

Adverse effects of electrothermal phototherapy in clinics in the city of Cascavel – PR

Efeitos adversos da eletrotermofototerapia em clínicas da cidade de Cascavel – PR

Los efectos adversos del electrotermofototerapia en clínicas de la ciudad de Cascavel – PR

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ABSTRACT | This study aimed to identify the main adverse effects observed by physical therapists using electrothermal phototherapy devices in clinics in the city of Cascavel, Paraná. The sample comprised 35 clinics, of which 25 were submitted to data collection after sorting. Data were collected through questionnaires in the form of semi-structured interview. In these questionnaires, the responsible for providing the electrothermal phototherapy service were asked about the occurrence of adverse effects experienced during labor activities at the clinic. Transcutaneous electrical nerve stimulation (TENS) showed problems in 64% of cases, being 36% due to skin irritations and 28% due to pain. The shortwave apparatus showed adverse effects in 60% of cases, of which 40% consisted of complaints of pain and 20% caused minor burns. Regarding therapeutic ultrasound, adverse effects were reported in 52% of cases, of which 32% were episodes of pain and 20% of nausea. The low-power laser therapy showed adverse effect on 36% of cases, with reports of increased local sensitivity. Finally, the medium frequency devices had adverse effect in only 20% of cases, being complaints of nausea. The amount of such effects found was important, but their gravity did not cause major concern.

Keywords | Electric Stimulation; Diathermy; Ultrasonic Therapy; Low-Level Light Therapy; Physical Therapy Modalities.

RESUMO | Esta pesquisa teve como objetivo identificar os principais efeitos adversos observados por fisioterapeutas

com o uso de aparelhos de eletrotermofototerapia em clínicas da cidade de Cascavel, Paraná. A amostra contou com 35 clínicas e destas, 25 foram alvo de coleta após triagem, cujos dados foram obtidos por questionários em forma de entrevista semiestruturada. Nestes se questionava aos responsáveis pelo serviço de eletrotermofototerapia sobre a ocorrência de efeitos adversos experienciados durante atividades laborais na clínica. Observou-se que a Neuroestimulação Elétrica Transcutânea (TENS) apresentou problemas em 64% dos casos, com 36% devido a irritações cutâneas e 28% a O aparelho de ondas curtas apresentou efeitos adversos em 60%, em que 40% foram queixas de dor e 20% causaram queimaduras leves. Já acerca do ultrassom terapêutico foram relatados efeitos adversos em 52%, sendo 32% de quadros de dor e 20% de casos com náuseas. A laserterapia de baixa potência demonstrou efeito adverso em 36%, com relatos de aumento da sensibilidade local. Por fim, os aparelhos de média frequência apresentaram efeitos adversos em apenas 20% dos casos, de queixas de náuseas. A quantidade de tais efeitos encontrados foi importante, porém sua gravidade não causou grande preocupação.

Descritores | Estimulação Elétrica; Diatermia; Terapia por Ultrassom; Terapia com Luz de Baixa Intensidade; Modalidades de Fisioterapia.

RESUMEN | Este estudio propone identificar los principales efectos adversos observados por fisioterapeutas con el uso

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de aparatos de electrotermofototerapia en clínicas de la ciudad de Cascavel, Paraná (Brasil). De la muestra han participado 35 clínicas, de las cuales restaron 25 después del triaje, cuyos datos fueron obtenidos por cuestionarios en forma de entrevista semiestructurada. Estos contenían preguntas al responsable del servicio de electrotermofototerapia sobre la ocurrencia de los efectos adversos ocurridos durante el trabajo en la clínica. Se observó que el Electroestimulación Transcutánea (TENS, en inglés) presentó problemas en un 64 % de los casos, con un 36 % debido a irritaciones de la piel y un 28 % al dolor. En el aparato de ondas cortas se verificó efectos adversos en un 60 %, de las cuales un 40 % fueron de quejas de dolor y un 20 %

de quemaduras leves. Sobre el ultrasonido terapéutico, se han divulgado los efectos adversos en un 52 %, de los cuales un 32 % fueron síntomas de dolor y un 20 % casos con náuseas. La terapia con láser de baja intensidad resultó en efectos adversos en el 36 %, con informes de aumento de la sensibilidad local. Por último, los dispositivos de frecuencia media revelaron efectos adversos en sólo el 20 % de los casos de las quejas de náuseas. La cantidad de estos efectos encontrados es importante, pero su gravedad no demostró gran preocupación.

Palabras clave | Estimulación Eléctrica; Diatermia; Terapia de Ultrasonido; Terapia por Luz de Baja Intensidad; Modalidades de Fisioterapia.

INTRODUCTION

The electrothermal phototherapy has several modalities, such as Transcutaneous Electrical Nerve Stimulation (TENS), interferential current, radiofrequency diathermy, ultrasound, low-power laser, surface electromyography, among others. It has various usages, aimed at: reducing pain and muscle spasms; recovering neuromuscular activity, with prevention and delay of disuse atrophy; gaining joint mobility; repairing tissues, including in skin lesions; increasing local blood flow; reducing acute and chronic edema; preventing postoperative thrombosis, among others¹. However, there are controversies regarding the results²⁻⁴.

Regardless of the form of stimulation used, the energy delivered needs to be absorbed by the tissue to produce effect¹. Low-frequency polarized currents show activity according to their poles, producing anode and cathode currents⁵. For depolarized currents, both of low and medium frequencies, the objective is to depolarize nerve fibers, aimed at producing mechanisms to control pain and muscle contraction⁶⁻¹⁰.

For the low-power laser, after absorption, the production of adenosine triphosphate (ATP) increases¹¹, proinflammatory mediators are reduced¹², and tissue repair accelerates¹³, in addition to analgesic effects¹⁴. The therapeutic ultrasound can produce both thermal and nonthermal effects, reducing pain and increasing metabolism, including of the inflammatory process, due to the effects of acoustic microcurrent and stable cavitation¹⁵⁻¹⁷. Regarding the radio frequency diathermy, both with the use of shortwaves and microwaves, the objective is to produce heat aimed at therapeutic effects

such as increase in tissue extensibility^{18,19} and changes in the inflammatory process and in the pain²⁰⁻²².

The literature presents cases in which these resources are contraindicated, including because their deleterious effect is not proved, but the information on their adverse effects are still scarce. Thus, this study aimed to identify the unwanted consequences of the electrothermal phototherapy reported by physical therapists from the city of Cascavel, PR, Brazil.

METHODOLOGY

This is a cross-sectional quali-quantitative study, based on questionnaire answers. The data were collected through visits to physical therapy clinics previously scheduled via e-mail, by attaching a copy of the questionnaire so that the therapist could know what it was about, and confirmed by phone call after the acceptance by the clinic.

The target population of the study were the responsible for electrothermal phototherapy sectors at 35 physical therapy clinics, and the criteria for inclusion were the use of electrotherapy equipment as a resource to treat patients, and signature of the free informed consent form, with preapproval by the Ethics Committee of the Universidade Estadual do Oeste do Paraná (Unioeste), under No. 1.741.859. The data collected include information such as: therapist's period of experience with the use of the electrothermal phototherapy; average of patients cared for; the most used apparatus; main adverse effects; duration and intensity of these effects.

The results were presented in the form of simple descriptive statistics based on percentages. The frequencies of

the effects according to the type of equipment were compared using the chi-squared test for k proportions, followed by the Marascuilo test²⁸. The significance level set was 5%.

RESULTS

Among 35 clinics initially listed, 3 were closed and 7 did not use electrophysical equipment, for being manual or alternative therapy clinics. Therefore, 25 clinics participated in the study, of which the physical therapists responsible for the electrothermal phototherapy sector were asked to answer the questionnaire, thus totaling 25 professionals.

The average of experience in the use of electrothermal therapeutic resources was 16 years, and 48% (n=12) had between 2 and 10 years, 36% (n=9) between 10 and 20 years and 16% (n=4) over 20 years, without exceeding the maximum time of 30 years of experience.

The respondents declared they had never witnessed cases of serious damage caused by the use of electrothermal phototherapy, and the few cases reported relate to incidents such as discomforts when exposed to currents with motor contraction potential, skin irritations or first-degree burns,

due to denial of patients regarding the temperature control and electrodes at the end of shelf life.

The main adverse effect reported was pain or discomfort, with 48% of the reports (n=12), followed by dizziness and nausea, with 28% (n=7), and irritation or minor burns (24%, n=6). Regarding the effects triggered by each apparatus, since more than one type of equipment per respondent were accepted, the sum of the percentages can be higher than 100%.

Based on the answers by the professionals and analyzing the equipment separately, a significant statistical difference in the distribution of frequencies was observed ($\chi^2=13.38$; $p=0.010$). The TENS device showed adverse effect in 64% of cases, of which 36% were cases of skin irritations and 28% were cases of pain. The shortwave apparatus showed adverse effects in 60% of cases, of which 40% consisted of complaints of pain and 20% cases of minor burns. In relation to therapeutic ultrasound, adverse effects were reported in 52% of cases, of which 32% were episodes of pain and 20% of nausea. The low-power laser therapy demonstrated adverse effect in 36% of cases, and all of them were reports of increased sensitivity in the organ affected. Finally, the medium frequency devices had adverse effect in only 20% of cases, being only complaints of nausea (Figure 1).

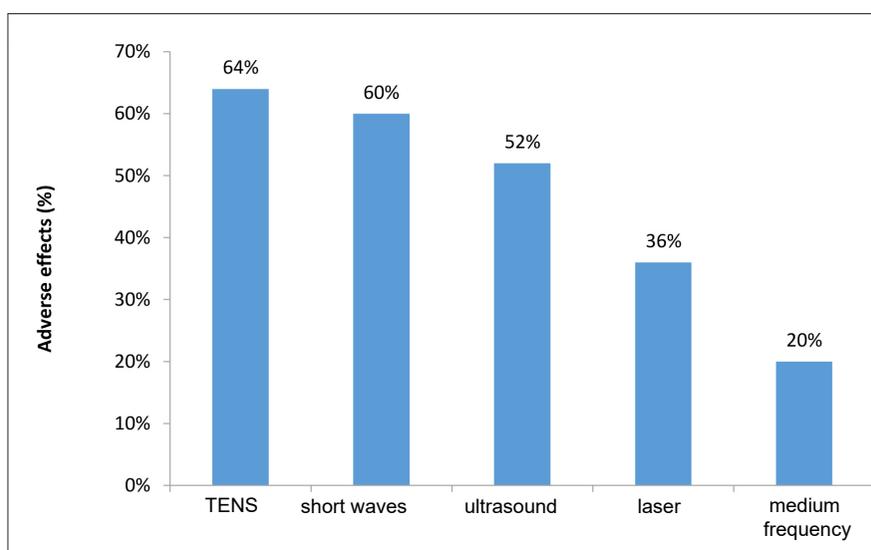


Figure 1. Graphic representation of the percentage distribution of the equipment with greater frequency of side effects reported.

DISCUSSION

Electrothermal and phototherapeutic resources are widely used in clinical practice and are effective in treating a variety of problems, such as orthopedic, rheumatologic

and neurological conditions, and during different phases of the disease (acute, subacute and chronic states)^{11,13,29}. However, one should bear in mind that the duration, association or type of application may vary, depending on the parameters used³⁰.

An important remark is that confirming the information collected in this study is impossible, since they are based on reports of the therapists interviewed, not on facts presented by the authors, but we believe in the professionals' honesty, considering their responsibility. Partridge and Kitchen³¹ suggest, even with informal evidence, the use of electrophysical agents may cause adverse effects, most of them being mild. Such effects can be explained by three hypotheses: imbalance of equipment, which may result in the release of excessive doses and cause harmful effects; inexperience of the therapist, in which unfamiliar professionals can opt for using parameters not specified in clinical practice, and the individual response of the patient.

In this study, most of therapists had technical knowledge, long experience and few cases of adverse reactions during treatment, even though many of them have already witnessed at least one episode of adverse effects. The most frequent answer of the participants concerned the patients' noncooperation in the feedback, making difficult to provide an adequate care. Thus, the sociocultural level of the different populations should be considered (the aforementioned study was carried out in the United Kingdom³¹), as well as the differences regarding the care while calibrating the equipment, which is not respected in Brazil due to several factors, ranging from ignorance about the need for this procedure to the high maintenance costs and low earnings while providing physical therapeutic services³²⁻³⁵. This is a serious problem in equipment such as ultrasound, from ineffectiveness to overdoses³⁴, which can be seen as an adverse reaction, but it is a dose problem caused by inadequate preventive maintenance.

The results of this study corroborate the literature, in which the adverse effects observed were classified as mild. The most reported effect was pain or discomfort, which can be explained by the unpleasant feeling caused mainly by the choice of the electrostimulation and its intensity, as well as the patient's physiological state³¹.

The second most reported effect concerns the dizziness and nausea, however the mechanisms causing such symptoms are not fully elucidated. This effect was the most reported for medium frequency currents. However, this equipment showed less effects compared with other devices, contrary to the study by Partridge and Kitchen³¹, who observed lower rates in the use of interferential current.

For low-power laser, the data collected draw the attention by the significant occurrence of cases of

increased sensitivity, since it is considered a low-risk treatment, except for eye burn. Although the treatment using laser is not thermal, the increased local metabolism can be responsible for sensitive change, mainly due to the lack of dose parameters³⁶.

No adverse effects were reported for the use of polarized currents, probably because this resource is not widely used, for it requires that the operator have certain knowledge and the risks of burns are higher⁵. The TENS device showed the largest number of adverse effects, which also may be caused by problems in its maintenance, once they are depolarized currents, with limitations that prevent high intensity release – that is, technical problems in equipment may have interfered with the results. Despite this report, therapists informally commented that the shortwave apparatus poses a greater risk of side effects, suggesting a greater care in its use induces fewer reports. Also, important signs that the side effects occur due to heat exist, and it obviously is not dangerous only for the patient, but also for the physical therapist who operates the radiofrequency equipment³⁷.

Although the electrothermal phototherapy is a practice used in physical therapy, further studies to indicate risks to patients are still required, making this treatment increasingly safe.

CONCLUSION

Observing that most of physical therapists working with electrothermal phototherapy have noticed adverse effects of the use of the equipment was possible, but the severity of such effects does not cause great concern. However, preventive measures must be taken to ensure the safety of patients and therapists, considering the maintenance characteristics of the equipment and the singularities of the patients.

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