A DIFFERENT VIBE

SCIENTIFIC BOOK - ABSTRACTS

ADDENDUM FOR

AESTHETIC MEDICINE

Summary

Dessy LA, Monarca C, Grasso F, Saggini A, Buccheri EM, Saggini R, Scuderi N. The use of mechanical acoustic vibrations to improve abdominal contour. Aesthetic Plast Surg. 2008 Mar;32(2):339-45. doi: 10.1007/s00266-007-9066-x. PMID: 18167017.

The adaptive effects caused by mechanical acoustic vibrations on the neuromuscular system are widely described. These vibrations applied to the muscle belly cause the "tonic vibrational reflex" characterized by an improvement in the power contraction of the stimulated muscle. Mechanical acoustic vibrations of moderate force placed on limited areas of the body produce positive muscle activity without damage. A prospective study from January to September 2006 examined 60 sedentary patients who had muscle hypotrophy associated with or not associated with lipodystrophy of the abdominal region who desired substantial improvement in the contour of that area without invasive procedures. Of these patients, 40 underwent a treatment protocol with mechanical acoustic vibrations applied to the abdomen, associated or not with moderate-intensity aerobic exercise. The remaining 20 patients engaged in physical training alone. The study aimed to assess whether the application of mechanical acoustic vibrations could improve the body's profile.

Our study showed that the treatment could not only be used in rehabilitation to increase muscle capacity, but also for aesthetic purposes. It allows an improvement of the silhouette of the body through an improvement in the strength and definition of muscle tone, particularly when combined with physical aerobics and moderate-intensity exercises.

Link e-copy: https://pubmed.ncbi.nlm.nih.gov/18167017/

Pilch, Wanda & Nastałek, Magdalena & Piotrowska, Anna & Czerwińska-Ledwig, Olga & Zuziak, Roxana & Maciorowska, Anna & Golec, Joanna. (2019). The effects of a 4-week vibrotherapy programme on the reduction of adipose tissue in young women with cellulite - a pilot study. Rehabilitacja Medyczna. 22. 10.5604/01.3001.0013.0109.

Lipodystrophy is a common problem for modern women. So far, no fully effective therapeutic methods have been developed to eliminate this type of change. Vibration massage is a method that has not yet been studied in the prevention and elimination of the symptoms of lipodystrophy.

Aim of the study: The aim of this study was to evaluate the efficacy of vibrotherapy on the reduction of lipodystrophic changes. Material and method: 10 volunteers with cellulite alterations aged 21 to 23 years with levels of physical activity described by the International Institute of Physical Activity

The IPAQ questionnaire participated in the study. All women included in the study were assessed based on a 5-day nutritional analysis. Before and after 4 weeks of vibrotherapy, waist, hip and thigh circumferences were measured, and body composition was assessed using bioimpedance and dermatoscope photos were taken.

Results: After the 4-week vibration series, a subsequent reduction in thigh, hip, and waist circumference was observed. The proposed series of treatments caused a reduction in body fat mass without affecting the body's water content, and analysis of dermatoscopic imaging results revealed an improvement in skin perfusion.

Conclusion: Oscillating-cycloidal vibration therapy may be an effective tool for alleviating lipodystrophic changes.

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Pilch W, Czerwińska-Ledwig O, Chitryniewicz-Rostek J, Nastałek M, Krężałek P, Jędrychowska D, Totko-Borkusewicz N, Uher I, Kaško D, Tota Ł, Tyka A, Tyka A, Piotrowska A. The Impact of Vibration Therapy Interventions on Skin Condition and Skin Temperature Changes in Young Women with Lipodystrophy: A Pilot Study. Evid Based Complement Alternat Med. 2019 May 29;2019:8436325. doi: 10.1155/2019/8436325. PMID: 31275423; PMCID: PMC6560364.

Background: Cellulite affects 85-98% of women over the age of 20. In any given context, mechanical vibrations have not been applied in the therapy of gynoid lipodystrophy (GL) so far. The aim of this pilot study was to assess the condition and temperature of skin affected by cellulite after vibration therapy interventions in young women with GL.

Methods: A total of 10 healthy women (21.5 ± 1.5 years) with stage 1 or 2 Nürnberger-Müller GL severity scale participated in the study. Subjects underwent 20 vibration surgeries using a Vitberg+ Rehabilitation Massage Device. Vibration therapy was applied 5 times a week for 60 minutes over a period of 4 weeks. Before and after the first and last surgery, the degree of lipodystrophy was assessed and thermographic images were acquired.

Results: Visual and palpatory analysis performed before and after a series of treatments demonstrated a total remission of cellulite after surgery in 40% of subjects (from stage 1 to stage 0). In the remaining 60% with stage 2 cellulite, an improvement in skin condition was observed and the degree of cellulite was determined as stage 1. The mean skin temperature on the lateral part of the thigh, as well as on the posterior surface of the thigh and buttocks increased significantly ($p<0.00001$) both after the first (respectively: 4.0°C ± 0.9°C, 3.9°C ± 0.8°C) and after the last vibrotherapy surgery (respectively: 3.1°C ± 1.1°C, 2.8°C ± 1.1°C). After the series of interventions, a statistically significant increase ($p=0.00705$) in mean skin temperature was observed in the lateral part of the thigh before the first treatment: 27.9°C ± 0.7°C; before the twentieth treatment: 29.0°C ± 1.2°C.

Conclusion: The series of vibration interventions contributed to the reduction of GL among participants. Analysis of thermographic imaging demonstrated the impact of both single and serial vibration interventions.

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Sadowski T, Bielfeldt S, Wilhelm KP, Sukopp S, Gordon C. Objective and subjective reduction of cellulite volume using a localized vibrational massage device in a 24-week randomized intra-individual single-blind regression study. Int J Cosmet Sci. 2020 Jun;42(3):277-288. doi: 10.1111/ics.12613. PMID: 32181499; PMCID: PMC7317706.

Cellulitis occurs in females and is a common condition of altered connective tissue matrix and increased adipogenicity with visible dimples and orange peel appearance on the surface of the skin. While advances in methods continue to aid our understanding, attempts to correct the appearance of cellulite topically have yielded limited success. Various types of non-invasive body contouring methods such as whole body vibration have been reported with demonstrable visible improvements in cellulite condition.

The aim of this study was to evaluate the reduction in volume and improvement in the visible appearance of cellulite as judged both objectively (3-D marginal projection at AEVA-HE phase shift, gradation of macrophotographic images) and subjectively (questionnaires) after the application of a coat. Kept localized vibrational device for 24 weeks.

The study was conducted on 40 healthy volunteers who were taught how to use the device on defined areas of cellulite on the outside and back of the thighs (iliotibial band and region above the biceps femoris, respectively). The first 12 weeks of continuous application of the study massage were followed by a 12-week phase in which volunteers were divided into 2 subgroups, one for the evaluation of regression effects and one for the effects of continuous application.

Measurements of the AEVA (skin surface volume) of cellulite-related dimples correlated with the questionnaires and visual image assessment score, as cellulite in the iliotibial region was significantly reduced at 12 weeks. In the regression subgroup, cellulite returned to baseline values immediately after cessation of treatment, while in the continuous application subgroup, cellulite remained decreased. The effect of this cellulite-reducing device, as observed in this study, shows that the continuous use of vibrational massage is beneficial in attenuating the visible signs of cellulite.

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Paolucci T, Bellomo RG, Pezzi L, Frondaroli F, Frondaroli S, Santarelli A, Barbato C, Porreca A, Saggini R. A Novel Rehabilitative Protocol in the Treatment of Mixed Urinary Incontinence in Women: The Effects of Focused Mechano-Acoustic Vibration. Biores Open Access. 2019 Dec 20;8(1):219-228. doi: 10.1089/biores.2019.0041. PMID: 32042506; PMCID: PMC6931011.

Pelvic floor dysfunctions related to mixed urinary incontinence in women are extremely limiting pathologies for the physical and psychosocial conditions of patients, altering their quality of life. The aim of this study was to determine the effects of focal mechanical vibrations in mixed urinary incontinence. In this retrospective observational case-control study, 65 patients were randomized and divided into 2 groups: focal mechanical vibration treatment group (VISS-10 sessions) (N = 33) and a wait-list control group (N = 32). In addition, both groups received ergonomic postural instruction at home to strengthen the pelvic floor. Data were collected at T0 (baseline), T1 (end of treatment) and T2 (follow-up = after 1 month): rheological muscle parameters were assessed by MyotonPRO compared to the assessment of gluteus maximus muscle. Then, the Pelvic Floor Disability Index (PFDI-20) and the Pelvic Floor Impact Questionnaire (PFIQ-7) were used to measure general pelvic floor disability and the impact of urogenital problems on daily activities. The groups were perfectly matched before treatment for age (58.20 ± 4.37 vs. 58.73 ± 5.19) and BMI (26.15 ± 2.22 vs. 25.85 ± 2.11); for two-way ANOVA analysis, a difference in gluteal variables over time and between groups was shown with the exception of GMDR (group p-value = 0.60). Two-way ANOVA shows statistically significant treatment and time effects for PDFI-20 and PFIQ-7 (p-value <0.001). Improvement in incontinence symptoms and quality of life has been reported in PDFI-20 and PFIQ-7 scores, and VISS may promote muscle stiffness for exercises by improving baseline tone normalization. Our results were encouraging and suggested the use of focal mechanical vibration as a novel tool for the treatment of mixed urinary incontinence in women to complement and aid the rehabilitation therapeutic protocol.

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Piotrowska A, Czerwińska-Ledwig O, Stefańska M, Pałka T, Maciejczyk M, Bujas P, Bawelski M, Ridan T, Żychowska M, Sadowska-Krępa E, Dębiec-Bąk A. Changes in Skin Microcirculation Resulting from Vibration Therapy in Women with Cellulite. Int J Environ Res Public Health. 2022 Mar 13;19(6):3385. doi: 10.3390/ijerph19063385. PMID: 35329074; PMCID: PMC8950355.

Cellulite is an aesthetic defect that affects more than 80% of post-pubertal women.

One of its pathological mechanisms involves microvascular dysfunction. It has been suggested that vibration is a physical stimulus that can improve circulation in the skin and muscles. The aim of this study was to evaluate the effect of local vibration on skin microcirculation and elimination of cellulite symptoms in women.

Methods: A total of 57 healthy women with at least grade 1 cellulite were recruited and divided into four different groups by treatment time and position (sitting or lying down) during vibration treatments. Participants took part in 15 vibrotherapy sessions.

Body composition, selected circumferences, degree of cellulite, and thermographic images of buttocks and thighs were recorded. Results: Significant changes in skin temperature were observed in both areas studied after the first and last treatment in each group. After a series of treatments, a significant decrease in the degree of cellulite was observed. The strongest effects were observed for the sitting position with a treatment time of 60 min.

Conclusion: Vibration treatment improves microcirculation in the areas affected by cellulite. No adaptation was observed over time, and subsequent treatments maintained the beneficial effects. The lengthening of the treatment time increases its influence on the skin's microcirculation.

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Mohammed T, Murphy MF, Lilley F, Burton DR, Bezombes F. The effects of acoustic vibration on fibroblast cell migration. Mater Sci Eng C Mater Biol Appl. 2016 Dec 1;69:1256-62. doi: 10.1016/j.msec.2016.07.037. Epub 2016 Jul 18. PMID: 27612824.

Cells are known to interact and respond to external mechanical cues and recent work has shown that application of mechanical stimulation, delivered via acoustic vibration, can be used to control complex cell behaviours.

Fibroblast cells are known to respond to physical cues generated in the extracellular matrix and it is thought that such cues are important regulators of the wound healing process. Many conditions are associated with poor wound healing, so there is need for treatments/interventions, which can help accelerate the wound healing process.

The primary aim of this research was to investigate the effects of mechanical stimulation upon the migratory and morphological properties of two different fibroblast cells namely; human lung fibroblast cells (LL24) and subcutaneous areolar/adipose mouse fibroblast cells (L929).

The results show that 100Hz acoustic vibration enhanced cell migration for both cell lines whereas acoustic vibration above 100Hz was found to decrease cell migration in a frequency dependent manner.
Mechanical stimulation was also found to promote changes to the morphology of both cell lines, particularly the formation of lamellipodia and filopodia.

These results suggest that low-frequency acoustic vibration may be used as a tool to manipulate the mechanosensitivity of cells to promote cell migration.

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Use of vibration to reduce the side effects of activities in aesthetic medicine

Sadala AY, Rampazo ÉP, Liebano RE. Vibration anesthesia during carboxytherapy for cellulite: a study protocol. Pain Manag. 2022 May;12(4):401-408. doi: 10.2217/pmt-2021-0080. Epub 2022 Jan 10. PMID: 35001651.

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Sharma P, Czyz CN, Wulc AE. Investigating the efficacy of vibration anesthesia to reduce pain from cosmetic botulinum toxin injections. Aesthet Surg J. 2011 Nov;31(8):966-71. doi: 10.1177/1090820X11422809. Epub 2011 Oct 14. PMID: 22001341.

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Mally P, Czyz CN, Chan NJ, Wulc AE. Vibration anesthesia for the reduction of pain with facial dermal filler injections. Aesthetic Plast Surg. 2014 Apr;38(2):413-8. doi: 10.1007/s00266-013-0264-4. Epub 2014 Jan 24. PMID: 24464122.

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Kuwahara H, Ogawa R. Using a Vibration Device to Ease Pain During Facial Needling and Injection. Eplasty. 2016 Feb 4;16:e9. PMID: 26933468; PMCID: PMC4750366.

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Sun C, Zeng R, Cao G, Song Z, Zhang Y, Liu C. Vibration Training Triggers Brown Adipocyte Relative Protein Expression in Rat White Adipose Tissue. Biomed Res Int. 2015;2015:919401. doi: 10.1155/2015/919401. Epub 2015 Jun 1. PMID: 26125027; PMCID: PMC4466483.

L'allenamento vibratorio è considerato una nuova strategia di perdita di peso; tuttavia, i suoi meccanismi non sono ancora chiari.
In questo studio, ratti normali o ad alto contenuto di grassi indotti da una dieta sono stati addestrati mediante vibrazioni di tutto il corpo per 8 settimane.
Abbiamo osservato che il peso corporeo e l'indice del metabolismo dei grassi, la glicemia, i trigliceridi, il colesterolo e gli acidi grassi liberi nei ratti obesi sono diminuiti significativamente rispetto al gruppo senza vibrazioni (n = 6). Sebbene il peso della BAT intrascapolare non sia cambiato in modo significativo, la vibrazione ha migliorato la riduzione dell'ATP e il livello proteico aumentato della molecola chiave del tessuto adiposo bruno (BAT), PGC-1α e UCP1 nella BAT. È interessante notare che gli adipociti nel tessuto adiposo bianco retroperitoneale (WAT) sono diventati più piccoli a causa dell'esercizio vibratorio e avevano un livello proteico più elevato della molecola chiave del tessuto adiposo bruno (BAT), PGC-1α e UCP1 e proteine relative infiammatorie, IL-6 e TNFa.
Contemporaneamente, il contenuto di ATP e il livello di proteina PPARγ in WAT sono diventati inferiori nei ratti rispetto al gruppo senza vibrazioni. I risultati hanno indicato che l'allenamento vibratorio ha modificato il metabolismo lipidico nei ratti e ha promosso un cambiamento simile al grasso bruno nei tessuti adiposi bianchi innescando l'espressione genica associata alla BAT, il riflesso infiammatorio e riducendo la riserva di energia.

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