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Efficacy of Dry Needling with Exercise in Cervicogenic Headache- A Randomized Clinical Trail

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Abstract

Background: Cervicogenic headache (CGH) is a type of a common musculoskeletal condition which can be dealt with in physiotherapy practice. The main objective of this study is to evaluate the effectiveness of dry needling (DN) with exercise in decreasing pain and improving function in patients with CGH.
AIM: Comparing DN plus exercise with DN alone for the management of CGH to determine which is more effective.
Method: 50 patients were assigned randomly to groups A and B. Group A received DN plus exercise and group B received DN alone. Baseline assessment was made before and after treatment; treatment was given for four weeks, twice/week. Visual analogue scale (VAS), neck disability index (NDI), and cervical range of motion (CROM) were outcome measures. Study was conducted in June 2020.
Results: The results indicated that both management approaches lead to a significant reduction in CGH. Both treatments showed positive effects in regard to CROM, but DN plus exercise showed more improvement except right rotation CROM as compared to DN alone. It is to be noted that other outcome variables also differed significantly between the groups.
Conclusion: The study findings indicate that both treatment methods improve the symptoms of a headache. Clinically, more improvement was indicated by DN plus exercise than by DN alone. According to our results, DN plus exercise should be preferred for the management of cervicogenic headache over DN alone.
Key Words: Dry needling, Exercise, Headache, Neck pain, Cervicogenic headache

INTRODUCTION:

Cervicogenic headache (CGH) is described as pain present on one side of the head and/or face which originates from the upper cervical spine. CGH is categorized as a secondary headache by the International Headache Society[1]. Headaches affect 47% of world's population and 15% to 20% of these are CGH. Four percent people in the general population suffer from CGH**.** Moreover, female to male ratio is 4:1[2]. Headache is a key health concern because it is the most common symptom of neurological disorders globally[3]. A study by Vos T, Abajobir AA et. al, on Global Burden Disease[4] defined migraine and tension type headaches (TTH) as primary headache disorders having prevalence of sixth and third highest out of 328 illnesses in 26 years. Additionally, Post dural puncture headache (PDPH), also known as postural headache, occurring with-in five days post Lumber Puncture. PDPH worsens in the standing position and alleviate in the supine-lying position, accompanied by vomiting, photalgia, hearing loss, tinnitus, or stiff neck[5]. Accidentally puncturing Dura matter is the commonest cause of PDPH in pregnant women with a incidence rate of 80–86% [6]. A variety of invasive and noninvasive treatments for CGH have been reported to work but the most beneficial treatment has still not been found. DN has grown in popularity and is now a relatively unique part of physiotherapy practice. A number of studies have suggested that DN is a highly effective method to manage the musculoskeletal disorder[2]. So far, no study had been done on the effect of DN in combination with exercise on CGH.

Hence, the present study was undertaken for comparing DN versus DN in combination with exercise on cervicogenic pain management to determine which treatment is more effective.

METHOD:

This research is a randomized double blind control trial consisting of 50 individuals aged 20-50 years (both genders) having persistent pain in the neck for at least six months, randomly assigned to group A receiving DN along with exercise and group B receiving DN alone.

Groups were assigned randomly by writing the method of intervention on 50 pieces of paper, which were then put into a container by a person who was blindfolded. Participants were then asked to pick a piece of paper from the container specifying the treatment type. Assessment was made at baseline, before, and after the treatment, which lasted for four weeks (twice/week). VAS, NDI and Universal goniometry (UG) were used for measuring pain, neck disability and CROM respectively. All patients were informed about the adverse effects of DN and asked to sign the informed consent forms. Patients were recruited from the physiotherapy department and the scientific and ethical approval was obtained and study was done in June 2020.

Assessment and Data Collection was done by physiotherapist skilled in diagnosing and treating trigger points for ten years. The physiotherapist performed the baseline, before treatment, and after treatment evaluations of all patients, and stayed blinded to group allotment. Patients were educated about the importance of not revealing their group allotment. Additionally, the physiotherapists who performed DN evaluated each patient's intensity of pain before each treatment to know the patient's pain intensity. The treatment was terminated if no pain was present; however, the follow-up evaluation was carried out as planned. The physiotherapist performing the DN documented the side effects, if any, resulting from the DN[7].

Sample size was calculated by using statistical program GRANMO version 7.11, which indicated that 25 subjects in each group could provide 80% output in order to determine a difference in pain intensity between two groups of 20mm on the VAS, supposing a standard deviation of 24mm on the VAS, an alpha level of 0.05, and a dropout rate of 16%[7,8].

Patients having cervical spine injury/surgery, congenital spinal deformity, cervical radiculopathy

dizzy spells, or vascular neurological disorders were excluded from the study.

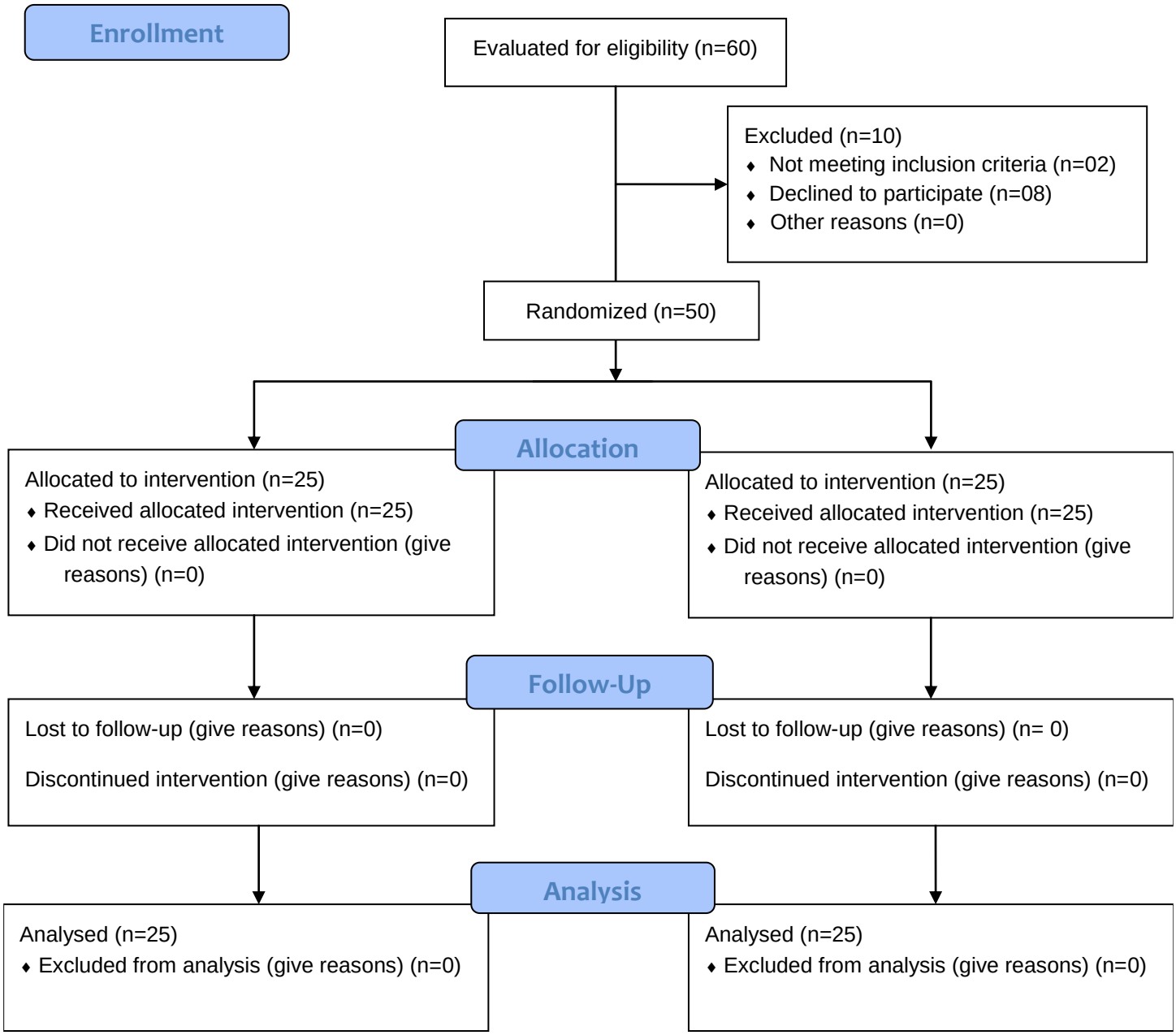

Figure 1 - Flow Chart illustrating strata allocation and randomization of group assignment

A trained physical therapist performed the trigger point DN technique. A 0.3X 40 mm club-physio sterile acupuncture needle was used for sub occipital and paraspinal muscle and 0.3X50 mm needle was used for trapezius muscles[9]. The therapists wore gloves for all procedures; they first cleaned the area with 70% isopropyl alcohol swab while the patient was sitting. This was followed by the identification of trigger points through palpation. The subject was informed

beforehand about the pinpricks, and the needle was then placed into the muscle. When the needle was extracted from the skin, the pricked site was pressed gently for about three seconds and the needle was thrown into a sharps container[2,7]. They were also advised to take proper rest, and use an ice pack on the affected area for 10 min to prevent muscle soreness[10,11].

The exercises for the cervical muscles for group A were carried out in sitting position. Red theraband was used for pressing forward in one set of 15 repetitions, and also to the right side, to the left side, and at the back.[12,13] Dynamic movements were incorporated with dumb-bell shrugs and rolls for the shoulders and upper extremities[12].

Analysis of data was performed by SPSS software (V.20). The groups were compared by applying paired t-test. Pain, NDI, and CROM values (Mean, SD, and P-value) were computed for both groups. Probability was acknowledged at ≤0.05 level of significance.

RESULTS:

50 patients were involved in this research with a mean age of 32.48 ±2.23 years and a height of 162.72±2.68 cms in group A (M=10; F=15) and a mean age of 32.88 ±2.28 years and a height of 162.64 ±2.61cms in Group B (M=10; F=15) with p values 0.671 and 0.877 for age and height respectively (P≤0.05). In terms of age and height, both the groups were homogenous. Furthermore, gender matching was done in both the groups to prevent gender bias.

The VAS values were compared between two groups (table 1, figure 2) at pre-test (baseline, 0 day) and post-test (end of four weeks). At pre-test, mean values for VAS for groups A and B were 6.56±0.38 and 6.48±0.41 respectively. The T test shows that these values were not statistically significant at P≤0.05. At post-test, mean values of VAS for groups A and B were 0.32±0.21 and 2.04±0.34 respectively. The T test shows that these values were statistically significant at P≤0.05.

Variables	Group A Mean± SD	Group B Mean± SD	P value (P≤0.05)
Pre test N=25	6.56 ±0.38	6.48 ±0.41	0.866
Post test N=25	0.32 ±0.21	2.04 ±0.34	0.000

Table 1- Between group comparison of VAS for Group A and B. Mean and SD of pre-test and post-test at 0 day and end of four weeks were used for comparison.

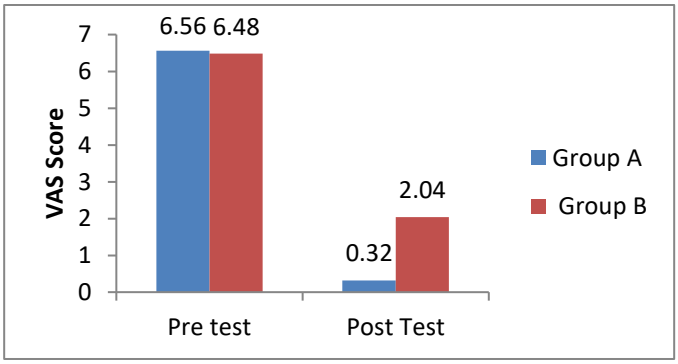

Figure 2- Between Group comparison of VAS for Group A and B.

The NDI values were compared between two groups (table 2, figure 3) at pre-test (baseline, 0 day) and post-test (end of four weeks). At pre-test, mean values for NDI for groups A and B were 33.88±1.90 and 33.28±2.09 respectively. The T test shows

that these values were not statistically significant at P≤0.05. At post-test, mean values of NDI for groups A and B were 14.88±1.39 and 20.26±1.51 respectively. The T test shows that these values were statistically significant (highly) at P≤0.05.

Variables	Group A Mean± SD	Group B Mean± SD	P value (P≤0.05)
Pre test N=25	33.88 ±1.90	33.28 ±2.09	0.052
Post test N=25	14.88 ±1.39	20.36 ±1.51	0.000

Table 2- Between group comparison of NDI for Group A and B. Mean and SD of pretest and posttest at 0 day and end of four weeks were used for comparison.

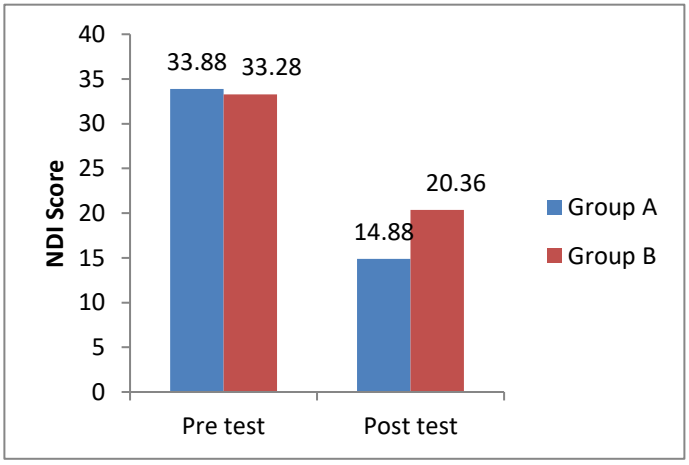

Figure 3-Between group comparison of NDI for Group A and B

Active CROM was recorded and compared as pre-treatment (0 day) and post treatment (end of four weeks) in both groups. At pre-test, mean values of active CROM- flexion, extension, rt. rotation and lt. rotation for groups A and B (Table 3) were 21.96±1.30, 22.76 ±1.30, 37.44 ±1.20, 41.92 ±2.65, and 22.16 ±1.33, 23.08 ±1.28, 37.8 ±1.74, 40.92 ±2.61 respectively. The T test shows that these values were not statistically significant at P ≤ 0.05. At post-test, mean values of active CROM- flexion, extension, rt. rotation and lt. rotation for groups A and B were 43.76 ±1.37, 42.72 ±1.79, 56.8 ±1.98, 66.4 ±1.70, and 29.28 ±1.05, 32.76 ±1.61, 56.6 ±2.38, 47.64 ±2.36 respectively. The T test shows that these values were statically significant except rt. rotation at P ≤ 0.05.

Groups	**CORM**	**Group A (N=25)** (Mean±SD)	**Group B (N=25)** (Mean±SD)	P-value (≤0.05)
	Flexion	21.96 ±1.30	22.16 ±1.33	0.457

Pre-test	Extension	22.76 ±1.30	23.08 ±1.28	0.362
	Rt. Rotation	37.44 ±1.20	37.8 ±1.74	0.635
	Lt. Rotation	41.92 ±2.65	40.92 ±2.61	0.120
Post-test	Flexion	43.76 ±1.37	29.28 ±1.05	0.000
	Extension	42.72 ±1.79	32.76 ±1.61	0.001
	Rt. Rotation	56.8 ±1.98	56.6 ±2.38	0.703
	Lt. Rotation	66.4 ±1.70	47.64 ±2.36	0.001

Table 3: Between Group comparison of CROM= cervical range of motion values between group A and B with t and p values. Mean and SD of pre-test and post-test at 0 day and end of four weeks were used for comparison.

Thus, it can be concluded from the above results that the treatment given to both the groups for the management of CGH were effective in reducing pain and increasing CROM; however, compared to DN alone, DN with exercise was more effective, as revealed by VAS, NDI and ACROM scores respectively.

DISCUSSION:

The present research reveals that both groups (A and B) had significant decrease in the severity of headache and neck disability and had improved neck ranges except right rotation range as compared to DN alone at the end of four weeks of intervention. Moreover, patients from group A (dry needling plus exercise) presented better improvement compared to the patients from group B (dry needling alone). Thus, we propose the use of multimodal management for cervicogenic headache mainly due to the achievement of positive effects with respect to both interventions at the same time, enhancing effectiveness of one intervention over the other and making treatment more effective compared to using each treatment alone.

DN involves application of thin mono-filament needles with no use of chemical agents. This is a common method of treating chronic musculoskeletal pain and is used by both doctors and physical therapists[14].

DN produces a kind of mechanical pressure inside the muscle, and as a result, the muscle and connective tissues are electrically polarized, causing polarization of the collagen fibers. This leads to tissue remodelin[15].

According to recent studies, DN shows promising effects on muscular dysfunction[16]. Ramesh et. al found that there is improvement in both the groups, but the combined treatment of DN and manual therapy leads to more significant improvement in reducing pain and increasing ROM[2]. Sıla Gildir et al. also found in their study that DN reduces the frequency, intensity, and period of headache and also increases Health-related quality of life (HRQoL) in chronic tension-type headache patients[17]. Moreover, Fahimeh Kamali et al. showed from his study that DN and friction massage had equal effectiveness in decreasing frequency and intensity of headache and improving CROM[18].

According to research done by Jull et al., individuals having CGH were prescribed exercise for six weeks, two times per day with a 12 month follow-up. Results showed 52 percent reduction in the pain index in the group treated with exercise and 21 percent reduction in the control group. VAS score reduced by 52 percent in the exercise group and by 25 percent in the control group. Moreover, the primary outcomes were related to CGH, while the primary focus of this research was initially neck pain and subsequently headache examination. The limitation of this research is that there was no classification according to sub-types of the headaches. Nevertheless, these studies have shown that both low and high intensity exercises for the cervical region can be utilized for treating headaches related to the cervical region[19].

In cervicogenic headache cases, a lower pressure level was observed relative to control group and those with other forms of headaches[20].
Relevant training that requires intense contraction of muscle which goes beyond muscle work engaged in ADL shows a reduction in pain locally, both instantly after exercise and in the extended period[21,22]. Exercising three days per week had a positive effect on the outcomes of earlier research, and therefore, must be taken into consideration while preparing the programs[23,24,25,26]. Jari Ylinen et al. also found that strength and endurance exercises were effective in treating headaches related to neck pain when followed by stretching exercises; the study also found that headaches had no adverse effect on exercise therapy outcomes[12].
This research indicates that DN with exercise is a safer and more effective method of management of cervicogenic headache and is strongly suggested clinically as being better than using stretches passively for reducing pain and disability by improving ACROM and strengthening of neck muscles. DN plus exercise treatment clinically helps in improving signs and symptoms in subjects suffering from CGH, achieving meaningful clinical differences.

In spite of positive effects, this study had certain limitations. The sample size was small. Duration of intervention was long without further longer follow-ups. It is recommended to increase sample size in further prospective analysis with equivalent patient variables including body size and muscle function to draw a reasonable conclusion.

CONCLUSION:

This research shows that the patient group who were given DN plus exercise showed more improvement than patients who were given DN alone. Based on the present study, the choice of intervention is DN plus exercise for the treatment of cervicogenic headache.

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DECLARATION OF PATIENT CONSENT:

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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DISCLOSURE STATEMENT:

No potential conflict of interest was reported by the authors.

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