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RESEARCH ARTICLE

EFFECT OF MICROCURRENT VERSUS WET CUPPING ON NON-SPECIFIC LOW BACK PAIN IN OVERWEIGHT ELDERLY

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ABSTRACT

Background: Non-specific low back pain considered a global disorder with significant negative economic impact, where cupping therapy and micro currents carry growing potential evidence for beneficial management for chronic non-specific low back pain. ***Purpose:*** To compare the effect of microcurrent with wet cupping significantly on non-specific low back pain in overweight elderly patients. ***Method:*** Forty overweight elderly males' participants suffering from non-specific low back pain from military rehabilitation center in Agouza, their age range 65-75 years old, also body mass index range 25- 29.9 kg/ cm^2. They were randomly allocated via envelops into two equal groups; ***Group A*** received wet cupping therapy 1 session/week; and ***Group B*** received micro-current stimulation 3 sessions/week, from January 2022 to March 2023. Demographic assessment and lumbar sagittal ROM using baseline bubble inclinometer and pressure pain threshold via pressure algometer. Statistical analyses were conducted at confidence interval of 95%. ***Result:*** No significant difference between group A and B pretreatment. Regarding lumbar ROM "flexion-extension" among group A, there was a significant increase in group A post treatment. While among group B, there was a significant increase in group B post treatment. *While, there were significant differences in group A compared with that of group B post treatment.* Also, regarding treatment effect on pressure pain threshold among group A, there was a significant decrease in group A post treatment. While, among group B, there was a significant decrease in group B post treatment. Furthermore, there was no significant difference in group A compared with that of group B either pre or post treatment. ***Conclusion:*** Both microcurrent and wet cupping modalities is valuable with superiority for wet cupping in terms of lumbar sagittal ROM so, could be considered for treating non-specific low back pain in overweight elderly patients

INTRODUCTION

Non-specific low back pain (NSLBP) is a leading contributor to disease burden worldwide. As well, non-specific low back pain is a leading cause of work-related disability and has important socioeconomic consequences and accounts for considerable healthcare and socioeconomic costs (1). The estimated point prevalence of NSLBP is 18%. Results of large-scale epidemiological studies show that one of the main characteristics of low back pain is recurrence. A substantial proportion of individuals with chronic NSLBP has been found to have chronic widespread pain. NSLBP is often associated with other pain manifestations such as headache, abdominal pain and pain in different locations of the extremities.

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Widespread pain is associated with a worse prognosis compared to localized NSLBP (2). Evidence indicates that lower physical activity levels, physical functioning and physical fitness exist in persons with CNSLBP. The reported lifetime prevalence of low back pain in western countries ranges between 49% and 85% globally (3). Almost overweight elder populations have a frequent complain of their lower back that revealed clinically in non-specific low back pain diagnosis, which overload overweight elderly with multiple medical prescriptions. Therefore, such traditional approach of pharmacological agents' usage for treating overweight elderly` non-specific low back pain overloads them by numerous side effects in addition to the financial cost (4). Numerous alternative therapeutic approaches have been offered involving microcurrent and wet cupping since earlier centuries. Where,

Kratzenstein who consider the father of electrotherapy" while Ancient Chinese were the prime with Ancient Egyptian whom used cupping that approved recently as wet cupping with clear medical standards (5,6). Micro-current stimulation works because of its ability to stimulate cellular physiology and growth. It could increase ATP generation by almost 500%. Also, it could enhance amino acid transport and protein synthesis. One of the greatest values of micro-current stimulation is pain control (7). In addition, wet cupping is potentially effective in reducing pain and improving disability associated with persistent non-specific low back pain.(8) As well, one of greatest values of micro-current stimulation is pain control (9). To available data, there is a research red era showing actual awareness among healthcare providers, whom focusing on minimizing complications and gaining as possible prognosis of non-specific low back pain (4). Therefore, current study was conducted to compare between micro current and wet cupping in line to offer as therapeutic efficient modality for non-specific low back pain overweight elder population to minimize reported medications side effects and financial costs, as well physical therapists as healthcare team members.

MATERIAL AND METHODS

This study was designed as a Prospective, Pre/ Posttreatment, randomized controlled trial. After approval of the ethical committee of the Faculty of Physical Therapy, Cairo University- Egypt (P.T.REC/000/000000), the procedures of the present study were discussed thoroughly and all the participants were asked to sign a written informed consent. Upon the results of the pilot study and by using G*POWER statistical software (version 3.1.9.2; Franz Faul, University at Kiel, Germany). The sample size was calculated as a function of the expected change in sagittal ROM of lower back. In order to detect a mean difference of 20 milliseconds between groups, the required sample size was 20 patients in each group under the assumption of a two-sided type I error of 5% and a power of 80%, effect size of 0.458.

Participants: Forty male participants allocated randomly into two groups (twenty patient per group), their age was ranged from 65 to 75 years old, were selected randomly from military rehabilitation centre in Agouza, during the period of January 2022 to March 2023.

Group A: had received wet cupping therapy 1 session/week for 8 weeks.

Group B: had micro-current stimulation 3 sessions/week for 8 weeks. Randomization were conducted using a computer-generated randomized table using SPSS program "version 23 for windows; SPSS Inc., Chicago, Illinois, USA". Each participant had one identification number that was used to assign participants into two equal groups in number (n=20), sequentially numbered index cards were secured in opaque envelopes. A researcher opened the sealed envelope and allocated the participants according to their groups.

Inclusion Criteria: Participants` age ranged from 65 to 75 years old, their body mass index ranges from 25 to 29.9 kg/ cm^2. All participants had main complains were persistent non-specific low back pain with specialist referral (Orthopaedist, Neuropsychiatrist and/ or Neurosurgeon).

Exclusion Criteria: All participants with specific low back painincludingdiscprolapse,spondylosis, spondylolisthesis…etc, individuals havehemodynamically unstable or with serious heart diseases, diabetic patients or anaemic individuals were excluded from this study.

Instruments

Assessment Instrument

Baseline Bubble Inclinometer: Baseline bubble inclinometer device is a latex free pocket size that was used for objective assessment of sagittal ROM of lower back, through measuring angle and joints` incline in degrees with great precision. It has high reliability and validity in measure the lumbar range of motion and follow-up the effectiveness of therapeutic interventions (10).

Pressure Algometer: It is an assessment tool that is widely utilized for objective assessment of pressure pain threshold. Pressure algometer has been shown to be valid and reliable. It is a hand-held device. It consists of a gauge that is attached to a hard rubber tip one centimetres in diameter. The gauge is calibrated in kg/cm^2 and ranges from 1 to 10 kg/cm^2 (11).

Therapeutic Instrument

Chattanooga electric stimulation: An FDA-approved intellect mobile stim unit for micro-current standard Rehabilitation four channels stimulator,manufactured by DJO, LLC. It is extraordinary versatility based on simplicity of operation with a logical control system and a large, easy to read graphical LCD.

Wet Cupping tools: Almost cupping tools package dimensions are a 10.4 X8 X3.5 inches, used wet cupping tools were D&D-5513 model, ASIN/ B00U7A0152, of twelve ounces. Hijama Box Arabic Health Vacuum

Evaluating Procedures

History taking: Detailed medical and physical histories was taken from each participant in current clinical trials` groups before starting the study and was recorded in a data recording.Two inclinometers were employed simultaneously for recording the dynamic motion. One inclinometer was placed at the top of the measured spine segment and other at the lower spine location. The measurement value of the lower spine was subtracted from upper spine value. This result was known as the "true angle".(12)

Specific outcome measures

- **Lumbar range of motion measurement:** Lumber ROM (flexion/extension) was measured using inclinometer, each patient was subjected to measurement, while wearing a comfortable clothe.

- **Pain threshold measurement:** Pain was assessed to each patient using pressure algometer to indicate the pain threshold and therefore the level of pain that patient is suffering from, individuals with non-specific low back pain have lower pain threshold (13).

Therapeutic procedures

Wet cupping treatment (Group A only): Proper counselling the participant about the procedures,hen patient relaxed in prone over sterilized bed and cleaned back, disinfected before cupping.Primary suctioning with one cup for five minutes (started with one site then done for six cupping sites; three sites on each lower back started at Dorsal vertebra 12 and ends at sacroiliac joint bilateral according to Shaban,(14) then suction and bloodletting that lasts for 5 minutes and conducted for pre-localized sites.(15) After removal of the cup, followed by the fifth step which includes dressing the area after cleaning and disinfecting through applied a moisturizer or antiseptic cream then rechecked the participant post treatment and rechecked after around thirty minutes before he leaved the clinic.

Microcurrent electrical stimulation (Group B only): Therapeutic program was initially explained to participant then ask the participant to relax in prone position and examined his back for any wounds then cleaned the skin. After that applied the electrodes placed on the skin bilaterally at the points BL23, BL24 and BL25,(9) as well securely and ensured good contact, which checked regularly throughout the session that extended for preadjusted twenty minutes. Participants had been re-examined after treatment.

Statistical Analysis: SPSS version 25 was used to conduct the analysis of the current study. The descriptive statistics was done calculating the mean, standard deviation (SD) per each group. Inferential statistical analysis "Orthogonal contrast post-test" was used in the form of paired T- test (test of difference) to compare the pre and post-test measures for each group and to compare between the two groups. The association between outcome measures were analyzed using the Spearman correlation coefficient. All statistically significant differences had been determined with a confidence interval of 95% and thus level of significance was settled at 0.05 level.(16)

RESULTS

Patients' Demographic Data: No statistically significant differences between groups regarding age, weight height and BMI as t values were -1.453, -0.923, 0.839 and -1.39 and P values were 0.163, 0.368, 0.412 and 0.181, respectively, table (1).

Table 1. Physical characteristics of patients

Measured variable	Group A Mean ±SD	Group B Mean ±SD	t-value	p-value
Age (years)	70.1±3.06	70.7±2.97	-1.453	0.163
Weight (kg)	70.7±2.98	71.18±2.34	-0.932	0.368
Height (cm)	160.4±3.23	160.1±3.19	0.839	0.412
BMI (kg/m^2)	27.63±1.06	27.91±1.06	-1.39	0.181

Table 1. Mixed MANOVA for the effect of treatment on ROM, pressure pain and SF-36

Mixed MANOVA		
Interaction effect (treatment * time)		
F = 25.48	*F = 25.48*	*F = 25.48*
Effect of time		
F = 117.89	*F = 117.89*	*F = 117.89*
Effect of treatment		
F = 4.95	*F = 4.95*	*F = 4.95*

F value: Mixed MANOVA F valuep value: Probability valueS: Significant

Effect of treatment on Lumbar Sagittal ROM and Pressure Pain Threshold: There was a significant interaction effect of treatment and time (P 0.001). There was a significant main effect time (P 0.001). There was a significant main effect of treatment (P 0.004), (Table 2).

Effect of treatment on Lumbar Sagittal ROM

Within group comparison: A significant increase in lumbar ROM of both groups A& B post treatment compared with pretreatment (P 0.001) with mean differences were 10.3°, 8.75°, 9.45°and 5.1°, respectively.

Between groups` comparison: No significant differences in lumbar ROM "flexion-extension" between group A and B pretreatment (P 0.205 and 0.01, respectively). However, there were significant differences of group A compared with that of group B post treatment (P0.02 and 0.001, respectively), table (3). Table (3): Mean lumbar ROM pre and posttreatment of both groups A& B

Effect of treatment on Pressure Pain Threshold

Within group comparison: A significant decrease in pressure pain threshold values of group A& B post treatment compared with pretreatment (P 0.001) with mean differences were-3 and -2.99, respectively. Figure (1) Pressure pain threshold means of both groups

Between groups` comparison: No significant difference in pressure pain threshold of group A compared with that of group B either pre nor post treatment (P 0.93 and 0.59), respectively.

DISCUSSION

NSLBP is a characterized by an enormous individual and socioeconomic disease i.e., without an unequivocal structural cause such as, vertebral fractures as confirmed by Frenken et al.(17)Clinical guidelines for chronic NSLBP had been emphasized on the importance of specialized rehabilitation mechanical force transmission along the superficial back line.(18) Moreover, prior clinical trials had reported an actual need to decrease the shear–strain transmission in lumbodorsal fascia in individuals with chronic NSLBP based on pathophysiological thought to be caused by inflammation.(17) Our results revealed thetreatment effect on lumbar ROM among group A has stated that pretreatment means ± SD value were 33.6°± 3.14°; 14.85°± 3.19°, also post treatment were 43.9°± 3.81°; 23.6°± 2.89°, respectively; with mean difference were 10.3° and 8.75°, respectively with a significant increase in lumbar (P 0.001). While, among group B has stated that mean ± SD value pretreatment were 32.65°± 2.08°; 13.1°± 1.68° and post treatment were 42.1°± 2.1°; 18.2°± 1.47°, respectively with difference were 9.45° and 5.1°, respectively. Thus, a significant increase (P 0.001). In addition, significant differences in lumbar ROM of group A compared with group B posttreatment (P 0.02 and 0.001, respectively). Current study results were supported by prior physical rehabilitation published clinical trials those ensured that NSLBP noninvasive management depends upon reduction of pain generators along with various conventional physiotherapy modalities had reported that range of lumbar flexion improved (19).

LumbarROM		Pretreatment	Posttreat
		X±SD	X±SD
GroupA	Flexion	33.6° ±3.14°	43.9° ±3.
	Extension	14.85° ±3.19°	23.6° ±2.
GroupB	Flexion	32.65° ±2.08°	42.1° ±2.
	Extension	13.1° ±1.68°	18.2° ±1.
MD	Flexion	0.95°±3.24°	1.8°±2.8
	Extension	1.75°±2.73°	5.4°±2.5
P-value	Flexion	0.205	0.02
	Extension	0.01	0.001

In addition, Hyun-Gun et al. had reported significant improvement in lumbar both sagittal flexibility ranges that supporting current study findings (20). In disagreement with current study results, prior clinical trial conducted by Ebadi et al. had ensured that a limited improvement in overall lumbar sagittal ROM, 59.8± 17.9 in flexion and 24.1± 9.3 for extension had been revealed in, which indicates no significant differences according to their conclusion for conservative physical therapy, mainly ultrasound therapeutic modality.(21) Furthermore, recent trial that conducted by Durmus et al. has reported very small improvements only in lumbar sagittal flexion mobility unless they concluded as a non-significant one based on their evaluation method used "Schober method in centimeters-posttreatment" (22). On the one hand, unambiguous points (meridians) relating to chronic NSLBP were determined and the number of people taking advantage of acupuncture has increased significantly in recent years. In the same line, kinesio taping was recommended for NSLBP as a supporting approach, as well considered not only sensory, but also a proprioceptive interaction (23,24).

As well, traditional approaches are therapeutic methods that conceptually combines psychoemotional and structural balance Several clinical trials had reported that restricted pelvic rotation reported no difference in lumbar extensor force-output between people with and without NSCLBP (25,26). Clinical guidelines for the management of nonspecific low back pain in primary care recommend advising the applying microcurrent stimulation on percutaneous neural tissues using a 60 μA intensity and a pulsation frequency of 3 pps for 15 minutes had showed a significant difference in the range of motion of the joint at flexion 48 hours later.(27) Earlier clinical trial had conducted by Manepaa et al. had ensured that microcurrent therapy relieves myocontracture and can enhance conventional rehabilitation programs for children with cerebral palsy(28), Cho et al. had advised the usage of microcurrent stimulation for 15 minutes showed significant therapeutic effects for the range of motion of the joints after four weeks of treatment ($p < 0.05$) (29). However, Kwon et al. had reported recently the significance of microcurrent stimulation, which facilitates the significant improvements in elbow movement in fifteen patients suffering from acute lateral epicondylitis ($p < 0.01$) that was explained through application of microcurrent stimulation could stimulate receptor proteins by opening Na+ and Ca^{2+} pathways in cellular membranes to stimulate the proliferation of cells such as chondrocytes, bone cells, fibroblasts and vascular endothelial cells, which differentiation and migration of the cell process enhances functional improvement (30). Also, regarding treatment effect on pressure pain threshold among group A has stated that the pretreatment value of pressure pain threshold pretreatment was 3.89± 0.38 and post treatment was0.89± 0.39, where the mean difference between pre and post treatment was -3. Thus, there was a significant decrease in the pressure pain threshold of group A post treatment compared with pretreatment (p.001). while, among group B has stated that value of pressure pain threshold pretreatment was 3.84± 0.31 and that post treatment was 0.85± 0.33, where mean difference between pre and post treatment was -2.99. Thus, there was a significant decrease in pressure pain threshold of group B post treatment compared with pretreatment (p 0.001). Furthermore, the mean difference in pressure pain threshold between groups pretreatment was 0.06± 0.31. Thus, there was no significant difference in the pressure pain threshold between group A and B pretreatment (p 0.93), while the mean difference in pressure pain threshold between groups post treatment was 0.05 ± 0.37. Thus, there was no significant difference in the pressure pain threshold of group A compared with that of group B post treatment (p 0.59). Current study was based on that pain pressure threshold was supported and agreed with recent recommendation has demonstrated that microcurrent approach as a novel single factor contributing the most consistent difference in patient-reported pain relief with an overall improvements in patient pain levels immediately after initial treatment and a further significant at the second day follow-up in patients with chronic mechanical neck pain (31). In agreement with current study results, revealed that the active microcurrent therapy with a peak current intensity of 50 μA vs. 500 μA had further decreased worst pain from the baseline for older individuals suffering from acute knee pain with higher BMI, especially at week three.(32) As well, Alshehri and his colleagues had presented a scientific explanation of the analgesic successes of specific acupuncture points stimulation either through application of microcurrent stimulation, (20) or wet cupping approach(33), those based physiologically on regulating autonomic nervous system, activating the release of beta-endorphins, regulating the central nervous system and producing local effects on the peripheral nervous system, thus electroacupuncture has been used as an adjunctive pain management in acupuncture for decades that was conducted across current study in form of microcurrent "applied microamp or millionth of amp (10–6 amperes) range; weak DCs (80 μA to <1 mA)" over specific points in a noninvasively. As well, current results supported by prior conclusions of prolonged pain relief after microcurrent that considered an area, where future research is required (34,35). According to current compelling evidence, nerve growth factor (NGF), which is produced by inflamed tissues, increases hyperalgesia (sensitivity to pain) and performs as a mediator in chronic pain conditions(36) that contributed to the sensitization of peripheral nerves by stimulating pro-inflammatory cytokines. Thus, when such peptides are released centrally, they also contribute to the pain's central sensitization in the dorsal horn of the spinal cord. Therefore, this mechanism plays a role among the central and peripheral components of pain (18). On controversy to current study results, prior clinical trials have reported that microcurrent could achieved a 3.8-fold average reduction in pain intensity, over an average treatment period of 5.6 weeks.(37) Wet-cupping may be a proper method to decrease persistent NSLBP without any conventional treatment in the first month follow-up visits. The therapeutic effects of wet-cupping could be longer lasting than conventional therapy even the functional outcomes of wet-cupping at the third up to six month follow up were significantly increased compared to the conventional approaches (38). Another conflicting opinion is based on that specific multidisciplinary treatment for non-specific low back pain is aimed at directly challenging the catastrophic misinterpretations of pain and various expectations about the relationship between physical activities and pain and/or back injury.

The treatment is designed to create harm expectation violations (or prediction errors) by exposing patients to movements or activities that they consider harmful or that they predicted to increase pain.(35) However, the effects of these treatments on disability levels were no different than a graded activity approach (31). Finally, regarding the participants` effect of treatment on Lumbar Sagittal ROM and pressure pain threshold outcome measures. There was a significant interaction effect of treatment and time (p 0.001). There was a significant main effect time (p 0.001). There was a significant main effect of treatment (p 0.004). Clinically, chronic NSLBP is not a medical emergency, also required a risk stratification approach at low risk receive less-intensive multimodal combination therapies. Thus, non-specific low back pain is a vast term that contains various aspects in which core strengthening plays a major role.(39) As well, various combination of therapeutic various exercise protocols, mobilizing and manipulative approaches, also lumbopelvic stabilization exercise were reported as a beneficial modality in reducing pain and disability in NSLBP.(40) Plus, Opioids are not recommended for treating chronic LBP, because the associated obvious side effects and demonstrate no greater effectiveness than NSAIDs (41). Wet cupping therapy could be an effective treatment either alone or as a combination therapy. Evidence mapping can facilitate the transfer of knowledge from researchers to policymakers and promote research on musculoskeletal pain i.e., lower back, neck pain and knee osteoarthritis.(35) Traditional wet-cupping care delivered in a primary care setting was safe and acceptable to patients with nonspecific low back pain. Wet-cupping care was significantly more effective in reducing bodily pain than usual care at 3-month follow-up (34).

In disagreement with current study findings, numerous evaluated structured exercise protocols and spinal manipulative therapy were stated to offer equal benefit in the management of pain and function in chronic NSLBP.(42) Furthermore, very low to moderate-certainty evidence that individualized (especially motor-control based treatments) exercise is effective for treatment of chronic non-specific low back pain (43). As a conflicting opinion to current study findings, wet cupping is potentially safe and effective in reducing pain and improving disability associated with persistent NSLBP at least for two weeks after the end of the wet cupping period.(44,45) On the other hand, recent published trial was conducted by Al-Eidi et al. had ensured that no superiority of either wet cupping or even traditional Hijamah techniques thus and they had concluded a longer follow-up period and more than one cupping session may be needed to evaluate their effectiveness (32). Evidence was of poor to moderate grade and most of it pertained to chronic nonspecific pain, making it difficult to draw more definitive conclusions regarding benefits and harms of various approaches of alternative modalities such as cupping (46). The clinical guidelines assert that the chronic NSLBP population is heterogenous. Current study findings regarding management of NSLBP populations revealed better response to complementary wet cupping than microcurrent mainly on flexibility “lumbar flexion-extension outcome measure”, although NSLBP individuals represented significant benefits for applied conservative management. Such gained benefits orient physical therapists to conduct wet cupping for management overweight elderly suffering from non-specific low back pain.

CONCLUSION

Based on current study revealed results and we could conclude that both microcurrent electrical stimulation and wet cupping are valuable for managing overweight elder populations suffering from chronic NSLBP, with superiority for wet cupping in terms of lumbar sagittal ROM so, it can be considered as an alternative as well as, adjacent method for treating non-specific low back pain in overweight elderly.

Limitation of this study: The limited sample population and focusing on non-specific low back pain among overweight elderly individuals results in our results may not apply to younger individuals. Moreover, current study populations were varied, since it comprised people with various diagnosis, thus it might have distinct effects on study populations` prognosis. Also, lack of a direct follow-up is a serious deficiency.

Conflict of interest: The authors confirmed that this article content has no conflict of interest.

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