Original Article

COMPARATIVE EFFECT OF PHONOPHORESIS USING IBUPROFEN AND METHYL SALICYLATE WITH ULTRASOUND USING AQUEOUS GEL IN PAIN MANAGEMENT DUE TO CERVICAL SPONDYLOSIS

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ABSTRACT:
BACKGROUND: Cervical spondylosis is a general terminology used for degeneration of inter vertebral disc. Ultrasound (US) are high frequency sound waves which are generated when electrical energy is converted into mechanical vibrations by piezoelectric crystal present in ultrasound probe. Phonophoresis is a technique by which therapeutic ultrasound is used to introduce pharmacologic agents, usually anti-inflammatory or analgesic drugs, through intact skin into the subcutaneous tissues.
OBJECTIVES: The objectives of this purposed study was to check the effectiveness of ibuprofen and methyl salicylate with therapeutic ultrasound in patients with neck pain due to cervical spondylosis. The other objective was to check which treatment is best so it can improve the activities of the daily living (ADLs) of the patients.
STUDY DESIGN: It was a Randomized Control Trial (Comparative Interventional Study), conducted at Madina Physical Therapy Clinical Services, Allied Hospital Faisalabad, District Headquarter Hospital (DHQ) and Aziz Fatima Hospital Faisalabad.
METHODOLOGY: The participants were selected by convenient sampling technique, who were neck pain patients diagnosed with cervical spondylosis. The sample size was 80 patients divided into two groups. Group A was treatment group and received phonophoresis with ibuprofen and methyl salicylate. Group B was control and received ultrasound intervention with aqueous gel. The treatment duration was 2 months with 3 sessions per week. The pain intensity was measured by visual analogue scale (VAS) and functional level was measured neck disability index (NDI) before and after the conclusion of treatment.
RESULTS: Pain mean before treatment of ibuprofen and methyl salicylate group was 7.3939±1.67592 and 7.8182±1.07397 in ultrasonic with aqueous gel group. After treatment pain mean was decreased to 1.8788±1.31714 in ibuprofen and methyl salicylate phonophoresis group and 5.0606±1.19738 in ultrasound with aqueous gel group. Functional level was also improved in ibuprofen and methyl salicylate phonophoresis group as compared to ultrasound group.
CONCLUSION: It is concluded from the results that neck pain was decreased markedly of patients who received phonophoresis with ibuprofen and methyl salicylate as compared to patients who received ultrasound treatment with aqueous gel.
KEYWORDS: Cervical Spondylosis, Phonophoresis, Ultrasound, Ibuprofen, Methyl Salicylate, Aqueous Gel.

INTRODUCTION:

The neck consists of seven cervical vertebrae with C1-C7. The upper surface of first cervical vertebrae (the atlas) has articulation with the base of the skull. The axis which has the ring

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type structure is the second cervical vertebrae. The atlas articulates through axis with paired facet joints and a pair of cylindrical bone called odontoid process[1].

Cervical spondylosis is a general terminology used for degeneration of intervertebral disc. Heavy loads on shoulders and heads and repeated occupational trauma accord to the formation of cervical spondylosis[2]. Degenerative changes are very common in general population with increasing age[3].

The causes of neck pain are multiple such as poor posture, anxiety, depression, neck strain, occupational or sporting activities. Non-specific neck pain results from mechanical and postural cause[3]. Neck pain prevalence found to be between 10.4%-21.3% with office and computer workers having higher incidence [4]. Acute neck pain resolves within days or weeks, but may become chronic in about 10% of people[5].

To make an effective treatment plan for neck pain the underlying problem must be successfully identified. Researchers have performed various experiments to find the best interventions for the management of neck pain. These include, neck muscles strengthening, stretching, endurance and stabilization exercises[6].

Ultrasound (US) is high frequency sound waves which are generated when electrical energy is converted into mechanical vibrations by piezoelectric crystal present in ultrasound probe. The waves are transferred by molecular vibration and collision. To completely transmit ultrasound waves onto the desired body regions coupling media in form of oil, water and most commonly gels are employed[6]. Due to its proven effectiveness therapeutic ultrasound is widely used by physiotherapists in treating different musculoskeletal conditions. Having thermal and mechanical effect on tissues it increases blood circulation, metabolism, connective tissue extensibility and tissue regeneration[7].

Phonophoresis is a technique by which therapeutic ultrasound is used to introduce pharmacologic agents, usually anti-inflammatory or analgesic drugs, through intact skin into the subcutaneous tissues. Phonophoresis provide a protected and painless substitute to injections. Phonophoresis has been studied in vivo with several anti-inflammatory drugs, including hydrocortisone, benzydamine, dexamethasone and salicylates, and with anesthetics such as lidocaine with variable results[8].

Ibuprofen is propionic acid derivative and now considered more suitable subtitute to aspirin. It is one of the most common nonsteroidal anti-inflammatory drug (NSAID) prescribed by physicians. It is non-selective inhibitor of cyclooxygenase- 1 (COX-1) and cyclooxygenase-2 (COX-2). It has pain killing, anti-inflammatory and antipyretic properties[9]. Methyl salicylate (MeSA) is one of the most common over the counter topical agents are used widely for managing a myriad range of painful and inflammatory conditions of joints and muscles[10]. The efficacy of these drugs via phonophoresis was ambiguous. This study was conducted to examine the efficacy of ibuprofen and methyl salicylate phonophoresis compared with ultrasound in patients with pain due to cervical spondylosis.

MATERIALS AND METHOD:

STUDY DESIGN:

The research design was randomized control trial.

SUBJECT RECRUITMENT PROCEDURE:

Convenient sample method was used for the recruitment of patients both male and female having the age of 30-60 visiting madina physiotherapy clinical services The university of Faisalabad, Allied hospital Faisalabad, District headquarter hospital Faisalabad and Aziz Fatima Hospital Faisalabad. Patients having fracture, cervical myelopathy, thoracic outlet syndrome, ankylosing spondylitis, disc herniation, sensory loss, active infection and spinal surgical procedures were not included in the study and were not involved in the study.

DATA COLLECTION PROCEDURE:

Before data collection, all information about the study was provided to the patients and they were signed the consent form. All information of the patients was kept confidential. The sample size was 80 subjects, both male and female

randomly allotted to both treatment groups. Two treatment groups were formed, in group A ibuprofen and methyl salicylate was applied, while in group B aqueous gel through ultrasound was applied.

Participants in each groups received 24 sessions of treatment at alternate days within 2 months. The pain intensity level was measured with visual analogue scale (VAS) and activities of daily living was recorded by neck disability index (NDI). Pain intensity and functional level was measured before the treatment and then at the end of the treatment.

Inclusion Criteria

Patients with neck pain due to cervical spondylosis. Age 30-65 years. Subjects with chronic neck pain Mechanical pain. Both male and female. Poor posture.

Exclusion Criteria

Age <30year and >65 year.
Fracture.
Cervical myelopathy.
Thoracic outlet syndrome.
Ankylosing spondylitis.
Disc herniation.
Sensory loss.
Active infection.
Patients who had history of cervical spine surgical procedures.

ULTRASOUND APPLICATION:

Each group received continuous ultrasound that applied on cervical region at 1MHz frequency while intensity was 1.5W/cm^2 with continuous mode for 5 minutes[11].

Both primary and secondary outcomes were measured. Primary outcome was reduction in pain measured through the visual analogue scale (VAS) which measure reading form 0-10, 0 means no pain while 10 mean maximum pain and also pain is divided into three levels mild, moderate and severe. If a subject within 0-3 range it indicates mild pain while 3-7 and 7-10 is moderate and severe respectively. Respondents mark the pain level corresponding degree of pain they feel and also provide freedom to express their exact pain intensity.

The secondary outcome was reduction in disability which is measured by neck disability index. Neck disability index questionnaire was used for assessment of neck pain during activities of daily living before and after the completion of study. This questionnaire has two sections, one is personal data information name, age, sex, and other section include ten daily life activities such as pain intensity, personal care, lifting, work, headaches, concentration, sleeping, driving, reading and recreation. In NDI each item has six possible answers from 0-5 which is summed up to a total score[12].

DATA ANALYSIS:

The acquired data was entered into SPSS version 23. Paired sample t test were applied to camper VAS and NDI. The data was subjected to further analysis for test of significance using 5% of significance. The data was presented in the form of tables.

RESULTS:

Figure 1 shows participants recruitment procedure in this study. Total participants were 80. In group A total drop out was 8 while in group B drop out was 6. The age ranged from 30 to 60 years

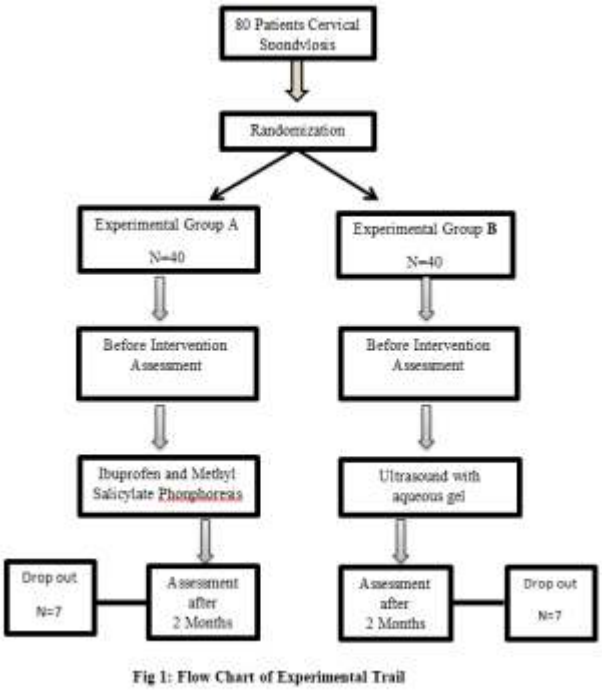

Fig 1: Flow Chart of Experimental Trail

Fig 1: Flow Chart of Experimental Trail

Table 1 VAS Score

VAS	Phonophoresis	Ultrasound
VAS Before VAS After	7.3939 1.8788	7.8182 5.0606

The VAS before treatment in group A was 7.3939±1.67592 in ibuprofen and methyl salicylate Phonophoresis group and 7.8182±1.07397 in ultrasonic group. VAS noted after the treatment is shown in table 1. VAS difference is shown in table 2 it shows that pain decreases in ibuprofen and methyl salicylate group was significantly higher than ultrasonic group. Activities of daily living was measured by NDI which shows that activity of daily living was improved in both groups but was significantly improved in group A as compared to group B. Table 2 shows NDI score interpretation.

Table 2 NDI Score

NDI	Phonophoresis	Ultrasound
Pain intensity Before Pain intensity After	3.3333 1.0303	3.3939 2.0909
Personal Care Before Personal Care After	2.7879 0.5455	3.0909 1.8788
Lifting Before Lifting After	3.4545 0.9394	3.0000 1.8182
Reading Before Reading After	2.9697 0.8788	2.9697 1.7879
Headaches Before Headaches After	2.6970 0..5152	2.0303 1.1515
Concentration Before Concentration After	2.6667 0.6667	1.7273 0.9697
Work Before Work After	2.9697 0.6970	3.1212 1.6970
Sleeping Before Sleeping After	2.8485 0.8788	2.7576 1.7273
Recreation Before Recreation After	2.9697 0.8182	2.9091 1.8788

Table 3 VAS Score Interpretation

Paired sample difference						
	Mean	**Std. Deviation**	**Std. Error Mean**	**t**	**Df.**	**Sig. (2 tailed)**
Group A VAS before – VAS after	5.46875	2.68790	0.47516	11.509	31	0.000
Group B VAS before – VAS after	2.75758	0.83030	0.14454	19.079	32	0.000

DISCUSSION:

The purpose of this study was to check the efficacy of Phonophoresis using ibuprofen and methyl salicylate with ultrasound using aqueous gel on patients with neck pain due to cervical spondylosis. This study clearly demonstrates that disability due to neck pain was greatly improved in Phonophoresis group than ultrasound group. The results thus indicate that ibuprofen and methyl salicylate is potent analgesic. As neck pain is one the most common condition in the whole world and its prevalence increases over time indicated by (Fejer, Kyvik and Hartvigsen, 2005). The above mentioned results proves that ADLS,s improve significantly as neck pain is managed by the recommended treatments also mentioned by[13] as chronic neck pain severely affects the patient's ability to independently perform his/her activities of daily living. Phonophoresis and ultrasound were found to be an effective treatment procedure in patients who suffers from chronic neck pain also mentioned by[14]. Phonophoresis with other additional treatments may also prove beneficial to the patients.

[11]In their research reached the conclusion ultrasound found to be an effective electrotherapy treatment modality in treating neck pain. This was also supported by our results that ultrasound proved to be an effective but less effective than phonophoresis in managing neck pain and subsequently improving ADL,s.

Phonophoresis was found to be an effective electrotherapy modality for inducing drugs into the subcutaneous tissue and decreasing pain intensity. This was also supported by[15] who found out that Phonophoresis is effective in treating upper trapezius myo-fascial trigger point.

Considering and analyzing above mentioned results it can be said that both phonophoresis and ultrasound are effective in reducing pain intensity. After selecting the subjects and handing over the NDI questionnaire we excluded on variable driving as we noticed majority of our targeted population included in the study did not drive so we decided to take driving as a control variable.

In conclusion it can be said that both Phonophoresis treatment and ultrasound treatment are found to be an effective pain alleviating agent for patients suffering from neck pain due to cervical Spondylosis.

LIMITATIONS:

The targeted population we selected was small and also reseach was conducted only on on faisalabad's population.

Limited researches on neck pain phonophoresis was also a limiting factor.

There was always a chance of patients over-reporting or under repoting the symptoms. There might also be other factors relieving the pain.

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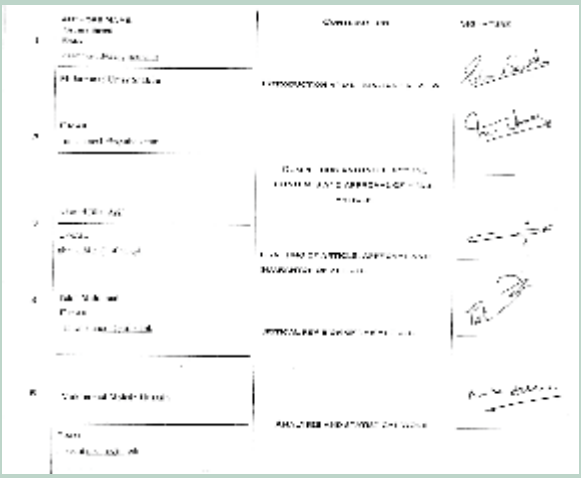

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After Revision

When you have to depart from this world and have to meet death (eventually), then why wish delay (why feel nervous about death).

Hazrat Ali (Karmulha Wajhay)