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Research

Kinesio Taping does not improve the symptoms or function of older people with knee osteoarthritis: a randomised trial

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KEY WORDS

Bandages
Knee injuries
Muscle strength
Pain
Oedema

ABSTRACT

Question: Does Kinesio Taping reduce pain and swelling, and increase muscle strength, function and knee-related health status in older people with knee osteoarthritis? **Design:** Randomised, controlled trial with concealed allocation, intention-to-treat analysis and blinded assessment. **Participants:** Seventy-six older people with knee osteoarthritis. **Intervention:** The experimental group received three simultaneous Kinesio Taping techniques to treat pain, strength and swelling. The control group received sham taping. All participants kept the taping on for 4 days. **Outcome measures:** The outcomes were: concentric muscle strength of knee extensors and flexors, measured by isokinetic dynamometry with an angular velocity of 60 deg/second normalised for body mass [(Nm/kg) x 100 (%)]; pressure pain threshold via digital pressure algometry (kgf/cm^2); lower-limb swelling via volumetry (l) and perimetry (cm); physical function via the Lysholm Knee Scoring Scale (0 = worst to 100 = best); and knee-related health status via the Western Ontario and McMaster (WOMAC) osteoarthritis index (0 = best to 96 = worst). Outcomes were measured at Day 4 (end of the taping period) and Day 19 (follow-up) after the start of the treatment. **Results:** At Day 4, there were no significant between-group differences for knee extensor muscle strength (MD –1%, 95% CI –7 to 5), knee flexor muscle strength (MD 2%, 95% CI –3 to 7), the pressure pain threshold at any measured point, volumetry (MD 0.05 L, 95% CI –0.01 to 0.11), perimetry at any measured point, Lysholm score (MD –4 points, 95% CI –9 to 2), or WOMAC score (MD –2 points, 95% CI –8 to 4). The lack of significant between-group difference was also seen at the follow-up assessment on Day 19. **Conclusion:** The Kinesio Taping techniques investigated in this study provided no beneficial effects for older people with knee osteoarthritis on any of the assessed outcomes. **Trial registration:** Brazilian Registry of Clinical Trials, RBR-36r3t5. **[Wageck B, Nunes GS, Bohlen NB, Santos GM, de Noronha M (2016) Kinesio Taping does not improve the symptoms or function of older people with knee osteoarthritis: a randomised trial. *Journal of Physiotherapy* 62: 153–158]**

Introduction

Some musculoskeletal diseases that are commonly seen as part of the ageing process may lead to important functional limitations in the older population; osteoarthritis is one of the main examples.[1] Knee osteoarthritis is associated with joint and muscle dysfunction, with consequent impairment in balance and gait.[2,3] These impairments are often seen along with pain, swelling, crepitation, decreased range of movement, joint laxity, presence of osteophytes and changes in the congruence of the joint surfaces.[1,3–5]

The clinical progression of knee osteoarthritis is associated with several factors, one of which is a decrease in quadriceps strength.[6,7] Therefore, strengthening of these muscles is usually one of the main aims in the treatment of knee osteoarthritis. However, the pain associated with knee osteoarthritis can be a limiting factor for strengthening. If pain reduces adherence to strength training, this could lead to a further decrease in muscle strength, resulting in more pain, with the process becoming a vicious cycle of pain-weakness-pain.[8] This process is usually accompanied by a decrease in joint function, which in turn leads to difficulties with activities of daily living and a decrease in quality of life.[4] Therefore, pain relief and functional improvement must be one of the main objectives when treating knee osteoarthritis.[4] According to Jevsevar,[5] pharmacological and invasive interventions for osteoarthritis are typically incompletely effective, have some potential adverse side effects, and/or have effectiveness that is not comprehensively established.[5] Thus, non-pharmacological treatments for the symptoms (mainly pain) should be further investigated.

Among the different modalities used in physiotherapy to treat knee osteoarthritis, the application of taping has gained popularity,[5,9] with several possible techniques. The Kinesio Taping technique has been seen in clinical practice, despite a lack of high-quality studies supporting its efficacy.[10] Nevertheless, some

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isolated studies have presented results that give clinicians and researchers some encouragement in the use of Kinesio Taping. Vithoulkaa et al reported that Kinesio Taping could increase the torque generated by the quadriceps in women without knee pain.[11] Campolo et al showed a reduction in pain due to Kinesio Taping during functional activities in people with patellofemoral pain.[12] The Kinesio Taping application, with its varied application techniques, could therefore be beneficial in treating people with knee osteoarthritis.

Therefore, the research question for this randomised, controlled trial was:

> Does Kinesio Taping reduce pain and swelling, and increase muscle strength, function and knee-related health status in older people with knee osteoarthritis?

Method

Design

This was a randomised clinical trial in which participants were allocated to either the experimental group, which received three simultaneous Kinesio Taping applications, or the control group, which received a single sham Kinesio Taping application. Potential participants were screened to determine eligibility before baseline assessment and randomisation to an intervention. Randomisation was performed using individual allocation codes placed within opaque, sealed envelopes by a person having no contact with the participants and assessors. Participants of both groups were instructed to keep the Kinesio Taping on the skin for 4 days and on the fourth day, after removal of the Kinesio Taping, all participants were again assessed by an assessor who was blinded to group allocation. A third assessment was performed 15 days after the second assessment (Figure 1).

Participants, therapists and centres

Older people with a clinical diagnosis of tibiofemoral osteoarthritis were recruited via outpatient clinics in a state capital of Brazil to take part in this study. Inclusion criteria were: minimum age of 60 years, minimum pain of 4/10 on a visual analogue scale, knee joint stiffness during standing activities, stiffness that had been present for at least 6 months at screening, pain during passive mobilisation of the knee, intermittent swelling, and radiographic signs of joint degeneration. Any grade of the Kellgren-Lawrence scale was permissible. Exclusion criteria were: systemic rheumatic diseases, history of surgery in the affected limb, presence of any other injuries in the affected limb (bone, muscle or skin), history of skin allergy, and any other condition that could affect assessments. For participants with bilateral knee osteoarthritis, the most affected side was used, according to the visual analogue scale of pain.

Intervention

The experimental group received three Kinesio Taping elements (Figure 2A–C) applied simultaneously (Figure 2D). This advanced application with multiple layers of Kinesio Taping is indicated when more than one effect of taping is desired.[13] Kase et al[13] suggested the use of advanced applications for diverse injuries

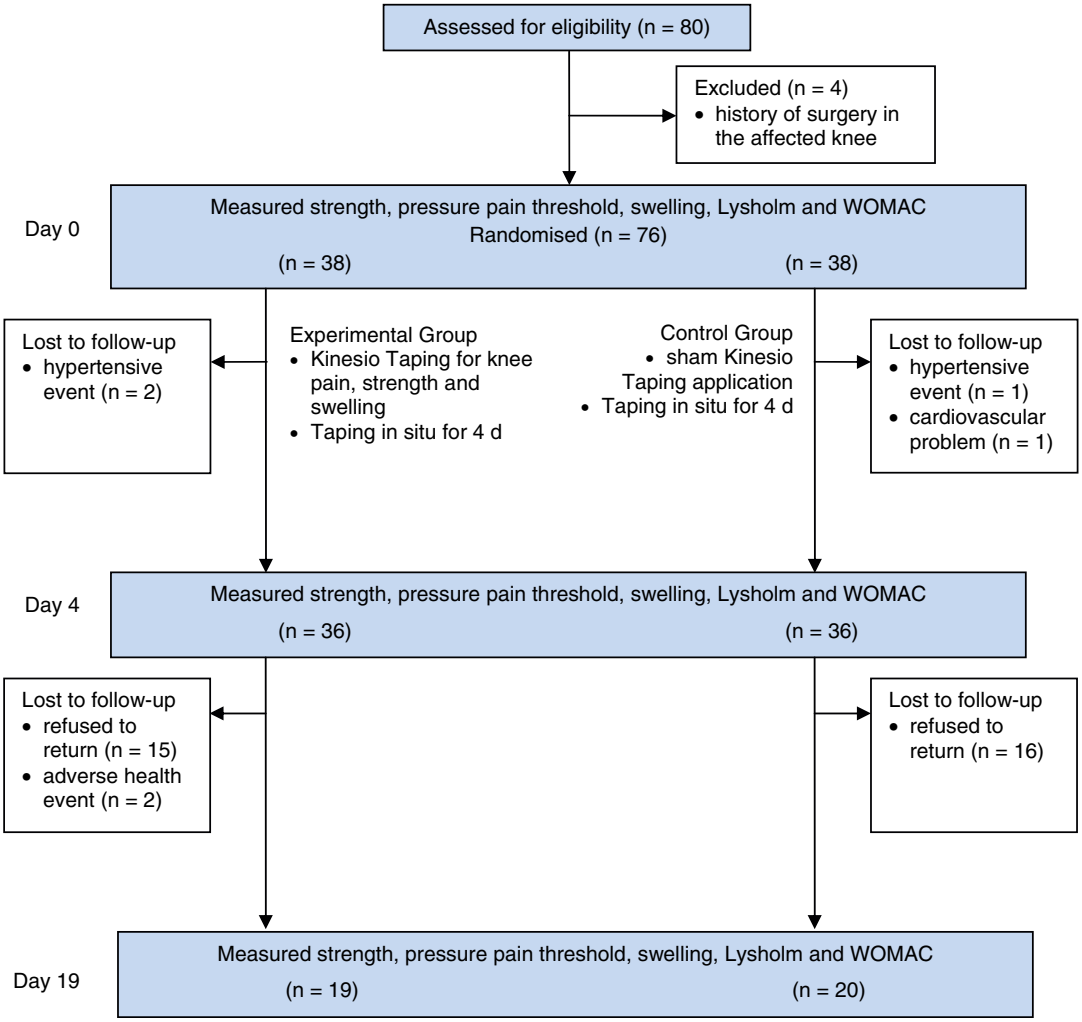

Figure 1. Flow diagram.

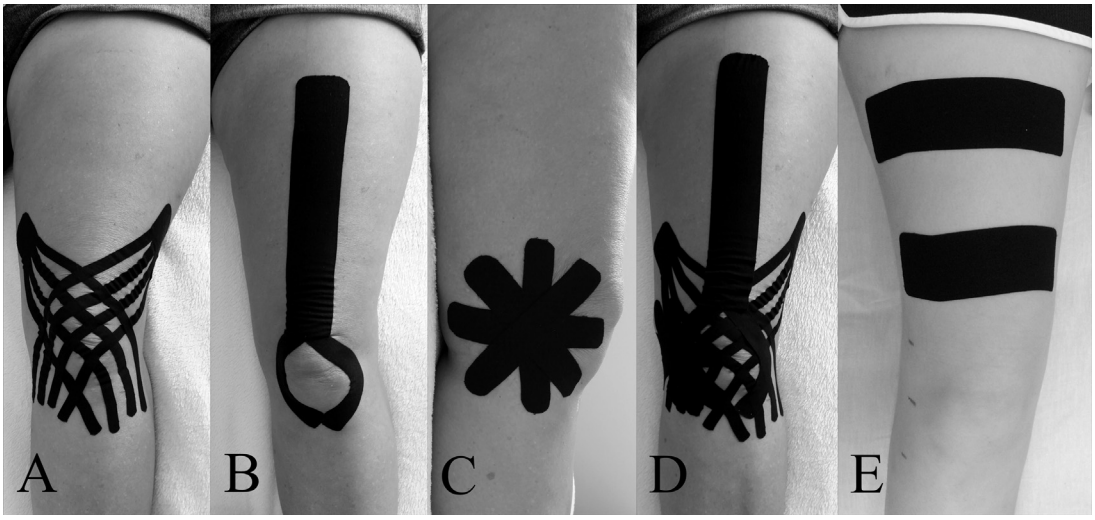

Figure 2. Kinesio Taping applications used in the study. A. Drainage element of the experimental application. B. Muscle strength element of the experimental application. C. Pain-relief element of the experimental application. D. Combined experimental application. E. Sham application.

such as epicondylalgia, quadriceps contusion, sciatica, knee ligament injuries and ankle sprain. The multi-layer application was selected due to the multifactorial characteristics of osteoarthritis. The elements were chosen to address each main symptom: muscle weakness, pain and swelling. Participants received the intervention or sham in a single session, which took place in a room at the university physiotherapy clinic. Elastic tapes were applied by a physiotherapist, who was experienced in Kinesio Taping techniques, in the order described below.

Drainage technique

The first element applied was a technique recommended to stimulate drainage of knee swelling.[13] Participants lay supine on a plinth with the leg to be taped in maximum passive knee flexion. Two pieces of tape were applied according to Kase et al,[13] as shown in Figure 2A, with the body of each piece divided longitudinally into four narrower strips. The first piece was applied laterally at the knee, with the base of the tape 15 cm above the articular line of the knee and the body of the tape crossing the front of the knee with 2 cm between each divided strip. The second piece was applied starting on the medial side of the knee, crossing the front of the knee, following the same procedure as the first piece. The two drainage strips crossed each other on the anterior aspect of the knee and they were applied with the pre-tension that was originally found in the tape.[13]

Muscular relaxation technique

The next element was applied with the aim of obtaining quadriceps relaxation to minimise pressure between the femur and patella and, thus, reduce pain.[13] The participants lay supine on a plinth with the leg to be taped in maximum passive knee flexion. A 'Y-strip' of tape was applied on the rectus femoris muscle in a Y shape. The tape was applied to the tibial tuberosity and the arms of the 'Y' were adhered around either side of the patella. The body of the strip was applied in a cephalad direction, ending 15 cm below the anterior superior iliac spine (Figure 2B). The Kinesio Taping was applied with the pre-tension that was originally found in the tape.[13]

Pain relief technique (star application)

The final element has been recommended for decompressing nerve endings in order to reduce pain at the knee joint.[13] The participants lay supine on a plinth with the leg to be taped in maximum passive knee flexion. Four 10-cm long 'I-strips' of tape were applied to the medial side of the knee in a star shape (Figure 2C). The application started from the middle of each strip (ie, the point where there was no tension in the tape) and from that point, full tension was applied to the length of the Kinesio Tape.[13]

The control group received a sham application. The participants lay supine on a plinth with the leg to be taped in maximum passive knee flexion. Two 'I'-shaped strips of Kinesio Taping were applied, without any tension, across the quadriceps muscle group. These two strips were applied 20 cm and 10 cm above the superior pole of the patella (Figure 2E). The tape size applied was one-third of the thigh circumference at the region of application.

Outcome measures

All participants were assessed before treatment, after treatment and at follow-up by a blinded assessor. At each assessment point, outcomes were measured in the following order: functional assessment, knee-related health status, perimetry, pressure pain threshold, volumetry and muscle strength.

Isokinetic muscle strength

Knee extensor and flexor isokinetic concentric strength were assessed with an isokinetic dynamometer[a]. Participants were seated with the hip in 85 deg and the knee in 90 deg of flexion. The rotational dynamometer axis was aligned with the lateral condyle of the femur and the resistance was applied to the shank, 5 cm above the lateral malleolus. The test range of movement was from 90 deg of flexion to 0 deg (full extension). To be familiarised with the equipment, participants performed five submaximal knee flexions and extensions followed by a 3-minute rest interval before performing two sets of three maximal knee extensions and flexions with angular velocity of 60 deg/second; there was a 5-minute interval between the sets.[14] Data were recorded as peak torque and divided by body mass, and expressed as a percentage, that is, (Nm/kg) x 100 (%), with gravity correction also performed.[14] The mean of the peaks of each set was used for analysis.

Pressure pain threshold

The pressure pain threshold was assessed with a pressure algometer[b]. The participant was seated with knees flexed to 90 deg and progressive pressure was applied perpendicular to the skin. Participants were instructed to report immediately when the sensation of pressure was accompanied by pain. The amount of pressure at that moment was recorded and considered as the pressure pain threshold.[15] The pressure was applied and recorded at six points around the knee in a random order: the base and apex of the patella, the lateral and medial extremities of the patella, and the lateral and medial aspects of the knee joint line. Data were also collected from an unaffected region of the body, the forearm, as a reference value for the pressure pain threshold.[15] Each point was assessed once, after one familiarisation trial at each point.[15] Data were recorded as kgf/cm^2.

Volumetry

An acrylic box (67 x 30 x 21 cm) was used to assess lower limb volume. The box was filled with water to the level of an escape spout (59 cm from the base) and the water temperature was maintained between 28 and 32 °C.[16] Initially, the participants were seated on a platform higher than the box. The limb to be measured was then slowly lowered into the box until the sole of the foot was in total contact with the bottom of the box. At the same time, the opposite limb was lowered to the ground outside the box. Participants were instructed to stand and remain relaxed with body weight distributed equally to both limbs. The assessed limb was kept from touching the box or moving until the water ceased dripping from the escape spout.[16] The water that flowed from the escape spout was collected and measured on a scale with 1-g precision[c]. The results in kg were converted into litres [density (g/cm^3) = mass (g)/volume (cm^3)], considering the water density = 1 g/cm^3.[17] This procedure was performed twice and the mean was used for analysis.

Perimetry

A measuring tape was used to measure the perimeter of the limb. The participant was positioned in supine on a plinth, with the hips in neutral position and the knees in full extension. The participant was instructed to lie still without muscle contraction in the assessed limb. From that position, the assessor measured the knee at three points: the fold at the popliteal fossa, 5 cm above that fold, and 5 cm below.[16] Each level was assessed three times and the mean of each level was used for analysis.

Physical function

Physical function was assessed using the Lysholm Knee Scoring Scale questionnaire.[18] Designed for use in people with a knee injury, the questionnaire includes eight questions related to daily activities, pain, instability and swelling. It generates a final score that can vary from 0 to 100; high scores mean good physical function.[18,19]

Knee-related health status

Knee-related health status was assessed via the Western Ontario and McMaster (WOMAC) osteoarthritis index.[20] The questionnaire is divided in three main domains: pain, joint stiffness and physical activities. The total score is given by the sum of the three domain scores and varies from 0 to 96; high scores mean poor health status.[19,20]

Data analysis

All the analyses followed the intention-to-treat principle. Missing data were processed with a multiple imputation method.[21] Twenty imputed data sets were created using the baseline and post-intervention data to predict the missing data.[21] Analysis of variance (ANOVA) with a linear mixed model was used to verify the effect of the Kinesio Taping. The mean difference and 95% CI were also calculated for each between-group comparison. The confidence level adopted was 5% and the statistical analyses were processed using the software SPSS[d].

The sample size was calculated to give the study sufficient statistical power to identify an isokinetic concentric quadriceps strength mean difference of 15 Nm/kg (standard deviation of 21 Nm/kg) between the groups[22] as statistically significant. The minimum sample size that was needed was 37 participants per group, based on power of 80%, an alpha of 5%, and a possible loss to follow-up of 15%.

Results

Flow of participants, therapists and centres through the study

From the 80 participants that were screened, 76 met the inclusion criteria and were included in the study. Two participants in each group could not be assessed after the intervention because they had an adverse health event (Figure 1). The baseline characteristics of the participants are presented in Table 1 and the first two columns of data in Table 2.

Table 1
Baseline characteristics of participants (n = 76).

Characteristic	Exp (n = 38)	Con (n = 38)
Age *(yr)*, mean (SD)	69.6 (6.9)	68.6 (6.3)
Gender, n female (%)	35 (92)	31 (82)
Height (*cm*), mean (SD)	1.61 (0.09)	1.60 (0.08)
Weight (*kg*), mean (SD)	77.8 (15.0)	79.9 (10.2)
Body mass index (kg/m^2), mean (SD)	30.0 (4.9)	31.3 (4.1)
Pain (*0 to 10 VAS*), mean (SD)	7.6 (1.7)	7.5 (2.2)
Symptom onset (*yr*), mean (SD)	10.5 (9.8)	10.3 (11.3)

Con = control group, Exp = experimental group, VAS = visual analogue scale.

Effect of intervention

The ANOVA analyses showed no difference between the experimental group and control group for any of the outcomes investigated at the end of the 4-day intervention period, or 15 days later (Table 2). Individual participant data are presented in Table 3 (see eAddenda for Table 3).

Discussion

The main objective of the Kinesio Taping application used here was to treat pain, directly or indirectly. However, the compilation of different Kinesio Taping techniques did not present any advantage compared with a sham application. The reason for that could possibly be explained by the short time that participants had the Kinesio Taping on (4 days), which may not have been long enough to induce any real benefits in a chronic condition like knee osteoarthritis. Alternatively, Kinesio Taping may not have the benefits advocated by its users.

The present results differed from those of Anandkumar et al,[23] who also investigated the effects of Kinesio Taping on people with knee osteoarthritis. They compared an experimental group who received Kinesio Taping to a control group and reported a reduction in pain in the Kinesio Taping group while climbing stairs. Their study used the visual analogue scale to measure pain, which may be considered a more subjective method compared to algometry, which was the method used in the present study. Anandkumar et al[23] found a decrease in pain in the treatment group; however, it is unclear whether the measurements were performed with or without the Kinesio Taping on, making it hard to understand how blinding of assessors was performed. In the present study, beside the direct method of measuring pain, two questionnaires that include questions related to pain (Lysholm and WOMAC) were also used, and the score was isolated and analysed from the pain domain from the WOMAC questionnaire. There were still no between-group differences in pain (analysis available from the authors upon request).

Considering the lack of significant difference in pain between groups, it was not a surprise to see no significant between-group difference for muscle strength. It is known that muscle contraction can be negatively affected in the presence of pain,[24] thus, it could be expected that muscle strength would also remain comparable between groups. A Kinesio Taping technique was chosen that, in theory, would promote quadriceps relaxation, thus decrease patellar pressure, improve joint biomechanics and increase muscle contraction strength. However, this increase in strength was not observed. Some previous studies have investigated the possible effects of Kinesio Taping on muscle strength in different populations, and the results are controversial;[11,23,25,26] however, only one study investigated the effect of Kinesio Taping on quadriceps muscle strength in older people with knee osteoarthritis.[23] In that study, isokinetic testing took place 30 minutes after the Kinesio Taping application and the results showed an increase in strength for the Kinesio Taping group. Unfortunately it was unclear whether the assessments were performed with the Kinesio Taping on the skin, or after the removal of the tape.[23] If the testing was performed with the Kinesio Taping still applied, it might be argued that the effects of Kinesio Taping

Table 2
Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups.

Outcome	Groups						Difference within groups				Difference between groups	
	Day 0		Day 4		Day 19		Day 4 minus Day 0		Day 19 minus Day 0		Day 4 minus Day 0	Day 19 minus Day 0
	Exp (n = 38)	Con (n = 38)	Exp (n = 36)	Con (n = 36)	Exp (n = 19)	Con (n = 20)	Exp	Con	Exp	Con	Exp minus Con	Exp minus Con
Knee extensor muscle strength *(%)*	81	74	86	79	97	88	4	5	16	14	−1	2
	(41)	(33)	(37)	(29)	(30)	(26)	(13)	(15)	(30)	(23)	(−7 to 5)	(−11 to 14)
Knee flexor muscle strength *(%)*	38	34	44	37	46	42	6	3	8	9	2	0
	(20)	(20)	(22)	(21)	(16)	(15)	(11)	(11)	(16)	(16)	(−3 to 7)	(−8 to 7)
Pressure Pain Threshold (kgf/cm^2)												
superior patellar extremity	4.3	4.3	4.4	4.2	4.6	4.7	0.2	−0.1	0.4	0.3	0.3	0.0
	(1.5)	(1.4)	(1.6)	(1.6)	(1.3)	(0.9)	(1.3)	(1.0)	(1.5)	(1.5)	(−0.3 to 0.8)	(−0.7 to 0.7)
inferior patellar extremity	4.8	4.6	4.9	4.7	5.1	4.7	0.1	0.1	0.4	0.1	0.1	0.2
	(2.1)	(1.6)	(1.6)	(1.6)	(1.7)	(1.0)	(1.5)	(1.6)	(1.7)	(1.4)	(−0.6 to 0.8)	(−0.5 to 0.9)
lateral patellar extremity	3.7	3.8	4.0	3.9	4.5	4.4	0.3	0.1	0.8	0.6	0.2	0.1
	(1.3)	(1.2)	(1.3)	(1.2)	(1.5)	(0.9)	(1.0)	(1.0)	(1.2)	(1.1)	(−0.3 to 0.6)	(−0.4 to 0.6)
medial patellar extremity	3.8	3.6	3.6	3.7	4.2	4.0	−0.2	0.1	0.4	0.5	−0.3	−0.1
	(1.3)	(1.4)	(1.3)	(1.0)	(1.2)	(0.8)	(1.0)	(1.0)	(1.3)	(1.4)	(−0.7 to 0.2)	(−0.7 to 0.5)
lateral knee region	2.9	2.9	3.0	3.0	3.0	2.8	0.1	0.1	0.2	−0.1	0.0	0.3
	(1.2)	(1.1)	(1.2)	(1.3)	(0.8)	(0.9)	(0.9)	(1.2)	(1.0)	(1.2)	(−0.5 to 0.5)	(−0.2 to 0.8)
medial knee region	2.3	2.1	2.4	2.2	2.6	2.5	0.1	0.1	0.3	0.4	0.0	0.0
	(1.0)	(0.8)	(1.1)	(0.8)	(0.9)	(0.5)	(0.8)	(0.9)	(0.8)	(0.9)	(−0.4 to 0.3)	(−0.4 to 0.4)
Volumetry *(L)*	5.9	6.0	5.9	6.0	5.9	6.0	0.0	0.0	0.0	0.0	0.1	0.0
	(1.0)	(1.0)	(1.0)	(1.0)	(1.0)	(1.0)	(0.1)	(0.1)	(0.1)	(0.1)	(−0.01 to 0.1)	(−0.02 to 0.1)
Perimetry *(cm)*												
fold at the popliteal fossa	40.6	41.2	40.2	41.3	40.4	41.4	−0.3	0.1	−0.1	0.2	−0.4	−0.4
	(3.5)	(3.6)	(3.5)	(3.8)	(3.6)	(3.7)	(1.4)	(1.2)	(1.2)	(1.4)	(−1.0 to 0.2)	(−1.0 to 0.2)
superior point	44.0	44.9	43.9	44.8	44.0	44.8	−0.1	−0.1	−0.1	−0.1	−0.1	0.0
	(5.0)	(4.8)	(4.9)	(4.7)	(4.9)	(4.6)	(0.9)	(1.5)	(0.8)	(1.1)	(−0.6 to 0.5)	(−0.4 to 0.4)
inferior point	37.1	37.9	37.1	38.2	37.1	38.2	0.0	0.3	0.0	0.3	−0.3	−0.3
	(3.0)	(3.4)	(3.1)	(4.1)	(3.1)	(3.7)	(0.6)	(1.3)	(0.6)	(0.7)	(−0.8 to 0.2)	(−0.6 to 0.0)
Lysholm *(0 to 100)*	49	50	53	58	54	55	4	8	5	5	−3	1
	(16)	(19)	(17)	(19)	(18)	(17)	(11)	(13)	(12)	(12)	(−9 to 2)	(−5 to 6)
WOMAC *(0 to 96)*	48	49	37	39	40	43	−12	−9	−8	−6	−2	−3
	(15)	(19)	(16)	(19)	(16)	(17)	(13)	(13)	(10)	(8)	(−8 to 4)	(−7 to 2)

Con = control group, Exp = experimental group, Lysholm = Lysholm Knee Scoring Scale (0 = worst to 100 = best), WOMAC = Western Ontario and McMaster osteoarthritis index (0 = best to 96 = worst).

were only expected while the tape application was in place. However, it is unclear from the Kinesio Taping creators whether the possible benefits of Kinesio Taping should only be expected while the tape is on.[13] In the present study, all assessments were performed after the removal of the Kinesio Taping, ensuring that the assessor was blinded to group allocation. Also, it is believed that any effects of Kinesio Taping should endure longer than the time of application itself, otherwise the use of Kinesio Taping becomes financially non-viable, especially for more disadvantaged populations such as the one in the present study. Another important distinction between the study by Anandkumar et al[23] and the present study relates to the duration of Kinesio Taping application. Anandkumar et al[23] had Kinesio Taping applied for 30 minutes, and they reported improvements in pain and strength. When analysing the results from both studies, there could be a suggestion that shorter duration of applications (30 minutes) might have better effects than a longer application (4 days). However, this suggestion seems flawed and the physiological foundation and rationale around it are unclear.

In the present study, it was expected that the Kinesio Taping drainage technique could have an indirect influence on pain. If there was a reduction in swelling, it could improve joint mobility, decrease intra-articular pressure and offer pain relief. The Kinesio Taping creator states that micro-waves are formed immediately under the skin when applying Kinesio Taping, and the micro-waves, along with muscle activation, could facilitate the movement of the swelling in the joint towards the lymphatic vessels and consequently improve drainage.[13] A study from Aguilar-Ferrándiz et al[27] using bioelectrical impedance reported that after 4 weeks of using Kinesio Taping, post-menopausal females with mild-to-moderate chronic venous insufficiency had a decrease in extracellular liquid in the lower limb that was tested; however, the same authors, in a different study with the same population characteristics, found no difference in lower limb volume measured by limb circumference after Kinesio Taping application.[28] The conflicting results from Aguilar-Ferrandiz et al,[27,28] along with the results of the present study, suggest that the possible changes in swelling promoted by Kinesio Taping could occur only at a cellular level, having little, if any, clinical relevance.

Therefore, it seems that the lack of positive results in knee-related health status is only a consequence of the lack of positive results in pain, strength and swelling. As ageing is a natural process, older people usually face difficulties with mobility and other activities that have an impact on their daily life,[29] and knee osteoarthritis sufferers seem to experience those difficulties.

The number of dropouts at follow-up on Day 19 may be considered as a limitation of the study. As improvements were not seen at the post-treatment assessment on Day 4, it is possible that the large dropout rate for the follow-up assessment was a reflection of the lack of satisfaction experienced by participants in both groups. Thus, the follow-up results should be considered with caution due to multiple imputation of the missing data.[21] However, the impact of the loss to follow-up at Day 19 on the study results was likely to be small due to the fact that even with full follow-up, a positive result would be unlikely and poorly credible if it were to occur. In addition to this, the high proportion of participation among those screened improves the external validity of the present study.

The present study showed that a 4-day application of Kinesio Taping techniques had no significant effect on pain, muscle strength, swelling, knee-related health status, or physical function in older people with knee osteoarthritis.

What is already known on this topic: People with knee osteoarthritis may experience pain and exhibit swelling, reduced range of movement and reduced quadriceps strength. These signs and symptoms may impair balance and gait.
What this study adds: People with knee osteoarthritis did not experience any significant benefits in pain, swelling, quadriceps strength, knee function or knee-related health status from Kinesio Taping applied for four days.

Footnotes: [a]Biodex Medical System, model Multi Joint System 4, Shirley, NY, USA. [b]EMG System do Brasil, model EMG230C, São Paulo, Brazil. [c]Prodigital, model NE7304, São Paulo, Brazil. [d]SPSS Inc. Version 17.0, Chicago, IL, USA.

eAddenda: Table 3 can be found online at doi:10.1016/j.jphys.2016.05.012

Ethics approval: The Human Research Ethics Committee of Universidade do Estado de Santa Catarina approved this study (approval number CAAE: 08132212.2.0000.0118). All participants gave written informed consent before data collection began.

Competing interest: Nil.

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