‘STUDY TO EVALUATE THE NUTRITIONAL VALUES, PHYSICO CHEMICAL AND ORGANOLEPTIC PROPERTIES, ACCEPTABILITY AND STABILITY OF DIFFERENT COW’S CURD BASED NUTRITIONAL PRODUCTS’

A Thesis

SUBMITTED TO THE

TILAK MAHARASHTRA VIDYAPEETH PUNE

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

In Subject Ayurveda

Under the Board of Ayurveda Studies

by

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UNDER THE GUIDANCE OF

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Certificate of the supervisor

It is certified that the work entitled **'study to evaluate the nutritional values, physico chemical and organoleptic properties, acceptability and stability of different cow's curd based nutritional products'** is an original research work done by Dr.Manoja Abhijit Joshi under my supervision for the degree of doctor of philosophy in Ayurveda to be awarded by Tilak Maharashtra Vidyapeeth, Pune. To best of my knowledge this thesis

- Embodies work of candidate herself
- Has duly been completed
- Fulfils the requirement of ordinance related to Ph.D. degree of the TMV.
- Up to the standard in respect of both content and language for being referred to examiner.

Signature of the Supervisor.

Tilak Maharashtra Vidyapeeth, Pune

Undertaking

I, Vd. Manoja Abhijit Joshi is the Ph.D Scholar of Tilak Maharashtra Vidyapeeth in Ayurved Subject. Thesis entitled 'study to evaluate the nutritional values, physico chemical and organoleptic properties, acceptability and stability of different cow's curd based nutritional products' under the supervision of Prof.(Dr.) Kalpana Sathe, Solemnly affirms 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 I have gone through extensive review of literature of the related published/ unpublished research works and the use of such reference made has been acknowledged in my thesis.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 Ph. D. research from any party, I have to go through the enquiry procedureas decided by the Vidyapeeth at any point of time. I understand that, if my Ph.D thesis (or part of it) is found duplicateat any point of time, my research degree will be withdrawn and in such circumstances, I will be solely responsible and liable for any consequences arises thereby.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 the TMV, Pune responsible and liable in any case.

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Introduction:

Evaluation of various samples of cow-curd mixed with different ingredients as suggested in Charaka-Samhita; for the Nutritional Values, Physico-Chemical and Organoleptic Properties, Acceptability and Stability of each sample is executed in this thesis. The theme got designed for following reason:

Various directions for maintenance of health are provided in Charaka-Samhita. It is always preferred medically and personally that health of individual should be maintained as far as possible than to get submitted to the diseases and to suffer thereafter.

One of the directions in Dinacharya i.e. daily regime is:

न नक्तं दधि भुञ्जीत न चाप्यघृतशर्करम्।

नामुद्गयूषं नाक्षौद्रं नोष्णं नामलकैर्विना [१] ||६१||

ca.saU. 7/ 61

The curd should not be eaten in plain form. It shouldn't be eaten without adding sugar, or without adding honey, or without adding soup of green gram, or without adding ghee or shouldn't be eaten after heating

दध्नोऽनेकप्रकारनिषिद्धत्वाद्दिङ्मात्रोदाहरणार्थं दधिभोजनविधिमाह- न नक्तमित्यादि। अत्र न नक्तमित्यत्र नोष्णमित्यत्र च नकारः क्रियया सम्बध्यते, तेन निशि उष्णं दधि सर्वथैव न सेव्यम्। अघृतशर्करमित्यादौ च निषेधो नञा सम्बध्यते, तेनोभयप्रतिषेधात् सशर्करं भुञ्जीतेत्यादि वाक्यार्थो भवति। तेन घृतादीनां मध्येऽन्यतमसम्बन्धेनापि दध्युपयोज्यं भवति। न नक्तमित्यादिवदिहापि नकारस्य क्रियासम्बन्धे मुद्गसूपसहितस्याप्यघृतशर्करत्वमस्त्येव दध्न इत्यनुपादेयत्वं स्यात्। जतूकर्णे- नापि घृतादीनां मिलितानामयोगाद्दध्यसेव्यमुक्तम्। यदुक्तं- "नाश्नीयाद्दधि नक्तमुष्णं वा न घृतमधुशर्करामुद्गामलकैर्विना वा" इति॥६१-६२॥

Commentator on the verse is explaining that the prohibitions for eating curd should be understood by healthy person. Wherever 'na' is used e.g. '*न नक्तमि*', it means it is strictly prohibited i.e. at night and after heating. He further explains that wherever 'a' is affixed e.g.

'*अघृतशर्करमित्यादौ*', indicates *that it should be eaten with ghee, sugar etc. A deviated statement of Jatukarna however does not support this also.*

अस्याग्रे- "अलक्ष्मीदोषयुक्तत्वान्नक्तं तु दधि वर्जितम्। श्लेष्मलं स्यात् ससर्पिष्कं दधि मारुतसूदनम्॥ न च सन्धुक्षयेत् पित्तमाहारं च विपाचयेत्। शर्करासंयुतं दद्यात्तृष्णादाहनिवारणम्॥ मुद्गसूपेन संयुक्तं दद्याद्रक्तानिलापहम्। सुरसं चाल्पदोषं च क्षौद्रयुक्तं भवेद्दधि। उष्णं पित्तास्रकृद्दोषान् धात्रीयुक्तं तु निर्हरेत्"॥ इति क्वचिदधिकः पाठ उपलभ्यते।

Further commentator adds the reason that with ghee curd becomes vata smoothening and kaph facilitating item. It does not increase pitta yet it helps digestion. Mixed with sugar it alleviates thirst and burning sensation. Mixed with soup of green gram it pacifies dhatu rakta and dosha vata. With honey it becomes tasty and its side effects are overcome. Heated curd becomes responsible for vitiating pitta, rakta hence should be avoided.

CONTRA INDICATIONS OF EATING CURD DURING NIGHT TIME:

Ayurveda explains that the taste of curd is sweet mixed with sour taste. It increases Kapha dosha in the body. The mucus generation is also attributed to the effect of Kapha in view point of modern medicine. During first part of night period, there is natural predominance of Kapha in the body. So, curd consumption at night will further increase kapha leading to kapha-doshaj complications. When curd is taken at night sequentially; i.e. per night for long period, it may precipitate diseases like fever, cold, anemia, jaundice, herpes, skin disorders and giddiness.

The wonder part is curd is important item in the meals or snacks of Indians. Presenty it is proven strong PROBIOTIC. In spite of its nutritive value, pro-biotic action, help to digestion, quality of adding taste to food and its benefit of lactobacilli; Ayurveda prohibits the frequent use of curd at night and generally the use of plain curd.

If curd is to be eaten, Charaka-Samhita has suggested certain combinations for curd, which could make it free from its ill effects, which are mentioned in commentator's statement above. **Considering this, before the trial of the plain curd or with the combination of various ingredients as suggested by Charaka-Samhita on living body; it could be worth to go for its laboratory analysis.** It is unethical to try directly on humans if it is responsible

for producing diseases as mentioned in the verse. Wouldn't it be necessary to observe at least by some lab tests to see if it really is dangerous to eat plain curd or we can enjoy such delicious item without any restriction?

With this thought the research project was set to explore the truth behind prohibition of eating plain, as well as heated curd; facilitation of eating it under certain conditions like suggested ingredients and in typical season as suggested by Ayurvedic compendia and abandoning the heated curd and the curd eaten at night totally.

Importance of topic:

Directions of Charaka-Samhita and other Ayurveda compendia for the maintenance of health are golden for the prevention of diseases. It is better to prevent diseases than to suffer from them, cure them and take efforts of rehabilitation. Curd is popular item in Indian meals and snacks.

It there are restrictions on curd eating by Ayurveda, Indian people are needed to follow them. The environment, temperature, and other geographical factors of any country are considered every time when local medicines are suggested in that particular area. Modern medicine got infused in India in British era when India was under their ruling. Till then Ayurveda was principle disciple of medicine used in this country. Curd is never prohibited in modern medicine. The only restriction on curd in modern medicine is heating. The country from which the modern medical schooling has arrived is a cool country whereas India is warm in many geographical regions.

As suggested in compendia, it is allowed to eat curd in Hemant and Varsha; relatively cool seasons, the reference of which is given in 'Literary Review'. In warm season may be due to its 'abhishyanda' property and 'amla rasa' it could precipitate ill health. For common person it is significant to realize these small yet very important medical facts to remain fit and fine and healthy.

India now is becoming health conscious hence these directions are needed to reach common people. Only prohibition won't help to convince today's sophisticated and learned Indian. Hence this work is designed with modern laboratory tests to support statement of Ayurvedic compendia regarding conditions of curd eating; an item used by most Indians every day.

Lacunae of the scheme:

- Since Ayurveda directly abandons eating plain curd, it could be **unethical** to go for experiment on living human body to feed them pure curd for longer period to observe if they suffer from the diseases as suggested by Ayurveda.
- This led to only choice of basic laboratory tests and then to consider the effect of results of laboratory test.
- In organoleptic test, as stated further in the thesis; out of the curd combinations suggested in Ayurveda; only two combinations are truly palatable. This is proved by hedonic scale. Hence experimental research work for comparison of plain curd with combinations of suggested ingredients on humans could become tedious. Obviously human would not eat what is not palatable for him
- On the whole, experiment on humans for confirming hypothesis proposed by Ayurveda about restriction of plain curd and facilitate combinations suggested by compendia in suggested seasons - was not easy to set.
- With these difficulties, it was decided that in this thesis the work done can be considered as pilot study; and only laboratory tests should be designed, along with general survey done casually with only questionnaire to explore the effects on regular curd eaters.

Scope:

- With all the lacunae mentioned above, the thesis will produce:
    - Laboratory analysis of plain curd on the basis mentioned in aims and objectives
    - Laboratory analysis of samples of combinations of ingredients suggested by Ayurveda
    - Organoleptic tests of all samples including plain curd
- With these result more schemes could be set for various geographical regions in India with different culture and environment
- More facts can be explored with these schemes to support Ayurvedic restrictions of eating plain curd and justify the combinations samples

Division of chapters:

The research work of thesis is divided into following chapters:

1.Introduction

– In this chapter the need and importance of topic, hypothesis etc are stated

1. Aims and objectives

– Aims and objectives of the thesis are given

2. Preview

– Work done on same topic in various universities is mentioned

3. Literary review

– Collection of references in context to topic of the thesis with literary material is presented

4. Material and method

– Material used for this thesis and method designed for carrying out the work is elaborated

5. Observational data and statistical analysis

6. Discussion

– The sequence between aim of thesis, literary review, material and method of thesis and result and conclusion is discussed

7. Result and conclusion

– is drawn after discussion

8. Summary

– Summary of all chapters is given

9. Bibliography

– Formal record of literary material used for thesis is tubulised

10. Appendix

– is added where needed

11. References

– The details of all references from thesis, which are not mentioned in chapters are given

Further research work: Many projects can be designed on various aspects of fundamental statements of Ayurvedic compendia related to ‘eat’ and ‘don’t eat’ directions of Ayurveda and vice a versa. A few are suggested at the end of thesis as appendix.

AIM AND OBJECTIVES

AIM:

To evaluate the nutritional values, physico-chemical and organoleptic properties, acceptability and stability of cow curd based nutritional products.

Objectives:

1. To study the properties of cow curd as per classical Ayurvedic texts.
2. To study nutritional, chemical, microbial and organoleptic properties of cow's milk curd.
3. To prepare the samples as per need of the research (curd heated to 60^{O}C, curd mixed with *amla* extract (*amla powder*), curd mixed with sucrose, curd mixed with cow's *ghee* and curd mixed with green gram dal curry (*Mudgayusha*)) as per classical Ayurvedic texts.
4. To study and compare nutritional, chemical, microbial and organoleptic properties of the prepared samples of curd.

5. Pevious work done

1.**Viability of Dysentery, Enteric and Cholera Organisms in Milk Curd (*Dahi*).**

Author(s) : PANJA, G.; GHOSH, S. K.

Journal article : Indian Medical Gazette 1945 Vol.80 No.8 pp.390-92

2.**Curd-A sedative with a bonus bowl of useful side effects**.

Author-parle Milind ,Malik Jyoty

Pharmacology division,Depart Pharm sciences,guru jambleshwar university of science and Technology,Hisar,Haryana,India.

International Research Journl Of Pharmacy.ISSN-2230-8407 april 2014

3. **STUDY OF MICROBIAL DIVERSITY IN RAW MILK AND FRESH CURD USED FOR FONTINA CHEESE PRODUCTION BY CULTURE-INDEPENDENT METHODS.**

(PMID:19232767)

Giannino ML , Marzotto M , Dellaglio F , Feligini M

International Journal of Food Microbiology [29 Jan 2009, 130(3):188-195]

DOI: 10.1016/j.ijfoodmicro.2009.01.022

4.**CHANGES OF ASTRINGENT SENSATION OF SOY MILK DURING TOFU CURD FORMATION**

Abdullah Al Mahfuz,*[†]Chigen Tsukamoto,[†]Shigenitsu Kudou,[§] andTomotada Ono[†]

Department of Agro-bioscience, Faculty of Agriculture, Iwate University, Ueda 3-18-8, Morioka 020-8550, Japan, and Institute of Tohoku Food Factor Science, 202 Tamagawa, Hamada, Aomori 030-0843, Japan

J. Agric. Food Chem., **2004**, *52* (23), pp 7070–7074

Publication Date (Web): October 19, 2004

Journal of Agriculture and food chemistry

5.Review Article Soybean Curd Residue: Composition, Utilization, and Related Limiting Factors

Shuhong Li, Dan Zhu, Kejuan Li, Yingnan Yang, Zhongfang Lei, and Zhenya Zhang Graduate School of Life and Environmental Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8572, Japan Correspondence should be addressed to Zhenya Zhang; zhang.zhenya.fu@u.tsukuba.ac.jp Received 24 May 2013; Accepted 2 July 2013 Academic Editors: M. D. Bermejo and J. Rajabathar

Hindawi Publishing Corporation ISRN Industrial Engineering Volume 2013, Article ID 423590, 8 pages http://dx.doi.org/10.1155/2013/423590

6 .**curd lactobacilli with probiotic potentiality**

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Citation: Halder D, Mandal S. Curd Lactobacilli with Probiotic Potentiality. Transl Biomed. 2015, 6:1. DOI: 10.21767/2172-0479.100008

7.Bioavailability of thiamine in cow milk and curd powders using rat bioassay

R. Singh and A.D. Deodhar

Division of Animal Biochemistry, National Dairy Research Institute, Kamal 132 001 (Haryana), India

Issue Lait **Volume** 72, Number **6**, 1992

Page(s) 545 - 551

DOI https://doi.org/10.1051/lait:1992639

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DOI: 10.1051/lait:1992639

FOOD STABILITY

Article By:

Schiraldi, Alberto Dipartimento di Scienze e Technologie Alimentari e Microbiologiche, Universita degli Studi de Milano, Milan, Italy.

Last updated:2001

DOI:https://doi.org/10.1036/1097-8542.YB010660

6. Review of literature

The literary review will be divided into:

A. Ayurvedic literary collection

B. Modern literary collection

A] Ayurvedc literary collection

Under this head:

1. References regarding curd in Vedic literature
2. References regarding curd in Ayurvedic compendia
3. Method of preparation of samples
4. Methods of organoleptic tests

B] Modern literary collection

Under this head:

1. References regarding curd in modern medicine
2. Methods of laboratory tests for nutritional, chemical, microbial analysis

A] Ayurvedc literary collection

Under this head:

1. **References regarding curd in Vedic literature**

References of Curd in Vedas-

Rugved

[01-005] HYMN V. Indra.

1 O COME ye hither, sit ye down: to Indra sing ye forth, your song,

companions, bringing hymns of praise.

2 To him the richest of the rich, the Lord of treasures excellent, Indra, with Soma juice outpoured.

3 May he stand by us in our need and in abundance for our wealth:

May he come nigh us with his strength.

4 Whose pair of tawny horses yoked in battles foemen challenge not:

To him, to Indra sing your song.

5 Nigh to the Soma-drinker come, for his enjoyment, these pure drops,

The Somas mingled with the curd.

[01-137] HYMN CXXXVII. Mitra-Varuna.

1. WITH stones have we pressed out: O come; these gladdening drops are blent with milk, these

Soma-drops which gladden you.

Come to us, Kings who reach to heaven, approach us, coming hitherward.

These milky drops are yours, Mitra and Varuna, bright Soma juices blend with milk.

2 Here are the droppings; come ye nigh the Soma-droppings blend with curd, juices expressed and blend with curd.

[05-051] HYMN LI. Visvedevas.

1. WITH all assistants, Agni, come hither to drink the Soma-juice;

With Gods unto our sacred gifts.

2 Come to the sacrifice, O ye whose ways are right, whose laws are true,

And drink the draught with Agni's tongue.

3 O Singer, with the singers, O Gracious, with those who move at dawn,

Come to the Soma-draught with Gods.

4 To Indra and to Vayu dear, this Soma, by the mortar pressed,

Is now poured forth to fill the jar.

5 Vayu, come hither to the feast, wellpleased unto our sacred gifts:

Drink of the Soma juice effused come to the food.

6 Ye, Indra, Vayu, well deserve to drink the juices pressed by us.

Gladly accept them, spotless Pair come to the food.

7 For Indra and for Vayu pressed are Soma juices blent with curd,

As rivers to the lowland flow: come to the food.

[06-048] HYMN XLVIII. Agni and Others.

1. SING to your Agni with each song, at every sacrifice, for strength.

Come, let us praise the Wise and Everlasting God, even as a well-beloved Friend,

2 The Son of Strength; for is he not our gracious Lord? Let us serve him who bears our gifts.

In battle may he be our help and strengthener, yea, be the saviour of our lives.

3 Agni, thou beamest forth with light, great Hero, never changed by time.

Shining, pure Agni! with a light that never fades, beam with thy fair beams brilliantly.

4 Thou worshippest great Gods: bring them without delay by wisdom and thy wondrous power.

O Agni, make them turn hither to succour us. Give strength, and win it for thyself.

5 He whom floods, stones, and trees support, the offspring of eternal Law;

He who when rubbed with force is brought to life by men upon the lofty height of earth;

6 He who hath filled both worlds fult with his brilliant shine, who hastens with his smoke to heaven. He made himself apparent through the gloom by night, the Red Bull in the darksome nights, the Red Bull in the darksome nights.

7 O Agni, with thy lofty beams, with thy pure brilliancy, O God,

Kindled, Most Youthful One! by Bharadvaja's hand, shine on us, O pure God, with wealth, shine,

Purifier! splendidly.

8 Thou art the Lord of house and home of all the tribes, O Agni, of all tribes of men.

Guard with a hundred forts thy kindler from distress, through hundred winters, Youngest God! And those who make thy singers rich.

9 Wonderful, with thy favouring help, send us thy bounties, gracious Lord.

Thou art the Charioteer, Agni, of earthly wealth: find rest and safety for our seed.

10 With guards unfailing never negligent speed thou our children and our progeny.

Keep far from us, O Agni, all celestial wrath and wickedness of godless men.

11 Hither, O friends, with newest song drive her who freely pours her milk;

Loose her who never turns away;

12 Who, for the host of Maruts bright with native sheen, hath shed immortal fame like milk;

Whom the impetuous Maruts look upon with love, who moves in splendour on their ways.

13 For Bharadvaja she poured down in days of old

The milch-cow yielding milk for all, and food that gives all nourishment.

14 Your friend like Indra passing wise, with magic power like Varuna.

Like Aryaman joy-giving, bringing plenteous food like ViSnxu for my wish, I praise,

15 Bright as the host of Maruts mighty in their roar. May they bring Pusan free from foes;

May they bring hither hundreds, thousands for our men: may they bring hidden stores to light, and make wealth easy to be found.

16 Haste to me, Pusan, in thine car, bright Deity: I fain would speak:

Most sinful is our foeman's hate.

17 Tear not up by the roots the Kakambira tree: destroy thou all malignity.

Let them not snare by day the neck of that Celestial Bird the Sun.

18 Uninjured let thy friendship be, like the smooth surface of a skin,

A flawless skin, containing curds,

Somarasa is a juice excreted from divine plant soma. This juice is blended with curds and then offered to god Indra. The herb of soma is crushed and juice is extracted.this raw juice is hot and sharp (tikshna).to reduce its tikshnatva or strongness it is blended with curds water and milk.from above references it can be said that the method of curd preparation is known from vedic era.

References of curd in puranas

1. **Vishnu Purana-**

1) Curd is widely used in jatakarma sanskar Customs and Consecrations. The reference are found in 3.3.10 .

At the time of childbirth, it is the father's responsibility to carry out certain customs and consecrations for the child. First of all, Jatakarma Sanskara is carried out by which the newly born baby is included in the family. During this custom, a Brahmin couple is fed. It is also necessary for the couple that they should sit facing east while feeding. Thereafter, the parents should offer oblations to appease the gods and dead ancestors. Lumps made of barley flour, curd and berries should be offered as oblations. Similar consecrations are carried out at the time of children's marriage.

2)–curd is used in the rituals of ablution with water, milk, curd, honey, clarified butter, and sugarcane juice in the worship of lord shiva.it is also used in the process of ardhya.it is mentioned in 4.1.15

5 Shiva Maha-Purana

There is description of seven island in 5.5.8

The whole earth is divided into seven islands or dweepas. The name of these islands is Jambu,

Plaksha, Shalala, Kraunch, Shaaka and Pushkar. All these islands are surrounded by such oceans on all sides. The content of each of these oceans is salt. Sugarcane juice, ghee, milk, curds and honey.

Similarly the Krauncha is surrounded by the ocean of curd and its area is thrice as that of Kusha island.

8 Varaha Purana

8.5.10 Shaurya and Sarva Bhaum Vrata

Shaurya and Sarva Bhaum vrata is related with the worship of goddess Durga and is observed on the nineth day of the bright half of the hindu month-ashvin.The rituals

commence by taking a 'sankalp' aswell as observing a fast on the preceding day(saptami).The fast is broken on the next day(ashtami) byhaving fruits.Cereals are excluded from the diet.One important aspect of this austerity is the worship ofvirgin girls along with goddess Durga.One who observes the rituals of this austerity attains power valourand strength. Sarva bhaum vrata is related with the worship of all the ten directions,considered asgoddesses.A fast is observed on the tenth day of the bright half of the hindu month-kartik and lasts for ayear whereby a devotee observes fast on the tenth day(bright half) of every month that follows.Oneimportant charecteristic of this fast is that it is broken at the end of the day by having rice andcurd.Making sacrifices in the name of all the ten directions are the inseparable part of this austerity.A devotee,who observes this austerity lasting for a year remains invincible in whatever he does.

8.6 The Significance of Dhenu-Daan

8.6.5 Sharkara-Dhenu Daan

In this ritual,idols of a cow and a calf are made from sugar.After being worshipped they should be donated to a brahmin.A devotee should live only on sugar for a day.Donating a Sharkara-Dhenu liberates a man from all his sins. Similarly,donating Madhu-Dhenu(made from honey),Kheer-Dhenu(made from rice and milk),Dadhi-Dhenu(curd),Navneet-Dhenu(made from butter),Lavan-Dhenu(salt) and Karpas-Dhenu(cotton) are all believed to bestow incomparable virtues to a devotee.

8.9 Rituals Pertaining to Last Rites

When the death seemsimminent,a morsel of 'Madhupark'(mixture of curd,water,honey and clarified butter) should be kept in the mouth of the dying person.While doing this one should pray to the almighty to liberate the dead man's soul.' 'The dead body should then be carried and kept under a tree where it is purified by smearing ghee,oil,perfumes,etc.It is then carried to creamation ground and kept at the bank of a river

8.9.3 Last Rites: The Flawed Shraddh and its Prevention

It is a grave sin to partake of a meal meant for the soul of the deceased person.

Anybody who has committed this sin should atone for his sin by observing a fast for full day and a night.He also has to perform many other rituals like taking bath in a river

flowing eastward, performing tarpan, making offerings of sesame seeds into the fire, Shanti path, Mangal path etc. Partaking of'Pancha-gavya' (a mixture of cow's milk, cow's urine,cow-dung, curd and charified butter) or'Madhupark' is also believed to purify such a person."

8.9.4 Last Rites: Preparation of ‘Madhupark’

While describing the method of preparing Madhupark, Lord Varaha told Prithvi--"Madhupark"

Manifested from the right half of my body at the time when the process of creation began. This is the reason why it is so pure. Anybody who makes offering of Madhupark in the course of my worship attains to my abode. **For the preparation of Madhupark honey, curd and ghee are mixed in equal proportion. While preparing it sacred mantras in my praise should be** constantly chanted. Giving some Madhupark to a dying man liberates his soul."

10.7.2 Omens and Signs

If one is about to go out of the

There are good omens for a departure and if one sees these good omens, the journey is bound to be successful. Good omens are white flowers, full vessels, meat, distant noises, an old goat, a cow, ahorse, an elephant, fire, gold silver, a sword, an umbrella, fruit, clarified butter, **curds**, a conch shell, sugarcane, the sound of thunder, lightning and a dead body with no one crying over it. Omens are important even if one is not going on a journey.

12 Kurma Purana

(i) Santapana: This involves living for one whole day on cow’s urine, cow dung, cow’s milk; curds made from cow’s milk and clarified butter made from cow’s milk. The next day is a day of fasting.

14 Garuda Purana

14.6 Karma and its consequences – Karma Vipak

14.6.1 Atoning for Sins

Person who has killed a cow can become liberated from his sin by consuming

'Panchgavya'(a mixture of cow-milk, cow-dung, cow-urine, ghee and curd) and leading the rest of his life in the servitude of cows.

14.7.3 Mahasantapana Vrata

This particular austerity comprises of specific rituals related with the usage of 'Panchagavya'(a mixtureof cow milk, curd, ghee, cow urine and cow dung). On the first day of the austerity a devotee should have only milk, on the second day curd, on the third day 'ghee', on the fourth day 'gomutra'(cow urine),on the fifth day 'gomaya' (cow dung), on the sixth day he should live only on 'kushodak'(drinking water from a vessel in which 'kusha' grass have been kept)

18 Narad Purana

18.16Description of Dwadashi Fast

These idols should be bathed with milk containing ghee, honey,curd and five types of dry fruits. It should be followed with proper worship of Lord Vishnu .

References regarding curd in vedas

In rugveda curd is used to mix with devine somarasa.soma is a devine plant.Somarasa is a juice extracted from this plant by crushing it.curd is added in the juice to reduce its *tikshna guna*.then this somarasa blended with curd is offered to God.

In Yajurveda ,curd is used for anupan of somarasa.

2.References regarding curd in Ayurvedic compendia

References from Brihat-trayi

Dadhi guna-properties of curd

Charak Samhita-

सूत्रस्थानम् - २७. अन्नपानविध्यध्यायः

रोचनं दीपनं वृष्यं स्नेहनं बलवर्धनम्। पाकेऽम्लमुष्णं वातघ्नं मङ्गल्यं बृंहणंदधि॥२२५॥ पीनसे चातिसारे च शीतके विषमज्वरे। अरुचौ मूत्रकृच्छ्रे चकाश्र्ये च दधि शस्यते॥२२६॥

शरद्ग्रीष्मवसन्तेषु प्रायशो दधि गर्हितम्। रक्तपित्तकफोत्थेषु विकारेष्वहितं च तत्॥२२७॥

Curd has following properties as described in Sutrasthana of Charaka-Samhita in Chapter 27, Annapaanavidhyadhyaayah

- *Rochana – improves taste, appetizer*
- *Deepana – improves digestion strength*
- *Vrushya – aphrodisiac*
- *Snehana – imparts oiliness*
- *Balavardhana – improves strength and immunity*
- *Amla Vipaka – Sour taste conversion after digestion*
- *Ushna – hot*
- *Vataghna – Balances Vata*
- *Mangalya – auspicious*
- *Brumhana – improves nourishment*

It is Useful in

- Pinasa (rhinitis)
- Atisara – diarrhea
- Sheetaka (fever with cold)
- Vishamajwara – irregular fever
- Aruchi – Anorexia, lack of interest in food
- Mutrakrichra – dysuria, difficulty to pass urine
- Karshya – emaciation

आयुर्वेददीपिका व्याख्या (चक्रपाणिदत्त कृत)

अत्र रोचनमित्युक्त्वाऽपि अरुचाविति वचनमरुचिरोगहरत्वेन, रोचनता तूपयोगकाल एव द्रव्यान्तररुचिकरत्वेनोक्ता।

The commentator of Charaka-Samhita Chakrapanidatta explained the term rochana as:

The term 'rochana' indicates that curd is used as medicine for disease named 'aruchi'; and adds that it adds to the taste of edible item with which it is mixed.

It is indicated that it should be used in Hemant and Varsha Rutu.

Ashtang hridaya

अम्लपाकरसं ग्राहि गुरूष्णं दधि वातजित्॥२९॥

मेदःशुक्रबलश्लेष्मपित्तरक्ताग्निशोफकृत्

रोचिष्णु शस्तमरुचौ शीतके विषमज्वरे॥३०॥

पीनसे मूत्रकृच्छ्रे च, रूक्षं तु ग्रहणीगदे|

नैवाद्यान्निशि नैवोष्णं वसन्तोष्णशरत्सु न॥३१॥

नामुद्गसूपं नाक्षौद्रं तन्नाघृतसितोपलम्

न चानामलकं नापि नित्यं नो मन्दमन्यथा॥३२॥

ज्वरासृक् पित्तवीसर्पकुष्ठपाण्डुभ्रमप्रदम्

- *Amla paka – undergoes sour taste conversion after digestion*
- *Grahi – absorbent, useful in diarrhea*
- *Guru – heavy to digest*
- *Ushna – hot in nature*
- *Vatajit – balances Vata*
- *Increases Meda (fat), Shukra (semen), Bala (strength), Kapha, Raktapitta (bleeding disorders), Agni (digestion strength) and shotha (inflammation).*

Sushrut Samhita

अथ दधिवर्गः |

दधि तु मधुरमम्लमत्यम्लं चेति; तत्कषायानुरसं स्निग्धमुष्णं

पीनसविषमज्वरातिसारारोचकमूत्रकृच्छ्रकाश्र्यापहं वृष्यं प्राणकरं मङ्गल्यं च

॥६५॥

निबन्धसङ्ग्रह व्याख्या (डल्हण कृत)

अथ दधिभेदानाह- दधीत्यादि| एतेन त्रिप्रकारं दध्युक्तम्| सामान्यदधिगुणमाह- तदित्यादि| उष्णमुष्णवीर्यम्| वृष्यं शुक्रकरम्| मङ्गल्यं मङ्गलहेतुः| अन्ये त्वेवं पठन्ति- 'दधि तु मधुरं सृष्टमूत्रपुरीषं गुर्वम्लमभिष्यन्दि श्लेष्मपित्तशोफवर्धनं कार्श्यापहं रोचनं मङ्गल्यं च, तदेव चोद्धृतसारं ग्राहयनभिष्यन्दि च, ससरं कफमेदःशुक्रकृत्, त्रिदोषकृन्मन्दजातम्' इति॥६५॥

महाभिष्यन्दि मधुरं कफमेदोविवर्धनम् |

कफपित्तकृदम्लं स्यादत्यम्लं रक्तदूषणम् ॥६६॥

- Curd has madhur rasa, amla and atyamla are the types according to rasa
- Curd astringent subtaste.
- Snigdha-oily, onctious
- Ushna-hot in nature
- Vrushya-aphrodaisiac

Used in

- Pinasa (rhinitis)
- Atisara – diarrhea
- Vishamajwara – irregular fever
- Aruchi – Anorexia, lack of interest in food
- Mutrakrichra – dysuria, difficulty to pass urine
- Karshya – emaciation

Types of curd

According to taste-

1. Madhur-it is fresh curd, which is madhur rasa,increasing kapha dosha and meda dhatu.it is abhisyandi or increasing secretions and causes oozing of the secretions.

2. Amla –It is having amla rasa,it increases kapha and pitta dosha

3. Atyamla - it having very amla rasa.it causes vitiation of rakta dosha

TYPES OF CURD ACCORDING TO BHAVA PRAKASHA

The 5 types of curd as mentioned in Bhava Prakasha Nigantu are Manda (Semi formed and thick curd), Swadu (Sweet and thick curd), Swadamla (Sweet – sour curd), Amla (Sour curd) and Atyamla (Excessively sour curd). Their properties are as follows:

Semi formed and thick curd - The curd which is not well formed and has no distinct taste is semi formed curd. It increases the production of urine and feces, increases tridoshas and causes burning sensation. It is generally not suitable

Sweet and thick curd – The curd which is formed properly and which is sweet in taste is Sweet curd. It is an aphrodisiac, increases fat and kapha whereas mitigates vata and is good for bleeding disorders.

Sweet – Sour curd – The curd which is sweet and little sour in taste increases appetite and increases pitta and kapha. It also increases disorders of blood.

Sour curd – This is the curd which is properly formed but sour in taste. This curd increases pitta dosha, kapha dosha and blood.

Excessively sour curd – The curd which is excessively sour when consumed produces tingling sensation in teeth and burning sensation in throat. This promotes appetite and increases vata, pitta and disorders of blood.

Properties of curd depending upon the animal whose milk is used to prepare the curds

विपाके मधुरं वृष्यं वातपित्तप्रसादनम् ॥६९॥

बलासवर्धनं स्निग्धं विशेषाद्दधि माहिषम् ।७०।

Curd from Cow's milk – It is sweet and sour in taste. It promotes taste, increases appetite, strength and good for heart. It mitigates vata and is the best among all type of curds.

Curd prepared from Buffaloes' milk – It is unctuous, heavy to digest and mitigates vata and pitta but increases kapha and vitiates the blood. It is an aphrodisiac.

Curd from Goat's milk – It is best and light to digest and bind feces. .It helps in overcoming breathing disorders, cold, cough, hemorrhoids, and emaciation and also mitigates the tridoshas.

Curd prepared from fat free milk – It is unctuous and heavy. It promotes strength, stoutness and taste. Mitigates vata and increases kapha. When it is added with sugar or honey, it does not increase pitta.

PROPERTIES OF SWEET CURD: When sugar or jiggery is added to to curd and taken, it relieves thirst, improves blood circulation, mitigates vata and pitta, increases sperm count and is good for health.

CONTRA INDICATIONS OF EATING CURD DURING NIGHT TIME: Ayurveda explains curd as having sour mixed sweet property and it increase Kapha dosha in the body. The mucus generation is also attributed to the effect of Kapha. During night period, there is natural predominance of Kapha in the body. So, curd consumption at night will further increase kapha leading to many complications. When curd is taken at night for longer period of time it may cause problems like fever, cold, anemia, jaundice, herpes, skin disorders and giddiness.

EFFECT OF INTAKE OF CURD ACCORDING TO SEASONS: It is best to take curd during cold and dewy season, in winter or in rainy season. It is to

be avoided during autumn, summer and spring seasons. In autumn, summer and spring seasons, buttermilk is good to be taken.

PREPARATION OF BUTTERMILK: To prepare buttermilk, add one scoop of curd and 4 times of water. Churn it well and remove the fat, then add little salt to taste. You can add little crushed cumin also.

Charaka-Samhita

सूत्रस्थानम् - २७. अन्नपानविध्यध्यायः

त्रिदोषं मन्दकं, जातं वातघ्नं दधि, शुक्रलः|

सरः, श्लेष्मानिलघ्नस्तु मण्डः स्रोतोविशोधनः||२२८|| आयुर्वेददीपिका व्याख्या

(चक्रपाणिदत्त कृत)

मन्दकं यदा क्षीरं विक्रियामापन्नं घनत्वं न याति तदा तन्मन्दकम्| जातं वातघ्नमिति यदा तु मन्दकावस्थामुत्सृज्य घनतया जातं सन्मधुरमीषदम्लं च भवति, तदा वातघ्नं विशेषेण भवतीत्यर्थः| पूर्वे तु दधिगुणाः सुजातस्य व्यक्ताम्लस्य बोद्धव्याः| शुक्रलः सर इति च्छेदः| सरो दध्युपरिस्नेहः, शुक्रलः

शुक्रसुतिवृद्धिकरः; अत एव सुश्रुते सरगुणे "वृष्यः शुक्रविवर्धनः" (सु. सू. ४५) इति पदद्वयोपादानं कृतम्| मण्ड इति प्रकरणाद्दधिमण्डो मस्त्वित्यर्थः||२२८||

Mandaka curd is vitiator of all three dosha. Jatam is vataghna curd. Manda is responsible for facilitating shukra, it is sara, it act for shrotovishoshana and it is kapha - vaataghna.

The terms are better explained by Chakrapanidatta:

Mandaka is that curd where the reaction of milk is chemically over yet the consistency of the curd is still fluidy. The properties of curd should be understood to be expressed in curd which has developed obvious sour taste in it after setting.

Jaatam is that curd which has overcome mandaka status and is now set as

gains its denser consistency;it is vaataghna and tastes little madhura and little sour

The fluidy fat on curd is sara in property and it is sara for shukrasruti hence is called shukravrudhikara. Sushruta has this notion when he calls such curd as shukravardhaka

Manda is water content of curd.

Ill effects of amla rasa of curd:

Sour is amla rasa. Amla rasa has prithvi and agni mahabhuta dominance in it,

सूत्रस्थानम् - १०. रसभेदीयाध्यायः

अम्लोऽग्निदीप्तिकृत्स्निग्धो हृद्यः पाचनरोचनः|

उष्णवीर्यो हिमस्पर्शः प्रीणनः क्लेदनो लगुः||१०||

करोति कफपितास्रं मूढवातानुलोमनः|

सोऽत्यभ्यस्तस्तनोः कुर्याच्छैथिल्यं तिमिरं भ्रमम्||११||

कण्डुपाण्डुत्ववीसर्पशोफविस्फोटतृड्ज्वरान्|

----------|१२|

पृथिव्यग्निभूयिष्ठत्वादम्लः, कफं विलापयति, पित्तमभिवर्धयति, रक्तं दूषयति,मांसं विदहति, कायं शिथिलीकरोति, क्षीणक्षतकृशदुर्बलानां

श्वयथुमापादयति

सूत्रस्थानम् - १०. रसभेदीयाध्यायः Ashtang hridaya

इदानीमम्लस्कन्धमाह----

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अम्लो धात्रीफलाम्लीकामातुलुङ्गाम्लवेतसम्||२५||

दाडिमं रजतं तक्रं चुक्रं पालेवतं दधि|

आम्रमाम्रातकं भव्यं कपित्थं करमर्दकम्||२६||

Functions and side effects of amla rasa:

- It increases kapha dosha
- It increases pitta dosha
- It increases rakta dhatu
- it causes loosening of body tissues
- it creates edema
- in weak persons it creates kshavathu

सूत्रस्थानम् - ५. द्रवद्रव्यविज्ञानीयाध्यायः

अम्लपाकरसं ग्राहि गुरूष्णं दधि वातजित्॥२९॥ मेदःशुक्रबलश्लेष्मपित्तरक्ताग्निशोफकृत्

रोचिष्णु शस्तमरुचौ शीतके विषमज्वरे॥३०॥

In Sushruta-Samhita:

सूत्रस्थानम् - ४५. द्रवद्रव्यविध्यध्यायः

अथ दधिवर्गः

दधि तु मधुरमम्लमत्यम्लं चेति; तत्कषायानुरसं स्निग्धमुष्णं

पीनसविषमज्वरातिसारारोचकमूत्रकृच्छ्र काश्र्यापहं वृष्यं प्राणकरं मङ्गल्यं च ॥६५॥

The references are repeated for the sake of combination with different ingredients. The reason becomes obvious if these are put side by side.

Cow ghee:

Ghee is Madura rasa, sheet virya, the combination of curd and ghee will be less amla rasa than plain curd. This decreased amla rasa will cause pitta pacifying action. The other ailments caused by pitta vriddhi get reduced

सूत्रस्थानम् - २७. अन्नपानविध्यध्यायः

स्मृतिबुद्ध्यग्निशुक्रौजःकफमेदोविवर्धनम्।वातपित्तविषोन्मादशोषालक्ष्मीज्वरापहम् ॥२३१॥

सर्वस्नेहोत्तमं शीतं मधुरं रसपाकयोः सहस्रवीर्यं विधिभिर्घृतं कर्मसहस्रकृत्॥२३२॥

मदापस्मारमूर्च्छायशोषोन्मादगरज्वरान्।
योनिकर्णशिरःशूलं घृतं जीर्णमपोहति॥२३३॥

सर्पीष्यजाविमहिषीक्षीरवत् स्वानि निर्दिशेत्।२३४।

सूत्रस्थानम् - ४५. द्रवद्रव्यविध्यध्यायः su.su 45

अथ घृतम् ।

घृतं तु मधुरं सौम्यं मृदु शीतवीर्यमनभिष्यन्दि

स्नेहनमुदावर्तोन्मादापस्मारशूलज्वरानाहवातपित्तप्रशमनमग्नि दीपनं
स्मृतिमतिमेधाकान्तिस्वरलावण्यसौकुमार्यौजस्तेजोबलकरमायुष्यं वृष्यं मेध्यं वयःस्थापनं गुरु चक्षुष्यं श्लेष्माभिवर्धनं पाप्मालक्ष्मीप्रशमनं विषहरं रक्षोघ्नं च ॥९६॥

सूत्रस्थानम् - १६. स्नेहविधिरध्यायः as.hrudaya

साम्प्रतं चतुर्णां स्नेहानां मध्ये यो येभ्यो हितः, तं दर्शयन्नाह

तत्र धीस्मृतिमेधादिकाङ्क्षिणां शस्यते घृतम्॥८॥

Ghrut is madhur rasa, sheet virya,saumya,pacifying vata and pitta,increases kapha,agnideepan,increases meda and shukra.

Khandasharkara

सूत्रस्थानम् - ४५. द्रवद्रव्यविध्यध्यायः su.su 45

मत्स्यण्डिकाखण्डशर्करा विमलजाता उत्तरोत्तरं शीताः स्निग्धाः गुरुतरा

मधुरतरा वृष्या रक्तपित्तप्रशमनास्तृष्णाप्रशमनाश्च ॥१६२॥

Khandsharkara is snigdha,madhur (sweet) in taste. Sheeta veerya, guru, and vrushya.

As it is madhura rasa and shit virya, it will cause pacifying effect on pitta dosha .it will minimize the vitiation of rakta dhatu.

It can increase shukra dhatu as it is vrushya.

Trishna can be minimized due to madhura rasa and shit virya.

Honey:

Madhu or honey is:

अथ मधुवर्गः | मधु तु मधुरं कषायानुरसं रूक्षं शीतमग्निदीपनं वर्ण्यं स्वर्यं लघु सुकुमारं लेखनं हृद्यं

वाजीकरणं सन्धानं शोधनं रोपणं(सङ्ग्राहि) चक्षुष्यं प्रसादनं सूक्ष्ममार्गानुसारि

पित्तश्लेष्ममेदोमेहहिक्काश्वासकासातिसारच्छर्दितृष्णाकृमिविषप्रशमनं हृलादि

त्रिदोषप्रशमनं च; तत्तु लघुत्वात् कफघ्नं, पैच्छिल्यान्माधुर्यात् कषायभावाच्च

वातपित्तघ्नम् ॥१३२॥

Honey is madhur and kashay. It is ruksha. The veerya is sheet.

It is agnideepana, good for svara, laghu, sukumar, good for heart, vajikarana, good for sandhana, shodhana ropana; it is responsible for creating constipation; it is good for eyes, luster of the skin, reaching minute channels, vruddhi of pitta, kapha, meda and is responsible for precipitating prameha, hikka, shvas, atisar, chardi, trushna, krumi. It is antidote to poisoning. It pacifies all three dosha. It is kaphaghna due to laghu guna; it is vaatapittaghna due to pichchil guna; madhura and kashaya rasa.

Amalaki churna:

References of Amalaki from Ayurvedic compendia:

1.शटीपुष्करमूलाम्लवेतसैलाहिङ्ग्वगुरुसुरसातामलकीजीवन्तीचण्डा इति दशेमानि श्वासहराणि भवन्ति (३७)

सूत्रस्थानम् - ४. षड्विरेचनशताश्रितीयोऽध्यायः

Amalaki is one of the strong remedial measures for asthma. Shathi, Pushkarmul, Amlavetas, Ela, Hingu, Surasa, Amalaki, Jeevanti, Chanda etc are other in the group of ten

2. अथातोऽभयामलकीयं रसायनपादं व्याख्यास्यामः॥१॥

चिकित्सास्थानम् - १/१. अभयामलकीयरसायनपादः

Abhaya, Amalaki - used as rasayan

2. कैयदेवनिघण्टु - १. ओषधिवर्ग

शृङ्गी धात्री चामलकी शुक्तिः शुष्कामलक्यपि ॥२३७॥

तद्वद् धात्री स्वेदमेदोहराम्ला शुक्रला हिमा |

भग्न सन्धानकृत् केश्या पिपासाकफपित्तहृत् ॥२३८॥

तन्मज्जा तुवरः स्वादुस्तृट्छर्द्यनिलपित्तहा |

हन्ति वातं तदम्लत्वात् पित्तं माधुर्यशैत्यतः ॥२३९॥

कफं रूक्षकषायत्वात् फलेभ्योऽभ्यधिकं मतम् |

चक्षुष्यं सर्वदोषघ्नं वृष्यमामलकीफलम् ॥२४०|

In Kaiyyadev nighantu the properties described are:

- *Swedahara, medahara, amlahara*
- *Shukrala*
- *Sheeta veerya*
- *Sandhanakrut*
- *Kapha hara due to kashaya rasa*
- *Keshya*
- *Thirst, pitta and kapha hara*
- *Vaata pitta hara due to amla, madhura and sheeta quality*
- *Facilitates eyes, tridoshaghna,*
- *Vrushya*

4. द्रव्यगुणसङ्ग्रह - ५. फलवर्ग

धात्री तद्वद्विशेषेण वृष्या शीतैव वीर्यतः ॥३८॥

हन्ति वातं तदम्लत्वात् पित्तं माधुर्यशैत्यतः |

कफं कटुकषायत्वात् फलेभ्योऽप्यधिकं च तत् ॥३९॥

अक्षं भेदनरूक्षोष्णं वैस्वर्यं क्रिमिनुत् कटु |

चक्षुष्यं स्वादुपाकं च कषायं कफपित्तनुत् ॥४०॥

Same set of properties are described here

5. पर्यायरत्नमाला

धात्री कर्षफला तिष्या वयःस्थामलकी शिवा ॥२१९॥

All synonyms are described here for Amalaki

राजनिघण्टु - ११. आम्रादिवर्ग

आमलकी

आमलकी वयस्था च श्रीफला धात्रिका तथा |

अमृता च शिवा शान्ता शीताऽमृतफला तथा ॥१५६॥

जातीफला च धात्रेयी ज्ञेया धात्रीफला तथा |

वृष्या वृत्तफला चैव रोचनी च चतुर्दश ॥१५७॥

आमलकं कषायाम्लं मधुरं शिशिरं लघु |

दाहपित्तवमीमेहशोफघ्नं च रसायनम् ॥१५८॥

कटु मधुरकषायं किञ्चिदम्लं कफघ्नं रुचिकरमतिशीतं हन्ति

पित्तास्रतापम् |

श्रमवमनविबन्धाध्मानविष्टम्भदोषप्रशमनममृताभं चामलक्याः फलं

स्यात् ॥१५९॥

The properties and synonyms describe above are mentioned in this compendium also.

7.

राजवल्लभनिघण्टु - ३. माध्याह्निकपरिच्छेद

आमलकीफलगुण

तद्वद्धात्री विशेषेण वृष्या शीतैव वीर्यतः |

हन्ति वातं तदम्लत्वात् पित्तं माधुर्यशैत्यतः ॥२०६॥

कफं रूक्षकषायत्वात् फलेभ्योप्याधिकं हि तत् |

आदावन्ते च मध्ये च भोजनस्य प्रशस्यते ॥२०७॥

निवत्ययं दोषहरं फले त्वामलकीफलम् ॥२०८॥

1. सूत्रस्थानम् - ६. अन्नस्वरूपविज्ञानीयाध्यायः

   (Ashtang-sangraha)

तद्वदामलकं शीतमम्लं पित्तकफापहम्।

9.सुश्रुतेऽपि (सू.अ.४६।१४३) त्रिदोषघ्नत्वमुक्तम्। तद्ग्रन्थो हि-

"चक्षुष्यं सर्वदोषघ्नं वृष्यमामलकीफलम्। हन्ति वातं तदम्लत्वात्

पित्तं माधुर्यशैत्यतः॥ कफं रूक्षकषायत्वात् फलेभ्योऽभ्यधिकं तु

तत्।" इति।

10.

चिकित्सास्थानम् - १/१. Charaka

Samhita)अभयामलकीयरसायनपादः

हरीतकीं पञ्चरसामुष्णामलवणां शिवाम्।

दोषानुलोमनीं लघ्वीं विद्याद्दीपनपाचनीम्॥२९॥

आयुष्यां पौष्टिकीं धन्यां वयसः स्थापनीं पराम्।

सर्वरोगप्रशमनीं बुद्धीन्द्रियबलप्रदाम्॥३०॥

कुष्ठं गुल्ममुदावर्तं शोषं पाण्ड्वामयं मदम्।

अर्शांसि ग्रहणीदोषं पुराणं विषमज्वरम्॥३१॥

हृद्रोगं सशिरोरोगमतीसारमरोचकम्।

कासं प्रमेहमानाहं प्लीहानमुदरं नवम्॥३२॥

कफप्रसेकं वैस्वर्यं वैवर्ण्यं कामलां क्रिमीन्।

श्वयथुं तमकं छर्दिं क्लैब्यमङ्गावसादनम्॥३३॥

स्रोतोविबन्धान् विविधान् प्रलेपं हृदयोरसोः।

स्मृतिबुद्धिप्रमोहं च जयेच्छीघ्रं हरीतकी॥३४॥

(अजीर्णिनो रूक्षभुजः स्त्रीमद्यविषकर्शिताः।

सेवेरन्नाभयामेते क्षुत्तृष्णोष्णार्दिताश्च ये)॥३५॥

तान् गुणांस्तानि कर्माणि विद्यादामलकीष्वपि।

यान्युक्तानि हरीतक्या वीर्यस्य तु विपर्ययः॥३६॥

अतश्चामृतकल्पानि विद्यात् कर्मभिरीदृशैः|
हरीतकीनां शस्यानि भिषगामलकस्य च||३७||

3. **Method of preparation of samples**

Plain curd / control sample:

Ayurvedic method- Method of preparation of curd according to Kshemakutuhala:

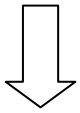
Cows or buffelow milk is boiled and allowed to cool. Buttermilk is added to it and kept in a vessel. In few hours clear white as shining moon or conch shell curd gets prepared.

Curd prepararti on

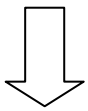
Desi cow milk is obtained from recognized centre. (BSDT Ayurveda hospital and research centre, Wagholi)

Cow milk is heated intensively to boil for 5 to 10 min

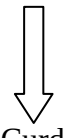
Cooled to room temperature



Cooled milk is added with previous day's curd or buttermilk



Stirred and allowed undisturbed to set, for overnight



Curd

Preparation of curd samples with ingredients directed by Charaka - Samhita:

1. Plain curd as control
   Flow chart is given above
2. Curd + honey

Curd (100 gm) + honey (100 gm)

3. Curd + khandasharkara

   Curd (100 gm) + khandasharkara (100 gm)

4. Curd + cow ghee

   Curd (100 gm) + cow ghee (100 gm)

5. Curd + mudgayusha

   Curd (100 gm) + mudgayusha (100 gm)

6. Curd + amalaki churna

   Curd (100 gm) + amalaki churna (100 gm)

4. Methods of organoleptic tests

Organoleptic tests as explained in the literarue are perception of the specia senses by humans. They are:

- Appearance
- Aroma
- Taste
- Sweetness
- Texture or mouth feel

Hedonic scale is used for it. The details of calculations and use of Hedonic scale is as below:

Acceptability of food is assessed with the help of following table.

Scorecard - Hedonic Rating Scale

Tray number ..... Name .....

In front of you is one sample. Taste the sample and tick ✓ how much you like or dislike each of the characteristics. You can taste the sample more than once.

	Appearance	Aroma	Taste	Sweetness	Texture/mouth-feel
Like a lot	_____	_____	_____	_____	_____
Like a little	_____	_____	_____	_____	_____
Neither like nor dislike	_____	_____	_____	_____	_____
Dislike a little	_____	_____	_____	_____	_____
Dislike a lot	_____	_____	_____	_____	_____

Hedonic scale Term used in tasting panels where the judges indicate the extent of their like or dislike for the food. ("hedonic scale." A Dictionary of Food and Nutrition.)

The calculation of the hedonic scale is as follows:

To calculate the score for each product each descriptor was assigned a score value:

- like a lot = 5
- like a little = 4
- neither like nor dislike = 3
- dislike a little = 2
- dislike a lot = 1

Figure 4 below gives some of the calculations that was done using the data collected.

Record Sheet - Hedonic Rating Scale

Food Characteristic – Appearance, Aroma, Taste, Sweetness, Texture/Mouth-feel

Score Value Assigned:
like a lot = 5 like a little = 4 neither like nor dislike = 3 dislike a little = 2 dislike a lot = 1

	Tester					Total Score	Average Score (total score ÷ number of testers)
	1	2	3	4	20		
Appearance	5 pts	4 pts	4 pts	4 pts	4 pts	84	4.2
Aroma	4 pts	4 pts	5 pts	5 pts	5 pts	92	4.6
Taste	4 pt	5 pt	5 pts	5 pts	5 pt	96	4.8
Sweetness	2 pt	2 pt	4 pt	4 pt	4 pt	64	3.2
Texture/ Mouth-feel	3 pt	3 pt	2 pt	2 pt	3 pt	52	2.6

Preparation of mudgayusha:

यूषपरिभाषा

कल्कद्रव्यपलं शुण्ठी पिप्पली चार्धकार्षिकी
वारिप्रस्थेन विपचेत्स द्रवो यूष उच्यते १५६।

Sharangdhar Samhita (madyamkhand)

The ingredients of which yusha is to be prepared should be taken in measure of one pala; ardhakarsha shunthi pippali and one prastha water is boiled and yusha is prepared

B] Modern literary collection

Under this head:

1. **References regarding curd in modern medicine**

Nutritional values

The nutritional value of food defines what a food is made of and its' impact on the body . It is particularly important to understand the nutritional value of food due to the impact on the body as it relates to cholesterol, fat, salt, and sugar intake

Nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excretion.

The diet of an organism is what it eats, which is largely determined by the availability, the processing and palatability of foods. A healthy diet includes preparation of food and storage methods that preserve nutrients from oxidation, heat or leaching, and that reduce risk of food borne illness.

A poor diet can cause deficiency diseases such as blindness, anemia, scurvy, preterm birth, stillbirth and cretinism health-threatening conditions like obesity and metabolic syndrome and such common chronic systemic diseases as cardiovascular disease diabetes, and osteoporosis. A poor diet can cause the wasting of kwashiorkor in acute cases, and the stunting of marasmus in chronic cases of malnutrition.

Definition: An indication of the contribution of a food to the nutrient content of the diet. This value depends on the quantity of a food which is digested and absorbed and the amounts of the essential nutrients (protein, fat, carbohydrate, minerals, vitamins) which it contains. This value can be affected by soil and growing conditions, handling and storage, and processing.

The nutritional value of food refers to the quantity and quality of nutrients found in the food item,.Information about the energy (measured in calories), the macronutrients (carbohydrates, protein, fats), micronutrients (vitamins and minerals) and phytochemicals of the food are required to understand this.

Foods have different nutritional value. To know the nutritional value of certain foods, the USDA has created the National Nutrient Database for Standard Reference, which lists the nutrient information of more than 8,000 foods. Consumers can also find out the nutritional value of food products by reading the Nutrient Facts Label of the package. The FDA provides information on its site about the understanding and use of Nutrition Facts Labels.

PHYSIOCHEMICAL PROPERTIES

1. of or pertaining to both physical and chemical properties, changes, and reactions

2. of or according to physical chemistry

Physical and chemical properties. Examples of physical properties are: color, smell, freezing point, boiling point, melting point, infra-red spectrum, attraction (paramagnetic) or repulsion (diamagnetic) to magnets, opacity, viscosity and density. There are many more[1] examples.

Examples of Chemical Properties

- Toxicity.
- Coordination number.
- Flammability.
- Enthalpy of formation.
- The heat of combustion.
- Oxidation states.
- chemical stability.
- Types of chemical bonds that will form.

Physical Characteristics

1. Shape 2. Size

3. Weight 4. Volume

5. Surface area 6. Density

7. Porosity 8. Color

9. Appearance 10. Drag coefficient.

11 Center of gravity

A physical property is any property that is measurable, whose value describes a state of a physical system. The changes in the physical properties of a system can be used to describe its transformations or evolutions between its momentary states. Physical properties are often referred to as observables. They are not modal properties. Quantifiable physical property is called physical quantity.

List of properties

The physical properties of an object that are traditionally defined by classical mechanics are often called mechanical properties. Other broad categories, commonly cited, are electrical properties and optical properties. Examples of physical properties include:

- absorption (physical)
- absorption (electromagnetic)
- albedo
- angular momentum
- area
- brittleness
- boiling point
- capacitance
- color
- concentration
- density
- dielectric
- ductility
- distribution
- efficacy
- elasticity

- electric charge
- electrical conductivity
- electrical impedance
- electric field
- electric potential
- emission
- flow rate (mass)
- flow rate (volume)
- fluidity
- frequency
- hardness
- inductance
- Intrinsic impedance
- intensity
- irradiance
- length
- location
- luminance
- luminescence
- luster
- malleability
- magnetic field
- magnetic flux
- mass
- melting point
- moment
- momentum
- opacity
- permeability
- permittivity
- plasticity
- pressure

- radiance
- resistivity
- reflectivity
- refractive index
- spin
- solubility
- specific heat
- strength
- stiffness
- temperature
- tension
- thermal conductivity
- velocity
- viscosity
- volume
- wave impedance

Food physical chemistry is considered to be a branch of Food chemistry concerned with the study of both physical and chemical interactions in foods in terms of physical and chemical principles applied to food systems, as well as the applications of physical/chemical techniques and instrumentation for the study of foods. This field encompasses the *"physiochemical principles of the reactions and conversions that occur during the manufacture, handling, and storage of foods"*

Chemical properties of food

Water, saccharides, proteins, lipids, minerals, colorants, and additives all contribute to the nutritional value and sensory properties of food. During post harvest storage and processing, these components change and the extent and nature of change depends on the chemical properties of the compounds themselves.

Common chemical properties analyzed in foods include the following:

- pH - Acidity
- Fat and oil quality

- Fat content
- Protein analysis

Acceptability of food: the measure of whether an animal will consume enough of food to meet its caloric needs. About Food Texture Texture plays a critical role in the satisfaction and acceptability of food products.

The body has constant need for energy in much the same way as any piece of complicated machinery and yet the process of providing this energy in the form of food involves far more than the mere ingestion of calories. Most of us appreciate that we can derive great pleasure from eating and drinking those things which we like and that, equally, however nutritious we know them to be (or are informed of the fact on the label) we quickly lose interest or indeed entirely reject those food products which are not pleasing or do not stimulate the appetite. In other words, given a free choice we are generally discriminative and select those foods and drinks which give us most pleasure. However, we must also recognise that the majority of us try to live our lives with the least effort and as discrimination involves effort it is not surprising that a large majority of consumers approach the selection and appreciation of food at best subconsciously or even, with the ever increasing pressures of today, unconsciously.

Sensory analysis, a multi-disciplinary science that uses human panelists and their senses of sight, smell, taste, touch and hearing measures the sensory characteristics and acceptability of food products

Meiselman (2002) identified four of the context factors which can influence food acceptability: evaluating the food as part of a meal, the effect of social interaction during food consumption, the environment in which the food is consumed, and the ability to make choices regarding the food that is being consumed.

Acceptability of food is assessed with the help of following table.

Scorecard - Hedonic Rating Scale

Tray number ..... Name .....

In front of you is one sample. Taste the sample and tick ✓ how much you like or dislike each of the characteristics. You can taste the sample more than once.

	Appearance	Aroma	Taste	Sweetness	Texture/mouth-feel
Like a lot	_____	_____	_____	_____	_____
Like a little	_____	_____	_____	_____	_____
Neither like nor dislike	_____	_____	_____	_____	_____
Dislike a little	_____	_____	_____	_____	_____
Dislike a lot	_____	_____	_____	_____	_____

Hedonic scale Term used in tasting panels where the judges indicate the extent of their like or dislike for the food. ("hedonic scale." A Dictionary of Food and Nutrition.)

Stability of Nutrients in Food -

The stability of nutrients in food depends on their environment.

Nutrients can be lost to varying degrees depending on whether the food is exposed to light or air, acid or alkali, the temperature and their ability to dissolve in water. Generally the losses of carbohydrate, fat, protein, vitamin K, niacin, biotin and elements are small during processing and storage. Greatest losses are usually seen with vitamins B-l and C, with intermediate losses shown by vitamin A, provitamin A and vitamins D, E, B-2, B-6, B-12, pantothenic acid and folacin.

Losses may be due to destruction of the nutrient or by dissolving in water that is later thrown away. The presence of acid (from other foods or addition of vinegar) or alkali (from other foods or added sodium bicarbonate (baking soda)) can cause destruction of some vitamins.

Foods are physicochemical systems in which a number of phases and chemical compounds can coexist in a metastable condition (that is, far from true thermodynamic equilibrium), and in the presence of microbes, whose metabolism may cause significant modifications of the chemical composition and physical properties of the hosting product. For this reason, food science not only deals with protection from external chemical, physical, and microbial injuries (for example, through the use of suitable additives or packaging), but also investigates the intrinsic causes of food instability, such as phase separations of dispersed systems, phase transitions (which mainly concern food polymers, such as starch, gluten and other proteins, and fats), enzymatic reactions (often related to the “endogenous” microbial agents), and preparation procedures (such as cooking, extruding, and freezing), all of which can profoundly modify the nutritional and sensory properties of the product.

The increased acidity causes the milk proteins (casein) to tangle into solid masses, or curds. Milk that has been left to sour (raw milk alone or pasteurized milk with added lactic acid bacteria) will also naturally produce curds, and sour milk cheeses are produced this way.

Food nutrients

Carbohydrates, or saccharides, are biomolecules. The four major classes of biomolecules are carbohydrates, proteins, nucleotides, and lipids. Carbohydrates are the most abundant of the four.

Also known as "carbs," carbohydrates have several roles in living organisms, including energy transportation. They are also structural components of plants and insects.

Carbohydrate derivatives are involved in reproduction, the immune system, the development of disease, and blood clotting.

- "Saccharide" is another word for "carbohydrate."
- Foods high in carbohydrates include bread, pasta, beans, potatoes, rice, and cereals.
- One gram of carbohydrate contains approximately 4 kilocalories

- High glycemic index (GI) carbohydrates quickly enter the bloodstream as glucose

Sources of carbohydrate- whole grains, fruit, and vegetables.

Carbohydrates, also known as saccharides or carbs, are sugars or starches. They are a major food source and a key form of energy for most organisms.

They consist of carbon, hydrogen, and oxygen atoms.

TYPES OF CARBOHYDRATE

There are various types of carbohydrate. They include monosaccharides, disaccharides, and polysaccharides.

MONOSACCHARIDES

This is the smallest possible sugar unit. Examples include glucose, galactose, or fructose. Glucose is a major source of energy for a cell. "Blood sugar" means "glucose in the blood."

In human nutrition, these include:

- galactose, most readily available in milk and dairy products
- fructose, mostly in vegetables and fruit

DISACCHARIDES

Disaccharides are two monosaccharide molecules bonded together, for example, lactose, maltose, and sucrose.

Bonding one glucose molecule with a galactose molecule produces lactose. Lactose is commonly found in milk.

Bonding one glucose molecule with a fructose molecule, produces a sucrose molecule.

Sucrose is found in table sugar. It is often results from photosynthesis, when sunlight absorbed by chlorophyll reacts with other compounds in plants.

POLYSACCHARIDES

Different polysaccharides act as food stores in plants and animals. They also play a structural role in the plant cell wall and the tough outer skeleton of insects.

Polysaccharides are a chain of two or more monosaccharides.

The chain may be:

- branched, so that the molecule looks like a tree with branches and twigs
- unbranched, where the molecule is a straight line

Polysaccharide molecule chains may consist of hundreds or thousands of monosaccharides.

Glycogen is a polysaccharide that humans and animals store in the liver and muscles.

Starches are glucose polymers that are made up of amylose and amylopectin. Rich sources include potatoes, rice, and wheat. Starches are not water soluble. Humans and animals digest them using amylase enzymes.

Cellulose is one of the main structural constituents of plants. Wood, paper, and cotton are mostly made of cellulose.

SIMPLE AND COMPLEX CARBS

.Monosaccharides and disaccharides are simple carbohydrates, and polysaccharides are complex.

Simple carbohydrates are sugars. They consist of just one or two molecules.They provide a rapid source of energy, but the consumer soon feels hungry again. Examples include white bread, sugars, and candies.

Complex carbohydrates consist of long chains of sugar molecules. Wholegrains and foods that still have their fiber in are complex carbs. They tend to fill you up for longer, and they are considered more healthful, as they contain more vitamins, minerals, and fiber. Examples include fruits, vegetables, pulses, and wholemeal pasta.

We could get all our energy from fats and proteins if we had to. One gram of carbohydrate contains approximately 4 kilocalories (kcal), the same amount as protein. One gram of fat contains around 9 kcal.

Proteins

Proteins are one of the four different types of macromolecules, in addition to carbohydrates, lipids, or fats, and nucleic acids, such as DNA and RNA. **Macromolecules** are large molecules that perform specialized functions inside living organisms. The structural arrangement of a protein molecule will differ in accordance with its function.

Proteins are long chains of **amino acids**. Amino acids are the building blocks of protein. In other words, amino acids are like the links in a chain. The chain itself represents the protein molecule. Protein chains are then twisted and folded together in specific ways to create certain molecules.

Protein can be categorized into two types: complete and incomplete proteins.**Proteins** is made up of smaller units, called amino acids. Complete **proteins** contain all of the amino acids your body needs and include meat, fish, and poultry, dairy, and soy products.

There are another types of protein known as fibrous proteins, structural proteins are necessary components of body. They include collagen, **keratin** and elastin. Collagen forms the connective framework of muscles, bones, tendons, skin and cartilage. **Keratin** is the main structural component in hair, nails, teeth and skin.

8 types of protein

Hormonal

Hormones are protein-based chemicals secreted by the cells of the endocrine glands. Usually transported through the blood, hormones act as chemical messengers that transmit signals from one cell to another. Each hormone affects certain cells in your body, known as target cells. Such cells have specific receptors on which the hormone attaches itself to transmit the signals. An example of a hormonal protein is insulin, which is secreted by the pancreas to regulate the levels of blood sugar in your body.

Enzymatic

Enzymatic proteins accelerate metabolic processes in your cells, including liver functions, stomach digestion, blood clotting and converting glycogen to glucose. An example is digestive enzymes that break down food into simpler forms that your body can easily absorb.

Structural

Also known as fibrous proteins, structural proteins are necessary components of your body. They include collagen, keratin and elastin. Collagen forms the connective framework of your muscles, bones, tendons, skin and cartilage. Keratin is the main structural component in hair, nails, teeth and skin.

Defensive

Antibodies, or immunoglobulin, are a core part of your immune system, keeping diseases at bay. Antibodies are formed in the white blood cells and attack bacteria, viruses and other harmful microorganisms, rendering them inactive.

Storage

Storage proteins mainly store mineral ions such as potassium in your body. Iron, for example, is an ion required for the formation of hemoglobin, the main structural component of red blood cells. Ferritin -- a storage protein -- regulates and guards against the adverse effects of excess iron in your body. Ovalbumin and casein are storage proteins found in breast milk and egg whites, respectively, that play a huge role in embryonic development.

Transport

Transport proteins carry vital materials to the cells. Hemoglobin, for example, carries oxygen to body tissues from the lungs. Serum albumin carries fats in your bloodstream, while myoglobin absorbs oxygen from hemoglobin and then releases it to the muscles. Calbindin is another transport protein that facilitates the absorption of calcium from the intestinal walls.

Receptor

Located on the outer part of the cells, receptor proteins control the substances that enter and leave the cells, including water and nutrients. Some receptors activate enzymes, while others stimulate endocrine glands to secrete epinephrine and insulin to regulate blood sugar levels.

Contractile

Also known as motor proteins, contractile proteins regulate the strength and speed of heart and muscle contractions. These proteins are actin and myosin. Contractile proteins can cause heart complications if they produce severe contractions.

Sources of protein

Foods **high** in **protein** per calorie include

lean chicken,

lean pork,

fish,

tofu,

beans,

lentils,

low-fat yogurt,

milk,

cheese,

seeds,

nuts,

eggs.

Functions of protein

Repair and Maintenance

Protein is termed the building block of the body. It is called this because protein is vital in the maintenance of body tissue, including development and repair. Hair, skin, eyes, muscles and organs are all made from protein. This is why children need more protein per pound of body weight than adults; they are growing and developing new protein tissue.

Energy

Protein is a major source of energy. If you consume more protein than you need for body tissue maintenance and other necessary functions, your body will use it for energy. If it is not needed due to sufficient intake of other energy sources such as carbohydrates, the protein will be used to create fat and becomes part of fat cells.

Hormones

Protein is involved in the creation of some hormones. These substances help control body functions that involve the interaction of several organs. Insulin, a small protein, is an example of a hormone that regulates blood sugar. It involves the interaction of organs such as the pancreas and the liver. Secretin, is another example of a protein hormone. This substance assists in the digestive process by stimulating the pancreas and the intestine to create necessary digestive juices.

Enzymes

Enzymes are proteins that increase the rate of chemical reactions in the body. In fact, most of the necessary chemical reactions in the body would not efficiently proceed without enzymes. For example, one type of enzyme functions as an aid in digesting large protein, carbohydrate and fat molecules into smaller molecules, while another assists the creation of DNA.

Transportation and Storage of Molecules

Protein is a major element in transportation of certain molecules. For example, hemoglobin is a protein that transports oxygen throughout the body. Protein is also

sometimes used to store certain molecules. Ferritin is an example of a protein that combines with iron for storage in the liver.

Antibodies

Protein forms antibodies that help prevent infection, illness and disease. These proteins identify and assist in destroying antigens such as bacteria and viruses. They often work in conjunction with the other immune system cells. For example, these antibodies identify and then surround antigens in order to keep them contained until they can be destroyed by white blood cells.

Lipids

Definition -

Molecules called **lipids** have long hydrocarbon chains that determine the way they act. They can be **fats**, oils, or hormones, and even exist in our cell membranes. Learn more about the chemical

Types

Classification of lipids

They may be classified based on their physical properties at room temperature (solid or liquid, respectively fats and oils), on polarity, or on their essentiality for humans, but the preferable classification is based on their structure.

Based on structure, they can be classified in three major groups.

- **Simple lipids**

They consist of two types of structural moieties.
They include:

glyceryl esters that is esters of glycerol and fatty acids: e.g. triacylglycerols, mono and diacylglycerols; cholesteryl esters that is esters of cholesterol and fatty acids; waxes which are esters of long-chain alcohols and fatty acids, so including esters of vitamins A and D; ceramides that is amides of fatty acids with long-chain di- or trihydroxy bases containing 12–22 carbon atoms in the carbon chain: e.g. sphingosine.

- **Complex lipids**

They consist of more than two types of structural moieties.

They include:

phospholipids that is glycerol esters of fatty acids; phosphoric acid, and other groups containing nitrogen; phosphatidic acid that is diacylglycerol esterified to phosphoric acid; phosphatidylcholine that is phosphatidic acid linked to choline, also called lecithin; phosphatidylethanolamine; phosphatidylserine; posphatidylinositol; phosphatidyl acylglycerol in which more than one glycerol molecule is esterified to phosphoric acid: e.g. cardiolipin and diphosphatidyl acylglycerol; glycoglycerolipids that is 1,2-diacylglycerol joined by a glycosidic linkage through position sn-3 with a carbohydrate moiety; gangliosides that is glycolipids that are structurally similar to ceramide polyhexoside and also contain 1-3 sialic acid residues; most contain an amino sugar in addition to the other sugars; sphingolipids, derivatives of ceramides; sphingomyelin that is ceramide phosphorylcholine; cerebroside: they are ceramide monohexoside that is ceramide linked to a single sugar moiety at the terminal hydroxyl group of the base); ceramide di- and polyhexoside that is linked respectively to a disaccharide or a tri- or oligosaccharide; cerebroside sulfate that is ceramide monohexoside esterified to a sulfate group.

Derived lipids They occur as such or are released from the other two major groups because of hydrolysis that is are the building blocks for simple and complex lipids. They include: fatty acids and alcohols; fat soluble vitamins A, D, E and K; hydrocarbons; sterols.

FUNCTIONS OF LIPIDS

- **They are stored in adipose tissue** (triglycerides) and are one of the major energy source. Lipids are the best energy source for humans since at a parity of weight they provide the major part of calories: if carbohydrates, on average, gives 4 kcal/g, as proteins, lipids provide, on average, 9 kcal/g. Moreover, they can be present in foods without there are also fiber or water (for polysaccharides 2 g water/g) allowing to contain a great quantity of energy in a little weight. Mostly of Nutrition Organizations recommend that lipids must contribute up to 30% (with saturated fatty acids only less than 10%) of the total daily energy intake.

- Some lipids are **essential nutrients** like fat-soluble vitamins A, (necessary for vision) and D (necessary for calcium metabolism), present in some fats and oils of animal origin, vitamin E (prevention of autoxidation of unsaturated lipids), present in vegetable oils, and vitamin K (normal clotting of blood) present in green leaves, essential fatty acids, in particular linoleic and α-linolenic acids, founders of the family of omega-6 and omega-3 fatty acids respectively.

- During growth they are utilized as "bricks" for construction of **biological membranes** (phospholipids, cholesterol and glycolipids together with proteins), so contributing to construction of that barrier that separates intracellular environment from extracellular one and, inside cell, circumscribes organelles like mitochondria, Golgi apparatus or nucleus, and whose integrity is the basis of life itself; moreover they are also important for maintenance, physiochemical properties and repairing of cell membranes themselves.

- **Many hormones are lipids**: steroid hormones, like estrogens, androgens and cortisol, are formed from cholesterol (essential also during embryogenesis), prostaglandins, prostacyclin, leukotrienes, thromboxanes, and other compounds (all eicosanids) from omega-3 and omega-6 polyunsaturated fatty acids with 20 carbon atoms.

- On plasmatic cell membranes they can act as **receptors, antigens and membrane anchors** for proteins and can modify the structure, and therefore the functionality, of membrane enzymes.

- Many lipids, like diacylglycerol, ceramides, sphingosine and platelet-activating factor act as regulators of intracellular processes.

- There are fat deposits not accessed during a fast, classified as **structural fat**, the function of which is to hold organs and nerves in the right position protecting them against traumatic injuries and shock; fat pads on the palms and buttocks protect the bones from mechanical pressure.

- A subcutaneous layer of fat is present in humans: it insulates the body **reducing the loss of body heat** and contributing to maintain body temperature.

- On epidermis they are involved in maintaining water barrier.

- They are **electrical insulator of axon of neurons** that are covered over and over again by plasmatic membranes of Swann cells, in peripheral nervous system, and of oligodendrocytes in central nervous system; these plasmatic membranes have a lipid content greater than that of the other cells. This lipoprotein coating is called myelin sheath.

- On digestive tract they f**acilitate the digestive process**depressing gastric secretion, slowing gastric emptying and stimulating biliary and pancreatic flow.

- **Bile salts** (by-products of cholesterol) are natural detergents synthesized in the liver and secreted into bile. They solubilize phospholipids and cholesterol in the bile, permitting the secretion of cholesterol into the intestine (the excretion of both cholesterol and bile salts is the major way by which cholesterol is removed from the body). Bile salts also aid in the digestion and absorption of fat and soluble-fat vitamins in gut.

- In many animals, some lipids are secreted into external environment and act as **pheromones** that attract or repel other organisms.

- They affect the **texture and flavor of food** and so its palatability.

Food manufacturers use fat for its textural properties, e.g. in baked goods fat increase the tenderness of the product. Chefs know that fat addiction add to the palatability of meal and increase satiety after a meal.

Sources of lipids

Food **sources** of saturated fats include butter, dairy products, meats and other animal products.

Unsaturated fats contain fatty acids with double-bonds in their carbon chains. This means they are not saturated with hydrogens, hence the name unsaturated.

Milk, **cheese**, **meat**, and other **animal foods** contain saturated fat.

Palm oil, cocoa**butter**, coconut oil, and other tropical oils also contain saturated fats, and these types of oils can be found in snacks, whipped toppings, and coffee creamers.**Butter**, **margarine**, and **shortening** also contain a great deal of saturated fat.

Ash value

The total **ash** is the residue remaining after incineration. The acid insoluble **ash** is the part of the total **ash** which is insoluble in diluted hydrochloric acid. The **ash** or residue yielded by an organic chemical compound is as a rule, a measure of the amount of inorganic matters present as impurity.

Ash content of selected food

Food	Percent ash (wet weight basis)
Butter	2.5
Cream	2.9
Evaporated milk	1.6
Margarine	2.5
Milk	0.7
Curd	0.8

The analysis of **ash content** in foods is simply the burning away of organic **content**, leaving inorganic minerals. This helps determine the amount and type of minerals in food; **important** because the amount of minerals can determine physiochemical properties of foods, as well as retard the growth of microorganisms.

Ash testing, also commonly referred to as **ash** content analysis, is a hugely important element of research and development for a number of key reasons.

Extractive value

Water-soluble **extractive value** plays an important role in evaluation of crude drugs. Less **extractive value** indicates addition of exhausted material, adulteration or incorrect processing during drying or storage or formulating.

Chemical analysis

Ph

The pH of any solution is the measure of its hydrogen-ion concentration. The higher the pH reading, the more alkaline and oxygen rich the fluid is. The lower the pH reading, the more acidic and oxygen deprived the fluid is. The pH range is from 0 to 14, with **7.0** being neutral.

pH is a measure of the hydorgen ion concentration of a solution. Solutions with a high concentration of hydrogen ions have a low **pH** and solutions with a low concentrations of H+ ions have a high **pH**.

pH

The negative logarithm of the hydrogen ion concentration, $[H^+]$, a measure of the degr ee to which a solution is acidic oralkaline An **ACID** is a substance that can give up a hydrogen ion (H^+); a **BASE** is a substance that can accept H^+.

The moreacidic a solution the greater the hydrogen ion concentration and the lower th e pH; a pH of 7.0 indicates neutrality, a pH ofless than 7 indicates acidity, and a pH of more t han 7 indicates alkalinity. The pH is used as a measure of whether the bodyis maintaining a n ormal **ACIDBASEBALANCE**. A favorable pH is essential to the functioning of enzymes and oth er biochemicalsystems. The body's fluids are normally somewhat alkaline, the pH being betw een 7.35 and 7.45. A pH above 7.8 or below6.8 is generally fatal. .

Acidity as lactic acid

Developed **acidity** which is due to **lactic acid** produced by the action of bacteria on lactose in milk. Generally the **acidity** of milk means the total **acidity** (Natural + developed) or titrable **acidity**.

The development of lactic acid bacteria

Bacterial growth shows a specific pattern comprising the following states

A. Adaptation phase
B. A period of rapid multiplication
C. A stabilization period
D. Decreasing phase

a. Adaptation phase

   The bacteria get adapted to the new environment in this period. The duration of this period depends upon

   - The type of bacteria
   - Viability of bacteria
   - Temperature of the milk
   - Presence of anti-bacterial factors in milk

b. Period of rapid multiplication

   In this period, getting adjusted to new environment, the bacteria start multiplying rapidly and ferment milk sugar i.e. lacose into lactic acid. The milk becomes thicker due to coagulation of the proteins and the taste becomes sour.

c. Stabilization period

   The number of bacteria during this phase remains constant. This is because they can not thrive in the acidic milk

d. Decrease in the number of bacteria

   The bacteria exhaust the nutrients of the milk and due to the produced lactic acid; the bacteria become inactive and even die after some time.

Starter cultures of lactic acid bacteria can be obtained from specialized firms and laboratories or from other dairy plants. Most of the starter cultures from the laboratories and specialized firms are freeze - dried; dairy plants generally have fresh (liquid) starter cultures available.

If starter cultures are not available easily, it is better to cultivate and maintain own cultures. Keeping the fresh raw milk at ambient temperatures facilitate the bacteral growth

including the lactic acid bacteria and after some time acid starts forming and the milk curdles. The milk could get contaminated during the spontaneous souring by growth of undesirable micro - organisms. The cultivation of the culture requires good hygiene and proper temperature.

Preparation of curd

2. Heat the milkd to 85^0C or higher for 3 minutes
3. Cool the milk to 45^0C
4. Add 30 ml or 2 - 3 tablespoons of fresh curd or buttermilk, which is not older than 2 days
5. Curd should be mixed well with milk
6. Leave the milk to ferment

The time required for the setting of the curd depends on the temperature

- At 40^0C to 45^0C it takes about 3 to 6 hours
- At 35^0C to 37^0C it takes about 15 to 20 hours

The ideal temperature to make acceptably palatable curd with firm consistency is 40^0C - 45^0C. it is not possible to set curd beyond the temperature 50^0C and below 30^0C. if it is kept cool, it can be maintened for one week

2. Methods of laboratory tests for nutritional, chemical, microbial analysis

Microplate measurement of amino acids by ninhydrin

Before using this or any other analytical method it is imperative that you check that it works with your samples. The bare minimum is to test accuracy and precision

- Test accuracy by creating a standard curve by serial dilution of a sample and / or via spike and recovery tests. Both tests will show if the analysis is affected by the sample matrix.
- Test precision by repeated analysis of the same sample. It's best to do separate precision tests for the analytical method (replicate analysis of the same extract) and for the entire extraction and analysis procedure (extract of the same sample several times and carry each extract through the analysis

procedure). These tests will show you where poor precision is creeping into your analysis

Remember that your results are qualitative if you rely on a standard curve with a purified analyte.

Principle

The principle of this assay is formation of a purple compound when ninhydrin reacts with free alpha amino acids.

The ‘trick’ with this assay is that ninhydrin reacts with ammonium with around 50 % of the sensitivity as it reacts with amino acids. One approach is to remove ammonium (e.g. by adding MgO to volatilize ammonium as ammonia). Alternatively one may measure the concentration of ammonium and use this to correct the apparent amino acid concentrations. If you take the latter approach you will need to carry ammonium standards through the ninhydrin procedure.

Method adapted from:

Jones D L, Owen A G, Farrar J F (2002) Simple method to enable the high resolution determination of total free amino acids in soil solutions and extracts. Soil Biology and Biochemistry 34: 1893 - 1902

Moore S. Stein W H (1954) A modified ninhydrin reagent for the photometric determination of amino acids and related compounds. The Journal of Biological Chemistry 211: 907.913

Prepare stock solutions

Make 4 M Na - Acetate buffer

- In a 100 ml beaker containing 60 ml of ultra - pure water dissolve 54.4 gm of sodium acetate trihydrate
- In a fume hood, add approximately 10 ml of glacial acetic acid to bring the pH to 5.2
- Transfer to a 100 - ml vol flask and make up to the mark with water

Make ninhydrin colour reagent:

- Work in a fumehood and only do this step on the day of analysis (the reagent is only stable for 2 - 3 days)
- In a 100 - ml beader containing - 75 ml of DMSO dissolve 0.3 gm of hydrindantin and 2 gm of ninhydrin
- Immediately prior to analysis add 25 ml of the 4 M Na - Acetate buffer
- Transfer to dark brown container (protect from light). Preferably flush container with N2 before closing (ninhydrin reacts with O2)

Make stabilizing solution (50 % ethanol)

- Dilute 50 ml of ethanol to 100 ml using ultra pure water

Make 10 mM amino - N stock solution

- Dissolve 0.075 gm of glycine in 100 ml of D I water
- Store in dark at 4^0 C

Make 200 µM Amino - N standardB

- Pipette 2 ml of 10 mM stock solution into 100 ml vol flask
- Make up to 100.0 ml using extractant (e.g. KCl) or sample matrix

Make amino acid std curve solutions

- Table below is for 10 ml final volume. Scale approximately for other volumes

Conc (µM)	ml of 200 µM	ml of matrix
0	0.0	10.0
10	.05	9.5
20	1.0	9.0
40	2.0	8.0
80	4.0	6.0
120	6.0	4.0
160	8.0	2.0
200	10.0	0.0

Analysis procedure

- Pipette 100 ul of sample or standard (0 - 200 μM) into 96 - well plate
- Add 75 ul of ninhydrin colour reagent
- Incubate at 80^0C for 30 minutes
- Coold and then add 100 ul of stabilising solvent
- Measure absorbance at 570 nm

Removal of ammonium

- If samples are frozen, thaw them in a fridge overnight
- Remove ammonium from the extracts by adding 25 mg of magnesium oxide (MgO) to a 1.5 ml Eppendorf reaction tube containing 1 ml of soil extract
- Put tubes on a horizontal shaker and leave them overnight, with their lids open
- Check the pH with a pH strip, it should be around 10 to 11
- Because of the high pH, ammonium will be reduced to ammonia which is gaseous and will volitilize from the extract. Removal of ammonium from the extracts is essential as it reacts with ninhydrin with almost equal sensitivity as amino acids

Organoleptic properties are the aspects of food, water or other substances that an individual experiences via the senses—including taste, sight, smell, and touch.

Sensory analysis (or **sensory evaluation**) is a scientific discipline that applies principles of experimental design and statistical **analysis** to the use of human senses (sight, smell, taste, touch and hearing) for the purposes of evaluating consumer products.

Sensory evaluation is a scientific discipline that analyses and measures human responses to the composition of food and drink, e.g. appearance, touch, odour, texture, temperature and taste.

- Taste
- Smell
- Appearance
- Texture
- Mouth feel

α-Amylase is a protein enzyme EC 3.2.1.1 that hydrolyses alpha bonds of large, alpha-linked polysaccharides, such as starch and glycogen, yielding glucose and maltose. It is the major form of amylase found in humans and other mammals. It is also present in seeds containing starch as a food reserve, and is secreted by many fungi.

Although found in many tissues, amylase is most prominent in pancreatic juice and saliva, each of which has its own isoform of human α-amylase. They behave differently on isoelectric focusing, and can also be separated in testing by using specific monoclonal antibodies. In humans, all amylase isoforms link to chromosome 1p21 (see AMY1A).

SALIVARY AMYLASE (PTYALIN)

Amylase is found in saliva and breaks starch into maltose and dextrin. This form of amylase is also called "ptyalin" /ˈtaɪəlɪn/ It will break large, insoluble starch molecules into soluble starches (amylodextrin, erythrodextrin, and achrodextrin) producing successively smaller starches and ultimately maltose. Ptyalin acts on linear α (1,4) glycosidic linkages, but compound hydrolysis requires an enzyme that acts on branched products. Salivary amylase is inactivated in the stomach by gastric acid. In gastric juice adjusted to pH 3.3, ptyalin was totally inactivated in 20 minutes at 37 °C. In contrast, 50% of amylase activity remained after 150 minutes of exposure to gastric juice at pH 4.3. Both starch, the substrate for ptyalin, and the product (short chains of glucose) are able to partially protect it against inactivation by gastric acid. Ptyalin added to buffer at pH 3.0 underwent complete inactivation in 120 minutes; however, addition of starch at a 0.1% level resulted in 10% of the activity remaining, and similar addition of starch to a 1.0% level resulted in about 40% of the activity remaining at 120 minutes.

Pancreatic amylase

Pancreatic α-amylase randomly cleaves the α (1-4) glycosidic linkages of amylose to yield dextrin, maltose, or maltotriose. It adopts a double displacement mechanism with retention of anomeric configuration.

Alpha amylase inhibition activity taste

Method for calculation of α-amylase inhibitory activity –

The α-amylase inhibitory activity was calculated by using the formula: The α-amylase inhibitory activity = (Ac+) – (Ac-)- (As-Ab) / (Ac+)- (Ac-) x 100 where, Ac+, Ac-, As, Ab are defined as the absorbance of 100% enzyme activity (only solvent with enzyme), 0% enzyme activity (only solvent without enzyme), a test sample (with enzyme) and a blank (a test sample without enzyme) respectively .

To 600 µl of sample, 1.2 ml of starch in phosphate buffer (pH 6.9) containing 6.7mM of sodium chloride was added. The reaction was initiated by adding 600 µl porcine pancreatic amylase and incubated at 37ºc. From the above mixture 600 µl was taken and 300 µl of DNSA (1g of DNSA, 30g of sodium potassium tartarate and 20 mL of 2N sodium hydroxide was added and made up to a final volume of 100 mL with distilled water) and kept it in a boiling water bath for 15 minutes. The reaction mixture diluted with 2.7 ml of water and absorbance was read at 540 nm.

For each concentration, blank tubes were prepared by replacing the enzyme solution with 600 µL in distilled water. Positive Control, representing 100% enzyme activity was prepared in a similar manner, without sample. Negative Control, representing 0% enzyme activity was prepared without sample and enzyme. The experiments were repeated thrice using the same protocol.

Sr. No.	Sample	% inhibition of alpha amylase
1	Dadhi	1.888%
2	Dadhi + Sharkara	2.262%
3	Dadhi + Yusha	2.234%
4	Dadhi + Madhu	2.328%
5	Dadhi + Amalaki	2.065%
6	Dadhi + Ghruta	0.87%

Formula:

(Ac+)-(Ac-)- [As-Ab]/ (Ac+)-(Ac-) x 100

Ac+ is absorbance of 100% enzyme activity (only solvent with enzyme)

Ac- is absorbance of 0% enzyme activity (only solvent without enzyme)

As is absorbance of test sample (with enzyme)

Ab is absorbance of blank (test sample without enzyme)

Readings:

Samples		**Reading**
Ac+		0.849
Ac-		0.054
Dadhi	**As**	0.409
	Ab	1.115
Dadhi + Sharkara	**As**	0.613
	Ab	1.616
Dadhi + Mudga Yusha	**As**	0.482
	Ab	1.463
Dadhi + Madhu	**As**	0.932
	Ab	1.988
Dadhi + Amalaki kwath	**As**	0.578
	Ab	1.425
Dadhi + Ghruta	**As**	0.25
	Ab	0.147

The inhibition of carbohydrate hydrolyzing enzymes such as α-amylase can be an important strategy to lower postprandial blood glucose levels. Such inhibitors which find application in the clinical practice for management of diabetes are known to be associated with various gastrointestinal side effects. Therefore, it is the need of time to identify and explore the amylase inhibitors from natural sources having fewer side effects. study,

Antioxidants:

Free radical test-

Free radicals are atoms or groups of atoms with an odd (unpaired) number of electrons and can be formed when oxygen interacts with certain molecules. Once formed these highly reactive radicals can start a chain reaction, like dominoes. Their chief danger comes from the damage they can do when they react with important cellular components such as DNA, or the cell membrane. Cells may function poorly or die if this occurs. To prevent free radical damage the body has a defense system of *antioxidants.*

Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. Although there are several enzyme systems within the body that scavenge free radicals, the principle micronutrient (vitamin) antioxidants are vitamin E, beta-carotene, and vitamin C. Additionally, selenium, a trace metal that is required for proper function of one of the body's antioxidant enzyme systems, is sometimes included in this category. The body cannot manufacture these micronutrients so they must be supplied in the diet.

Vitamin E : d-alpha tocopherol. A fat soluble vitamin present in nuts, seeds, vegetable and fish oils, whole grains (esp. wheat germ), fortified cereals, and apricots. Current recommended daily allowance (RDA) is 15 IU per day for men and 12 IU per day for women.

Vitamin C : Ascorbic acid is a water soluble vitamin present in citrus fruits and juices, green peppers, cabbage, spinach, broccoli, kale, cantaloupe, kiwi, and strawberries. The RDA is 60 mg per day. Intake above 2000 mg may be associated with adverse side effects in some individuals.

Beta-carotene is a precursor to vitamin A (retinol) and is present in liver, egg yolk, milk, butter, spinach, carrots, squash, broccoli, yams, tomato, cantaloupe, peaches, and grains. Because beta-carotene is converted to vitamin A by the body there is no set requirement. Instead the RDA is expressed as retinol equivalents (RE), to clarify the relationship. (NOTE: Vitamin A has no antioxidant properties and can be quite toxic when taken in excess.)

Test of antioxidant activity by DPPH method

- About 10 μL (2-1000 μg/ml) of test sample solution was added to 190 μL DPPH (150 μM) in ethanol solution and incubated for 30 minutes at 37°C. The control contains DPPH without sample. The decrease in absorbance of test mixture (due to quenching of DPPH free radicals) was measured at 517 nm and the percentage inhibition was calculated.

Cytotoxicity test

Testing the effects of compounds on the viability of cells grown in culture is widely used as a predictor of potential toxic effects in whole animals. Among the several alternative assays available, measuring the levels of ATP is the most sensitive, reliable, and convenient method for monitoring active cell metabolism.

Cytotoxicity is the quality of being toxic to cells.

Assessing cell membrane integrity is one of the most common ways to measure cell viability and cytotoxic effects. Compounds that have cytotoxic effects often compromise cell membrane integrity. Vital dyes, such as trypan blue or propidium iodide are normally excluded from the inside of healthy cells; however, if the cell membrane has been compromised, they freely cross the membrane and stain intracellular components. Alternatively, membrane integrity can be assessed by monitoring the passage of substances that are normally sequestered inside cells to the outside. One molecule, lactate dehydrogenase (LDH), is commonly measured using LDH assay. LDH reduces NAD to NADH which elicits a colour change by interaction with a specific probe. Protease biomarkers have been identified that allow researchers to measure relative numbers of live and dead cells within the same cell population. The live-cell protease is only active in cells that have a healthy cell membrane, and loses activity once the cell is compromised and the protease is exposed to the external environment. The dead-cell protease cannot cross the cell membrane, and can only be measured in culture media after cells have lost their membrane integrity.

Cytotoxicity can also be monitored using the 3-(4, 5-Dimethyl-2-thiazolyl)-2, 5-diphenyl-2H-tetrazolium bromide (MTT) or with 2,3-bis-(2-methoxy-4-nitro-5-sulfophenyl)-2H-tetrazolium-5-carboxanilide (XTT), which yields a water-soluble product, or the MTS

assay. This assay measures the reducing potential of the cell using a colorimetric reaction. Viable cells will reduce the MTS reagent to a colored formazan product. A similar redox-based assay has also been developed using the fluorescent dye, resazurin. In addition to using dyes to indicate the redox potential of cells in order to monitor their viability, researchers have developed assays that use ATP content as a marker of viability. Such ATP-based assays include bioluminescent assays in which ATP is the limiting reagent for the luciferase reaction.

Cytotoxicity can also be measured by the sulforhodamine B (SRB) assay, WST assay and clonogenic assay.

Suitable assays can be combined and performed sequentially on the same cells in order to reduce assay-specific false positive or false negative results. A possible combination is LDH-XTT-NR (Neutral red assay)-SRB which is also available in a kit format.

A label-free approach to follow the cytotoxic response of adherent animal cells in real-time is based on electric impedance measurements when the cells are grown on gold-film electrodes. This technology is referred to as electric cell-substrate impedance sensing (ECIS). Label-free real-time techniques provide the kinetics of the cytotoxic response rather than just a snapshot like many colorimetric endpoint assays.

Cytotoxicity experiment

1) Take 2-3 mg EDTA (for 100 ml blood) in a glass bottle. Collect 100 ml sheep blood in the bottle from mutton shop.

2) Centrifuge the blood at 1000 rpm for 5 min.

3) Add 4 ml settled red blood cells (RBC's) in 96 ml Phosphate buffered saline (PBS). This is 4% RBC suspension.

PBS composition:

Dissolve 8 g NaCl, 0.2 g KCl, 1.44 g Na_2HPO_4, 0.24 g KH_2PO_4 in 800 ml distilled water, Adjust pH to 7.0, make volume to 1 lit. autoclave and store at room temperature.

4) Take compound 4e (BCTU). Prepare 20000 mg/L stock by dissolving 2 mg in 100 µl DMSO.

5) From this stock add 45, 30, 15, 7.5, 4, 2, 1 µl to a total of 750 µl PBS in different eppendorf tubes.

6) Add 750 µl of 4% sheep RBC suspension to these tubes. Mix. Keep at 37°C in Incubator or water bath for 2 h. The concentrations range will be 600, 400, 200, 100, 50, 25, 12.5 mg/L. Keep similar set as a duplicate.

7) Prepare Triton X-100 (0.1% (v/v) in PBS.

8) Add 750 µl above Triton X-100 solution to 750 µl of 4% sheep RBC suspension. This is positive control which gives 100% lysis.

9) Add 750 µl only PBS or 1% DMSO in PBS solution to 750 µl of 4% sheep RBC suspension. This is negative control which gives 0% lysis.

10) After 2 h incubation, centrifuge tubes at 2,000 rpm for 10 min and the absorbances of supernatant should be read at 540 nm. Remove the supernatant carefully using micropipette.

Calculate Percent haemolysis as: [{(A-B)/(C-B)} x 100], where A and B are the absorbance values of supernatant from the test sample and PBS (solvent control), respectively, and C is the absorbance value of supernatant from the sample after 100% lysis.

The results will indicate the cytotoxicity of the compounds to mammals.

Moisture:

Reference of test

From Journal of State of California - Business, Transportation, and Housing Agency; California Test 225; November 1999

Department of Transportation; engineering service center, transportation Laboratory, 5900 Foisom Boulevard, Sacramento, California 95819 - 4612

Scope: This test is used to determine the water content of a material by drying a sample to constant mass at a specified temperature, the water content of a given matter is expressed as a percentagem of the mass of the pore water to the mass of the solid material

Apparatus

a. Weighing device: A balance or scale sensitive to 0.1 % of the mass of the test sample, and having a capacity equal to, or greater than, the wet mass of the sample to be tested
b. Drying device: An oven or other suitable thermostatically controlled heating chamber capable of maintaining a temperature of 110 ± 5^0C
c. Containers: Any pan or other container that will not be affected by the drying temperature, and is suitable for retaining the test sample without loss while permitting the water to evaporate.

Test procedure:

1. Prepare a representative portion of the material to be tested
2. Determine the mass of the test sample and record this mass as the 'wet mass'
3. Dry to constant mass at 110 ± 5^0C
4. Remove the sample from the drying device and cool to room temperature
5. Determine the mass of the test sample and record this weight as the 'dry mass'

Calibration:

Determine the moisture content of the test sample as follows:

1. Mass of water in sample = wet mass - dry mass
2. Percent moisture = $\frac{mass\ of\ water}{dry\ mass\ of\ sample}$ x 100

MATERIAL AND METHOD

Material and methods

Materials:

Samples: Cow's milk curd samples (100gm each), khadisakhar,amalaki churna, cow's ghee (clarified butter), *Mudgayush* (Curd mixed with cooked green gram dal) ,madhu.

Raw materials were procured from local authorized shop and the samples were prepared at laboratory scale.

Control sample: pure cow's milk curd

(Curd was prepared as per the standard method described in Dairy Products' Technology Handbook of class XII, CBSC, Delhi)

The methods of preparation are described in 'Literary review' chapter under heading 'Methods of preparation of curd samples'

Preparation of curd samples with ingredients directed by Charaka - Samhita:

Sample1.Curd + honey

Curd (100 gm) + honey (100 gm)

Madu (honey)is procured from National honey bee institute ,pune.

Sample2 Curd + khandasharkara

Curd (100 gm) + khandasharkara (100 gm)

Khandsharkaa is grinded finely and mixed with curd in equal proportion.

Sample3 Curd + cow ghee

Curd (100 gm) + cow ghee (100 gm)

(Cow's ghee was prepared as per standard procedure mentioned in Dairy Products' Technology Handbook of class XII, CBSE, Delhi.)

Sample4 Curd + mudgayusha

Curd (100 gm) + mudgayusha (100 gm)

(*Akruta Mudgayusha* was prepared as per classical Ayurvedic texts.)

20 gm green gram +360 ml water is is boiled to cook the green gram.after cooking upper watery portion is filtered.then it is allowed to cool and then mixed with curd.

Sample5 Curd + amalaki churna

Curd (100 gm) + amalaki churna (100 gm)

(amalaki churna procured from Green Pharmacy ,pune and was be standardized as per API (Ayurvedic Pharmacopia of India))

Sample 6: heated curd

Methods:

All the samples were analyzed for nutritional, chemical, microbial and organoleptic parameters on the zero day i.e. on the day of sample preparation.

Parameters tested were:

1. Nutritional analysis: Total CHO, crude fat, crude protein, Lactic acid, moisture, total ash,.
2. Chemical analysis: pH, titrable acidity
3. Microbial analysis: *Lactobacillus bulgaricus,*
4. Organoleptic analysis: taste, texture, mouth feel, color, flavor and overall acceptability etc. using 7 point hedonic scale. The details of the scoring hedonic are given in literary review chapter

5. In vitro toxicity assay for heated curd.

6. *In vitro* analysis of cow's milk curd for studying the protein bioavailability.
7. *In vitro* analysis of cow's milk curd for studying the effect on intestinal α amylase activity.

Hypothesis:

There is significant difference in the studied properties of curd sample and those of test samples. (H1)

Additional work

Anti-oxidant activity by DPPH method:

Anti oxidant activity of control sample and all five test samples are done

Survey study

Survey of curd eating habits and present diseases are done of 197 volunteers by questionnaire.

8. OBSERVATIOINAL DATA AND STATISTICAL ANALYSIS

Observation data:

1. A comparative table of analysis of plain curd and the samples of curd prepared with ingredients as suggested by Charaka-Samhita
2. Master chart of survey - attached in the appendix

Nutritional analysis

Table 1 nutritional analysis

test	protein %
curd	100.00
curd+ghee	139.42
curd+hony	99.27
curd+sugar	50.36
curd+amla	135.77
curd+mudgayush	52.55

Graph 1

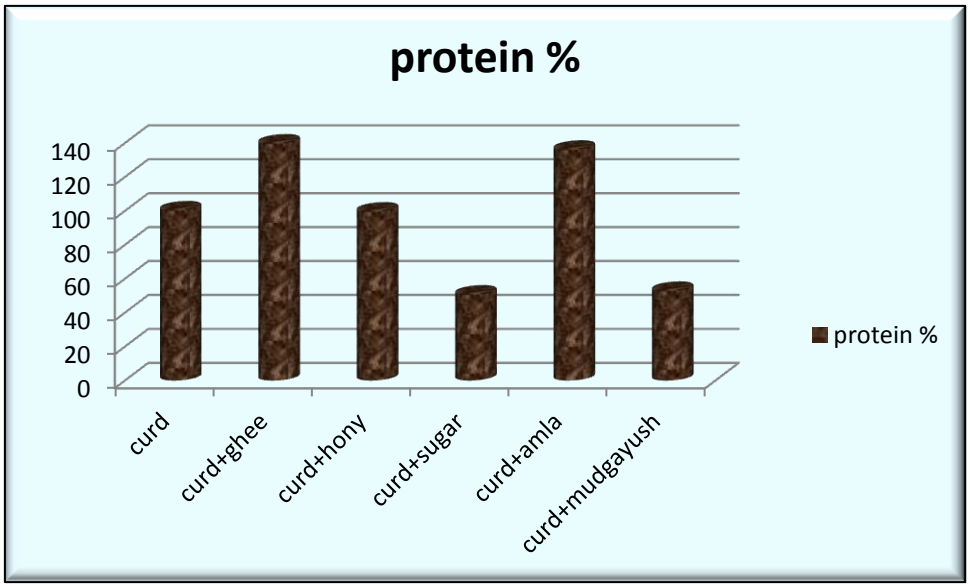


Table 2

test	carbohydrate %
curd	100.00
curd+ghee	159.12
curd+hony	416.97
curd+sugar	515.36
curd+amla	371.36

curd+mudgayush	28.06

Graph 2

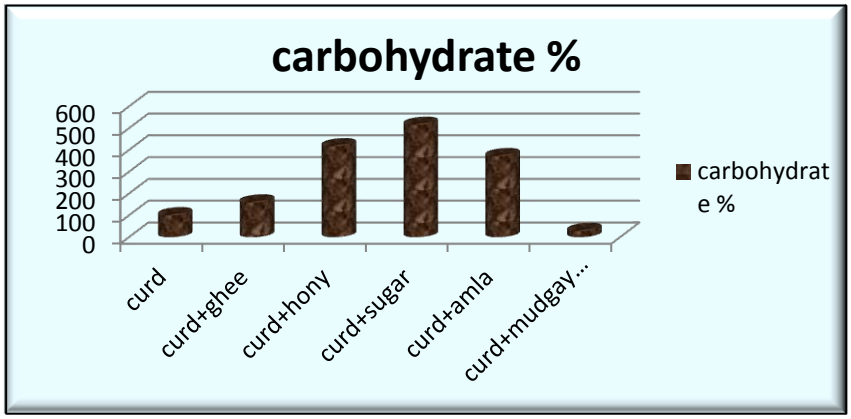


Table 3

test	fat %
curd	100.00
curd+ghee	626.30
curd+hony	96.19
curd+sugar	53.63
curd+amla	117.65
curd+mudgayush	219.03

Graph 3

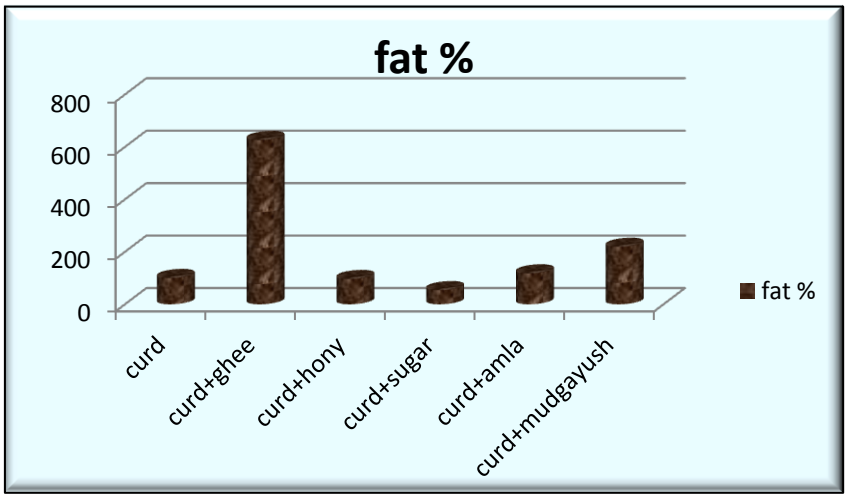


Table 4

test	moisture %
curd	100.00
curd+ghee	77.34
curd+hony	68.89
curd+sugar	61.01

curd+amla	70.55
curd+mudgayush	104.08

Graph 4

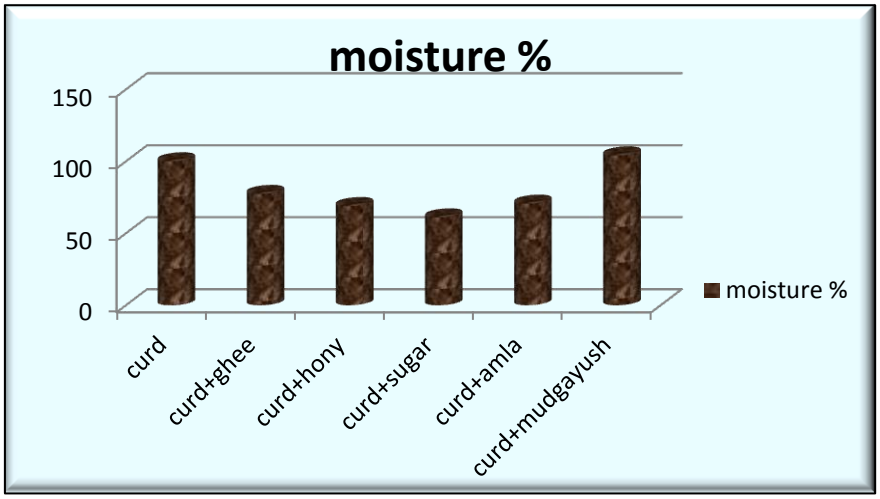
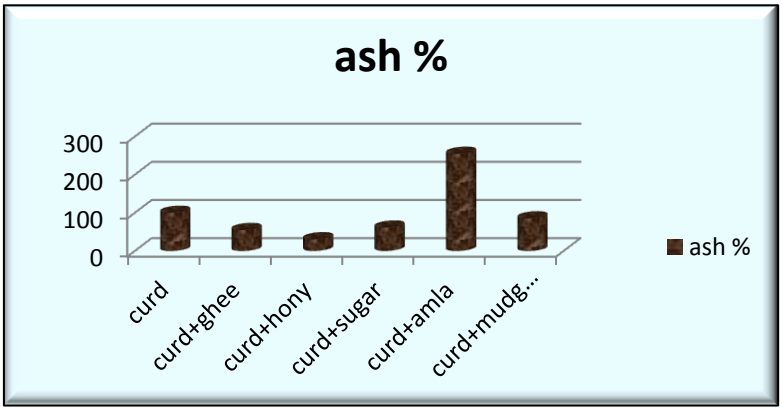


Table 5

test	ash %
curd	100.00
curd+ghee	54.84
curd+hony	30.65
curd+sugar	61.29
curd+amla	254.84
curd+mudgayush	85.48

Graph 5



Chemical analysis

Table 6

test	ph %
curd	100.00
curd+ghee	102.04
curd+hony	100.58
curd+sugar	104.96
curd+amla	83.97
curd+mudgayush	108.16

Graph 6

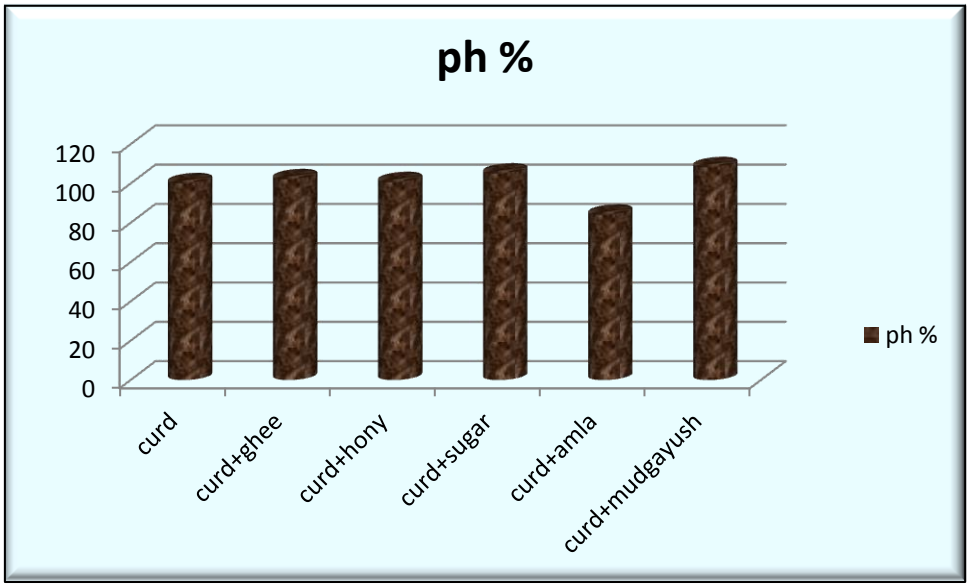
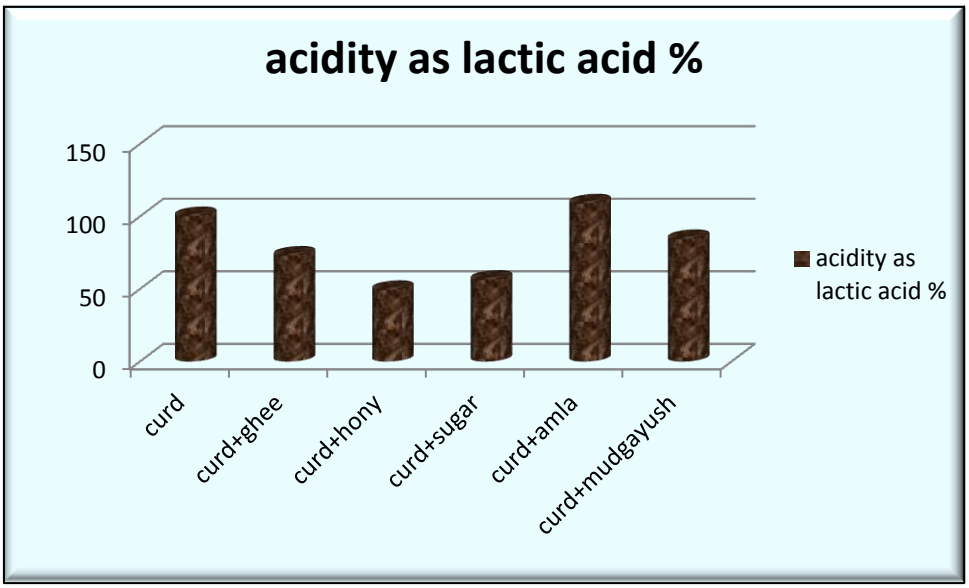


Table 7

test	acidity as lactic acid %
curd	100.00
curd+ghee	72.81
curd+hony	49.12
curd+sugar	56.14
curd+amla	108.77
curd+mudgayush	84.21

Graph 7



Organoleptic analysis

Hedonic scale

Scorecard - Hedonic Rating Scale

Tray number ..... Name .....

In front of you is one sample. Taste the sample and tick ✓ howmuch you like or dislike each of the characteristics. You can taste the sample more than once.

	Appearance	Aroma	Taste	Sweetness	Texture/mouth-feel
Like a lot	____	____	____	____	____
Like a little	____	____	____	____	____
Neither like nor dislike	____	____	____	____	____
Dislike a little	____	____	____	____	____
Dislike a lot	____	____	____	____	____

Table8: Samples Vs Appearance

The cross-tabulation of respondents according to Samples Vs. Appearance along with its bar graph is as given below.

Table 8

Samples	Appearance				Total
	Grade 2	Grade 3	Grade 4	Grade 5	
Curd	2	0	4	4	10
%	20.0	0.0	40.0	40.0	100.0
Curd + Mudga Yusha	2	1	6	1	10
%	20.0	10.0	60.0	10.0	100.0
Curd + Madhu	1	0	2	7	10
%	10.0	0.0	20.0	70.0	100.0
Curd + Ghruta	1	1	4	4	10
%	10.0	10.0	40.0	40.0	100.0
Curd + Sharkara	0	0	3	7	10
%	0.0	0.0	30.0	70.0	100.0
Curd + Amalaki Churna	4	1	4	1	10
%	40.0	10.0	40.0	10.0	100.0
Total	10	3	23	24	60

Graph of samples vs appearance:

Graph 8

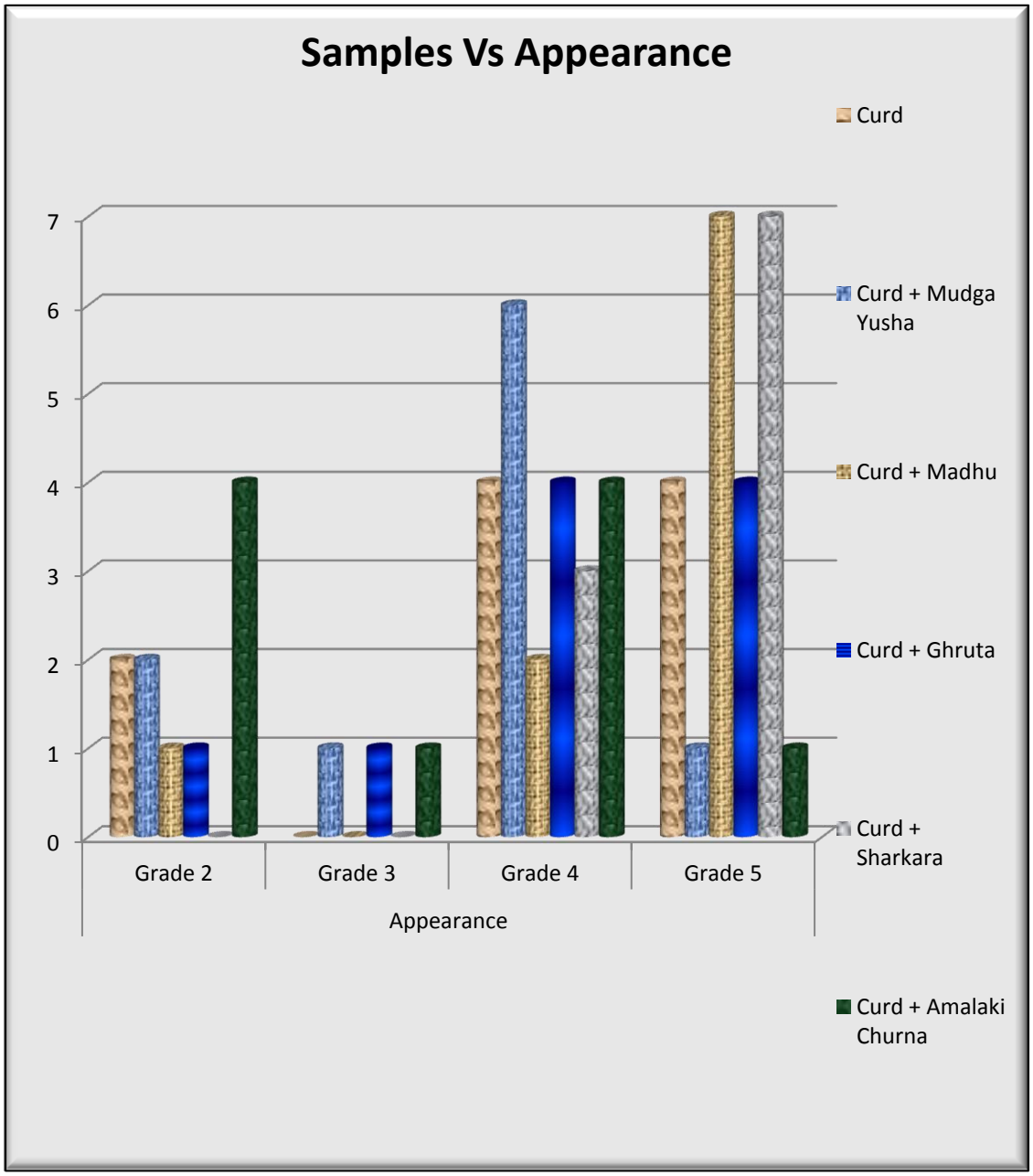


Table9: Samples Vs Aroma

The cross-tabulation of respondents according to Samples Vs. Aroma along with its bar graph is as given below.

Table 9

Samples	Aroma					Total
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	
Curd	1	1	1	6	1	10
%	10.0	10.0	10.0	60.0	10.0	100.0
Curd + Mudga Yusha	0	1	3	5	1	10
%	0.0	10.0	30.0	50.0	10.0	100.0
Curd + Madhu	0	0	0	2	8	10
%	0.0	0.0	0.0	20.0	80.0	100.0
Curd + Ghruta	2	0	3	3	2	10
%	20.0	0.0	30.0	30.0	20.0	100.0
Curd + Sharkara	0	0	1	2	7	10
%	0.0	0.0	10.0	20.0	70.0	100.0
Curd + Amalaki Churna	0	2	2	5	1	10
%	0.0	20.0	20.0	50.0	10.0	100.0
Total	3	4	10	23	20	60

Graph of samples vs aroma

Graph 9

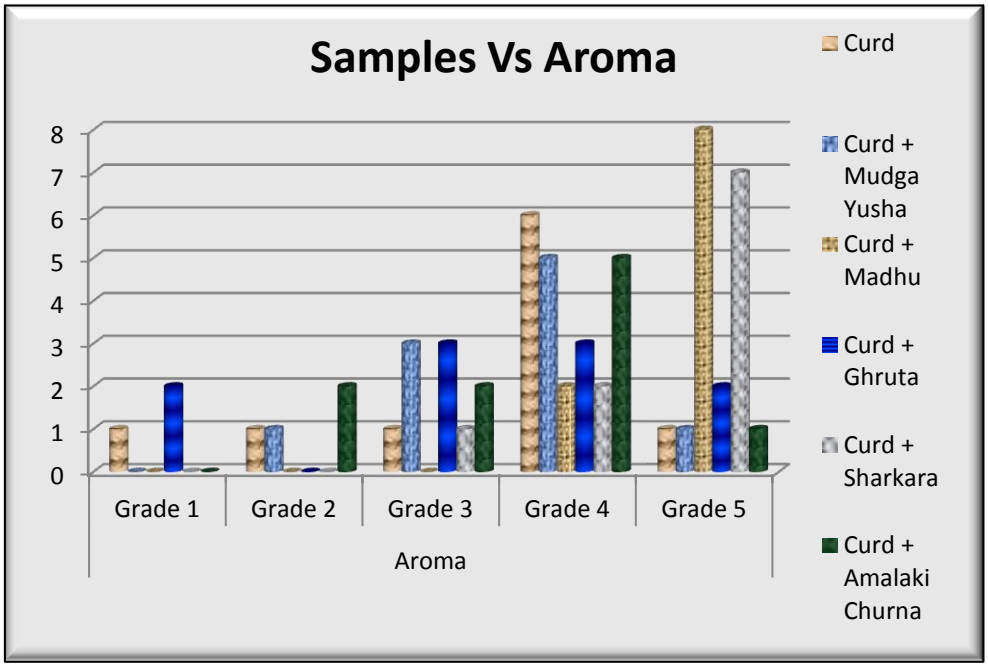


Table10: Samples Vs Taste-The cross-tabulation of respondents according to Samples Vs. Taste along with it's bar graph is as given below.

Table 10

Samples	Taste					Total
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	
Curd	1	1	1	4	3	10
%	10.0	10.0	10.0	40.0	30.0	100.0
Curd + Mudga Yusha	0	3	2	2	3	10
%	0.0	30.0	20.0	20.0	30.0	100.0
Curd + Madhu	0	0	0	2	8	10
%	0.0	0.0	0.0	20.0	80.0	100.0
Curd + Ghruta	0	2	1	3	4	10
%	0.0	20.0	10.0	30.0	40.0	100.0
Curd + Sharkara	0	0	0	0	10	10
%	0.0	0.0	0.0	0.0	100.0	100.0
Curd + Amalaki Churna	1	1	2	4	2	10
%	10.0	10.0	20.0	40.0	20.0	100.0
Total	2	7	6	15	30	60

Graph of samples vs taste

Graph 10

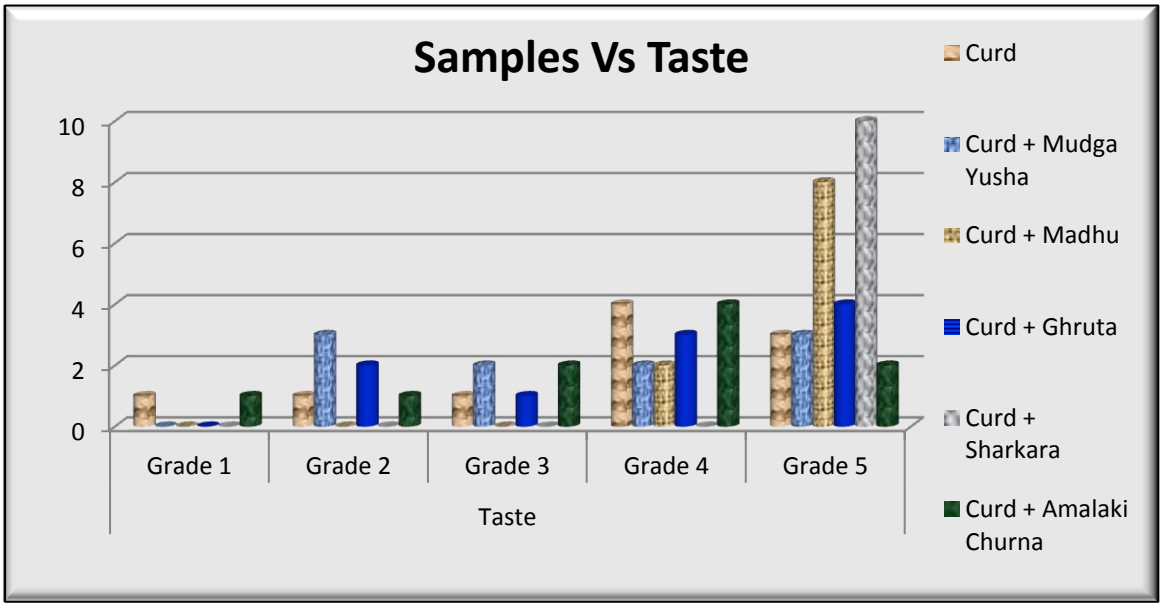


Table11: Samples Vs Sweetness

The cross-tabulation of respondents according to Samples Vs. Sweetness along with its bar graph is as given below.

Table 11

Samples	Sweetness				Total
	Grade 2	Grade 3	Grade 4	Grade 5	
Curd	0	10	0	0	10
%	0.0	100.0	0.0	0.0	100.0
Curd + Mudga Yusha	2	7	0	1	10
%	20.0	70.0	0.0	10.0	100.0
Curd + Madhu	0	1	3	6	10
%	0.0	10.0	30.0	60.0	100.0
Curd + Ghruta	4	5	0	1	10
%	40.0	50.0	0.0	10.0	100.0
Curd + Sharkara	0	1	5	4	10
%	0.0	10.0	50.0	40.0	100.0
Curd + Amalaki Churna	3	4	2	1	10
%	30.0	40.0	20.0	10.0	100.0
Total	9	28	10	13	60

Graph of samples vs sweetness

Graph 11

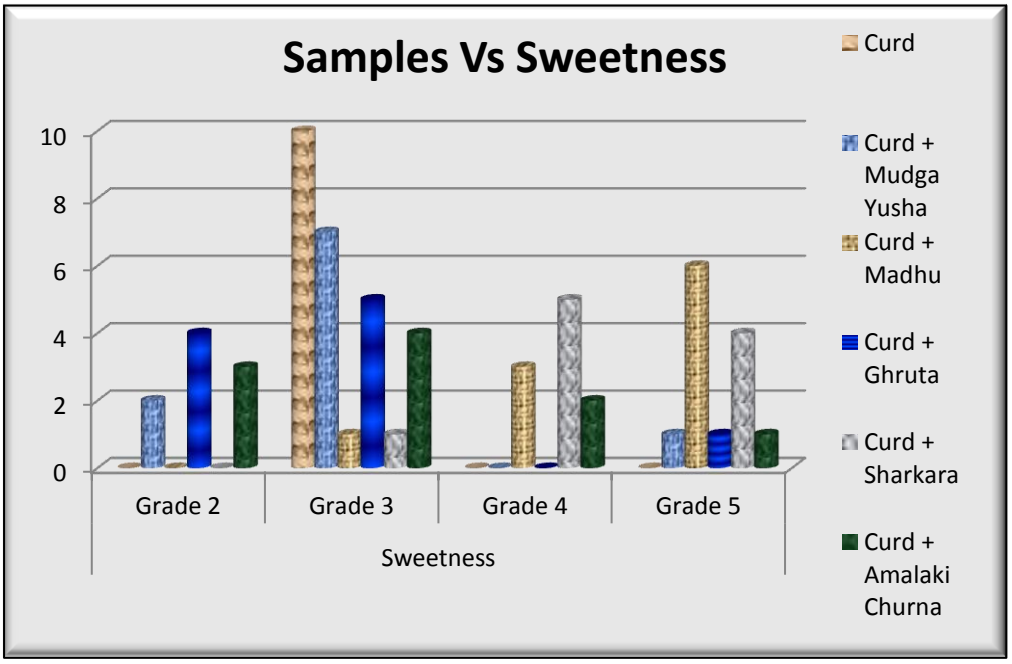


Table12: Samples Vs Texture

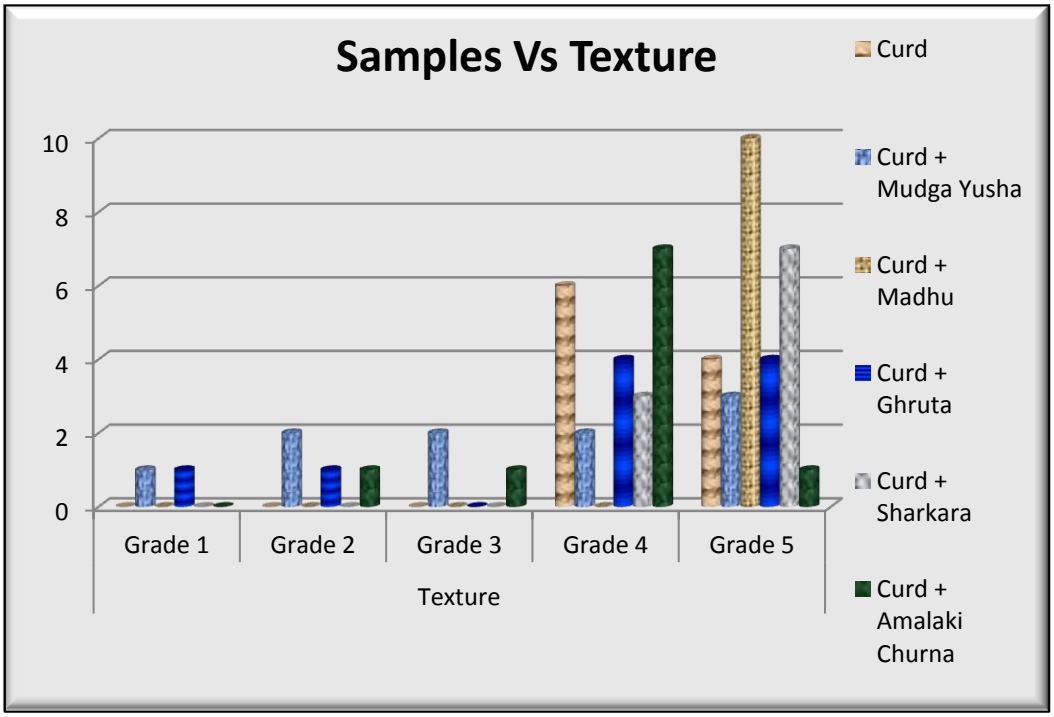
The cross-tabulation of respondents according to Samples Vs. Texture along with its bar graph is as given below.

Table 12

Samples	Texture					Total
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	
Curd	0	0	0	6	4	10
%	0.0	0.0	0.0	60.0	40.0	100.0
Curd + Mudga Yusha	1	2	2	2	3	10
%	10.0	20.0	20.0	20.0	30.0	100.0
Curd + Madhu	0	0	0	0	10	10
%	0.0	0.0	0.0	0.0	100.0	100.0
Curd + Ghruta	1	1	0	4	4	10
%	10.0	10.0	0.0	40.0	40.0	100.0
Curd + Sharkara	0	0	0	3	7	10
%	0.0	0.0	0.0	30.0	70.0	100.0
Curd + Amalaki Churna	0	1	1	7	1	10
%	0.0	10.0	10.0	70.0	10.0	100.0
Total	2	4	3	22	29	60

Graph of samples vs texture

Graph 12



Analysis - 2

Samples

Factors: Appearance, Aroma, Taste, Sweetness, Texture

To test whether there is significant difference in grades of factors stated above different samples.

To test the hypotheses,

The null hypothesis, H_0:

There is no significant difference in grades of factors stated above for different samples.

Vs.

The alternative hypothesis, H_a:

There is significant difference in grades of factors stated above for different samples.

The test used is Kruskal Wallis test for independent samples more than two.

Table 13

Ranks			
	Samples	N	Mean Rank
Appearance	Curd	10	30.50
	Curd + Mudga Yusha	10	22.15
	Curd + Madhu	10	39.50
	Curd + Ghruta	10	31.15
	Curd + Sharkara	10	41.45
	Curd + Amalaki Churna	10	18.25
	Total	60	
Aroma	Curd	10	24.45
	Curd + Mudga Yusha	10	23.85
	Curd + Madhu	10	46.20
	Curd + Ghruta	10	22.95
	Curd + Sharkara	10	42.40
	Curd + Amalaki Churna	10	23.15
	Total	60	
Taste	Curd	10	24.85
	Curd + Mudga Yusha	10	22.55
	Curd + Madhu	10	41.00
	Curd + Ghruta	10	27.55
	Curd + Sharkara	10	45.50
	Curd + Amalaki Churna	10	21.55

	Total	60	
Sweetness	Curd	10	23.50
	Curd + Mudga Yusha	10	22.85
	Curd + Madhu	10	47.50
	Curd + Ghruta	10	19.15
	Curd + Sharkara	10	45.20
	Curd + Amalaki Churna	10	24.80
	Total	60	
Texture	Curd	10	30.70
	Curd + Mudga Yusha	10	20.55
	Curd + Madhu	10	46.00
	Curd + Ghruta	10	27.20
	Curd + Sharkara	10	38.35
	Curd + Amalaki Churna	10	20.20
	Total	60	

Table 14

Test Statistics[a,b]					
	Appearance	Aroma	Taste	Sweetness	Texture
Chi-Square	15.776	21.085	19.863	28.820	20.273
df	5	5	5	5	5
P value	.008	.001	.001	.000	.001
a. Kruskal Wallis Test					
b. Grouping Variable: Samples					

Since p value < 0.05, the level of significance; there is sufficient evidence to reject the null hypothesis.

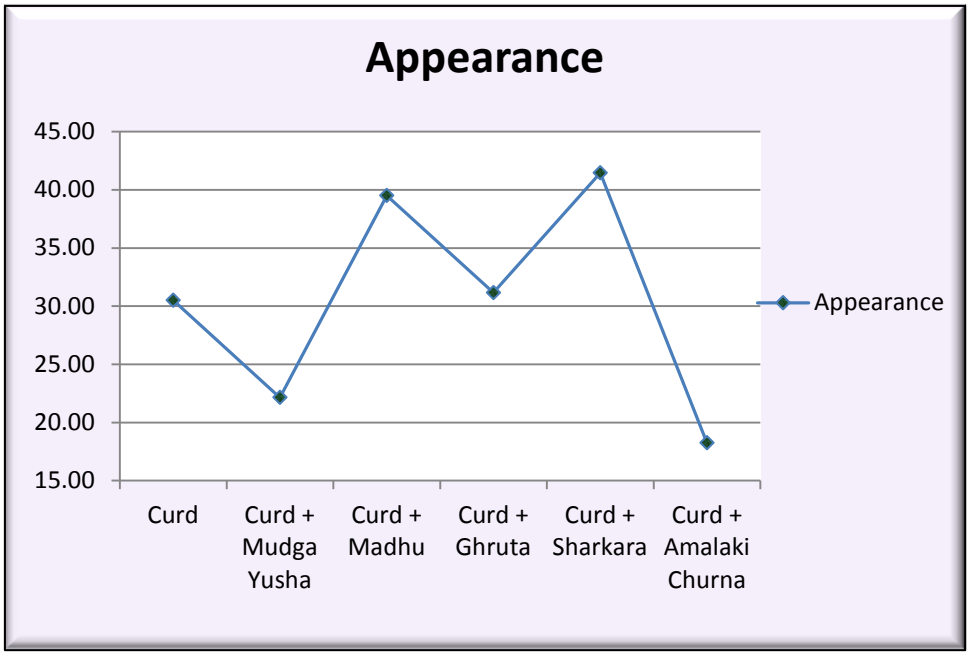
Conclusion:

There is significant difference in grades of factors stated above for different samples.

Part A] Mean Rank plot for Appearance

The means rank plot for Appearance is as given below.

Graph 13



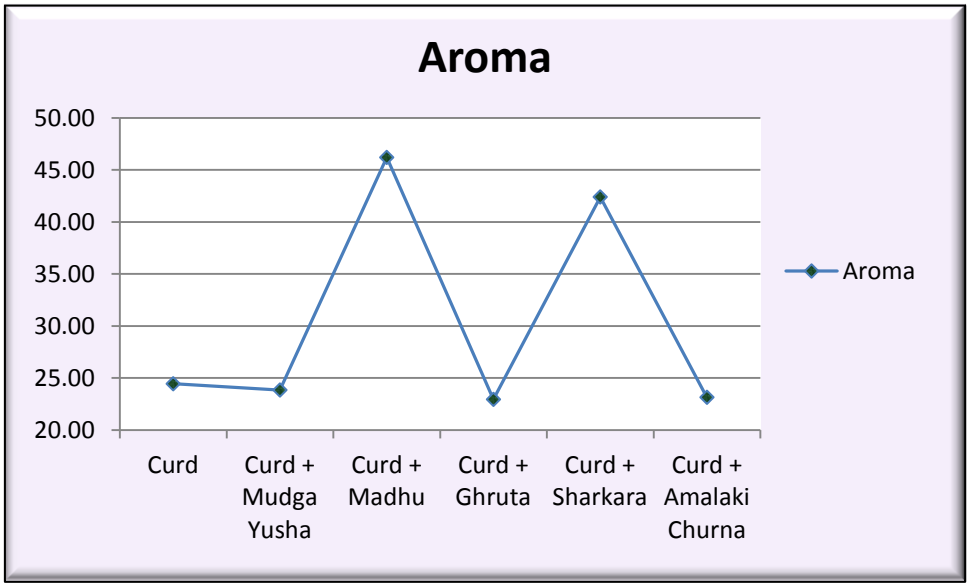
Summary:

The grades are highest for Curd + Sharkara; then Curd + Madhu; then Curd + Ghruta; then Curd; then Curd + Mudga Yusha; then Curd + Amalaki Churna.

Part B] Mean Rank plot for Aroma

The means rank plot for Aroma is as given below.

Graph 14

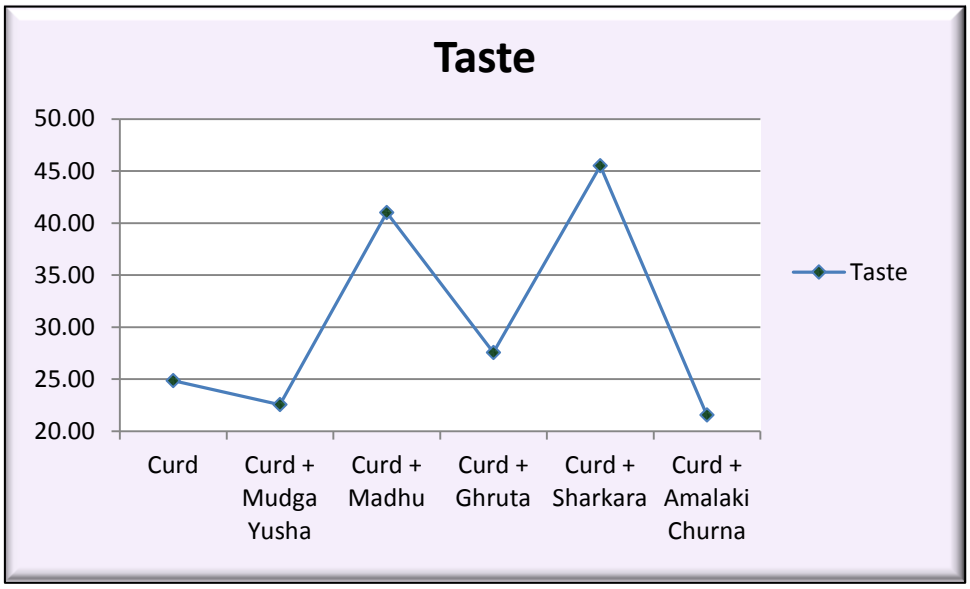


Summary:

The grades are highest for Curd + Madhu; then Curd + Sharkara; then Curd; then Curd + Mudga Yusha; then Curd + Amalaki Churna; then Curd + Ghruta.

Part C] Mean Rank plot for Taste

Graph 15



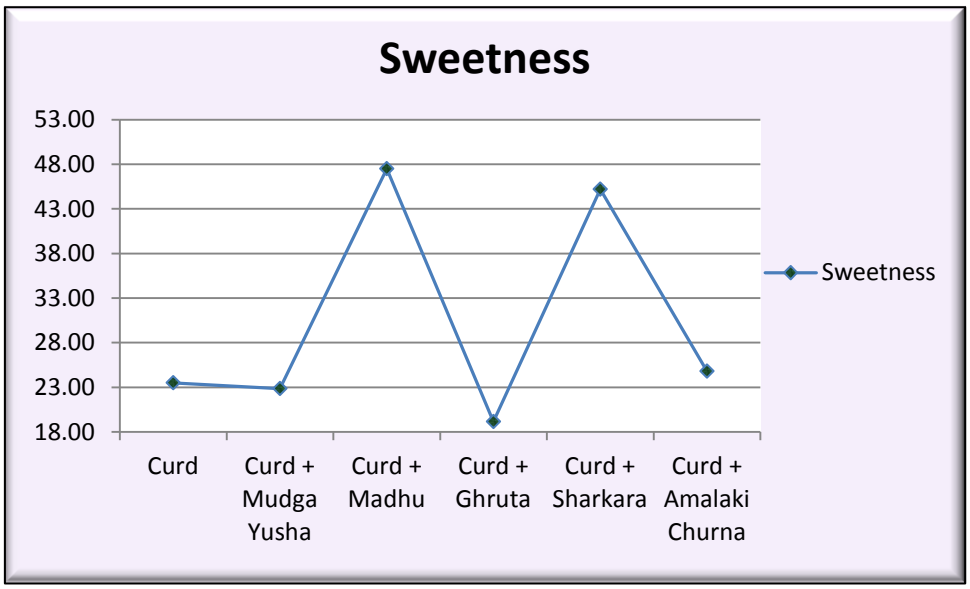
Summary:

The grades are highest for Curd + Sharkara; then Curd + Madhu; then Curd + Ghruta; then Curd; then Curd + Mudga Yusha; then Curd + Amalaki Churna.

Part D] Mean Rank plot for Sweetness

The means rank plot for Sweetness is as given below.

Graph 16



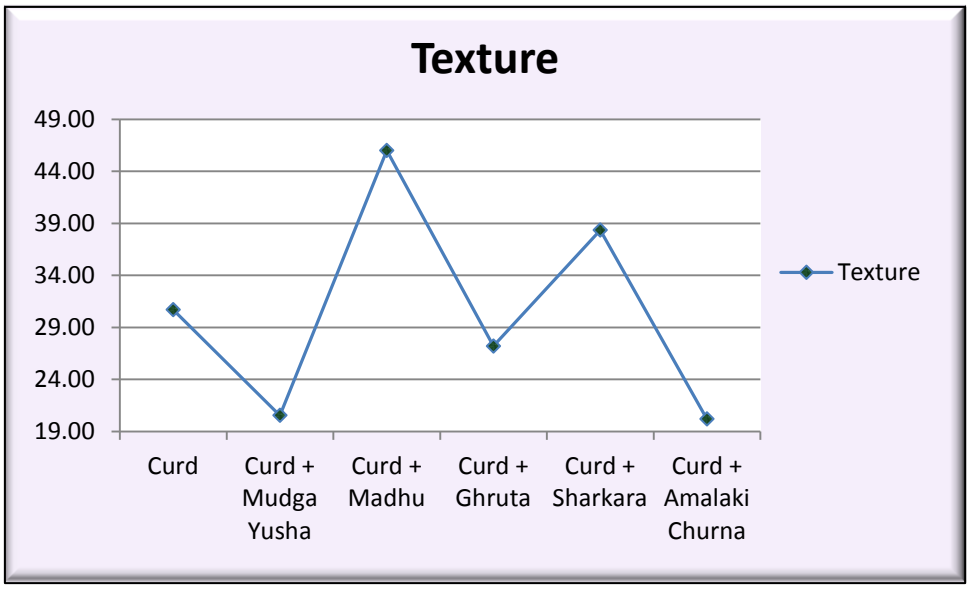
Summary:

The grades are highest for Curd + Madhu; then Curd + Sharkara; then Curd + Amalaki Churna; then Curd; then Curd + Mudga Yusha; then Curd + Ghruta.

Part E] Mean Rank plot for Texture

The means rank plot for Texture is as given below.

Graph 17



Summary:

The grades are highest for Curd + Madhu; then Curd + Sharkara; then Curd; then Curd + Ghruta; then Curd + Mudga Yusha; then Curd + Amalaki Churna.

Table showing hierarchy among samples:

Table 15

Parameters	Highest to Lowest					
Appearance	Curd + Sharkara	Curd + Madhu	Curd + Ghruta	Curd	Curd + Mudga Yusha	Curd + Amalaki Churna
Aroma	Curd + Madhu	Curd + Sharkara	Curd	Curd + Mudga Yusha	Curd + Amalaki Churna	Curd + Ghruta
Taste	Curd + Sharkara	Curd + Madhu	Curd + Ghruta	Curd	Curd + Mudga Yusha	Curd + Amalaki Churna
Sweetness	Curd + Madhu	Curd + Sharkara	Curd + Amalaki Churna	Curd	Curd + Mudga Yusha	Curd + Ghruta
Texture	Curd + Madhu	Curd + Sharkara	Curd	Curd + Ghruta	Curd + Mudga Yusha	Curd + Amalaki Churna

Toxicity assay of heated curd

Results of cyto-toxicity assay:

Formula: (A-B/C-B)x100

A- Absorbance of sample

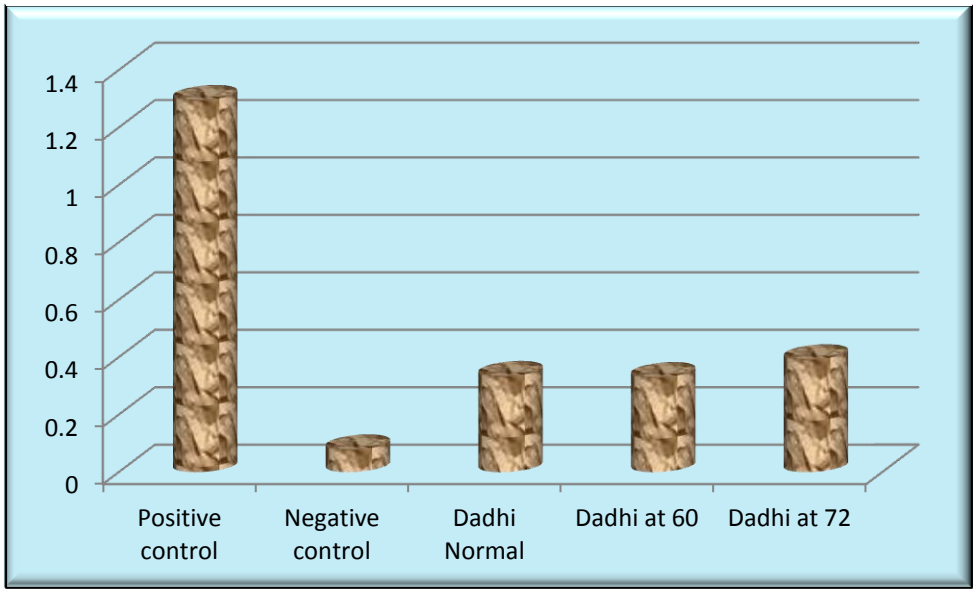
B- Absorbance of negative control

C- Absorbance of positive control

Table 16

Sr. No.	Sample	Absorbance (Duplicate)		Mean Absorbance	Haemolysis (%)
1	Positive control	1.294			
2	Negative control	0.077			
3	Dadhi Normal	0.333	0.333	0.333	21.04
4	Dadhi at 60	0.329	0.345	0.334	21.12
5	Dadhi at 72	0.391	0.401	0.396	26.21

Graph 18



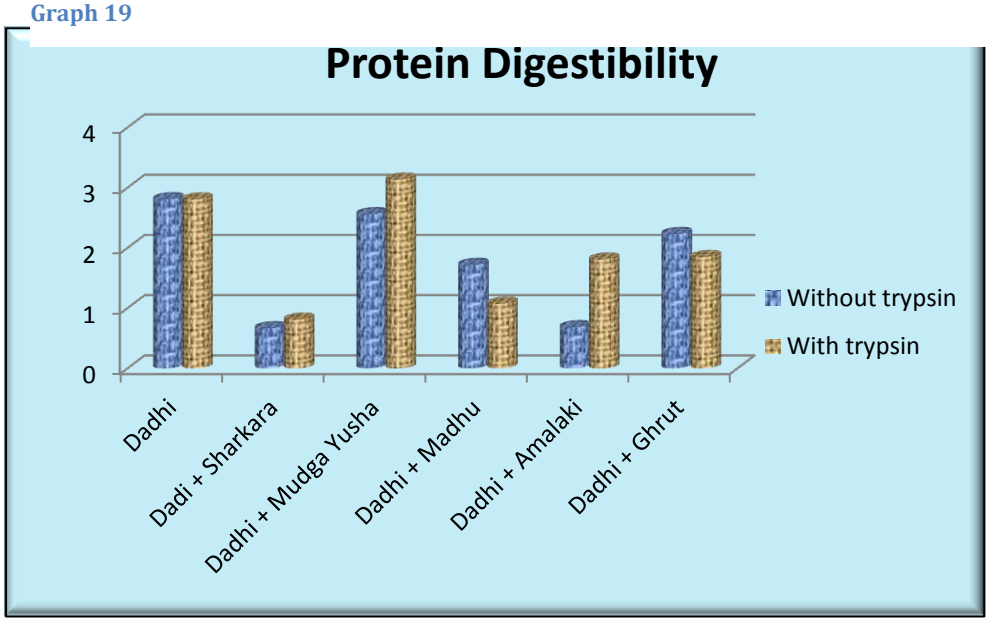
Protein bioavailability

Protein digestability

Table 17

		Dadhi	Dadhi + Amalaki	Dadhi + Yusha (50% diluted)	Dadhi + Sharkara	Dadhi + Madhu	Dadhi + Ghruta
Without trypsin	Reading 1	2.539	0.736	2.457	0.679	1.842	2.243
	Reading 2	3.075	0.629	2.662	0.651	1.592	2.216
	Mean (A)	**2.807**	**0.6825**	**2.5595**	**0.665**	**1.717**	**2.2295**
With trypsin	Reading 1	2.976	0.711	3.003	1.035	1.862	1.879
	Reading 2	2.633	0.906	3.264	1.111	1.752	1.815
	Mean (B)	**2.8045**	**0.8085**	**3.1335**	**1.073**	**1.807**	**1.847**

Graph 19



Alpha amylase inhibition activity

Table 18

Sr. No.	Sample	% inhibition of alpha amylase
1	Dadhi	1.888%
2	Dadhi + Sharkara	2.262%
3	Dadhi + Yusha	2.234%
4	Dadhi + Madhu	2.328%
5	Dadhi + Amalaki	2.065%
6	Dadhi + Ghruta	0.87%

Formula:

(Ac+)-(Ac-)- [As-Ab]/ (Ac+)-(Ac-) x 100

Ac+ is absorbance of 100% enzyme activity (only solvent with enzyme)

Ac- is absorbance of 0% enzyme activity (only solvent without enzyme)

As is absorbance of test sample (with enzyme)

Ab is absorbance of blank (test sample without enzyme)

Readings:

Table 19

Samples		Reading
Ac+		0.849
Ac-		0.054
Dadhi	**As**	0.409
	Ab	1.115
Dadhi + Sharkara	**As**	0.613
	Ab	1.616
Dadhi + Mudga Yusha	**As**	0.482
	Ab	1.463
Dadhi + Madhu	**As**	0.932
	Ab	1.988
Dadhi + Amalaki kwath	**As**	0.578
	Ab	1.425
Dadhi + Ghruta	**As**	0.25
	Ab	0.147

Graph 20

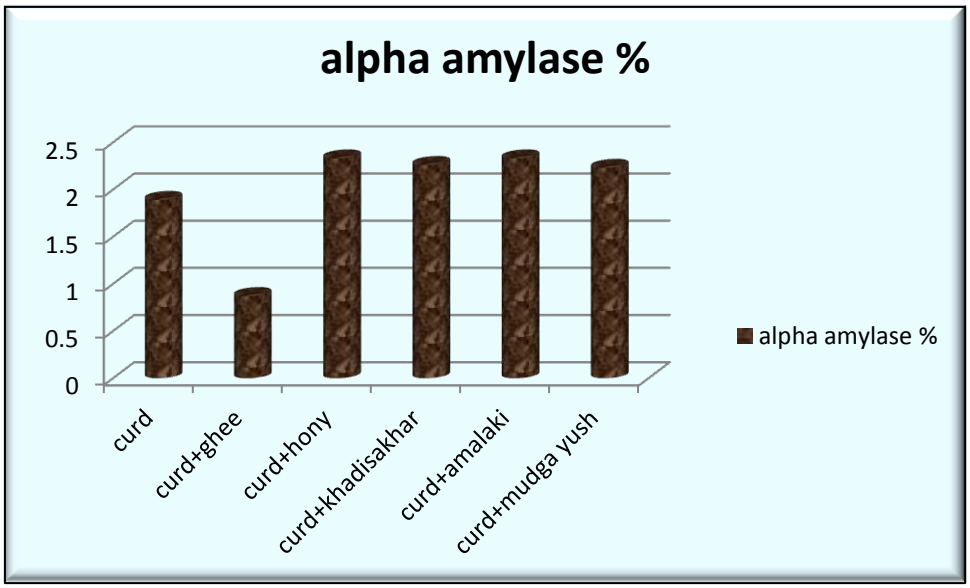
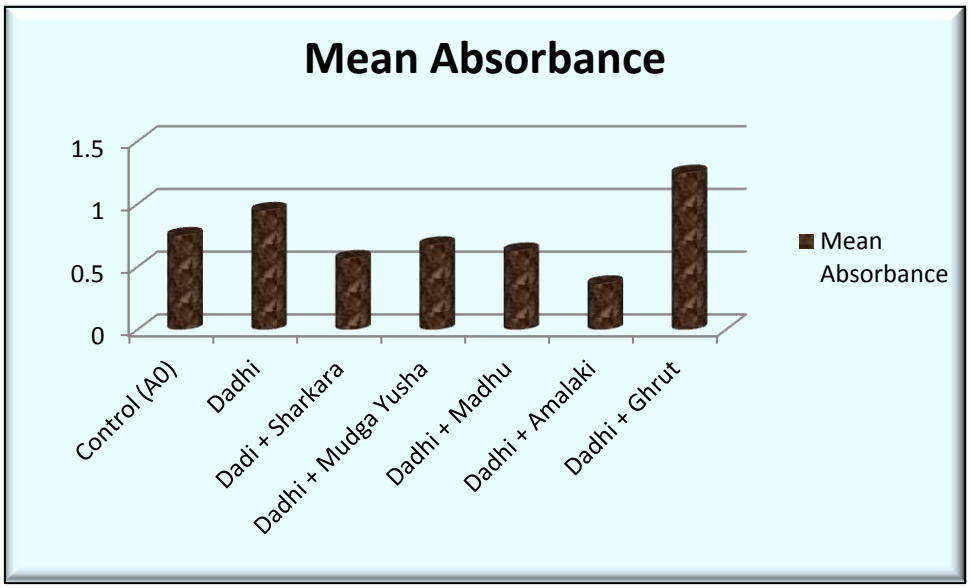


Table 20

Sample	**Mean Absorbance**
Control (A_0)	0.75
Dadhi	0.95
Dadi + Sharkara	0.567
Dadhi + Mudga Yusha	0.676
Dadhi + Madhu	0.627
Dadhi + Amalaki	0.365
Dadhi + Ghrut	1.247

Graph 21



anti-oxidant activity

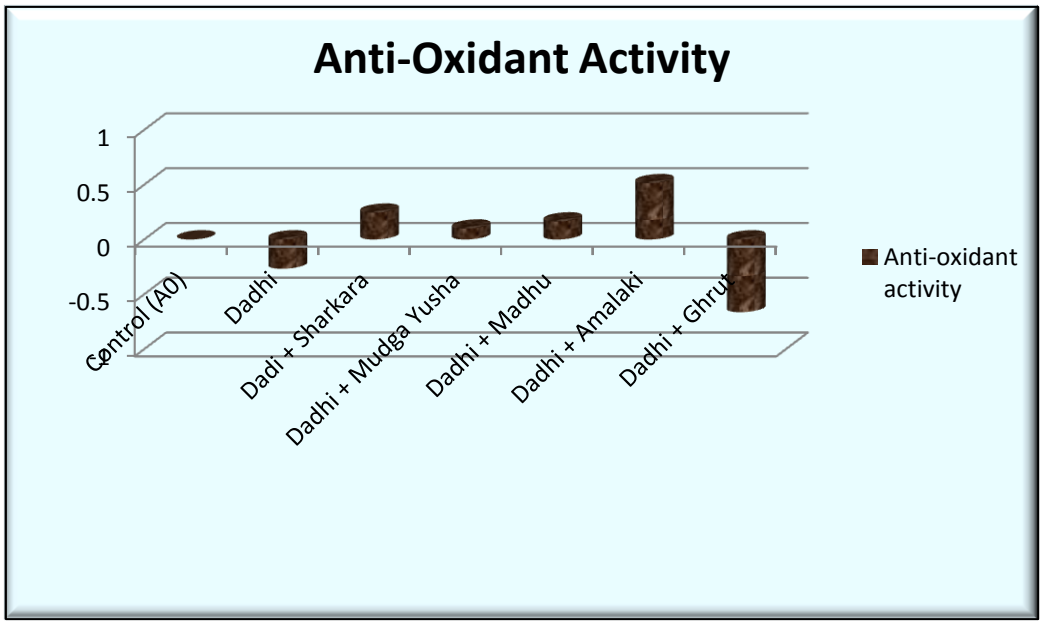
Results of Anti-oxidant activity by DPPH method:

Formula: A_0-A_s/A_0

Table 21

Sr. No.	Sample	Absorbance (Triplicate)			Mean Absorbance	Anti-oxidant activity
1	Control (A_0)	0.733	0.701	0.817	0.75	-
2	Dadhi	1.047	0.872	0.931	0.95	-0.267
3	Dadi + Sharkara	0.398	0.658	0.644	0.567	0.244
4	Dadhi + Mudga Yusha	0.701	0.691	0.636	0.676	0.099
5	Dadhi + Madhu	0.702	0.624	0.556	0.627	0.164
6	Dadhi + Amalaki	0.384	0.331	0.381	0.365	0.513
7	Dadhi + Ghrut	1.254	1.194	1.292	1.247	-0.663

Graph 22



Survey study

Analysis 1 - questionnaire

Table1: Age Groups

The frequency distribution of patients according to Age Groups along with it's bar graph is as given below.

Table 22

Age Groups	Frequency	Percent
Upto 20	22	11.2
21 to 30	79	40.1
31 to 40	42	21.3
41 to 50	33	16.8
51 to 60	10	5.1
61 to 70	9	4.6
Above 70	2	1.0
Total	197	100.0

Graph 23

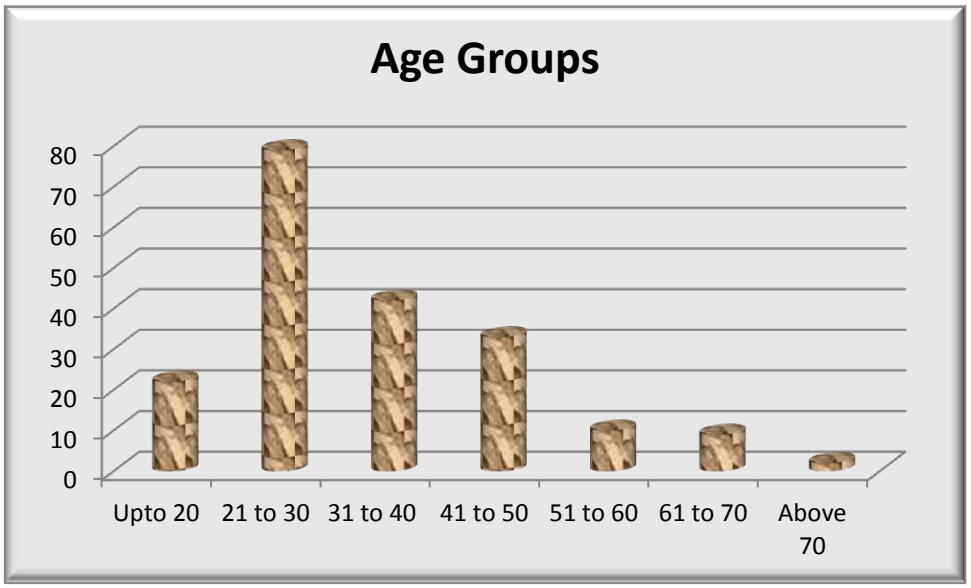


Table2: Gender

The frequency distribution of patients according to Gender along with it's bar graph is as given below.

Table 23

Gender	Frequency	Percent
Female	133	67.5
Male	64	32.5
Total	197	100.0

Graph 24

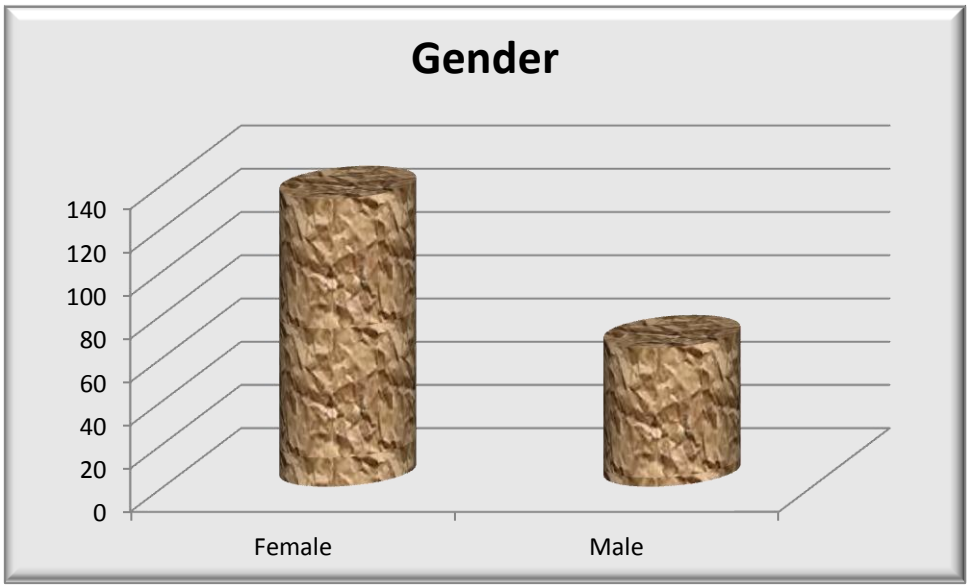


Table3: Life Style

The frequency distribution of patients according to Life Style along with it's bar graph is as Table 24

Life Style	Frequency	Percent
Amlapitta	2	1.0
Highly Active	18	9.1
Moderately Active	128	65.0
Sedentary	49	24.9
Total	197	100.0

Graph 25

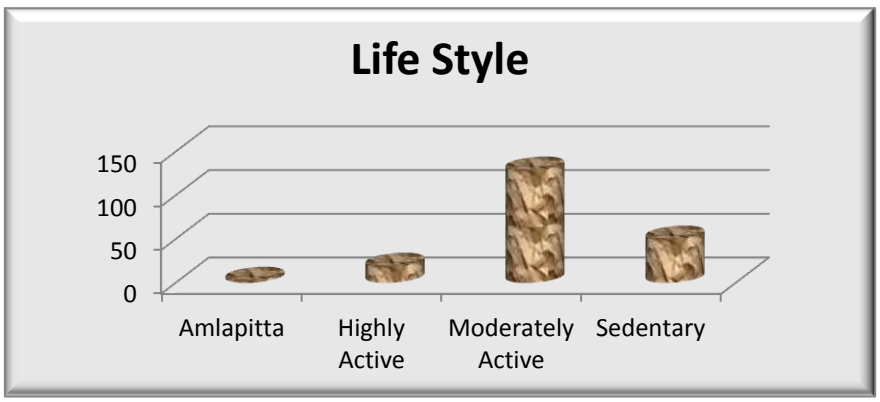


Table4: Q1

The frequency distribution of patients according to Q1 along with it's bar graph is as given below.

Table 25

Responses of Q1	Frequency	Percent
Grade 1	65	33.0
Grade 2	56	28.4
Grade 3	43	21.8
Grade 4	21	10.7
Grade 5	12	6.1
Total	197	100.0

Graph 26

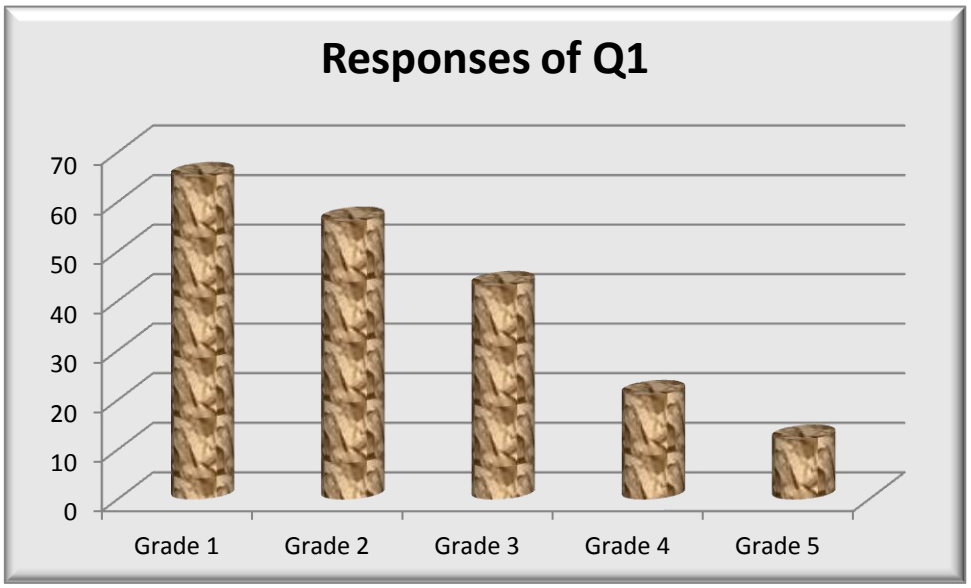


Table5: Q2

The frequency distribution of patients according to Q2 along with it's bar graph is as given below.

Table 26

Responses of Q2	Frequency	Percent
Grade 1	58	29.4
Grade 2	11	5.6
Grade 3	37	18.8
Grade 4	70	35.5
Grade 5	21	10.7
Total	197	100.0

Graph 27

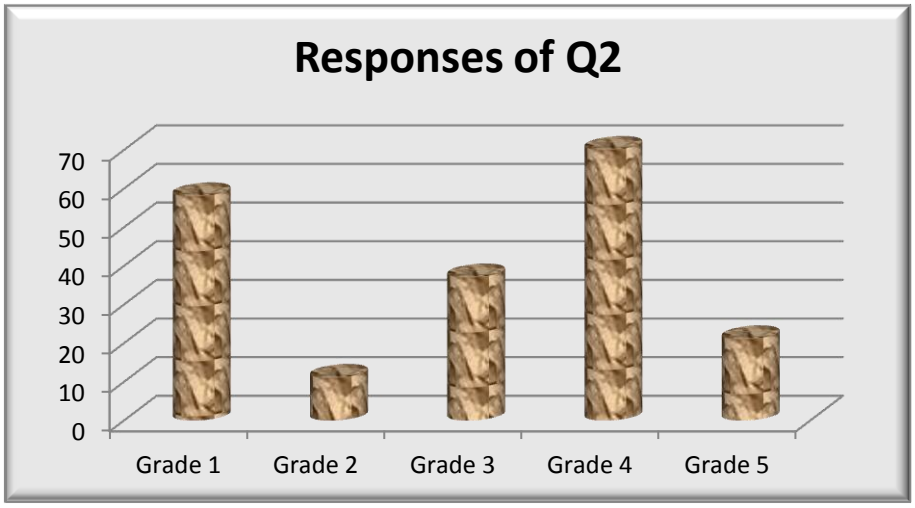


Table6: Q3

The frequency distribution of patients according to Q3 along with it's bar graph is as given below.

Table 27

Responses of Q3	Frequency	Percent
Grade 1	8	4.1
Grade 2	46	23.4
Grade 3	55	27.9
Grade 4	43	21.8
Grade 5	45	22.8
Total	197	100.0

Graph 28

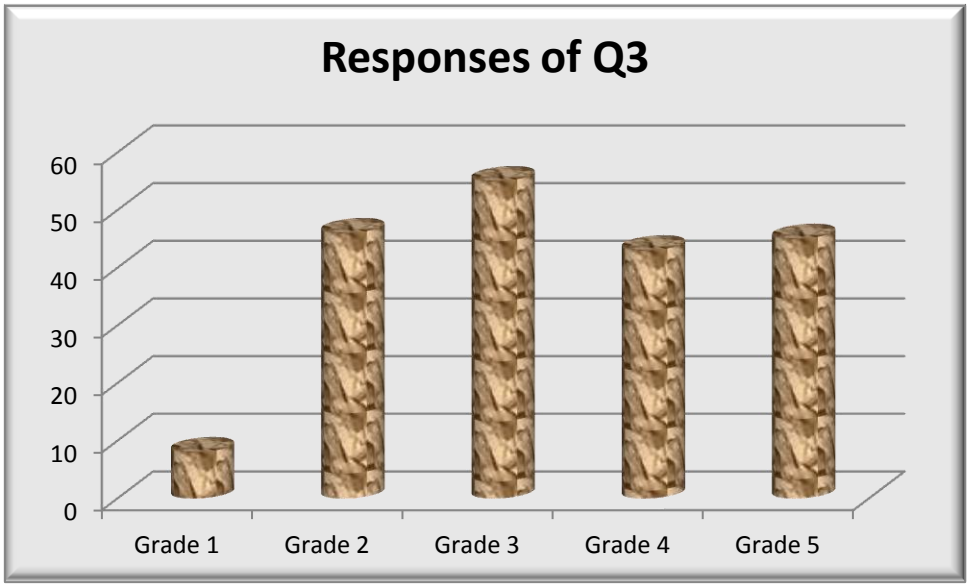


Table7: Q4

The frequency distribution of patients according to Q4 along with it's bar graph is as given below.

Table 28

Responses of Q4	Frequency	Percent
Grade 1	9	4.6
Grade 2	115	58.4
Grade 3	4	2.0
Grade 4	27	13.7
Grade 5	42	21.3
Total	197	100.0

Graph 29

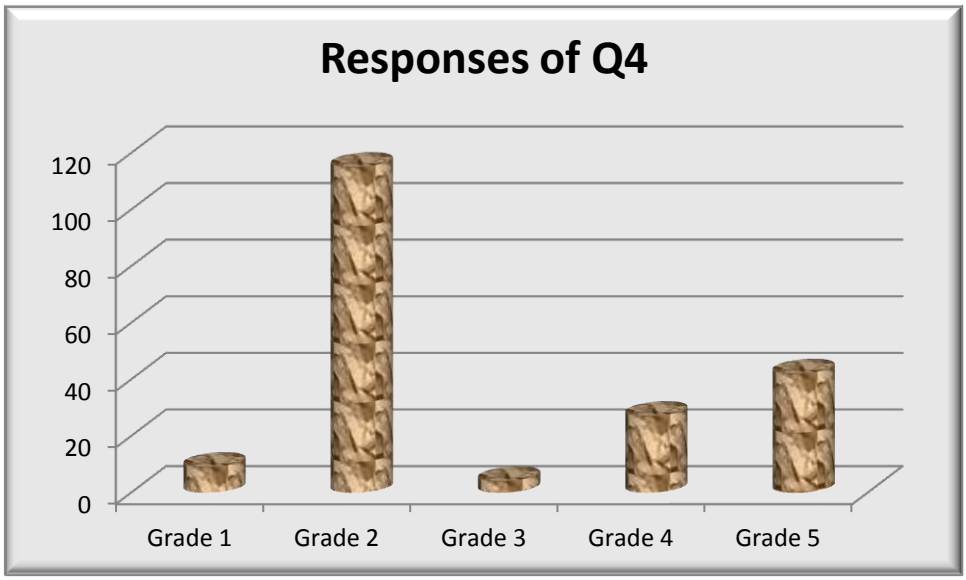


Table8: Occupation

The frequency distribution of patients according to Occupation along with it's bar graph is as given below.

Table 29

occupation		
		Frequency
Valid	advocate	1
	beautician	2
	buisness	6
	business	7
	cleark	1
	counsellar	1
	doctor	8
	engineer	1
	farmer	2
	fashion designer	1
	h/w	43
	jim trainer	1
	moderately active	1
	musician	1
	nurse	1
	retired	8
	self employed	1
	service	30
	student	67
	tailor	1

	teacher	8
	therapist	1
	transprt	2
	watchman	1
	yoga instructor	1
	Total	197

Data analysis and result - 2

Aim: To decide whether the association between responses of Questions & Occurrence of Present Illness is significant.

To test the hypotheses,

The null hypothesis, H_0: The association is not significant.

Vs.

The alternative hypothesis, H_a: The association is significant.

The test used is Chi Square Test for association of attributes.

Part A] Q1 Vs Present Illness

Table 30

Crosstab

Count

		Illness		Total
		Absent	Present	
Q1	Grade 1	28	28	56
	Grade 2	24	32	56
	Grade 3	22	21	43
	Grade 4	10	10	20
	Grade 5	4	18	22
Total		88	109	197

Table 31

Chi-Square Tests			
	Value	df	P value (2-sided)
Pearson Chi-Square	7.927[a]	4	.094
Likelihood Ratio	8.564	4	.073
Linear-by-Linear Association	2.920	1	.088
N of Valid Cases	197		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.93.			

Since p value > 0.05, the level of significance; the null hypothesis can not be rejected.

Conclusion: The association is not significant.

Part B] Q2 Vs Present Illness

Table 32

Crosstab				
Count				
		Illness		Total
		Absent	Present	
Q2	Grade 1	25	25	50
	Grade 2	5	6	11
	Grade 3	15	22	37
	Grade 4	36	32	68
	Grade 5	7	24	31
Total		88	109	197

Table 33

Chi-Square Tests			
	Value	df	P value (2-sided)
Pearson Chi-Square	8.835[a]	4	.065
Likelihood Ratio	9.273	4	.055
Linear-by-Linear Association	1.825	1	.177
N of Valid Cases	197		
a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.91.			

Since p value is close to 0.05, the level of significance; the null hypothesis can be rejected.

Conclusion: The association is significant. The crosstab shows that higher frequencies are concentrated at the higher grades.

Part C] Q3 Vs Present Illness

Table 34

Crosstab				
Count				
		Illness		Total
		Absent	Present	
Q3	Grade 1	11	1	12
	Grade 2	24	22	46
	Grade 3	20	34	54
	Grade 4	18	23	41
	Grade 5	15	29	44
Total		88	109	197

Table 35

Chi-Square Tests			
	Value	df	P value (2-sided)
Pearson Chi-Square	15.047[a]	4	.005
Likelihood Ratio	16.411	4	.003
Linear-by-Linear Association	8.140	1	.004
N of Valid Cases	197		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.36.			

Since p value < 0.05, the level of significance; the null hypothesis can be rejected.

Conclusion: The association is significant.

Part D] Q4 Vs Present Illness

Table 36

Crosstab				
Count				
		Illness		Total
		Absent	Present	
Q4	Grade 1	7	1	8
	Grade 2	52	63	115
	Grade 3	3	1	4
	Grade 4	9	18	27
	Grade 5	17	26	43
Total		88	109	197

Table 37

Chi-Square Tests			
	Value	df	P value (2-sided)
Pearson Chi-Square	9.303[a]	4	.054
Likelihood Ratio	9.875	4	.043
Linear-by-Linear Association	2.616	1	.106
N of Valid Cases	197		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.79.			

Since p value is close to 0.05, the level of significance; the null hypothesis can be rejected.

Conclusion: The association is significant. The crosstab shows that higher frequencies are concentrated at the higher grades.

Parameters: Grades of Q1, Grades of Q2, Grades of Q3, Grades of Q4, Grades of Q5.

To test whether there is significant difference in Grades of questions on an average if Presence & Absence of Illness are considered.

To test the hypotheses,

The null hypothesis, H_0:

There is no significant difference in Grades of questions on an average if Presence & Absence of Illness are considered.

Vs.

The alternative hypothesis, H_a:

There is significant difference in Grades of questions on an average if Presence & Absence of Illness are considered.

The test used is Mann Whitney test for two independent samples.

Table 38

Ranks				
	Illness	N	Mean Rank	Sum of Ranks
Q1	Absent	45	80.22	3610.00
	Present	152	104.56	15893.00
	Total	197		
Q2	Absent	45	83.94	3777.50
	Present	152	103.46	15725.50
	Total	197		
Q3	Absent	45	77.33	3480.00
	Present	152	105.41	16023.00
	Total	197		
Q4	Absent	45	83.43	3754.50
	Present	152	103.61	15748.50
	Total	197		

Table 39

Test Statistics[a]				
	Q1	Q2	Q3	Q4
Mann-Whitney U	2575.000	2742.500	2445.000	2719.500
Wilcoxon W	3610.000	3777.500	3480.000	3754.500
Z	-2.593	-2.089	-2.983	-2.349
P value (2-tailed)	.010	.037	.003	.019
a. Grouping Variable: Illness				

Since p value < 0.05, the level of significance; the null hypothesis can be rejected for all questions.

Conclusion:

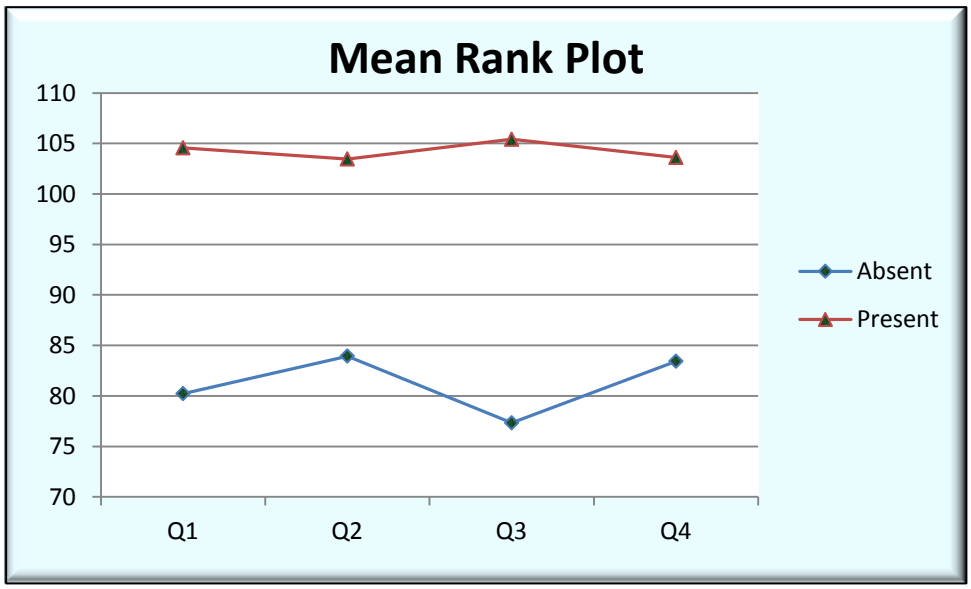
There is significant difference in Grades of questions on an average if Presence & Absence of Illness are considered.

The mean rank values suggest that the grades of all the questions significantly lower for absence of illness.

Mean Rank Plot:

The mean rank plot showing the mean ranks for all the questions & according to Presence & Absence of Illness is as given below.

Graph 30



The mean rank plot suggests that the grades of all the questions significantly lower for absence of illness.

DISCUSSION

Dosha dhatu mala are functions of living body and any edible item which is contra-indicated by compendia **cannot ethically be experimented on living beings as per research ethics**. This left no option for the research scheme but to rely upon the laboratory tests to maximum extent. Curd has tremendous nutritional and Probiotic value and is recommended by modern medicine in many places. It is common item in Indian food. Yet Ayurveda warned against its eating alone and about its eating at night.

Heating is prohibited in both medical sciences; however the other warnings given by Ayurveda are not observed in modern science.

The rules and regulations of eating curd are given especially in Ayuveda. Only two seasons are recommended for eating curd - namely Hemant and Varsha.

Title of the research work intends to evaluate various samples of cow-curd prepared with different ingredients as suggested in Charaka-Samhita for:

- Nutritional Values
- Physico-Chemical Properties
- Organoleptic Properties
- Acceptability
- Stability of each sample

The samples used are:

- Plain cow curd
- Cow curd mixed with honey
- Cow curd mixed with khandasharkara
- Cow curd mixed with cow ghee
- Cow curd mixed with mudga yusha
- Cow curd mixed with amalaki churna

Plain curd or control

Properties of curd

The fresh cow curd has following properties:

Rasa - madhura, amla

Anurasa - kashaya

Vipaka - amla

Veerya - ushna

Effect of dosha:

Vata-pacifying

Pitta-increasing

Kapha-increasing

Effect on dhatu

Rakta -increasing

Meda, shukra-increasing

Vipaka-amla

Veerya-ushna.

Long term consumption of curd can cause kapha vridhi lakshanani.

If the sample reports are studied it will be seen that following factors are altered, from the plain or control sample to other samples; which are prepared, using ingredients, as per the directions of Charaka-Samhita.

If rasa is considered it is madhura, amla, depending upon the duration of setting time of curd yet the principle rasa is amla. Means it is sour in taste. This taste depends upon the pH and acidity content of the curd.

Here it is obvious that the madhura rasa is not strong enough in curd to give madhura vipaka or sheeta veerya. Taste sour is amla rasa. Obviously this is dependent on pH of curd and acidity contents curd has.

Sour taste of curd is due to the presence of lactic acid and the acidity of curd. **Acidity** is due to lactic **acid** produced by the action of bacteria on lactose in milk. The

acidity increases with the storage time. Hence this parameter leads to the checking of its storage time. As per the Indian Standards, **acidity of dahi** should be in the range of 0.6 to 0.8%.

The analysis of ash content in foods is simply the burning away of organic content, leaving inorganic minerals. This helps determine the amount and type of minerals in food; important because the amount of minerals can determine physiochemical properties of foods, as well as retard the growth of microorganisms.

Moisture content is one of the most important characteristics in consumer sensory perception of food. Change in moisture content will dramatically affect flavor and texture as well as physical and chemical properties, as water gives chemicals a helpful medium to catalyze chemical reactions (water activity). The presence of free moisture is directly related to water activity; the higher the water activity, the more susceptible the food will be to interactions with microbes and its environment.

Moisture content has been established as an important indicator of shelf life for foods. Moisture can determine the aesthetics of food, giving estimates to product shelf life regardless of sample properties in a wet or dry state. Ash content also is essential to a food's nutrition and longevity.

The reports show following table:

Table 40

No	Sample	pH	Acidity
1	Plain cow curd	100.00	01.14
2	curd+ghee	102.04	00.83
3	curd+honey	100.58	00.56
4	curd+sugar	104.96	00.64
5	curd+amalaki	83.97	01.24
6	curd+mudgayush	108.16	00.96

This test is related to acidity of curd and different samples of curd with other dietary substances. As acidity causes sour taste of curd and it can be considered that sour taste

is directly proportional to acidity. As acidity increases, sour taste also increases and as acidity decreases, sour taste decreases.

Maximum to minimum amlata is as follows:

- Plain curd
- Curd + mudgayusha
- Curd + ghee
- Curd + sugar
- Curd + honey
- curd + amalaki

Hence it is proved by laboratory tests that the curd when desired to have less amla rasa it should be eaten with order given above.

It is amla rasa with amla vipaka with ushna veerya which is responsible for:

- Vilayana of kapha
- Increase in pitta due to samana guna.

This vrudhi in two dosha may become vulnerable if it accumulates every day and gets vitiated to give rise to diseases.

In this aspect, plain curd as per laboratory reports is most dangerous. ***Ayurvedic compendia realizing this fact, made a rule of never to eat plain curd; never at night and never continuously.***

Addition of the ingredients directed by Charaka-Samhita decreases the amla rasa of plain curd, or lessens the effects of amla rasa, which is proved by laboratory test.

Nutritional values:

As far as nutritional values are concerned modern nutrition is divided into principle factors of food namely proteins, carbohydrates and fats

Proteins:

Table 41

Test	protein %
Curd	100.00
curd+ghee	139.42
curd+hony	99.27
curd+sugar	50.36
curd+amla	135.77
curd+mudgayush	52.55

Hence from highest grade to the lowest grade the protein contents of the various samples are:

- Curd + ghee
- Curd + amalaki churna
- Plain curd
- Curd + honey
- Curd + mudga yusha
- Curd + khandasharkara

Curd combined with aamalaki churna and curd with ghee gives good quantity of proteins than plain curd.protein is building blocks and also a good source of energy for body.it is structural entity in our body.it increases weight .hence it can be co-related to prithvi tatva as prithvi has guruta as one of it characteristics.Manushya deha is Jarayuja and it is one of Prithvi vishaya.hence the combination of curd and ghee and amalaki can be used whenever weight gain is anticipated.the combination will increase the dosha, dhatu and mala which has prithvi mahabhuta as its major constituent in panchbhautik sanghatan

Carbohydrates:

Table 42

Test	carbohydrate %
Curd	100.00
curd+ghee	159.12
curd+hony	416.97
curd+sugar	515.36
curd+amla	371.36
curd+mudgayush	28.06

Hence from highest grade to the lowest grade the carbohydrate contents of the various samples are:

- Curd + khandasharkara
- Curd + honey
- Curd + amalaki churna
- Curd + ghee
- Plain curd
- Curd + mudgayusha

Carbohydrate contents are higher in four samples than plain curd sample.these are curd with sugar,honey,amalaki and ghee.this samples can be used where energy required

Fats:

Table 43

Test	fat %
Curd	100.00
curd+ghee	626.30
curd+hony	96.19
curd+sugar	53.63
curd+amla	117.65
curd+mudgayush	219.03

Hence from highest grade to the lowest grade the fat contents of the various samples are:

- Curd + ghee
- Curd + mudgayusha
- Curd + amalaki churna
- Plain curd
- Curd + honey
- Curd + khandasharkara

The samples having Fat content of less than that of plain curd can be used in the conditions where medho-vridhi is present ,the conditions like shaulya,prameha,medha dhatu vrudhi lakshanani present.

Moisture:

Table 44

Test	moisture %
Curd	100.00
curd+ghee	77.34
curd+hony	68.89
curd+sugar	61.01
curd+amla	70.55
curd+mudgayush	104.08

Hence from highest grade to the lowest grade the moisture contents of the various samples are:

- Curd + mudgayusha
- Plain curd
- Curd + ghee
- Curd + amalaki churna
- Curd + honey
- Curd + khandasharkara

Moisture content of all these samples exept curd and mudgayusha is less than plain curd.as moisture content test reflects the water content of the smple, we can say that water content of these samples are less than the curd.

Ash content:

Table 45

Test	ash %
Curd	100.00
curd+ghee	54.84
curd+hony	30.65
curd+sugar	61.29
curd+amla	254.84
curd+mudgayush	85.48

Hence from highest grade to the lowest grade the ash contents of the various samples are:

- Curd + amalaki churna

- Plain curd
- Curd + mudgayusha
- Curd + khandasharkara
- Curd + ghee
- Curd + honey

Ash content reveals the inorganic minerals .curd and aamalaki churna sample have gratest ash value that means it has higher mineral content.thus it can be used when there is deficiency of minerals in the body. minerals resembles with prithvi mahabhoot,hence the sample can increase the prithvi mahabhoot level of sharer as per Samanya-vishesh sidhant.

Table 46

Parameters	Highest to Lowest					
Appearance	Curd + Sharkara	Curd + Madhu	Curd + Ghruta	Curd	Curd + Mudga Yusha	Curd + Amalaki Churna
Aroma	Curd + Madhu	Curd + Sharkara	Curd	Curd + Mudga Yusha	Curd + Amalaki Churna	Curd + Ghruta
Taste	Curd + Sharkara	Curd + Madhu	Curd + Ghruta	Curd	Curd + Mudga Yusha	Curd + Amalaki Churna
Sweetness	Curd + Madhu	Curd + Sharkara	Curd + Amalaki Churna	Curd	Curd + Mudga Yusha	Curd + Ghruta
Texture	Curd + Madhu	Curd + Sharkara	Curd	Curd + Ghruta	Curd + Mudga Yusha	Curd + Amalaki Churna

Acceptibility test:

It expresses the palatability of human.

- Most palatable seems to be curd and madhu combination
- Next palatable is curd and khandasharkara
- Third acceptance is to plain curd and curd and ghee
- Next is curd and mudgayusha
- Least palatable is amalaki

Titrable acidity = pH value + lactic acid production

Table 47

Test	ph %
Curd	100.00
curd+ghee	102.04
curd+hony	100.58
curd+sugar	104.96
curd+amla	83.97
curd+mudgayush	108.16

pH value:

Table 48

Test	pH value
Curd	3.43
curd+ghee	3.50

curd+khandasharkar	3.60
curd+amalaki	2.88
curd+ mudgayush	3.71
curd+honey	3.45

Ph values from higher to lower level

- curd+amla
- Curd
- curd+honey
- curd+ghee
- curd+khandasharkar
- curd+ mudgayush

Table 49

Test	acidity as lactic acid %
Curd	100.00
curd+ghee	72.81
curd+honey	49.12
curd+sugar	56.14
curd+amla	108.77
curd+mudgayush	84.21

Hence from highest grade to the lowest grade the titrable acidity contents of the various samples are:

- Curd + amalaki churna
- Plain curd
- Curd + mudgayusha
- Curd + khandasharkara

- Curd + ghee
- Curd + honey

Developed **acidity** which is due to **lactic acid** produced by the action of bacteria on lactose in milk. Generally the **acidity** of milk means the total **acidity** (Natural + developed) or titrable **acidity**.as acidity increases sour test also increases.hence amla rasa also get increased.four samples namely curd with mudgayusha,khandsharkara,ghee,honey has lower acidity and ph value than plain curd sample.hence these samples can be used when there is pitta dosh shaman is anticipated.

Alpha amylase:

Table 50

Sample	alpha amylase inhibition activity %
Curd	1.89
curd+ghee	0.87
curd+honey	2.33
curd+khadisakhar	2.26
curd+amalaki	2.33
curd+mudga yush	2.23

Hence from highest grade to the lowest grade the alpha amylase inhibition activity of the various samples are:

- Curd + amalaki churna and Curd + honey

- Curd + mudgayusha
- Curd + khandasharkara
- Plain curd
- Curd + ghee

. .. The inhibition of carbohydrate hydrolyzing enzymes such as α-amylase can be an important strategy to lower postprandial blood glucose levels. Such inhibitors which find application in the clinical practice for management of diabetes are known to be associated with various gastrointestinal side effects. Therefore, it is the need of time to identify and explore the amylase inhibitors from natural sources having fewer side e fects.

Simple dietary products which have Alpha Amylase inhibitory activity can prove good in minimizing or maintaining blood sugar levels in normal limits.

Curd is one of the cause of prameha.it is kapha vardhak and meda dhatu vardhak. kapha,kleda and meda dhatu are root causes of prameha.when curd mixed with these ingredients ,reduce kapha,kleda and meda dhatu.As per laboratory tests ,it can maintain or minimize blood sugar level .. Alpha Amylase inhibitory activity is directly proportional to the glycemic index.thus inhibition effect necessary to reduce the blood sugar levels.5 samples than plain curd has shown higher alpha amylase inhibition activity hence these samples can be used in diet instead of plain curd to reduce risk of diabetis.

Protein digestability

Table 8:

Table 51

Sample	Protein digestability
Dadhi + Mudga Yusha	**2.5595**

Dadhi	**2.807**
Dadhi + Ghrut	**2.2295**
Dadhi + Amalaki	**0.6825**
Dadhi + Madhu	**1.717**
Dadi + Sharkara	**0.665**

From higheswt grade to lower grade protein digestability

- Dadhi + Mudga Yusha
- Dadhi
- Dadhi + Ghrut
- Dadhi + Amalaki
- Dadhi + Madhu
- Dadi + Sharkara

He sample prepared with mudgayusha has highest protein digestability than control sample of curd.protein content of this sample is lower than curd ,but protein digestability is higher than curd.plain curd is considered as rich source of protein in modern nutrition.but curd mixed with mudga yush has higher protein availability.thus it proves wisdom of ayurvedic diet planes about eating curd.

Antioxidant activity

From higher to lower grade anti-oxidant activity

Curd+ Ghee

Plain Curd

Curd+Mudga

Curd+ Honey

Curd+ Khand

Curd+ Amala

Antioxidents are the molecules which react with free radicals to reduce there effect on vital body molecules.curd and amalaki sample has higher antioxidant activity.other samples except curd and ghee shows higher antioxidant activity.

DISCUSSION ON EACH SAMPLE:

Table 52

Test	**Grades from lower to higher level**					
	1	2	3	4	5	6
Proteins	Ghee	Amala	Plain	Honey	Mudga	Khand
Carbohydrates	Khand	Honey	Amala	Ghee	Plain	Mudga
Fats	Ghee	Mudga	Amala	Plain	Honey	Khand
Ash value	Amala	Plain	Mudga	Khand	Ghee	Honey
Moisture	Mudga	Plain	Ghee	Amala	Honey	Khand
Acceptability	As per above table					
Alpha amylase Inhibition activity	Amala Honey	Mudga	Khand	Plain	Ghee	-
Tritrable acidity	Amala	Plain	Mudga	Khand	Ghee	Honey
Anti-oxidant activity	Amala	Khand	Honey	Mudga	Plain	Ghee
Protein digestability assay	sharkara	madhu	aamalaki	ghrut	plain	mudgayush

- **Plain cow curd**
  - It is used as control for other combinations
  - It shows less nutritive values than khandasharkara and ghee combinations as far as proteins carbohydrates and fats are concerned
  - It shows second grade ash value, moisture and titrable acidity
  - Its digestive power is medium
  - Its antioxidant value is low

- **Cow curd prepared with honey**
  - It shows second highest nutritive values as far as carbohydrates are concerned
  - It shows fourth and fifth grade ash value, moisture and lowest titrable acidity.as it has lower moisture content than that of curd,.
  - As it shows lower titable acidity,
  - Its alpha amylase inhibition activity is higher than plain curd.so it will reduce glycemic index than plain curd.it can reduce blood glucose level than plain curd.
  - Its antioxidant value is medium
  - For organoleptic analysis ,it has higher grade results for aroma,sweetness and texture.hence the sample is higher palatability than plain curd.

Hence this combination can be used in following conditions:

  - Where dryness is desired
  - Where acidity is anticipated
  - Where kapha dosha shaman is anticipated.
  - Where medh dhatu khaya is anticipated.

- **Cow curd prepared with khandasharkara**
  - It shows highest nutritive values as far as carbohydrates are concerned
  - It shows fourth and fifth grade ash value, moisture and little less than medium titrable acidity

- Its alpha amylase inhibition activity is more than plain curd and little lower than honey.so it will definitely reduce glycemic index than plain curd.
- Its antioxidant value is medium,but more than curd.
- For organoleptic analysis ,it has higher grade for taste and appearance.

Hence this combination can be used in following conditions:

- Where acidity is anticipated
- Where pitta shaman is desired
- Where nourishment is desired

- **Cow curd prepared with cow ghee**
  - It shows highest nutritive values as far as proteins and fats are concerned
  - It shows low grade ash value, medium grade moisture.
  - low grade titrable acidity,
  - Its alpha amylase inhibition activity is lower than curd
  - Its antioxidant value is lowest
  - It has medium grade results for organoleptic analysis.
  - Considering all above laboratory tests,we can say that the combination would show guru guna,amlata of curd will get reduced,so can be used in

Hence this combination can be used in following conditions:

- Where snehana is desired
- Where acidity is anticipated

- **Cow curd prepared with mudga yusha**
  - It shows less nutritive values far as proteins carbohydrates and are concerned and shows high value of fat
  - It shows medium ash value, highest moisture and less than medium titrable acidity.as highest moisture ,it has little shelf life hence freshly prepared yusha should be consumed.
  - Its alpha amylase inhibition activity is more than plain curd.it can reduce glycemic index more than plain curd.

- Its antioxidant value is low
- Lower grade results for organoleptic analysis.

Can be used in following conditions

Where meda khaya is anticipated

To reduce sthaulya conditions.

- **Cow curd prepared with amalaki churna**
  - It shows high nutritive values as far as proteins carbohydrates and fats are concerned
  - It shows highest ash value, moisture and highest titrable acidity
  - Its shows highest alpha amylase inhibition activity than any other sample.
  - Its antioxidant value is higest

Hence this combination can be used in following conditions:

- Where abhishyanda of ordinary curd is to be avoided
- Where kapha and pitta shaman is desired
- Where amla rasa is specifically preferred

यदाहारगुणैः [१] पानं विपरीतं तदिष्यते|

अन्नानुपानं धातूनां दृष्टं यन्न विरोधि च||३१९|| Cha. Su.27

आहारगुणैरिति शीतस्नेहमधुरादिभिः; विपरीतमिति विपरीतगुणमनुपेयम्|

एवं च दध्नोऽम्लस्य मधुरं क्षीरं तथा पायसस्य काञ्जिकानुपानं स्यादित्याह-

धातूनां यन्न विरोधि चेति| Chakrapani

These dravyas described for the combination are with *viparit* properties ,but the combination is *dhatu avirodhi*.to maintain swasthya samadhatu condition should be achieved and to achieve this homeostasis ,acharya has given directions about eating curds.

DISCUSSION ABOUT HEATING CURD

The cytotoxicity test shows that:

Cytotoxicity after heating

Table 53

Sample	Absorbance (Duplicate)		Mean Absorbance	Haemolysis (%)
Positive control	1.294			
Negative control	0.077			
Dadhi Normal	0.333	0.333	0.333	21.04
Dadhi at 60	0.329	0.345	0.334	21.12
Dadhi at 72	0.391	0.401	0.396	26.21

Hence the curd should not be heated. It becomes cytotoxic .heating of curd is not recomanded by Ayurveda and also by modern medicine.as heating of curd will kill the probiotic bacterias.when cytotoxicity test of heated curd was done at 72 degree,haemolysis effect was observed .It proves that heating of curd can reduce its good effect and increases untoward effect.

In this way the samples are observed, analysed and with the help of laboratory tests, various ingredients are assessed.

There is significant difference between nutritive properties, physic-chemical properties, antioxidant value, of the plain curd and the various ingredients combined

to the plain curd as suggested by Charaka-Samhita. The heating is prohibited and the reason is obvious by the proof provided by the laboratory tests.

The entire discussion leads to prove the constant value of the fundamentals of Ayurveda; and leads to the golden directions for the prevention of the disedases.

DISCUSSION ABOUT SURVEY

A random survey was set, 197 volunteers were asked to reply questions and analysis was done.

Following four questions were principally put forward

1. How often you consume curd?
2. How you consume curd?
3. Quantity of curd you consumed at a time –
4. When you consume curd?

The conclusions were as follows:

A] Aim: To decide whether the association between responses of Questions & Occurrence of Present Illness is significant.

Q1 Vs Present Illness

Conclusion: The association is not significant.

Q2 Vs Present Illness

Conclusion: The association is significant. The crosstab shows that higher frequencies are concentrated at the higher grades.

Q3 Vs Present Illness

Conclusion: The association is significant.

Q4 Vs Present Illness

Conclusion: The association is significant. The crosstab shows that higher frequencies are concentrated at the higher grades.

Parameters: Grades of Q1, Grades of Q2, Grades of Q3, Grades of Q4, Grades of Q5.

Conclusion:

There is significant difference in Grades of questions on an average if Presence & Absence of Illness are considered.

The mean rank values suggest that the grades of all the questions significantly lower for absence of illness.

It can therefore by accepted that the overall impression of the association of the questions of the survey and the outputs do not significantly match; however every question with the gradations are considered, statistically it gives significant results hence it is derived that the survey shows that the daily consumption of curd does get associtated with the present illness any human at any geographical location with any occupation hence the law given in Ayurvedic compendia is statistically significant.

10. CONCLUSION

All the results and tables and graphs are given under the observational data.

The conclusions are as follows:

- Plain curd is avoided as per directions of Ayurvedic compendia. This fact is proved by showing its relatively low nutritive value, medium digestive power and lower than medium anti-oxidant property as compared to the samples prepared as per the suggestions of Charaka-Samhita adding ingredients; which boost the nutritive value, anti-oxidant property along with lowest acidity value
- Curd should not be heated as it increases the cytotoxic value
- Palatability and quality do not match every time
- Daily consumption of curd leads to trigger the presently occurring illnesses

11. SUMMARY

Introduction - Various directions for maintenance of health are provided in Charaka-Samhita. It is always preferred medically and personally that health of individual should be maintained as far as possible than to get submitted to the diseases and to suffer thereafter. One of the directions in Dinacharya i.e. daily regime is:

न नक्त दधि भुञ्जीत न चाप्यघृतशर्करम्|
नामुद्गयूषं नाक्षौद्रं नोष्णं नामलकैर्विना [1] ||६१||

If curd is to be eaten, Charaka-Samhita has suggested certain combinations for curd, which could make it free from its ill effects, the study designed for its laboratory analysis.

Aim -The thesis aims at evaluation of various samples of cow-curd mixed with different ingredients as suggested in Charaka-Samhita; for their Nutritional Values, Physico-Chemical and Organoleptic Properties, Acceptability and Stability.

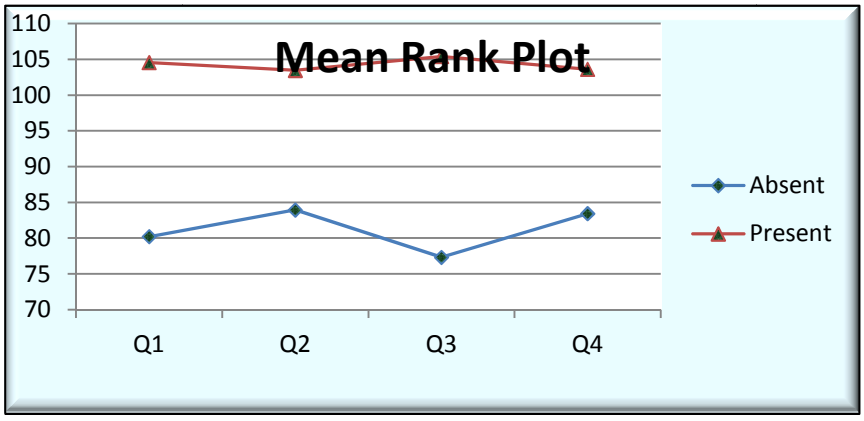
Material and method- 6 samples were analysed for their nutritive values,chemical,organoleptic properties,alpha amylase inhibition activity,protein digestability ,antioxidant activity and heated curd for toxicity test.

As an additional work,survey of curd eating habits and present illness were carried out for about 197 volenteers.

Observation and results-The collected data was analysed by using Pearson chi square test,likelihood ratio,linear by linear association,Mann –Whitney U,Wilcoxan W test and Kruskal Wallis test.

Mean Rank Plot:

The mean rank plot showing the mean ranks for all the questions & according to Presence & Absence of Illness is as given below.



The mean rank plot suggests that the grades of all the questions significantly lower for absence of illness.

Observation of each sample

Test	**Grades from lower to higher level**					
	1	2	3	4	5	6
Proteins	Ghee	Amala	Plain	Honey	Mudga	Khand
Carbohydrates	Khand	Honey	Amala	Ghee	Plain	Mudga
Fats	Ghee	Mudga	Amala	Plain	Honey	Khand
Ash value	Amala	Plain	Mudga	Khand	Ghee	Honey
Moisture	Mudga	Plain	Ghee	Amala	Honey	Khand
Acceptability	As per above table					
Alpha amylase Inhibition activity	Amala Honey	Mudga	Khand	Plain	Ghee	-
Tritrable acidity	Amala	Plain	Mudga	Khand	Ghee	Honey
Anti-oxidant activity	Amala	Khand	Honey	Mudga	Plain	Ghee
Protein digestability assay	sharkara	madhu	aamalaki	ghrut	plain	mudgayush

Discussion and conclusion-

According to observation ,alternate hypothesis is proved that there is significant difference in the curd sample and samples prepared by curd mixed with ingredients mentioned in samhitas.

- So the study ends with conclusion that Plain curd is avoided as per directions of Ayurvedic compendia and samples prepared as per the suggestions of Charaka-Samhita adding ingredients boost the nutritive value, anti-oxidant property ,alpha amylase inhibition activity ,along with lowest acidity value.
- Curd should not be heated as it increases the cytotoxic value
- Palatability and quality do not match every time
- Daily consumption of curd leads to trigger the presently occurring illnesses.

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14. ANEXURES

Following appendices are attached:

1. Master chart of the survey
2. Questionnaire for survey
3. Test reports
4. Further research schemes

1. Master chart of the survey

	age	gender	Occupation	lifestyle	present ilness	known case of	q1	q2	q3	q4
1	16	m	Student	sedentary	-	-	2	1	3	5
2	16	m	Student	sedentary	-	-	1	3	4	5
3	15	m	Student	sedentary	-	-	1	4	3	5
4	16	m	Student	moderatly active	-	-	1	1	2	1
5	17	m	Student	sedentary	-	-	3	4	3	1
6	38	f	Service	highly active	allergy to dust	vatavyadhi	2	1	1	2
7	54	f	Teacher	moderately active	Sandhishula, Pinas	sthaulya	1	3	4	2
8	24	f	h/w	highly active	daurbalya	tvachavikar, Sandhishula	2	1	5	5
9	23	M	Student	moderately active	kasa	-	2	1	2	2
10	43	f	h/w	sedentary	sandhidhula	HTN	1	1	1	1
11	31	f	Beautician	highly active	Sandhishula, Pinas	HTN	2	2	3	2
12	28	m	Engineer	sedentary	-	Nidranasha	1	4	1	2
13	56	f	h/w	sedentary	Sandhishula, Pinas	Sandhivata	1	3	1	2
14	62	m	Retired	sedentary	daurbalya	Prameha, HTN, Thyroid	2	4	2	4
15	47	f	fashion designer	sedentary	-	Malavashtambha	3	2	3	4
16	37	f	Student	moderately	nidranash	Nidranas	4	4	4	2

				activeni		ha				
17	67	m	Retired	sedentary	udarshul	HTN,prameha	5	4	4	4
18	68	f	Retired	sedentary		HTN,prameha,sandhivat,sthaulya	3	1	4	4
19	38	m	Business	moderately active		amlapitta	4	4	4	2
20	63	f	h/w	moderately active			1	2	3	2
21	65	m	Retired	moderately active		HTN	4	1	5	2
22	22	f	Student	moderately active			2	1	5	2
23	25	f	Student	moderately active			5	1	5	2
24	45	f	h/w	moderately active			2	3	5	2
25	75	f	Retired	moderately active		HTN,prameha,sandhivata	1	3	2	2
26	25	m	Service	moderately active			1	4	1	4
27	50	m	Business	moderately active			2	1	5	2
28	25	f	Student	moderately active	amlapitta		5	1	5	2
29	34	f	h/w	sedentary	amlapitta	sthaulya	3	3	4	4
30	23	f	Teacher	sedentary	kasa	tvachavikar,	3	3	2	1
31	40	f	Service	sedentary	Malavshtam		1	2	3	1

					bha					
32	56	f	Teacher	moderately active	sandhivata	sandhivata	1	4	5	4
33	48	f	h/w	sedentary	kasa		1	1	5	2
34	49	f	Doctor	moderately active		HTN	5	5	5	5
35	23	f	Student	moderately active			1	4	3	5
36	47	f	Doctor	moderately active			3	4	2	2
37	30	F	Doctor	moderately active			3	5	3	2
38	23	M	Student	sedentary	shwas	shwas	1	1	3	5
39	42	f	Counsellor	moderately active			4	5	5	5
40	22	F	Student	moderately active	pinasa		1	1	3	2
41	32	f	h/w	sedentary	Pinasa	badhirya	1	1	3	2
42	31	f	Service	sedentary	amlapitta	constipation	1	1	3	5
43	11	f	Student	moderately active		-	3	1	3	2
44	20	f	Student	moderately active			2	4	4	2
45	78	f	Doctor	moderately active	-	abdominal disorder	2	4	2	2
46	26	f	h/w	moderately active		prameha, sthaulya, abdominal dis	3	4	2	2
47	47	m	Service	moderately		prameha	2	4	2	2

				active						
48	23	m	Student	moderately active	pratishyaya		3	5	4	2
49	23	m	Student	moderately active	pratishyaya		1	3	3	2
50	21	f	Student	moderately active	pratishyaya		1	5	5	5
51	23	m	Student	moderately active		shwas	1	4	4	3
52	20	f	Student	high active	-	-	2	3	4	2
53	23	m	Student	high active	-	-	3	4	3	2
54	21	f	Student	mooderately active	twachavikar	twachavikar	1	4	5	5
55	21	f	Student	moderately active	-	-	2	3	2	2
56	21	F	Student	moderately active		TWACHAVIKAR	3	1	5	2
57	40	F	Doctor	Moderately active		abdominal disorder	1	5	2	2
58	21	f	Student	Moderately active		abdominal disorder	2	4	4	2
59	44	m	Watchman	Moderately active			1	2	5	2
60	36	m	moderately active			abdominal disorder	3	4	5	2
61	24	f	Student	Moderately active			1	1	5	2
62	21	f	Student	Amlapitta		amlapitta	3	5	2	3

63	27	m	h/w	moderately active	twachavikar	twachavikar	1	3	2	2
64	30	m	Doctor	sedentary	amlapitta	amlapitta	2	1	3	4
65	25	m	Cleark	sedentary	amlapitta	amlapitta	2	1	2	2
66	26	f	Teacher	moderately active	pratishyaya	-	3	3	3	5
67	25	f	Advocate	moderately active	pratishyaya	twachavikar	2	4	4	2
68	26	m	Service	moderately active	-	-	2	1	5	2
69	18	f	Student	sedentary	udarshul	sthaulya, abdominal disorders	1	1	5	2
70	36	f	h/w	moerately active	pratishyaya	-	2	3	5	2
71	28	f	Teacher	sedentary	pratishyaya	sthaulua	2	1	4	2
72	21	f	Student	moderately active	-	-	2	1	5	2
73	31	f	Doctor	moderately active	-	-	1	4	2	2
74	22	f	Service	moderately active	depression, Prushthashula	twachavikar, Nidranasha	1	3	3	5
75	24	m	Service	highly active	twachavikar	sandhivata	1	1	2	4
76	50	f	h/w	highly active	-	-	5	5	2	2
77	18	f	Student	moderately active	-	-	4	4	5	5
78	51	f	Beautician	moderately active	amlapitta	sthaulya, amlapitta	3	4	4	2

79	44	f	Service	moderately active	Adhmana, sandhishula	sandhivata	2	4	2	2
80	40	f	h/w	moderatly active	Krodha	twachavikara	5	4	5	2
81	15	f	Student	moderately active	Kshudhamandya, daurbalya	Shwasa, twachavikar, Nidranasha	4	5	4	4
82	55	m	Farmer	highly active	-	-	1	3	2	2
83	58	m	transprt	sedentary	HTN	HTN	2	4	3	2
84	21	f	Student	moderately active	amlapitta	-	2	4	2	2
85	32	m	transprt	moderately active	twachavikar	twachavikara	1	4	2	2
86	30	f	h/w	moderately active	-	sandhivata	2	4	4	2
87	31	f	Doctor	moderately active	-	-	1	4	2	2
88	61	m	Retired	moderately active		DM	1	3	5	2
89	22	m	Student	moderately active		-	3	4	5	4
90	32	m	Service	moderately active	-	-	5	5	5	5
91	21	m	Student	moderately active	-	-	1	4	3	5
92	23	m	Student	moderately active	-	-	4	3	4	5
93	21	m	Student	moderately active	Ajirna	Udarashula	1	4	4	2

94	53	m	Business	moderately active	-	twachavikar	2	4	3	1
95	22	f	Student	moderately active	twachavikar	twachavikar	2	3	4	4
96	18	m	Student	moderately active	khalitya, Palitya		4	4	3	5
97	47	f	h/w	sedentary	udarshul	HTN, Abdominal disorders	2	4	3	2
98	24	m	Service	moderately active	amlapitta	amlapitta	1	1	3	5
99	45	f	h/w	moderately active	prameha	-	1	1	2	5
100	24	f	Student	sedentary	pratishyaya	-	1	1	5	2
101	24	f	Service	sedentary	jwar		4	2	4	5
102	24	m	Service	moderately active			1	1	2	5
103	21	m	Student	sedentary	shirahshula		2	5	5	5
104	21	m	Student	sedentary	pratishyaya		1	1	4	2
105	38	f	h/w	sedentary	amlapitta		2	1	3	2
106	25	m	Service	sedentary	khalitya, Palitya		2	2	3	2
107	45	f	service	moderately active	amlapitta	amlapitta, nidranaasha	2	3	4	5
108	28	f	h/w	sedentary		abdominal disorder	2	3	4	2
109	24	f	Student	moderately active	pratishyaya		4	1	3	2
110	48	m	Farmer	highly	paad shoola		1	1	4	5

				active						
111	30	f	h/w	sedentary			1	1	3	5
112	25	m	Service	moderately active	mutraashmari	mutraashmari	2	3	3	2
113	21	m	Student	moderately active	shirahshula	twavhaa vikaara	3	1	5	5
114	26	m	Service	sedentary			3	4	3	4
115	18	f	Student	moderately active	pcod	pcod, nidraanaasha	4	1	5	2
116	24	m	Teacher	moderately active		twavhaa vikaara	2	4	5	4
117	24	f	Student	moderately active		twavhaa vikaara	3	4	3	4
118	25	f	Student	sedentary	shirahshula	Nidranasha	1	2	3	2
119	20	f	Student	highly active	kanthashoola		1	4	3	4
120	21	f	Student	sedentary	angamarda	twavhaa vikaara	1	1	5	4
121	24	f	Student	moderately active	kasa		1	4	2	2
122	45	f	h/w	moderately active	Sandhishula	paandu	2	1	5	2
123	20	f	Student	sedentary		sthoulya	2	1	4	5
124	45	m	Business	highly active		HTN	3	1	3	2
125	22	m	Business	moderately active		khalitya	2	3	2	2
126	22	f	Student	moderately active			4	4	4	2
127	20	f	Student	sedentary			1	1	5	5

128	49	f	h/w	moderately active		asthma, sandhigata vaata	1	5	2	5
129	30	f	Service	sedentary			3	4	3	2
130	20	f	Student	sedentary	shirahshula	shirahshoola, nidraanaasha	1	4	5	4
131	32	f	Tailor	moderately active			2	3	3	2
132	22	f	Student	sedentary	khalitya, Palitya		3	4	5	5
133	22	f	Student	moderately active	khalitya, Palitya		3	4	3	3
134	24	f	Student	moderately active		abdominal disorder	4	2	2	5
135	29	f	h/w	moderately active		shwaasa	3	1	3	4
136	40	f	h/w	moderately active	hasta shoola	sandhivata	4	5	4	2
137	35	f	h/w	moderately active	sandhishoola	sandhivata	2	4	3	2
138	37	f	h/w	moderately active			3	1	4	2
139	26	m	Student	moderately active	shirahshula	twachaa vikaara, abdominal disorder	4	3	3	2
140	34	f	h/w	sedentary			3	4	2	2

141	52	m	Service	sedentary	amlapitta	HTN, Abdominal disorders, nidraana asha	1	1	2	1
142	46	f	h/w	moderately active	asthi soushirya	asthi soushirya	2	1	2	2
143	23	f	Student	sedentary	twachavikar	twacha vikar, abdominal disorder	1	1	3	2
144	38	m	Service	highly active			1	1	2	2
145	41	f	h/w	sedentary	amlapitta	amlapitta	3	5	3	2
146	44	f	h/w	sedentary	khalitya, dourbalya	prameha, twacha vikara, sthoulya	4	5	3	2
147	31	f	Business	moderately active			1	1	4	2
148	36	f	h/w	moderately active			1	4	4	5
149	43	f	Service	moderately active			4	4	2	2
150	43	f	h/w	moderately active	twachavikar	twachaa vikaara, HTN	1	4	2	1
151	47	f	Business	moderately active	-	-	1	1	1	2

152	37	f	h/w	moderately active	twachavikar	-	1	1	3	2
153	34	f	h/w	moderately active	vishvachi	-	2	4	5	2
154	27	f	Student	moderately active	-	-	1	1	2	5
155	30	f	Business	highly active	-	twachavikar	2	3	5	5
156	21	m	Teacher	highly active	-	-	4	3	4	2
157	42	m	Musician	sedentary	hasta shoola	abdominal disorder	2	3	4	2
158	66	f	Retired	moderately active	nidranash	Nidranasha, HTN	3	3	2	2
159	35	f	Nurse	highly active	manyashula	twachavikar	3	1	4	2
160	41	f	self employed	moderately active	-	twachavikar	3	4	2	2
161	63	m	Retired	moderately active	pratishyaya	prameha, HTN, shwas	3	5	1	2
162	57	f	h/w	moderately active	pratishyaya	-	3	3	3	2
163	49	f	h/w	moderately active	amlapitta	twachavikar, nidranasha, amlapitta	3	4	3	2
164	32	f	Service	moderately active	pratishyaya	shirashula	3	3	2	2
165	24	m	jim trainer	highly active	lumbar spine injury	-	5	1	5	4

166	19	f	Student	moderately active	-	-	3	3	4	3
167	36	f	h/w	moderately active	-	abdominal disorder	1	3	2	2
168	40	f	h/w	moderately active	angamarda		2	3	3	2
169	43	m	Business	moderatly active	twachavikar	twachavikara	3	1	3	5
170	23	m	Student	moderatly active	kshudhamandya	nidranasha,abdominal disorders	2	1	3	2
171	35	f	h/w	moderatly active	pratishyaya	Shwasa, Nidranasha	1	4	2	2
172	22	f	Student	moderatly active			2	4	3	2
173	54	f	h/w	moderatly active	Malavshtambha	sthaulya, spondilysis,abdominal disorder	3	4	4	4
174	29	f	Student	moderatly active	-		2	4	3	2
175	30	f	Business	maderatly active			2	4	3	5
176	26	f	Business	high active			4	4	4	2
177	33	f	Teacher	highly active	twachavikar	twachavikara	3	2	2	2
178	42	f	h/w	moderatly active	twachavikar	thyroid,twachavikara	1	4	1	1

179	39	f	Therapist	moderatly active	pratishyaya	paandu,hypothyroid,karnanada	3	5	2	2
180	17	f	Student	moderatly active			1	4	4	5
181	32	f	Service	maderatly active	kasa	katishool	5	3	5	5
182	40	f	Service	moderatly active	pan	pandu	5	4	2	4
183	39	f	h/w	moderatly active	manyashula	sthaulya	2	3	3	4
184	35	f	h/w	moderatly active	amlapitta	amlapitta	1	3	5	2
185	35	f	h/w	moderatly active	pratishyaya		5	5	2	2
186	49	m	Service	sedentary			4	4	4	5
187	39	m	Service	moderatly active	Malavshtambha		2	5	3	5
188	19	m	Student	moderatly active	shirahshula	twachavikara,abdominal disorder	1	3	5	5
189	18	m	Student	moderatly active			3	4	2	2
190	30	f	yoga instructor	moderatly active	Malavshtambha		3	4	4	4
191	20	f	Student	moderatly active	kasa	twachavikara	2	4	5	2
192	32	f	Business	moderatly active			2	4	4	2
193	30	f	Business	moderatly active			4	5	5	2

194	42	m	Service	sedentary	twachavikar		2	1	5	2
195	61	m	Service	sedentary		sthualya, nidranash	2	2	2	4
196	33	f	Service	moderatly active		sthualya	3	4	4	4
197	44	f	Service	moderatly active			5	5	4	4

2. Consent form

Title: "Study to Evaluate the Nutritional Values, Physico Chemical and Organoleptic Properties, Acceptability and Stability of Different Cow's Curd Based Nutritional Products''

Informed written consent

Name –

M /F Age - Years

1. I confirm that I have read & understood the information for the study & have the opportunity to ask the questions.
2. I understand that my participation in the study is voluntary & I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
3. I understand that the sponsors of the clinical trial are working on the sponsor's behalf, the ethical committee & the regulatory authority will not need my permission to look at my health records that may be conducted in relation to, even if I withdraw from trial. I agree to this access. However I understand that my identity will not be revealed in any information released to third party or published.
4. I agree not to restrict the use of any data or result that arises from this study provided such a use is only for scientific purpose.
5. I agree to take part in this study.

Name & Signature	Name & Signature	Name & Signature
Investigator	witness	volunteer

Date:

Place:

3. Questionnaire for survey

Name – naav

Age - vaya years Gender – Male / Female

Address – patta

Contact no. – dooradhvani kramanka

Occupation – vyavasaaya

Life style – sedentary / moderately active / high active

jaIvanapqdtI baOzo kama /maqyama halacaala/

Present illness –

No.	Complaints	Duration
1		
2		
3		
4		
5		

Known case of –

No.	Complaints	Yes / No	Duration if yes	On medication yes / No
1	Diabetes			
2	Blood pressure			
3	Asthma			
4	Skin problems			
5	Sandhivata			
6	Obesity			
7	Disorders related to sleep			
8	Any other, please specify –			

9	Digestive disorders like constipation,frequent loose motions,pain in stomach.			

How often you consume curd?

1) Rarely
2) 1-2 times / month
3) 1-2 times / week
4) 2-3 times / week
5) More than 4 times / week

How you consume curd?

1) Curd with sugar
2) Curd with rice and salt
3) Curd with chapatti / paratha etc.
4) Curd as an ingredient of food item like rayata / koshimbir / gravy / biryani /lassi etc.
5) Only curd

Quantity of curd you consumed at a time –

1) Less than one table spoon (less than 20 grams)
2) 1 – 2 table spoon (20 – 50 grams)
3) 3 – 4 table spoon (50 – 60 grams)
4) 5 – 6 table spoon (60 – 100 grams)
5) 1 – 2 bowls (100 to 200 grams)

When you consume curd?

1) During breakfast
2) During lunch
3) During evening snacks
4) At any time
5) During dinner

4. Test reports

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1441 **Date of Issue : 06/10/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Plain Curd (2609171489)**
2 **Date of Sample Receipt : 26/09/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 27/09/2017 to 05/10/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Acidity as Lactic Acid	1.14	g/100 g	IS:1479 (Part-1 Sr.No-14)
2 * $	Lactic Acid Bacteria	<10	CFU/g	ISO 15214

CFU - Colony Forming Unit.

Note : For Lactic Acid Bacteria <10 can be considered as Absent.

Authorised By - Namrata Babar
Manager Q. A.

Authorised By-Vinay Oswal
Director

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1442 **Date of Issue : 06/10/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd with Honey (2609171490)**
2 **Date of Sample Receipt : 26/09/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 27/09/2017 to 05/10/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Acidity as Lactic Acid	0.56	g/100 g	IS:1479 (Part-1 Sr.No-14)
2 * $	Lactic Acid Bacteria	<10	CFU/g	ISO 15214

CFU - Colony Forming Unit.

Note : For Lactic Acid Bacteria <10 can be considered as Absent.

Authorised By - Namrata Babar
Manager Q. A.

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Director

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1443

Date of Issue : 06/10/2017

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd with Khadisakhar (2609171491)**
2 **Date of Sample Receipt : 26/09/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 27/09/2017 to 05/10/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Acidity as Lactic Acid	0.64	g/100 g	IS:1479 (Part-1 Sr.No-14)
2 - 5	Lactic Acid Bacteria	<10	CFU/g	ISO 15214

CFU - Colony Forming Unit.

Note : For Lactic Acid Bacteria <10 can be considered as Absent.

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(Internal Test Report)

Date	:	27/9/2017
Analyst	:	Kalyani
Date(s) of Analysis	:	27/9/2017
Department	:	Chemistry
Due date of Results	:	5/10/2017
Sample Name	:	Curd With Khadisakhar
Sample Code No	:	2609171491
Packing Material	:	Non Commercial plastic Bottle
Condition of Sample	:	Ok

Sr.	Parameters	Results	Units	Limits	Accreditation Status	Test Method
1	Acidity as Lactic Acid	0.64	g/100g	_	A	IS:1479 (part-1 Sr.No-14)

Remarks :Products- Milk And Dairy Products

Signature of Analyst : Kalyani

Verified by : B.D.Kulkarni

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1444

Date of Issue : 06/10/2017

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd with Cow Ghee (2609171492)**
2 **Date of Sample Receipt : 26/09/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 27/09/2017 to 05/10/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Acidity as Lactic Acid	0.83	g/100 g	IS:1479 (Part-1 Sr.No-14)
2 * $	Lactic Acid Bacteria	<10	CFU/g	ISO 15214

CFU - Colony Forming Unit.

Note : For Lactic Acid Bacteria <10 can be considered as Absent.

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1445

Date of Issue : 06/10/2017

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd with Green Gram Yusha (2609171493)**
2 **Date of Sample Receipt : 26/09/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 27/09/2017 to 05/10/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Acidity as Lactic Acid	0.96	g/100 g	IS:1479 (Part-1 Sr.No-14)
2 * $	Lactic Acid Bacteria	<10	CFU/g	ISO 15214

CFU - Colony Forming Unit.

Note : For Lactic Acid Bacteria <10 can be considered as Absent.

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1446

Date of Issue : 06/10/2017

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 Sample Name : Curd with Aamalaki Kadha (2609171494)
2 Date of Sample Receipt : 26/09/2017
3 Your Ref. : Test Request Form
4 Sample Pkg. : Non Commercial Plastic Bottle
5 Sample Collected By : Client
6 Date(s) of Testing : 27/09/2017 to 05/10/2017

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Acidity as Lactic Acid	1.24	g/100 g	IS:1479 (Part-1 Sr.No-14)
2 * $	Lactic Acid Bacteria	<10	CFU/g	ISO 15214

CFU - Colony Forming Unit.

Note : For Lactic Acid Bacteria <10 can be considered as Absent.

Authorised By - Namrata Babar
Manager Q. A.

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1606 **Date of Issue : 06/11/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd + Ghee (3010171706)**
2 **Date of Sample Receipt : 30/10/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 31/10/2017 to 03/11/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Protein	1.91	g/100 g	IS:1479 (P-II, Sr. No 7 & 8)
2	Carbohydrate	13.78	g/100 g	IS:1656 (Annex C)
3	Fat	18.1	g/100 g	IS:1224 (P-I,Sr. No 1)
4	Moisture	65.87	g/100 g	IS:12333
5	Ash	0.34	g/100 g	IS:1165

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1605 **Date of Issue : 06/11/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd + Mudgayusha (3010171705)**
2 **Date of Sample Receipt : 30/10/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 31/10/2017 to 03/11/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Protein	0.72	g/100 g	IS:1479 (P-II, Sr. No 7 & 8)
2	Carbohydrate	2.43	g/100 g	IS:1656 (Annex C)
3	Fat	6.33	g/100 g	IS:1224 (P-I,Sr. No 1)
4	Moisture	89.99	g/100 g	IS:12333
5	Ash	0.53	g/100 g	IS:1165

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1604 **Date of Issue : 06/11/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd + Aamalaki (3010171704)**
2 **Date of Sample Receipt : 30/10/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 31/10/2017 to 03/11/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Protein	1.86	g/100 g	IS:1479 (P-II, Sr. No 7 & 8)
2	Carbohydrate	32.16	g/100 g	IS:1656 (Annex C)
3	Fat	3.4	g/100 g	IS:1224 (P-I,Sr. No 1)
4	Moisture	61	g/100 g	IS:12333
5	Ash	1.58	g/100 g	IS:1165

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1603 **Date of Issue : 06/11/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd + Honey (3010171703)**
2 **Date of Sample Receipt : 30/10/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 31/10/2017 to 03/11/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Protein	1.36	g/100 g	IS:1479 (P-II, Sr. No 7 & 8)
2	Carbohydrate	36.11	g/100 g	IS:1656 (Annex C)
3	Fat	2.78	g/100 g	IS:1224 (P-I,Sr. No 1)
4	Moisture	59.56	g/100 g	IS:12333
5	Ash	0.19	g/100 g	IS:1165

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1602 **Date of Issue : 06/11/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Curd + Khadisakhar (3010171702)**
2 **Date of Sample Receipt : 30/10/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 31/10/2017 to 03/11/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Protein	0.69	g/100 g	IS:1479 (P-II, Sr. No 7 & 8)
2	Carbohydrate	44.63	g/100 g	IS:1656 (Annex C)
3	Fat	1.55	g/100 g	IS:1224 (P-I,Sr. No 1)
4	Moisture	52.75	g/100 g	IS:12333
5	Ash	0.38	g/100 g	IS:1165

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CIN No. U74220PN2002NPL017463

Report No : 17-18/1601 **Date of Issue : 06/11/2017**

Issued To : Dr. Manoja Joshi
Tilak Maharashtra Vidyapeeth
Pune

TEST REPORT

1 **Sample Name : Plain Curd (3010171701)**
2 **Date of Sample Receipt : 30/10/2017**
3 **Your Ref. : Test Request Form**
4 **Sample Pkg. : Non Commercial Plastic Bottle**
5 **Sample Collected By : Client**
6 **Date(s) of Testing : 31/10/2017 to 03/11/2017**

SR.NO.	PARAMETERS	RESULTS	UNITS	TEST METHODS
1	Protein	1.37	g/100 g	IS:1479 (P-II, Sr. No 7 & 8)
2	Carbohydrate	8.66	g/100 g	IS:1656 (Annex C)
3	Fat	2.89	g/100 g	IS:1224 (P-I,Sr. No 1)
4	Moisture	86.46	g/100 g	IS:12333
5	Ash	0.62	g/100 g	IS:1165

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Director

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End of Report

Sr. No.	Sample	% inhibition of alpha amylase
1	Dadhi	1.888%
2	Dadhi + Sharkara	2.262%
3	Dadhi + Yusha	2.234%
4	Dadhi + Madhu	2.328%
5	Dadhi + Amalaki	2.065%
6	Dadhi + Ghruta	0.87%

Formula:

(Ac+)-(Ac-)- [As-Ab]/ (Ac+)-(Ac-) x 100

Ac+ is absorbance of 100% enzyme activity (only solvent with enzyme)

Ac- is absorbance of 0% enzyme activity (only solvent without enzyme)

As is absorbance of test sample (with enzyme)

Ab is absorbance of blank (test sample without enzyme)

Readings:

Samples		Reading
Ac+		0.849
Ac-		0.054
Dadhi	**As**	0.409
	Ab	1.115
Dadhi + Sharkara	**As**	0.613
	Ab	1.616
Dadhi + Mudga Yusha	**As**	0.482
	Ab	1.463
Dadhi + Madhu	**As**	0.932
	Ab	1.988
Dadhi + Amalaki kwath	**As**	0.578
	Ab	1.425
Dadhi + Ghruta	**As**	0.25
	Ab	0.147

Results of Anti-oxidant activity by DPPH method:

Formula: A_0-A_s/A_0

Sr. No.	Sample	Absorbance (Triplicate)			Mean Absorbance	Anti-oxidant activity
1	Control (A_0)	0.733	0.701	0.817	0.75	-
2	Dadhi	1.047	0.872	0.931	0.95	-0.267
3	Dadi + Sharkara	0.398	0.658	0.644	0.567	0.244
4	Dadhi + Mudga Yusha	0.701	0.691	0.636	0.676	0.099
5	Dadhi + Madhu	0.702	0.624	0.556	0.627	0.164
6	Dadhi + Amalaki	0.384	0.331	0.381	0.365	0.513
7	Dadhi + Ghrut	1.254	1.194	1.292	1.247	-0.663

Results of cytotoxicity assay:

Formula: (A-B/C-B)x100

A- absorbance of sample

B- absorbance of negative control

C- absorbance of positive control

Sr. No.	Sample	Absorbance (Duplicate)		Mean Absorbance	Haemolysis (%)
1	Positive control	1.294			
2	Negative control	0.077			
3	Dadhi Normal	0.333	0.333	0.333	21.04
4	Dadhi at 60	0.329	0.345	0.334	21.12
5	Dadhi at 72	0.391	0.401	0.396	26.21

		Dadhi	Dadhi + Amalaki	Dadhi + Yusha (50% diluted)	Dadhi + Sharkara	Dadhi + Madhu	Dadhi + Ghruta
Without trypsin	Reading 1	2.539	0.736	2.457	0.679	1.842	2.243
	Reading 2	3.075	0.629	2.662	0.651	1.592	2.216
	Mean (A)	**2.807**	**0.6825**	**2.5595**	**0.665**	**1.717**	**2.2295**
With trypsin	Reading 1	2.976	0.711	3.003	1.035	1.862	1.879
	Reading 2	2.633	0.906	3.264	1.111	1.752	1.815
	Mean (B)	**2.8045**	**0.8085**	**3.1335**	**1.073**	**1.807**	**1.847**

Trypsin	Reading 1	0.046
	Reading 2	0.242
	Mean (C)	**0.144**

	Dadhi	Dadhi + Amalaki	Dadhi + Yusha (50% diluted)	Dadhi + Sharkara	Dadhi + Madhu	Dadhi + Ghruta
B-A	-0.0025	0.126	0.574	0.408	0.09	-0.3825
Y = (B-A)- C	-0.1465	-0.018	0.43	0.264	-0.054	-0.5265
D for 100% dilution			0.86			
Y=mx+c Y=0.056x + 0.010 X=y-0.010/0.056	**-2.79464**	**-0.5**	**15.17857**	**4.535714**	**-1.14286**	**-9.58036**