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PHYSIOTHERAPY EFFECTS ON PAIN WHILE WALKING IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Abstract

Knee osteoarthritis is a chronic degenerative disease. The main symptom of patients with knee osteoarthritis is a degenerative and mechanical type of pain. Pain is very noticeable while walking in rugged terrain, during ascent and descent of stairs, when changing from sitting in standing position as well as staying in the sitting position for a long time. Many studies have shown that the strength of the quadriceps femoris muscle can affect gait, by improving or weakening it. Kinesio Tape is a physiotherapeutic technique, which reduces pain and increases muscular strength by irritating the skin receptors. The aim of this article was to verify if Kinesio Tape reduces pain while walking, in patients with knee osteoarthritis. 74 patients with primary knee osteoarthritis, aged 50-73 years, participated in this study. We observed the change of pain, while walking for 10 meters at normal speed for each patient, before, a day after the application and three days after the application of Kinesio Tape on quadriceps femoris muscle, with the help of numerical pain rating scale - NRS. Our results indicated that there was a significant decrease of the pain while walking for 10 meters.

KEY WORDS: knee osteoarthritis, gait, Kinesio Tape, rehabilitation, numerical pain rating scale - NRS, 10 meter walking test.

Introduction

Osteoarthritis is a widespread, slowly developing disease, with a high prevalence increasing with age. The most common large joints involved in the disease are the knees, where the disease is particularly disabling because of difficulty in rising from chair, climbing stairs, kneeling, standing and walking. These limitations are partly due to muscle weakness, especially quadriceps muscle (Van Baar et al, 1998, Fransen et al, 2002, Steultjens et al, 2001, Slemenda et al, 1997). It has been suggested that functional ability is also affected by poor proprioception (Sharma et al, 2003, Sharma 2003, Sharma et al, 1997, Bennell et al, 2003, Hurley et al, 1997, Pai et al, 1997, Marks 1994).

The primary complaints of patients suffering from osteoarthritis are pain, stiffness, instability and loss of function. In addition to this impaired muscle function is frequently observed in patients with osteoarthritis of the knee. It was found that 80% of patients with knee osteoarthritis reported problems related to muscle function, strength, endurance and coordination (Rogind et al, 1988).

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Hassan et al. 2001 observed that knee joint pain and quadriceps strength were significant predictors of increased postural sway. Women who reported widespread pain had a 60% greater risk of falling compared to women with no or mild pain (Mandeville et al, 2008).

Additional factors associated with disability in persons with knee osteoarthritis include increasing age, obesity, female gender, co morbidity and quadriceps muscle weakness (McAlindon et al,1993, Dekker et al, 1993). Pain and muscle strength may particularly influence postural sway (Marks 1994). Impairments in knee joint proprioception have been mentioned by multiple authors (Marks 1994, Hurley et al, 1997, Tarigan et al, 2009). These deficits, in combination with the ageing process, may culminate in greater impairments of balance in this patient population, compared with their age-matched and healthy counterparts (Mandeville et al,2008).

Kinesio Tape is the original and authentic elastic therapeutic tape. According to Kenzo Kase (Kase 2003, Kase 2008), Kinesio Tape is a definitive rehabilitative taping technique that is designed to facilitate the body's natural healing process while providing support and stability to muscles and joints without restricting the body's range of motion as well as providing extended soft tissue manipulation to prolong the benefits of manual therapy administered within the clinical setting. These proposed mechanisms may include: 1. correcting muscle function by strengthening weakened muscles, 2. improving circulation of blood and lymph by eliminating tissue fluid or bleeding beneath the skin by moving the muscle, 3.decreasing pain through neurological suppression, and 4. repositioning subluxed joints by relieving abnormal muscle tension, helping to return the function of fascia and muscle. Chen et al. 2008 mentioned in their studies that Kinesio Tape can lift the skin to increase space between skin and muscle, reducing and localized pressure, promoting circulation and lymphatic drainage. This theoretically reduces pain, swelling, and muscle spasm. Chronic pain can be improved via the sensory stimulation of other types of nerve fibers. In these circumstances, Kinesio Tape may be effective for pain that persists after an injury has healed or for pain that is above and beyond the injury severity

To our knowledge, no study has directly investigated the effect of Kinesio Tape on pain intensity during walking in patients with knee osteoarthritis. The aim of this study was to verify if the application of Kinesio Tape on quadriceps muscle reduces pain while walking for 10 meters at normal speed, in patients with knee osteoarthritis before the application of Kinesio Tape, a day after the application of Kinesio Tape and three days after the application of Kinesio Tape on quadriceps femoris muscle.

Patients And Methods

The subjects (n=74), aged 50-73years (mean age 61.5), were consecutive out-patients with a clinical diagnosis of primary knee osteoarthritis made by a rheumatologist. The main criterion for the selection of the subjects in this study was the diagnosis of knee osteoarthritis by X-ray. Criteria for excluding subjects in the study were other musculoskeletal diseases, total knee replacement, significant hip or spinal arthritis, neurological diseases and diseases that affect balance and coordination. All of the subjects signed a written consent to participate in the study voluntarily.

Kinesio Tape was applied with a tonus regulation technique also called muscle technique on quadriceps femoris muscle. We measured the tape length in maximal stretched position of the tissue. The application was done with the patient in this maximal stretched position. The tape was applied without stretch following the course of the muscle borders from one insertion to the opposite one.

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Figure 1. Apply of Kinesio Tape on quadriceps femoris muscle.

We observed the change of pain, while walking for 10 meters at normal speed for each patient, before, a day after the application and three days after the application of Kinesio Tape on quadriceps femoris muscle, with the help of numerical pain rating scale - NRS. The worse knee, as selected by the patient was the "index" knee. Pain was assessed by numerical pain rating scale (NRS), by instructing the patient to choose a number from 0 to 10 that best describes their current pain. 0 would mean "no pain" and 10 would mean "worst possible pain" (McCaffery et al,1989).

In the current study the alternative hypothesis that Kinesio Tape is effective to decrease the pain while walking on a distance of 10 meters in patients with knee osteoarthritis was tested.

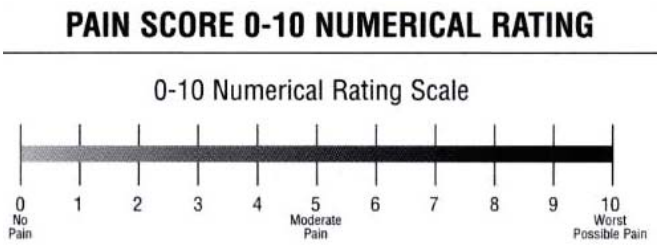

Figure 2. Numerical pain rating scale used in this study.

Results

Seventy four consecutive out-patients with a clinical diagnosis of primary knee osteoarthritis participated in this study, mean age of the participants was 61.5 (range 50-73 years), 67% of whom were female. The worse knee, as selected by the patient was the "index" knee.

We observed the change of pain, while walking for 10 meters at normal speed for each patient before the application of Kinesio Tape, a day after the application of Kinesio Tape and three days after the application of Kinesio Tape on quadriceps femoris muscle, with the help of numerical pain rating scale (NRS), where 0 would mean "no pain" and 10 would mean "worst possible pain" (19).

In Table 1 is shown the number of patients who chose the pain score while walking for 10 meters on normal speed before applying the Kinesio Tape. It is shown that 21 of 74 patients (28.4%) chose score 5, 15 of 74 patients (20.3%) chose score 6, 17 of 74 patients (22.9%) chose score 7 and 21 of 74 patients (28.4%) chose score 8 on the numerical pain rating scale.

Table 1. Numerical pain rating scale (NRS) scores before applying Kinesio Tape (KT)

NRS	Number of patients before KT	%
0		
1		
2		
3		
4		
5	21	28,4
6	15	20,3
7	17	22,9
8	21	28,4
9		
10		

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In Table 2 is shown the number of patients who chose the pain score while walking for 10meters on normal speed one day after applying the Kinesio Tape. It is shown that 10 of 74 patients (13.5%) chose score 4, 26 of 74 patients (35.1%) chose score 5, 29 of 74 patients (39.3%) chose score 6, 5 of 74 patients (6.7%) chose score 7 and 4 of 74 patients (5.4%) chose score 8 on the numerical pain rating scale.

In Table 3 is shown the number of patients who chose the pain score while walking for 10meters on normal speed three days after applying the Kinesio Tape. It is shown that 15 of 74 patients (20.3%) chose score 2, 26 of 74 patients (35.1%) chose score 3, and 33 of 74 patients (44.6%) chose score 4 on the numerical pain rating scale.

Table 2. Numerical pain rating scale (NRS) scores scores one day after applying Kinesio Tape (KT)

NRS	Number of patients one day after KT	%
0		
1		
2		
3		
4	10	13,5
5	26	35,1
6	29	39,3
7	5	6,7
8	4	5,4
9		
10		

Table 3. Numerical pain rating scale (NRS) scores three days after applying Kinesio Tape (KT)

NRS	Number of patients three days after KT	%
0		
1		
2	15	20,3
3	26	35,1
4	33	44,6
5		
6		
7		
8		
9		
10		

Table 4. Numerical pain rating scale (NRS) scores before applying Kinesio Tape (KT), one day and three days after applying KT.

NRS	Number of patients before KT	%	Number of patients one day after KT	%	Number of patients three days after KT	%
0						
1						
2					15	20,3
3					26	35,1
4			10	13,5	33	44,6
5	21	28,4	26	35,1		
6	15	20,3	29	39,3		
7	17	22,9	5	6,7		
8	21	28,4	4	5,4		
9						
10						

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Discussion

Lack of information about the impact of elastic therapeutic tape in pain relief in this diagnosis led us to carry out this research. Our objective was to determine whether the application of Kinesio Tape on quadriceps muscle in patients with knee osteoarthritis will lead to a pain relief while walking a 10 meter distance on a normal speed.

The results of this study showed no significant difference in pain intensity during walking one day after applying Kinesio Tape on quadriceps femoris muscle. However a significant decrease in pain intensity was shown during walking three days after applying the Kinesio Tape. Similar findings have been reported elsewhere. Kaya et al. 2011 studied 55 patients with shoulder impingement syndrome treated by Kinesio Tape or local modalities and found that although immediate effect of Kinesio Tape is greater than the local modalities, Kinesio Tape was similarly effective at the second week of the treatment.

The results of the study conducted by Miller and Osmotherly 2009 provided evidence for a short - term role for taping as an adjunct to routine physiotherapy program in different treatments. They found that Kinesio Tape has main effect on the early stage of treatment and that there was not a significant Kinesio Tape effect after several weeks. The immediate results and improvements following the Kinesio Tape are also reflected in the work of researchers who found significant improvements immediately following Kinesio Tape compared with placebo taping in patients with other musculoskeletal disorders such as patellofemoral pain syndrome (Crossley et al, 2009, Lan et al, 2010) or whiplash - associated disorders (Gonzalez et al, 2009, Nederhand et al, 2002).

Kase et al. 2003 and Kase 2008, Thelen et al. 2008 however, recommend at least three daily action of elastic therapeutic tape. Kase et al. mentions that three days after the application of Kinesio Tape can occur soft tissue changes, improvement of muscle function, increase of blood circulation and lymphatic drainage. Thelen et al. found that after three days of Kinesio Tape application, a significant decrease of the functional shoulder joint pain was reported, and an increase of movement.

Limitations in this study was the sample size, for with a greater sample size we could obtain more relevant results. In this study the effect of Kinesio Tape in pain relief in knee osteoarthritis was not assessed. Further studies are needed to investigate the effect of Kinesio Tape in pain relief of knee osteoarthritis.

Conclusion

There seems to be a significant decrease of pain three days after applying Kinesio Tape on quadriceps femoris muscle. However, no significant improvement was noted a day after the application. Kinesio Tape can be used in patients with knee osteoarthritis, especially when pain relief is a short term goal of the treatment. More clinical research is needed to investigate the effect of Kinesio Tape in pain relief of knee osteoarthritis.

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