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### **Abstract**

The contemporary principles that influence the use of electrotherapy are very different from those that were offered historically, despite the fact that electrotherapy has a well-established function within the field of physiotherapy therapy. The claim is made that electrophysical modalities have a part in modern practice. A number of basic ideas are discussed along with more detailed details on two instances of modalities: ultrasound and interferential therapy. The use of electrophysical agents produces physiological consequences, and it is these modifications—rather than the modality itself—that yield the therapeutic benefit. Clinical decision processes that make use of the data that is currently available should make it possible to select the modality that is the best suitable for a certain patient or patient group. When electrotherapy is used without proper consideration, it is highly unlikely to produce significant benefits; but, when it is utilized at the appropriate moment, it has the potential to have beneficial effects. According to the available research, the patient management plan that incorporates manual therapy, exercise therapy, and electrotherapy should be able to provide the most effective management of a patient's dysfunction. The purpose of this study is to examine some of the most recent developments in electrotherapy and to establish connections between these developments and both general and specific therapies.

**Keywords:** *Physiotherapy, Electrotherapy, Practices, Uses.*

## **1. Introduction**

Electrotherapy is a fundamental aspect of physical therapy practice, even in the early phases of the profession, it was not frequently used. An attempt is made in this essay to establish a contextual framework for the practice of contemporary electrotherapy (Silva et al., 2020). The practice of electrotherapy is not considered to be the most important aspect of the care of musculoskeletal problems; rather, it is generally considered to be the most suitable use of electrotherapy as an adjuvant to other therapies. With the right application, it has the potential to be of significant benefit. If it is not used effectively, it may not have any effect at all, or even worse, it may have a negative impact on the state of health of the patients (Armstrong, 2016). In the field of electrotherapy, one of the most important abilities to possess is the ability to make decisions on which modality to employ and under what treatment settings. Despite the fact that this article will not seek to present a collection of recipes, it will make an effort to examine the fundamentals of contemporary electrotherapy and the ways in which it may be effective (Chipchase et al., 2008).

### **1.1 Current Electrotherapy Concepts**

In contemporary electrotherapy applications, it is common to apply treatment dosages that are lower than those used in the past (Zahid et al., 2022). However, the therapeutic effects that are said to be more significant are reportedly more significant. Numerous research trends have a big impact on electrotherapy treatments, even if they are largely outside the direct field of physiotherapy. The justification for this conceptual change is related to these research trends (El-Gendy et al., 2019).

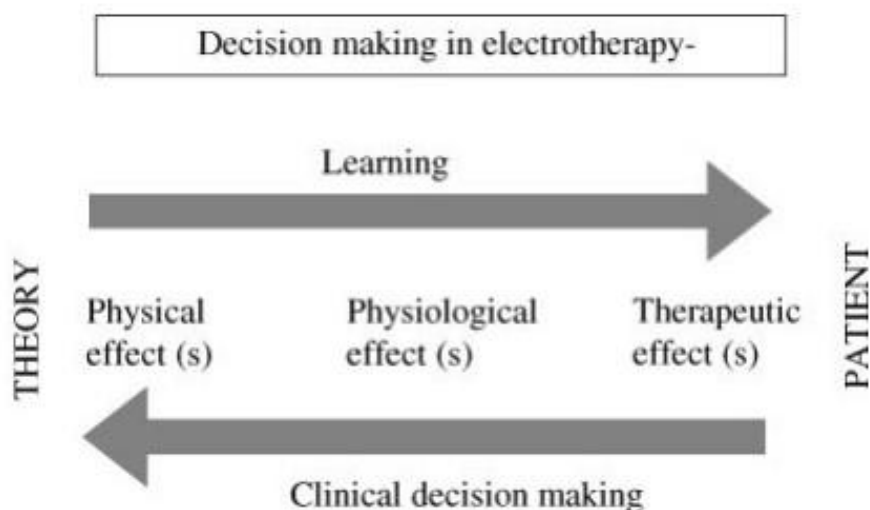
The concept of minimum involvement is one of the more ambiguous of these several approaches. There is a lack of certainty regarding the exact origin of this phenomenon; nonetheless, it is undeniable that the present therapy dosages with ultrasound, for instance, are far lower than the levels that were utilized few years ago. Therapists often use the lowest effective dose rather than a high dose since the latter may be too "strong" to elicit the desired response. By using a "low dose," which is enough to exceed the minimal effect threshold, it is hoped that the desired physiological changes can be initiated without causing any negative side effects (Fidvi and May 2010).

While the mechanisms underlying the generation of electrical energy may vary across tissues, certain fundamental principles remain consistent across all biological systems. Undoubtedly, this electrical activity is a fundamental element in the functioning of physiological systems. Scholars have demonstrated a substantial correlation between fluctuations in electrical activity and physiological occurrences (Singh, 2012).

## 1.2 Basic Model of Electrotherapy

It is via the study of physics that the majority of therapists acquire knowledge about the numerous electrotherapy modalities. Subsequently, they learn about the physical and physiological effects of these modalities, and finally, they are able to decide the therapeutic applications that may be utilised for the treatment of various conditions (Jagmohan, 2011).

An effective way to begin the process of decision making in a clinical setting is to have a conversation about the issues that the patient is experiencing. Once the therapeutic objectives and treatment priorities have been established, it becomes possible to identify the physiological processes that require activation or enhancement to achieve problem resolution. This is done in order to get the desired response (Turhan and Kocamaz 2021). It is possible to discover the modality that is most capable of achieving the physiological effects after the physiological effects have been identified. The ultimate choice of dose and treatment technique should be made. As a consequence, the therapeutic application that is ultimately implemented should be reasonable, rational, and backed by whatever evidence is available (Krawczyk et al., 2018).



**Fig. 1: Basic model of Electrotherapy**

*Source: (Liebert and Kiat 2021)*

The therapist runs the danger of implementing a therapy that is not totally suitable if they choose treatment modes and dosages only based on previous learning (Watson and Nussbaum 2020). This means that even if the patient may show signs of improvement, the therapist may not have attained the highest possible level of efficiency. The effort of staying current with the facts may be somewhat challenging, particularly when the subject matter is considered to be "peripheral" to the primary operation of the practitioner (Liebert and Kiat 2021). If there are already available treatments that appear to be helpful but for which there are no particular published articles, it is imperative that these treatments be discarded. Despite the fact that this should lead to increases in the quality of therapies, it is absolutely necessary that these treatments not be ignored. In the event that treatment methods are, in fact, viable, but they do not have controlled trials that are conducted with double blinding, there is a possibility that they will be rejected at some point. It is clear that there is inadequate evidence to either support or reject the use of physiotherapy treatments in every known instance when a comprehensive assessment is carried out on the whole range of physiotherapy treatments, which includes cold therapy, hydrotherapy, and numerous other therapies in between (Mangalvedhe and Raj 2019).

## 2. Literature Review

**Giura and Nagel (2010)** stated that it has been established that putting a stop to or reversing the electrical activity can result in a reduction or loss of the reaction that was expected. This growing consensus among the medical professionals that these internal electrical activities are substantial has had an influence on practice in a number of sectors, including orthopaedics, despite the fact that there is unavoidably some ambiguity among the scientific community as a whole. Orthopaedics is one of the fields that has been affected by this.

**McRobert et al. (2023)** research conducted on randomised controlled studies of physiotherapy for the purpose of reducing the squeal that is associated with facial nerve paresis. A comparison was made between the therapy and either another intervention or no intervention at all in these studies. Evaluation of the procedures that were carried out was carried out by two reviewers separately using the PEDro scale. Two randomised controlled trials that included physiotherapy were found to exist, according to the findings. Relaxation, biofeedback, and exercise therapy were the interventions that were utilised in the research that were included for the purpose of treating individuals who suffered from facial nerve paresis. There was no indication of a physiotherapeutic approach in either of the two randomised controlled experiments that were conducted in comparison to a control group. The advantages of the therapies were revealed in both of the trials.

**Mazur-Bialy et al. (2020)** examined that it is not always the case that the absence of evidence indicates that there is proof of absence (devoid of effect). In spite of the fact that this does not provide an explanation for the absence of published data concerning electrotherapy, it does highlight the fact that there are several therapies that are utilised that appear to have contextual validity.

**Nicholls (2023)** reported that thirty percent of the approximately forty million new cases of peripheral facial nerve paralysis that occur annually progress to facial nerve paresis with very mild to severe sequelae (including asymmetry of the face at rest and during movement, difficulties with speaking, eating, and drinking, and psychosocial issues). In 1996, an unpublished internal report detailing a selective survey of 400 Dutch physiotherapists was conducted. The survey revealed that 25% of the physiotherapists were engaged in the treatment of patients afflicted with facial nerve paresis, with a response rate of 76%.

**Pynt et al. (2009)** researched that eligible interventions included physiotherapy interventions that are commonly used in the treatment of musculoskeletal pain. These interventions included: exercise therapy, which includes specific types of exercises such as neuromuscular training, strength training, and endurance training; manual therapy, which includes massage, manipulations, and mobilizations; and electrotherapy, which includes TENS, low-level laser, and other surrogate terms. Due to the fact that acupuncture is not included in the field of physiotherapy in all nations, it was not regarded a practice that falls under the category of physiotherapy. In order to make a comparison between the therapy and alternative conservative active therapies, such as "care as usual" or sham therapy, or with no treatment at all the therapy required to be compared. Researchers anticipated that only a small number of the trials that were available utilised a placebo or sham control, therefore researchers made the decision to additionally include trials in which an active control was used as intervention.

**Rahmansyah and Anggiat (2022)** discussed that the patients experience when engaging in physical activities (1–5). A theoretical model of physiotherapy that described the ways in which degenerative alterations in the joints, muscles, tendons, and nerves might impede mobility. Restricted mobility can manifest itself in the form of a decreased range of motion and a diminished muscular strength. These limits, in turn, can have an impact on the ability to carry out activities of daily living and to operate socially. In the context of social functioning, the term "handicap" refers to dysfunctions that include the inability to complete tasks such as those of a parent and workplace employee.

**Rajfur et al. (2017)** conducted that the goal of therapy is to maximise function, this may indicate that the physiotherapist is working to improve a "healthy" function rather than lowering a dysfunction. When a patient develops stronger, it is possible that he is improving his functionality in day-to-day life. This is the theoretical explanation that may be used to support this. It is possible that such an improvement may lead to an increase in the sensation of coping and a reduction in the feeling of helplessness, which will in turn make it easier for another beneficial activity to occur. It is possible for

this to be followed by optimistic expectations of one's own capabilities, which might subsequently aid the body's natural healing processes.

**Robertson et al. (2006)** examined that the hypothalamus is responsible for integrating information from a variety of sources, including the somatic, endocrine, and autonomic systems, as well as the cognitive and emotional processes. In light of this evidence, it may be concluded that the hypothalamus plays a significant part in the process of integrating physiology and behaviour. During the process of coping, the endocrine system and the central nervous system work together in close conjunction with one another. The regulation of hormone secretion from the pituitary gland, which subsequently governs the secretion of hormones from endocrine glands including the adrenal glands and the thyroid gland, falls under the jurisdiction of the hypothalamus. Patients diagnosed with FM were first given an injection of corticotrophin-releasing hormone, and then they were presented with a state of insulin-induced hypoglycemia.

### **3. Objectives of the study**

- To evaluate the current practices in modern physiotherapy, with a specific focus on the utilization of electrotherapy techniques.
- To identify safe and effective electrotherapy best practices and recommendations in contemporary physiotherapy.
- To examine the current electrotherapy techniques employed in modern physiotherapy practice.

### **4. Research Methodology**

#### **4.1 Study design**

A questionnaire was utilised to conduct a cross-sectional study in the physiotherapy departments and clinics of NHS hospitals in the Punjab region. However, the authors visited each of the 46 departments in order to authenticate the information that was given, ensure the quality of the data, and analyse departmental practices that were related to the health and safety mandate of this research. Financial limitations imposed a restriction on the number of departments that could be chosen (Rueda et al., 2023).

#### **4.2 Registration of participants**

The data utilised in the compilation of a comprehensive list of 102 physiotherapy departments was supplied by the physiotherapy unit of the Department of Health and Social Care. From this list, a stratified random sample was selected which consisted of 57 departments from a variety of National Health Service institutions. Large departments located in major centres and smaller community clinics were among the departments that were chosen for this study.

Furthermore, a request was formulated to the physiotherapy manager or the superintendent physiotherapist to complete a consent form regarding their participation in the study, in addition to employing telephone and mail methods to contact departments. Although nine departments did not indicate any interest in participating, two departments responded that they had no intention of doing so. After obtaining consent from all forty-six departments, a questionnaire for a self-completion survey, accompanied by a covering letter and questionnaire completion instructions, were dispatched to each department. The letter specifically instructed the respondent to complete the questionnaire subsequent to consulting with department members who utilised the electrotherapy apparatus on a regular basis (Salian and Singh 2016).

#### **4.3 Survey instrument**

The number of devices that were available, how frequently they were used, and the number of devices that were available were all questions that were included in the survey questionnaire that was designed in-house. The questionnaire was predominantly comprised of closed-ended inquiries. The respondents were asked to rate the frequency of utilisation of different types of modalities on a nine-point Likert scale. Modalities with the highest frequency of use were denoted by a single point, while those with the lowest frequency were designated by points nine (Schabrun, 2010).

A preliminary investigation was undertaken involving personnel of the Department of Health Studies and Social Care with the purpose of validating the questionnaire prior to its distribution to the general

populace. Every single author has contributed the final iteration of the questionnaire to the public domain.

#### 4.4 Data compilation

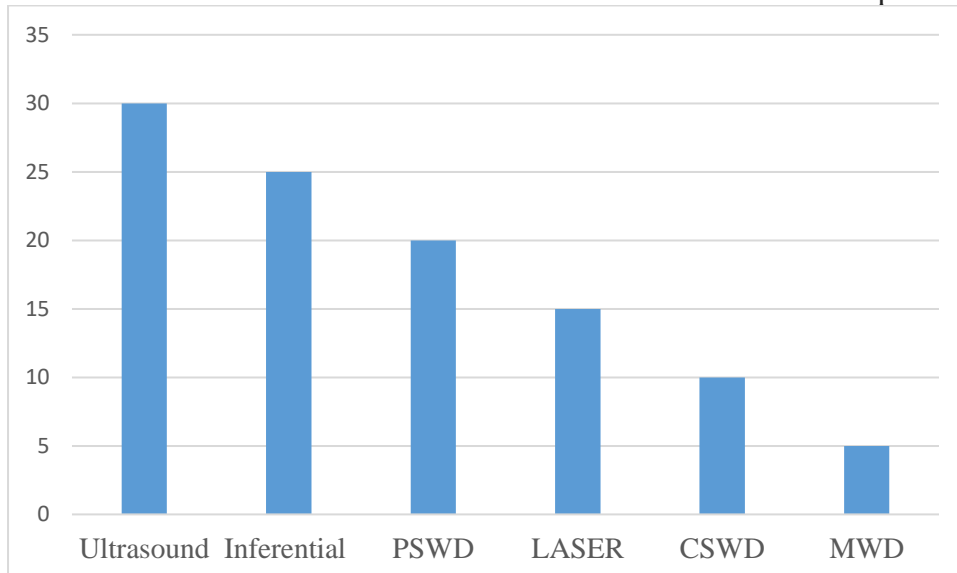
The results of the descriptive analysis were presented in the form of graphs and were compiled with the help of Microsoft Excel 2007.

### 5. Results

#### 5.1 Availability of electrotherapy devices

There is a variety of electrotherapy equipment accessible, and it is possible to obtain them. In the case of each specific form of electrotherapy modality, the availability of devices and the amount of devices that are available for use.

However, none of the departments had any MWD equipment available to them, despite the fact that all of the departments that answered ( $n = 46$ ) used ultrasound equipment. A comprehensive count of the many types of electrotherapy equipment that is available for use inside the department. Various transcutaneous electrical nerve stimulation (TENS) devices like, 30 devices for ultrasound, 20 devices for post-stroke wounds (PSWD), 25 devices for interferential, 10 devices for chronic pain, and 15 devices for laser were the maximum number of devices that each department was allowed to utilise.



**Fig. 2: Electrotherapy devices used in the department**

A small department is one that has ten or less full-time physiotherapists, while a big department is one that has more than ten full-time physiotherapists. The authors categorised hospitals into these two categories. Only the number of ultrasound devices was shown to have a significant and positive relationship ( $r = 0.374$ ,  $P = 0.05$ ) with the size of the department. Any other type of device was not found to have any relationship with the size of the department.

#### 5.2 Equipment use

The implementation of diverse electrotherapy modalities in departments that possessed the requisite apparatus that was readily available. Despite the fact that there was a wide variety of equipment available, different departments used it in different ways. Ultrasonography was the modality that was employed by the greatest number of departments ( $n = 37$ , 80.4%); conversely, CSWD was utilised by the smallest number of departments ( $n = 4$ , 8.7%). In spite of the availability of many modalities, the frequency of non-use of CSWD was greatest, followed by PSWD, and finally laser. Large departments were the only ones that utilised CSWD (Shah and Farrow 2012).

In spite of the fact that the equipment was readily available, it was not utilised in smaller departments. However, the percentage of departments that did not employ PSWD was higher in large departments. PSWD was utilised in both small and large departments.

Only in smaller departments was it discovered that lasers were not being used, despite their availability.

## 6. Conclusion

In spite of the fact that there is a substantial amount of study, it is not feasible to describe all of the effects that are caused by all of the different modalities. In certain circumstances, there are occasions where there is data from laboratory study that is legitimate, but it is not reflected in clinical application. On the other hand, there is a justification for the continuous use of a variety of modalities as a component of treatment. The correlation between energy expenditure, physiological response, and therapeutic advantage derived from the treatment is a critical factor to take into account. Contrary to what manipulation, massage, or exercise may imply, the modalities do not possess a miraculous quality. The external energy delivery system initiates one or more physiological responses; the therapeutic effects experienced by the body are a result of these physiological processes being stimulated. Consequently, in order to select the most appropriate modality, it is imperative to comprehend the relationship that exists between the physiological, energetic, and therapeutic aspects. In order to determine the most suitable modality, clinical decision making grounded in principles of physics, physiology, pathology, assessment, and patient care abilities prevails over the need to memories a succession of recipes. To obtain the greatest possible benefit from the intervention, it is critical that further investigation be conducted in this field.

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