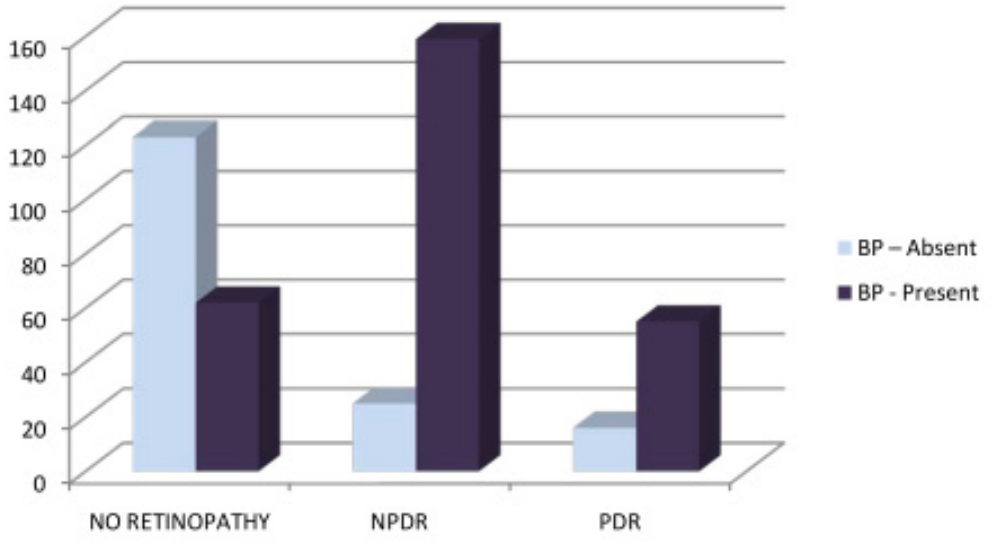
It was found that male patients were more with retinopathy compared with females. Chi-square test showed an association since the p-value is <0.05. So we can say that sex is also a determining factor in retinopathy incidence.

Table No. 3.15. Types of retinopathy and Blood Pressure

		BP		
		Absent	**Present**	**Total**
No Retinopathy	Count	123	62	185
	Expected Count	69	116	185
	% within TYPES	66.50%	33.50%	100.00%
	% within BP	75.00%	22.50%	42.00%
	% of Total	28.00%	14.10%	42.00%
NPDR	Count	25	159	184
	Expected Count	68.6	115.4	184
	% within TYPES	13.60%	86.40%	100.00%
	% within BP	15.20%	57.60%	41.80%
	% of Total	5.70%	36.10%	41.80%

		BP		
		Absent	**Present**	**Total**
PDR	Count	16	55	71
	Expected Count	26.5	44.5	71
	% within TYPES	22.50%	77.50%	100.00%
	% within BP	9.80%	19.90%	16.10%
	% of Total	3.60%	12.50%	16.10%
Total	Count	164	276	440
	Expected Count	164	276	440
	% within TYPES	37.30%	62.70%	100.00%
	% within BP	100.00%	100.00%	100.00%
	% of Total	37.30%	62.70%	100.00%

Most of the retinopathy patients were found to be hypertensive also. Among the 189 NPDR patients 154 patients were found to be hypertensive also. And among the 71 PDR patients, 55 were having high hypertension. It was found that retinopathy has got an association with blood pressure.



Graph 3.6. Types of retinopathy and Blood Pressure

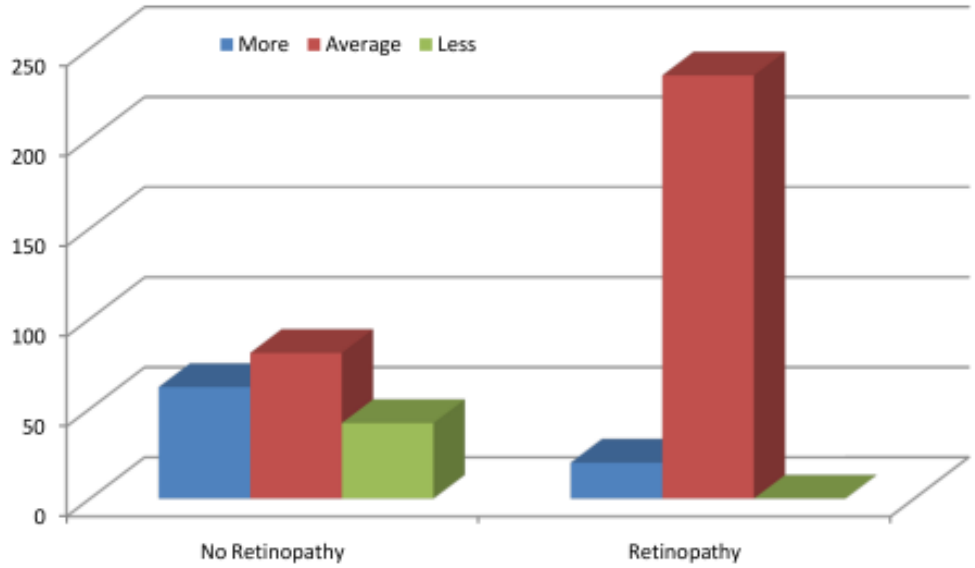
Table No. 3.16. Chi Square Test -Types of retinopathy and Blood Pressure

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.183E2[a]	2	0.000
Likelihood Ratio	123.163	2	0.000
Linear-by-Linear Association	78.417	1	0.000
N of Valid Cases	440		

Chi-square test showed that p-value <0.05 which indicates an association. So we can say that blood pressure is another factor which augments for the occurance of retinopathy.

Table No. 3.17. Stress and diabetic retinopathy

		Stress			
		More	**Average**	**Less**	**Total**
No	Count	62	81	42	185
Retinopathy	Expected Count	34.5	132.9	17.7	185
	% within DR	33.50%	43.80%	22.70%	100.00%
	% within STRESS	75.60%	25.60%	100.00%	42.00%
	% of Total	14.10%	18.40%	9.50%	42.00%
Retinopathy	Count	20	235	0	255
	Expected Count	47.5	183.1	24.3	255
	% within DR	7.80%	92.20%	0.00%	100.00%
	% within STRESS	24.40%	74.40%	0.00%	58.00%
	% of Total	4.50%	53.40%	0.00%	58.00%
Total	Count	82	316	42	440
	Expected Count	82	316	42	440
	% within DR	18.60%	71.80%	9.50%	100.00%
	% within STRESS	100.00%	100.00%	100.00%	100.00%
	% of Total	18.60%	71.80%	9.50%	100.00%



Graph 3.7. Stress and diabetic retinopathy

It was found that 235 patients among 255 retinopathy patients were having average stress and some patients were more stressful. So we can say that stress is also a complimenting factor for retinopathy.

Table No. 3.18. Chi Square Test - Stress and diabetic retinopathy

Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.307E2[a]	2	0.000
Likelihood Ratio	147.955	2	0.000
Linear-by-Linear Association	0.344	1	0.557
N of Valid Cases	440		

Chi-square test shows that there is an association since the p-value is <0.05. Stress increases diabetes (hyperglycemia) thus enhancing the occurance of retinopathy.

Table No. 3.19. Sleep and diabetic retinopathy

Sleep		Diabetic Retinopathy		Total
		No	Yes	
Good	Count	24	0	24
	% within Sleep	100.00%	0.00%	100.00%
	% within Diabetic Retinopathy	13.00%	0.00%	5.50%
Average	Count	124	255	379
	% within Sleep	32.70%	67.30%	100.00%
	within Diabetic Retinopathy	67.00%	100.00%	86.10%
Less	Count	37	0	37
	% within Sleep	100.00%	0.00%	100.00%
	% within Diabetic Retinopathy	20.00%	0.00%	8.40%
Total	Count	185	255	440
	% within Sleep	42.00%	58.00%	100.00%
	% within Diabetic Retinopathy	100.00%	100.00%	100.00%

Most of the patients were found to be having average sleep, maybe because most of the patients were in the age group

49-60. 5.5 % were having good sleep and 8.4% were found to be having less sleep.

Table No. 3.20. Bowels and Retinopathy

		Bowels			
		Good	Average	Less	Total
No Retinopathy	Count	116	14	55	185
	Expected Count	148.8	11.8	24.4	185
	% within DR	62.70%	7.60%	29.70%	100.00%
	% within Bowels	32.80%	50.00%	94.80%	42.00%
	% of Total	26.40%	3.20%	12.50%	42.00%
Retinopathy	Count	238	14	3	255
	Expected Count	205.2	16.2	33.6	255
	% within DR	93.30%	5.50%	1.20%	100.00%
	% within Bowels	67.20%	50.00%	5.20%	58.00%
	% of Total	54.10%	3.20%	0.70%	58.00%
Total	Count	354	28	58	440
	Expected Count	354	28	58	440
	% within DR	80.50%	6.40%	13.20%	100.00%
	% within Bowels	100.00%	100.00%	100.00%	100.00%
	% of Total	80.50%	6.40%	13.20%	100.00%

In this study most of the patients were under medication either Allopathic or Ayurveda, It may be the cause that most of the patients were having normal bowels.

Table No. 3.21. Addiction and Diabetic Retinopathy

		Diabetic Retinopathy		
		No	**Yes**	**Total**
No	Count	185	255	440
	% within Addiction	42.00%	58.00%	100.00%
	% within DR	100.00%	100.00%	100.00%
Total	Count	185	255	440
	% within Addiction	42.00%	58.00%	100.00%
	% within DR	100.00%	100.00%	100.00%

It was found that retinopathy patients were not having any type of addictions like alcohol, cigarettes smoking etc.

Table No. 3.22. Other Complications and Diabetic retinopathy

		Diabetic Retinopathy		
		No	**Yes**	**Total**
Complication	Count	165	255	420
	% within Complication	39.30%	60.70%	100.00%
	% within DR	89.20%	100.00%	95.50%
Neuropathy	Count	20	0	20
	% within Complication	100.00%	0.00%	100.00%
	% within DR	10.80%	0.00%	4.50%
Total	Count	185	255	440
	% within Complication	42.00%	58.00%	100.00%
	% within DR	100.00%	100.00%	100.00%

Among the patients selected, 5% were found to have neuropathy along with retinopathy. We know that neuropathy and retinopathy have got similar pathology i.e. microangiopathy. So retinopathy patients may also develop neuropathy in the future. In this study, it was found that some of the patients (10.8%) with retinopathy were having diabetic neuropathy also.

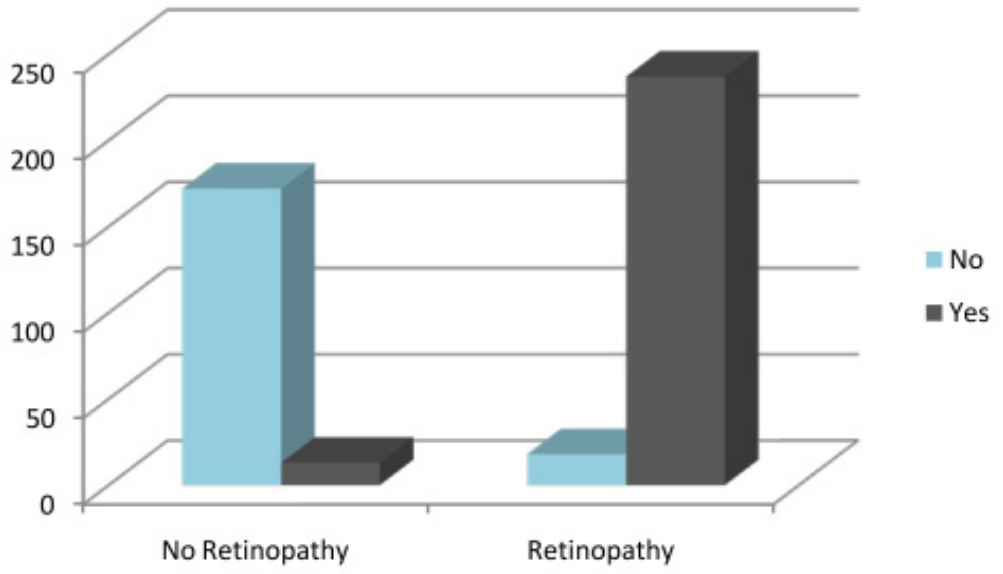
Table No. 3.23. Exercise and diabetic retinopathy

		Diabetic Retinopathy		
		No	**Yes**	**Total**
Average	Count	1	0	1
	% within Exercise	100.00%	0.00%	100.00%
	% within DR	0.50%	0.00%	0.20%
Less	Count	184	255	439
	% within Exercise	41.90%	58.10%	100.00%
	% within DR	99.50%	100.00%	99.80%
Total	Count	185	255	440
	% within Exercise	42.00%	58.00%	100.00%
	% within DR	100.00%	100.00%	100.00%

It was found that retinopathy patients were doing less exercise. Lack of exercise may be leading to hyperglycaemia thus causing retinopathy. We know that diabetes is a disease-causing *kapha medo dushti*, retinopathy is also due to *kapha dushti*, individuals without exercise have *kapha dushti* and uncontrolled blood glucose level which again leads to retinopathy.

Table No. 3.24. Watching TV and diabetic retinopathy

		Watching TV		
		No	**Yes**	**Total**
No Retinopathy	Count	172	13	185
	Expected Count	79.9	105.1	185
	% within DR	93.00%	7.00%	100.00%
	% within TV	90.50%	5.20%	42.00%
	% of Total	39.10%	3.00%	42.00%
Retinopathy	Count	18	237	255
	Expected Count	110.1	144.9	255
	% within DR	7.10%	92.90%	100.00%
	% within TV	9.50%	94.80%	58.00%
	% of Total	4.10%	53.90%	58.00%
Total	Count	190	250	440
	Expected Count	190	250	440
	% within DR	43.20%	56.80%	100.00%
	% within TV	100.00%	100.00%	100.00%
	% of Total	43.20%	56.80%	100.00%



Graph 3.8. Watching TV and diabetic retinopathy

Tables above show a relationship between watching TV and retinopathy. Among the 255 retinopathy patients, 237 patients were watching TV regularly. We know that Watching TV is an *achakshushya Vihara* which will adversely influence the visual health and which will augment the eye diseases. So watching TV will enhance the occurance of retinopathy among diabetic patients.

Table No. 3.25. Chi Square Test - Watching TV and diabetic retinopathy

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.226E2[a]	1	0		
Continuity Correction[b]	319.06	1	0		
Likelihood Ratio	377.527	1	0		
Fisher's Exact Test				0	0
Linear-by-Linear Association	321.819	1	0		
N of Valid Cases[b]	440				

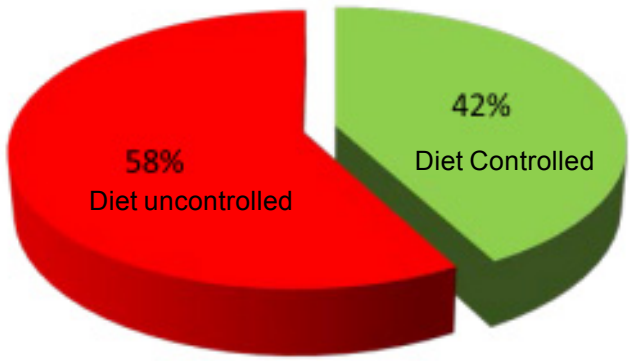
Chi-square test also shows that an association statistically.

This showed a relation between watching TV and retinopathy.

Table No. 3.26. Risk for retinopathy among diabetic patients in watching TV

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for DR (No Retinopathy / Retinopathy)	174.205	83.124	365.087
For cohort TV = No	13.171	8.423	20.597
For cohort TV = Yes	0.076	0.045	0.128
N of Valid Cases	440		

Odds Ratio showed an association between watching TV and Retinopathy.



Graph 3.9. Diabetic retinopathy and diet control / uncontrolled

It was found that most of the patients with retinopathy were

with uncontrolled diet pattern. This may be the cause for an increase in blood glucose level thus leading to retinopathy.

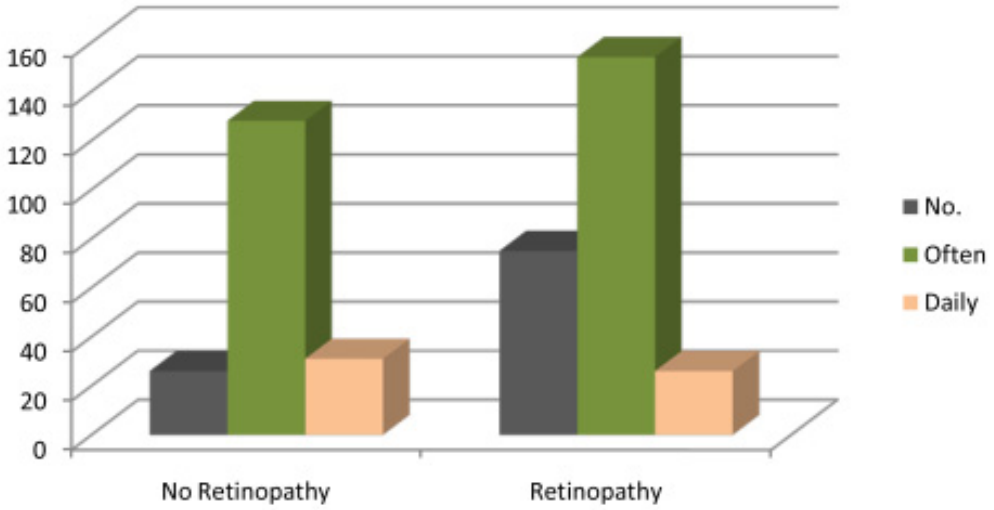
Table No. 3.27. Diet and retinopathy - FRUITS

		Fruits			
		No.	Often	Daily	Total
No Retinopathy	Count	135	27	23	185
	Expected Count	139.6	20.2	25.2	185
	% within DR	73.00%	14.60%	12.40%	100.00%
	% within Fruits	40.70%	56.20%	38.30%	42.00%
	% of Total	30.70%	6.10%	5.20%	42.00%
Retinopathy	Count	197	21	37	255
	Expected Count	192.4	27.8	34.8	255
	% within DR	77.30%	8.20%	14.50%	100.00%
	% within Fruits	59.30%	43.80%	61.70%	58.00%
	% of Total	44.80%	4.80%	8.40%	58.00%
Total	Count	332	48	60	440
	Expected Count	332	48	60	440
	% within DR	75.50%	10.90%	13.60%	100.00%
	% within Fruits	100.00%	100.00%	100.00%	100.00%
	% of Total	75.50%	10.90%	13.60%	100.00%

Most of the retinopathy patients were not taking any type of fruits regularly. It may be because retinopathy patients have a misconception that fruits will increase the blood glucose level.

Table No. 3.28. Diet and retinopathy - CURD

		Curd			
		No.	Often	Daily	Total
No Retinopathy	Count	26	128	31	185
	Expected Count	42.5	118.6	24	185
	% within DR	14.10%	69.20%	16.80%	100.00%
	% within Curd	25.70%	45.40%	54.40%	42.00%
	% of Total	5.90%	29.10%	7.00%	42.00%
Retinopathy	Count	75	154	26	255
	Expected Count	58.5	163.4	33	255
	% within DR	29.40%	60.40%	10.20%	100.00%
	% within Curd	74.30%	54.60%	45.60%	58.00%
	% of Total	17.00%	35.00%	5.90%	58.00%
Total	Count	101	282	57	440
	Expected Count	101	282	57	440
	% within DR	23.00%	64.10%	13.00%	100.00%
	% within Curd	100.00%	100.00%	100.00%	100.00%
	% of Total	23.00%	64.10%	13.00%	100.00%



Graph 3.10. Diet and retinopathy - CURD

We can see that among the total patients with retinopathy, 154 patients were taking curd often and 26 patients daily. We know that curd is an *achakshushya* diet which enhances the occurance of retinopathy.

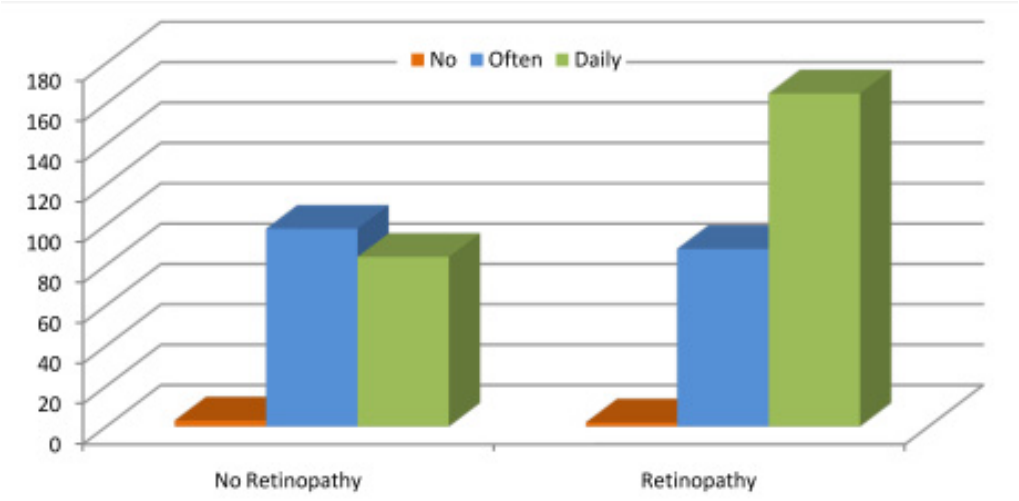
Table No. 3.29. Chi-SquareTest - Diet and retinopathy - CURD

Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.873[a]	2	0.000
Likelihood Ratio	16.462	2	0.000
Linear-by-Linear Association	14.721	1	0.000
N of Valid Cases	440		

Chi-square test showed that an association since the p-value is <0.05. Spearman's correlation also shows a relation to retinopathy and curd.

Table No. 3.30. Diet and retinopathy - BAKERY

		Bakery			
		No.	Often	Daily	Total
No Retinopathy	Count	3	98	84	185
	Expected Count	2.1	78.2	104.7	185
	% within DR	1.60%	53.00%	45.40%	100.00%
	% within Bakery	60.00%	52.70%	33.70%	42.00%
	% of Total	0.70%	22.30%	19.10%	42.00%
Retinopathy	Count	2	88	165	255
	Expected Count	2.9	107.8	144.3	255
	% within DR	0.80%	34.50%	64.70%	100.00%
	% within Bakery	40.00%	47.30%	66.30%	58.00%
	% of Total	0.50%	20.00%	37.50%	58.00%
Total	Count	5	186	249	440
	Expected Count	5	186	249	440
	% within DR	1.10%	42.30%	56.60%	100.00%
	% within Bakery	100.00%	100.00%	100.00%	100.00%
	% of Total	1.10%	42.30%	56.60%	100.00%



Graph 3.11. Diet and retinopathy - BAKERY

We can see from the tables that among the 255 retinopathy patients 165 patients were using bakery items daily and 88 patients often. Bakery items are also considered among the *achakshushya ahara* since they will deteriorate the *agni*.

Table No. 3.31. Chi-SquareTest - Diet and retinopathy - BAKERY

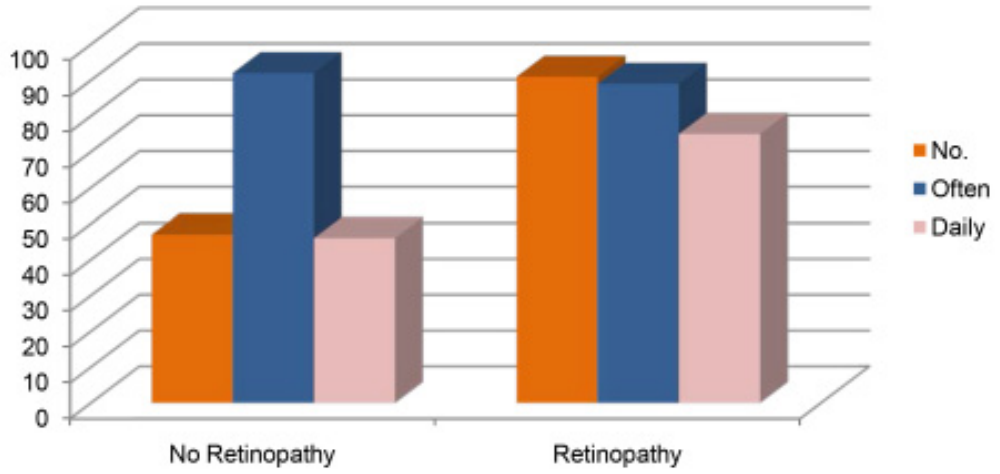
Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.365[a]	2	0.000
Likelihood Ratio	16.390	2	0.000
Linear-by-Linear Association	16.082	1	0.000
N of Valid Cases	440		

Chi-square test also showed an association, Spearmans

correlation showed significance and establishes a relation with bakery items and the occurance of retinopathy.

Table No. 3.32. Diet and Retinopathy - COFFEE

		Coffee			
		No.	Often	Daily	Total
No Retinopathy	Count	47	92	46	185
	Expected Count	58	76.1	50.9	185
	% within DR	25.40%	49.70%	24.90%	100.00%
	% within Coffee	34.10%	50.80%	38.00%	42.00%
	% of Total	10.70%	20.90%	10.50%	42.00%
Retinopathy	Count	91	89	75	255
	Expected count	80	104.9	70.1	255
	% within dr	35.70%	34.90%	29.40%	100.00%
	% within Coffee	65.90%	49.20%	62.00%	58.00%
	% of Total	20.70%	20.20%	17.00%	58.00%
Total	Count	138	181	121	440
	Expected Count	138	181	121	440
	% within DR	31.40%	41.10%	27.50%	100.00%
	% within Coffee	100.00%	100.00%	100.00%	100.00%
	% of Total	31.40%	41.10%	27.50%	100.00%



Graph 3.12. Diet and retinopathy - COFFEE

The tables above showed that among the 255 retinopathy patients, 75 patients were taking coffee daily and 89 patients taking coffee often. Drinking coffee was found to enhance the occurance of retinopathy. We can say that coffee is *achakshushya*.

Table No. 3.33. Chi-SquareTest - Diet and retinopathy - COFFEE

Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.150[a]	2	0.006
Likelihood Ratio	10.161	2	0.006
Linear-by-Linear Association	0.599	1	0.439
N of Valid Cases	440		

Chi-square test showed that an association between

retinopathy and drinking coffee. Spearman's correlation shows a relationship between retinopathy and drinking coffee.

Table No. 3.34. Regression Analysis

Model		Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (β)	t	Sig.
1	(Constant)	0.299	0.183		1.628	0.104
	Prakriti	-0.062	0.021	-0.091	-2.977	0.003
	Sex	-0.075	0.03	-0.066	-2.523	0.012
	Stress	0.072	0.033	0.076	2.166	0.031
	Sleep	0.041	0.039	0.031	1.046	0.296
	Curd	-0.052	0.037	-0.062	-1.402	0.162
	Bakery	0.041	0.026	0.043	1.564	0.119
	TV	0.744	0.03	0.746	24.851	0
	Coffee	0.024	0.028	0.038	0.85	0.396
	Duration	-0.302	0.063	-0.181	-4.757	0
	Age	0.04	0.042	0.024	0.955	0.34

Regression analysis is a powerful statistical method that allows us to examine the relationship between two or more variables of interest. While there are many types of regression analysis, at the core they all examine the influence of one or more independent variables on a dependent variable. Here independent variables like *prakriti*, sex, age, duration of diabetes, stress, sleep and achakshshya *vihara* like watching TV, *ahara* like curd, bakery, coffee regularly lead to the occurance of retinopathy which was the dependent variable.

Chapter 4

DISCUSSION, SUMMARY AND CONCLUSION

DISCUSSION

It was observed that *kapha* predominant *prakriti* is more affected, compared to *pitta* and vata *prakriti* individuals. Among the total diabetic patients with 10 years and more duration, 42% were of *kapha* predominant *prakriti* individuals and 41% *pitta* predominant *prakriti* individuals and the remaining 17% of individuals were vata predominant *prakriti*. We can also see that these patients were following *ahara* and *vihara* which increases *kapha* and *pitta* thus leading to diabetic retinopathy.

We know that diabetes which is similar to *prameha* is caused by *kapha medo dushti*. In diabetic retinopathy (NPDR) the main pathology is the walls of the blood vessels in the retina weakens, When it progresses from mild to severe, more blood vessels become blocked, and swelling of nerve fibres occurs. Sometimes the central part of the retina begins to swell causing macular oedema. In (PDR) proliferative diabetic retinopathy,

the damaged vessels close off, causing the growth of new abnormal blood vessels in the retina and jelly-like substance fills the centre of the eye. In this study, both *kapha* predominant and *pitta* predominant *prakritis* were more affected.

It was found that among the total 255 retinopathy patients 184 patients were having NPDR and 71 were PDR. 116 patients with NPDR were *kapha prakriti*, 64 were *pitta prakriti* and 4 patients were vata *prakriti*. In the PDR group, 30 patients were *pitta prakriti*, 34 patients were with vata *prakriti* and 7 patients with *kapha prakriti*. From the properties of three *dosha*s, we may say that in NPDR patients, the properties of *kapha* like *snigdha*, *guru* , *mrtsna*, *sthira*, *slakshna* properties caused the retinal blood vessels to get weakened and blocked. Acharya had explained while describing *sukhasadhya* roga lakshanas that when *dushya*, *desa* (locality), rtu (seasons) and *prakriti* (constitution) are not identical, the disease is curable. Diabetic retinopathy is a complication of diabetes which is a disease caused by *kapha dushti*. And we can say that it is a disease affecting the upper part of the body which is a *kapha sthana*. Since eyes are said to be the seat of *pitta*, *pitta* also has a role in the occurance of diabetic retinopathy. When we see the symptoms of PDR and when we consider the gunas of *pitta* we can see that there is leakage from the blood vessels in PDR which may be due to the gunas like *sara* (flowing), *drava* (liquid) *snigdha* (unctuous), *tiksha* (sharp) and *ushna*

(hot). *Kapha Prakriti* individuals with *kapha medo dushti* (diabetes) who indulge in *kapha* increasing *aharas* and *viharas* will be more prone to get diabetic retinopathy (NPDR). Vata *prakriti* and *pitta prakriti* individuals with uncontrolled diabetes who indulge in activities which increases *pitta* and vata are also prone to diabetic retinopathy (PDR). So *kapha prakriti* and *pitta prakriti* individuals are at high risk of getting affected with diabetic retinopathy.

Diabetes (*prameha*) which starts from *kaphadushti*, later it is *pitta* predominant and at the end stage, it is vata predominant. Like that in diabetic retinopathy also, in the early stages, it is *kapha* predominant (NPDR) and then *pitta* predominant (PDR) and later on it is vata predominant where retinal detachment occurs. Here we can see that the transformation of NPDR to PDR is faster in *pitta prakriti* individuals compared to *kaphaprakriti* individuals. When we see the aetiology of *kapha* vitiation, we can see that eating foods which are *madhura* (sweet) *Amla* (Sour) and *Lavana* (salty) and *snigdha* (oily) *Guru* (heavy) *Abhishyanda (*Slimy) and *Seeta* (cold) causes vitiation of *kapha*. *Viharas* like lack of exercise, day sleep and *Ajeerna* (indigestion) causes *kapha* vitiation. Here we can see those *kaphaprakriti* individuals indulging in *kapha* vitiating *aharas* and *viharas* in a disease with *kapha dushti* leading to a complication which is also *kaphapradhana* (NPDR). If the individual again follows the same lifestyle it will cause the next *dosha* ie *pitta* vitiation

(PDR) and vata vitiation (Retinal detachment or degeneration). If the individuals who indulge in *aharas* which is *Katu* (pungent), *Amla* (sour), *Lavana* (salty), *Tikshna* (sharp), *Ushna* (hot) and *Vidhahi* (burning) causes *pitta* vitiation. If the *prakriti* of the individuals is also *pitta prakriti* it will enhance the vitiation thus causing *pitta pradhana* disease, if *pitta prakriti* individuals affected with diabetes who indulge in *pitta* kopa *aharas* and *vihara* there is more chance to retinopathy especially proliferative diabetic retinopathy.

Acharya had explained *Tiimira, Kacha* and *Linganasha* according to the *dosha* and *dhatu* involvement and also considering the patala. While considering this with retinopathy we can say that since NPDR (Non-Proliferative Diabetic Retinopathy) has got more symptoms of *kapha* involvement like oedema it can be considered as Timira (especially *Kapha* predominant). Here we should consider the *dosha*s and *dhatu* involvement and the degree of vision loss also. When we consider PDR (it is more *pitta*) we can consider this as *kacha*. Here also we should consider *dosha* and *dhatu* involvement and also the degree of vision loss. When it comes to *linganasa* we can say that total degeneration and retinal detachment occurs causing complete vision loss and difficult to cure.

Patient with diabetes who is *kapha prakriti* or *pitta prakriti*

should avoid *kapha* vitiating and *pitta* vitiating *aharas* and *viharas*. We know that diabetes or *prameha* is a disease with *kapha medo dushti*, if the patient continues with the same *aharas* and *viharas* without controlling the blood sugar level, this will lead to complications like retinopathy where the first *dosha* to vitiate is *kapha* (leakage, exudates and oedema), and if the patient continues the same regimen then *pitta dosha* gets vitiated (retinal haemorrhage) and at the end, vata gets vitiated (retinal detachment).

We can see many similarities in *prameha* nidana and netra roga nidanas like *amla rasa, suktaranala. masha, kulatha, vega vinigraha*. It is *srotodushti* in *raktavaha srotas* of the retina which causes *sanga* (occlusion of retinal blood vessels), *siragrandi* (aneurysms), *athipravrti* (neo-vascularisations), and *vimarga gamana* (retinal haemorrhage).

In this study, it was found that male patients were more affected compared to females. Previous studies regarding diabetic retinopathy and sex showed that male patients are more prone to retinopathy. When considering the age group, 49-60 were the more affected group compared to other age groups. And while considering the chronicity of diabetes 10-15 years were more affected. In Ayurveda Samhitas, it is explained that those who follow *achakshushya ahara* like, *ushna ahara,*

utklesha ahara, abhishyandi ahara, virudha ahara, asathmya ahara, adhyasana are prone to get affected with eye diseases. Those *ahara's* which vitiates *pitta* and *abhishyandkara* cause eye diseases. In this study, it was found that patients with diabetes who followed such type of *ahara*'s ended up in retinopathy. 154 patients were taking curd often and 26 patients daily. Curd is an *achakshushya* diet which augments the occurance of retinopathy. Among 255 patients with retinopathy 165 patients were using bakery items daily and 88 patients were using often. Bakery items are also considered among the *achakshushya ahara* since they will deteriorate the *agni*. Derangement of *agni* causes an increase in blood sugar level as well as retinopathy. Among the 255 retinopathy patients 75 patients were taking coffee daily and 89 patients taking coffee often. Drinking coffee is found to enhance the occurance of retinopathy. We can say that coffee is *achakshushya* since it causes derangement of agni and it also increases the blood pressure thus increasing the chance of retinopathy.

Other factors like stress, blood pressure, exercise, watching TV etc., were contributing to the occurance of retinopathy. We know that watching TV is *achakshushya* since it will give overstrain to the eyes, it was found that among the 255 retinopathy patients 237 patients have watched TV regularly more than 3 hours a day. Most of the patients with retinopathy were not doing any sort of exercise. And most of the patients

were having average stress at home or in the workplace which contributed to the occurance of retinopathy. Among the 189 NPDR patients 154 patients were found to be hypertensive also. And among the 71 PDR patients, 55 were having hypertension. This shows hypertension also contributes to retinopathy. Regression analysis shows that the variables *Prakriti*, Age, Sex, Duration of diabetes, Chronicity, Watching TV, lack of exercise, Food which deranges *agni* like Bakery items, Curd, Coffee, Hypertension, Stress are some of the factors which contribute to the occurance of retinopathy among diabetic patients.

SUMMARY

- Diabetes is a disease with *kapha medo dushti*, So *kapha prakriti* individuals are prone to diabetes.
- *Vata prakriti* individuals are less affected by diabetes, if affected they are prone to get complications earlier.
- Diabetic retinopathy is a disease with *kapha* and *pitta dosha* vitiation. So *kapha prakriti* and *pitta prakriti* individuals are prone to retinopathy.
- If diabetic patients follow *ahara* and *vihara* which increases *kapha dosha* and *pitta dosha*, retinopathy is more likely to occur.
- Retinopathy is more likely to occur in patients who follow *achakshushya ahara* like *ushna ahara, abhishyandi ahara, utklesha ahara,* etc.

- Diabetes is a metabolic syndrome, so ahara which causes derangement of *agni* also leads to complications eg, food items like bakery, coffee etc
- Retinopathy is more likely to occur in patients with diabetes who follow *vihara* like watching TV and lack of exercise, etc,
- Retinopathy is more likely to occur in patients with diabetes who are Stressful, Hypertensive, etc.

CONCLUSION

This study shows that *Prakriti* has got an association in the causation of diabetic complication ie; retinopathy. From the tables in the analysis part, it is clear that diabetic patients with *kapha pradhana* and *pitta pradhana prakriti* are more prone to retinopathy. So they should avoid *ahara* and *vihara* which vitiates *kapha* and *pitta*. It is clear from the observations that diabetes is less affected in *vata pradhana prakriti* individuals, so they are less prone to retinopathy. While treating retinopathy patients the line of treatment should be to pacify the *kapha dosha* and *pitta doshas*. Along with *prakriti* other factors like *ahara*, *vihara*, hypertension, stress, sleep pattern also will contribute to the occurrence of retinopathy. Since this study was done to find the association of *prakriti* and retinopathy only a few factors other than *prakriti* were included. Many more factors may be contributing to the causation of retinopathy which was behind the scope of this study. In this study, we

found that hypertension, stress, age, chronicity of diabetes, control of diabetes, diet control, sex, diet such as curd, bakery, coffee, *vihara* like watching TV, lack of exercise contributing to the occurrence of retinopathy. So while treating diabetic retinopathy we should consider all these factors. And we can also advise the diabetic patients to avoid the *ahara* and *vihara* which is *achakshushya*, so that they can control or delay the occurrence of retinopathy.

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APPENDIX

PROFORMA

Name .....

Age ..... years Sex : ☐ Male ☐ Female

Address

Occupation/ occupational history

Education

Marital status

Socio-economic status

Diabetic History

Retinopathy Present Absent

Treatment History of Diabetes Family History

Diet

Exercise

Other systemic Disorders Y N

If Yes, Treatment History

Family History

Drug History

Ahara/Diet

Morning

Afternoon

Night

In between

Any Addiction

Achakshushya ahara and vihara

Fruits	No	Often (More than 3 times a week)	Daily
Curd	No	Often	Daily
Bakery	No	Often	Daily
Coffee	No	Often	Daily
TV	No	Often	Regularly 3-5 hrs
Exercise	Good	Average	Less
Stress	More	Average	Less
Bowels	Good	Average	Less
Addiction	Yes	No	
Diet controlled	Yes	No	

AYUSOFT QUESTIONAIRE AND WEIGHTAGE REPORT

Physician Name:

Dosha Prakriti Weightage Configuration						
Question ID	**Related To**	**Question Text**	**Category**	**Gender**	**Group**	**Type**
1	Built	The Built	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Lean			Vaata	6	6
2	Well Built / Sturdy / Chubby.			Kapha	6	0
Question ID	**Related To**	**Question Text**	**Category**	**Gender**	**Group**	**Type**
2	Physique	The Body Stature / Physique(Body Frame, Height)	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Tall And Thin.			Vaata	6	6
2	Short And Thin.			Vaata	6	0
3	Plump / Stout (Either Tall Or Short).			Kapha	6	0
4	Height And Width After Spreading Both The Hands Is Equal.			Kapha	6	0
Question ID	**Related To**	**Question Text**	**Category**	**Gender**	**Group**	**Type**
3	Appearance	The Body Parts Look Like (Appearance Of Body Parts)	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Dry.			Vaata	2	0
2	Delicate / Tender.			Pitta	2	0
3	Shapely / Beautiful.			Kapha	2	2
Question ID	**Related To**	**Question Text**	**Category**	**Gender**	**Group**	**Type**
4	Body Odor	The Body Smell Is (Body Odor)	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Strong / Foul Smelling / Stinking.			Pitta	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
5	General Appearance	The General Appearance (General Impression Of The Person)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Not So Impressive / Weird / Ugly / Non Pleasant.	Vaata	2	2
2	Weird With Sad Look.	Pitta	2	0
3	Mild / Calm / Fresh / Lively / Gentle.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
6	Forehead	The Size Of The Forehead	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Broad And Tall Forehead.	Kapha	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
7	Hands	The Hands (Length Of Hand From Shoulder To Tip Of Middle Finger)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Very Long Hands (Length Of The Hand From Shoulder To Tip Of The Middle Finger Is More).	Kapha	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
8	Chest	The Chest (Massiveness Of Chest)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Massive (Ribs Hidden, Fleshy)	Kapha	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
9	Joints Appearance	The Appearance Of Joints	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Well Knit (Well Formed) And Nicely Covered With Flesh.	Kapha	2	2
2	Well Proportionate (The Joints Are In Good Proportion, In Relation To The Whole Body Frame).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
10	Joints Functioning	The Functioning Of The Joints	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Make Crepitating Sound With Movements.	Vaata	6	6
2	Tendons And Muscles Of The Joints Are Lax.	Pitta	6	6
3	Well Lubricated (No Cracking Sound With Movements).	Kapha	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
11	Tendons Ligaments	The TendonsAnd The Ligaments (The Tone And / Or Appearance Of Tendons And Ligaments)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Very Apparent Or Conspicuous.	Vaata	2	2
2	Lax.	Pitta	2	2
3	Not Apparent.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
12	Muscles - General	Texture Of Body Muscles On Touch (To Examine The Belly Of The Muscles)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Firm.	Vaata	2	2
2	Lax / Supple.	Pitta	2	2
3	Built Well (Without Laxness) / Firm.	Kapha	2	2
4	Fleshy.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
13	Calf Muscles	The Calf Muscles (Muscle Tone Of Calves)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Calf Muscles Appear Massive Due To Lack Of Fat Dressing(With Prominent Tendon Portion Over Muscle Spread / Prominent And Hard Muscles Especially The Hamstrings And Calf).	Vaata	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
14	Sclera Colour	Colour Of The Sclera (TheColor Of The White Part Of The Eyes)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Misty.	Vaata	2	2
2	Grayish.	Vaata	2	2
3	Dull.	Vaata	2	2
4	Reddish Eyes (Get Red Immediately In Sunrays Or After Alcohol Consumption Or After Getting Angry).	Pitta	2	2
5	Clean White, Bluish Colored Eyes With Reddishness In The Corners.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
15	Iris Colour	Iris Colour (Colour Of The Black Portion Of Eyes)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Other than black.	Pitta	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
16	Eyes - Size	The Size Of The Eyes	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Small / Sunken / Narrow.	Vaata	2	2
2	Medium.	Pitta	2	2
3	Big / Wild (Wide Open).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
17	Appearance of Eyes	The Appearance Of The Eyes In General	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Odd, Nervous, Dead Look (Lusterless, Dry, Rough).	Vaata	2	2
2	Remain Half Closed During Sleep.	Vaata	2	2
3	Steady Gaze(Staring Look).	Vaata	2	2
4	Excessive Movements Of Eye Balls (Just Due To Inquisitiveness).	Pitta	2	2
5	Pleasant (Emphasizing Part Of Personality, Watery).	Kapha	2	2
6	Soft Look.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
18	Eye Lashes	Appearance Of Eye Lashes	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Long.			Kapha	1	1
2	Short.			Pitta	1	1
3	Thick.			Kapha	1	1
4	Thin.			Pitta	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
19	Teeth	Teeth	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Grinding Of Teeth During Sleep.			Vaata	2	2
2	Dry, Brittle Teeth (Break Easily, History Of Occassional Chipping / Crusting Of Teeth).			Vaata	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
20	Skin Complexion	The Skin Complexion	Old/Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Dusky.			Vaata	2	2
2	Dark.			Vaata	2	2
3	Black.			Vaata	2	2
4	Wheatish.			Vaata	2	2
5	Yellowish White.			Pitta	2	2
6	Reddish.			Pitta	2	2
7	Coppery.			Pitta	2	2
8	Very Fair And Clean Complexion (Also Consider Skin Colors Like Lotus Varieties).			Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
21	Skin Moisture	Skin Moisture	Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Dry (Dryness Soon Even After Applying Oil / Moisturizer).			Vaata	2	2
2	Cracked.			Vaata	2	2
3	Slightly Oily / Moderately Oily.			Pitta	2	2
4	Oily.			Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
22	Skin Texture	Skin Texture(On Touch)	Adult/Child/Infant	MF	Anatomical	Main
Option No.	**Options**			**Dosha**	**System Weightage**	**Physician Weightage**
1	Rough And Hard.			Vaata	2	2
2	Soft And Supple / Loose.			Pitta	2	2
3	Soft And Tight, Velvety Smooth / Silky.			Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
23	Skin Temperature	The Temperature Of The Skin (Room Temperature)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Cold With Dryness (On Hands, Legs, Forehead).	Vaata	2	2
2	Warm/ Hot.	Pitta	2	2
3	Cold Without Dryness.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
24	Skin - General	Description Suiting To The Skin	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Conspicuous Veins (Veins Are Very Prominent And Big).	Vaata	6	6
2	Skin With Lots Of Moles / Warts / Freckles.	Pitta	6	6
3	Redness Marked On Lips, Palms, Tongue, Nails (Skin Gets Flushed Quickly And Gets Reddened With Little Exposure To Sun, Heat, Friction, Knock).	Pitta	6	6
4	Skin With Glow / Radiance / Shine.	Kapha	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
25	Hair Colour	The Colour Of The Hair (Hair Colour)	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Tawny.	Vaata	2	2
2	Brown.	Vaata	2	2
3	Golden.	Pitta	2	2
4	Blonde.	Pitta	2	2
5	Reddish Brown.	Pitta	2	2
6	Black.	Kapha	2	2
7	Jet Black.	Kapha	2	2
8	Blue Tinge.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
26	Hair Moisture & Strength	Hair Moisture And Strength Of The Hair Roots (Of Body Hair And Scalp Hair To Be Judged By Touch)	Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Dry / Brittle / Rough.	Vaata	2	2
2	Not Dry / Medium.	Pitta	2	2
3	Oily / Shining.	Kapha	2	2
4	Strong Roots (Do Not Fall Easily While Combing).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
27	Hair Texture & Quantity	Lookwise Texture Of Hair And Amount Of Hair	Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Thick / Abundant And Rough.	Kapha,Vaata	1	1
2	Thick / Abundant / Soft And Smooth.	Kapha	1	1
3	Less And Soft / Delicate.	Pitta	1	1
4	Less And Rough.	Vaata	1	1
5	Splits In Hair.	Vaata	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
28	Hair Loss	Early Hair Loss Or Early Balding	Adult/Child	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Early Hair Loss (Baldness).	Pitta	4	4
2	Excessive And / Or Early Graying Of Hair.	Pitta	4	4

Question ID	Related To	Question Text	Category	Gender	Group	Type
29	Body Hair Colour	The Color Of The Body Hair	Old/Adult/Child/Infant	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Golden / Blonde.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
30	Beard & Mustache	Texture And Quantity Of Hair Of Beard And Mustache	Old/Adult/Child	M	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Dry / Rough And Less In Number(Less Thickness), Split.	Vaata	2	2
2	Soft And Less In Number (Less Thickness).	Pitta	2	2
3	Abundant, Covering More Area.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
31	Appetite	Overall Nature Of Appetite	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Irregular Hunger - Sometimes Intense Hunger, Sometimes Not.	Vaata	2	2
2	Strong Hunger (Sharp And Intense).	Pitta	2	2
3	Less Sharp Hunger.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
32	Food Quantity	Amount Of Food Per Meal.	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Need For Moderate Quantity Of Food Per Meal.	Vaata	2	2
2	Need For Large Quantity Of Food Per Meal.	Pitta	2	2
3	Need For Small Quantity Of Food Per Meal.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
33	Digestive Capacity	Frequency Of Appetite(Digestive Capacity)	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Sometimes Feel Hungry Soon After Food, Sometimes Not.	Vaata	2	2
2	Always Become Hungry Soon After Food.	Pitta	2	2
3	Become Hungry Late After Food.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type

34	Hunger Tolerance	Capacity To Skip Meals (Tolerance To Hunger)	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Can Tolerate Skipping Of Meal Easily.	Kapha	4	4

Question ID	Related To	Question Text	Category	Gender	Group	Type
35	Eating Habits	Eating Habits	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Eating Fast / Hastily.	Vaata	2	2
2	Eating More Frequently.	Pitta	2	2
3	Eating Food Leisurely.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
36	Water Requirement	Quantity Of Water To Satisfy Thirst Along With Frequency Of Thirst	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	More Amount Of Water Satisfies Thirst.	Vaata	2	2
2	Very Frequent Thirst And More Amount Of Water Satisfies Thirst.	Pitta	2	2
3	Less Amount Of Water Satisfies Thirst .	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
37	Thirst Tolerance	Capacity To Retain Thirst	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Good Tolerance For Being Thirsty.	Kapha	4	4

Question ID	Related To	Question Text	Category	Gender	Group	Type
38	Stools	Stools	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Large Quantity.	Pitta	2	2
2	Very Quick Emptying Of Bowels.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
39	Perspiration	Perspiration (Quantity And Incidence.)	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Excessive And Quick Sweating (Sweating Even With Less Exposure To Heat Or Sunrays).	Pitta	2	2
2	Less Sweating (Sweats Only If Very Hot Climate.)	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
40	Micturation	Micturation (Quantity And Frequency Of Urine)	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Passing Of Profuse Amount Of Urine Every Time, More Frequently.	Pitta	6	6

Question ID	Related To	Question Text	Category	Gender	Group	Type
41	Sleep Duration	Duration For Sleep	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Routinely Short Span Of Sleep Needed.	Vaata	2	2
2	Routinely Prolonged Span Of Sleep Needed.	Kapha	2	2
3	Routinely Moderate Span Of Sleep Needed.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
42	Sleep	Nature Of Sleep, Freshness After Sleep	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Light Sleep (Interrupted Sleep).	Vaata	2	2
2	Mouth Remaining Partly Open During Sleep With Or Without Snoring.	Vaata	2	2
3	Deep Sleep (Difficult To Wake Up, Uninterrupted Sleep).	Kapha	2	2
4	Sleepiness (A Feeling Of Incomplete Sleep).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
43	Dreams	Dreams : - Most Often Dreams Are Related To	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Dreams Of Running, Journey, Flying, Seeing Sky, Trees, River, Hills, Mountains (Competitions, Racing, Driving, Hiking, Frightening Things).	Vaata	2	2
2	Dreams Of Falling Stars, Fire, Emergencies, Accidents, Violence, Anger, Passion.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
44	Gait	The Walkgait- Style And Speed (Habit Of Stumbling To Objects While Walking)	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Fast / Quick / Untidy With Short Steps (Stumbling / Dashing To Objects While Walking).	Vaata	2	2
2	Steady Gait (Walk Elegant Like Elephant / Walking With Touching Complete Sole To The Floor).	Kapha	2	2
3	Sad Gait With Drooping Shoulders.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
45	Movements	Movements And Activities	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Fast / Hurried / Untidy Actions / Restless Movements (Habit / Style To Move Restlessly The Neck, Hands,	Vaata	4	4
	Lips, Eyes, Shoulders, Head, Eyebrows, Tongue - All Or One Of These).			
2	Slow, Thoughtful And Few Movements, Deliberate Style Of Activities.	Kapha	4	4

Question ID	Related To	Question Text	Category	Gender	Group	Type
46	Stamina	Physical Stamina	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Very Less.	Vaata	2	2
2	Moderate (But With Less Tolerance To Physical Exertion Over A Long Period).	Pitta	2	2
3	Good.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
47	Voice	Voice(Quality And Pitch Of Voice)	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Dry / Brittle.	Vaata	2	2
2	High Pitched / Screechy Voice.	Vaata	2	2
3	Weak / Thin / Exhausted / Inaudible.	Vaata	2	2
4	With Treble / Hoarse / Sad.	Vaata	2	2
5	Deep / Soft / Resonant / Melodious / Pleasant / Effective.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
48	Speech	Speech(Speaking Style)	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Fond Of Chit-Chatting All The Time (Chattering / Excessive Talking).	Vaata	2	2
2	Fast / Hasty / Fumbling Style Of Speaking.	Vaata	2	2
3	Slow, Rich With Moments Of Silence.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
49	Speech Effectiveness	Effectiveness Of Speech	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Incomprehensive/ Inarticulate.	Vaata	2	2
2	Convincing(Winners In Arguments).	Pitta	2	2
3	Pleasant, Soothing, Soft And Gentle.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
50	Sexual Desire	Sexual Desire And Function	Old/Adult	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Less.	Pitta	2	2
2	Moderate.	Pitta	2	2
3	More.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
51	Semen Quantity	Amount Of Semen	Old/Adult	M	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Less.	Pitta	2	2
2	Moderate.	Pitta	2	2
3	More.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
52	Fertility	Fertility (Choose The Best Suited Answer.)	Old/Adult	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	No Children.	Vaata	2	2
2	Child After Waiting For Many Years.	Vaata	2	2
3	Conception / Child After Treatment For Diagnosed Underlying Infertility.	Vaata	2	2
4	After Delivery Never Used Contraception, Yet No Conception.	Vaata	2	2
5	One Child, No Abortions.	Pitta	2	2
6	Delayed Conception After Discontinuing Contraception.	Pitta	2	2
7	No Child, But Two Or More Abortions (Either Accidental Or Medical Abortion).	Pitta	2	2
8	Two Or More Than Two Children.	Kapha	2	2
9	One Child, With Two Or More Than Two Abortions (Either Accidental Or Medical Abortion).	Kapha	2	2
10	Immediate Conception After The Discontinuation Of The Contraception.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
53	Liking: Food	Likes And Dislikes For Food, Beverages	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Liking For Hot And Dry Food.	Kapha	1	1
2	Liking For Cold Food.	Pitta	1	1
3	Liking For Hot And Oily Food.	Vaata	1	1
4	Liking For Hot Beverages.	Vaata	1	1
5	Liking For Cold Beverages (Dislike For Drinking Very Hot Liquids).	Pitta	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
54	Liking: Climate	Likes And Dislikes For Weather Or Climatic Conditions.	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Liking For Hot And Moist Seasons And Climates.	Vaata	0.5	0.5
2	Liking For Cold Seasons And Climates.	Pitta	0.5	0.5
3	Liking For Hot And Dry Seasons And Climates.	Kapha	0.5	0.5

Question ID	Related To	Question Text	Category	Gender	Group	Type
55	Tolerance	Disliking And / Or Level Of Tolerance	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Intolerance For Cold.	Vaata	1	1
2	Disliking For Perspiration.	Pitta	1	1
3	Very Good Tolerance For Hot Conditions.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
56	Liking: Tastes	Liking For Various Tastes	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Sweet.	Kapha,Pitta,Vaata	0.5	0.5
2	Sour.	Vaata	0.5	0.5
3	Salty.	Vaata	0.5	0.5
4	Bitter.	Pitta	0.5	0.5
5	Astringent.	Pitta,Kapha	0.5	0.5
6	Pungent / Chilly / Spicy.	Kapha	0.5	0.5

Question ID	Related To	Question Text	Category	Gender	Group	Type
57	Hobbies	Hobbies /Likings For	Old/Adult/Child	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Travel / Roaming.	Vaata	0.5	0.5
2	Arguing / Debate.	Vaata	0.5	0.5
3	Arts And Enjoyment.	Vaata	0.5	0.5
4	Make Up And Garments.	Pitta	0.5	0.5
5	Jewelry, Decorating Body	Pitta	0.5	0.5

Question ID	Related To	Question Text	Category	Gender	Group	Type
58	Possessiveness	Tendency For Possession And Donation	Old/Adult/Child	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Craves For More Shopping / Collecting Things.	Vaata	1	1
2	Gives Away The Things If Asked For.	Pitta	1	1
3	A Generous And Thoughtful Donor.	Kapha	1	1
4	Does Not Crave Much For Collecting Or Buying Things.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
59	Temperament	Temperament	Old/Adult/Child	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Anxious, Not Composed.	Vaata	1	1
2	Short Tempered.	Pitta	1	1
3	Straight Forward.	Pitta	1	1
4	Composed.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
60	Initiative	Initiative	Old/Adult/Child	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Quick Initiator.	Vaata	0.5	0.5
2	Slow Initiator (Or Habit Of Postponing Tasks).	Kapha	0.5	0.5
3	Poor Follow Through Of The Work Initiated.	Vaata	0.5	0.5
4	Excellent Follow Through Of The Work Initiated.	Kapha	0.5	0.5

Question ID	Related To	Question Text	Category	Gender	Group	Type
61	Memory	Memory (Quality And Span)	Old/Adult/Child/Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Quick To Remember.	Vaata	0.5	0.5
2	Slow To Remember.	Kapha	0.5	0.5
3	Forgets Quickly / Accuracy Less.	Vaata	0.5	0.5
4	Forgets Slowly / Accuracy More.	Kapha	0.5	0.5

Question ID	Related To	Question Text	Category	Gender	Group	Type
62	Friendship	Friendship	Old/Adult/Child/Infant	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Quick In Making Friendships (Easily Adapt To Different Kinds Of People).	Vaata	1	1
2	Short Lasting Relationships / Friendships / Acquaintances.	Vaata	1	1
3	Harsh To Friends / Caring And Consoling To Those Who Want To Reconciliate.	Pitta	1	1
4	Slow To Make New Friends	Kapha	1	1
5	Relationships Continue Even After Conflicts.	Kapha	1	1
6	Enmity Long Lasting.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
63	Concentration	Concentration	Old/Adult/Child	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Poor.	Vaata	1	1
2	Excellent.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
64	Decisive Power	Decisive Power	Old/Adult/Child	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Poor / Uncertain Decisive Power.	Vaata	2	2
2	Moderate Decisive Power.	Kapha	2	2
3	Quick And Good Decisive Power.	Pitta	2	2
4	Excellent Decisive Power.	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
65	Wisdom	Performance In Field Of Wisdom	Old/Adult	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Unpredictable / Unsteady Performance.	Vaata	3	3
2	Intelligent.	Pitta	3	3
3	Learned / With Steady Performance.	Kapha	3	3
4	Judiciousness.	Kapha	3	3

Question ID	Related To	Question Text	Category	Gender	Group	Type
66	Other Qualities	Other Qualities	Old/Adult/Child/Infant	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Ungrateful / Unappreciative / Unthankful.	Vaata	1	1
2	Fearful / Coward.	Vaata	1	1
3	Tendency Towards Using Or Taking Othersâ€™ Belongings / Secretly Watching Or Over Hearing Others.	Vaata	1	1
4	Violent.	Vaata	1	1
5	Egoist.	Pitta	1	1
6	Brave / Valor.	Pitta	1	1
7	Excellent In Acquiring Bodily Skills And Arts (Eg. Different Skillsets, Arts Etc.).	Pitta	1	1
8	Shy.	Kapha	1	1
9	Very Polite And Reverent.	Kapha	1	1
10	Religious And Fond Of Performing Rituals.	Kapha	1	1
11	Grateful / Appreciative / Thankful.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
67	Resemblance	Resemblance To The Animals	Old/Adult/Child/Infant	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Camel.	Vaata	1	1
2	Crow.	Vaata	1	1
3	Donkey.	Vaata	1	1
4	Vulture.	Vaata	1	1
5	Rat.	Vaata	1	1
6	Rabit.	Vaata	1	1
7	Goat.	Vaata	1	1
8	Jackle.	Vaata	1	1
9	Dog.	Vaata	1	1
10	Owl.	Pitta	1	1
11	Bear.	Pitta	1	1
12	Cat.	Pitta	1	1
13	Monkey.	Pitta	1	1
14	Tiger.	Pitta	1	1
15	Snake.	Pitta	1	1
16	Gandharva.	Pitta	1	1

17	Yaksha.	Pitta	1	1
18	Mangoos.	Pitta	1	1
19	Horse.	Kapha	1	1
20	Indra.	Kapha	1	1
21	Cow.	Kapha	1	1
22	Eagle.	Kapha	1	1
23	Braahman`a.	Kapha	1	1
24	Rudra.	Kapha	1	1
25	Varun`a.	Kapha	1	1
26	Bull.	Kapha	1	1
27	Lion.	Kapha	1	1
28	Swan.	Kapha	1	1
29	Elephant.	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
68	Wealth	Acquirement Of Wealth/ Means Of Living (Success In Life In View Of Material And Financial Gain)	Old/Adult	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Average Earnings And Material Gains.	Vaata	1	1
2	Moderate Earning And Material Gains.	Pitta	1	1
3	Excellent Earning And Material Gains	Kapha	1	1

Question ID	Related To	Question Text	Category	Gender	Group	Type
69	Salivation	How Much Are The Salivary Secretions?	Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Often Less (Mouth Dry, Quickly Demands Water With Any Intake).	Vaata	2	2
2	Average Salivary Secretions, Average Thirst.	Pitta	2	2
3	Profuse Saliva Always, Does Not Mind Wating Without Water.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
70	Feeding Demands	How Is The Babyâ€™S Expression For The Demands For The Feed?	Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Mostly Uncertain Feeding Demands, Craves For Frequent Feeds / Food. Needs Frequent Suckling / May Accept Average Amount Of Food At ATime.	Vaata	2	2
2	Food / Feeds Come On The First Priority Over Playing Or Any Other Activities. Needs Large Amounts Of Food / Feeds Every Time.	Pitta	2	2
3	Low Demands - Has To Be Asked / Forced / Reminded For Food / Feeds.Remains Calm Even After Delay In Feeds.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
71	Baby General Behaviour	How Is The General Behaviour Of The Baby?	Infant	MF	Psycological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Always Crying / Complaining (Needs Attendant).	Vaata	2	2
2	Restless	Vaata	2	2
3	Intolerant, Gets Irritated And Pleased Quickly (Throws Tantrums Quickly).	Pitta	2	2
4	Cries Less.	Kapha	2	2
5	Quiet, Tolerant (Plays Without An Attendant).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
72	Babyâ€™s Comfort	How Is The Babyâ€™S Comfort Level With Clothes, Coverings, Sweating?	Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Likes Being Wrapped, Warm Clothing, Warm, Hot Food, Uncomfortable In A/C / Ceiling Fan / Wind.	Vaata	2	2
2	Likes To Be Kept In Windy Place / Open / Cool; Dislikes Woolen Clothing,Sweats If Wrapped.	Pitta	2	2
3	Likes To Be Kept Warm.	Kapha	2	2
4	Sweating Less But Less Tolerance To Heat.	Vaata	2	2
5	Uncomfortable With Perspiring.	Pitta	2	2
6	Sweating Less But More Tolerance To Heat.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
73	Defaecation & Urine	What Can Be Said About The Bowel And Urine?	Infant	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Needs Medicinal Help For Passage Of Motion.	Vaata	2	2
2	Easily Vulnerable To Get Loose Motions With LIittle Medication.	Pitta	2	2
3	Does Not Need Help For Passage Of Urine And Motions.	Kapha	2	2
4	Stools Hard, Blackish, Less In Quantity.	Vaata	2	2
5	Stools Mostly Semisolid, Less Time Needed For Passing.	Pitta	2	2
6	Stools Are Well Formed, Solid.	Kapha	2	2
7	Urine Frequent And More (Wets Diapers Every Now And Then).	Pitta	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
74	Reaction to Stressors	How Does The Health Get Affected With Travel, Food Changes, Climate Changes?	Child/Infant	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Falls Ill Quickly, Needs Medication Very Often.	Vaata	2	2
2	Resistance To Illness Is Moderate.	Pitta	2	2
3	Good Resistance To Illness.	Kapha	2	2
4	More Vulnerable In Travels, Cold.	Vaata	2	2
5	More Vulnerable To Illness When Eats Spicy, In Summer After Rainy Season.	Pitta	2	2
6	More Vulnerable To Illness, When Eats Oily / Heavy Food / Milk Products Or When The Season Changes From Winter To Summer (During Spring).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
75	Recovery Pattern	What Can You Say About The Recovery From Illnesses And Overall Growth?	Child/Infant	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Recovery From Illness Incomplete, Takes Uncertain Time (Bruises / Wounds Heal Slowly).	Vaata	2	2
2	Recovery From Illness At Medium Pace(Wounds Tend To Get Spoilt / Infected Quickly, Take More Time To Heal).	Pitta	2	2
3	Quick And Good Recovery From Illness(Bruises And Wounds Heal Quickly).	Kapha	2	2
4	Growth Milestones Are Irregular.	Vaata	2	2
5	Maturity Faster / Growth Milestones Faster.	Pitta	2	2
6	Baby Growth / Maturity Is Slow But Steady.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
76	General Capacities	At What Age You Felt Your Capacities Are Decreasing?	Old/Adult	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Comparatively At Early Age (At The Age Of 30-40 Yrs)	Vaata	2	2
2	Changes Evident Since The Age Of 40-50 Yrs	Pitta	2	2
3	Changes Apparent Comparatively Late (Since The Age Of 50-60 Yrs.).	Kapha	2	2
4	Debility Excessive, Comparatively More Weight Loss / Muscle Wasting.	Vaata	2	2
5	Moderate Changes In Physique / Musculature (Medium Weight Loss, Medium Debility).	Pitta	2	2
6	Good Physique, Without Many Changes (Minimum Debility / Muscle Wasting).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
77	Health	Healthwise, How Was Your Profile Throughout The Life?	Old/Adult	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Very Frequent Illnesses, Always Needed Medication (More Vulnerable To Colds, Weakness, Insomnia, Joint Pains, Strokes, Muscular Debility Etc.).	Vaata	2	2
2	Moderate Disease Resistance (More Vulnerable To Hyperacidity, Loose Motions, Boils, Psychological Illnesses, Mental Stress, Peptic Ulcers, Hypertension Etc.).	Pitta	2	2
3	Over All , A Healthy Life, Needed Medication Rarely (Vulnerable To Diseases Like Cold,Ischemia, Indigestion, Heart Blocks, Joint Swelling, Arthritis Etc.).	Kapha	2	2
4	More Vulnerable To Effects Of Cold Seasons, Travels, Late Night Work, Over-Exertion.	Vaata	2	2
5	More Vulnerable To The Effects Of Hot / Spicy Food, Hot Weather, Mental Stress.	Pitta	2	2
6	More Vulnerable To The Effects Of Cold, Rainy Seasons, Spring, Excessive Eating, Sedentary Life-Style.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
78	Disease Tolerance	At This Age, How Is Your Tolerance To Different Illness Triggering Factors (Like Food, Exertion, Climatic Changes, Mental Tensions Etc)?	Old/Adult	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Small Changes Disturb My Health And Routine Quickly.	Vaata	2	2
2	Moderate Tolerance To Illness Causing Elements	Pitta	2	2
3	Good Tolerance To Illness Causing Elements.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
79	Muscle & Skin Changes	At What Age, Muscle And Skin Changes Became Very Apparent?	Old/Adult	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Skin Dryness More Apparent Than Other Skin Changes.	Vaata	2	2
2	Skin Wrinkles And Laxity More Apparent In Skin Changes.	Pitta	2	2
3	Skin Is Comparatively Good And Fresh, Less Dry, Less Wrinkled Or Lax.	Kapha	2	2
4	Skin, Muscle Changes Appeared Quite At Early Time (30 - 40 Yrs).	Vaata	2	2
5	Skin, Muscle Changes Appeared At The Age Of 40 - 50 Yrs.	Pitta	2	2
6	Skin And Muscle Changes At Late Age (50 - 60 Yrs).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
80	Hair Changes	With The Age, What Are Changes That Occurred To Your Hair?	Old/Adult	MF	Anatomical	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Had Less And Dry Hair, Early Hair Loss.	Vaata	2	2
2	Had Thin Hair, Balding And Graying Very Fast And At Early Age Relatively.	Pitta	2	2
3	Had Thick, Abundant, Black Hair.	Kapha	2	2

4	Hair Is Still In Place And Black. Graying Is Less And Slow, Balding Is Less And Slow (Near Age Of 50 Yrs).	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
81	Sense Organs	How Is Overall Status Of All The Sense Organs? (Hearing Loss, Diminished Eyesight, Alterations In Olfactory Function (Sense For Smelling), Diminished Sense Of Taste, Alterations In Sense Of Touch Like Numbness Etc .)	Old/Adult	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Overall Changes In Functions Of Sense Organs At Early Age And More.	Vaata	2	2
2	Overall Changes In Sensory Organ Functions At Average Age And In Moderate Amount.	Pitta	2	2
3	Overall Very Less Or No Changes In Sensory Functions Till Late Age.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
82	Digestive Functions	By Age, What Changes Do You Mark In Your Digestive Functions?	Old/Adult	MF	Physiological	Supportive

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Digestion Is Getting More Uncertain, Hunger Getting More Irregular. Can Not Tolerate Eating Legumes, Cold, Stale Food.	Vaata	2	2
2	Capable Of Good Eating And Digesting, Compared To The Same Age People. Can Not Tolerate Eating Hot, Spicy Food.	Pitta	2	2
3	Always A Small Eater, At This Age, Hunger Diminished, Can Not Tolerate Heavy, Oily Food.	Kapha	2	2

Question ID	Related To	Question Text	Category	Gender	Group	Type
83	Bowel Habits	By Age, What Changes Do You Mark In Your Bowel Habits?	Old/Adult	MF	Physiological	Main

Option No.	Options	Dosha	System Weightage	Physician Weightage
1	Year By Year I Need More Medication For Easy Bowel Emptying.Irregularity In Motion, Dry And Hard Stools Are Common With Me.	Vaata	2	2
2	More Sensitive To Even Small Amounts Of Laxatives / Purgatives, Stools Often Semisolid. Afraid Of Tendency To Get Loose Motions Rather Than Constipation.	Pitta	2	2
3	No Much Complaint, No Much Need For Medical Help For Easy Bowel Emptying. Stools Often Well Formed And Moderate Amount.	Kapha	2	2

GOVT AYURVEDA COLLEGE, TRIPUNITHURA

Name of the investigator **Dr. Pradeep K**
Address Associate Professor, Dept. of Kriyasarira
Govt. Ayurveda College Tripunithura

INFORMED CONSENT

I, the undersigned do hereby give my full consent to participate in the clinical trial after understanding the objectives and nature of the study as described below, which as explained and understood by me in my own language.

This research titled "An observational study to explore the association of Prakriti and Diabetic Retinopathy" is done as a part of PhD research in Ayurveda by the investigator under the guidance of Dr. ANURA. P. BALE Principal Gomanthak ayurveda college and Research centre, Shiroda,Goa.
The study helps to explore the association of Prakriti and Diabetic Retinopathy. There is no expense on the part of the participant, nor will any remuneration paid.

1. The information collected will be strictly confidential. The result will not be analyzed or presented in a way that can lead to identification of any individual.
2. The participation is voluntary and the subject is free to refuse to take part in this study or withdraw from the study at any time.
3. The signature of the person in this form indicates that he/she has understood to his/her satisfaction the information regarding participation in this research project and agree to undergo the specific clinical investigation/laboratory investigations.

Signature of the investigator Signature of the patient

Place : ……..

Date: ……

സമ്മതപത്രം

ഈ സമ്മത പത്രത്തിൽ ഒപ്പിട്ടിരിക്കുന്ന ഞാൻ, എന്റെ പൂർണ്ണസമ്മതത്തോടെയാണ് ഈ ഗവേഷണ പരിപാടിയിൽ പങ്കെടുക്കുന്നത്. ഇതേപറ്റിയുള്ള പൂർണ്ണവിവരങ്ങൾ എന്റെ മാതൃഭാഷയിൽ എന്നെ ധരിപ്പിച്ചിട്ടുള്ളതാകുന്നു.

ഈ ഗവേഷണത്തിന്റെ വിഷയം ''ഡയബെറ്റിക്ക് റെറ്റിനോപ്പതിയിൽ വിവിധദോഷ പ്രകൃതികൾ കാണിക്കുന്ന പ്രവണത –'' ഒരു നിരീക്ഷണ പഠനം ("An observational study to explore the association of Prakriti and Diabetic Retinopathy") എന്നതാണ്. ഈ ഗവേഷണം തൃപ്പൂണിത്തുറ ഗവൺമെന്റ് ആയുർവേദ കോളേജിലെ ക്രിയാശാരീരം വിഭാഗത്തിലെ ഡോ. പ്രദീപ് കെ, ഡോ. അനുര പി ബാലെ– യുടെ മേൽനോട്ടത്തിലാണ് നടത്തുന്നത്.

ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നതുകൊണ്ട് യാതൊരു സാമ്പത്തിക ബാധ്യതയും ഉണ്ടാകുന്നതല്ല. ഇതിൽ പങ്കെടുക്കുന്നവരിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ രഹസ്യമായി സൂക്ഷിക്കുന്നതാണ്. വ്യക്തികളുടെ പേരോ മേൽവിലാസമോ പരസ്യപ്പെടുത്തുകയോ ദുരുപയോഗപ്പെടുത്തുകയോ ചെയ്യുന്നതല്ല. ഗവേഷണവുമായി ബന്ധപ്പെട്ട് ഏതെങ്കിലും വിധത്തിലുള്ള ബുദ്ധിമുട്ട് ഉണ്ടാകുന്ന പക്ഷം ഈ ഗവേഷണത്തിന്റെ ഏത് ഘട്ടത്തിലും ഇതിൽ നിന്നും പിന്മാറാനുള്ള സ്വാതന്ത്ര്യം ഉ ായിരിക്കുന്നതാണ്. ഈ സമ്മത പത്രത്തിലെ ഒപ്പ് ഈ ഗവേഷണ പരിപാടിയെക്കുറിച്ചുള്ള പൂർണ്ണ വിവരങ്ങൾ മനസ്സിലാക്കി എന്നതിനും ഇതിന്റെ ഭാഗമാകാൻ സന്നദ്ധമാണ് എന്നതിനുമുള്ള സൂചനയാണ്.

ഗവേഷകന്റെ ഒപ്പ് വ്യക്തിയുടെ പേര്

സ്ഥലം : .....

തിയ്യതി : ..... ഒപ്പ്

सर्वे सन्तु निरामया

INSTITUTIONAL COMMITTEE FOR ETHICS IN RESEARCH
(Institutional review Board)
GOVT. AYURVEDA COLLEGE
TRIPUNITHURA

Ref: 1/SAL/2016 Date: - 20.02.2016

The committee held on 20.02.2016, after scrutiny of the synopsis unanimously approves the research project titled ' An observational study to explore the association of prakriti and diabetic retinopathy 'of Pradeep.K under the supervision of Dr.Anura Bale in the Department of Kriya sarira in the condition that the work will be monitored by the committee and any alterations in the research protocol should have further clearance from the committee.

COMMITTEE FOR ETHICS IN RESEARCH
TRIPUNITHURA-682 301
GOVT. AYURVEDA COLLEGE

Chairman

Sri.M P Antoni
Chairman
Committee for Ethics in Research
Govt. Ayurveda College
Tripunithura

Master Sheet

Diabetic Retinopathy	Yes - 1	No - 0	
Age	1=30 - 39	2= 40 - 49	3=49 - 60
Prakriti	Kapha - 1	Pitha - 2	Vata - 3
Sex	Male - 1	Female - 2	
Duration	10 - 15 =1	15 - 20=2	20 Above - 3
	Controlled - 1	Uncontrolled - 2	
Family History	Yes - 1	No - 0	
Treatment	Allopathy - 1	Ayurveda - 2	Others - 3
Other Systemic Disorders	Yes - 1	No - 0	
Other Complications	Neuropathy - 1	Nephropathy - 2	
Sleep	Good - 1	Average - 2	Less - 3
Bowels	Good - 1	Average - 2	Less - 3
Stress	More - 1	Average - 2	Less - 3
Exercise	Good - 1	Average - 2	Less - 3
Addiction	Yes - 1	No - 0	
Diet Controlled	Yes - 1	No - 0	
	Non Proliferative - 1	Proliferative - 2	No Retinopathy - 0
Tv Watching Longer Period (< 3hrs)	Yes - 1	No - 0	
Achakshushya Ahara	Curd1 - no	2 - Often	3 - daily
Bakery	1 - no	2 - Often	3 - daily
Blood Pressure	Yes - 1	No - 0	

SL NO	AGE	Diabetic Retinopathy	TYPES DR	PRAKRITI	SEX	DURATION OF DIABETES	CON/UNCON	FAMILY H/O	TREATMENT	SLEEP	STRESS	BOWELS	EXERCISE	DIET C/U	OTHER DISEASES	TAKING BATH	TIME B	ADDICTION	COMPLICATION	FOOD HABITS	FRUITS PREFERED	MILK	CURD	COFFEE	TEA	BAKERY	OIL APPL	WATCHING TV	BP
1	42	0	0	1	2	1	1	1	1	1	2	1	3	1	0	1	1	0	0	3	1	1	2	1	3	2	2	0	0
2	43	0	0	1	1	1	2	1	1	3	3	3	3	0	0	1	1	0	0	1	1	1	2	2	3	2	1	0	0
3	42	0	0	1	1	1	2	1	1	1	3	1	3	1	1	1	1	0	1	3	4	2	2	2	3	3	2	0	0
4	45	0	0	1	2	1	2	1	1	1	2	3	3	1	1	1	1	0	1	1	1	1	2	2	3	2	1	0	0
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6	50	0	0	1	2	1	1	1	1	1	2	2	3	1	1	1	1	0	1	3	1	1	2	2	3	2	2	0	0
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9	55	0	0	1	1	2	1	1	1	1	2	2	3	1	1	1	1	0	1	3	1	1	2	2	3	2	2	0	0
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12	59	0	0	1	1	2	2	1	1	1	2	2	3	1	1	1	1	0	0	3	2	2	2	2	3	2	2	0	0
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18	59	0	0	1	1	2	2	1	1	3	3	3	3	1	0	1	1	0	0	3	2	2	2	2	3	2	2	0	1
19	60	0	0	1	1	2	2	1	1	3	3	3	3	1	0	1	1	0	0	1	1	2	3	3	1	3	1	0	1
20	60	0	0	1	1	2	2	1	1	3	3	3	3	1	0	1	1	0	0	1	1	2	3	3	1	3	1	0	1
21	50	0	0	1	1	2	2	1	1	3	3	3	3	1	0	1	1	0	0	1	1	1	2	2	3	2	1	0	1
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23	54	0	0	1	1	2	2	1	1	3	3	3	3	1	0	1	1	0	0	3	1	1	2	1	3	2	2	0	1
24	55	0	0	1	1	2	2	1	1	3	3	3	3	1	0	1	1	0	0	3	1	1	2	1	3	2	2	0	0
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41	54	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	1	2	2	3	2	2	1	1
42	59	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	1	1	1	2	2	3	2	2	1	1

43	58	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	2	2	2	2	3	2	2	1	1
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45	53	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	1	1	2	3	3	1	3	1	1	1
46	55	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	2	2	2	2	3	2	2	1	1
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48	59	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	1	1	1	2	2	3	2	2	1	1
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58	58	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	2	1	1	3	3	1	1	1
59	57	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	4	2	2	2	3	2	2	1	1
60	53	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	2	1	1	3	3	1	1	1
61	55	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	2	1	1	3	3	1	1	1
62	52	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	4	2	2	2	3	3	2	1	1
63	59	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	2	1	1	3	3	1	1	1
64	60	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	1	1	1	2	3	3	3	1	1	1
65	60	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	2	1	1	3	3	1	1	1
66	50	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	1	1	1	2	3	3	3	1	1	1
67	51	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	3	1	2	1	1	3	3	1	1	1
68	54	1	1	1	2	1	2	1	1	2	2	1	3	1	0	1	1	0	0	2	4	3	2	1	3	2	1	1	1
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List of Publications

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THE ROLE OF PRAKRITI IN THE CAUSATION OF DIABETIC RETINOPATHY IN DIABETIC PATIENTS

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ABSTRACT

Prakriti starts to take shape at the very first step after conception in mother's womb, which is the complete psychosomatic architect of an individual[1]. It is influenced by the *sukra* (semen) of the father and *artava* (ovum) of the mother and the dietary habits and lifestyle of the mother. According to Vagbhata the Prakriti remains inheritant throughout the life prior to death. Ayurveda categorizes human population in to sub population such as Vata Prakriti, Pitta Prakriti and Kapha Prakriti or their combination on the basis of anatomical, physiological, and psychological characteristics with completely avoidance of racial, ethical,and geographical consideration. Ayurveda has designed Prakriti such as Vata, Pitta and Kapha or combination of either two or three of them[2]. All individuals will be influenced by the doshas, or will be having the features of these doshas. But we consider an individual as VATA prakriti, PITTA prakriti, or KAPHA prakriti according to the features found in them. These individuals are prone to get diseases according to their prakriti, ie, Vata prakriti individual is more prone to get vata predominant diseases if he is following a vata vitiating life style. If we know our prakriti we can change our life style for maintaining the doshas in equilibrium, so that health is maintained. This study aims to observe the role of prakriti in the causation of diabetic retinopathy in diabetic patients. The prevalence rate of diabetic retinopathy in type 2 DM was reported as 34.6% from south India . In this study around 182 diabetic retinopathy patients was selected and their prakriti was assessed using the software AYUSOFT developed by C-DAC PUNE. The results was analysed statistically to find any association between prakriti and and causation of diabetic retinopathy in diabetic patients.

KEY WORDS : ***PRAKRITI, DIABETIC RETINOPATHY***

INTRODUCTION

The word Prakriti has been derived from "Prakarshena karoti iti Prakriti" The word Prakriti is derived from Pra + Kriti (to create or to act). Pra means the "beginning", "commencement" or "source of origin" and kriti means "to perform" or "to form". Put together prakriti means "natural form" or "original form" or

"original source". Prakriti is one of the most important concepts described in ayurveda and it is decided at the time of conception .It is the complete psychosomatic architect of an individual which starts to take shape in mother's womb. Thus generated prakriti helps in understanding the health and disease state of an individual and helps in maintaining health and also for treatment when diseased. As we all know the prevalence of diabetes is increasing day by day. And the patients with diabetic complications are also getting increased. One of the major complication in diabetes is diabetic retinopathy. By analyzing the *prakriti* of the individuals with diabetic retinopathy we can assess which type of *prakriti* individuals is getting this disease more, so that we can predetermine the occurance of diabetic retinopathy in diabetic patients with that particular *prakriti.* And also it will help to assess which type of retinopathy that particular *prakriti* individual is prone to. We all know diabetic retinopathy is a disease occurring the retinal musculature and it is one among the major complications of diabetes. We know that diabetes is a disease caused by kapha medo dusti and diabetic retinopathy is a disease occurring the eyes, which is said to be the seat of pitta. So patients with diabetes should avoid kapha and pitta vitiating aharas and viharas to keep the doshas in equilibrium, so that the disease is controlled. This study aims to find the role of prakriti in the causation of diabetic retinopathy. We know that when the doshas,desa,rthu and prakriti become predominant of the same doshas, the disease occurs or it is difficult to cure the disease. So if the prakriti of the individual is different from the dushyas, desa and rtu, the disease does not occur or if occurs it is easily curable. This study aims to find the role of prakriti in the causation of diabetic retinopathy.

METHODOLOGY

SOURCE OF DATA: Patients with diabetic retinopathy was included in this study.

RESEARCH DESIGN

Descriptive - observational study

SAMPLING

Convenience sampling

SAMPLE SIZE

182 Diabetic retinopathy patients

SETTING

1. The study was conducted in already diagnosed diabetic retinopathy patients
2. A valid questionnaire was used to assess the *prakriti* of each participants –

AYUSOFT OF C-DAC PUNE

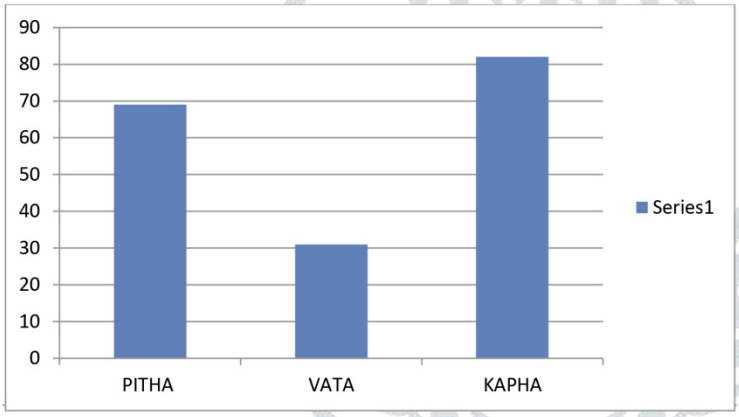
3. Ophthalmoscopy and vision testing was used to diagnose diabetic retinopathy

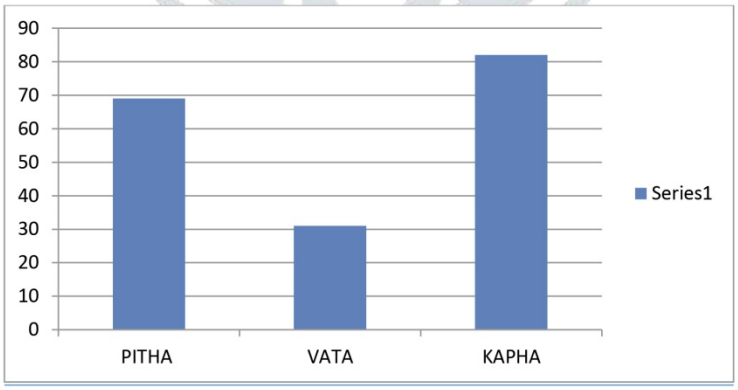
4. The collected data was statistically analysed to find the relationship between *prakriti* and diabetic retinopathy.

PLAN OF ANALYSIS

According to Data collected the results were evaluated and the significance of the study was assessed using basic statistical analysis (descriptive statistics) and the relationship if any with prakriti is assessed using appropriate tests like chi-square test. Analysis was done using EXCEL and SPSS software.

RESULTS AND DISCUSSION





Among the 182 diabetic retinopathy patients analysed 82 was found to be kapha predominant prakriti and 69 patients was pitta predominant prakriti and 17 vata prakriti individuals .

Duration of diabetes in years

		Frequency	Percent
Valid	10-15	164	90.1
	15-20	18	9.9
	Total	182	100.0

In this study of the 182 Patients selected 90.1% patients were of 10-15 years of history of diabetes remaining 9.9 % were having a history of 15-20 years

		Frequency	Percent
Valid	CONTROLLED	7	3.8
	UNCONTROLLED	175	96.2
	Total	182	100.0

Among the patients selected it was found that 4% of the patients was with controlled diabetes and remaining 96% of the patients was with uncontrolled diabetes. From this we can say that uncontrolled diabetes is one of the major cause of diabetic retinopathy.

		Frequency	Percent
Valid	AVERAGE	2	3.64
	LESS	180	98.9
	Total	182	100.0

In this study it was found that in most of the patients lack of regular exercise leading to uncontrolled diabetes

DISCUSSION

Since eyes are said to be situated in the upper portion of our body, and we know that the upper portion is Kapha dominant[3] , So persons with kapha prakriti are more prone to get diseases affecting the upper portion of our body and diabetes is a disease caused by kapha medo dushti.. And since eyes are said to be the seat of pitta [4], pitta also has got a significant role in causation of retinopathy. All this factors favouring the vitiation of kapha along with the similarity in prakriti may affect the Kapha prakriti persons with diabetes in leading to diabetic retinopathy Along with this Ahara and vihara which vitiates kapha and pitta may increase the probability of the disease causation. And retinopathy is caused either by occlusion or leakage of retinal vessels which may be considered as the vitiation of kapha and pitta.

CONCLUSION

Prakriti has got an important role in the occurrence of disease especially diabetic complication like diabetic retinopathy. We know that when the dushya (doshas), desa(place), rtu(season) and prakriti[5] are same there is more probability of getting the disease or it is difficult to cure the disease. So diabetes patients with kapha and pitta prakriti should avoid kapha and pitta vitiating Ahara and viahara so that they can control or delay the causation of diabetic retinopathy.

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ASSOCIATION OF PRAKRITI AND LIFE STYLE IN THE DETERMINANT OF RETINOPATHY IN DIABETIC PATIENTS

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ABSTRACT

Diabetic retinopathy is a chronic progressive, potentially sight threatening disease of the retinal microvasculature associated with the prolonged hyperglycemia. The prevalence rate of diabetic retinopathy in type 2 DM was reported as 34.1% from south India. The presence of diabetic retinopathy is directly proportional to the duration of diabetes[1]. Ayurvedic science is unique and has stressed the importance of life style. Modifying the life style will surely help in controlling diabetes . By modifying the life style of diabetic patients we can delay or control the occurrence of diabetic Retinopathy. In this study diabetic retinopathy patients was selected and questionnaire prepared with a focus on life style which may possibly effect the visual health adversely according to ayurvedic samhitas. The study was an observational study, 50 cases of Already diagnosed diabetic retinopathy patients was selected and their *ahara* and *vihara* was assessed using the questionnaire prepared keeping in focus of *Achakshushya* life style according to ayurvedic samhitas. Similar 50 diabetic paients without retinopathy was selected and their life style assessed using the same questionnaire and compared. In this study it was found that patients with diabetic retinopathy was leading a life style which was *achakshushya(*adversely affecting eye health) than those without diabetic retinopathy. As eyes are seats of *pitha, pitha* vitiating *ahara's* and *viharas* will lead to diseases of eye. Diabetic patients following this type of life style will leads to diabetic retinopathy.

KEY WORDS: Life style, diabetic Retinopathy, Achakshushya Ahara and vihara

INTRODUCTION

In recent years there is a rapid change in the life style of mankind, which altered our traditional style of living, dressing, food habits etc. People today eat according to their convenience without appreciating its nutritive value. Most of us are in a hurry and behind something or other so that we pay less attention to what we eat and its consequences. The human body is the same as that was thousand years before .But the diseases affecting the humans have made some remarkable changes since the ancient period. Apart from the change in the external environment, the change in the life style can be held responsible for this change in the spectrum of diseases that affect the human population. As a result of this pivotal role of life style in causing diseases, a new category termed as life style disorders came into existence .In fact, the increased quantum of stress caused by the current life style can be seen as the real culprit in the occurance of most of the modern day disorders. The constant and indiscriminate usage of indriyas evokes various structural and functional discrepancies in them. Thus, in a wide category of diseases, change in life style can be considered as an important causative factor. The importance of the life style factors are increased when we observe that these are modifiable causes in comparison with some other factors such as genetic factors which are not modifiable.

Ayurvedic science is unique and has stressed the importance of lifestyle , since ayurveda is not only for curing diseases but also for protecting from disease it has explained '*dinacharya* and *rtucharya*' in the beginning itself. Unwholesome some food and habits vitiates doshas and cause chronic disorders in long period of time under favorable conditions. It is difficult to predict the type of disease they produce because doshas produce a variety of disorders on different organs depending in strength and the strength of the organ or dhatu. We can say that chronic diseases are due to shortfall in life style and to be easy preventive measure is to follow healthy diet and habits.

In *Ashtanga hrdaya uttarasthana* (ch 16)*Vaghbata* explains that Persons who are fond of their eyes though healthy should always adhere to the following;Grains such as *yava, godhooma,Sali, sashtika, kodrava,mudga*,etc.which are old and which mitigate *kapha* and *pitta* mixed with more of ghee, vegetables and meat of desert animals having similar properties , *dadima ,sita*(sugar) , *saindhava, triphala, draksha*, and rainwater for drinking, the use of umbrella, footwear and resorting to therapies to eliminate the *doshas* in the proper ways. He should avoid suppression of urges, indigestion, over-eating, anger, grief, sleeping during day, keeping awake at night exposure to sunlight , foods and medicines which cause heart-burn and constipation[2].

In the centre of the feet (soles)are situated two siras (veins etc) which are greatly connected to the eyes. These transmit the (effect of the) medicines applied over the feet in the form of bathing , massage, external application etc to the eyes. These (veins of the feet) vitiated by the accumulation of the mala(dirt), assault (by the weapons-stone and other hard substances) and squeezing (and other kinds of painful activities) bring about abnormalities of the eyes. Hence every person should always make use of the foot wear , massaging with oil and washing them well[3].

In Susrutha samhitha the aetiology regarding the eye diseases is explained

"*ushnapithapthasya jalapravesat*

durekshanaat swapnaviparyayacha

prasakthasamrodhanakopasokhat

klesabhighathadimaidunacha

suktharanalamla kulatha masha

niveshanadwega vinigrahacha

swedadatho dhoomanishevanacha

chardervighathatvamanadiyogat

bashpagrahath sookshma nireekshanacha

netre vikaran janayanthi doshah"

Entering into reservoirs of water (pond ,river etc) immediately after getting heated up by exposure ot sunlight ,fire etc. seeing objects present very far, avoiding sleep, indulging in bouts of weeping,anger, sorrow and exertion ,(for long periods)injury (to eye),excess of copulation ,consumping *sukta (*vinegar) *aranala* (rice-wash)and such other sours (fermented drinks) foods prepared from *kulatha* (horse-gram) *masa* (black gram)suppressing the urges (of urine,faeces etc) excess sweating inhaling smoke, controlling bouts of vomiting

or excess of vomiting ,controlling of tears, observing minute objects (for longer time) by these causes doshas get aggravated and produce diseases[4].

Tridoshas are responsible for the normal functioning of the body, when vitiated they lead to diseases . The vitiation of these doshas are by specific factors for individual organs. The factors responsible for the vitiation of doshas in the eye, which causes the derangement of the doshas and leading to diseases are; *Ahara viharas manas Roga's Aganthuka, Chikitsa janya*[5].

AIMS AND OBJECTIVES

To observe the influence of life style and prakriti in patients in the occurrence of diabetic retinopathy.

PLAN OF THE STUDY

Study was conducted in 50 patients who attended the camps for eye at Govt Ayurveda college Kannur kerala . A survey was conducted in 50 normal individuals who were randomly selected in the same geographical area.

Criteria for selection

Group 1: Healthy individuals with visual acuity 6/6 . Age Group 20-60 (sample size 50)

Group 2 : Individuals with diabetic retinopathy . Age group 20-60 (sample size 50)

Exclusion criteria

Group 1 : Individuals with any systemic diseases as well as those with ocular pathology.

Group 2 : Individuals with ocular pathology other than diabetic retinopathy

Investgations

Only those with Diabetic retinopathy , in whom diagnosis was made on the basis of test for visual acuity and ophthalmoscopy were included in the study.

Criteria for assessment

a) **Diabetic retinopathy & normal individuals**: Already diagnosed cases of diabetic retinopathy were included in group 1. In group 2 only normal individuals with visual acuity of 6/6 were selected.
b) **Life style** : A questionnaire was prepared with a focus on the life style which may possibly effect the visual health adversely
c) **Prakriti Assessment**: Prakriti was assessed using Ayusoft software developed by C-DAC Pune.

METHOD OF SAMPLING

Purposive sampling

STATISTICAL ANALYSIS

According to Data collected the results will be evaluated and the significance of the study will be assessed using basic statistical analysis (descriptive statistics) and the relationship if any in, ahara, vihara in the causation of diabetic retinopathy will be assessed by appropriate tests like chi-square test and Anova etc

RESULTS AND DISCUSSION

Diabetic Patients following ahara and vihara which leads to kapha medo dushti and achakshya, causes diabetic Retinopathy.

Day sleep	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
Yes	40	80.0	11	22.0
No	10	20.0	39	78.0
Total	50	100.0	50	100.0

Table.1

In this study majority of the retinopathy patients were doing day sleep, causing kapha medo dushti.

Exercise	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
Yes	14	28.0	43	86.0
No	36	72.0	7	14.0
Total	50	100.0	50	100.0

Table.2

Lack of proper exercise was observed in most of the diabetic retinopathy patients

Prakriti	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
vata pradhana	10	20.0		
kapha pradhana	21	42.0	7	14.0
pitta pradhana	19	38.0	43	86.0
Total	50	100.0	50	100.0

Table3

While analysing prakriti, kapha pradhana and pittapradhana prakriti was found to be more susceptible for Diabetic retinopathy

Head bath	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
cold water	7	14.0	50	100.0
hot water	43	86.0		
Total	50	100.0	50	100.0

Table 4

Most of the retinopathy patients were old , they were using hot water for bath

Oil Application	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
yes	22	44.0	43	86.0
no	28	56.0	7	14.0
Total	50	100.0	50	100.0

Table 5

Most patients with diabetic retinopathy were not using oil application for head

Hobbies	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
COMPUTER	10	20.0		
TV	34	68.0	43	86.0
STICHING	6	12.0	7	14.0
Total	50	100.0	50	100.0

Table 6

Most of the retinopathy patients were watching TV for long time.

Food Habits	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
VEGETERIAN	24	48.0	16	32.0
MIXED	26	52.0	34	68.0
Total	50	100.0	50	100.0

Table 7

Curd	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
OCASSIONALLY	38	76.0	24	48.0
DAILY	12	24.0	26	52.0
Total	50	100.0	50	100.0

Table 8

Bakery	Diabetic Retinopathy		Normal Individuals	
	No	%	No	%
NO	1	2.0	7	14.0
OCCASSIONALLY	33	66.0	43	86.0
DAILY	16	32.0		
Total	50	100.0	50	100.0

Table 9

Most of the diabetic patients were using Achakshushya ahara's like curd, mixed diet, tea, bakery items etc. Along with vihara's like watching TV, hot water bath leads to pitta vitiation in the eyes, and some time along with kapha causing diabetic retinopathy.

Diabetes Mellitus

Achakshushya viharas	**Achakshushya Aharas**
Day Sleep	**Ushna ahara**
Lack of Exercise	**Utklesa ahara**
Hot water bath	**Amla ahara(curd)**
Watching TV, computers, mobiles	**Vidahi Ahara**
No oil application in head	
	+ Prakriti

Diabetic Retinopathy

CONCLUSION

As eyes are said to be the seats of pitta, Pitta vitiating ahara and vihara will lead to diseases of the eyes ie, in this study diabetic retinopathy. Diabetic patients should give importance to their life style, since they are prone to get diabetic retinopathy. They should avoid vihara like day sleep, lack of exercise, watching TV, computers, mobiles etc, ahara like vidahi, amla, utklesa,virudha, ushna, etc which are achakshushya and which will lead to pitta vitiation and leads to diabetic retinopathy. Along with this if the patients are having Kapha prdhana and pitha pradhana prakriti ie, Kapha pitta and pitta kapha prakriti , they are more vulnerable for getting diabetic retinopathy.

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