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EDITORIAL

BJMVB 2024, 2(2):14-16

Editorial

Second Joint Congress on Mechanical vibration and technological innovation in health (MEVITIH-2024): Health innovations for evidence-based clinical practice

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Introduction

In this second issue of volume 2 of the Brazilian Journal of Mechanical Vibrations in Biosciences (BJMVB) will be presented publications about technological innovations with different approaches to promote the prevention and treatment of diseases, using the concept of clinical practice based on evidence. In this context, the use of mechanical vibration and other technologies will be discussed as a modality of intervention to be used in the prevention, diagnostics, rehabilitation approaches, among other.

By harnessing the available science, technology, and innovation, the world can face challenges of different natures that can compromise people's health and the balance of the environment. Moreover, the world's population is aging, and people are living with an increasingly longer life expectancy. In consequence, the proper use of science, technologies and innovations will permit having high-quality health systems in the sustainable development goals era that will bring benefits to everyone (1,2,3).

Another consideration is related to the fact that new diseases have emerged in the last years worldwide and has been necessary the integration of various acknowledgments, such as molecular approaches, through the metabolomic, until the use of various technologies with different sources of physical agents and data-driven technologies. In this context, it is relevant to point out the importance of scientific meetings, that may highlight different technologies that can be used in Health Sciences, like the “The 2nd Joint Congress on Mechanical Vibration and Technological Innovations in Health” (MEVITIH-2024).

The correct use the science, technologies and innovations in health, the discussion about these applications and the sharing of this knowledge to promote better practices are important to face the challenges. Furthermore, the comprehensive view of the individual and the discussion on multidisciplinary care favor better practices and results. This will be the aim of “MEVITIH-2024” to promote the acquisition of knowledge and discussions related to best practices based on evidence and on the evidence that can favor best practices, with a comprehensive and multi-professional view. The MEVITIH-2024 will bring together the activities of "The 3rd Congress Vibration in Biosciences" (VIBMECBIO-2024) and "The 3rd International Congress on Technological Innovations in Health (ICTIH-2024)". Researchers from several states in Brazil and around the

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world will participate in the activities in person and online. This year, the MEVITIH-2024 program will be broadcast live for the various states of Brazil, as *Universidade Federal de Viçosa*, *Universidade Federal de Uberlândia*, *Universidade Federal de Minas Gerais*, *Universidade Federal de Santa Maria*, *Universidade do Estado de Santa Catarina* and other countries, as Italy, Republic of Kazakhstan, Spain, Taiwan, and USA.

The topics covered in the MEVITIH-2024 round tables will involve technological innovations in osteoarticular alterations, oncology, neurology, tissue repair, metabolic alterations, diagnosis and therapy, health monitoring, health monitoring, rehabilitation, chronic disease care, sleep and performance disorders, recovery and assessment. Discussion forums on the importance of standardizing anthropometric measurements and on innovation and entrepreneurship in health (from the bench to Startup) will also be promoted at MEVITIH-2024.

The program of the MEVITIH-2024 will involve: A- workshops, (i) Practice involving systemic vibratory therapy, (ii) Practice on the use of transcranial stimulation, (iii) How to set up your Biobank and (iv) Check your motion as a functionality assessment tool; B- a Keynote Lecture entitled "Evolution of science in the Brazilian scenario", C- Round Tables such as:

Round table 1: Technological innovations in osteoarticular changes and oncology with the lectures - "Effects of systemic vibratory therapy in individuals with knee osteoarthritis", "Somatotype in spondyloarthritis and its clinical and social interactions", "Balance assessment with Techbalance in knee arthrosis" and "Robotic surgery in oncology".

Round table 2: Technological innovations in neurology with the lectures - "Transcranial direct current stimulation in stroke treatment", "Implantation of spinal devices with navigation", "Deep brain stimulation implant for Parkinson's" and "Subacute stroke and modular therapies".

Round table 3: Technological innovations in tissue repair with the lectures - "Introduction to scar acceleration methodology (MAC)", "Efficacy of systemic vibratory therapy in lymphedema", "Compression therapy in the treatment of lymphedema: how and why?" and Effect of systemic vibratory therapy on tissue repair".

Round table 4: Technological innovations in metabolic changes with the lectures - "Analysis of intestinal microbiota as a health marker", "Systemic vibratory therapy in the management of obesity and metabolic syndrome", " Whole Body Vibration in diabetic patients: partial results" and "Metabolic semiological interpretation and the use of probiotics in Metabolic Syndrome".

Round table 5: Technological innovations in diagnosis and in therapy with the lectures - "Clinical thermography: criteria for use and applicability", "Metabolomics in precision medicine", and "Dental pre-screening system for profile analysis for undergraduate subjects".

Round table 6: Technological Innovations in health monitoring with the lectures - "Peripheral and cerebral muscle oxygenation: clinical applicability and research with near infrared spectroscopy", "Functional assessment of hospitalized patients", "Smart fabrics for monitoring the body's physical and medical conditions".

Round table 7: Technological Innovations in rehabilitation with the lectures - "Transcranial photobiomodulation in neurological disorders", "Wearable technologies for movement disorders", and "Orthopedic workshops: rehabilitation and care for people with disabilities".

Round table 8: Innovations in chronic diseases with the lectures - "Innovation in the management of COPD", "Effects of systemic vibratory therapy on the symptoms of Parkinson's disease" and Innovative approaches to patient care with metabolic changes.

Round table 9: Technological innovations in sleep disorders and performance with the lectures - "New technologies for sleep apnea diagnosis and therapy", "High-performance sport: Is there a safe limit?", "Precision medicine in the assessment of excessive daytime sleepiness" and " Technological innovations in the analysis of human movement".

Round table 10: Approaches to recovery and evaluation with the lectures "Importance of the Enhanced Recovery After Surgery (ERAS) protocol in patient recovery", "Applicability of the baropodometry test in the health sector", "Diagnostic criteria for sarcopenic obesity" and "Child development assessment tools".

In addition, a Satellite lecture - "Clinical applicability and viability for the use of canabidiol" and another one with "Presentation of researchers from Germany and Taiwan", a "Discussion forum" "From Jury Panel to a Startup: Innovation and Entrepreneurship in Health", and another one "Measurement of anthropometric measures: the importance of standardization" will be presented throughout the MEVITIH-2024.

Besides the workshops, round-tables, satellite lectures and discussion forum, several researches will present findings about studies that are ongoing in the "Poster presentation"

Conclusion

This issue of the BJMVB is about actual and important theme that are related to clinical practices based on evidence considering science, technology, and innovation. The discussion of multidisciplinary approaches involving the care of the patient and research about better techniques to improve assistance are desirable in health management to optimize the cost-effectiveness of the actions in health.

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ORIGINAL RESEARCH

BJMVB 2024, 2(2):18-27

Original research

Functional parameters responses after 5 weeks of whole-body vibration and/or auriculotherapy interventions in individuals with knee osteoarthritis: randomized controlled trial

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Abstract

Introduction: Knee osteoarthritis (KOA) is a joint disease that can cause limitations or loss of physical function. Different nonpharmacological interventions have been recommended for the treatment of KOA. Whole-body vibration (WBV) exercises and auriculotherapy (AT) can be effective interventions for managing KOA. **Objective**: This study aimed to evaluate the effects of WBV, AT, and the combination of the two techniques on parameters related to functionality in KOA individuals. The hypothesis was that WBV and AT could improve the functional parameters of KOA individuals. **Methods**: Participants were randomized into four groups (n=108): (i) WBV (GV) using mechanical vibration (MV) with peak-to-peak displacement 2.5, 5.0, and 7.5 mm, frequencies from 5 to 14 Hz and peak acceleration from 0.12g to 2.95g, twice a week, for 5 weeks (n=29); (ii) AT (GA) was performed with mustard seeds at the knee, kidney and Shenmen acupoints on the ear (n=29); (iii) WBV+AT (GAV) (n=23), and; (iv) Control Group procedures (GC) (n=27). **Results**: As a result, significant improvements were observed in functional parameters of individuals with KOA in the Lysholm evaluation, and in the Timed Up and Go test. WBV and AT would be relevant to be included in primary care, as they are effective, and easy to be performed and have a low cost. **Conclusion**: The interventions (WBV, AT, and WBV+AT) can lead to physiological responses that can be associated with improvement in clinical-functional parameters in individuals with KOA.

Keywords: Knee osteoarthritis; auriculotherapy; systemic vibratory therapy; functionality.

1. Introduction

Osteoarthritis (OA) is a degenerative joint disease with high prevalence around the world that can limit the ability of individuals to work and fulfill community tasks. It is one of the ten most disabling diseases in developed countries and also in low to middle-income countries (1-3). According to the World Health Organization (WHO), 9.6% of men and 18.0% of women over 60 years of age have symptomatic osteoarthritis. Furthermore, it is estimated that 80% of these

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symptomatic subjects will have limitations in their movements and 25% of this population will not be able to perform normal daily activities (WHO). OA commonly affects the metatarsophalangeal, knee, hip, and spine joints, being knee OA (KOA) the most frequent form (WHO). KOA is characterized by micro and macro injuries of the knee joint that lead to degeneration of the extracellular matrix and periarticular soft tissues (4).

The American College of Rheumatology (ACR) and the Osteoarthritis Research Society International (OARSI) recommend the use of pharmacological and nonpharmacological interventions, such as physical activity and alternative therapies to manage KOA (5,6).

Alternative therapies are part of Traditional and Complementary Medicine, focusing on diverse therapeutic resources with an important contribution to global health, including techniques such as acupuncture and auriculotherapy (AT) (7,8). WHO Strategy on Traditional Medicines for 2014-2023 indicates the importance of alternative therapy in the world context (9). AT can be performed with seeds and has been shown to be effective in the management of individuals with KOA (10,11).

Physical exercise (PE) is also a non-pharmacological alternative in the treatment of individuals with KOA as recommended by guidelines (5,6). PE is an important tool in the management of individuals with various chronic conditions, including KOA (12-15). Skou *et al*. (12) argue that physical exercises should be a first-line intervention in the clinical management of individuals with KOA. In addition, Zampogna *et al*. (15) demonstrated that physical exercises and sports are effective in reducing pain and functional capacity in elderly with KOA. Whole-body vibration (WBV) is a safe modality of exercise to populations with various clinical conditions and has been suggested as an adequate intervention for individuals with KOA (16-19). WBV occurs through systemic vibratory therapy, in which mechanical vibration produced in a vibrating platform (VP) is transmitted to the whole body of an individual that is in contact with the base of the VP, generating WBV exercise (20,21)

The benefits of WBV exercise have been highlighted for individuals with fibromyalgia (22), metabolic syndrome (23-26), obese (27), chronic obstructive pulmonary disease (28), stroke (29) and KOA (19,30,31). Some beneficial effects related to WBV exercise have been described, such as increasing the muscle strength (32,33) and bone mineral density (23,34), improving the balance (24,35), flexibility (25,31,36), functional capacity (23,25,31,33,36), reducing fatigue (37) and pain level (29,36).

A combination of intervention techniques is often used in research, such as physiotherapy or exercise and acupuncture (38-40), and WBV and AT (19,29,30). Studies reported benefits of a combined intervention of WBV and AT in KOA individuals, such as a reduction in pain level (29), increased handgrip strength (19), flexibility improvement and functional capacity (30). Regardless, an optimal protocol with these interventions aiming to improve functionality in KOA is not yet established. Thus, the objective of this study was to evaluate the effect of WBV, AT, and the combination of the two techniques on parameters related to functionality in individuals with KOA. This work hypothesized that WBV and AT can improve parameters related to the functionality of individuals with KOA. In addition, the combination of the two techniques (WBV + AT) could enhance the beneficial effects of the isolated interventions.

2. Methods

2.1 Study design and protocol registration

This is a randomized, interventional, double-blind study, conducted in accordance with the checklist and guideline for randomized clinical trials (CONSORT) (41), approved by the Research

Ethics Committee in human beings of the *Hospital Universitário Pedro Ernesto* (HUPE), *Universidade do Estado do Rio de Janeiro* (UERJ) (CAAE 19826413.8.0000.5259) and registered in the *Registro Brasileiro de Ensaio Clínico* (ReBEC): RBR-7dfwct.

2.2 Randomization

KOA individuals were randomly allocated through virtual randomization on the website https://www.random.org. For randomization to be considered blind, each protocol intervention group was included on the website: (i) WBV protocol - group submitted to WBV (GV); (ii) AT protocol - group submitted to AT (GA); (iii) Combined protocols - group submitted to the combination of the two techniques (GAV), and (iv) Control Group procedures (GC). Randomization was performed by the same professional who monitored the interventions. The professional who evaluated the results (evaluator) and the participants were not aware of the corresponding group. After randomization, participants were referred for initial assessment and started the intervention according to the allocation. After an intervention period of 5 weeks (10 sessions), participants underwent a final assessment, 24 hours after the last session.

2.3 Participants

Participants with a diagnosis of KOA according to Ahlbäck's criteria (42), were recruited at the Departamento de Ortopedia at HUPE / UERJ and were referred to *the Laboratório de Vibrações Mecânicas e Práticas Integrativas* (LAVIMPI), where the interventions took place. All the procedures were performed from October 2018 up to January 2020. Initially, the participants were informed and oriented about the study and signed the Informed Consent Form (ICF). Subsequently, anamnesis to identify the eligibility criteria, anthropometric measurements, and the first assessment (baseline) were performed.

2.4 Eligibility criteria

Inclusion criteria: Participants aged ≥ 40 years, of both sexes, diagnosed with KOA according to Ahlback's criteria (42).

Exclusion criteria: Participants diagnosed with untreated systemic arterial hypertension, fear of movements of the VP, severe or disabling clinical disease, clinically evident cardiovascular disease in the last six months manifested by myocardial infarction or stroke, history of deep venous thrombosis or active disease, pacemaker, metallic prosthesis, previous surgery on the knee or lower limbs that prevented the realization of the protocol and major physical limitations that can compromise the participants' safety during the protocol, and the individuals that refused to sign the ICF.

2.5 Data collection

The assessments of functionality parameters were carried out using the Lysholm questionnaire, translated and validated to Portuguese (Brazil) and the Timed up and go (TUG) test. The Lysholm questionnaire is a self-reported instrument that contains items related to symptoms and functional limitations of the knee such as pain level, joint swelling, stiffness, and mobility. This questionnaire uses a 100-point rating scale which 95-100 is excellent and <64 is poor (43,44).

The TUG test is an instrument to assess postural control, mobility, balance, and functional capacity (45). To perform the test, the individual gets up from a chair, walks in a straight line from 3 meters away, turns around, walks back, and sits in the chair again. The test was performed twice, and the shortest running time was recorded for analysis (46). This test is highly recommended to assess the functional capacity of individuals with KOA (47-49). The evaluations took place on the

same day, before the intervention (baseline) and after the protocol at the final evaluation, (24 hours after the last session).

2.6 Intervention protocols

Participants were allocated into 4 groups: AG, GV, GAV, and GC. The protocol lasted 5 weeks (2 weekly sessions).

2.6.1 **WBV protocol**

Participants performed the WBV protocol (GV) seated in an ancillary chair positioned in front of a VP with a side-alternating displacement of the base (Novaplate Fitness Evolution®, DAF Produtos Hospitalares Ltda, São Paulo), with their hands resting on their knees to facilitate the transmission of the mechanical vibration to the whole body and with their feet on the VP base with a comfortable flexion of knees (110° to 120° knee flexion). The biomechanical parameters of the mechanical vibration used in this protocol were: (i) three different peak-to-peak displacements (D) (2.5, 5.0, and 7.5 mm); (ii) frequency at 5 Hz in the first session, and progressively increased by one unit per session to 14 Hz in the last session; (iii) aPeak from 0.12 to 2.95g; (iv) 3 bouts of 3 min of mechanical vibration with 1 min of rest after each bout (50). The VP display was covered with an opaque plate so that the participants were not aware of the frequency or the time of exposure to the mechanical vibration. This group placed seedless adhesive tapes at the same acupuncture points as the GA. The professional who accompanied the intervention instructed the participant to report any discomfort to stop the intervention, if necessary. The participants did not report any discomfort during all the interventions.

2.6.2 **Auriculotherapy protocol**

In the AT group (GA), an adhesive tape with two mustard seeds (Semen vaccariae) was placed on the points to be stimulated in both ears (Knee, Kidney, and Shenmen) according to previous studies (19,29,30,36), the point "knee joint" is the corresponding point which is located at the superior crus of the antihelix, at the same level of the superior border of the inferior crus of the antihelix. The point "kidney", located in the upper part of the cymba conchae at the superior portion of the acupuncture point of the small intestine, has a function related to the bones and lower limbs. The point "Shenmen" is an analgesic point and is located at the bifurcation of the crus of the antihelix (51-53)

The tapes were changed in each session. All participants were instructed to manually stimulate the acupoints at least 3 times a day and to remove the tape the day before returning to LAVIMPI. This group performed the same protocol as the GV, but the VP with frequency zero “0”, with a coupled device that emits a sound similar to the sound produced by the mechanical vibration.

2.6.3 **Combination protocols**

In this group (GAV), the protocols of the GV and GA were performed concomitantly. In other words, in the GAV, the same biomechanical parameters of the mechanical vibration and the same stimulation of the acupuncture points of the GA (Knee, Kidney, and Shenmen) were used.

2.6.4 **Control Group procedures**

The individuals of the GC had adhesive tapes without seeds fixed in the chosen points in both ears (Knee, Kidney, and Shenmen) as the GV and performed the same protocol as the GV, but the VP with frequency zero “0”, with a coupled device that emits a sound similar to the sound produced by the mechanical vibration when the VP is turned on.

2.7 Sample Size

The sample size was calculated using the G-Power® 3.1 software (Franz Faul, Universitat Kiel, Germany), based on the variable TUG test from the study by Janyacharoen *et al*. (54), with a power value of 80% and a two-tailed α value of 0.05. The calculation identified the need for a total sample of 90 individuals, with 18 individuals for each group. However, considering a loss of around 15%, 105 individuals were recruited, 21 for each group.

2.8 Statistical analysis

For statistical analysis, the difference (Δ) was calculated, considering the values obtained (after – before) the functional assessments (Lysholm and TUG) in all interventions and in the GC. The software used was "R" version 3.5.0. The Shapiro-Wilk normality test was applied to all variables, and they did not present a normal distribution. In this case, the appropriate non-parametric tests (Kruskal-Wallis and Wilcoxon rank sum test with Bonferroni correction). For anthropometric data, the Kruskal-Wallis test and the Chi-square test were performed, comparing the baseline of all groups. Statistically significant differences were considered with $p<0.05$.

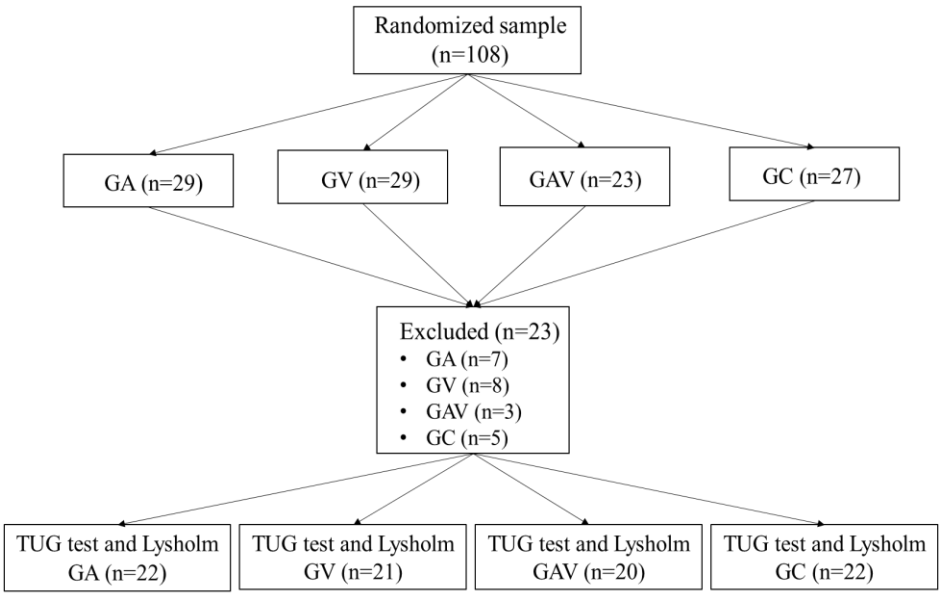

Figure 1. **Flowchart of individuals included in the study**. GC - Control Group procedures; GA – Auriculotherapy protocol; GV – ABV protocol (Group subjected to mechanical vibration); GAV – Combined protocols (Group submitted to the two associated techniques); TUG - Timed up and go.

3. Results

The study included 108 individuals with KOA, who were randomized into four groups: GC (n = 27), GV (n = 29), GA (n = 29), and GAV (n = 23). Eleven participants discontinued treatment due to the pandemic period (COVID-19), three of the GV, two of the GAV, three of the GA, and three of the GC. One participant of the GC was removed due to suspected COVID-19 infection. Twelve patients interrupted the intervention for personal reasons (five from the VG, one from the GAV, four from the GA, and two from the GC). No participant was excluded due to adverse effects related to the proposed interventions or worsening of signs and symptoms of KOA. The flowchart of individuals throughout the work is shown in Figure 1.

Table 1 shows the anthropometric characteristics of participants from all groups before the first intervention (baseline). No differences among the groups were found. Moreover, no participant used analgesics during the study period.

On the Lysholm scale, a significant difference was observed when comparing all groups (p<0.0001). Afterwards, the analysis was carried out among the interventions and in the GC. A significant difference was observed between GC X GV - p=0.002; GC X GA - p<0.0001 and GC X GAV - p<0.0001. When comparing the interventions, significant differences were observed only between GA and GAV (p= 0.003) and between GV and GAV (p=0.036), however, there was no difference between GA and GV (p=0.617). Suggesting that the GV, GA and GAV interventions were more efficient than GC, however when comparing between these interventions, the GAV group presented better results. (Figure 2).

Table 1. Anthropometric characteristics of participants in the baseline.

Variables	**GC** (n=22)	**GA** (n=22)	**GV** (n=21)	**GAV** (n=20)	***p*-value**
Sex	F – 20/ M – 2	F – 16/ M – 6	F – 18/ M – 3	F – 15/ M – 5	0.365
Age (years)	68.45 (9.53)	66.09 (6.69)	63.10 (5.70)	62.60 (14.61)	0.243
Body mass (kg)	76.46 (8.35)	84.25 (11.94)	80.16 (17.11)	81.57 (10.87)	0.119
Height (m)	1.58 (0.09)	1.61 (0.05)	1.60 (0.09)	1.59 (0.05)	0.445
BMI (kg/m^2)	30.82 (5.60)	32.27 (3.49)	31.62 (7.98)	32.60 (5.76)	0.506
RA (score 1-5)	1=16/ 4=5/ 5=1	1=15/ 3=2/ 4=2/ 5=3	1=11/ 2=5/ 4=4/ 5=1	1=15/ 2=2/ 4=2/ 5=1	0.061
LA (score 1-5)	1=16/ 2=2/ 3=2/ 4=2	1=15/ 4=3/ 5=4	1=14/ 2=1/ 3=3/ 5=3	1=16/ 2=2/ 4=2	0.127
ODI (score 1-5)	1=10/ 2=8/ 3=4	1=14/ 2=8	1=12/ 2=2/ 3=3	1=13/ 2=4/ 3=3	0.219
IPAQ (score 1-3)	1=16/ 2=2/ 3=4	1=14/ 2=2/ 3=6	1=15/ 2=2/ 3=4	1=11/ 2=2/ 3=7	0.899

Note: GC - Control Group procedures; GA – Auriculotherapy protocol; GV – WBV protocol (Group subjected to mechanical vibration); GAV – Combined protocols (Group submitted to the two associated techniques); TUG - Timed up and go.; BMI – Body mass index; RA/LA – Ahlback classification of the right and left knee, - (where 1 lighter and 5 more severe) (Ahlback 1968), ODI – Oswestry Disability Index – (Functional disability classification, where 1=minimal disability, 2=moderate disability, 3=severe disability, 4=crippled and bed-bound); IPAQ – International Physical Activity Questionnaire – (level of physical activity, where 1 = low activity, 2 = moderate activity and 3 = high activity). F: female; M: male. For the sex variables, RA, LA, ODI e IPAQ, the test was used Chi-square and for body mass, height and BMI, the Kruskal-Wallis test was used and are expressed as mean (standard deviation). *Significance level $p \leq 0.05$.

For the TUG test, a significant difference was observed when comparing all groups (p<0.0001). Afterward, the analysis between the interventions and the GC was carried out. A significant difference was observed between GC X GV - p=0.0009; GC X GA - p<0.0001 and GC X GAV - p<0.0001. However, no significant differences were observed between the interventions. GA and GV (p=0.551), GA e GAV (p=0.160) e GV and GAV (p=0.425) (Figure 3).

Discussion

The individual with KOA presents signs and symptoms that can interfere with the individual's functional abilities and daily activities, including limitations such as walking and sitting and rising from a chair (55,56). Considering this, the current study compared two interventions (WBV and AT) and the association of these techniques (WBV + AT) to assess the functional parameters of

individuals with KOA. WBV and AT would be relevant to be included in primary care, as they are effective, and easy to be performed and have a low cost.

The results found in the present study regarding the Lysholm questionnaire, showed a significant improvement in the final score of all interventions compared to the GC, suggesting a beneficial effect regarding the perception of KOA symptoms after the application of the AT, WBV and their association techniques (WBV + AT). Likewise, an improvement was found in the GAV group when compared to the GA and the GV, suggesting that the association of interventions may have potentiated the effect of the two techniques, as between the GA and GV no statistical difference was observed. Similarly, Alves *et al*. (57) also observed improvements in Lysholm scores, however, it was after a plasma application.

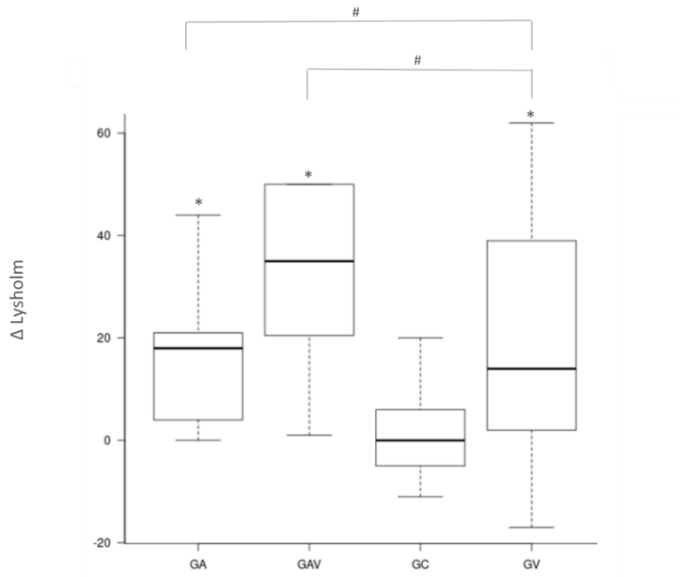

Figure 2. Comparation among the groups of the differences (after and before the interventions) **of the Lysholm score**. Δ - difference (after - before) the Lysholm score. *p<0.05 when compared to the GC - Control Group procedures. #p<0.05 when comparing the interventions (GA – Auriculotherapy protocol, GV – WBV protocol (Group submitted to mechanical vibration) and GAV – Combined protocol (Group submitted to the two associated techniques).

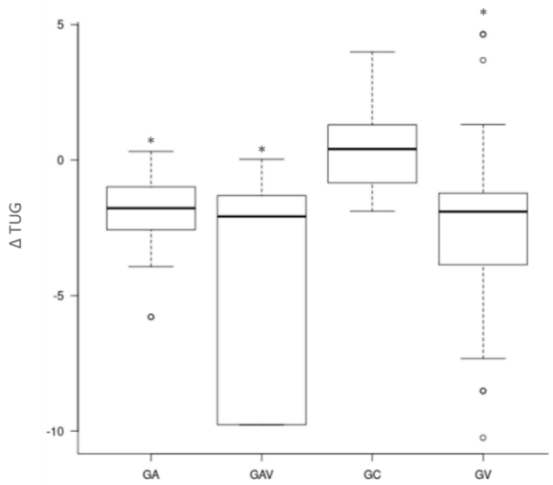

Figure 3. Comparation among the groups of the differences (after and before the interventions) of the time to perform the Timed up and go test. Δ - difference (after - before) the Timed up and go (TUG) test. *p<0.05 when compared to the GC - Control Group procedures. #p<0.05 when comparing the interventions (GA – Auriculotherapy protocol, GV – WBV protocol (Group submitted to mechanical vibration) and GAV – Combined protocols (Group submitted to the two associated techniques)

As for the functional parameters (TUG test), the results also showed a benefit of the interventions in relation to the GC, suggesting that the studied interventions (AT and WBV) can bring benefits to this population, associated or not, because when compared to each other, no differences were observed. These results are in agreement with Bhagat *et al*. (58), who showed an improvement in functional parameters through the TUG test in patients with KOA after using manual therapy techniques, which is considered alternative medicine. (58)

The improvement in the functional parameters found in the present study could be associated with a better muscle activation response promoted by the WBV, which can be explained as a result of the tonic vibration reflex, which is a reflex of muscle contraction by the mechanical vibration (59,60). In addition, in line with Vincent *et al*. (61), the WBV is considered a physical exercise (62), which demonstrated that increases the strength of muscles in the knee region in KOA individuals (61).

AT has been discussed as a low-cost and safe method in various clinical conditions (63). The findings of current work suggest that AT can promote a significant improvement in functional parameters in KOA individuals. Likewise, Viera *et al*. (64); demonstrated in a systematic review that AT can be beneficial in chronic diseases (64).

Moreira-Marconi et al. (19) showed that the combination of AT with WBV can promote an improvement in handgrip strength, in agreement with the results of this study, which showed that the combination of the two techniques had better results when compared to individual therapies concerning disease symptoms.

As a limitation of the study, it is important to highlight that the data from the present study were collected during the COVID-19 pandemic, which made collection difficult, with a loss of approximately 20% of the initial sample, with around 10% due to the pandemic.

As a fact is that both techniques were beneficial and efficient in improving the functional parameters in individuals with KOA. Therefore, as perspectives, it is expected that these interventions could be more used in the management of this population. Furthermore, the strength of this work was to show that two non-pharmacological and non-invasive interventions, could be used to improve the functionality in individuals with KOA, being potentialized when associated.

Conclusion

According to the findings of this study, 5 weeks of the interventions (WBV, AT, and the association of the two techniques) may trigger responses, which might be responsible for improving the parameters related to the functionality of individuals with KOA. The TUG test presented good results after the interventions. On the other hand, the association of interventions may have potentiated the effect of the two techniques, promoting a better score at Lysholm. Future studies with good methodological quality are needed to better understand these responses in functional parameters.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

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Obituary

Mechanical vibration world: how it works, and how it will be without Joern Rittweger

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Unfortunately, the scientific community that works with mechanical vibration in science and on clinical approach received unexpected and sad news. Last week, our colleague Joern Rittweger passed.

The scientific contribution of Joern is fantastic and admirable. Only in PubMed there are more than 350 publications. Several books and numerous chapters of books were also published by him. The studies published by Joern have been very important to understand how the mechanical vibrations work in the body to generate relevant biological effects. Your scientific contribution to try to understand the best biomechanical parameters associated with the mechanical vibration and the role of gravity to the comprehension of the response of the body to the mechanical stimulus was exceptional. The studies developed by Rittweger have also been important to aid to understand the effect of the microgravity in the man in the Aerospatiale journeys.

Besides being a scientist, Joern was a special human being, an admirable friend. Your ideas and criticisms were always welcome because he participated in discussions and aided to improve the works that were been developed. He was always trying to involve the colleagues and students to reflect on and integrate ideas. Moreover, he stimulated the growing of scientific Sociates, as the World Association of Vibration Experts (WAVex), and the Brazilian Association of Mechanical Vibration in Biosciences.

The knowledge that Joern is leaving to us, it will be important to understand more as the mechanical vibration works nowadays and in the future. Science loses one of the most representative scientists in the world in the field of different approaches of movement/motion and in the physiology of space.

Our condolences to his family and to all those friends and colleagues at personal and professional levels.

References

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MEVITIH 2024

- PROGRAM -

The 2nd Joint Congress on Mechanical Vibration and Technological Innovations in Health (MEVITIH-2024)
Chairman – Danúbia de Sá-Caputo, Brazil
Co-Chairman – Redha Taiar, France
November 6-8th, 2024

The 3rd Congress of the Brazilian Association of Mechanical Vibration in Biosciences (VIBMECBIO-2024)
Chairman – Mario Bernardo-Filho, Brazil
Co-Chairman – François Constant, France

The 3rd International Congress on Technological Innovations in Health (ICTIH-2024)
Chairman – Anelise Sonza, Brazil
Co-Chairman – Adérito Seixas, Portugal

Program

November 6th, 2024

9am – Application/Accreditation
9:30 am – 11:30 am – Pre-congress workshops

Workshop 1 – Practice involving systemic vibratory therapy
Prof. Dr. Danúbia da Cunha de Sá Caputo; Prof. MSc. Marcia Cristina Moura Fernandes; Prof. MSc. Ana Carolina Coelho

Workshop 2 – Practice on the use of transcranial stimulation
Prof. Dr. Egas Caparelli Dáquer

Workshop 3 – How to set up your Biobank
Prof. Dr. Diego Pinheiro Aguiar

Workshop 4 – Check your motion as a funcionality assessment tool
Prof. MSc. Samuel Brandão

1pm – Opening ceremony

1:30 pm – Keynote Lecture - Evolution of science in the Brazilian scenario
Prof. Dr. Eliete Bouskela

2pm – Presentation by the UERJ Choir

2:30 pm – Opening cocktail

3:30 pm – Round table 1: Technological innovations in osteoarticular changes and oncology

Coordinators: Prof. Dr Redha Taiar; Prof. Dr. José Alexandre Bachur; Dr. Ana Gabriellie Valério Penha

3:30 pm – Effects of systemic vibratory therapy in individuals with knee osteoarthritis - Prof. Dr. Mario Bernardo Filho

3:50 pm – Somatotype in spondyloarthritis and its clinical and social interactions - Prof. Dr. Paulo César Handam

4:10 pm – Balance assessment with Techbalance in knee arthrosis - Prof. Dr. Liszt Palmeira

4:30 pm – Robotic surgery in oncology - Prof. Dr. Paulo Roberto Salustiano de Carvalho

4:50 pm – Discussion

5pm – Round-table 2: Technological innovations in neurology

Coordinators: Dr. Adérito Seixas; Dr. Paulo César Handam; Dr. Luelia Teles Jaques de Albuquerque

5pm – Transcranial direct current stimulation in stroke treatment - Prof. Dr. Egas Caparelli Dáquer

5:20 pm – Implantation of spinal devices with navigation - Prof. Dr. Flávio Nigri

5:40 pm – Deep brain stimulation implant for Parkinson's - Prof. Dr. Elington Simões

6pm – Subacute stroke and modular therapies - Prof. Dr. François Constant Boyer

6:20 pm – Discussion

Closing of the day's activities

November 7 th, 2024

8:40 am - Round-table 3 – Technological innovations in tissue repair

Coordinators: Prof. Dr. François Constant Boyer; Prof. Dr. Danúbia de Sá Caputo; Dr. Rosane da Silva Rodrigues

8:40 am – Introduction to scar acceleration methodology (MAC) - Prof. Dr. Marcus Vinícius Mello Pinto

9am – Efficacy of systemic vibratory therapy in lymphedema - Prof. Dr. José Alexandre Bachur

9:20 am – Compression therapy in the treatment of lymphedema: how and why? - Prof. Dr. Anke Bergmann

9:40 am – Effect of systemic vibratory therapy on tissue repair - Prof. Dr. Thais Porto Amadeu

10am – Discussion

10:20 am – 10:40 am – coffee break

10:40 am – Round-table 4 – Technological innovations in metabolic changes

Coordinators: Prof. Dr. Anelise Sonza; Prof. Dr. Thais Porto Amadeu; Dr. Aline Reis Silva

10:40 am – Analysis of intestinal microbiota as a health marker - Prof. Dr. Antonio Martins Tieppo

11am – Systemic vibratory therapy in the management of obesity and metabolic syndrome - Prof. Dr. Danúbia de Sá Caputo

11h:20 am – Whole Body Vibration in diabetic patients: partial results - Prof. Dr. Maria das Graças Rodrigues de Araújo

12pm – 1:30 pm – **Satellite lecture with lunch box "Clinical applicability and viability for the use of canabidiol" Offer by Biopharm/Brown Cannabis Institute.**

1:30 pm – Discussion forum - "Measurement of anthropometric measurements: the importance of standardization" - Prof. Dr. LucianePires; Vanessa de Moraes Tenius

2pm – Round-table 5 – Technological innovations in diagnosis and in therapy
Coordinators: Prof. Dr. Alessandro dos Santos Pin; Prof. Dr. Luciane Pires; Dr. Alessandra Andrade
2pm – Clinical thermography: criteria for use and applicability – Prof. Dr. Adérito Seixas
2:20 pm – Metabolomics in precision medicine – Prof. Dr. Gilson Costa dos Santos Junior
2:40 pm – Dental pre-screening system for profile analysis for undergraduate subjects - Prof. Dr. Maria Isabel de Castro de Souza
3pm – Discussion
3:30 pm-4:20 pm - Coffee break and poster presentation

4:20 pm – Round-table 6 - Technological innovations in health monitoring
Coordinators: Prof. Dr. François Constant Boyer; Prof. Dr. Gilson Costa dos Santos Junior; Prof. MSc. Marcia Cristina Moura Fernandes
4:20 pm – Peripheral and cerebral muscle oxygenation: clinical applicability and research with near infrared spectroscopy - Prof. Dr. Anelise Sonza
4:40 pm – Functional assessment of hospitalized patients - Prof. Dr. Fernando Silva Guimarães
5pm – Smart fabrics for monitoring the body's physical and medical conditions - Prof. Dr. Redha Taiar
5:20 pm – Discussion

Closing of the day's activities

November 8th, 2024

9am – Round-table 7 – Technological innovations in rehabilitation
Coordinators: Dr. Adérito Seixas; Prof. Dr. José Alexandre Bachur; Dr. Gabriel Siriano
9am – Transcranial photobiomodulation in neurological disorders - Prof. Dr. Nivaldo Parizoto
9:20 am – Wearable technologies for movement disorders - Prof. Dr. Denise Hack Nicaretta
9:40 am – Orthopedic workshops: rehabilitation and care for people with disabilities - Prof. Dr. Denise Flávio de Carvalho Botelho
10am – Discussion

10:20 am – 10:40 am – Coffee break

10:40 am – Round-table 8 – Innovations in chronic diseases
Coordinators: Prof. Dr. Nivaldo Parizoto; Prof. Dr. Anelise Sonza; Dr. Jennyfer Mazini
10:40 am – Innovation in the management of COPD - Prof. Dr. Cláudia Henrique da Costa
11am – Effects of systemic vibratory therapy on the symptoms of Parkinson's disease - Prof. Dr. Alessandro dos Santos Pin
11:20 am – Innovative approaches to patient care with metabolic changes - Prof. Dr. Rogério Bosignoli
11:40 am – Discussion
12pm – 2pm – Lunch and poster presentation

2pm – Round-table 9 – Technological innovations in sleep disorders and performance

Coordinators: Prof. Dr. André Luiz B Dionizio Cardoso; Prof. Dr. Ariane da Silva Pires; Dr. Larissa Berto

2pm – New technologies for sleep apnea diagnosis and therapy - Prof. Dr. Pedro Lopes de Melo

2:20 pm – High-performance sport: ss there a safe limit? - Prof. Dr. Rodolfo Alkmim
2:40 pm – Precision medicine in the assessment of excessive daytime sleepiness - Prof. Dr. Christiane Bahia
3pm – Technological innovations in the analysis of human movement - Prof. Dr. Adriane Mara de Souza Muniz
3:20 pm – Discussion

3:40 pm – 4:10 pm - Coffee break

4:10 pm – Discussion forum - From Jury Panel to a Startup: Innovation and Entrepreneurship in Health - Prof. Dr. Renata Angeli

4:40 pm – Round-table 10- Approaches to recovery and evaluation

Coordinators: Prof. Dr Redha Taiar; Prof. Dr. Christiane Bahia; Dr. Yasmin Moura Fernandes

4:40 pm – Importance of the Enhanced Recovery After Surgery (ERAS) protocol in patient recovery - Prof. Dr. Flávio de Sá Ribeiro
5pm – Applicability of the baropodometry test in the health sector - Prof. Dr. Ariane da Silva Pires and Prof. Dr. Eugênio Fuentes Pérez Júnior
5:20 pm – Diagnostic criteria for sarcopenic obesity - Prof. Dr. Alessandra Mulder
5:40 pm – Child development assessment tools - Prof. Dr. Renata Alves Paes
6pm – Discussion

6:20 pm – Closing ceremony and poster awards

ABSTRACTS OF THE LECTURES

Abstracts of the lectures

Effects of systemic vibratory therapy in individuals with knee osteoarthritis

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The knee joint allows leg flexion and extension, besides other movements. Moreover, the knee also contributes to vertical posture and the balance of an individual, and to walk, run, sit, and stand. The aging can commit the knee joint, and a progressive inflammatory and degenerative process appears and favors the arising of knee osteoarthritis (KOA). Other risk factors for the KOA have been described, involving biomechanical and genetic factors that contribute to the imbalance between the synthesis and destruction of articular cartilage of the knee joint. The KOA prevalence is higher in the women than in the men. Besides clinical symptoms, such as pain, stiffness, swelling, crepitation and decreased muscle strength; radiological findings aid the diagnosis of the KOA. Medications, biological agents, surgery, and physical treatments have been used for the management of KOA individuals to alleviate the symptoms. Physical activity has been suggested as an important option of intervention, but these individuals are unmotivated to perform exercise. In this context, systemic vibratory therapy (SVT) has been an important alternative. In the SVT, the mechanical vibration (MV) produced in vibrating platform (VP) is transmitted to the individual producing the whole-body vibration exercise (WBVE), a modality of physical activity. WBVE is a safe, suitable, and effective intervention is a potentially feasible intervention for those patients who cannot perform conventional physical activity, such as the KOA individuals. The desirable effects of SVT include increasing muscle strength and power, and bone mineral density, reduction of pain reduction and risk of falls, and improvement of the quality of life, functionality, and cognition. In a protocol of SVT, biomechanical parameters of the MV, such as frequency and peak-to-peak displacement, and type of the VP, exposure time (work time) and rest time to the MV in the SVT session, number of sessions, week periodicity and total time of the SVT must be considered. In conclusion, although several studies have been published and shown that SVT is a feasible intervention to manage KOA individuals, it is necessary more studies to establish effective and proper protocols of SVT to consolidate this intervention as safe and effective in reducing pain and stiffness, and improving the physical function and quality of life, and increasing the muscle strength of KOA individuals.

Support: CNPq and FAPERJ

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Abstracts of the lectures

Spinal device implant with navigation

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Introduction: Pedicle screws are the mainstream for spinal fixation since late 1980's and early 1990's. Approximately 2 million pedicle screws are placed each year in the U.S. for spinal surgery. Pedicle screw malpositioning is a current problem with 443 articles retrieved from PUBMED-Medline with the words "pedicle screw malposition" of which 161 articles were published in the last 5 years. Between 5% and 15% of pedicle screws placed by free-hand technique have been reported as malpositioned and 1/300 patients will have to return to the operating room because of screw malpositioning. Redirection to optimize positioning may compromise biomechanical integrity, with a potential 28% loss of pull-out strength. Screw malpositioning has several implications causing vascular and neural lesions, revisions and prolonged hospitalization. **Objective:** Describe and discuss current options for pedicle screw placement with focus on our initial experience with intraoperative 2D/3D images coupled with navigation. **Methods**: Literature review and report of our initial experience with intraoperative 2D/3D images and navigation. **Results:** Many options have been directed to optimized pedicle screw implants. Intraoperative fluoroscopy and X-rays are the most frequently applied but is still resulting in screw malpositioning. Shaded areas in upper thoracic and cervical axial spine and parallax phenomenon may compromise screw positioning. Intraoperative electromyographic monitoring and electrical conductivity measurement systems may detect malpositioned screws causing neural compression but cannot determined other forms of screw malposition. 3D-printed targeting systems are still experimental with just a few reported cases. Intraoperative 2D/3D imaging system coupled with navigation system have been shown to reduce surgical team X-ray exposition and to optimize pedicle screw positioning. Intraoperative checking of final screw position is obtained with high quality 2d and 3D tomographic images. Our initial experience with Loop-X imaging System coupled with BrainLab navigation device showed excellent results and perfect pedicle screw positioning. **Conclusion**: Intraoperative 2D/3D imaging system coupled with navigation system seems to be a definitive tool to avoid screw malpositioning. Evaluation of cost and time effectiveness are necessary to encourage investment.

Keywords: navigation, spine, pedicle screw.

Support: FAPERJ, NIPNAC and NIPNDIM Secretary of State of Rio de Janeiro/UERJ Projects.

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Abstracts of the lectures

Deep brain stimulation for Parkinson´s disease

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Introduction: Parkinson´s disease is a degenerative movement disorder that affects motor circuits within central nervous system. Initial pharmacologic therapy includes L-DOPA and MAO-B inhibitors, but as the disease progresses, loss of efficacy and side effects like dyskinesia appear. **Objective**: Implant of deep brain electrodes for stimulation at specific targets within basal nuclei has been used to reduce severe motor symptoms when medications are ineffective. **Methods**: present the multidisciplinary team approach for selecting Parkinson´s disease patients and the technique of bilateral deep brain stimulation implants, performed in single surgical session at Pedro Ernesto University Hospital (UERJ), Rio de Janeiro. **Results**: Sixty-one patients were operated between January 2020 and September 2024. Fifty-nine patients received bilateral subthalamic nucleus implants and two patients bilateral globus pallidus internus nucleus (GPi) implants. **Conclusion**: Bilateral deep brain stimulation for Parkinson´s disease is a safe and effective procedure for reducing the symptoms of the disease and can be performed within the Brazilian public health system.

Keywords: Parkinson´s disease; DBS; deep brain stimulation; movement disorder; neuromodulation.

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Abstracts of the lectures

Whole-body vibration on tissue repair

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Introduction: Tissue repair is a complex, multifactorial process that involves molecular, biochemical and cellular events. In certain cases, the healing process can be impaired, leading to delayed wound closure or incomplete healing. This issue poses a notable challenge to public health. Various therapies have been investigated to accelerate abnormal tissue repair in wounds; however, many of these approaches have limitations due to side effects or inconsistent outcomes. Physical exercise is recognized as an important factor that impacts healing. Among alternative therapies, whole-body vibration (WBV) has attracted interest for its potential benefits in diverse conditions, although its effects on skin healing remain unclear. **Aim:** This lecture aims to offer a thorough overview of the primary effects of whole-body vibration (WBV) on the healing of skin wounds, both in human and murine pathological and non-pathological conditions. **Results**: An experimental study, conducted by our group, evaluated the effects of whole-body vibration (WBV) on cutaneous tissue repair in male rats. After a 15-day intervention, preliminary evidence of potential benefits, such as increased angiogenesis and Galectin-3 expression, was observed. Other studies corroborate these findings and show promising results. It is also crucial to recognize that each case is distinct, making it essential to evaluate the potential benefits and risks of WBV therapy on an individual basis. **Conclusion:** In summary, current data on WBV indicates its potential as a therapeutic approach to accelerating wound healing. Data highlights the relevance of further investigations to elucidate the underlying mechanisms and confirm the role of WBV in wound healing. However, additional research is necessary to validate these findings and develop standardized protocols for using WBV as a treatment for skin wound healing.

Keywords: whole-body vibration; wound healing; skin.

Financial Support: CNPq.

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BJMVB

Abstracts of the lectures

Dental pre-screening system for profile analysis for undergraduate subjects

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Introduction: Access to dental treatment is still a challenge in Brazil, where there is a deficit in the provision of services by the public health system, with emphasis on specialized treatments. There is often a large geographic shift for patients, who seek out dental Specialty Centers and services offered by higher education institutions in large cities to carry out evaluation and treatment consultations. However, academic training activities presuppose the development of skills and competencies as well as a degree of technical maturity that need to be linked to the patient's clinical profile. **Objective:** The objective of the present study was the development of responsive software (STO) capable of carrying out dental pre-screening of patients who seek undergraduate teaching clinics at Dentistry/UERJ, to be associated with the degree of training of undergraduate students. **Methods:** Phase 1) A sample of participants (35 patients and 10 developers) with a mixed methodology was used to evaluate usability (System Usability Scale - SUS) and to measure patients' perception (semi-structured interview) about the STO components. Phase 2) After this preliminary analysis, the software was disseminated among different academic units at UERJ for use of the software and clinical care to verify users' self-perception of their oral health and appropriate indication within the undergraduate clinical care flow and; Phase 3) Development of explanatory and guidance material for patients who did not have the profile for care in undergraduate clinics. **Results**: Phase 1) The overall SUS rating for the system was 76.92. Among patients, 24 described the system as easy to use, 83% agree or strongly agree with question 1 "I think I would like to use this system often" and 83% of them agree or strongly agree that people would learn to use it quickly. Qualitative data collected showed that 100% of patients would recommend the software to someone they know. Phase 2) 87 patients enrolled virtually, but only 61 (70.1%) received clinical care for comparison between reported and clinical data. 22 patients were enrolled and 18 are in care. The procedures most demanded by patients using the software were cleaning (53/86.8%), orthodontic appliances (25/40.9%) and restoration (18/29.5%). Phase 3) All patients who did not qualify for graduated care received guidance via cell phone message about possible locations for their needs. **Conclusion**: The results of the SUS and the semi-structured interview showed that the STO achieved its objective and can optimize the in-person screening process in a public dental service. The comparison between the perception of their oral health and the software questionnaire proved to be positive, reinforcing the promise of using the software for dental pre-screening in institutions.

Keywords: user-centered design; dentistry; teledentistry; usability test.

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Abstracts of the lectures

Assessing brain and peripheral muscle oxygenation: clinical applications and research insights using near-infrared spectroscopy

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Introduction: Near-infrared Spectroscopy (NIRS) is a non-invasive optical imaging technique that assesses tissue oxygenation and hemodynamics. By measuring the absorption of near-infrared light in tissues, NIRS evaluates concentrations of oxygenated and deoxygenated hemoglobin. The aim of this lecture is to present the historical development, clinical applications, and research surrounding NIRS for brain and peripheral muscle oxygenation. **Methods**: A literature search was conducted in three databases (PubMed, Scopus, and Web of Science) up to October 2024 to highlight key findings related to the history, clinical applications, and NIRS research. **Results**: The foundational principles of spectroscopy were established in the 19th century, however, by the 1970s, the NIRS´ concept began to materialize. This technology enables the observation of changes in muscle oxygenation and other parameters in clinical trials involving patients with chronic diseases, facilitating the assessment of muscle oxygenation during rehabilitation exercises and the adjustment of therapy. Additionally, NIRS is employed in critical care and surgical settings and brain oxygenation, particularly in cases of traumatic brain injury, stroke, and neonatal monitoring. Clinical studies have also investigated the effects of physical exercise training or during clinical tests in different populations. Another area of interest is the investigation of brain activity associated with cognitive processes, such as attention, memory, decision-making, and cognitive performance. However, NIRS does have limitations, such as depth sensitivity. Factors such as skin pigmentation, movement that increases artifacts, and ambient light can also affect readings, requiring careful interpretation. **Conclusion**: NIRS technology has evolved from theoretical principles into a widely used clinical tool. Its non-invasive nature and ability to provide real-time data make it particularly valuable for managing various medical conditions and understanding physiological responses in research settings. While the limitations of technology must be considered, ongoing advancements are likely to enhance its accuracy and broaden its applications in healthcare and scientific research, furthering our understanding of physiological processes.

Keywords: near-infrared spectroscopy; muscle oxygenation; brain oxygenation; clinical application; hemodynamics.

Financial Support: *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* - CAPES.

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Abstracts of the lectures

Effects of systemic vibratory therapy on the symptoms of Parkinson's disease

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Introduction: Parkinson's Disease (PD) is a neurodegenerative condition that compromises motor control, caused by a deficit in cortical dopamine, leading to significant functional difficulties. Whole Body Vibration (WBV) is a therapeutic approach that has gained attention for its potential to improve patient mobility and quality of life. **Objective**: To review the effect of WBV in the treatment of PD, highlighting the parameters used and the effects achieved. **Method**: A bibliographic review was conducted using databases such as PubMed and Scopus, focusing on studies published in the last ten years that explored the application of WBV in patients with PD. The analyzed parameters included frequency, amplitude, and session duration. **Results and Discussion**: The review identified that WBV, with frequencies ranging from 20 to 40 Hz and amplitudes of 2 to 4 mm, resulted in significant improvements in balance, muscle strength, and functional mobility. Additionally, patients reported reductions in motor symptoms and improvements in quality of life. The results suggest that WBV may be an effective and safe intervention, complementing traditional approaches. However, the variability among studies indicates the need for standardized protocols. **Final Considerations**: WBV shows promise in the management of PD, requiring further research to establish specific clinical guidelines and optimize interaction with conventional therapeutic treatments.

Keywords: whole-body vibration, Parkinson's disease, treatment

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Abstracts of the lectures

Management of chronic obstructive pulmonary disease: what is early disease?

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Introduction: Chronic obstructive pulmonary disease (COPD) is currently the third leading cause of death worldwide and continues to be underdiagnosed. The main causes of delayed diagnosis include the difficulty in performing spirometry, the insidious onset of the disease, which causes few respiratory symptoms at first, which are usually associated with smoking or aging, and the idea that COPD manifests itself after many years of exposure to aggressive agents, therefore, it is a disease of the age group over 60 years. **Objective:** To present data that support the need for earlier diagnosis. **Method:** bibliographic survey on the subject. **Results:** Most patients (54%) diagnosed with COPD are already in spirometric stage 3 or 4. On the other hand, data from COPDGene, evaluating 4,388 patients without spirometric alterations, found that these patients were younger than patients with COPD, but could present many respiratory symptoms and tomographic alterations such as emphysema and bronchial thickening. Other publications confirmed the fact that smokers without functional alterations can exacerbate more than patients with an established diagnosis of COPD. These data confirm the unmet need to expand and improve the way we diagnose COPD. One of the proposals is to use artificial intelligence to read chest computerized tomography (CT) scans. Several recent publications indicate that it will be possible, in the near future, for new technologies to be able to expand the diagnosis, increasing the number of confirmed patients. **Conclusion:** COPD is still a very underdiagnosed disease. The use of new technologies to facilitate and expand diagnosis is essential so that appropriate treatment can be implemented in earlier stages of the disease, when structural damage can be reversed or minimized.

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Abstracts of the lectures

Precision Medicine in Narcolepsy

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Introduction: Narcolepsy is the most significant central disorder of hypersomnolence. While HLA-DQB1*06:02 is the primary genetic risk factor for narcolepsy, other alleles have also been identified. However, data on these conditions in Brazil is limited, with previous studies not exploring HLA high-resolution sequencing and hypocretin measurement, now considered a biomarker for NT1. Additionally, there is ongoing research to find a biomarker for diagnosing narcolepsy type 2 (NT2) and IH. Therefore, genetic studies in a diverse population like Brazil can provide valuable information on primary hypersomnias. The latest edition of the International Classification of Sleep Disorders (ICSD-3) has redefined narcolepsy terminology, replacing the subdivisions “with" or "without" cataplexy to narcolepsy type 1 (NT1) and type 2 (NT2), based on the discovery that low levels of hypocretin-1 (Hcrt) in cerebrospinal fluid (CSF) is the hallmark of NT1. However, the measurement of this biomarker is not readily available in many countries, including Brazil, and the lumbar puncture may deter patients. Cataplexy and a positive multiple sleep latency test (MSLT) are still used to diagnose NT1 without hypocretin data. Nevertheless, these criteria have limitations, as both NT1 and NT2 patients may exhibit atypical or absent cataplexy, and most episodes are not witnessed by the specialist, leading to diagnostic challenges. **Objective:** This study aimed to investigate genetic characteristics associated with susceptibility or protection for narcolepsy in the Brazilian population using Precision Medicine to diagnose NT1 and NT2 and to compare clinical and genetic variables between NT1 and NT2 classified based on biomarker criteria, focusing on which variables can better predict NT1 diagnosis beyond cataplexy. **Methods**: Diagnosis of narcolepsy was based on the third version of the International Classification of Sleep Disorders, with sub-classification into NT1 and NT2 determined by the concentration of CSF hypocretin 1 using radioimmunoassay. Mass parallel sequencing was conducted for High-resolution HLA sequencing for class I (A, B, and C) and class II (DPB1, DRB1, and DQB1) alleles. The study compared the data obtained with the National Registry of Bone Marrow Donors (REDOME) database, matching by sex, self-declared ethnicity, and geographic location in a ratio of 1 case to 5 controls. Clinical, neurophysiological, and genetic data from high-resolution HLA-sequencing were obtained. Univariate analysis was performed to compare the two groups (Epinfo©). Regarding multivariate analysis, a biological model was made by omitting hypocretin information to unveil which variables were better in differentiating NT1 from NT2 (MetaboAnalyst 6.0©) **Results**: The study included 43 narcolepsy patients and 215 controls, 15 NT1, 16 NT2 and 12 narcolepsy without hypocretin measurement. NT1 patients exhibited a higher frequency of the HLA-DQB1*06:02 allele compared to controls and NT2 patients (100% vs. 20% vs. 18.75%, respectively; p<0.001). Following DQB1*06:02,

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DRB1*15:03 was identified as the most common allele associated with NT1, forming a haplotype with an odds ratio of 14.47 compared to controls (95% CI: 4-53.1, p<0.005).DRB1*15:01 was not associated with a significant risk after the Bonferroni correction. All 43 patients presented at least one risk, as already described in the literature. Thirty-one patients (15 NT1 and 16 NT2) and 73 variables were compared. Typical cataplexy was absent in 20% (n=3) of NT1 patients. Atypical cataplexy was present in 43,7% of NT2 (n=7). NT1 subjects exhibited significantly higher body mass index (BMI) and frequency of typical cataplexy and lower sleep latency (SL), total sleep time (TST), and mean sleep latency in MSLT compared to NT2 (p<0.05). These results are compatible with the Hcrt deficit. In multivariate analysis, the Variance Importance of Projection (VIP Score) "ranking" of the variables highlighted in multivariate analysis. The top five: HLA-DQB1*06:02, SL, DRB1*15:03, DRB1*15:03~DQB1*06:02, typical cataplexy. **Conclusion:** These preliminary results of the first Brazilian study on narcolepsy using precision medicine revealed that HLA-DQB1*06:02 is the primary genetic risk factor for NT1 but not NT2, with a higher frequency than previous reports. The DRB1*15:03 was more prevalent among NT1 Brazilian patients in this sample, suggesting the influence of African heritage. No single test alone is perfect for distinguishing NT1 and NT2, but the importance of cataplexy may be overrated. Therefore, objective parameters beyond cataplexy, especially HLA-DQB1*06:02, SL, and BMI, are attractive to compose multimodal criteria that provide a more accurate diagnosis of NT1 and NT2 even without Hcrt information. This differentiation can be helpful in public health in selecting the best candidates for new drugs based on hypocretin function since they are more effective in NT1 patients.

Keywords: narcolepsy, hypocretin, HLA-DQB1*06:02, precision medicine.

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Abstracts of the lectures

Technological advancements in the analysis of human motion

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Human motion analysis is essential in monitoring disease progression, guiding rehabilitation, assessing athletic performance, and designing assistive devices. Optical motion capture systems, using cameras and reflective markers, remain the gold standard for analyzing diverse human movements. These systems capture three-dimensional kinematics, such as joint angles, limb positions, and motion velocities, facilitating early detection of movement abnormalities and supporting health professionals throughout the rehabilitation process. Alternatively, inertial measurement units (IMUs), which incorporate triaxial gyroscopes and accelerometers, provide a cost-effective means of estimating kinematic parameters through measurements of angular velocity and acceleration. These wearable sensors offer practical and efficient data collection, independent of environmental constraints, as demonstrated by smartphone-based assessments for gait abnormalities. Recent advances in artificial intelligence, particularly deep neural networks, have enabled markerless motion analysis, expanding its applicability to outdoor settings. Despite ongoing challenges in the reliability of these techniques, markerless methods support efforts to standardize three-dimensional kinematic assessments. These innovations enhance tools for clinical practice, enabling early musculoskeletal diagnoses and continuous patient progress monitoring. Additionally, advances in machine learning have improved the sensitivity of motion capture systems to subtle gait variations, aiding therapeutic decision-making and refining rehabilitation evaluations.

Keywords: motion analysis, gait analysis, inertial measurement units, markerless.

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Abstracts of the lectures

Applicability of the baropodometry exam in the health field

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Introduction: Computerized baropodometric assessment is an important diagnostic tool in the health field that allows recording plantar impressions and pressure, ground reaction forces in the support area during the vertical position, in addition to allowing the analysis of postural balance through stabilometry and the relationship of the foot with posture, not only during the static position, but also dynamically, during walking. **Objective**: to describe the applicability of the baropodometry exam in the health field correlating it with clinical practice. **Methods**: expository lecture with panel presentation and debate on the topic addressed. **Results**: Data obtained about the analysis of plantar pressure can help to understand and correlate postural problems and establish an appropriate form of treatment for musculoskeletal, integumentary and neurological disorders. **Conclusion**: Based on the data obtained from baropodometry and stabilometry, health professionals can use them to identify the population at risk, as well as to modify or establish a new treatment program through changes in footwear, orthoses and therapeutic exercises. This information is also useful to improve understanding of the possible relationships between plantar pressure and lower limb posture.

Keywords: clinical analysis; pressure; foot; posture; gait.

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Abstracts of the lectures

Child development assessment tools

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Introduction: Child development is a multifaceted process and an adequate assessment of this development allows not only the early identification of possible delays and disorders, but also the planning of interventions that favor the child's healthy evolution. Developmental assessment tools have been used to track development indicators in several areas, including motor, cognitive, emotional and linguistic skills. These instruments provide valuable and comparable parameters, allowing health and education professionals to monitor children's progress and identify early signs of neurological and psychosocial disorders. We will discuss the main tools for assessing child development, addressing their theoretical foundations and practical applicability in clinical and educational contexts. **Objective**: To present the main instruments that assess child development, highlight advantages and disadvantages of the instruments, helping professionals choose the best tool for each situation and age group, highlight the limitations of the tools regarding cultural, social or economic issues and present the tools as aid for understanding development, for diagnoses and treatments. **Methods**: choice of widely used and validated tools for assessing child development. **Results**: The age range covered in each tool reflects the basic theory, with Weschler intelligence scales. Some tools offer broader age monitoring, but have specific developmental limitations, such as the Denver Developmental Scale. There are no complete tools that cover emotional and social development and behaviors with the Child Behavior Checklist. Therefore, an assessment requires several tools evaluating different aspects of cognition and behavior. **Conclusion**: We conclude that the tools are fundamental for identifying delays and difficulties in child development, allowing early interventions whether in the clinical or pedagogical area. Accurate assessments make it possible to monitor different areas of development. In addition to the benefit for children and adolescents, they offer support and guidance to family members and caregivers, which positively impacts the quality of interventions given to individuals.

Keywords: child development, assessment tools, neuropsychological assessment, diagnostic tools.

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ABSTRACTS OF THE POSTER SECTION

Abstracts of the poster section

Lower limbs peripheral muscle oxygenation during a submaximal physical test in adolescents with congenital heart disease

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Introduction: Due to advances in early diagnosis and surgical techniques for correction of congenital heart defects, most children with congenital heart disease (CHD) survive to adulthood. Exercise intolerance and fatigue are significant consequences of the disease. **Objective**: To assess peripheral muscle oxygenation in the lower limbs of adolescents with congenital heart disease (CHD) during a submaximal physical capacity (PC) test. **Methods**: Cross-sectional study with adolescents (12 to 18 years old), divided into 2 groups: adolescents with corrected CHD (ACCHD) and adolescents with uncorrected CHD (AUCHD), submitted to the 3-minute step test (3MT). Peripheral muscle oxygenation during the 3MT was measured by NIRS, positioned on the triceps surae. BORG scale was used to rate perceived exercise exertion. Interand intra-group comparisons were performed using the t-test for independent samples or Mann-Whitney and t-test for paired samples or Wilcoxon test. The significance level adopted was $p<0.05$. **Results**: Twenty-six adolescents were evaluated, divided into the ACCHD (n=15) and the AUCHD (n=11), with a mean age of 14.5 (±2.1) vs. 13.2 (±1.3) years. Regarding performance in the 3MST, the ACCHD group performed an average of 69.8 (±9.2) steps, the AUCHD group, and 69.7 (±4.5) steps. There was a significant intergroup difference for the HbO2 variable at minute 1 (3.8 (±4.0) vs. 8.0 (±5.9)), for the HHb variable at minute 1 (4.3 (±3.1) vs. 0.3 (±3.5)), minute 2 (1.5 (±2.1) vs. -0.9 (±2.7)) and minute 3 (1.1 (±2.2) vs. -1.0 (±2.7)) and for the baseline IST variable (64.7 (±4.8) vs. 69.4 (±4.6)) for ACCHD vs. AUCHD, respectively. For intragroups comparisons, in the ACCHD group, there was a significant difference in the variables HbO2, HHb, tHb and BORG for all minutes in relation to the basal value. In the AUCHD group, for the variables HbO2 and tHb and BORG for all minutes, in relation to the basal value. There was no difference in HHb. **Conclusion**: The variations in peripheral muscle oxygenation in the variables HbO2, HHb, tHb and IST showed differences in adolescents with corrected or uncorrected CHD, with important information about the kinetics of muscle oxygenation of the lower limbs and the behavior of the variables in the different groups during the 3MST.

Keywords: congenital heart disease; submaximal physical capacity; peripheral muscle oxygenation.

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Abstracts of the poster section

Technology in postural education method: technological innovations for postural health promotion in scholars

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Introduction: The "Technology in Postural Education Method" (TEP) integrates technologies and innovative pedagogical practices, for body postural education promotion and the acquisition of adequate postural habits in scholars. **Objective:** To evaluate the dynamic postures and theoretical knowledge about posture and health education of adolescents, pre- and post- TEP intervention. **Method:** This is a quasi-experimental study with adolescents aged between 15 and 18 from a public school. An assessment, three theoretical-practical interventions and a reassessment were applied. For dynamic postures, the adolescents were filmed in the frontal and sagittal planes during activities such as picking up and dropping a heavy object, tying their shoes and carrying a backpack, with the camera on a tripod 0.90 cm high and 3 meters away from the student. The learning process of the topics covered in the method was assessed by a theoretical knowledge questionnaire. Theoretical-practical interventions took place once a week, lasting 120 min each, and involved interactive postural education and a group of physical exercise. The students were submitted into gamification with the Mentimeter® (Mentimeter, Sweden) and Google® Sites (Google, USA) was a repository with digital teaching materials and animated folders with exercise demonstrations. These materials were developed in Genially® (Genially, Spain) and Canva® (Canva, Australia). Data were processed and analyzed using SPSS, version 20.0. Data distribution was assessed using the Kolmogorov-Smirnov test. The Wilcoxon Test was applied ($p \leq 0.05$). **Results:** 70 adolescents participated in the study, with a mean age of 16 ± 0.96 for males (n=40) and 16.3 ± 0.79 for females (n=30). After applying the TEP Method, there was a significant improvement in dynamic posture execution ($p<0.001$) and in the overall score of theoretical knowledge (8.00 [7.22-8.81] vs. 14.00 [13.17-14.23], $p<0.001$), as well as in the daily activities and musculoskeletal anatomy domains ($p<0.001$). **Conclusion:** TEP significantly improved the execution of dynamic postures and theoretical knowledge about posture and health of adolescents. This innovative resource facilitated playful activities, enhancing the teaching-learning process about posture and body awareness.

Keywords: dynamic postures; postural education; technology.

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Abstracts of the poster section

Postural assessment, screen time, and self-reported

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Introduction: Generation Z teenagers, born between 1997 and 2012, belong to a generation characterized by digital fluency and constant connection with the media, and may present postural changes and musculoskeletal pain due to excessive use of electronic devices. **Objective:** To evaluate and compare between sexes the static posture, screen time, and musculoskeletal pain in adolescents. **Method:** Cross-sectional observational study with adolescents aged 12 to 17 from a public school. Postural assessment was performed using bio-photogrammetry with SAPo Software. Participants were photographed in an orthostatic position in frontal and sagittal planes by the same trained evaluator, with spherical markers placed on anatomical regions and images calibrated using a plumb line. The BackPei-CA questionnaire was used to assess screen time and musculoskeletal pain. Data was processed and analyzed using the SPSS, version 20.0. Data distribution was assessed using the Kolmogorov-Smirnov test. Mann-Whitney U test was applied to compare quantitative variables between sexes ($p \leq 0.05$). **Results:** The sample consisted of 120 adolescents, 60 of each sex, with an average age of 15.76 ± 1.16 years for males and 15.65 ± 1.29 years for females. In the overall postural assessment, pelvic horizontal misalignment to the left forward head posture and right lateral head tilt were observed. When comparing sexes, there was a significant difference in the horizontal alignment of the anterosuperior iliac spines in the right ($p<0.001$) and left ($p=0.001$) lateral views, and in the horizontal alignment of the head relative to C7 in the right lateral view ($p=0.043$), with greater angulation in females in both cases. The average screen time was 9 hours for both sexes, exceeding the 3-hour limit recommended by the Brazilian and International Societies of Pediatrics. Musculoskeletal pain was reported by 65.8% of adolescents, with higher prevalence in females (71.6%), particularly in the lumbar (32%) and cervical (22.8%) spine, with moderate pain intensity (31.6%). **Conclusion:** Adolescents from Gen Z showed postural deviations and reported high musculoskeletal pain and excessive screen time, especially among females These findings highlight the need for health promotion in schools to promote better posture and reduce screen time among adolescents.

Keywords: posture; screens; musculoskeletal pain; adolescents.

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Abstracts of the poster section

Effects of whole-body vibration exercises combined with russian current on funcional capacity and pain after meniscectomy: a case report

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Introduction: Meniscus injuries degenerative are common in older individuals are mainly affecting women between 60 and 70 years old. Physicaltherapy are commonly used to manage this condition, but there are case that surgery can be indicated. The main complications of this surgery include the risk of deep vein thrombosis and infections, muscle strength loss and edema. Recommended treatment strategies include strengthening muscle and recovering the range of motion (RoM). Whole-body vibration exercises (WBVE) may be a viable exercise option for this condition, as well as the use Russian current (RC). **Objective:** To demonstrate the effects of WBVE combined with RC on funcional capacity and pain after meniscectomy. **Methods:** A 61-year-old underwent a surgery to repair a bucket- handle tear in the lateral meniscus of the right knee. She was referred to the Physiotherapy, 15 days after surgery, with the main complaint of "pain when walking". The patient was informed about the treatment and signed consent for the publication of the collected data and images. Functional capacity and pain were assessed before and after treatment using the instruments: analog goniometer, Short Physical Performance Battery (SPPB), Lysholm questionnaire, Kendall strength scale, and Numeric Pain Rating Scale (NPRS). The treatment lasted for 2 months (2x per week – 16 sessions). A WBVE protocol was performed on the vibration platform (Power Plate My5®), in the squat position (knee flexion at 30º) with the following biomechanical parameters: frequency from 25 to 40 Hz; peak-to-peak displacement of 2 mm; 4 bout of 1:3 min. The RC was introduced after the fourth session using a Neurodyn 10 Channels Electrostimulation Platform (IBRAMED®) with the following parameters: carrier frequency of 2,500 Hz, frequency modulation at 40 Hz, ramp-up time (RISE) of 4 seconds with 50 seconds of work (T-ON); ramp-down time (DECAY) of 4 seconds and rest time (T-OFF). **Results:** After 16 sessions, there were improve te pain (NPRS=6 for 0), muscle strength (Kendall =3 for 5), the RoM for knee flexion (120º for 137º), SPPB score (9-moderate for 11-good capacity), and the Lysholm score (66-fair for 96-excellent performance). **Conclusion:** WBVE combined with RC was able to improve functional capacity and pain in the postoperative period of meniscectomy.

Keywords: whole-body vibration exercise, electrostimulation, meniscectomy, functional capacity, physiotherapy.

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Abstracts of the poster section

Skin temperature of the lower limbs of post-covid-19 individuals: partial results

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Introduction: COVID-19 induces an excessive increase in pro-inflammatory cytokines causing severe damage to various body tissues. Persistent imbalance in the levels of these cytokines can lead to deregulation of skin temperature. These changes, patterns of inflammation and perfusion, can be detected using infrared thermography, by capturing images that show the distribution of thermal radiation emitted by the body's surface. **Objective:** To evaluate the skin temperature of the lower limbs of post-COVID-19 individuals using infrared thermography according to gender. **Methods:** A cross-sectional study, approved by the CEP/CCS/UFPE (n°5.014.316), developed at the Laboratory of Kinesiotherapy and Manual Therapeutic Resources (LACIRTEM), based on the analysis of a previous database. The study included individuals affected by COVID-19 proven by laboratory tests, >18 years old, living in the metropolitan region of Recife. The skin temperature of the lower limbs was assessed using a FLIR E40bx thermographic camera, including the thigh and leg segments in the posterior view. The thermograms obtained were analyzed using Thermofy© software and descriptive statistical analysis of the data was carried out using SPSS software version 20.0. **Results:** Data from 40 post-COVID-19 patients were analyzed, 15 men and 25 women. In men, the average temperature was 32.6°C and 32.1°C in the right IM, posterior thigh and calf, respectively; in the left IM, the average temperature was 32.7°C and 32.1°C in the thigh and calf, respectively. In the female group, the average skin temperature in the posterior region of the thigh in the right IM was 32.8°C, while in the calf the average was 31.7°C; in the left IM, the average temperature was 32.9°C and 31.7°C in the thigh and calf region, respectively. **Conclusion:** Our study showed an increase in skin temperature in the lower limbs of patients after COVID-19 infection.

Keywords: COVID-19; skin temperature; lower limbs; infrared thermography.

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Abstracts of the poster section

Modelling blood flow dynamics during muscle contractions

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This work deals with the development of a physical model of blood flow during muscle contractions. The central topic is how exactly muscle contractions influence blood flow in the human body. Investigating the mechanisms of blood flow during muscle contractions is of great importance for understanding muscle physiology and its adaptations under different conditions such as inactivity, ageing and clinical conditions. The focus lies on the human active musculoskeletal system, especially the calf muscles during isometric contraction. Overall, this work represents a significant advance in our understanding of the complex interactions that determine the physiological performance of the human body. Different methods were used to investigate the dynamics of blood flow during isometric contractions. By combining theoretical physical principles with experimental data from our own studies and the literature, a robust model is created that can represent the dynamics of blood flow during muscle contractions. The Brachial Analyzer for Research (BAfR) software program was used to analyze the diameter of the femoral artery as a function of time, as well as the anterograde and retrograde flow velocities in different levels of the maximum voluntary contraction (MVC) and relaxed state. The mathematical modelling of blood flow aims to consider the non-Newtonian properties of blood by using Navier-Stokes equations. The model is being validated by experimental data collected during the study to ensure that the simulations reflect realistic physiological conditions. The integration of the collected data and physical principles enabled the development of a model that accurately represents the blood flow dynamics during muscle contractions. The results demonstrate a variation in blood flow and pressure drop with increasing MVC levels. Specifically, blood flow decreased, and pressure drop increased as MVC levels rose, indicating the impact of muscle contraction on arterial haemodynamics. The work concludes that muscle contraction intensity significantly affects the haemodynamics of the femoral artery. These findings have important implications for understanding muscle-artery interactions during physical activity and could be seen as a significant step towards pushing the boundaries of current research and opening new possibilities for medical diagnosis and treatment methods.

Keywords: arterial blood flow; haemodynamics; muscle perfusion; fluid mechanics;

Acknowledgment: This work is still in progress. The model is currently under validation, and as such, no concrete results are available currently. Further development and refinement are necessary before final conclusions can be drawn.

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Abstracts of the poster section

Method of calibration of a vibration platform with different loads: a methodological study

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Introduction: Whole Body Vibration can improve muscle strength and power, balance and body composition, and aid in metabolic control in young and old people, including those with Type II Diabetes Mellitus. Despite these benefits, there is a significant gap in research and clinical practice regarding the verification of vibration parameters and their stability. This is important because individuals with different body characteristics often perform the same training protocol and many equipment do not deliver what they promise. However, this calibration requires multidisciplinary collaboration between engineers and health professionals, which can facilitate this approach. **Objective:** to evaluate and describe the stability and reliability of vibration parameters of a platform used at different loads. **Method:** A methodological study was carried out involving a conventional sample of young, healthy adults with different body weights. The vibration platform provided a rotational vibration with rotation around a central axis causing an alternating vertical displacement of the legs. Measurements were made by accelerometry to verify the actual vibration frequency, acceleration and displacement of the plate during six distinct frequencies and in three different foot positions. All measurements were performed on two non-consecutive days. **Results:** The intraclass reliability coefficient is performed for all measurements covered. Simple linear regression analysis is used to evaluate the correlation between the displayed platform frequency and the actual frequency measured by the accelerometer. Differences or correlations between vibration parameters with foot positioning and weight variations is analyzed. **Conclusion:** This study seeked to validate the stability of frequencies and displacement considering variations in weight and positioning. The objective is to emphasize the importance of performing calibration procedures before using the platform in health-related research studies and clinical practices.

Keywords: whole body vibration; accelerometry; reliability; vibration parameters.

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Abstracts of the poster section

Novel approach to investigate muscle contraction behaviour in children and adolescents with spastic cerebral palsy

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Introduction: Whole-body vibration therapy (WBVT) is a well-established and frequently used therapeutic intervention in rehabilitation of children with spastic cerebral palsy (CP). The positive effects of WBVT-supported therapy can be seen in reduction of different CP-associated physical disabilities. However, the underlying mechanisms within the muscle are unknown. To investigate the effects of WBVT on muscle function a testing protocol requiring voluntary and controlled contractions is mandatory. We therefore examined feasibility and acceptability in children and adolescents with CP of a muscle testing protocol that is based on the muscle examinations of astronauts and in bed-rest studies. **Methods**: Twelve participants, aged between 8 and 18 years, with CP and age-matched able-bodied counterparts (Ctrl) have been included into the study. They completed testing procedures on two visits on separate days. Participants performed three kinds of isometric plantarflexion contractions on a custom build dynamometer. The first task was the maximum voluntary contractions (MVC), followed by constant submaximal contractions at 20 %, 40 % and 60% MVC and ramp contractions from rest to 100 % MVC and back to 0%, with three trials for each task. The tasks were visualized using a plantarflexion torque-controlled video game. Electromyography (EMG) was recorded for tibialis anterior (TA), soleus (Sol) and lateral gastrocnemius (GL) muscles. During submaximal contractions a near-infrared spectroscopy (NIRS) optode has been attached to the medial gastrocnemius mid-belly, which was replaced by an ultrasound probe during ramp contractions. After each task participants answered an acceptance questionnaire with a five-tier scale. To normalize for body mass, plantar flexion force was expressed as multiples of Earth's acceleration (g). As markers of performance we computed steadiness, defined as standard deviation of the fluctuations, and slope, as well as the achieved MVC. Data were statistically analyzed via Linear Mixed Effect Models and Wilcoxon Test for pairwise comparisons. **Results**: One participant of the CP group was not able to perform the tasks due to limited cognitive abilities and dropped out for the second visit. All other participants successfully completed both measurements. Especially younger children and children with cognitive impairments were not able to adequately answer the acceptance questionnaire. The MVC differed between groups and visits (visit 1: 4.3 g Ctrl vs. 1 g CP; visit 2: 4.9 g Ctrl vs. 1.4 g CP, $p_{measurement}<0.001$ and $p_{group}<0.001$). Steadiness differed between groups during submaximal contractions with CP showing higher fluctuations (visit 1: 6.1 %MVC Ctrl vs. 52.2 %MVC CP; visit 2: 5.3 %MVC Ctrl vs. 20.6 %MVC CP, $p_{group}=0.002$). Pairwise comparison within visits confirmed significant differences between groups in both visits (visit 1: $p_{group}<0.001$; visit 2: $p_{group}<0.001$). During ascending ramp contractions CP showed higher fluctuations in torque than Ctrl (visit 1: 7 %MVC Ctrl vs. 26.3 %MVC CP; visit 2: 8.6 %MVC Ctrl vs. 14.5 %MVC CP, $p_{group}=0.019$). Pairwise comparison within visits confirmed significant differences between groups during visit 1 but not during visit 2 (visit 1: $p_{group}=0.016$; visit 2: $p_{group}=0.015$). During descending ramp contractions steadiness differed between groups (visit 1: 8.1 %MVC Ctrl vs. 34.1 %MVC CP; visit 2: 7.7%MVC Ctrl

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vs. 15.9 %MVC CP, p_{group}=0.015). Also, the slope differed significantly between groups (visit 1: -10.3 %MVC/s Ctrl vs. -3.8 %MVC/s CP; visit 2: -10.5 %MVC/s Ctrl vs. -10.1 %MVC/s CP, p_{group}=0.018). Pairwise comparisons could confirm the differences in steadiness (visit 1: p_{group}=0.012; visit 2: p_{group}=0.013) but not the differences in slope (visit 1: p_{group}=0.228; visit 2: p_{group}=0.456). **Discussion:** Application of our gamified muscle testing protocol was well acceptable and mostly feasible. Contrasting with constant isometric contractions and decreasing ramp contractions, the performance of children with CP during ascending ramp contractions improved to the level of control subjects within 2 visits. A crucial prerequisite to perform successful measurements are good cognitive skills and at least one familiarization visit. To assess acceptability of the measurement a different tool for quantification than a questionnaire should be considered. However, all children voluntarily repeated the measurement procedure for visit 2. **Conclusion**: In this study we were able to show that the reported measurement setup and protocol are feasible for muscle examinations in children and adolescents with cerebral palsy. Based on these results, future studies to investigate the effects of WBVT on muscle mechanics and function are of great interest and will be conducted in the near future.

Abstracts of the poster section

Evaluation of the effects of systemic vibratory therapy after 1 session and after 6 weeks on thermogenesis in individuals with obesity: preliminary randomized results

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Introduction: Obesity, characterized by excessive fat accumulation and a body mass index (BMI) of ≥30 kg/m², is a world health challenge. Brown adipose tissue produces heat through thermogenesis, mediated by UCP1, and is a strategy to increase energy expenditure. Both physical exercise and cold exposure can increase thermogenesis, however, obese individuals may have difficulty adhering to conventional exercise. Systemic vibratory therapy (SVT) that promotes whole-body vibration through mechanical vibration (MV) in a vibrating platform (VP) has demonstrated good adherence. **Aim:** To evaluate the effects of SVT on thermogenesis in obese individuals. **Methods:** A randomized study, approved by the ethics committee (CAAE 30649620.1.0000.5259), included 15 participants, divided into a control group (GC) (n=7) and an SVT group (n=8). Infrared thermography (FLIR E40 camera) was used to measure the temperature (in Celsius ºC) of the right supraclavicular (SCR) and left supraclavicular (SCL) areas before and after the first session (FS) and before and after the final session 6 weeks (6W). The SVT protocol (MV: frequency 30 Hz, low peak-to-peak displacement) involved static squats for 30 min (1 min work, 1 min rest). The CG followed the same protocol with the VP turned off. Data were analyzed using R software with ANOVA for repeated measures, and the results were expressed as temperature difference (mean Δ°C), with *p* values. Results: There was no significant difference between groups regarding age: $p = 0.08$ [years]; body mass: $p = 0.975$ [kg]; BMI: $p = 0.386$ [kg/m²]. In the SCR area, there was a significant difference when comparing the CG vs SVT groups: (ΔC°1st: -1.2± (CG)/ -0.25± (SVT)/ ΔC°6w: -0.3 (CG)/-0.01 (SVT), intergroup $p=0.028$), intragroup $p=0.0785$). In the SCL, no difference was observed: (ΔC°FS: -0.7 (CG)/ -0.1 (SVT)/ ΔC°6W: -0.05(CG)/-0.1 (SVT), intergroup $p=0.355$, intragroup $p=0.355$). **Conclusion:** This study demonstrated a significant decrease in the temperature of the SCR area immediately after the SVT protocol in obese individuals, suggesting that the increase in sympathetic activity promoted by exercise may increase blood flow to the muscles and limit heat dissipation by the SCR area, affecting local temperature. However, this study is preliminary and further investigations will be needed.

Keywords: mechanical vibration; obese; exercise; adipose tissue

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Abstracts of the poster section

Analysis of the parasympathetic nervous system during systemic vibratory therapy in obese patients

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Introduction: Systemic vibratory therapy (SVT) is an intervention that uses mechanical vibration generated on a vibrating platform (VP) to promote whole-body vibration exercise. SVT has been studied as an alternative of physical exercise for individuals with diseases such as obesity and metabolic syndrome (MetS). The behavior of the autonomic nervous system (ANS) during SVT is not fully understood. Thus, heart rate variability (HRV) analysis is a safe and non-invasive method to evaluate ANS behavior. **Objective:** The aim of this work was to investigate the parasympathetic ANS during a single SVT session, analyzing the square root of the mean square of successive differences in RR intervals (RMSSD) in obese individuals. **Methods:** Fifteen individuals with obesity (11 women, 4 men) were exposed to a TVS session, using the VP with alternating displacement of the base, generating MV with a peak-to- peak displacement of 2.5 mm and 30 Hz frequency. The individuals were positioned in an orthostatic position at the base of the VP, barefoot, with 130° of knee flexion, in a semi-squat position. TVS protocol consisted of 9 bouts of 1 minute of vibration followed by 1 minute of rest, with a total of 17 minutes. HRV was taken in the orthostatic position before SVT, during SVT, and in the orthostatic position after SVT. The RMSSD index was analyzed. The protocol was approved by the Ethics Committee and registered on *Plataforma Brasil* (CAAE 30649620.1.0000.5259). Data analysis was performed using R software, evaluating anthropometric variables and the RMSSD index using t-tests and ANOVA for repeated measures. The results were expressed as mean ± standard deviation, and statistical differences were considered with $p < 0.05$. **Results:** The individuals had the following characteristics age (53.47 ± 9.35 years), body mass (101.17 ± 18.18 kg), height (163.80 ± 9.29 cm) and body mass index (37.60 ± 5.61 kg/m^2). After a single SVT session, no statistical difference was observed in the RMSSD index (PRE – 11.38 ± 6.01 ms / DURING – 12.61 ± 10.49 ms / POST – 7.66 ± 4.14 ms, F=2.633, $p \geq 0.0909$). **Conclusion:** The parameters used in this protocol did not acutely alter the parasympathetic activity of individuals with obesity. New studies analyzing other parameters and with more individuals can increase knowledge on this subject.

Keywords: Exercise. Whole-body vibration. Autonomic nervous system. Heart rate variability.

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Abstracts of the poster section

Acute effect of systemic vibratory therapy combined with osteopathic manipulative treatment on heart rate variability in obese patients with or without metabolic syndrome

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Introduction: Obesity is a disease characterized by excess body fat, associated with cardiovascular risk, metabolic syndrome (MetS), chronic low-grade inflammation and autonomic nervous system imbalance. Heart rate variability (HRV) is an indicator of autonomic activity. **Aim:** To investigate the acute effect of systemic vibratory therapy (SVT) combined with osteopathic manipulative treatment (OMT) on HRV in individuals with obesity with or without MetS. **Methods:** Cross-sectional randomized study. Thirty obese individuals (23 women, 7 men) were randomized into three groups: 1) SVT + OMT, 2) OMT + SVT, 3) Control Group (CG), with peak-to-peak displacement of 2.5 mm and frequency of 30 Hz. The individuals were positioned standing on the base of the vibrating platform (VP), with their knees flexed at 130° during all active periods of the protocol that consisted of 9 series of 1-minute vibration followed by 1-minute rest. The CG performed the same protocol, however, with the VP turned off and a device attached to it. HRV was performed before and after the interventions, and the SDNN index was analyzed. The protocol was approved by the Research Ethics Committee and registered in *Plataforma Brasil* (CAAE 30649620.1.0000.5259). Statistical analysis was performed using R software, evaluating anthropometric variables, and SDNN through repeated measures ANOVA. The results were expressed as mean ± SD and the difference was considered at p-value < 0.05. **Results:** Anthropometric analysis did not indicate any difference between the groups regarding age (GC – 51.6 ± 16.09 years / SVTG + OMTG – 53.4 ± 10.11 years / OMTG + SVTG – 54.4 ± 11.7 years / p-value = 0.887), body mass (GC – 98.42 ± 30.5 kg / SVTG + OMTG – 91.54 ± 17.6 kg / OMTG + STVG – 86.08 ± 15.3 kg / p-value = 0.509), height (GC – 160.83 ± 7.9 cm / SVTG + OMTG – 163.7 ± 9.25 cm / OMTG + SVTG – 155.75 ± 8.7 cm / p-value = 0.172), BMI (GC – 37.86 ± 9.2 kg/m2 / SVTG + OMTG – 34.36 ± 5.9 kg/m2 / OMTG + SVTG – 35.49 ± 5.7 kg/m2 p-value = 0.650). In the analysis of the SDNN index between groups (p = 0.697), over time (p = 0.943) or in the interaction between group and moment (p = 0.297), these p-values indicate that the observed variations are not significant. **Conclusion:** The parameters used in this study did not show statistical significance in HRV in these individuals, and further research is needed to expand knowledge on this topic.

Keywords: exercise, whole-body vibration, autonomic nervous system, heart rate variability.

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Abstracts of the poster section

Effect of systemic vibration therapy on insulin resistance in obese adults: preliminary results.

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Introduction: Obesity is associated with various metabolic dysfunctions, such as insulin resistance and inadequate glucose regulation, which increase the risk of developing diabetes, cardiovascular diseases, and related comorbidities. Physical exercise impacts insulin resistance primarily through its anti-inflammatory effects, reducing the inflammation associated with obesity. Systemic Vibration Therapy (SVT) promotes functional and structural adaptations in tissues in response to vibration stimuli, which may positively influence glucose metabolism. **Objective:** Analyze the effect of SVT on insulin resistance in obese adults. **Methods:** This was a randomized, double-blind, interventional study, CAAE 30649620.1.0000.5259. Adults (18 to 59 years) with a BMI ≥ 30kg/m² participated. Participants were divided into the sham group (SG) and the side-alternating vibration platform (AVP) group. The SG followed the SVT group protocol and turned the platform off. AVP used a frequency of 30Hz and displacement peak to peak of 2.5mm. They performed 1 minute of static squats followed by 1 minute of rest, with 15 repetitions, totaling 29 minutes, twice a week for 6 weeks. The concentrations of insulin and glucose were used to calculate the HOMA-IR index, measured before and after the protocol, the cutoff point for identifying insulin resistance in Brazilians was > 2.7. Statistical analysis was performed using SPSS version 20. Shapiro-Wilk normality tests were applied, independent samples t-tests for characterization and between-group analysis, and paired t-tests for within-group analysis, with data expressed as mean ± standard deviation and $p \leq 0.05$. **Results:** Fourteen participants were studied: 7 in the AVP group (3 men and 4 women) and 7 in the SG group (1 man and 6 women). The groups started from the same baseline (age p=0.404; height p=0.127; body mass p=0.351; BMI p=0.437). Results within groups from the PVA group: 2.94±1.04 before and 2.05±1.37 after (p=0.408); in the SG: 3.33±0.57 before and 2.96±0.64 after (p=0.223). Results between groups in the HOMA-IR index were p=0,553. **Conclusion:** SVT did not cause significant differences in the HOMA-IR index, suggesting that it helped maintain stable insulin resistance, which is positive for preventing the worsening condition. However, the results are preliminary.

Keywords: adiposity, insulin resistance, cardiovascular risk, whole-body vibration exercise.

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Abstracts of the poster section

Effects of systemic vibration therapy on knee and hip extensor muscle strength in adults with obesity: preliminary results

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Introduction: Obesity is a chronic disease characterized by excessive fat accumulation, which leads to a state of low- grade inflammation. This inflammatory process can negatively affect muscle strength, especially in the lower limbs. Systemic vibration therapy (SVT) is a form of physical exercise that can enhance muscle strength by providing neuromuscular activation, improving muscle performance. **Objective**: To analyze the effect of systemic vibratory therapy on the strength of knee and hip extensors. **Material and method:** Randomized, double-blind, and interventional study (CAAE 30649620.1.0000.5259). Participants were adults aged 18 to 59 years with a BMI ≥ 30 kg/m². They were allocated into three groups: G-sham (GS), Vertical Base Displacement Vibration Platform (PV-T), and Alternating Base Displacement Vibration Platform (PV-A). PV-T and PV-A used a frequency of 30 Hz and a displacement peak to peak of 2.5 mm and low, respectively. Participants performed 1 minute of static squats followed by 1 minute of rest, with 15 repetitions, totaling 29 minutes, twice a week for 6 weeks. Muscle strength was assessed using the Lafayette Hand-Held Dynamometer before the first session and after the sixth session. The SPSS 20 was used for data analysis. To assess the effects of WBV on the muscle strength of knee and hip extensors, a multivariate statistical approach was conducted. The pre-test data analysis was performed using MANOVA, while the post-test analysis employed factorial repeated measures MANOVA and post hoc Bonferroni. **Results:** The sample characterization, which included the analysis of 6 individuals in the PV-A and GS groups and 5 in the PV-T group. No significant differences were observed between the groups for the analyzed characterization and dependents variables. MANOVA showed that there were no significant differences in the pre-test analysis ***p*=0,94** and no significant differences in the post-test analysis ***p=4,94***. However, the PV-T and PV-A groups showed an increase in means compared to the GS group. **Conclusion:** The PV-T and PV-A groups showed a tendency to increase muscle strength compared to the G-sham group. Although statistical significance was not reached, these findings suggest that SVT has potential for strengthening muscles. Increasing the sample size is necessary to confirm these preliminary results.

Keywords: obesity, strength, exercise, muscle

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Abstracts of the poster section

Effects of systemic vibratory therapy on fat mass and functional capacity in adults with obesity: preliminary results

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Introduction: Obesity is a multifactorial condition characterized by the excessive accumulation of fat mass, negatively influencing functional capacity and, consequently, the autonomy of individuals. In this context, systemic vibratory therapy (SVT) may be considered an option for managing this population. **Aim:** To evaluate the effect of six weeks of SVT on body fat and functional capacity in adults with obesity. **Materials and Methods:** A randomized, double-blind, interventional, longitudinal clinical trial (CAAE 30649620.1.0000.5259). Participants aged 18 to 59 years, of both sexes, with a BMI of 30 to 39.9 kg/m² were included. Allocation groups: side-alternating vibratory platform (AVP); vertical vibratory platform (VVP) and sham group (SG) with the platform turned off. Positioning: in a squat (knee flexion at 130^0). Frequency: 30 Hz, peak-to-peak displacement: 2.5 mm. Each session consisted of 1 minute of vibration followed by 1 minute of rest (no vibration), repeated 15 times, totaling 29 minutes over 6 weeks. Fat mass was assessed using bioelectrical impedance analysis, while functional capacity was evaluated using the Short Form Health Survey 36, with a score of 0 indicating the worst health state and 100 the best. Measurements were made before and after the protocol. SPSS version 20 was used for statistical analysis. The Shapiro-Wilk test was used for normality, and repeated measures factorial ANOVA was employed for within-group and between-group analyses, with significance set at $p \leq 0.05$. **Results:** Twenty-four adults participated in the study: AVP group, n = 9 (6 women and 3 men); VVP group, n = 5 (3 women and 2 men); SG, n = 10 (8 women and 2 men), with all groups starting from the same baseline (age $p>0.17$; height $p>0.30$; body mass $p>0.60$; BMI $p>0.10$). Within-group analysis of fat mass in the AVP group ($p>0.01$), VVP group ($p>0.22$) and SG ($p>0.21$). For functional capacity, within-group in the AVP, VVP, and SG groups with $p<0.01$, respectively. Between-group analysis ($p>0.78$). **Conclusion:** The results indicate that the AVP group showed a significant reduction in body fat, accompanied by improvements in functional capacity, suggesting that the reduction of excess fat mass may contribute to enhanced functional capacity. Although VVP group and SG group also demonstrated advancements in functional capacity, there were no significant changes in body mass. The between-group analysis did not reveal statistical differences, indicating similar outcomes among the different protocols used in the study.

Keywords: Obesity, Exercise, Fat mass, Functional capacity

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Abstracts of the poster section

Acute effects of systemic vibratory therapy on cardiac autonomic regulation in obese adult individuals: preliminary results

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Introduction: Visceral obesity significantly contributes to metabolic dysregulation and the development of cardiovascular diseases (DCS). Heart rate variability (HRV) stands out to be a simple and non-invasive method of assessing the autonomic nervous system and plays an important role in the early identification of DSC. Systemic vibration therapy (SVT) is strongly suggested for the management of the population with obesity, due to the effects of being assimilated with traditional types of physical exercise. **Aim:** To evaluate the effects of SVT on cardiac autonomic regulation and body composition in individuals with obesity. **Methods:** Randomized, double-blind, interventional study, CAAE 30649620.1.0000.5259. Adults (18 to 59 years old) with BMI ≥ 30kg/m² participated. Participants were divided into two groups: Sham (GS) and alternating vibrating platform (AVP). GS followed the TVS group protocol with the platform turned off. For the AVP group, frequency of 30Hz and displacement of 2.5mm. They performed 1 minute of static squats followed by 1 minute of rest, with 15 repetitions, totaling 29 minutes. Statistical analysis of HRV was performed using SPSS version 20. Shapiro-Wilk tests for normality and repeated measures factorial MANOVA considering $p \leq 0.05$, MD±SD and difference between means**. Results:** 10 participants were included: 5 in the AVP group (3 men and 4 women; age 45±8.74 years; height 1.65.6±8.17 m; body mass 103.52±23.06 kg; BMI 38.18±9.43 kg/m²; GST 42.38±9.33%), and 5 in the CG (1 man and 6 women; age 42.2±2.58 years; height 1.62±6 .87 m; body mass 98.82±9.81 kg; BMI 37.22±1.84 kg/m²; There were no significant differences for the RMSSD HRV index (AVP [p=0.59ms]; GS [p=0.73ms]), however, when analyzing the differences between the means, an increase of 0.75ms was noticed for the AVP group. **Conclusion:** SVT did not cause significant differences in the HRV index, not allowing an improvement in the health of cardiac autonomic function. However, we must consider that the results are still preliminary.

Keywords: cardiovascular diseases, heart rate variability, obesity.

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BJMVB

Abstracts of the poster section

Effects of systemic vibratory therapy on fat mass and functional capacity in adults with obesity: preliminary results

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Introduction: Aging is accompanied by physiological changes that contribute to a decline in functionality, which is closely tied to muscle strength. Physical exercise plays a key role in improving these functions. However, this population often faces challenges in adhering to conventional exercise protocols. As a result, systemic vibration therapy (SVT) has been increasingly used due to its safety and high adherence rates. **Objective:** To assess the effects of SVT on muscle strength and functionality in frail and pre-frail elderly women. **Materials and Methods:** This cross- sectional clinical study (CAAE 68385022.9.0000.5259) included individuals aged 60 years or older with frailty. Participants followed a seated protocol, exposed to 5 Hz frequency, with peak-to-peak displacements of 2.5, 5.0, and 7.5 mm, and peak acceleration ranging from 0.12 to 2.95 g, across three sets (1 minute of work and 1 minute of rest), for a total of 18 minutes. Functionality and strength were evaluated using the Timed Up and Go (TUG) test and handgrip dynamometry, with a suggested cutoff point for TUG of ≥8.00 seconds. Measurements were taken before SVT and after the 20th SVT session. Statistical analysis was performed using SPSS version 20. The Shapiro-Wilk test assessed normality, and intragroup analysis was conducted using the non-parametric Wilcoxon signed-rank test. Data were reported as median (interquartile range), mean ± standard deviation, with a significance level of $p \leq 0.05$. **Results:** Seventeen elderly women participated (age 70.11 ± 4.98 years; height 1.54 ± 0.05 m; body weight 75.64 ± 10.75 kg; BMI 31.71 ± 4.39 kg/m²; frailty score 3.76 ± 0.75). The TUG results were 13.75 (5.38) seconds pre- intervention and 13.84 (6.15) seconds post-intervention (p=0.076). Right upper limb (RUL) dynamometry showed values of 18.66 (6.83) kg pre-intervention and 19.33 (7.33) kg post-intervention (p=0.074), while left upper limb (LUL) dynamometry recorded 17 (7.33) kg pre-intervention and 21.99 (6.20) kg post-intervention (p=0.049). **Conclusion:** No significant differences were found in functionality or RUL strength, despite a clinical improvement being observed.

Keywords: aging, elderly, functionality, systemic vibration therapy

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Abstracts of the poster section

Effect of systemic vibration therapy on total leukocytes in obese adults

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Introduction: Obesity is characterized by an excess of body fat, which promotes a state of chronic low-grade inflammation and is a risk factor for various comorbidities, including type 2 diabetes (T2DM). The total leukocyte count can be used as an indicator to determine whether obesity increases the risk of T2DM. Alternative modalities of physical exercise have been incorporated into the management of this population, such as systemic vibration therapy (SVT), in which mechanical vibration (MV) generated at the base of a vibration platform (VP) is transmitted to the body, resulting in whole-body vibration exercise (WBVE). **Objective**: To evaluate the effects of SVT on total leukocyte counts in obese adults. **Materials and Methods**: This was a randomized, double-blind, interventional study, CAAE 30649620.1.0000.5259. Adults (18 to 59 years) with a BMI ≥ 30 kg/m² participated. Participants were divided into a sham group (SG) and a vertical vibration platform group (VVP). The SG followed the SVT group's protocol, but the platform was turned off. The VVP used a frequency of 30 Hz and low amplitude. They performed 1 minute of static squats, followed by 1 minute of rest, with 15 repetitions, totaling 29 minutes, twice a week for 6 weeks. Total leukocyte concentrations were measured before and after the protocol. The cutoff range was 3600 to 11000 µL. Statistical analysis was performed using SPSS version 20. The Shapiro-Wilk normality test and paired t-test for intragroup analysis were conducted. Data were expressed as mean ± standard deviation, with $p \leq 0.05$ considered significant. **Results**: Fourteen participants were included, 7 in the VVP group (3 men and 4 women; age 43.85 ± 8.05 years; height 1.70 ± 0.08 m; body mass 98.44 ± 14.07 kg; BMI 33.52 ± 2.18 kg/m²) and 7 in the SG group (1 man and 6 women; age 39.28 ± 11.36 years; height 1.63 ± 0.79 m; body mass 84.00 ± 8.95 kg; BMI 34.64 ± 2.93 kg/m²). The VVP group's leukocyte count was 7885.71 ± 4492.74 µL before and 6985.71 ± 2100.34 µL after ($p = 0.576$). The SG group's leukocyte count was 6631.34 ± 1427.79 µL before and 6394.28 ± 859.06 µL after ($p = 0.604$). **Conclusion**: There were no significant differences in leukocyte analyses with SVT intervention. However, the VVP group showed a reduction in leukocyte levels, though these results are preliminary.

Keywords: obesity, leukocytes, systemic vibration therapy.

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Abstracts of the poster section

Effect of systemic vibratory therapy on castelli index i in adults with obesity: preliminary results

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Introduction: Obesity is a chronic condition associated with dyslipidemia. This condition can be assessed using indicators such as the Castelli Index I (CI-I), which relates total cholesterol and HDL cholesterol levels. Physical exercise (PE) plays a crucial role in managing obesity and optimizing the lipid profile. However, many individuals face difficulties in maintaining adherence to traditional PE programs. In this context, Systemic Vibration Therapy (SVT) emerges as a recommended alternative for this population. **Aim:** To evaluate the impact of SVT on CI-I in obese adults. **Materials and Methods:** Randomized, double-blind, interventional study, CAAE 30649620.1.0000.5259. Adults (18 to 59 years old) with BMI ≥ 30kg/m² participated, divided into three groups: control (GC), alternating vibrating platform (AVP) and vertical (VVP). The GC followed the SVT group protocol with VP turned off. AVP and VVP used a frequency of 30Hz and a displacement of 2.5mm and low, respectively. They performed 1 minute of static squats followed by 1 minute of rest, with 15 repetitions, totaling 30 minutes, twice a week for 6 weeks. The lipid profile was analyzed at the beginning and end of the protocol. Statistical analysis was performed with SPSS version 20. Shapiro-Wilk tests for normality, factorial MANOVA of repeated measures, p ≤0.05 and MD±SD. **Results:** 21 participants were included: 7 in the AVP group (3 men and 4 women; age 43.85 ± 8.05 years; height 1.70 ± 0.08 m; body mass 98.44 ± 14.07 kg; BMI 33.52 ± 2.18 kg/m²), 7 in the VVP group (3 men and 4 women; age 49.14 ± 7.96 years; height 1.65 ± 0.12 m; body mass 97.22 ± 15.61 kg; BMI 35.10 ± 2.96 kg/m²), and 7 in the GC (1 man and 6 women; age 39.28 ± 11.36 years; height 1.63 ± 0.79 m; mass body 84.00 ± 8.95 kg; BMI 34.64 ± 2.93 kg/m²). The results demonstrated that there were no statistically significant differences in the intergroup analysis (p=0.955). **Conclusion:** The parameters used in this study did not show statistical significance in the CI-I of these individuals, meaning more research is needed to expand knowledge on this topic.

Keywords: lipidogram; adiposity; whole body vibration exercise; cardiovascular system.

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Abstracts of the poster section

Effects of systemic vibratory therapy on the functionality of patients with chronic venous insufficiency and venous ulcer: a case study

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Introduction: Obesity is a chronic condition associated with dyslipidemia. This condition can be assessed using indicators such as the Castelli Index I (CI-I), which relates total cholesterol and HDL cholesterol levels. Physical exercise (PE) plays a crucial role in managing obesity and optimizing the lipid profile. However, many individuals face difficulties in maintaining adherence to traditional PE programs. In this context, Systemic Vibration Therapy (SVT) emerges as a recommended alternative for this population. **Aim:** To evaluate the impact of SVT on CI-I in obese adults. **Materials and Methods:** Randomized, double-blind, interventional study, CAAE 30649620.1.0000.5259. Adults (18 to 59 years old) with BMI ≥ 30kg/m² participated, divided into three groups: control (GC), alternating vibrating platform (AVP) and vertical (VVP). The GC followed the SVT group protocol with VP turned off. AVP and VVP used a frequency of 30Hz and a displacement of 2.5mm and low, respectively. They performed 1 minute of static squats followed by 1 minute of rest, with 15 repetitions, totaling 30 minutes, twice a week for 6 weeks. The lipid profile was analyzed at the beginning and end of the protocol. Statistical analysis was performed with SPSS version 20. Shapiro-Wilk tests for normality, factorial MANOVA of repeated measures, $p \leq 0.05$ and MD±SD. **Results:** 21 participants were included: 7 in the AVP group (3 men and 4 women; age 43.85 ± 8.05 years; height 1.70 ± 0.08 m; body mass 98.44 ± 14.07 kg; BMI 33.52 ± 2.18 kg/m²), 7 in the VVP group (3 men and 4 women; age 49.14 ± 7.96 years; height 1.65 ± 0.12 m; body mass 97.22 ± 15.61 kg; BMI 35.10 ± 2.96 kg/m²), and 7 in the GC (1 man and 6 women; age 39.28 ± 11.36 years; height 1.63 ± 0.79 m; mass body 84.00 ± 8.95 kg; BMI 34.64 ± 2.93 kg/m²). The results demonstrated that there were no statistically significant differences in the intergroup analysis ($p=0.955$). **Conclusion:** The parameters used in this study did not show statistical significance in the CI-I of these individuals, meaning more research is needed to expand knowledge on this topic.

Keywords: chronic venous insufficiency; venous ulcer; systemic vibration therapy; short physical performance battery

Funding: This research was supported by FAPERJ, CNPq and CAPES.

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Abstracts of the poster section

Evaluation of fatigue in women with gynecological cancer undergoing whole-body vibration exercise during chemotherapy infusion.

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Introduction: Gynecological cancers (cervix, endometrium and ovary) are among the ten most common neoplasms in women in Brazil. One of the most prevalent complications in cancer patients' treatment is fatigue. Oncological fatigue is a distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning. Physical exercise is recommended for the prevention and treatment of this condition, and frequently fatigue is an obstacle to this practice. Whole-Body Vibration Exercise (WBVE) may be an option for this population because it is an easy-to-perform physical activity with low perceived effort. **Objective**: To analyze the level of fatigue of women with gynecological cancer undergoing WBVE during chemotherapy (CT) infusions. **Methods**: Randomized, blinded clinical trial, divided into 2 groups: intervention group (IG) and control group (CG). The project was approved by the ethics and research committee of INCA (67391223.4.0000.5274) and REBEC (RBR-7d3yxz3). They were included women >18 years old who underwent CT with carboplatin and paclitaxel (n=25) for gynecological cancer. In IG (n=10), WBVE was performed in the sitting position, with frequencies between 10 and 35 Hz and peak-to-peak displacement of 4 mm, during 10 minutes per CT sessions (1:1). In CG (n=15) followed the institutional routine. Fatigue was assessed by the EORTC QLQ F12 questionnaire before and after CT. **Result**: The mean age was 65.1 (±7.8) years. The analysis between groups showed no statistically significant difference ($p>0.05$). **Conclusion**: the results demonstrated that WBVE did not changed the level of fatigue in women with gynecological cancer.

Keywords: whole-body vibration exercise, physiotherapy, chemotherapy, oncology, gynecological cancers

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Abstracts of the poster section

Pain assessment using the numeric pain scale through systemic vibratory therapy in pre-frail and frail elderly patients: preliminary results

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Introduction: Autism Spectrum Disorder (ASD) affects communication and social interaction, characterized by rigid and repetitive behaviors (DSM-V-TR). In Attention Deficit Hyperactivity-Impulsivity Disorder (ADHD), patterns of inattention and/or hyperactivity-impulsivity interfere with the individual's functioning and development (DSM-V-TR). The tests assessed learning, attention, executive functions, intelligence, language, memory, visual perception, psychopathology, personality, and dementia screening, investigating potential deficits and compensatory strategies. The late diagnoses of ASD Level 1, comorbid with ADHD is possible, even though both are developmental disorders, which can lead to expressive impairment and distress in the individual's life. **Objective:** To present the late diagnosis of ASD with comorbid ADHD through a neuropsychological evaluation, examining cognitive and executive functions along with associated impairments. **Materials and Methods:** The case study involved the following tests and scales used to diagnose ASD and ADHD: Wechsler Adult Intelligence Scale (WAIS- III) (RB41), d2 test – revised (d2-r) (RB118)**,** Psychological Attention Battery (BPA) (RB19)**,** Rey Auditory Verbal Learning Test (RAVLT) (RB122)**,** Stroop Color Test (Victoria version)**,** Online Attention Battery (AOL)**,** Rey Complex Figure Test (FCR) (RB59)**,** Five Digit Test (FDT) (RB150)**,** Emotional Intelligence Battery (BOLIE)**,** memory recognition test 2 (TEMR- 2) (RB273)**,** Adult ADHD Rating Scale (ETDAH-AD) (RB219)**,** Functional Impairments Scale – ADHD (EPF-TDAH)**,** Barkley Executive Functioning Scale (BDEFS - Long Version)**,** Social Responsiveness Scale (SRS-2)**,** Social Skills Inventory 2 (IHS2 - del-Prette)**. Results:** The SRS-2 and IHS2- del-Prette tests indicated impairments in communication abilities, social interactions and cognitive rigidity, supporting the diagnosis of ASD. the BPA, WAIS-III, d2-r, ETDAH-AD, BDEFS, and EPF- TDAH tests revealed deficits in attention, impulsivity, emotional aspects, inhibitory control, motivation, hyperactivity, time management, organization, problem-solving, self-control, and executive functions, justifying the diagnosis of ADHD. Following the diagnosis, referrals were made to improve social skills and emotional regulation. **Conclusion:** in this evaluation, the 69-year-old patient was diagnosed late with autism spectrum disorder level 1, with comorbid Attention Deficit Hyperactivity-Impulsivity Disorder, presenting significant impairments and compensatory strategies

Keywords: autism spectrum disorder; attention deficit hyperactivity impulsivity disorder; diagnosis; neuropsychology

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Abstracts of the poster section

Whole body vibration exercise: investigating tissue repair in a diabetic rat model

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Introduction: Tissue repair is a complex and multifactorial process. Regular physical activity has been associated with improvements in this process of restoring skin lesions. However, for individuals with limited mobility, such as those with ulcers, traditional physical activities can be an obstacle. Thus, Whole Body Vibration Exercise (WBVE) gains prominence as an alternative to assist in healing, especially in cases of venous and diabetic ulcers. Objectives: To investigate the effects of WBVE on the skin healing process, using a diabetic rat model. **Methodology**: Twelve male Wistar rats were induced to diabetes with Alloxan (150mg/kg). They were considered diabetic with glucose ≥200mg/dL and were divided into two groups: Sham, a group that does not perform mechanical vibration despite being restrained on the vibration platform, and the group that was subjected to vibration on the vertical movement vibration platform (50Hz, aPeak 7.8g) for 10 consecutive days. The lesions (4cm2) were performed in the dorsal region and were photographed on days 0, 7 (d7) and 10 (d10) post-lesion. On d10, the rats were euthanized and the lesions with adjacent healthy skin were collected, preserved in formalin, processed and embedded in paraffin. The sections were stained with hematoxylin and eosin (HE) and Picrosirius. **Results**: The results did not show significant differences between the studied groups in lesion contraction ($p = 0.0931$). However, microscopic analysis revealed a similarity in the general structure of the granulation tissue between the studied groups and a low presence of inflammatory cells in HE staining, especially in the treated group. The collagen fibers, observed distributed parallel to the surface, presented a yellowish- green coloration in both groups. However, a qualitative difference was observed between the studied groups. **Conclusion**: In summary, the preliminary data indicate that WBVE has a positive impact on the healing of skin lesions in male Wistar diabetic rats. These results highlight the need for additional analyses to evaluate other mechanisms that may be involved and validation of its role in the skin lesion healing process in diabetics.

Keywords: Wound Healing, Diabetes, Whole Body Vibration Exercise, Rat.

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Abstracts of the poster section

Effect of whole-body vibration exercise on the lipid profile in diabetic *Wistar* rats

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Introduction: Diabetes mellitus (DM) is a metabolic disorder characterized by elevated blood glucose levels and it is often linked to lipid profile abnormalities, increasing cardiovascular risk. Physical exercise has shown positive effects on lipid metabolism and whole-body vibration (WBV) exercise, using mechanical vibrations (MV) generated by a vibrating platform, has emerged as a potential intervention to improve metabolic outcomes. Both human and animal studies suggest that WBV can modulate lipid profiles, making it a relevant intervention for addressing DM-related dyslipidemia. **Aim:** Evaluate the effects of WBV exercise on the lipid profile in alloxan-induced diabetic rats. **Methods:** Ten male *Wistar* rats (250-350g, 2-3 months) were allocated into two groups, diabetic control (DM, n=5) and diabetic rats exposed to MV (DM+WBV, n=5). For diabetes induction, alloxana monohydrate (170 mg/ kg) diluted in saline (NaCl 0.9%) was used. To confirm diabetes status, glucose was measured in a blood collected from the rats tail with a glycosimeter and they were considered diabetic with glucose above ≥ 11,1 mmol/L. The DM+WBV group was exposed to MV (frequency-50 Hz; amplitude-0.78 mm) at 4 bouts of 30s, separated by 1-min rest period in each session, performed for 5-weeks. In the final week, blood samples were collected, and the concentrations of total cholesterol, high-density lipoprotein (HDL), and triglycerides were assessed. The protocol was approved by the Ethics Committee of the Rio de Janeiro State University (process number CEUA/IBRAG/UERJ/006/2019). The t-test for independent samples was used to compare the groups by using the software GraphPad Prism 6.0. Results were expressed as mean ± standard deviation and difference was considered at p-value<0.05. **Results:** After 5-weeks, hyperglycemia status was confirmed (28.2±6.91 - mmol/L) in all animals. Moreover, no statistical difference was found when compared the lipid profile between the animals of DM group (1.2 ± 0.1 [total cholesterol]; 0.6 ± 0.1 [HDL*]; 0.7 ± 0.2 [triglycerides$^{\#}$] - mmol/L) and DM+WBV group (1.2 ± 0.2 [total cholesterol]; 0.5 ± 0.1 [HDL*]; 0.6 ± 0.2 [triglycerides$^{\#}$] - mmol/L) p=0.46, p^{*}=0.46, $p^{\#}$=0.57. **Conclusion:** Whole-body vibration after 5-weeks had no effects in the lipid profile between diabetic rats.

Keywords: mechanical vibration, diabetes, recognition, alloxan, animals.

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Abstracts of the poster section

Analysis of renal and liver function in diabetic rats treated with *Chenopodium ambrosioides* extract

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Introduction: Type 1 diabetes *mellitus* (DM1) is an autoimmune disease characterized by the destruction of pancreatic beta cells, resulting in deficiency of insulin production. DM1, if uncontrolled, can lead to renal and hepatic complications. *Chenopodium ambrosioides* (mastruz) is a plant-based product with hepatoprotective and hypoglycemic properties. However, the chronic effects of the aqueous extract (EA) of mastruz on biomarkers of hepatic and renal function in DM1 have not yet been fully elucidated. **Aim:** Evaluate the effect of treatment with aqueous extract (EA) of mastruz in diabetic rats induced by alloxan, investigating blood biomarkers of liver and kidney function. **Methods**: Male *Wistar* rats (250-350g, 2-3 months, n=8) were used and allocated into two groups: diabetic control (DM, n=4) and diabetic treated with mastruz EA (DM+MTZ, n=4). Diabetes induction was performed by intraperitoneal injection of alloxan (170 mg/kg). Over the course of 5 weeks (Monday to Friday), the DM+MTZ group received 1.0 mL of mastruz (15 mg/mL) by gavage and the DM group received 1.0 mL of deionized water. After 5 weeks, hematological analyses were performed to measure glucose, urea, creatinine, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP). The experiment was approved by the ethics committee (CEUA/006/2019). For statistical analysis, with GraphPad Prism5 software, the Student's t-test was used to compare groups. Data were expressed as mean±standard error of the mean and differences were considered with *p*-value<0.05. **Results**: There was a decrease ($p<0.05$) in the concentration of hepatic biomarkers DM+MTZ group (63.25±10.6)[urea], (0.55±0.02)[creatinine] compared to the DM group (161.75±30.6)[urea], (0.66±0.03)[creatinine]), and in the enzyme levels of AST (56.37±5.3) [DM+MTZ] x (163±12.25) [DM], p=0.0259). Hyperglycemia was observed in both groups (506.4±68.7)[glucose, DM+MTZ], (487.7±65.9) [glucose, DM]). No differences were observed in the levels of ALT (97.75±13.55-DM+MTZ) x (140±18.09-DM) and ALP (1249.25±509.1-DM+MTZ) x (1310.5±439.5- DM). **Conclusion:** Mastruz treatment in induced diabetes rats indicated a possible specific physiological response by altering some hepatic and renal biomarkers, highlighting the need for further research.

Keywords: Diabetes *mellitus* type 1; *Chenopodium ambrosioides*; diabetic rats; alloxan.

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Abstracts of the poster section

Effect of systemic vibration therapy on health-related quality of life and dyspnea in individuals with chronic obstructive pulmonary disease

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Introduction: Chronic obstructive pulmonare disease (COPD) is a disorder that promotes airflow limitation, dyspnea and reduced health-related quality of life (HRQoL). Pulmonary rehabilitation has been suggested for individuals with COPD. Systemic vibratory therapy (SVT) is the most promising exercise to improve quality of life in chronic diseases. **Aim**: To evaluate the effect of SVT on HRQoL and dyspnea in individuals with COPD. **Methods**: An open-label, crossover clinical trial was carried out with convenience allocation, consisting of 6 weeks of intervention and a 2-week washout period, approved by the Ethics Committee (CAAE: 30649620.1.0000.5259). Individuals with COPD (n=10, 66.5±3.68 years) were included and allocated into 2 groups: sitting (GS2) on an auxiliary chair positioned in front of the vibration platform (VP) and a group standing on (GP2) the base of the VP. An alternating displacement VP was used. The SVT protocol utilized a frequency of 25Hz and a peak-to-peak displacement of 2.5mm, with 1 minute of work and 1 minute of rest, totaling 10 minutes of intervention, twice a week, for 6 weeks. At the beginning and end of the study, HRQoL was assessed using the St. George's Respiratory Questionnaire (SGRQ), and dyspnea was assessed using the COPD Assessment Test (CAT) and the Modified Medical Research Council (mMRC) scale. Data analysis was performed using the R software version 4.4.1, evaluating variables and anthropometric instruments using the t test, ANOVA, expressed as mean ± standard deviation and p-value. **Results**: 60% were women (GS2 31.35±7.28; GP2 25.3±5.28, p=0.2139 BMI kg/m²/ GS2 2±1.22; GP2 2±0.71, p=0.3687 GOLD and GS2 58.7±27.53; GP2 57±29.44, p=0.6491 [FEV/1]). In the SGRQ, there was no statistical difference before and after SVT intervention in both inter- and intra-group comparisons GS2 42,57±18,08-GP2 37,39±19,59 *p=0.066*/*p*=0.804). The instruments that assessed dyspnea did not show statistical differences before and after SVT (GS2 11±9.74-GP2 14±6.58 p=3.967/p=0.815 mMRC/ (GS2 31.34±12.20-GP2 30.28±17.01 p=0.052/p=0.0825 CAT). **Conclusion**: SVT did not promote a significant improvement in HRQoL or reduction in dyspnea.

Keywords: systemic vibration therapy, chronic obstructive pulmonary disease, quality of life, dyspnea, pulmonary rehabilitation, clinical trial.

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Abstracts of the poster section

Effect of systemic vibratory therapy on the quality of life of elderly people with chronic obstructive pulmonary disease: evaluation by the world health organization quality of life questionnaire

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Introduction: Chronic Obstructive Pulmonary Disease (COPD) compromises respiratory and muscle function, especially in the elderly, affecting their quality of life. Systemic vibration therapy (SVT) is a promising intervention to improve quality of life in chronic diseases, but its evidence in COPD is still limited. **Aim:** to evaluate the effect of systemic vibration therapy on the quality of life of elderly patients with COPD using the World Health Organization Quality of Life questionnaire (WHOQOL-bref). **Methods**: open, crossover clinical trial with allocation by convenience was carried out, with 6 weeks of intervention and 2-week washout. There were 10 individuals (5 men and 5 women), who were allocated into 2 groups: Group (GP1): the individual was positioned standing on a vibrating platform with an alternating base, frequency of 25 Hz and peak-to-peak position of 2.5 mm, with 5 series of 1 minute of work and 1 minute of rest, performed once a week for 6 weeks; in the Control Group (CG), the individuals were not subjected to intervention. At the beginning and end of the study, quality of life was assessed using the WHOQOL-bref questionnaire. Approved by the Ethics Committee (CAAE: 30649620.1.0000.5259). The GraphPad Prism 6.0 software was used for statistical analysis, the paired t-test was used for sample characterization variables, and the Mann-Whitney test was used for the WHOQOL-bref questionnaire variables. The results were expressed as mean ± SD and the difference was considered at p-value <0.05. **Results**: The statistical analysis did not indicate any difference between the groups regarding age (GC – 63.8±4.8 years / GP1 – 69±2.8 years / *p*-value = 0.0728), body mass (GC – 75.9±9.5 kg / GP1 – 74.1±14.8 kg / *p*-value = 0.826), height (GC – 1.6±0.11 cm / GP1 – 1.63±0.06 cm / *p*-value = 0.6888), BMI (GC – 29.8±4.5 kg/m2 / GP1 – 27.6±5.5 / *p*-value = 0.5246), GOLD (GC – 2.2±0.4/ GP1 – 2.2±0.8 / *p*-value = 1.000). In the analysis of the WHOQOL-bref between groups in the variables Physical Health (p = 0.0381), Psychological Health (*p* = 0.4527), Social Relationships (*p* = 0.5877), Environment (*p* = 0.739). **Conclusion**: In the quality of life analysis between the control group and GP1, they are significantly different, indicating that the intervention, systemic vibration therapy, had a positive impact on the quality of life of patients with COPD.

Keywords: systemic vibration therapy, COPD, quality of life, pulmonar, rehabilitation, elderly

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Abstracts of the poster section

Effect of whole-body vibration exercise on healing in patients with chronic venous insufficiency and venous ulcer: a case study

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Introdução: Human skin wounds are a major health care concern, carry an immense epidemiologic and financial burden healing (1), affecting >6 million people annually Chronic wounds fail to proceed through the normal phases of wound healing in an orderly and timely manner which involved an effort to understand the physiology of healing and wound care. WBV is an exercise modality or treatment/prophylaxis method in which subjects are exposed to mechanical vibrations through a vibrating platform, recently new studies have shown that low-intensity vibration (LIV) can improve angiogenesis and wound healing in diabetic mice. WBV has been investigated as a potential therapeutic intervention to improve healing, but its efficacy in humans has not been more fully clarified. **Objective:** The objective of this case study was to evaluate the effect of EVCI on healing in a patient with chronic venous insufficiency and venous ulcer. **Methods:** Patient began treatment on July 19, 2021, at the Policlínica Universitária Piquet Carneiro and signed a specific Informed Consent Form (ICF) before to the intervention. Personal data were collected during anamnesis, including age, sex, and any associated comorbidities. Following this, the wound was measured and documented via a photograph on the first day and after the intervention period. For the whole-body vibration exercise (WBVE), the patient sat on an auxiliary chair placed in front of an alternating displacement vibration platform, with bare feet placed on the platform base, knees flexed at 120-130 degrees (verified with a goniometer), and hands resting comfortably on the knees. During WBVE, the feet were positioned to correspond with a peak-to-peak displacement of 2.5 mm, and the patient was exposed to a vibration frequency of 25 Hz. Six WBVE sessions were conducted over six consecutive weeks, each session consisting of five sets of 1 minute of exercise and 1 minute of rest, totaling 10 minutes of exercise for session. **Results**: A 55-year-old female patient with a venous ulcer on the lower third of her right leg for 21 years. No other comorbidities were reported, nor was she a smoker or alcohol consumer. Before WBV, the wound measured 4.4 cm in length by 3.0 cm in breadth. After six weeks of WBVE, the wound was reduced by approximately 0.5 cm in both length and breadth, measuring 4.0 cm in length and 2.5 cm in breadth, indicating an improvement in percentage between pre- and post-treatment. **Conclusion:** This case study suggests that WBVE may be an effective intervention for improving wound healing in patients with chronic venous insufficiency (CVI) and venous ulcers. However, additional studies with larger samples and rigorous control are necessary to confirm these findings and to determine the subjacent mechanisms behind the observed benefits.

Keywords: chronic venous insufficiency; whole-body vibration exercise; wound healing.

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Abstracts of the poster section

Effects of whole body vibration on chemotherapy-induced peripheral neuropathy: preliminary results

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Introduction: Chemotherapy-induced peripheral neuropathy (CIPN) is a clinically relevant toxicity. Its symptoms such as pain, paresthesia, loss of strength and balance deficits are limiting factors for medical therapy, causing delays, dose reductions or even interruption of treatment, which may compromise the patient's overall survival. Studies of whole-body vibration exercises (WBVE) have shown benefits in the non-pharmacological treatment of patients with neuropathies of different etiologies, including those secondary to the use of chemotherapy (CT). **Objective:** to investigate the effects of WBVE in preventing CIPN and related symptoms - sensitivity, balance and functionality - in women diagnosed with gynecological cancer. METHODOLOGY: These are preliminary RCT results in patients undergoing CT with carboplatin and paclitaxel, divided into an intervention group (IG, n=7) and control group (CG, n=10). Those allocated to the IG received mechanical vibration through a vibrating platform, in a sitting position, frequencies between 10 and 25 Hz and amplitude of 2mm, for a total time of 10 minutes, during the CT infusion. **Partial results:** the group had an average age of 62 years (SD±11.08), the majority were black or mixed race (65%), incomplete primary education (35%), an average BMI of 29.7, with 65% of them eutrophic , non-diabetic (95%), hypertensive (59%), non-drinkers (94%) and smokers (53%). As for primary neoplasia, 76.5% have endometrial and ovarian cancer, 23.5%. All started CT with functional loss (sit-to-stand test) with a mean time of 16.1 (SD±6.3) and balance changes (75%). In the subsequent evaluation, the IG showed an average increase in strength of 1.33 kg (SD±3.27) compared to the loss of 1.55 kg (SD±5.17) by the CG, but without statistical difference (p=0.248). No IG patient showed worsening in the sensory evaluation and in relation to balance, 43% showed maintenance or improvement in this item. **Conclusion:** physiotherapeutic monitoring during CT is extremely important, given the functional losses presented even before its start. Due to the small number of participants, the results found do not present statistical significance so far, but the follow-up of this study will contribute to a better overview of these women and the importance of physiotherapy being included in this phase, acting preventively and contributing to new approaches, such as EVCI, in order to reduce adverse effects.

Keywords: antineoplastic agents, physical therapy, vibration

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Abstracts of the poster section

Health-related quality of life of women with gynecological cancer undergoing whole-body vibration exercise during chemotherapy infusions

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Introduction: Gynecological cancers (cervix, endometrium and ovary) represent the highest incidence among postmenopausal women. Physical and emotional changes resulting from diagnosis and treatment can interfered in functional capacity and health-related quality of life (HRQoL) of these women. Physical exercise is recommended for the prevention, treatment and remission of the disease; however, many patients are unable to maintain or initiate this habit due to metabolic and physical changes resulting from chemotherapy (CT). Whole-body vibration exercise (WBVE) is an easy-to-perform physical activity modality with low perceived effort that can contribute to maintaining or introducing the habit of exercising in women during CT. **Objective:** To analyze the HRQoL of women with gynecological cancer undergoing WBVE during CT infusions. **Methods:** Randomized clinical trial, single-blind, divided into 2 groups: control group (CG) and intervention group (IG). The project was approved by the research ethics committee of INCA (67391223.4.0000.5274) and REBEC (RBR-7d3yxz3). Twenty-five women who underwent CT with carboplatin and paclitaxel for gynecological cancer, aged >18 years, were included. In IG (n=10), the EVCI was performed in the sitting position, with frequencies between 10 and 35 Hz and peak-to-peak displacement of 4 mm, during 10 minutes in the CT infusions (1:1). The CG (n=15) followed the institutional routine. HRQoL was assessed using the EORTC QLQ C-30 questionnaire before and after CT. **Results:** The mean age was 65.1 (±7.8) years. The analysis between the groups showed no statistically significant difference in most domains, except for physical function, which showed improvement in IG (p=0.013). **Conclusion:** the results demonstrated that EVCI improved HRQoL in physical function domain of women with gynecological cancer during CT and can be used in the institutional routine during CT infusions.

Keywords: whole-body vibration exercise, physiotherapy, chemotherapy, oncology, gynecological cancers

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Abstracts of the poster section

Effect of photobiomodulation for prevention of chemotherapy-induced peripheral neuropathy in women with breast cancer

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Introduction: Chemotherapy-induced peripheral neuropathy (CIPN) presents variable degrees of toxicity, according to the type, time of administration and cumulative dose of medications. Photobiomodulation (PBM) by laser or Light-Emitting Diode (LED) is a safe, non-pharmacological, low-cost resource and has been widely studied for the prevention and/or treatment of different complications of cancer treatment. **Objective:** To evaluate the efficacy of PBM by LED board in the prevention of CIPN in the lower limbs of women with breast cancer undergoing chemotherapy at the National Cancer Institute. **Methods:** This abstract is part of the master's degree of student Maíra C. Fernandes. It was a randomized clinical trial, double-blind (CEP/INCA: 5,737,539; ClinicalTrials.gov NCT05663723), conducted in women ≥ 18 years old with breast cancer stages I to IIIC and indication for chemotherapy. After recruitment, all women included in the intervention group who used the Infrared and Red LED board were analyzed for this study. The LED board applications were performed daily at home for 20 minutes on each foot (foot sole), from the beginning to the end of chemotherapy. The CIPN outcome was assessed using the CIPN Assessment Tool (CIPNAT) at the time of inclusion and 30 days after the end of chemotherapy. **Results:** To date, 25 patients have been included. The mean age was 51.29 years (±8.30), most had a partner (60.0%), had more than 8 years of schooling (64.0%), self-declared as black/brown skin color (76.0%), with diagnostic advanced stage breast cancer (>IIIA)(60.0%). In the 30-day after the end of chemotherapy, there were statistically significant differences in the following CIPNAT domains: numbness in the hands and feet; tingling in the feet; weakness of arms/hands or legs/feet (severe); and trouble with the balance (severe and frequency). **Conclusion:** The PBM through the Infrared and Red LED board was not able to prevent CIPN in women with breast cancer undergoing chemotherapy.

Keywords: breast cancer, peripheral nerve repair, photobiomodulation therapy, oncology.

Financial Support: We would like to thank student Maíra Carneiro Fernandes for providing part of the results of her master's degree for the presentation of this abstract and the Cancer National Institute, Rio de Janeiro, RJ, Brazil (INCA/RJ) for financing this study. EMM hold scholarships for postdoctoral study.

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Abstracts of the poster section

Effects of systemic vibratory therapy on daytime sleepiness in individuals with narcolepsy after six weeks of intervention: preliminary data

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Introduction: Narcolepsy is a primary disorder of the central nervous system with symptoms such as excessive daytime sleepiness, cataplexy, sleep paralysis, sleep fragmentation, hypnagogic hallucinations. Studies encourage the practice of physical exercise to improve the daytime sleepiness. Interventions such as systemic vibration therapy (SVT) have been suggested as an alternative to improve daytime sleepiness in individuals with narcolepsy. **Objective:** The purpose of this study is to evaluate the effects of SVT on improving daytime sleepiness in individuals with narcolepsy. **Methods**: 4 individuals (3 women/1 man), 22 to 30 years old, 157 to 168 cm tall, 79.1 to 83.3 kg body mass, 29.1 to 37 kg/m² BMI, recruited from the Neurology sector HUPE/UERJ, diagnosed with narcolepsy. Project approved by the Ethics Committee of the State University of Rio de Janeiro - UERJ (CAAE 30649620.1.0000.5259). Single-arm clinical trial, in which participants were exposed to SVT, using alternating PV. SVT (25 Hz, 2.5 mm) was performed in 5 series (1 min of work, 1 min of rest between interventions), 2 times/week, for 6 weeks. The ESS is a self-administered questionnaire to determine the degree of daytime sleepiness in the adult individual, in 8 situations involving daily activities, scores above 10 suggest a positive diagnosis for EDS. **Results**: The results obtained did not demonstrate a significant difference in the intervention in the ESS before 17.75 (4.81) and after 15.25 (3.03) (p-value=0.625) due to the chronic effects of the intervention by Wilcoxon matched-pairs signed rank test. A slight reduction in the final score after the intervention was observed, although the ESS index remained above the average at the cutoff point. **Conclusion**: Small difference was observed in the effects of the TVS intervention in relation to daytime sleepiness by ESS. However, this is a preliminary analysis, and further studies are needed to investigate the effects of SVT on daytime sleepiness in individuals with narcolepsy.

Keywords: narcolepsy, sleep fragmentation, daytime sleepiness, systemic vibration therapy, Epworth Sleepiness Scale.

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Abstracts of the poster section

Effect of 6 weeks of systemic vibratory therapy on sleep latency in individuals with narcolepsy: preliminary data

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Introduction: Narcolepsy is a central nervous system disease, which is characterized by a pentad of symptoms such as excessive daytime sleepiness, cataplexy, sleep paralysis, hypnagogic hallucinations and nighttime sleep fragmentation. Scientific evidence relates the practice of physical exercise to improvement in sleep quality. Interventions such as systemic vibration therapy (TVS) have been suggested as an alternative to exercise to improve the sleep quality in individuals with narcolepsy. Methods: Single Arm Clinical Trial (CAAE 30649620.1.0000.5259). Four female individuals, 22 to 37 years old, 157 to 165 cm tall, 79.1 to 83.3 kg of body mass, 29.1 to 37 kg/m², diagnosed with narcolepsy. SVT (25 Hz, 2.5 mm) was performed in 5 series (1 min of work, with 1 min of rest between interventions), 2 times/week, for 6 weeks. The Pittsburgh Sleep Quality Index (PSQI) and actigraphy (7 days) were applied pre and post-intervention). Statistical analyses were performed using the Wilcoxon matched-pairs signed rank test. Results: The results obtained did not demonstrate significant differences in the intervention in both analysis instruments applied: PSQI - latency domain before 0.5 (0.86) and after 0.75 (0.43) (p value=0,7728), and Actigraphy - sleep latency before 1,67 (1,14) and after 2,68 (1,85) (p value=0,625). Conclusion: No significant difference was observed in the cumulative effects of the intervention on sleep latency in individuals evaluated with narcolepsy, although a slight trend was observed for improvement in sleep latency in the individuals tested. However, as this is a preliminary analysis, further studies are needed to elucidate the use of PSQI (latency domain) and actigraphy to verify the effects of SVT on sleep quality in individuals with Narcolepsy.

Keywords: narcolepsy; latency; actigraphy; Pittsburgh sleep quality index; systemic vibration therapy.

Financial Support: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).

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Abstracts of the poster section

Fall risk: effect of twenty sessions of systemic vibratory therapy on the time to perform the timed up and go test in elderly

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Introduction: Fall risk is one of the major causes of morbidity in elderly people. This is a multifactorial problem whose prevention requires the identification of possible risk factors. Physical exercise (PE) is a nonpharmacological intervention for the prevention of falls. However, many elderly people face difficulties in maintaining adherence to traditional PE programs. In this context, systemic vibratory therapy (SVT) emerges as a recommended alternative for this population. **Objective:** To assess the risk of future falls in the elderly through the phases of the timed up and go the timed up and go test (TUG) after using the SVT. **Methods:** This was a longitudinal clinical study approved by the Ethics Committee (CAAE No. 30649620.1.0000.5259). Thirty individuals (69.40±5.31 years old) were divided equally into SPG and StandPG groups. In the SPG, individuals bare feet were seated in an ancillary chair placed in front of a side-alternating VP with knees flexed at 90º. In the StandPG group, the individuals stand with a 30º of knee flexion. Twenty sessions of SVT were conducted, utilizing mechanical vibration (MV) with frequencies of 5 to 14 Hz, peak-to-peak displacement: 2.5 to 7.5 mm, with 1 minute of intervention and 1 minute of rest. The time to perform the TUG was determined before the first session and after the last session. Statistical analysis was done on the SSPS software, version 20 and data was submitted to Shapiro-Wilcox normality test. For intragroup analysis the paired t Student test was used with p=0.752. **Results:** The time to perform the TUG was 13.48±3.11 (before) and 13.20±3.11 (after) seconds for SPG. For StandPG, the time was 11.61±2.31 (before) and 10.11±1.71 seconds. There were no significant differences in the TUG Test intragroup results, but the intergroup results showed a relevant difference (p=0.002). **Conclusion:** The VST demonstrated an increase in the benefits of patients' functionality as there was an improvement in the time taken to perform the TUG, suggesting a possible reduction in the risk of falling. However, more research is needed to expand knowledge on this topic.

Keywords: fall risk; systemic vibratory therapy; the timed up and go test.

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Abstracts of the poster section

Pain assessment using the numeric pain scale through systemic vibratory therapy in pre-frail and frail elderly patients: preliminary results

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Introduction: Pain is an experience of sensory and emotional fatigue associated with or similar to actual or potential tissue damage. Treatment requires a combination of pharmacological and non-pharmacological medications. This should reduce pain and improve overall functionality. **Aim:** The aim of this study was to evaluate the cumulative effect of whole-body vibration exercises (WBVE) on pain in frail and pre-frail older adults. **Methods:** This longitudinal clinical trial was approved by the Research Ethics Committee (CAAE nº 30649620.1.0000.5259). The criteria for placing the individual in a sitting position with knees flexed at 90º, using an auxiliary chair with bare feet at the base of the VP, included lack of static and dynamic balance that would allow standing for approximately 30 minutes, presence of vertigo and/or labyrinthitis, reduced mobility and the presence of osteoporosis and/or osteopenia. 20 TVS sessions were performed, using MV with frequencies of 5 to 14 Hz, peak-to-peak displacement: 2.5 to 7.5 mm, peak acceleration: 0.12 to 2.95 g, with 1 minute of intervention and 1 minute rest. Pain was assessed using the NPRS before and after the 20 SVT sessions. The results were expressed as mean ± standard deviation (SD) and the difference was considered at p-value < 0.05. **Results:** Twenty-six women participated in the study, with a mean age of 69.6 ± 5.5 years; height 155.2 ± 6.2 cm; body mass of 73.2±6.2kg; BMI of 30.4 ± 4.9 kg/m²; and frailty score of 3.6 ± 1.09. The initial pain score was 2.346 ± 3.149 and the final score was 1.577 ± 2.283 (p=0.2769). **Conclusion**: The parameters used in this study did not show statistical significance in pain levels, but showed a reduction in pain scores and increased patients' functional performance.

Keywords: pain, whole-body vibration exercise, rehabilitation.

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Abstracts of the poster section

Effects of systemic vibratory therapy on fear of falling in elderly women with knee osteoarthritis: preliminary results

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Introduction: The fear of falling is common among elderly individuals with knee osteoarthritis (KOA), a degenerative disease that affects the joints, causing pain and reduced mobility. Physical limitations increase the risk of falls due to the loss of balance and muscle strength, compromising stability and decreasing confidence in performing daily activities. **Objective**: To analyze the effects of systemic vibratory therapy (SVT) on the fear of falling in elderly women with KOA. **Methods**: This is a longitudinal clinical study, approved by CAAE nº 198 26413.8.0000.5259, registered in the Brazilian Clinical Trials Registry (ReBEC nº RBR 7dfwct). All participants signed the Free and Informed Consent Form. The SVT group (GTVS) performed ten sessions of SVT were conducted on a vibrating platform (VP) with alternating base displacement, sitting on an auxiliary chair, using mechanical vibration with a progressive frequency of 5 to 14 Hz, peak-to-peak displacement of 2.5, 5.0, and 7.5 mm, in three sets, with 3 minutes of work and 1 minute of rest, twice a week, for 5 weeks and the Sham group (GSHAM) followed the same protocol, but the VP was customized and turned off. The fear of falling was assessed before and after the SVT using the FES-I instrument. Statistical analyses were performed using the Statistical Package for the Social Science (SPSS) software, version 20, with normality tested by the Shapiro-Wilk test. A paired sample Student's t-test was used to compare the means, and a p-value of <0.05 was considered statistically significant. **Results**: The analysis included 10 elderly women with KOA, The GTVS (n=5) had an age (67.00±2.00 years), height (1.52±0.06 m), body mass (76.74±10.34 kg), body mass index (36.27±4.34 kg/m2), and FES-I scores assessed baseline (44.00±7.51) and final evaluation (36.20±6.01), intra-group with $p<0.228$. The GSHAM (n=5) had an age (61.60±9.23 years), height (1.57±0.03m), body mass (75.20±11.56 kg), body mass index (30.37±4.37 kg/m2), and FES-I scores assessed baseline (40.40±11.37) and final evaluation (38.60±10.71), intra-group with $p<0.543$. **Conclusion**: The preliminary study suggests that 10 sessions of SVT did not reduced the fear of falling in elderly women with KOA, but further studies with larger samples are needed to confirm these findings.

Keywords: knee osteoarthritis; fear of falling; exercise; whole body vibration.

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Abstracts of the poster section

Effects of systemic vibratory therapy on daytime sleepiness in elderly women: a study using the epworth sleepiness scale

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Introduction: Knee osteoarthritis (KOA) is a chronic arthropathy that results in worse quality of life (QoL) scores in the individuals affected. Physical exercise is recommended for these individuals. However, KOA indiviuals may be resistant to conventional exercise. Systemic vibratory therapy (SVT) has been suggested for individuals with KOA due to its significant clinical and functional results. **Aim:** To investigate the effects of SVT on the QoL of patients with KOA, using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Methods: Longitudinal clinical study, CAAE nº 198 26413.8.0000.5259, ReBEC nº RBR 7dfwct and with a Free and Informed Consent Form signed by the participants. The SVT Group (GSVT) performed 10 sessions on a vibrating platform (VP) with alternating displacement of the base, sitting on an auxiliary chair, with a progressive frequency of 5 to 14 Hz, peak-to-peak displacement of 2.5, 5.0 and 7, 5 mm, in three sets, with 3 minutes of work, 1 minute of rest, twice a week, for 5 weeks and the Sham group (GSHAM) followed the same protocol, but the VP was customized and turned off. WOMAC was performed at the beginning and end of the protocol. The SPSS Statistics Software, version 20, was used, checking normality with the Shapiro-Wilk test. For comparison, a 2x2 factorial ANOVA with repeated measures was performed for intra and intergroup analyzes and the results are presented as mean and standard deviation, considering $p<0.05$ for statistical significance. **Results:** A total of 24 elderly women with koa participated in the study (GSVT = N=12 (age: 62.08 ± 9.75 years; height: 1.59 ± 1.27 m; body mass: 80.46 ± 21.21 kg; and BMI: 30.19 ± 8.39 kg/m²) and (GSHAM = N=12; age: 64.08 ± 7.92 years; height: 1.55 ± 1.15 m; body mass: 73.78 ± 15.42 kg; BMI: 29.88 ± 5.72 kg/m²). The WOMAC score the baseline GSVT (59.90 ± 25.01) and final assessment (45.49 ± 22.63), intra-group ($p<0.04$). The WOMAC score the baseline GSHAM (56.16 ± 19.91) and final assessment (35.94 ± 29.02), intra-group analysis ($p<0.01$). There was no significant inter-group difference with $p<0.45$. **Conclusion:** Preliminary results suggest that SVT not promoted benefits in the QoL of individuals with KOA.

Keywords: knee osteoarthritis; quality of life; exercise; whole body vibration.

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