



EFFECTIVENESS OF DICLOFENAC SODIUM PHONOPHORESIS TO RESOLVE PAIN RELATED TO FACET SYNDROME: A CASE STUDY

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ABSTRACT

A single case study design was used to investigate the effects sodium diclofenac (Voltaren Emulgel®, Novartis) phonophoresis and back stabilization exercises for lumbar facet syndrome. A visual analogue scale was used to measure pain, Modified Oswestry disability questionnaire was used to measure disability and Sorensen test was used to measure back endurance. The study involved three phases in an ABC design. They were 1- week pre assessment, 2- treatment phase and 2 week post treatment assessment phase and 2 weeks follow up phase. The technique resulted in reduction in pain, reduction in disability and improvement in core muscle strength in case of Facet syndrome.

Although single case study design limits generalization of the results, it does provide evidence of the beneficial response obtained by use of Phonophoresis and stabilization exercises in Facet syndrome patients.

Key Words: Facet Syndrome, Phonophoresis, stabilization exercises, Spine endurance

INTRODUCTION

The concept that facet (zygapophysial) joints can cause low back pain was proposed by Goldthwait¹ in 1911. Since then, numerous investigators have suggested that facet joints can cause lumbar, thoracic and cervical spine pain²⁻⁴. As early as 1933, Ghormley coined the phrase "the facet syndrome" stating that arthritic changes in the facets with inter foraminal stenosis can lead to Sciatica. Following him, Badgley in 1941 supported his idea and showed that free bodies formation in the facet joint is akin to that of knee joint derangement. He laid special stress on the importance of the facet joints in low back pain and leg radiation.

In addition to causing localized spinal pain, facet joints may refer pain to adjacent structures. Pain referral patterns of facet joints have been well described⁵⁻⁸. Cervical facet joint pain may radiate to the neck, head and shoulders and lumbar facet joint pain may refer to the back, buttocks and proximal lower extremities. In accordance with criteria established by the International Association for the Study of Pain⁹, zygapophysial (facet) joints have been shown to be the source of chronic pain in 15% to 45% of patients with chronic low back pain¹⁰⁻¹², 54% to 60% of the patients with chronic neck pain¹² and 42% to 48% of the patients with thoracic pain¹¹.

Phonophoresis consists of using ultrasound to drive a drug through the skin and into underlying tissues.^{13,14} Thus, phonophoresis offers the potential advantage of delivering a pharmacologic agent in a relatively safe, painless, and easy manner to structures that lie somewhat deep within the body. Ultrasonically driven hydrocortisone was superior to ultrasound alone in alleviating pain and inflammation in patients with arthritic disorders¹⁶. Hydrocortisone phonophoresis was effective in treating patients with various inflammatory conditions.¹⁷

Strengthening and neuromuscular re-education of the core musculature is thought to play a significant role in restoring stability to the spinal column and in turn minimizing pain associated instability¹⁸. The main emphasis of core

strengthening is focused on muscular stabilization of abdominal, paraspinal and gluteal musculature¹⁹. The specific role of individual muscles in relation to spinal stability is still widely unknown, but optimal firing and synchronization of all core muscles is proposed to be necessary for the greatest amount of spinal stability.

The aim of this study was to demonstrate the effects of Phonophoresis and back stabilization exercises in case of lumbar facet syndrome.

METHOD

Research Design

A single case study design was used to achieve the objectives of this project. A-B-A design which was already described for single case study modified as A-B-C design for this study²⁰. This approach has been used previously to study the effectiveness of manipulative physiotherapy in The treatment of cervicogenic headache²¹ and tennis elbow²². During post treatment period (C) patient was permitted to continue with the stabilization exercises.

Ethical Clearance: Ethical Clearance was obtained from institutional ethical committee of PDVVPF's, COPT, Ahmednagar. (PDVVPF's/COPT/2013/1252 Dated; 11/01/2013.)

Subject

Subject was 47 years Male at initial assessment presented with unilateral Low back pain (Left Side) radiating up to the Knee joint since 1 year. There was also stiffness and local dull pain on Left side of lumbar spinous processes.

Subject was better in lying, had no pain exacerbation by coughing and not worsens by flexion and extension, worsens with standing for long time and twisting movements. There was no peripheralisation or centralization of pain with repeated sagittal plane movements ruling out the disc as a pain generator.

Physical Examination revealed following findings

- Tenderness on L3,L4 and L5 spinous processes and L4 – L5 facet area(Left Side)
- Para spinal Muscles spasm present on left side lumbar region
- Straight Leg raising, FABER Patric test, Piriformis test was found bilaterally negative
- Hip examination found to be negative

MRI findings showed facet joint hypertrophied and mild facet joint effusion at L4 and L5 level on left side. Mild annular disc budge with dessication noted at L3-L4,L4-L5 and L5-S1 levels.

The subject was selected for the study on the basis of this clinical presentation which is usually recognized as Facet syndrome.

Measurement Procedure

Modified Oswestry Low Back Disability Questionnaire.

The Oswestry Disability Questionnaire was originally described in 1980.¹⁵ The questionnaire consists of 10 items addressing different aspects of function. Each item is scored from 0 to 5. The point total from each section is summed and then divided by the total number of questions answered and multiplied by 100 to create a percentage disability. The scores range from 0-100% with lower scores meaning less disability.

Pain

The level of current pain perception was measured using a visual analogue scale (VAS). The pain VAS consisted of a 10 cm horizontal line anchored at one end by the words 'no pain' and at the other end by the words 'worst pain'. The reliability of this VAS has been previously demonstrated²³.

Back Endurance Testing : Sorensen Test

Biering-Sorensen¹⁵ describes this method of testing isometric back endurance; it measures how long (to a maximum of 240 seconds) the subject can keep the unsupported trunk (from the upper border of the iliac crest) horizontal while prone on an examination table (Figure 4). According to the literature, the Sorensen procedure appears to provide a global measure of back extension endurance capacity. Published studies demonstrate that the test assesses the endurance of all the Muscles involved in extension of the trunk, which include not only the paraspinal muscles, but notably the multifidus muscle.¹⁶

Treatment Technique

Treatment techniques under investigation in this study were Phonophoresis and stabilization exercises. Phonophoresis

was applied with sodium diclofenac (Voltaren Emulgel®, Novartis), Continuous ultrasonic, 1 MHz frequency and 1 watt/cm² power were applied with a 4 cm diameter applicator. (Figure 5) Phonophoresis and stabilization exercises were administered daily for five days, followed by two days off, and then by five more consecutive days. The patient received a total of 10 treatments. Stabilization exercises were continued by subject as a home exercise during post treatment assessment period (C) for 1 more week. Stabilization exercise protocol included Warm up and various exercises involving Transversus abdominis muscle, Multifidus muscle strengthening.

The study was divided into three phases:

Phase (A):Pre-treatment assessment

Baseline outcome measures (Pain, MODQ, Sorensen test) were recorded at the beginning of the study in first week. Treatment was not given in this period (A)

Phase (B): Intervention Phase: Phonophoresis and Stabilization exercises

The sodium diclofenac (Voltaren Emulgel®, Novartis) Phonophoresis along with stabilization exercises were given during this phase over period of 2 weeks (10 sessions). Outcome measures were recorded at the end of the first and second weeks.

Phase (C):Post-treatment/home exercise programme.

In the final phase, active intervention was withdrawn, but a subject was asked to continue stabilization exercises as a home exercise programme for the period of 2 week. Outcome measures were recorded at the end of the first and second weeks.

Post-treatment follow-up

Assessment was conducted at 2 weeks (Follow up)after the Completion of phase C.

RESULTS

The majority of the results are presented in graphic form for visual analysis, which is the traditional way to evaluate single case studies.²⁴ Statistical analysis has not been applied to the data; as currently there is little consensus as to whether Inferential analysis is appropriate or not when evaluating single case studies²⁵. Also when a treatment effect is clearly discernable visual inspection alone is considered appropriate²⁶.

Visual analysis of change in levels of disability, pain and strength of core muscles can be seen in graphs over the pre-treatment (A), treatment (B), post-treatment(C) phases and the 2 weeks follow up, with numbers referring to weeks.

Table 1

Outcome measure	Pre Treatment (A)	Treatment (B)		Post Treatment (C)		Follow up (2 weeks)
		B1	B2	C1	C2	
Modified Oswestry Low Back Disability Questionnaire (MODQ) (%)	60	53.33	48	44.44	42.22	34
Visual Analogue Scale (VAS – 100mm)	8.5	7.2	6.0	6.3	5.3	3.5
Spine Endurance – Sorensen Test (Time Hold in Seconds)	71	83	88	92	91	93

Disability

Linear decrease was seen in disability score (53.33%) from first week of treatment (B1) to the score (42.22%) during home exercise period (C2). Decrease in score (34%) was also seen till the end of 2 week follow up period. (Fig.1)

Pain

VAS score (8.5) reduced sharply from assessment phase (A) to the score (6.0) of second week of treatment (B2). Then the score (6.3) increased slightly at the end of first week of home exercise phase (C1) and then again sharp decrease in the score (3.5) was seen till the end of follow up period. (Fig.2)

Isometric back endurance

Steady increase was found in sorenson test score (71) from assessment period (A) to score(93) at the end of follow up. (Fig.3)

DISCUSSION

The result of study has demonstrated the beneficial effect of applying Phonophoresis and stabilization exercises on pain,

disability and muscle endurance related to facet syndrome. The Improvements on baseline measures achieved during the treatment and home exercise phases were maintained at the 2 week follow-up. The single case methodology employed in this study is particularly suitable for an in-depth investigation of the management of an individual subject.²¹

Fig. 1 Modified Oswestry Low Back Disability Questionnaire (MODQ)

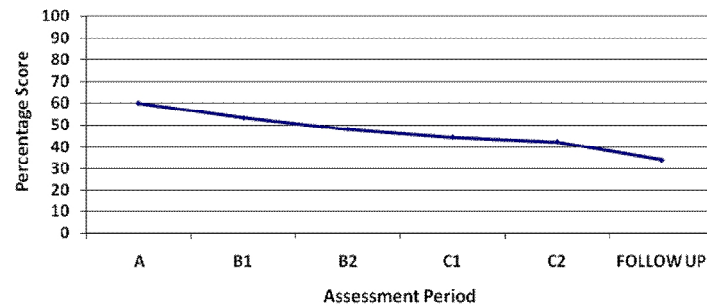


Fig. 2 Visual Analogue Scale Score

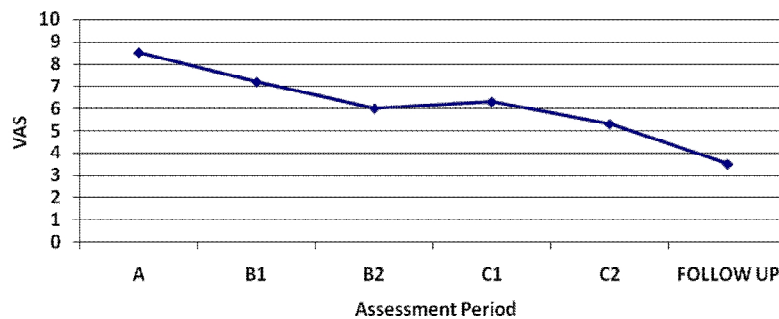


Fig. 3 Sorens Test Score

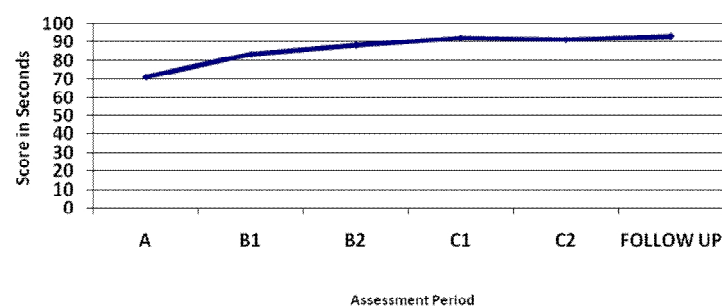


Figure 4: Subject performing Sorensen Test



Figure 5: Subject Receiving Phonophoresis for facet joint

Phonophoresis has been suggested by early studies to enhance the absorption of analgesics and anti-inflammatory agents²⁷. Effectively, medicines contained within or under the ultrasound gel are pushed by the sound waves of the US and driven to a much deeper level than those massaged by hand²⁸. Researchers have noted varying results with regard to the therapeutic benefits of phonophoresis (such as pain relief and improved range of motion)²⁹⁻³¹. Both continuous and pulsed Ultrasound with diclofenac gel phonophoresis is more effective for pain and functional status of patients with knee osteoarthritis than topical application of diclofenac gel.³⁰ Lumbopelvic stabilization approach seems to be useful for the management of low back pain. Based on a solid biomechanical model (Panjabi's hypotheses), it has demonstrated positive effects over pain and return to activity, but it is not clear the optimal type of exercise, duration or number of repetitions, among other variables. Exercises designed to improve spinal stabilization have gained popularity in the conservative treatment of patients with LBP; however, the evidence for the effectiveness of this approach is sparse and equivocal.³² Improvements in pain intensity and functional disability were also demonstrated in groups of patients with low back pain suffering from a spondylolysis or a spondylolisthesis³³ and a significant decrease of symptoms in people with hypermobility.³⁴

CONCLUSION

This study has documented that the Phonophoresis along with stabilization exercises leads to reduction in pain, reduction in disability and improvement in core muscle strength in case of facet syndrome. The single case study design utilized in this study limits the generalization of its findings. However, it does provide the impetus to conduct controlled clinical trials utilizing Phonophoresis and stabilization exercises in facet syndrome cases.

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