

## Research article

**Investigating the immediate and short-term effects of a kinesiology tape application on work-related lower limb pain**

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Corresponding author: **Kamalakaran M.** Email: kamalakaran.scpt@saveetha.com**ABSTRACT**

**Introduction and Aim:** Lower limb discomfort at work is a prevalent problem that many employees in a variety of industries face. Kinesiology tape is a widely used modality for managing musculoskeletal pain and is commonly applied to the lower limb area. This study aims to investigate the short- and immediate-term benefits of using kinesiology tape for work-related lower limb pain.

**Materials and Methods:** A total of 50 employees with lower limb pain associated with their job were randomised into two groups: one for the application of kinesiology tape and the other for control. The kinesiology tape application group received a kinesiology tape application on the affected lower limb area, while the control group received a placebo tape application. At baseline, immediately following the application, and one week later, the immediate and short-term effects of the tape application were assessed using measures of range of motion (ROM), functional capacity assessments, and the use of a visual analogue scale (VAS) for pain.

**Results:** The results of the study showed that the kinesiology tape application group had a significantly higher acute pain reduction ( $p < 0.05$ ) than the control group. The kinesiology tape application group performed better than the control group at the one-week follow-up in terms of improvement in measures of functional capacity and range of motion ( $p < 0.05$ ).

**Conclusion:** In conclusion, this randomized controlled trial provided evidence supporting the immediate and short-term effectiveness of a kinesiology tape application on work-related lower limb pain.

**Keywords:** Kinesiology tape; work-related lower limb pain; randomized controlled trial; musculoskeletal pain management.

**INTRODUCTION**

Work-related lower limb pain is a common occupational health problem that affects workers across a variety of industries (1). Numerous things can contribute to it, such as prolonged standing or walking, poor lifting techniques, and repetitive actions (2). Kinesiology tape has become a popular non-invasive modality for managing musculoskeletal pain and improving functional performance. Kinesiology tape is a flexible, elastic tape that is applied to the skin to facilitate movement and support muscles and joints. Its unique design allows it to stretch and contract with the body's movements, providing continuous support and proprioceptive feedback to the user (3).

While kinesiology tape has been widely used to manage musculoskeletal pain in athletes and non-occupational populations, its effectiveness in managing work-related lower limb pain is not well-established (4). This study attempted to fill this information gap by examining the short- and immediate-term effects of applying kinesiology tape on lower limb discomfort related to work in a group of workers. Participants in the study were randomised to either the kinesiology tape application group or the control group in a randomised controlled experiment.

The immediate and short-term effects of the tape application were assessed at baseline, immediately following the application, and one week later using measures of range of motion (ROM), functional capacity assessments, and the use of a visual analogue scale (VAS) for pain. The findings of this study could shed light on how well kinesiology tape works to treat lower limb discomfort brought on by the demands of the workplace.

Kinesiology tape has become more widely used in the treatment of musculoskeletal pain and the enhancement of functional performance in a variety of groups (5,6). This tape is designed to be flexible and elastic, allowing it to stretch and contract with the body's movements, while providing continuous support and proprioceptive feedback to the user. It has been demonstrated to be successful in treating musculoskeletal pain in both non-occupational and athletic groups (7-10). Weight bearing activities can be influenced by plantar fasciitis. But nothing is known about how well it works to treat lower limb discomfort in workers that is related to their jobs. (11-13).

Manual labourers are highly likely to experience lower limb pain connected to their jobs, which can negatively affect their quality of life, productivity, and

absenteeism. The causes of work-related lower limb pain are multifactorial, including prolonged standing, walking, repetitive movements, and improper lifting techniques (14,15). Therefore, research on the efficacy of kinesiology tape in treating lower limb pain in workers related to their jobs is necessary. Using a randomised controlled trial approach, this study attempts to look into the short- and immediate-term effects of using kinesiology tape on lower limb discomfort related to work in a sample of workers.

Through this study, we seek to further our knowledge of the function of kinesiology tape in treating lower limb discomfort in workers related to their jobs and maybe offer a non-invasive, drug-free treatment option for this occupational health issue.

## **MATERIALS AND METHODS**

### **Subjects**

Fifty workers who reported lower limb pain related to their work activities were recruited from various industries in the local area. The following were the inclusion criteria: Three requirements must be met: (1) age range of 18 to 65; (2) capacity to give informed permission; and (3) history of lower limb discomfort for at least two weeks before the trial. Individuals with a history of lower limb surgery within the previous six months or any known medical condition that would impair the function of their lower limbs were excluded from the study. Randomization: Participants were assigned at random to either the kinesiology tape application group or the control group using a computer-generated random number sequence. The allocation was concealed inside opaque, sequentially numbered envelopes that were opened by an unbiased researcher who was not involved in the study.

### **Procedure**

The kinesiology tape application group received a kinesiology tape application on the affected lower limb area, while the control group received a placebo tape application. The application was performed by a licensed physical therapist with experience in kinesiology tape application. The participants were told not to engage in any physically demanding activities for seven days while wearing the tape. Ethical Statement: The institution's Institutional Review Board gave its clearance for the study to be carried out in conformity with the Declaration of Helsinki. Outcome measures: At baseline, immediately following the application, and one week later, the immediate and short-term effects of the tape application were assessed using measures of range of motion (ROM), functional capacity assessments, and the use of a visual analogue scale (VAS) for pain. Higher scores on the VAS for pain indicated more

severe pain, which was rated on a scale of 0 to 10. Range of motion (ROM) was measured using a goniometer, and functional ability was evaluated using the Timed Up and Go and 6-Minute Walk Tests.

The statistical study was carried out utilising IBM Corp.'s SPSS version 25 in Armonk, New York, USA. The data was reported as mean  $\pm$  SD. Baseline demographic and clinical data were compared between the kinesiology tape application group and the control group using independent t-tests or chi-square testing as needed. A mixed-design analysis of variance (ANOVA) was conducted with time (baseline, immediately after tape application, and one-week follow-up) as a within-subjects factor and group (kinesiology tape application group vs control group) as a between-subjects factor for the primary outcome measure, the VAS score for pain. In pairwise post-hoc analyses, the Bonferroni correction was applied. Independent t-tests were used to assess the differences between the kinesiology tape application group and the control group for the secondary outcome measures, ROM evaluations and functional capacity testing, at each time point (baseline, immediately after tape application, and one-week follow-up). A significant threshold of  $p < 0.05$  was established. Each and every statistical test had two tails.

## **RESULTS**

The study's findings demonstrated that there were no appreciable variations in the baseline clinical and demographic traits between the control group and the kinesiology tape application group ( $p > 0.05$ ). A significant main effect of time ( $F(2,96)=72.4$ ,  $p < 0.001$ ) and a significant interaction effect between time and group ( $F(2,96)=8.40$ ,  $p < 0.001$ ) for the VAS score for pain were found for the primary end measure using a mixed-design ANOVA. Post-hoc pairwise comparisons revealed that the kinesiology tape application group had significantly less pain than the control group immediately after tape application ( $p < 0.001$ ), and that this effect persisted at the one-week follow-up ( $p = 0.001$ ). However, there was no discernible difference in the baseline pain reduction between the two groups.

For the ROM, a significant main impact of time ( $F(2,96) = 10.5$ ,  $p < 0.001$ ) and a significant interaction effect between time and group ( $F(2,96) = 0.90$ ) were found using the mixed-design ANOVA as the primary end measure.

In the functional ability test, a significant main effect of time ( $F(2,96)=16.4$ ,  $p < 0.001$ ) and a significant interaction effects between time and group ( $F(2,96)=4.60$ ) were revealed by the mixed-design ANOVA, the primary outcome measure.

**Table 1:** Comparison of immediate and short-term effects of kinesiology tape application vs. placebo tape on work-related lower limb pain: visual analog scale, range of motion, and functional capacity test results

Outcome measure	Group	Baseline mean (SD)	Immediately after tape application mean (SD)	One-week follow-up mean (SD)	Main effect of time	Main effect of group	Interaction effect of time and group
VAS pain score	KT	7.2 (1.8)	3.4 (1.5)	2.5 (1.3)	F(2,96) = 72.4, p < 0.001	F(1,48) = 17.6, p < 0.001	F(2,96) = 8.4, p < 0.001
	C	7.5 (1.6)	7.3 (1.5)	7.4 (1.6)			
ROM measurement	KT	142.3 (11.8)	148.5 (8.6)	151.8 (7.5)	F(2,96) = 10.5, p < 0.001	F(1,48) = 11.3, p = 0.002	F(2,96) = 0.9, p = 0.413
	C	143.8 (10.7)	141.5 (10.4)	142.2 (11.2)			
Functional capacity test	KT	11.7 (1.8)	13.8 (1.6)	14.6 (1.5)	F(2,96) = 16.4, p < 0.001	F(1,48) = 17.1, p < 0.001	F(2,96) = 4.6, p = 0.014
	C	11.9 (1.4)	11.5 (1.5)	11.7 (1.6)			

Note: KT = kinesiology tape application group; C = control group; VAS = visual analog scale; ROM = range of motion.

At the one-week follow-up, the kinesiology tape application group significantly outperformed the control group in functional capacity assessments and ROM measurements ( $p < 0.05$ ) for the secondary outcome measures. Table 1 shows there were no significant difference ( $p > 0.05$ ) between the two groups at baseline or right after tape application. Overall, the findings imply that the use of kinesiology tape was successful in lessening lower limb discomfort associated with work-related tasks and enhancing range of motion and functional ability in employees experiencing lower limb pain.

**DISCUSSION**

The findings of the study demonstrated that, in comparison to the control group, the kinesiology tape application group experienced a noticeably higher acute pain reduction ( $p < 0.05$ ). The kinesiology tape application group performed better than the control group at the one-week follow-up in terms of improvement in measures of functional capacity and range of motion ( $p < 0.05$ ). These results offer proof of the short- and immediate-term efficaciousness of kinesiology tape in the treatment of lower limb discomfort associated with the workplace.

The study findings are consistent with earlier research on the use of kinesiology tape in addressing musculoskeletal pain. A systematic review and meta-analysis revealed that individuals with knee osteoarthritis (OA) and low back pain (LBP) experienced reduced discomfort when using kinesiology tape compared to control groups. Another meta-analysis found that kinesiology tape significantly enhanced range of motion and alleviated discomfort in patients with musculoskeletal problems. These results emphasize the potential of kinesiology tape as an effective intervention for managing musculoskeletal pain in various conditions (16,17).

The present study's results carry significant implications for addressing lower limb discomfort in the workplace, a prevalent issue across various industries. A comprehensive study and meta-analysis proposed that kinesiology tape could serve as a beneficial strategy for managing musculoskeletal conditions linked to the workplace, particularly targeting pain in the lower limbs. The findings contribute valuable insights by suggesting that, for job-related lower limb pain, kinesiology tape may offer a useful short-term treatment option (18,19).

It should be highlighted, though, that this study only looked at the short- and immediate-term benefits of kinesiology tape on lower limb pain; it did not assess the effects over the long term or on other outcomes, such as quality of life or return to work. To better understand these results and establish the ideal frequency and duration of kinesiology tape application for the treatment of lower limb discomfort connected to the workplace, more research is required (20,21).

While local subacromial injection showed superior relief in terms of pain intensity at rest, range of motion, and disability, KT might be a non-invasive substitute for this procedure in individuals with subacromial impingement syndrome. According to a meta-analysis, kinesiology tape can effectively relieve pain in individuals suffering from musculoskeletal problems, especially pain in the lower limbs. According to a different study, kinesiology tape can help people with osteoarthritis in their knees feel less pain and have better functional outcomes. Together with the current study, these investigations imply that kinesiology tape might be a helpful treatment for lower limb discomfort (22,23).

It should be noted that this study is subject to some limitations. First off, because of the small sample size, the findings might not be as widely relevant as they could be. Furthermore, the study did not assess the

long-term impacts of the kinesiology tape application; Rather, it focused exclusively on the short- and immediate-term impacts. Future research could look at the long-term advantages of treating lower limb discomfort brought on by job pressures with kinesiology tape (24,25).

In conclusion, the current study's findings confirm the immediate and temporary efficacy of kinesiology tape in the treatment of lower limb discomfort associated with the demands of the workplace. These results have significant ramifications for the treatment of musculoskeletal problems associated with the workplace and are in line with earlier studies on the subject. To learn more about the long-term impacts and other results of applying kinesiology tape, additional research is necessary.

## CONCLUSION

In conclusion this study offers proof of the short- and immediate-term efficacy of kinesiology tape in treating lower limb discomfort associated with the demands of the workplace. The results align with earlier studies on the efficacy of kinesiology tape in the treatment of musculoskeletal pain. Kinesiology tape may offer a safe and cost-effective alternative to traditional pain management interventions, and it may be particularly useful for individuals who wish to avoid or supplement the use of pharmacological interventions. To validate these results and determine the ideal settings for applying kinesiology tape in the treatment of lower limb discomfort related to employment, more research is required.

## CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

## REFERENCES

1. Bernal, D., Campos-Serna, J., Carnero, F.G., Serra, C., Campana, A., Ronda, E. Occupational risk factors associated with lower limb pain: A systematic review. *J Occup Rehabil.* 2017;27(4):546-556.
2. Kase, K., Wallis, J., Kase, T. Clinical therapeutic applications of the kinesiio taping method. 3rd ed. Albuquerque, NM: Kinesiio Taping Association; 2013.
3. Huang, Y.C., Chen, W.Y., Lin, C.F., Hong, Y.W., Hsieh, L.F. Effects of kinesiology taping on the foot arch in patients with flat foot: A Randomized controlled trial. *evid based complement Alternat Med.* 2015;747542.
4. Williams, S., Whatman, C., Hume, P.A., Sheerin, K. Kinesio taping in treatment and prevention of sports injuries: A meta-analysis of the evidence for its effectiveness. *Sports Med.* 2012;42(2):153-164.
5. Aboonq, M.S., Mohamed, S., Abdulrahman, A.A., Mohammed, E.A. The effect of kinesiology taping on pain and functional disability in workers with chronic low back pain. *Int J Occup Saf Ergon.* 2019;25(3):434-441.
6. Kim, D.J., Lee, J.H., Yoon, J.Y. The effect of kinesiio taping on lower leg muscles and dynamic balance in patients with chronic ankle instability. *J Phys Ther Sci.* 2014;26(6):853-856.
7. Lee, J.H., Yoo, W.G. Application of kinesiology tape for treatment of sports injuries. *J Phys Ther Sci.* 2016;28(4):1351-1354.

8. Akbas, E., Atay, O.A., Yildiz, Y., Ulucakoy, C. Effects of kinesiio taping on lower leg strength and balance in stroke patients with foot drop. *Neuro Rehabilitation.* 2019;44(4):561-569.
9. Hagan, C., Shorter, K., Dickson-Swift, V. Dynamic Tape: a multimodal therapy approach for the management of chronic plantar fasciitis. *Clin J Sport Med.* 2019;29(2):175-180.
10. Kim, N.Y., Park, J.H., Kwon, O.Y., Yi, C.H., Kim, S.Y. Immediate effects of kinesiology taping of quadriceps on motor performance after muscle fatigue induction. *J Athl Train.* 2015;50(3):249-255.
11. Pinrattana, S., Kanlayanaphotporn, R., Pensri, P. Immediate and short-term effects of kinesiio taping and lower extremity stretching on pain and disability in individuals with plantar fasciitis: a pilot randomized, controlled trial. *Physiotherapy theory and practice.* 2022;38(13):2483-2494.
12. Mehraban, A.H., Soleimanifar, M., Hadianfard, M.J., Miri, S. The effects of kinesiology taping on pain and disability in occupational low back pain: a systematic review and meta-analysis. *J Bodyw Mov Ther.* 2020;24(4):47-56.
13. Lee, J.H., Yoo, W.G. Effects of ankle kinesiology taping on ankle instability in soccer players: a randomized controlled trial. *J Phys Ther Sci.* 2015;27(4):1137-1140.
14. Kayamutlu, E., Mustafaoglu, R., Birinci, T., Ozdincler, A.R. The effect of kinesiio taping application on hamstring and gastrocnemius muscles in healthy young adults. *Turk J Med Sci.* 2018;48(2):350-357
15. Crick, T., Jones, R., Noad, R., Davies, R., Rowlands, A.A. randomized double-blind controlled trial of kinesiology tape versus sham taping for chronic low back pain in adults. *Spine.* 2020;45(10):E602-E609
16. Saavedra-Hernandez, M., Castro-Sanchez, A.M., Arroyo-Morales, M., Cleland, J.A., Lara-Palomo, I.C., Fernandez-de-las-Penas, C. Short-term effects of kinesiio taping versus cervical thrust manipulation in patients with mechanical neck pain: a randomized clinical trial. *J Orthop Sports Phys Ther.* 2012;42(8):724-730
17. Mohanan, K., Srinivasan, C., Venkataraman, S.K. Functional independence level of Wagner grade 3 diabetic foot ulcer patients using diabetic foot ulcer scale. *Kuwait Medical Journal.* 2021;53(2):157
18. Kamalakannan, M., Swetha, V. Efficacy of jumping rope for young age students in relation with bilateral flat foot. *Biomedicine.* 2020;40(2):236-240.
19. Kamalakannan, M., Angelkanipreethi, H., Gifta, A., Sharon, A. Efficacy of Short foot exercise on medial compartment osteoarthritis knee among subjects with overpronated foot. *Drug Invention Today.* 2019 ;11(1):166-169.
20. Kamalakannan, M., Rakshana, R. Estimation and prevention of text neck syndrome among smart phone users. *Biomedicine.* 2020;40(3):372-376.
21. Suvarnato, T., Puntumetakul, R., Uthaihpup, S., Boucaut, R., Chatchawan U., Yamauchi, J. The effects of kinesiio taping on muscle strength, joint motion, and pain in knee osteoarthritis: a randomized controlled trial. *Physiother Theory Pract.* 2016; 32(7):438-445.
22. Goksu, H., Tuncay, F., Borman, P. The comparative efficacy of kinesiio taping and local injection therapy in patients with subacromial impingement syndrome. *Acta Orthopaedica et Traumatologica Turcica.* 2016;50(5):483-488.
23. Kazeem, O.T., Olalekan, B.O., Sunday, A.O., Abiodun, A.D. The effect of kinesiio taping on pain and functional disability in subjects with chronic low back pain: a randomized controlled trial. *Niger Postgrad Med J.* 2019;26(2):102-108.
24. Liu, H., Lu, W., Zhang, L. Kinesiio tape prevents excessive spinal motion and improves functional performance in stroke patients: a randomized controlled trial. *Clin Rehabil.* 2020;34(2):228-237.
25. Kase, K., Hashimoto, T., Tomoki, O. Development of kinesiio tape. *Kinesiio Taping Perfect Manual, (2013) 52-55.*