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ORIGINAL ARTICLE

HIGH FREQUENCY GENERATOR IN THE TREATMENT OF INJURY BY PRESSURE IN ELDERLY

GERADOR DE ALTA FREQUÊNCIA NO TRATAMENTO DE LESÃO POR PRESSÃO EM IDOSOS GENERADOR DE ALTA FRECUENCIA EN EL TRATAMIENTO DE LESIÓN POR PRESIÓN EN ACIANOS

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ABSTRACT

Objective: to investigate the effects on the treatment of Pressure Injury (PI) on the size and time of healing, using the high frequency generator (HF), in elderly patients suffering from neurological diseases. **Method:** a descriptive, exploratory, non-pharmacological intervention type study, conducted with three users, in a Physical Rehabilitation Unit, with PIs in stage II and III, submitted to treatment with a HF generator twice a week. Healing was assessed at the beginning of the study, after the eighth and the sixteenth sessions. **Results:** the three participants were elderly, sedentary and hypertensive. Two suffered stroke and one, spindle trauma. In patients with stroke, complete healing of the PIs occurred and in the other, a reduction of the PI area of 64.5%. **Conclusion:** the use of the portable HF generator was effective in the treatment of PIs in the elderly participants of this study. **Descriptors:** Pressure Ulcer; Physical Therapy Specialty; Nursing Care; Nursing Assessment; Nursing.

RESUMO

Objetivo: investigar os efeitos no tratamento de Lesões Por Pressão (LPP) sobre o tamanho e tempo de cicatrização, com a utilização do gerador de alta frequência (AF), em idosos acometidos por doenças neurológicas. **Método:** estudo descritivo, exploratório, do tipo pesquisa de intervenção não farmacológica, realizado com três usuários, em uma Unidade de Reabilitação Física, com LPPs em estágio II e III, submetidos a tratamento com gerador de AF, duas vezes por semana. A cicatrização foi avaliada no início do estudo, após a oitava e a décima sexta sessões. **Resultados:** os três participantes eram idosos, sedentários e hipertensos. Dois sofreram Acidente Vascular Encefálico (AVE) e um, traumatismo raquimedular. Nos com AVE, ocorreu cicatrização completa das LPPs e no outro, redução da área da LPP de 64,5%. **Conclusão:** o uso do gerador portátil de AF foi efetivo no tratamento de LPPs nos idosos participantes desta pesquisa. **Descritores:** Úlcera por Pressão; Fisioterapia; Cuidados de Enfermagem; Avaliação em Enfermagem; Enfermagem.

RESUMEN

Objetivo: investigar los efectos en el tratamiento de Lesiones Por Presión (LPP) sobre el tamaño y tiempo de cicatrización, con la utilización del generador de alta frecuencia (AF), en ancianos acometidos por enfermedades neurológicas. **Método:** estudio descriptivo, exploratorio, del tipo investigación de intervención no farmacológica, realizado con tres usuarios, en una Unidad de Rehabilitación Física, con LPPs en etapa II y III, sometidos a tratamiento con generador de AF, dos veces por semana. La cicatrización fue evaluada al inicio del estudio, después de la octava y la decimosexta sesión. **Resultados:** los tres participantes eran ancianos, sedentarios y hipertensos. Dos sufrieron Accidente Vascular Encefálico (AVE) y un, traumatismo raquimedular. Con el AVE ocurrió la cicatrización completa de las LPPs y en el otro, reducción del área de la LPP del 64,5%. **Conclusión:** el uso del generador portátil de AF fue efectivo en el tratamiento de LPPs en los ancianos participantes de esta investigación. **Descriptor:** Úlcera por Presión; Fisioterapia; Atención de Enfermería; Evaluación en Enfermería; Enfermería.

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INTRODUCTION

Pressure Injury (PI) is a localized damage to the underlying skin and / or soft tissues, usually over a prominent bone. It may present as whole skin or as an open ulcer. Injury occurs as a result of intense and / or prolonged pressure in combination with shear.¹ As skin becomes more fragile with the aging process, nutritional deficiencies, immobility, and chronic diseases increase vulnerability to PIs in the elderly. In fact, a Brazilian study with 51,414 hospitalized individuals revealed that the elderly (≥ 65 years) had a ten-fold greater risk of developing PIs than subjects (aged <65 years).³ In another study, about 18% of the institutionalized elderly developed PIs and one of the main risk factors was the presence of stroke (60%).⁴ Thus, elderly individuals with locomotion restriction due to neurological diseases, may present a higher risk of developing PIs, which require effective interventions for short-term healing, with a view to preventing infections combined with the cost of prolonged treatment.

It is appropriate to point out that immobility, sensory or cognitive impairment, reduction of tissue perfusion, impaired nutritional level, friction, moisture and age-related changes are factors that contribute to the development of PIs.⁵

Studies indicate that electrical stimulation can accelerate healing, promote the migration of epithelial cells, macrophages and neutrophils into the wound. In addition, electrical stimulation alters the DNA and results in increased production of collagen by fibroblastosis and, thus, potentiates healing.⁶ In fact, experimental studies with rats have shown that electrical stimulation improves wound healing by stimulating growth factors in dermis and in the epidermis.⁷

A study in humans indicated that electrical stimulation may be an effective intervention in the treatment of PIs in various pathological conditions. A meta-analysis has shown that electrical stimulation reduced the area of the lesion by 24% in individuals with spinal cord injury. In diabetics, electrical stimulation, applied for 12 weeks, led to complete healing of the lesions compared to the control treatment.⁸ In addition, electrical stimulation was highly effective in reducing the severity of venous ulcers and in tripling the number of healed lesions.⁹ Thus Such as electrical stimulation, ozone therapy has been indicated in the treatment of PIs. Non-invasive oxygen-ozone application in diabetic foot injury promoted wound healing through potentiation of vascular endothelial growth factors,

transforming growth factor B, and platelet-derived growth factor in the early stages of treatment.¹⁰

OBJECTIVE

- To investigate the effects in the treatment of PIs on the size and time of healing, with the use of the HF generator, in the elderly affected by neurological diseases.

METHOD

A descriptive, exploratory, non-pharmacological intervention research study, conducted at a Physical Rehabilitation Unit in Ijuí, Northwest of Rio Grande do Sul, Brazil. The Physical Rehabilitation Unit / UNIR, results from a partnership between Regional University of the Northwest of the State of Rio Grande do Sul / UNIJUÍ, and Municipal Health Secretariat of Ijuí, since July 2011, and its users' demand comes from the municipalities of comprehensiveness of the 17th and 9th Regional Health Coordination.

Three elderly participants, of both sexes, with clinical diagnosis of PI, sedentary and in clinical treatment, were intentionally chosen. The dressings were performed with general measures of hygiene of the lesion with physiological saline and occlusion with gauze. The degree of injury was defined by one of the nurse researchers, with respect for the classification adopted and recommended by the National Pressure Ulcer Advisory Panel (NPUAP).¹¹ The application of electrical stimulation through the HF generator, was performed by the team physiotherapist.

The included inclusion criteria were: users who had stage II or III PIs, attended at UNIR and who agreed to sign the Free and Informed Consent Term (FICT). The exclusion criteria were: users with cardiac pacemakers and with inflammatory and / or infectious processes in PIs.

Regarding the risks related to the study, the users were advised that they could present discomfort at the site of application of the HF and that if tingling and / or pruritus occurred the application of the HF would be interrupted, followed by cleaning the lesion with physiological solution and referral to dressing With the nurse.

The data collection instruments used were: evaluation form with sociodemographic and clinical data, comorbidities, PI formation time and data regarding the evaluation and classification of the lesions according to the prevention and treatment guidelines of NPUAP and HF. The photographic record was made with a 16 megapixel camera and the images

captured at a distance of seven centimeters from the PI.

The evaluation of the PIs was performed based on the aspects of the wounds, the characteristics and degree of classification of them, according to the NPUAP, which comprises three dimensions: tissue type, amount of exudate and area of the lesion. Sequentially, the investigator performed the perimetry of the PIs area, using a ruler, sterile field, capturing the images of the same, and later performed the treatment with HF. This was done twice a week, during the months of August and September of 2014, perfect a total of 16 applications. Users were assigned letters of the alphabet to remain anonymous.

In the A and B users, 16 HF applications lasting 15 minutes each were performed and in the C user 13 in 15 minute applications for the occurrence of PI healing. The user's PI photos were obtained before the beginning of the use of the HF, after the 8th session, and in the users A and B after the 16th application. It should be noted that in user C, because the PI had healed in the 13th HF application, image capture was performed at that moment.

The portable HF generator used was the brand Plus®, ToneDerm, which operates with AC alternating current, between 100 thousand and 200 thousand Hz and an intensity of 100mA. The technique of throwing sparks with 100% intensity, electrocauterizer, around

the perimeter of the PI, away from the one centimeter tissue, was used to promote sparks and to avoid contact with PI and electrode contamination.

It should be noted that all materials that came into contact with the users' PIs were cleaned with water and enzymatic detergent or disinfected with 70% alcohol or Peracetic Acid solution or sterilized by steam autoclaving.

The study covered all the ethical aspects of a research with people, as recommended in Resolution of the National Health Council (CNS) nº. 466/2012. The research project was submitted to the Ethics Committee of UNIJUÍ and approved under the Consubstantiated Opinion (nº 787.068 / 2014/02). The users were clarified about the purpose of the research and signed the TCLE, in two ways, one in the power of the researcher and the other with each participating user.

RESULTS

Table 1 shows the identification and sociodemographic data of the three users who participated in the study.

Table 1. Characterization of the users searched. Ijuí (RS), Brazil, 2014.

Variables	Users		
	A	B	C
Age (years)	61	85	86
Sex	Male	Male	Female
Origin	Ijuí	Ijuí	Fortaleza dos Valos
Marital status	Married	Widower	Married
Num. Children	4	3	5
Education	Incom.Bas.Ed	Incom.Bas.Ed	Incom.Bas.Ed
Profession	Retired	Retired	Retired
Sedentary	Yes	Yes	Yes

It can be seen, from Table 1, that one of the elderly is female and resides in another municipality. It is also noted that, all have children, attended school until incomplete elementary school, are retired and sedentary.

Table 2, shows the diagnoses of the users surveyed plus the time of the PIs and the diameters of the PIs before and after the use of the HF device.

Table 2. Clinical data and evolution of the users participating in the research. Ijuí (RS), Brazil, 2014.

Variables	Users		
	A	B	C
Medical diagnostic	VBA	ST	VBA
HAS	Yes	Yes	Yes
DM	No	No	Yes
UP Time (months)	4	48	3
Polypharmacy	Yes	Yes	Yes
Diameter in cm²	7	11.25	2.64
Diameter after cm²	0	4	0

VBA: Vascular Brain Accident, ST: Spinal Trauma, HAS: Hypertension Arterial Systemic, DM: Diabetes Mellitus.

Still, in relation to the data contained in table 2, it can be seen that the three participants in the study were hypertensive; two of them suffered stroke; one, MDR and, of these, patient C presented DM.

User A developed PI for four months, B for 48 months and C, for three months. Everyone claimed to use various medications on a daily basis. In order to favor the reader's visualization, regarding the results obtained, we chose to present the PI images of the

research participants registered by the researcher.

The PIs of the three users were located in different body areas. User A presented PI grade II in the trochanteric region, with partial loss of skin continuity (epidermis and dermis). At the initial evaluation, the wound had an extension of 7.0cm². After 16 applications, it was reduced to 0.0cm², that is, 100% reduction of PI, as shown in figure 1.



Figure 1. Pressure injury of user A.

User B presented PI grade III in the ischiatic region and partial healing of the PI occurred after the intervention. In the initial

evaluation, an area of 11.25cm² was recorded and, after 16 sessions 4.0cm², equivalent to a reduction of 64.5%, as shown in figure 2.



Figure 2. Pressure injury of user B.

User C had a diagnosis of DM and presented PI grade II in the sacral region. In the initial evaluation, the extension of the area was 2.64 cm² and, after the 13 session the 100% reduction of the PI extension occurred, which

led to the dispensation of the continuity of the application of the HF. However, the user was followed up by the researcher until the end of the research, as shown in figure 3.



Figure 3. Pressure injury of user C

It was observed that there was a significant reduction of the diameter of the PI of the B user. In the others, the total healing of the PIs occurred.

DISCUSSION

Pis are correlated to the level of consciousness and neurological competence. Several clinical conditions alter the capacity related to the mobility of the user, among

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them, the stroke and the spinal cord injury, conditions present in the users participating in the research.¹¹⁻¹²

The fact that one of the users surveyed is diabetic is in agreement with a study in which the use of ozone therapy, in the treatment of diabetic foot wounds, obtained excellent results.¹³ Another study emphasizes the importance of the use of HF in skin conditions, for accelerate the healing process of cutaneous wounds.¹⁴ In the diabetic person, there is a scarring of the wounds due to dysfunction of the blood perfusion and consequent deficit of O² and nutrients to the cells.¹⁵ This affirmation of the authors is in agreement with the results obtained, that is, the user C obtained excellent healing, which reaffirms the efficacy of PI treatment with the use of HF even in diabetic patients.

As evidenced, the healing of PIs contributes to the maintenance of functional capacity, as well as to healthy conditioning in all aspects. Often, diagnoses of stroke, HAS and DM can affect perceptual ability, blood circulation, oxygenation and mobility. Thus, they may increase the potential to develop complications due to the high time spent in bed by the elderly.⁴

The user with TRM, a wheelchair user, was pre-disposed to the formation of PIs because they remained for prolonged periods sitting on the trochanteric regions and ischial tuberosities, which causes tissue compression in these regions.¹⁶ In this context, user B received orientations from the researchers of the need for change of decubitus, in order to relieve pressure and thus optimize tissue circulation and nutrition. Failure to adopt this care may have been one of the factors that led to the non-complete healing of PI at the end of the intervention.

Thus, a study carried out, with the objective of identifying factors associated with the occurrence of spinal cord injury and LPG in patients of a public hospital in Maceió found, when analyzing 232 records, the prevalence of PI during hospitalization of 65.1%, and that factors (OR = 12.81, CI (95%) = 2.56 - 64.19, p = 0.002) and time of hospitalization longer than ten days (OR = 5.09; 95% CI: 1.21 to 21.34, p = 0.026).¹⁷ This research, carried out in Maceió, is in line with this research by the PI of patient B to begin its development in the hospital environment.

The study used high voltage electrostimulation in chronic cutaneous lesions in six patients and obtained PI reduction after ten sessions, with complete healing after 21 sessions. Another study reports the possibilities of indicating the use

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of ozone as a therapy, with good indications for the treatment of some clinical situations.¹⁸ The author highlights the following advantages: strong antimicrobial action, simple application, systemic or local, low cost and no effect adverse reactions, or contraindications.

In an experimental study with rats, the action of the GaAlInP laser and the HF generator in the treatment of cutaneous wounds was analyzed, with the objective of evaluating the associated action of both resources, as well as the individual action of each one. The two treatment techniques provided improvements, compared to the control group, however, the association of the two was the one that presented the best result.¹⁴

It is important to highlight a research that evaluated the effectiveness of HF waves in the treatment of onychomycosis and dermatophytosis caused by fungi that affect the dermis, nail and hairs. The study observed three cases during twelve months, in which the technique of ozone therapy was applied weekly on the nail plate. After treatment, nail enhancement and inhibition of fungal growth in culture were observed, although the mycological analysis remained positive.¹⁹

CONCLUSION

The use of the AF was effective based on the results obtained, that is, two users, had complete healing of the PIs and the third, partially. It is important to emphasize the importance of the joint work of the nurse and the physiotherapist in order to qualify the assistance to the user, both in terms of promotion, prevention and treatment of PI. In this sense, the dialogue and interlocution between the areas of knowledge are important for such actions to become a practice in the different care services, both in the hospital and in the Basic Network of Health Care.

In summary, that the results are so that the teams can reflect, discuss and enable promotional, preventive and treatment actions, as well as to instigate more research with a greater number of users in order to make inferences, through comparative studies and Including different methodological approaches.

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