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Assessment of role of Dexamethasone phonophoresis in patients with knee osteoarthritis: A clinical study

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Abstract

Background: The present study was conducted to assess role of Dexamethasone phonophoresis in patients with knee Osteoarthritis (OA).

Materials and methods: This study was conducted on 90 patients of knee osteoarthritis of both genders. Group I received DxPh and conventional physical therapy treatment in the form of transcutaneous electrical nerve stimulation (TENS) current and exercise (study group). Group 2 received ultrasound therapy and the same conventional physical therapy treatment (control group). Knee pain was assessed by the visual analog scale (VAS) and Western Ontario and McMaster Universities OA Index (WOMAC) pain subscale. Functional mobility was also assessed.

Results: There were 25 males and 20 females in group I and 23 males and 22 females in group 2. Pretreatment VAS in group I was 80.5 and in group 2 was 72.3, post treatment VAS in group I was 38.4 and in group 2 was 58.5. Pre- treatment TUD in group I was 12.5 and in group 2 was 10.4, post treatment TUG was 7.8 in group I and 9.3 in group 2, pre-treatment WOMAC pain score in group I was 14.6 and in group 2 was 12.2, post treatment score was 6.7 in group I and 8.3 in group 2, pre- treatment WOMAC stiffness in group I was 6.8 and in group 2 was 5.2, post treatment was 2.9 in group I and 4.9 in group 2, pre- treatment WOMAC function score was 43.5 in group I and 44.3 in group 2, post treatment was 19.2 in group I and 32.3 in group 2, WOMAC pre- treatment score in group I was 66.4 and in group 2 was 61.2, post treatment total score in group I was 28.3 and in group 2 was 46.7. The difference was significant (P<0.05).

Conclusion: Authors found that DxPh resulted in a greater improvement in pain and function in patients with knee OA than therapeutic ultrasound combined with exercise and TENS.

Keywords: Knee OA, TENS, ultrasound

Introduction

Osteoarthritis (OA) is characterized by the breakdown of articular cartilage over time. Although cartilage change is the major disease characteristic, OA affects all joint tissues, including the synovial membrane, which is usually associated with increased pain and joint dysfunction ^[1]. Evidence-based guidelines on the conservative treatment of knee OA are riddled with inconclusive and consensus recommendations due to the inadequacy of clinical trials addressing certain aspects of the treatment modalities ^[2]. A very recent study found that only 25% of nonsurgical trials registered on ClinicalTrials.gov were actually relevant to recommendations made within the AAOS conservative management guidelines, with the greatest number of new or ongoing trials addressing a recommendation which is already supported by strong evidence ^[3].

Intraarticular corticosteroid injection is considered an adjunct treatment to core treatments for the relief of moderate-to-severe pain in OA patients ^[4]. Corticosteroids produce antiinflammatory and immunosuppressive effects by reducing vascular permeability, inhibiting the accumulation of inflammatory cells and preventing the synthesis and secretion of several inflammatory mediators ^[5].

Phonophoresis is the use of ultrasound waves (US) to enhance the absorption of topically applied drugs by increasing skin permeability to topical medications. Few studies have been done on phonophoresis of topical corticosteroids in reducing the symptoms of articular degenerative diseases and comparison between the efficiency of these treatments on reduction of inflammation diverse regions ^[6]. Dexamethasone phonophoresis (DxPh) was shown to

improve the pain and function of patients with several musculoskeletal conditions, including knee OA ^[7]. The present study was conducted to assess role of Dexamethasone phonophoresis in patients with knee Osteoarthritis (OA).

Materials and Methods

This study was conducted in the department of Orthopaedics. It comprised of 90 patients of knee osteoarthritis of both genders. Patients were informed regarding the study and their consent was obtained. Ethical clearance was obtained before starting the study.

Demographic profile such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 45 each. Group 1 received DxPh and conventional physical therapy treatment in the form of transcutaneous electrical nerve stimulation (TENS) current and exercise (study group). Group 2 received ultrasound therapy and the same conventional physical therapy treatment (control group). Knee pain was assessed by the visual analog scale (VAS) and Western Ontario and McMaster Universities OA Index (WOMAC) pain subscale. Functional mobility was also assessed. Results were subjected to statistics. P value < 0.05 was regarded significant.

Results

Table 1: Distribution of patients

Total- 90						
Groups	Group I	Group 2				
Treatment	DxPh, TENS and Exercise	Ultrasound therapy and TENS				
Male: Female	25:20	23: 22				

Table I shows that group I received DxPh and conventional physical therapy treatment in the form of transcutaneous

electrical nerve stimulation (TENS) current and exercise (study group). Group 2 received ultrasound therapy and the same conventional physical therapy treatment (control group). There were 25 males and 20 females in group I and 23 males and 22 females in group 2.

Table 2: Outcome	measures	for	both	groups
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Groups	Period	Group I	Group 2	P value
VAC	Pre- treatment	80.5	72.3	0.12
VAS	Post- treatment	38.4	58.5	0.05
TUC	Pre- treatment	12.5	10.4	0.01
100	Post- treatment	7.8	9.3	0.02
WOMAGasia	Pre- treatment	14.6	12.2	0.01
womac pain	Post- treatment	6.7	8.3	0.04
WOMAC stifferess	Pre- treatment	6.8	5.2	0.05
wOWAC summess	Post- treatment	2.9	4.1	0.03
WOMAC	Pre- treatment	43.5	44.3	0.17
WOMAC function	Post- treatment	19.2	32.3	0.001
WOMAC Total	Pre- treatment	66.4	61.2	0.14
WOWAC TOtal	Post- treatment	28.3	46.7	0.001

Table 2, graph 1 shows that mean Pre- treatment VAS in group 1 was 80.5 and in group 2 was 72.3, post treatment VAS in group 1 was 38.4 and in group 2 was 58.5. Pre-treatment TUD in group 1 was 12.5 and in group 2 was 10.4, post treatment TUG was 7.8 in group 1 and 9.3 in group 2, pre-treatment WOMAC pain score in group 1 was 14.6 and in group 2 was 12.2, post treatment score was 6.7 in group I and 8.3 in group 2, pre- treatment WOMAC stiffness in group 1 was 6.8 and in group 2 was 5.2, post treatment was 2.9 in group 1 and 4.9 in group 2, pre- treatment WOMAC function score was 43.5 in group 1 and 32.3 in group 2, post treatment was 19.2 in group 1 and 32.3 in group 2, womAC pre-treatment score in group I was 66.4 and in group 2 was 61.2, post treatment total score in group 1 was 28.3 and in group 2 was 46.7. The difference was significant (P < 0.05).



Graph 1: Outcome measures for both groups

Discussion

The drug selection for phonophoresis seems to be as important as the ultrasound parameters for the success of the treatment ^[8]. A greater accumulation of dexamethasone in the serum was demonstrated with the use of ultrasound

facilitation compared to sham ultrasound applied over an occlusive dressing ^[9]. However, hydrocortisone acetate absorption did not seem to be affected by ultrasound waves ^[10]. The present study was conducted to assess role of Dexamethasone phonophoresis in patients with knee

Osteoarthritis (OA).

In present study, group 1 received DxPh and conventional physical therapy treatment in the form of transcutaneous electrical nerve stimulation (TENS) current and exercise (study group). Group 2 received ultrasound therapy and the same conventional physical therapy treatment (control group). There were 25 males and 20 females in group I and 23 males and 22 females in group 2. Akinbo et al. [11] in their study fifty patients (19 males and 31 females) with a mean age of 53.6 +/- 8.9 years were randomly assigned to PH or ION groups with 25 patients in each group. Ultrasound waves of 1 MHz frequency was applied for 5 minutes to the target knee, so also was the direct current for 10 minutes for 10 session's treatment period. Western Ontario and McMaster University Osteoarthritis Index (WOMAC) scores, 20 meters ambulatory time, and knee range of motion (ROM) were evaluated before and after therapy as the outcome measures. At the end of two weeks, significant improvement in total WOMAC scores was observed in 15 (60%) and 16 (64%) patients in the PH and ION groups respectively, indicating no significant difference in the improvement rate. Twenty (20) metres ambulatory time and knee range of motion also improved significantly in both groups, yet these variables showed no significant difference between the two groups.

We found that pre- treatment VAS in group I was 80.5 and in group 2 was 72.3, post treatment VAS in group I was 38.4 and in group 2 was 58.5. Pre-treatment TUD in group I was 12.5 and in group 2 was 10.4, post treatment TUG was 7.8 in group I and 9.3 in group 2, pre-treatment WOMAC pain score in group I was 14.6 and in group 2 was 12.2, post treatment score was 6.7 in group I and 8.3 in group 2.

Ahmed et al. [12] included 46 female patients with knee OA were randomized into two equal groups. The study group received DxPh over the medial side of the knee, transcutaneous electrical nerve stimulation (TENS), and quadriceps strengthening exercises. Control group received ultrasound therapy and the same TENS and exercise program. Pain was assessed using the visual analog scale (VAS) and the pain subscale of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pre-and posttreatment. The VAS, TUG, and WOMAC scores improved with both modalities. Pain intensity improved by 50.6%-58.0% in the study group (VAS and pain subscale of WOMAC, respectively) compared to 17.8%-28.6% for the control group. Functional mobility showed a higher rate of improvement in the DxPh group compared to control (37.7 vs. 17.5% for TUG and 53.2 vs. 23.0 and 56.1 vs. 26.4% for the joint stiffness and physical function subscales of WOMAC, respectively). Posttreatment results revealed statistically and clinically significant improvement in pain intensity and functional mobility in the DxPh group.

We observed that pre-treatment WOMAC stiffness in group I was 6.8 and in group 2 was 5.2, post treatment was 2.9 in group 1 and 4.9 in group 2, pre- treatment WOMAC function score was 43.5 in group 1 and 44.3 in group 2, post treatment was 19.2 in group 1 and 32.3 in group 2, WOMAC pretreatment score in group I was 66.4 and in group 2 was 61.2, post treatment total score in group 1 was 28.3 and in group 2 was 46.7. The difference was significant (P < 0.05).

The shortcoming of the study is small sample size.

Conclusion

Authors found that DxPh resulted in a greater improvement in pain and function in patients with knee OA than therapeutic ultrasound combined with exercise and TENS.

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