

Effectiveness of Taping in Treatment of Patellofemoral Pain

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Abstract: The term arthritis is derived from Greek word 'arthro' meaning joint and its meaning inflammation, so arthritis is inflammation of joint or several joints. Some form of arthritis involves along with joint other structure while Osteoarthritis solely affects joints. Patellofemoral Osteoarthritis mainly causes anterior knee pain i.e. retro patellar and peripatellar pain resulting from physical, biomechanical and pathological changes in Patellofemoral joint. In Patellofemoral Osteoarthritis, pain typically occurs with activity and worsens with descending stairs, prolonged sitting. The other symptoms are limitation of range of motion, swelling, crepitus and stiffness is common. The symptomatology is due to joint space narrowing, sclerosis and osteophyte formation.

Keywords: Osteoarthritis, Patella Femoral Osteoarthritis, Vastus Medialis Obliquus, Vastus Lateralis, Vastus Medialis, Short Wave Diathermy etc.

1. Introduction

Osteoarthritis is a leading cause of pain and disability in elderly people worldwide. Osteoarthritis is a chronic joint disorder in which there is progressive softening and disintegration of articular cartilage and bone at joint margins and capsular fibrosis. It can affect any of 3 compartments:

- 1) Medial Compartment:- It is very common. It affects 80% of people and lead to varus or bow-legged deformity.
- 2) Lateral compartment:- It affects 5 to 10% of people and leads to valgus or knock knee deformity.
- 3) Patellofemoral compartment:- Patellofemoral and medial compartment are usually first to involved and very common in arthritic knee.

Patellofemoral Osteoarthritis can be result of inflammatory condition or mechanical abnormalities. Inflammatory condition includes Rheumatoid arthritis. Mechanical abnormalities can be result of prior fracture, inherent mal-alignment, muscle imbalance or chronic instability

There are various treatments used for patellofemoral osteoarthritis:

- 1) **Relative rest:** Initially knee activity should be reduced.
- 2) **Ice:** Application of ice for 10 - 20 minutes after activity is reasonable.
- 3) **Electrotherapy modalities:** Various modalities like shortwave diathermy, ultrasound, transcutaneous electrical nerve stimulation are used for the treatment.
- 4) **Exercises:** Quadriceps strengthening is most commonly recommended because quadriceps muscle plays a significant role in patellar movements. Hip, hamstrings, calf and iliotibial band stretching is also considered important.
- 5) **Taping:** Taping is utilized in treatment of patellofemoral osteoarthritis with intent to shift the patella to more appropriate alignment thus allowing proper biomechanics and reconditioning of knee musculature.

Null Hypotheses

H0(a) : Physical therapy programme which include taping is

not better to alleviate knee pain among the subjects with patellofemoral arthritis than conventional physical therapy programme.

H0(b) : Physical therapy programme which include taping is not better to improve functions among the subjects with patellofemoral osteoarthritis than conventional physical therapy programme.

Hypotheses

H1(a): Physical therapy programme which include taping is better to alleviate knee pain among the subjects with patellofemoral arthritis than conventional physical therapy programme.

H1(b): Physical therapy programme which include taping is better to improve functions among the subjects with patellofemoral arthritis than conventional physical therapy programme.

Operational Definitions

Patellofemoral Arthritis:-

Patellofemoral arthritis is a non - inflammatory degenerative disorder of joint characterised by progressive deterioration of articular cartilage and formation of new bone, around patellofemoral compartment of knee joint.

Taping:-

Taping is a technique which is mainly used to restrict potentially harmful movements & to allow desired motion. It can be used as protective mechanism during healing and rehabilitation phase and as preventive measure in high - risk activities.

Pain:-

It is a psychological experience interpreted within the context of one's experience, environment and cultural background. It is a signal of real or impending tissue damage. It represent signal of biological dysfunction.

Functional Activities:-

Activities identified by an individual as essential to support

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physical & psychological well being as well as to create a personal sense of meaningful living.

2. Literature Review

Various physiotherapy treatment techniques are in use for treatment of Patellofemoral Pain.

[D'Hondt NE (2002)] the aim of the study was to assess the effectiveness of foot and knee orthotics including Knee taping for the treatment for Patellofemoral pain syndrome. The result suggested a comprehensive programme including tape application was significantly superior to a monitored Exercise programme.

[NG. GY et al, (2002)] The aim which was to examine the immediate effects of patellar taping on pain and relative activity of Vastus Medialis Obliquus (VMO) to Vastus Lateralis in the subjects with Patellofemoral pain and Patellofemoral joint mal-alignment. Conclusion was the patellar taping can reduce pain in the subjects with Patellofemoral pain syndrome and mal-alignment but it reduces the activity of Vastus Medialis Obliquus to Vastus Lateralis.

[Gignate A. et al, (2001)] studied the effects of Paellar taping on Patellofemoral incongruence by computed tomography. The result of this study did not support the use of this method for passive correction of Patellofemoral incongruence, although patellar taping may be well effective in controlling anterior knee pain during physical therapy.

[Cowan SM (2000)] et al studied the effect of the application of tape over the Patella on the onset of EMG activity of Vastus Medialis Oblique relative to Vastus Lateralis in participants with or without Patellofemoral pain syndrome. Result suggested that application of therapeutic Patellar tape was found to alter the temporal characteristics of VMO and VL activation, whereas Placebo tape had no effect.

[Kay Crossley et al, (2002)] studied the efficiency of 6-week regimen of the Physical therapy along with taping than the Placebo treatment. Conclusion was 6-week Physical therapy regimen along with taping is efficacious for alleviation of Patellofemoral pain.

[Callaghan MJ et al, (2002)] Studied the effect of Patellar taping on knee joint proprioception. Result of the study was. Patellar taping provided proprioceptive enhancement, in subject with poor proprioceptive ability.

3. Research Methodology

A total of 34 patients were selected for the therapy out of which 30 patients were able to continue the treatment, 4 patients as excluded due to complications. 30 patients were divided into two groups i.e. 15 in each group, experiment group I and experiment group II.

Setting:

It was an out patient setting in the physiotherapy department

of following hospitals; Bhandari Hospital and Research Center, Indore Astha old age Home, Indore. Duration of treatment protocol was of 3 weeks.

Study Design: - Type: -

A Randomized prospective experimental study with different subject design was used.

Independent variable was aping and dependent variables were pain and functional activity.

Inclusion Criteria:

- Age - 45 to 55 yrs.
- Radiological evidence of Patellofemoral osteoarthritis.
- Chronicity at least 5 years.

Exclusion Criteria:

- Age - <45 yrs. & >55 yrs.
- Rheumatoid arthritis of Knee
- Other arthritic condition around Knee
- Fracture around Knee
- Deformities of hip and Knee.
- Patellofemoral pain because of hyper-pronated foot.

Tools & Instrumentation

Materials:

- Short wave diathermy:- SWD of electocare system & service Ltd. with frequency of 27 . 12 MHz and wavelength of 11.06 ms was used for deep heat.
- Tape:- Johnson & Johnson adhesive tape (Oynaplast) was used for taping the Patellofemoral joint.
- Assessment Chart:- It was used to assess the patients and record the date of their examination.

Outcome Measures:

- Visual Analogue Scale (VAS):- Visual Analogue scale was introduced by Boud & Pilowskly in 1966. It is an important tool which assess present pain intensity. It is a straight line placed horizontally on paper. It is 10 cm. long but distances of 15 & 20 cm are also used. The patient is asked to rate his or her pain on a 0 to 10 scale where 0 is equal to no pain & 10 is the worst possible pain.
- Timed Up and Go Test (TUGT):- This test is used to measure the ability of patient to perform sequential locomotion task that incorporates walking and turning. This test requires patients to stand up from chair, walk 3 meter, turn around, walk back to the chair and sit down again. Podsiadlo and Richardson modified the Get up and Go test to incorporate a time component.
- 27 Stairs Ascending and Descending Test (27 SAD):- This test is used to measure the ability of patient to ascend and descend stairs. In this test patient is asked to climb 27 stairs and then descend down. Time to complete the task is recorded.

4. Data Analysis

4.1 Demographic Data

Table 1: Age distribution in Group I and II

Age	Group I	Group II
44-47	6	5
48-51	3	4
52-55	6	6
Mean	49.46	49.66
S.D.	3.72	3.49
t - .1468 P - 0.10		

Table No. I shows the comparison of Age between Group I and Group II. The mean and standard deviation were calculated. Comparison between both the groups was done by using unpaired t-test. t value of which is 1468 at .10 level of significance. There is no significant difference between the ages of both the groups.

Table 1: Sex distribution in Group I and II

	Group I		Group II	
	M	F	M	F
Number	7	8	8	7
Percentage	46.60%	53.33%	53.33%	46.60%

Table No. 1 shows sex distribution in group I and Group II. In group I there were 46.6% males and 53.3% females and in Group II there were 53.3% males and 46.6% females.

5. Result

Cerebral palsy include neurodegenerative disorders, inborn errors of metabolism development abnormalities of the spinal cord, neuromuscular disorders, movement disorders, and neoplasm of differential considerations based on the predominant clinical feature.

Table 2: VAS (Pre)

Groups	n	x	S.D.	T	p
Group I	15	7.53	1.24	.4939	0.10
Group II	15	7.73	.96		

Table No. 2 shows Pre values (initial value) of Visual Analogue scale for pain of both the Groups. The mean and standard deviation were calculated. The comparison of pre values of visual analogue scale for pain between both the groups was done by using unpaired t test. The value of t for this is 0.4939. At 0.10 level of significance there is no significant difference in the Pre values of VAS of both the groups.

Table 3: VAS (Post)

Groups	n	x	S.D.	t	p
Group I	15	4.3	1.16	8.0470	0.0005
Group II	15	1.2	.94		

Table No. 3 shows post values (After 3 weeks) of Visual Analogue scale for pain of both the Groups i.e. Group I and Group II. The mean and standard deviation were calculated. Comparison of the post values of VAS between both groups was done by using unpaired t-test. The t value is 8.0470. There is significant difference between the groups at 0.0005 level of significance.

Comparison of VAS Pre & Post Values in Group I & II

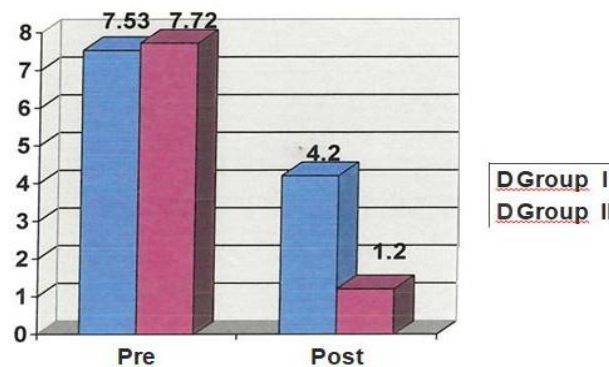


Table 4: Timed up and go test <Peel

Groups	n	x	S.D.	t	p
Group I	15	12.73	1.63	.8198	0.10
Group II	15	12.26	1.53		

Table No. 4 shows Pre values (initial value) of timed up and go test (functional test) of Group I and Group II. The mean and standard deviation were calculated. The comparison of pre values of timed up and go test between both the groups was done by using unpaired t - test. This shows there is no significant difference in pre values of timed up and go test between the groups at 10 level of significance.

Table 5: Timed up and go test (Post)

Groups	n	x	S.D.	t	p
Group I	15	10.66	1.63	5.3960	0.0005
Group II	15	8	1		

Table No. 5 shows post values of timed up and go test (functional test) of both Groups. The mean and standard deviation were calculated. The comparison of post values of timed up and go test between group I and group II was done by using unpaired t - test. t value of which is 5.3960. At 0.0005 level of significance. This shows there is significant difference in pre values of timed up and go test both the groups.

Comparison of Pre & Post Values Of TUGT in Group I & Group II

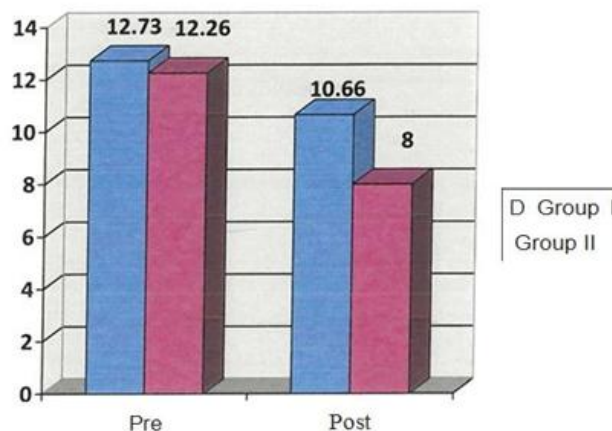


Table 6: 27 stair ascending descending test (Pre)

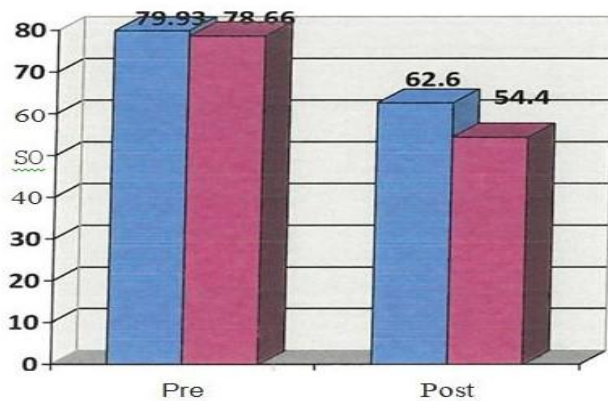
Groups	n	x	S.D.	t	p
Group I	15	79.93	14.38	.2544	0.10
Group II	15	78.66	12.94		

Table No. 6 shows pre values of 27 stairs ascending descending test of both the Groups. The mean and standard deviation were calculated. The comparison of pre values of 27 stairs ascending descending test between group II and group I was done by using unpaired t - test. t value of which is .2544. At 0.10 level of significance there is no significant difference in the pre values of 27 stairs ascending descending test between the groups.

Table 7: 2T stair ascending descending test (Post)

Groups	n	x	S.D.	t	p
Group I	15	62.6	7.65	3.3615	0.005
Group II	15	54.5	5.56		

Table No. 7 shows post values of 27 stairs ascending descending test of the Groups I and Group II. The mean and standard deviation were calculated. The comparison of post values of 27 stairs ascending descending test between groups was done by using unpaired t - test. t value of which is 3.3617. This shows there is significant difference between the groups at .0005 level of significance.



6. Discussion

The result of the data analysis shows that there was significant improvement in the experimental Group II as compare to that in Experimental Group I, with respect to pain and functional activity. Hence these results reject the null hypothesis and support experimental hypothesis. Thus improvement can be attributed to taping which was given to the patients along with the conventional therapy (SWD + Exercises).

Comparison of Post values of VAS in both groups showed significant difference i.e. Pain in experimental Group II was much reduced than Experimental Group I.

Main reason for pain reduction through taping are attributed to biomechanical and neural mechanism: Biomechanically taping realigns the patella within the femoral trochlea, thus reducing the abnormal stress on the surface and altering the magnitude and distribution of patellofemoral joint. It unloads the fat pad so that the strain on the inflamed tissue is reduced. It relieves the pressure on damaged lateral facet of patellofemoral joint and improves tracking of patella.

Lateral tracking problem appears to be the result of an imbalance between weak medial and over powering lateral structure, VMO is the only medial force restraining the patella, so VMO strengthening is essential to restore the

proper tracking mechanism. McConnell advocated the use of tape to assist in restoration of patellofemoral alignment proposing that tape allows the VMO to be strengthened in position of normal length and tension.

Neural mechanism theories responsible for pain reduction are:

- Gate Control theory
- Facilitation of proprioception.

Pain relief occurs because cutaneous receptors are stimulated by touch, pressure and stress on skin from tape. The pain gate theory is effective because impulses from the superficial sensory organs travels along the faster transmitted. A beta fibers to block the pain transmission from slower conducting delta & c pain fibers into CNS Proprioception defect had been found in osteoarthritic knees.

Joint proprioception and function improves when cutaneous receptors are stimulated. Tape stimulates the proprioceptors to improve movement. A study describes that acquisition of stimuli from peripheral mechanoreceptors in the joints, muscles and deep tissues and projection of these stimuli to CNS modifies motor control. Application of taping improves proprioceptive deficits. According to proprioceptive theory when one sense is lost the other sense takes over to compensate the loss, hence proprioception is enhanced which contributes to decrease the pain.

7. Conclusion

The significant improvement in the pain and functional activity was seen more in the experimental Group II as compared to experimental Group I.

Thus it can be concluded that taping the Patella medially is the effective method to reduce pain and can be use with conventional therapy (SWD + Exercises). Also it can be concluded by seeing the results that as the pain decreased, the functional activity increases. So application of taping results in.

- Lesser pain perception
- Improve proprioception
- Enhance VMO contraction.

Thus, this study suggest that the hypothesis "Physical therapy program which include taping is better to alleviate pain & improve function among the subjects with patellofemoral osteoarthritis than conventional physical therapy program hold true.

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