MUSIC THERAPY ON PAIN LEVEL, BLOOD PRESSURE AND HEART RATE IN CHRONIC WOUNDS

MUSICOTERAPIA EN EL NIVEL DE DOLOR, LA PRESIÓN ARTERIAL Y LA FRECUENCIA CARDÍACA EN HERIDAS CRÓNICAS

MUSICOTERAPIA SOBRE O NÍVEL DE DOR, PRESSÃO ARTERIAL E FREQUÊNCIA CARDÍACA EM FERIDAS CRÔNICAS

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ABSTRACT

Objective: to investigate the level of pain, blood pressure and heart rate before and after music therapy. **Methods**: Quantitative and quasi-experimental research, carried out in a basic health unit. It had an intentional sample with N=10. Data collection, carried out in three moments, was used as instruments the Visual Analogue Scale of Pain and a form to collect the variables: blood pressure, heart beats per minute, age, type of wound and sex. The collected data were tabulated in Microsoft Excel for Windows 2016 and statistical analysis was performed in SPSS 20.0. **Results**: There was an equal distribution of sex, predominance of diabetic ulcers (80%) and age between 40-59 years (50%). There was no statistically significant difference in pain levels. Blood pressure showed significant changes with music therapy sessions. Conclusion: The musical intervention demonstrated the potential to reduce blood pressure in patients with chronic wounds at the time of dressing.
Keywords: Music Therapy; Wounds and injuries; Ache; Ulcer.

RESUMEN

Objetivo: investigar el nivel de dolor, presión arterial y frecuencia cardíaca antes y después de la musicoterapia. **Métodos**: Investigación cuantitativa y cuasi-experimental, realizada en una unidad básica de salud. Se tuvo una muestra intencional con N=10. La recolección de datos, realizada en tres momentos, se utilizó como instrumentos la Escala Visual Analógica del Dolor y un formulario para recolectar las variables: presión arterial, latidos cardíacos por minuto, edad, tipo de herida y sexo. Los datos recopilados se tabularon en Microsoft Excel para Windows 2016 y el análisis estadístico se realizó en SPSS 20.0. Resultados: Hubo distribución equitativa de sexo, predominio de úlceras diabéticas (80%) y edad entre 40-59 años (50%). No hubo diferencia estadísticamente significativa en los niveles de dolor. La presión arterial mostró cambios significativos con las sesiones de musicoterapia**. Conclusión:** La intervención musical demostró el potencial para reducir la presión arterial en pacientes con heridas crónicas al momento del vendaje.
Palabras clave: Musicoterapia; Heridas y lesiones; Dolor; Úlcera.

RESUMO

Objetivo: investigar nível de dor, pressão arterial e frequência cardíaca antes e depois da musicoterapia. **Métodos:** estudo quantitativo e quase-experimental, realizado com dez pessoas com feridas de difícil cicatrização em uma unidade básica de saúde. Utilizou-se a Escala Visual Analógica de Dor e formulário para coleta das variáveis: pressão arterial, batimentos cardíacos por minuto, idade, tipo de ferida e sexo. Os dados coletados foram tabulados no *Microsoft Excel for Windows* 2016 e a análise estatística foi realizada no SPSS 20.0. **Resultados:** houve distribuição igualitária de sexo, predomínio de úlceras diabéticas (80%) e de idade entre 40-59 anos (50%). Não houve diferença estatística significativa nos níveis de dor. A pressão arterial apresentou mudanças significativas com as sessões de musicoterapia. **Conclusão:** a intervenção musical demonstrou potencial de redução da pressão arterial de pacientes com feridas crônicas no momento de realização do curativo.
Palavras-chave: Musicoterapia; Ferimentos e lesões; Dor; Úlcera.

INTRODUCTION

Wounds that are difficult to heal or chronic ulcers are considered a public health problem worldwide, as they demand high costs with materials and qualified human resources, in addition to causing work incapacity, limitation in walking, standing for long periods of time and/or carrying out efforts by the people affected [1,2]. They are characterized by prolonged healing time and recurrent infections. Aging associated with inadequate life habits generates risk factors for diseases such as diabetes and hypertension, diseases directly linked to the etiology of wounds[1,3].

Leg ulcers that are difficult to heal can be venous ulcers (VUs), also known as gravitational or varicose ulcers, resulting from thrombosis and subsequent lipodermatosclerosis, thus, any injury generated in the skin will cause the ulcer. In addition to UVs, there are diabetic foot ulcers (UPDs), caused by diabetic neuropathy, which causes loss of sensitivity, thus favoring trauma and injury without the presence of pain and, associated with peripheral vascular disease caused by diabetes mellitus, causes mentioned UPD[4].

It should be noted that most wounds that are difficult to heal trigger pain. Pain can be characterized, in general, as an unpleasant sensory or emotional experience, which can be acute or chronic, according to duration, being defined as a psychological state, but almost always associated with a physical cause [5]. In a health unit in Ribeirão Preto, 11% of people assisted with chronic leg ulcers, based on the visual analogue scale (VAS = 10), reported a pain level of a magnitude of 10 presented as the worst possible pain[6].

In the case of wounds that are difficult to heal, it is emphasized that pain is characterized as chronic, caused by the wound together with physical limitations that disable the individual for leisure and work; self-image disturbances, leading to low self-esteem and low self-confidence, anxiety due to the length of treatment, reclusion, feelings of rejection, self-depreciation, major impacts on sex life and odor. In addition, the wounds generate enormous mental distress to the person, and may cause generalized anxiety disorder, social phobia and panic[7,8].

Music is the combination of rhythm, harmony and melody in a way that sounds pleasant to the ears, an arrangement between sounds and pauses, being a vehicle for expressing feelings that are influenced by it[9]. Regarding health interventions, music therapy demonstrates positive effects regarding pain intensity, anxiety, use of non-opioid analgesic agents, blood pressure and heart rate [10]. It is up to the music therapist to identify the style applied to the people for the best possible response to the treatment, as receptive music therapy (sound perception) has the potential to reduce serum cortisol and norepinephrine levels[11], so it can contribute to the clinical improvement of people in wound care.

Clinical studies of the impact of music therapy in relation to the physiological and psychological areas began to intensify from 1970[10]. In Brazil, the Brazilian Journal of Music Therapy was created in 1996 and, in 2010, the Center for Interdisciplinary Studies and Research in Music Therapy at the State University of Paraná (UNESPAR) emerged, which also publishes in the area through the InCantare Magazine. By the year 2019, these two journals had a total of 244 articles published, however, in relation to topics such as mental health, pain, anxiety, depression, among others, only ten articles were published, demonstrating a lack of research on the subject[12].

Considering this lack of research, we believe in the innovative nature of the study in question, focusing on the possible relationship between pain relief associated with chronic wounds and the use of music therapy.

It is worth noting that complementary therapies are adjuvants to conventional treatments, especially when they prove to be insufficient. In this sense, it is necessary to carry out research related to music therapy to build scientific and clinical knowledge.

Therefore, this study aimed to investigate the level of pain, blood pressure and heart rate before and after using music therapy.

METHODS

Quantitative, descriptive and quasi-experimental study, before and after, with a single group, being carried out at the Basic Health Unit of the Federal University of Amapá

(UBS/Unifap). UBS Unifap is a place where university extension projects are developed, among them is the project "Complex Wounds: follow-up of people being followed up on a Care Line", which assists people with chronic wounds, monitoring and treating their wounds. same until remission.

Data collection was carried out between August and October 2020, after approval of the research protocol by the Research Ethics Committee of the Federal University of Amapá under Opinion n. 4,444,615. The study population was intentional and 14 people agreed to participate in the study, however four were excluded for the following reasons: two due to the need to be referred to the emergency room during collection and two people due to treatment abandonment. Thus, the sample totaled ten participants who met the eligibility criteria, namely: people with chronic wounds such as Diabetic Foot Ulcer (UPD) or Venous Ulcer in segment in the referred unit, who presented wounds from 10 cm2 and larger than 18 years. Exclusion criteria were: treatment abandonment and presence of intercurrences during the study that required referral to the emergency service.

For data collection, three instruments were used: the form with the variables sex, age, type of ulcer and clinical signs of vital signs, heart rate and blood pressure; the Visual Analog Pain Scale (VAS), which requires an average application time of 1 minute, as the person is instructed in a few words about the functioning of the scale, and, at the same time, the pain level is indicated by the participant, who can vary from 0

to 10, with 0 corresponding to "no pain" and 10, "worst possible pain"[13] and the Beck Anxiety Inventory (BAI), which has 21 statements that describe anxiety symptoms, containing the alternatives: "Absolutely not" (n=0), "It didn't bother me much" (n=1), "It was very unpleasant, but I could bear it" (n=2), "I could hardly bear it" (n=3), results from 0-10 being considered as minimal or little anxiety, mild from 11-19, moderate from 20-30, severe from 31-63[14].

The data collection procedure was carried out by three trained researchers, with a pre-test having been used with an average time of 40 minutes. The intervention lasted 45 days, with measurements every 15 days, totaling three interventions. The collection was performed during the day shift, on days of care, with the researcher and the patient being present at the time of collection. The steps for data collection were: (1) Guidance on the intervention; (2) Measurement of vital signs, heart rate and blood pressure using an automatic pressure gauge; (3) Measuring the level of pain using the VAS; (4) Performing a dressing with the application of music therapy, with extra-auricular stereo headphones and Low Uplifting Songs by Erik Satie: Gymnopédies & Gnossiennes (Full Album) available for free on the YouTube platform according to the experiment by Hirokawa and Ohira [11], which verified a decrease in the production of norepinephrine, levels of stress, anxiety and depression and (5) Realization of a new measurement of vital signs and levels of pain immediately after the end of the dressing procedure.

In order to avoid biases in the research, some measures were implemented, such as training the researchers to measure the level of pain and vital signs and intercalating each collection between the researchers. It should be noted that no possible biases were found for the application of music therapy, considering that it is an isolated instrument (patient-reproductive device).

The collected data were tabulated in Microsoft Excel for Windows 2016®, being transferred to statistical analysis in SPSS 20.0. For descriptive data, the analysis was performed using absolute and relative frequency, with mean and standard deviation of data referring to age. The Kolmogorov-Smirnov test was performed to assess the normal distribution of variables for all groups (blood pressure, heart rate and pain level through VAS) and variables (pre and post-treatment). The test showed that the variables follow a normal distribution. The paired T-Student Test was also performed for pre- and post-treatment comparison, in addition to being submitted to analysis of variance (one-way ANOVA), followed by Tukey's post-test for comparison between pairs, assuming a significance level of 5% ($p<0.05$).

RESULTS

The distribution related to the gender variable was equal, with 50% (n=5) male and 50% (n=5) female; the mean age was 59.8±19.41, in which 10% (n=1) were between 20 and 39 years old, 40% (n=5) between 40 and 59 years

old and 30% (n=4) from 60 to 79 years old. As for the type of ulcer, 20% (n=2) had venous ulcers and 80% (n=8) had diabetic foot ulcers.

Data referring to the level of pain obtained by the EVA scale, blood pressure level and heart rate before and after music therapy are shown in Table 1. It is observed that, in the first session before and after music therapy, there was a statistically significant reduction in heart rate (p=0.0477) and blood pressure (p=0.0142). In the third session, after 45 days, there was also a significant reduction in heart rate (p=0.002) and blood pressure (p=0.008). In both sessions, pre and post music therapy, there was no statistically significant reduction in pain levels obtained through the VAS. However, in the second session before and after music therapy, there was a significant difference in the reduction of pain levels (p=0.047).

Table 1 - Distribution of pain levels by EVA scale, heart rate and blood pressure, according to pre and post music therapy sessions, Macapá, AP, Brazil, 2021, (n=10)

		EVA		BPM		BP	
		average±PD	p-valuer	average±PD	p-value	average±PD	p-value
1st session	Befo After	2,5±2,32	0,467	92,3±15,9	0,047	139x81±9x15	0,0142
		2,2±2,09		85,8±10,8		128x83±10,9	
2nd session	Before	2,3±2,4	0,047	83,8±14,3	0,328	145x90±19x14	0,0173
	After	0,5±0,84		86,1±14,3		133x88±15x10	
3rd session	Before	2,1±2,55	0,153	88,5±10,7	0,021	133x86±7x5	0,0086
	After	1,4±1,71		84,8±10,4		129x86±10x5	

EVA: visual analogue scale (pain level); BPM: heart beats per minute; BP: blood pressure. p-value t test student.
Source: The authors

In order to compare the effects of music therapy on pain levels, heart rate and blood pressure between sessions, analysis of variance (one-way ANOVA) with Tukey's post-test was performed. First, it was carried out between the three groups of variables in the three pre and post music therapy sessions, and then, separately, only between the pre sessions and only between the post sessions.

Figure 1 presents data regarding the level of pain measured by the VAS scale. The standard average of pain levels was found to be mild to moderate in most sessions. Only after the second session was a standard average of mild pain obtained. The analysis between the three sessions

showed no statistically significant difference between the level of pain (p=0.1230). However, when analyzing the groups by post music therapy sessions, there is a statistically significant difference (p-value = 0.0487) between the scores of the first and second sessions.

Figure 1 - Comparison of pain level by VAS scale between music therapy sessions, Macapá, AP, Brazil (n=10)
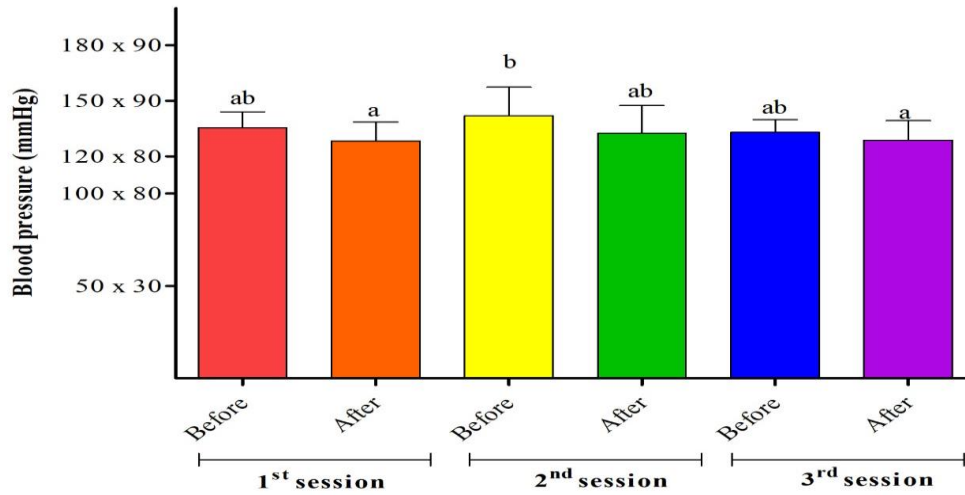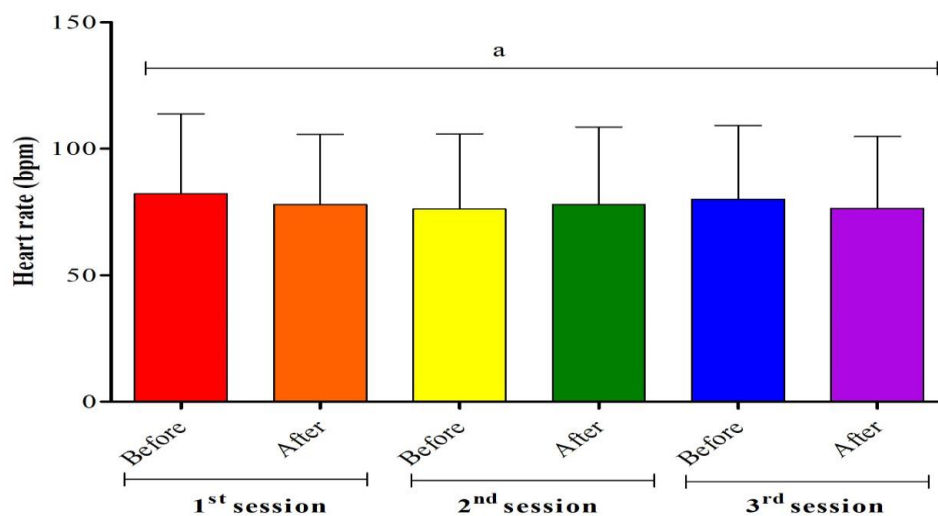

Source: The authors

Figure 2 presents the results related to heart rate per minute. It was observed that there was a small variation in the mean heart rate, between 83.8 and 92 beats per minute between all sessions. This is confirmed by analysis of variance in which there is no statistically significant difference in heart rate between sessions (p-value = 0.7200). And, when analyzing, separately, only the pre sessions (p-value = 0.3937) and only the post-music therapy sessions (p-value = 0.9684), there was also no statistically significant difference.

Figure 2 - Heart rate comparison between musicotherapy sessions, Macapá, AP, Brazil, 2021 (n=10)
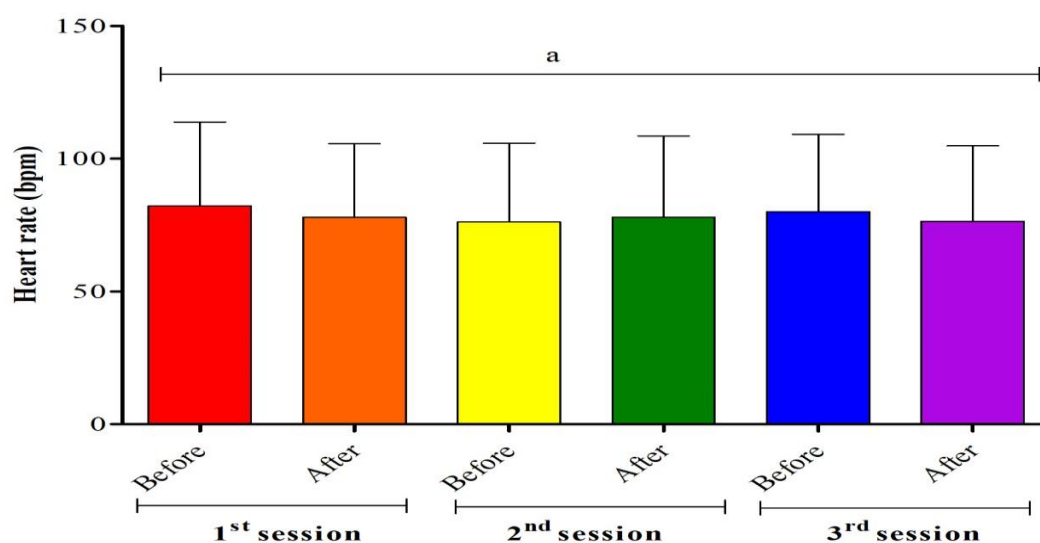

Source: The authors

Results related to blood pressure are shown in Figure 3. It was observed that there was variation in mean blood pressure between all sessions, ranging from 128 to 28 mmHg and 145 to 75 mmHg. Analysis of variance confirms this result, as there is a statistically significant difference in blood pressure between the first and third post-music therapy sessions and the second pre session (p-value = 0.0365). However, when analyzing, separately, only the pre sessions (p-value = 0.0984) and only the post-music therapy sessions (p-value = 0.6074), it appears that there is no statistically significant difference in both.

Figure 3 - Comparison of blood pressure between music therapy sessions, Macapá, AP, Brazil, 2021 (n=10)

Source: The authors

DISCUSSION

The need to improve the quality of care for people with wounds that are difficult to heal goes beyond the need for healing. Strategies that help reduce pain and symptoms that may affect health should be understood as part of humanized care in wound care.

With regard to the characteristics of the participants, it was found that the average age is similar to that of other studies that point to a relationship with aging[15,16]. Wounds become common due to physiological factors that involve skin dryness and weakening, associated with chronic health conditions. There is still no consensus on which gender is most affected by chronic wounds. International studies on the profile indicate equivalence between males and females[17,18], whereas in Brazil there is no well-characterized profile, it is important to consider that wounds can occur due to different socioeconomic and cultural factors for both sexes.

It is noteworthy that the UPD with the presence of mild pain was reported by most participants in this study. With regard to the

intensity of pain and type of wound, UPD can cause pain characterized as mild in relation to that of other chronic wounds, such as venous ulcers, which tend to be more painful, as described in a study carried out in Paraíba, whose evaluation on pain and type of chronic wound identified the predominance of UV and severe pain[18,19].

With regard to pain, ulcers such as UV and UPD are an important limiting pain factor for patients with leg and foot ulcers, however there was no statistically significant difference between all sessions in this study. In the study by Barradas, no statistically significant reductions were identified in the level of chronic pain in the long term after sessions of receptive music therapy (p-value = 0.760) and a decrease in pain right after music therapy in the first and third time of the study and, a total of four times, reports slight reductions in pain intensity[20,21].

In the present study, heart rate also did not show statistically significant differences between collections, as opposed to the result of the pilot study by Calamassi et al., which used receptive music therapy with different musical styles and standard musical frequency equalized to 432 Heatz (HZ) in comparison with the frequency of 440 Heatz, demonstrating a mean reduction of 4.79 in beats and p-value = 0.05[22]. This study used music with the standards of the International Organization For Standardization (ISO) established at 440 Hz, as well as the environmental variables in which the waiting line, the style of locomotion and apprehension

with the dressing may have justified the results[23].

The statistically significant difference present between the samples of the first and third sessions of the present study (p-value = 0.0365) demonstrates the potential for lowering blood pressure resulting from the application of low uplifting music, reducing the risk of stroke by 13% every 5 mmHg, which may be a coadjuvant in the treatment of hypertensive individuals, and the physiological mechanism. Although not fully elucidated, it is speculated a decrease in the action of the sympathetic nervous system and an increase in vagal activity, decreasing cardiac output and peripheral resistance. When in hyperactivity, the sympathetic nervous system is correlated with systemic arterial hypertension, and the positive auditory stimulus can also release endorphins that promote the feeling of well-being and relaxation and decrease of catecholamines (adrenaline and noradrenaline) in the central nervous system[24,2].

As limitations of the study, its small sample is pointed out, which, due to the unpredictability of the outcomes during the treatment of the person with ulcer, was reduced. However, added to the incipient literature on the subject, the study reinforces its relevance, as well as its replication and deepening of studies that associate music therapy in the care of people with chronic wounds.

Because they are the focus of pain and odor, in addition to causing difficulty in locomotion, financial costs, prejudice, self-deprecating feelings, rejection, restriction of

socializing and work activities, chronic wounds are constantly reported as generating anxiety, and can evolve into anxiety disorders generalized, social phobia and panic. Therefore, it is necessary to carry out studies with non-pharmacological approaches that contribute to the treatment[8].

CONCLUSIONS

There was a slight reduction in pain levels and heart rate, as well as therapeutic potential for reducing blood pressure, generating relevance and the need to expand quantitative studies that analyze physiological parameters, with the application of music therapy aimed at the population affected by wounds that are difficult to heal, in addition to the diversification of analysis parameters. In this study, music therapy demonstrated proximity of action on the brain limbic system, affecting emotions, motivation and affectivity and, consequently, physiological characteristics. Thus, it becomes necessary to standardize the application to replicate the effects observed in other studies, with a greater possibility of therapeutic success as an adjunct to conventional treatments.

PROMOTION

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