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Kinesio taping or sham taping in knee osteoarthritis? A randomized, double-blind, sham-controlled trial

Figen Kocyigit [a, *, 1], Mehmet Besir Turkmen [a, 2], Merve Acar [a, 3], Nezahat Guldane [a], Tugce Kose [a], Ersin Kuyucu [b], Mehmet Erdil [b]

[a] Denizli State Hospital, Department of Physical Medicine and Rehabilitation, Denizli, Turkey
[b] Medipol University, Faculty of Medicine, Department of Orthopeadics and Traumatology, İstanbul, Turkey

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ABSTRACT

Purpose: To compare effects of kinesio taping with sham taping at the end of 3 consecutive taping periods in knee osteoarthritis.
Methods: 41 patients diagnosed with knee osteoarthritis according to American College of Rheumatology were randomized to receive either KT or sham taping. Baseline evaluations included a visual analog scale (VAS) for activity and nocturnal pain, Lequesne index for functional assessment and Nottingham Health Profile (NHP) for the quality of life. Taping was applied every four days, three times, and all of the assessments were repeated at the end of the treatment period.
Results: In both groups VAS for activity pain, VAS for nocturnal pain, Lequesne index score, NHP score decreased significantly. NHP energy scores were different significantly between the groups in favor of sham taping at the end of the 12-day period.
Conclusion: Our findings indicate inconclusive evidence of a beneficial effect of kinesio taping over sham taping in knee osteoarthritis.

1. Introduction

Osteoarthritis (OA) is the most frequent form of arthritis. The knee is one of the most commonly involved joints because of weight bearing and repeated movements. Knee osteoarthritis is one of the leading causes of knee pain and functional limitation [1,2]. The different types of pain (activity, at rest, nocturnal) and functional limitation may affect the quality of life in the elderly population [3].

Management of knee OA represents a challenge for the scientific community [1]. Non-operative measures, such as modification of daily living activities, weight loss, physical therapies including exercise, electrotherapy and taping, nonsteroidal anti-inflammatory drugs, and injection therapies alleviate symptoms in most of the patients with mild-moderate knee OA.

Kinesio taping (KT) has emerged as an interesting method that can be applied virtually in any musculoskeletal injury. Kenzo Kane, a chiropractor, introduced this technique in 1979 in Japan. Kinesio tape is an elastic adhesive material that has a high stretching capacity to ensure the free mobility of the applied area [4].

Immediate effects of KT in knee OA was investigated in a recent study. Pain decreased significantly immediately after taping in KT group compared to sham taping [5]. Another study investigated effects of KT on isokinetic quadriceps torque in knee osteoarthritis and concluded that therapeutic KT was effective in improving isokinetic quadriceps torque and reducing pain [6]. Likewise, this study also investigated the immediate effects of KT and sham taping was applied with KT. None of the mentioned studies investigated effects of KT on functional parameters and quality of life.

Namely there is not much mention of KT for knee OA management in the literature. Moreover, sham taping design of previous

* Corresponding author.
E-mail addresses: figen7876@yahoo.com (F. Kocyigit), drbesir@hotmail.com (M.B. Turkmen), nezle_43@hotmail.com (N. Guldane), fzt.tugce@hotmail.com (T. Kose), ersinkuyucu@yahoo.com.tr (E. Kuyucu), mehmet.erdil@medipol.com.tr (M. Erdil).
[1] Pamukkale University, School of Physical Therapy and Rehabilitation, Denizli, Turkey.
[2] Norobilim Medical Center, Department of Physical Medicine and Rehabilitation, Turkey.
[3] Kecioren Training and Research Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Turkey.

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studies is somewhat inadequate. Taping in the same way as therapeutic banding but with a non-therapeutic material would fit better with the definition of ideal sham taping. The results would be more attributable to the therapeutic material instead of taping method.

The aim of this study is to compare effects of KT with sham taping in patients with knee OA. Also we investigated the effects of KT on functional status, quality of life as well as pain during activity and nocturnal pain at the end of 3 consecutive taping periods.

2. Materials and methods

This is a randomized, double-blinded, placebo-controlled study that aims to investigate the efficacy of KT in patients with knee OA when compared to the sham taping.

We performed power analysis for the sample size estimation. Type I error (α) was set at 0.05 and power of the test was selected 0.80 and calculated sample size appropriate to test the hypothesis and have confidence was 41. The number of patients to ensure that the final sample size is achieved was calculated to be 46 when the proportion of attrition is accepted 10% [7]. We allocated 43 patients for the study and stopped recruitment when the estimated study size was achieved. All procedures performed in our study were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. All volunteers were informed about the study procedure, and they gave oral and written informed consent.

2.1. Study population

50 patients who were presented to the institutional outpatient clinic with a primary complaint of knee pain were scrutinized for enrollment in the study to reach the estimated allocation number. One patient had documented anterior cruciate ligament rupture and knee joint instability. One patient was diagnosed as ankylosing spondylitis. Two patients had electrotherapy for knee, and one patient had intra-articular knee injection in last six months. We excluded five patients because they did not match inclusion criteria. Two patients declined to participate. Finally, 43 patients were allocated. One patient from KT group was unwilling to continue taping because of difficulty in transportation. We excluded one patient during the follow-up because of mild pruritic rash in the control group. Finally, data from 41 patients were analyzed (Fig. 1). Table 1 shows the inclusion and exclusion criteria for the study.

The admission complaint of the patients was knee pain and/or stiffness. We diagnosed the patients as knee osteoarthritis according to clinical criteria for the classification of idiopathic OA of the knee that were developed by American College of Rheumatology (ACR) [8]. Comprehensive physical and neurological evaluations were performed to rule out other clinical conditions (paresis, cruciate ligament tears, inflammatory arthritis) causing knee pain. We questioned and recorded co-morbidities.

All patients were advised to modify daily living activities (avoid kneeling, restriction of walking distance to the painless range) to obtain relative rest and prevent further loading of the affected knees. Use of nonsteroidal anti-inflammatory drugs was restricted during the study period. Patients were informed to contact the doctor if they experience pain that does not respond to rest.

2.2. Group assignment and taping technique

We used the numbered envelopes method for randomization of patients into two groups. Group 1 (n = 22) was the KT group, and group 2 (n = 21) was the sham taping group.

'Y-strip' is the most widely used of all strips in KT. It consists of a length of tape with a single longitudinal section continuing from one end for a specified distance along the center of the tape. The other end of the tape is left intact, resembling the letter "Y". I-strip has no cut down the middle of the tape. When a little bit of the paper is torn off, and the tape is applied directly to the skin as it comes off the paper backing, a "paper-off" tension is used. The first strip was a Y-strip representative of the quadriceps. It was applied when the patient was lying in the supine position, knee in maximal flexion. Tails of the quadriceps strip were applied to the patella, wrapping patella medially and laterally with 25% tension. The base of the strip was applied with paper off tension towards the anterior superior iliac spine. The second strip, a Y-strip was applied between tibial tuberosity and inferior pole of the patella when the knee is flexed 90°. The tails of the second strip are again applied wrapping patella medially and laterally. The tails are directed towards vastus medialis and vastus lateralis. The third strip was an I-strip applied when the knee was flexed 30°. The strip was applied to patella mediolaterally with 75% tension in the middle and paper-off tension at the ends (Fig. 2).

The control group received sham taping with 5 cm Beta fix Surgical Hypoallergenic Flexible Tape. Identical strips were used for sham taping that did not attempt to correct misalignment by reducing muscle spasm and enhance local circulation as expected for KT. We did not apply tension to the tape during application; as the structure of the tape was not suitable for tension. The tape was overlaid on the skin (Fig. 3). Taping was applied immediately following initial measurements by the same physiotherapist in each patient. Taping was repeated every four days, three times.

The taping applications looked similar except for the color of the tape. Therefore, we do believe that blinding of the subjects was appropriate. All of the patients stated that they were unaware of their group assignment at the end of the study.

2.3. Outcome measures

We assessed all patients at baseline, at the end of taping period (12th day). Assessments were performed by the same physiatrist (FK, MBT or MA) for each patient. Taping was applied by the same physiotherapist in each patient (NG or TK). Physiatrists evaluated the patients after the tapes were removed and, therefore, were blinded to the type of taping. The primary outcome measures were pain intensity with activity and at night. We measured pain intensity during activity and at night on a 100-mm visual analog scale (VAS).

We applied Lequesne index for functional assessment and Nottingham Health Profile (NHP) for the quality of life evaluation.

Lequesne index was developed in 1987 to evaluate of severity for osteoarthritis of the hip and knee. The Index has three sections to evaluate pain or discomfort, maximum distance walked and activities of daily living. The total score ranges between 0 and 24, and high scores demonstrate more severe involvement [9].

NHP is a self-administered questionnaire that is used to determine and quantify perceived health problems. It is divided into six subscales (sleep, mobility, energy, pain, emotional reactions, social isolation) and consists of 38 items [10]. Validity and reliability of the Turkish version of NHP were documented in 2000 [11].

2.4. Statistical analysis

We performed statistical analysis with SPSS software, release 21.0 (SPSS Inc., an IBM Company, and Chicago, IL, USA). We used standard descriptive statistics to summarize characteristics of the participants including means and standard deviations (SD) of all