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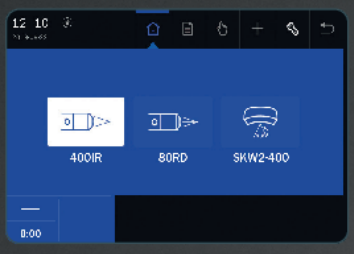

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TERAPIA POWAŻNYCH KONTUZJI I USZKODZEŃ MIĘŚNI

Głęboka Oscylacja doskonale sprawdza się w leczeniu poważnych kontuzji i uszkodzeń, które są efektem naciągnięcia mięśni i ścięgien.
Głęboka oscylacja z powodzeniem jest stosowana także po treningu: bardzo szybko relaksuje mięśnie, redukuje ból i skutecznie chroni przed mikro-urazami. Stymuluje komórki, dzięki czemu produkty przemiany materii zostają szybciej wydalone przez organizm. Wszystko to sprawia, że organizm znacznie szybciej się regeneruje i pacjent w krótszym czasie wraca do pełnej sprawności.

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Głęboka Oscylacja stymuluje przepływ limfy, dzięki temu zbędne produkty przemiany materii jak i płyny zalegające w obrzękach zostają przetransportowane i wydalone. Dlatego w przypadku stosowania DEEP OSCILLATION® obrzęki wchłaniają się znacznie szybciej niż ma to miejsce w przypadku stosowania tradycyjnych zabiegów.

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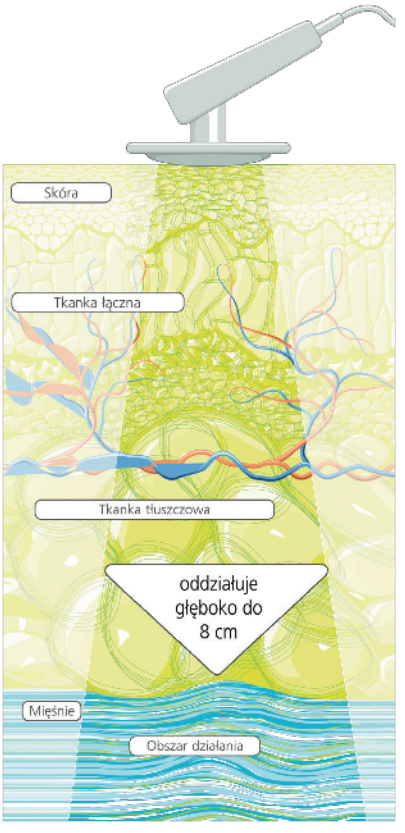
PRZYSPIESZANIE PROCESU GOJENIA SIĘ RAN

Poprzez redukcję obrzęków, procesy stymulujące układ immunologiczny oraz poprawę metabolizmu Głęboka Oscylacja skraca okres gojenia się ran. Leczenie z wykorzystaniem Głębokiej Oscylacji może być stosowane we wczesnej fazie terapii, już w pierwszej dobie po zabiegu chirurgicznym.

WZMACNIANIE ORGANIZMU

Głęboka oscylacja stymuluje miejscowy układ odpornościowy. Badania kliniczne potwierdziły, że terapia z wykorzystaniem Głębokiej Oscylacji zapobiega również powstawaniu infekcji.



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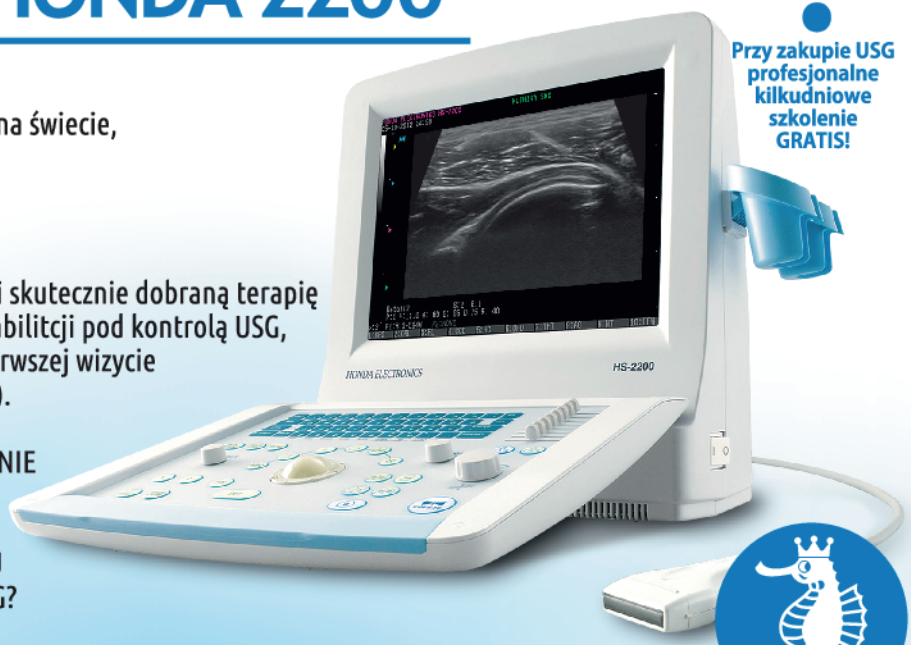

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Electrophysiological response of the Neurodynamic Mobilization and Cupping therapy in Patients with Discogenic Sciatica: A Randomized Controlled Trial

Elektrofizjologiczna odpowiedź na neuromobilizację i terapię bańkami u pacjentów z rwą kulszową pochodzenia dyskopatycznego

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Abstract

Objectives. To investigate and compare between the neurophysiological response on mobilization, and cupping therapy on pain, range of motion, and function in discogenic sciatica.
Materials and Methods. Thirty-two patients were enrolled in this study from the outpatient physical therapy clinic at Faculty Physical Therapy, Kafrelsheik University. Participants were randomly allocated into: Passive neurodynamic mobilization (PVM; n = 9), traditional cupping (TC; n = 9), and passive neurodynamic mobilization with cupping (COM; n = 14). Participants were assessed for pain pressure threshold at UB-25, GB-30, UB-37 and UB-57 acupuncture points, F-wave and H-reflex latencies, straight leg raising (SLR) ROM and disability by Oswestry Disability Questionnaire (ODQ), immediately prior to and following the assigned intervention.
Results: All groups showed statistically significant improvement in ROM ($P < 0.05$). In addition, the PVM group improved in the ODQ score ($P < 0.05$). The COM group showed improvement in pain pressure threshold at UB-25, GB-30 and UB-57 acupuncture points with no significant improvement at UB-37 ($P > 0.05$). Between groups comparison reveled statistically significant differences for ROM ($P < 0.05$) otherwise there was no significant difference in other tested variables. Conclusions: There were no differences between the three groups, so we advise to use only neurodynamic mobilization for treatment of discogenic sciatica patients, as adding cupping therapy to it had no superior effect.

Key words:
neurodynamic mobilization, cupping, electrophysiological response, discogenic sciatica

Streszczenie

Cele. Zbadanie i porównanie reakcji neurofizjologicznej na neuromobilizację i terapię bańkami pod kątem bólu, zakresu ruchu i funkcji w rwie kulszowej pochodzenia dyskopatycznego.
Materiały i metody. W badaniu wzięło udział 32 pacjentów z ambulatoryjnej kliniki fizykoterapii na Wydziale Fizjoterapii Uniwersytetu Kafrelsheik. Uczestnicy zostali losowo przydzieleni do: pasywnej neuromobilizacji (PVM; n = 9), tradycyjnej terapii bańkami (TC; n = 9) i pasywnej neuromobilizacji z terapią bańkami (COM; n = 14). Uczestników oceniano pod kątem progu bólu uciskowego w punktach akupunkturowych UB-25, GB-30, UB-37 i UB-57, okresu utajenia załamka F i H, uniesienia prostej nogi, zakresu ruchu i niepełnosprawności za pomocą kwestionariusza Oswestry Disability Questionnaire (ODQ), bezpośrednio przed terapią i po niej.
Wyniki. We wszystkich grupach zaobserwowano statystycznie znaczącą poprawę w zakresie ruchu ($P < 0,05$). Ponadto w grupie PVM zaobserwowano poprawę wyniku ODQ ($P = 0,039$). W grupie COM zaobserwowano poprawę w zakresie progu bólu uciskowego w punktach akupunkturowych UB-25, GB-30 i UB-57, jednak nie zaobserwowano znaczącej poprawy w punkcie UB-37 ($P=0,656$). Porównanie wyników grup ujawniło statystycznie znaczące różnice dla zakresu ruchu ($P=0,041$). W zakresie pozostałych badanych zmiennych nie zaobserwowano znaczących różnic.
Wnioski. Nie zaobserwowano znaczących różnic między trzema grupami, dlatego zalecamy stosowanie wyłącznie neuromobilizacji w leczeniu pacjentów z rwą kulszową pochodzenia dyskopatycznego, ponieważ wprowadzenie terapii bańkami nie dawało lepszego rezultatu.

Słowa kluczowe
neuromobilizacja, bańki, badanie przewodnictwa nerwowego, rwa kulszowa, ból dolnej części pleców

Introduction

Many people experience low back pain at a certain stage in their lifespan. The prevalence of lumbar pain is among the highest complaints in subjects within their third decade. In addition, overall prevalence rises with age until the sixth decade but after this it is gradually diminishes [1]. Americans complaining of chronic LBP are negatively affected socially and economically. Some of this is due to the need for frequent visits to health care providers with the associated costs for treatment [2].

Impairment and disability can be a result of a motor response to discogenic sciatica [3]. Discogenic sciatica is considered to be the most widespread cause of radiculopathy and a good examination is required as it may be easily mistaken with other musculoskeletal disorders [4].

Multiple approaches are available for assessment of pain intensity, including categorical scales [e.g., mild, moderate, severe], numerical rating scales (NRS), visual analog scale (VAS), and well-validated verbal descriptor scales that have excellent statistical properties (e.g., the Descriptor Differential Scale) [5]. In addition a pressure pain threshold might be a useful parameter in assessing effects of treatment for musculoskeletal pain and myofascial pain syndrome [6].

Numerous clinical tests have been formulated to decide whether sciatic pain is caused by disk compression on a spinal nerve origin or other musculoskeletal related conditions. Most of the clinical tests are varieties of the straight leg raise test [SLR]. Ropper et al., note that the sensitivity of this test to disk herniation is 90% [4].

Electromyography (EMG) and electroneurography (ENG) are also used in the determination of discogenic sciatica by alterations in nerve activity along the involved segments. Denervation develops days or weeks after trauma, and changes in appearance takes longer in distal than in proximal muscles. The most common findings are fibrillations and sharp waves in muscles that are innervated with the same nerve root, as well as altered sensory potentials from nerves that carry that root. It has been suggested that examining four or five muscles within the distribution of the suspected nerve roots, including paraspinal dermatomes, is considered satisfactory. Ropper and Zafonte, [4] stated that late responses are often included in the nerve-conduction studies because of root compression sensitivity. Electrodiagnostic confirmation that sciatica pain is because of a radiculopathy rather than to an undefined musculoskeletal problem is usually accompanied with better patient outcomes [4]. Only a few electrophysiological parameters are useful for diagnosing lumbosacral radiculopathies [7]. The test is specific and can help in excluding other improper diagnoses which could have neurologic signs and symptoms in the legs [8]. It has been established that F wave latency (FWL) and Hoffman reflex [H-reflex] were useful to diagnose discogenic sciatica [9]. There are many functional questionnaires used to report disability associated, The ODI is a widely used questionnaire with normal values of 8.73 and a cut off value of 12. [10].

Non pharmacological therapies include a great variety of treatments, such as exercise, Tai Chi, Yoga, mindfulness, psychological therapies, acupuncture, multidisciplinary rehabilitation, cupping [11]. However, many of RCTs using these therapies revealed that functional improvements were smaller than improvements in pain for the patients and this may be due to many trials enrolling patients with a primary outcome of moderate pain. Therefore, further research is required to establish the influence of nonpharmacologic therapies for radicular LBP and to explain the accumulated benefits of combining therapies, in addition to which therapy combinations and ordering are most influential [12]. Furthermore, there is an urgent need for RCTs with assessment of more outcome variables on other non-invasive therapies that focus on patients with discogenic sciatica [13].

Thus, the purpose of this study was to investigate and compare the electrophysiological response to neurodynamic mobilization and cupping therapy on pain, range of motion, and function in patients with discogenic sciatica.

Materials & Methods

Study design

A pretest posttest control group, a randomized trial was used. The study was conducted in outpatient physical therapy clinic at Faculty Physical Therapy, Kafrelsheik university. Prior to implementation, the study was approved by the appropriate Institutional Review Board (IRB) and informed consent was obtained from each individual. This trial was registered in pan-African registration site with unique number of PACTR201812663422445.

Participants

All participants presented with chronic low back and leg pain that was diagnosed as being caused by a disc lesion. Patients were recruited sequentially as they presented at the clinic. Informed consent was obtained from each patient. The criteria for inclusion of the patients in the study were sciatica symptoms of not less than 3 month's duration, age between 24 and 65 years, involvement of one or more lumbar discs, and consistency in the pattern of pain complaint, neurologic, and radiologic findings. Exclusion criteria included pregnancy, previous spinal surgery, abnormal laboratory findings, and systemic and psychiatric illnesses. In addition, those who were found to have piriformis syndrome, lumbar spinal stenosis, spondylolisthesis or sacroiliac joint dysfunction upon assessment were excluded. Some patients were excluded if the physical exam found they did not meet the inclusion criteria.

Initial evaluation included patient characteristics, a physical examination and plain radiographs of the lumbar spine. Following the initial evaluation, all patients that met the inclusion criteria were assessed for the study measures of function, range of motion, tenderness, and nerve conduction. The patients were randomly assigned to one of the 3 intervention groups and received the intervention. Following the intervention, the patients were reexamined, and their outcome measures were repeated immediately after the session with a follow-up visit after 1 week.

Evaluation procedures

All patients were examined by the same personnel. Muscular tenderness upon palpation of paravertebral muscles was graded as follows: 0 = no tenderness, 1 = mild, 2 = moderate, 3 = painful, 4 = severely painful. To meet the inclusion criteria, all patients had to receive a grade of 1, 2 or 3, while those with a grade 0 and 4 were excluded. A straight-leg raise test (SLR) of 70° or less in the affected leg confirmed the inclusion criteria were met. The limit of SLR was measured when the patient first started to complain of increasing low back and leg pain.

Outcome measures

1. Pressure algometry: The use of pressure algometry has been demonstrated to be a reliable for quantifying local pain and tenderness in various tissues [14]. The pain threshold was measured on 4 traditional Chinese medicine points located in urinary bladder (UB) and gall bladder (GB) tracts (See figure 1 for representation of the sites) [15, 16].
2. Range of motion for hamstring flexibility was used measured using a digital absolute axis goniometer. The position to assess this used hip flexion with an extended knee. The measurement was taken once unless the participant demonstrated substitutions or unwanted movements such as flexing raised knee, flexing the rested knee, waist raise or trunk rotation, in which case the test was done again. [17].
3. F wave and H reflex tests using the neurodiagnostic Russian device [Neurosoft, Ivanovo, Moscow]. Places of stimulating, recording and ground electrodes were marked to ensure high accuracy of before and after readings and standard protocols identified by Buschbacher and Prahlow were used [18].
4. The functional measure used in this study is the Arabic version of the Oswestry Disability Questionnaire (ODQ) which is easy to understand, reliable and a valid condition-specific outcome measure for the measurement of the limitation of functional ability cause by LBP [19, 20]. The ODQ consists of 10 items each scored from 0 to 5. The total is calculated through multiplying the sum of the scores by 2, giving a range of 0 to 100; a higher score reflects higher disability [21, 22].

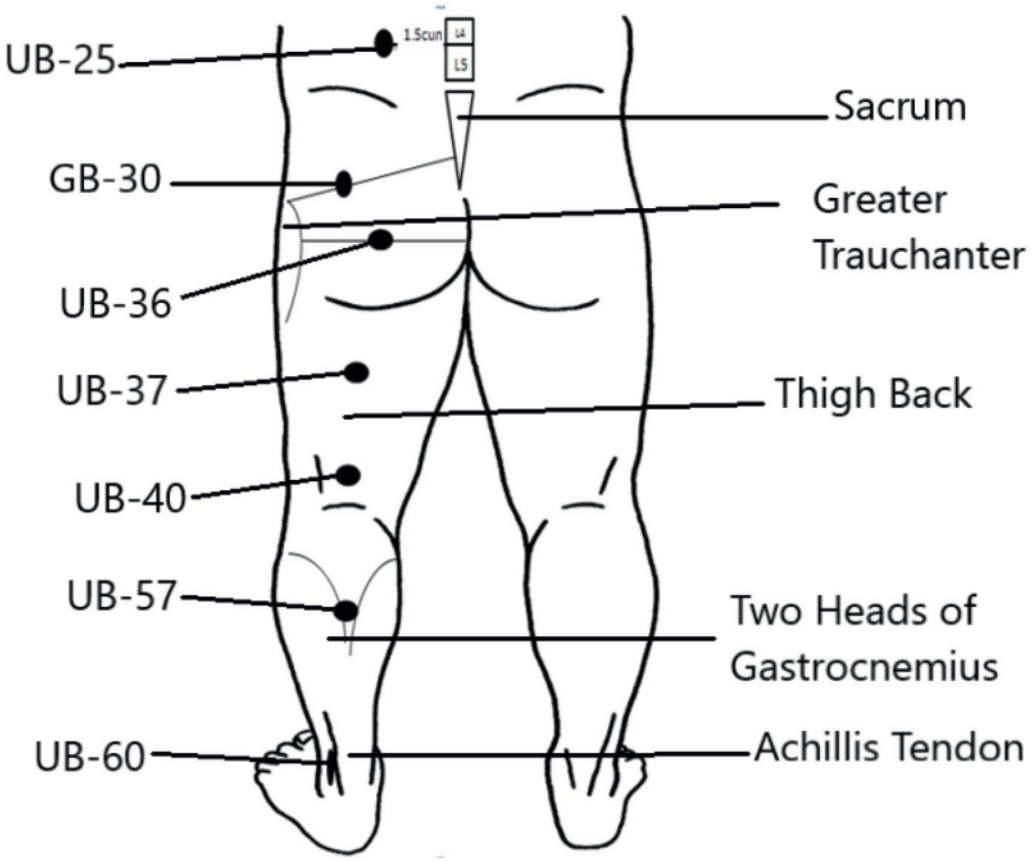

Figure 1. Schematic diagram to illustrate acupuncture points used in this study

Intervention

Participants were randomly allocated into 3 groups using computerized random generator by authors. Passive neurodynamic mobilization program (PVM; n = 9), Traditional cupping (TC; n = 9) and Passive neurodynamic mobilization added cupping [COM; n = 14]. All treatments were conducted in one session with another visit after one week for follow up of function. Other interventions were not allowed during the follow up period. After the treatment session, we asked the patients to restrict other treatments or home remedies, as much as possible. The study was conducted at an outpatient physical therapy clinic at Faculty of Physical Therapy, Kafrelsheik University. All groups received oral and written instructions for home about lifting, standing, sitting, sleeping and exercising. It was hoped this would limit potential confounding

factors that may aggravate low back pain, and thus allow the follow up to reflect the effects of the intervention [23].

Neural mobilization group

The technique for the passive neural mobilization was focused towards mobilizing the common peroneal nerve and tibial nerve. The technique followed the recommendations of Shacklock, with mobilization applied using straight spinal lateral flexion to the contralateral side [towel under waist], leg raising, hip adduction, medial rotation and knee extension [24], while the patient is side lying, and the treated limb is up. The therapist stands in front of the patient to provide the best mechanical advantage. The mobilization was maintained for 30 sec with rest for 30 sec, and repeated 5 times for 5 sets [25].

Cupping group

Wet cupping was performed by an expert certified physical therapist, who regularly performed cupping in the clinical setting. The patient took a side lying position with the affected side up. The standard wet cupping procedures were used in this study, as previously described by Al Jaouni et al. and Huang [26, 27].

Combined group

The combined intervention used the applied cupping for sciatica pain to the following points (identified from the PPT): UB-25, GB-30, UB-37 and UB-57. Every cup was applied separately to decrease the risk of the cup falling off as passive neurodynamic mobilization was applied over the sciatic nerve with its two branches [tibial and common peroneal nerve] during the same time at which the blood was letting into the cup. The patient assumed a side lying position according to the affected site fully exploring each point for bloodletting sequentially. During the stretch, as the end feel changed, the passive stretch was increased. The stretching maneuver continued till complete ROM was obtained or blood stopped accumulating in the cup.

Sample size calculation

A power analysis for this study was calculated using a previously published effect size for range of motion. According to the results of two previous studies, range of motion (ROM) showed an effect size = 0.839 [28, 29]. Using this effect size, with an alpha of 0.05, and a power of 0.95, the needed sample size was 9 per group.

Statistical analysiss

All data analyses were done with SPSS statistical software (Version 23, SPSS Inc, Chicago, IL) and descriptive data are presented as means ± standard deviation (SD). Baseline pain pressure thresholds, ROM, f wave and h reflex latencies and the Oswestry disability questionnaire score were compared between the 3 treatment groups. Normality tests revealed that the data are normally distributed. Differences within and between the groups over time were analyzed with mixed model ANOVAs. Differences were considered significant for (p) less than 0.05.

Results

The Consolidated Standards for Reporting Trials diagram is shown in Figure II. A total of 32 patients (15 men and 17 women) with a mean age of 41.7 ± 10.9 years (range, 24-65 years) were included in the sample and arrangement for the visits were established, but only 32 of them participated in the intervention. The demographics of the patients were similar for the 3 groups (Table 1). No statistically significant differences in age, gender, weight, height, BMI, or symptom side were found between the 3 groups.

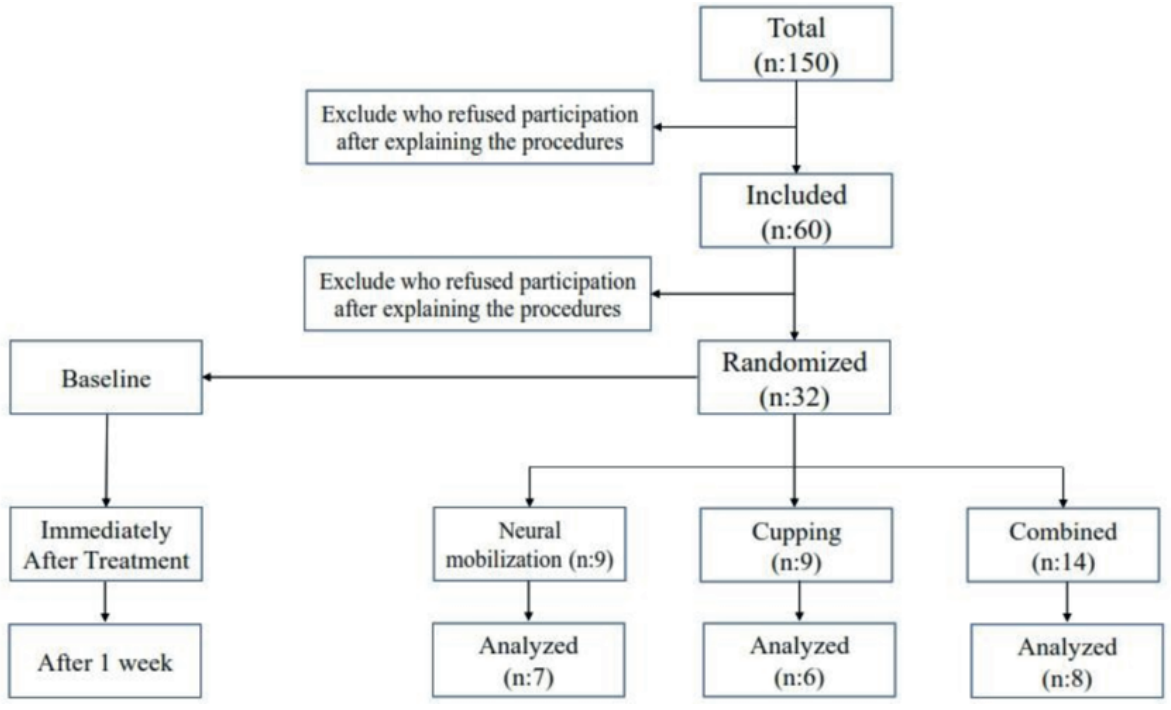

Figure 2. The consolidated Standards for reporting Trial Diagram showing the flow of participants through the trial

Between group comparisons showed no significant differences in pain pressure thresholds, F wave and H reflex and disability score between the groups prior to the interventions. Only ROM had a statistically significant difference for the response among the three groups ($P < 0.05$) with post treatment values significant difference ($P < 0.05$) stating better results in PVM group when compared with other 2 groups ($P < 0.05$).

Within group comparison showed statistically significant improvement of ROM in three groups, pain pressure thresholds at UB-25, GB-30 and UB-57 in COM group only and ODQ in PVM group only otherwise, there were no statistically significant differences after treatment in comparison to pretreatment mean values.

Table 1. Characteristics of groups at start of the study

	Neural mobilization (n = 9)	Cupping (n = 9)	Combined (n = 14)
Age [Years]	45.1 (13.9)	42 (8.18)	39.4 (9.54)
Gender n [Female/Male]	**5/4**	**5/4**	**7/7**
Weight [kg]	75.9 (5.34)	87.8 (26.11)	90.8 (21.86)
Height [cm]	159.2 (8.07)	162.2 (11.27)	166.6 (7.9)
BMI [kg/m^2]]	30.1 (3.19)	32.9 (6.68)	32.6 (7)
Side n [Right/Left]	**2/7**	**4/5**	**5/9**

Values are given as mean value (SD) unless otherwise indicated

Table 2. Changes in outcome variables in all therapy groups

		Neural mobilization (n = 9)		Cupping (n = 9)		Combined (n = 14)		ANOVAs (between groups)
		Mean (SD)	P	Mean (SD)	P	Mean (SD)	P	
UB 25	BT	7.5 (2.53)	0.321	5.69 (1.94)	0.727	7.09 (3.18)	0.012*	0.239
	AT	8.23 (2.02)		5.94 (2.87)		8.65 (4.23)		
GB 30	BT	5.63 (2.94)	0.260	5.43 (3.28)	0.987	5.81 (2.19)	0.002*	0.535
	AT	6.42 (2.8)		5.42 (2.37)		7.71 (3.34)		
UB 37	BT	7 (3.77)	0.499	5.41 (1.92)	0.979	7.85 (5.56)	0.656	0.205
	AT	7.99 (3.99)		5.45 (2.26)		8.37 (3.71)		
UB 57	BT	5.68 (2.37)	0.425	5.64 (2.25)	0.366	6.31 (2.71)	0.001*	0.301
	AT	6.09 (2.37)		5.18 (1.85)		7.84 (3.26)		
SLRROM	BT	60 (16.1)	0.000*	58.9 (15.3)	0.042*	53.9 (13.8)	0.000*	0.041*
	AT	83.67 (8.33)		67.44 (10.63)		71 (11.5)		
Tib Lat	BT	3.34 (0.64)	0.983	3.39 (0.76)	0.162	4.24 (1.24)	0.163	0.054
	AT	3.35 (0.48)		3.76 (0.88)		4.53 (1.48)		
CP Lat	BT	3.33 (1.11)	0.265	3.13 (1.13)	0.875	3.71 (1.14)	0.449	0.346
	AT	4.21 (3.4)		3.01 (1.02)		4.19 (1.71)		
HR Lat	BT	30.33 (5.84)	0.063	29.91 (3.19)	0.639	30.94 (4.72)	0.572	0.667
	AT	33.74 (5.05)		30.78 (2.68)		29.98 (8.66)		
ODQ	BT	15.56 (6.53)	0.039*	16 (7.87)	0.053	16.64 (7.97)	0.532	0.732
	AT	10.29 (2.55)		12.83 (6.44)		13.75 (5.7)		

** Significant recovery compared to baseline values in the same group (P > 0.05); BT, before treatment; AT, after treatment; UB, Urinary bladder; GB, Gall bladder; SLR ROM, rang of motion of hip straight leg raising test; Tib Lat, Tibial nerve latency; CP Lat, common peroneal latency; HR Lat, Hoffman's reflex latency; ODQ, oswestry disability questionnaire*

Discussion

Physical modalities are frequently used to treat patients who have low back pain and radiating symptoms elsewhere in the body. Therapeutic modalities including heat, ice, laser treatment, transcutaneous electrotherapy, and massage are frequently used for pain modulation of such conditions [30]. These modalities, and other tools can be used to suppress pain, decrease effusion, and ease fascia restrictions, as well as to increase ROM, and improve muscle strength [31]. Thus, our study was conducted to investigate and compare two common modalities used for treatment of sciatica

The findings of the current trial do not support the original hypotheses of the study as no difference was found between groups regarding pain thresholds, f wave and h reflex latencies and the disability score following the interventions. These findings are not consistent with some previous studies that have larger sample sizes, suggesting that our study may have a Type II decision making error.

It is believed that the current trial provides the first data that combines passive neurodynamic mobilization with wet cupping. As noted, no differences were found between neurodynamic mobilization, cupping and the combined intervention for variables related to discogenic sciatica. All treatments showed similar improvements for ROM measurements.

Many studies agreed with our findings related to the ROM improvement in the neurodynamic group, One of these studies stated that sciatic neurodynamic mobilization is more effective in knee muscle stimulation than hamstring static stretching regarding chronic stroke patients [32]. Another study concluded that sciatic nerve stretching with either plantarflexion or dorsiflexion increased ROM of hip flexion with extended knee [33] and this may be because it improved specifically the ability of the hamstring to stretch [34].

In contrast to changes in ROM, we found no improvement in pain threshold except for combined group. This came in agreement with Ferreira et al., 2016 who stated that neurodynamic treatment plus education have no effect on leg pain [measured by VAS] and disability (measured by ODQ) at 2 weeks [35]. A study conducted to compare neurodynamic mobilization with the Maitland technique found that passive neurodynamic mobilization group improved regarding pain (VAS), knee ROM, lumbar spine ROM and Disability [36]. This is partially consistent with our findings, as ROM and ODQ improved. However, pain did not improve, in contrast to their results and this may be due to using different methods to assess pain and may be due to posttest timing, as this study examined immediate effects while Mehta et al. used repeated intervention over several weeks. Another study that partially disagrees with our study stated that compared to traditional treatment, activity pain and function improved following neuro-dynamic mobilization, however, there was no significant improvement in pain at rest [37]. Those authors used the McGill pain questionnaire which some consider less objective than algometry [38]. Sharma and Sheth also used hot pack application over the low back region, core stabilization exercises and neurodynamic mobilization over 6 sessions within one week. A study conducted to investigate if neurodynamic treatment plus a home exercise program improved measures at a 2-week interval showed no significant improvements [39], which is partially similar to our findings. Also Lopes et. al., agree with the findings of this trial regarding absence of immediate effect of neurodynamic mobilization on pain threshold [40],

Wet cupping has been shown to reduce pain associated with sciatica, including decreased lumbar pain of 54.4%, sciatica pain of 65.5% and headache by 12.7% [41]. The TC group in this study showed improvements in ROM which is compatible with a pilot study conducted to determine impact and safety of bloodletting cupping for non-specific low back pain [19]. In addition, there is a potential effect of cupping on musculoskeletal conditions regarding disability indexes and quality of life [42]. Cupping has been shown to significantly sedate pain and boost disability scores for LBP patients versus control management [43]. This conclusion is in disagreement with our study regarding ROM. However, we should be cautious in drawing conclusions regarding one treatment as the complete analysis did not find distinctive differences with all three groups.

The combined technique with the passive neurodynamic mobilization and cupping therapy, needs more time to conduct than each technique alone as each cup is applied individually to reduce its risk of fall during stretch. The results of study conducted by Singh et. Al., is similar to our findings, as he stated that neural mobilization when applied in combination with PNF stretching did not produced any additional benefits in terms of hamstring flexibility measured during the straight leg raise so there is no value of combining neurodynamic mobilization with other techniques [44].

On the other hand, many studies have shown that combining neural mobilization with other treatments is more effective than neural mobilization alone. For example, when added to traditional physical therapy [TENS and exercises] or lumbar stabilization it helped in the reduction of short-term disability and functional improvement and pain relieving in sciatica [45, 46]. In respect to cupping therapy, it is recommended to use it adjacent to other treatment programs [47] however in our study there is no greater effect when combined with another treatment.

There are several limitations in this study. The first limitation is the absence of a double blind, which is not possible as the assessor can see the cupping marks on the body of the patient following the intervention. The second limitation is the absence of a control group and this is because of ethical constraints that consider receiving standard care of physical therapy requires at least 6 sessions over 2 weeks. The third limitation is the sample size. The initial sample size was based on a power analysis which used an effect size based on range of motion changes, which is usually larger than the other variables. Finally, the high dropout rate of patients affected the final sample size. Follow-up on those who did not complete the study was not done, thus we are unable to say whether these individuals were significantly different from the remaining groups. Due to the small remaining sample, an intention to treat analysis may have limited the findings [although given the lack of significant changes, this would not have changed]. The results of this trial cannot be generalized to the entire population of individuals with back-related leg pain, as our sample was limited to those with specific symptomology.

Conclusion

There were no superior effect for cupping therapy on neurodynamic mobilization in treatment of discogenic sciatica patients. Also, adding cupping therapy for neurodynamic mobilization in treatment of those patients has no added effect. Furthermore, we recommend use neurodynamic mobilization only, as it is a noninvasive technique as well as to safe time, effort and money with the same efficacy.

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