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The Effect of Kinesio Taping on Carpal Tunnel Syndrome in Informal Sector Workers

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ABSTRACT

Introduction: CTS is a musculoskeletal disorder caused by compression of the median nerve, commonly occurring in informal sector workers, particularly those engaged in repetitive wrist movements, which can lead to reduced hand function and work productivity. This study aims to determine the relationship between occupational risk factors and pain with the Boston Carpal Tunnel Questionnaire (BCTQ) score in informal sector workers with CTS after kinesiotaping. **Methods:** This study used a quasi-experimental design. Respondents were informal sector workers with CTS symptoms who met the inclusion criteria. The BCTQ score was used as a measure of hand function and CTS symptoms. Statistical analysis used Spearman's correlation test and linear regression. **Results:** Spearman's correlation analysis showed that age had a weak and insignificant negative correlation with BCTQ scores (sig. 0.170; R = -0.234). Repetitive movements showed a moderate and significant negative correlation (sig. 0.020; R = -0.385). Meanwhile, night pain and daytime pain showed a very strong and significant correlation with BCTQ scores (sig. 0.000; R = 0.928). The results of the linear regression test supported these findings, in which age (sig. 0.705) and repetitive movements (sig. 0.894) had no significant effect on BCTQ scores, while night pain and daytime pain showed a significant effect on increasing BCTQ scores. **Conclusion:** Kinesiotaping is effective in reducing BCTQ scores in patients with carpal tunnel syndrome (CTS), particularly through the reduction of pain, both night pain and activity pain.

***Keywords**: BCTQ, Carpal Tunnel Syndrome, Kinesiotaping, Pain, Informal Workers*

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INTRODUCTION

CTS is a syndrome caused by compression of the median nerve in the wrist when it is in the limited space of the osteofibrous canal, also known as the carpal tunnel (Anggraini & Astari, 2021). The carpal tunnel consists of the transverse carpal ligament, median nerve, digital flexor tendons, and wrist bones (Malakootian et al., 2023).

CTS is a work-related musculoskeletal disorder that often causes pain, tingling, and decreased hand function, and has the potential to reduce work productivity. Occupational factors such as repetitive activities, excessive use of hand strength, and non-ergonomic work postures have been shown to increase the risk of CTS (Ticoalu et al., 2025). In Indonesia, the prevalence of CTS caused by occupational factors is not yet fully known, but research indicates between 5.6% and 15% in high-risk occupations, and this condition is often found in workers in the industrial sector, with a prevalence of around 5-21% among workers (Komalasari et al., 2023). This condition is of particular concern for workers in the informal sector, who, according to several local studies, have high exposure to CTS, but often have limited access to ergonomic education (Putra et al., 2024).

Rapid developments in the millennium era have affected various employment sectors, including the informal sector, which involves repetitive work patterns such as laundry, online motorcycle taxi drivers, traders, garment workers, and others. These repetitive work patterns

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increase the risk of musculoskeletal disorders, making the application of ergonomic principles important in various fields of work (Sari et al., 2017). Repetitive wrist movements, excessive grip strength, and non-ergonomic work postures are factors directly associated with an increased risk of Carpal Tunnel Syndrome (CTS). Therefore, workers in the informal sector are a group at risk of developing CTS (Simargolang & Nasution, 2018).

The population that needs attention is workers in the informal sector who are at risk of developing CTS due to repetitive movements, lifting excessive loads, and poor ergonomic work postures (Bicha et al., 2024). This is in contrast to workers in the formal sector, who generally have adequate access to occupational health facilities and ergonomic education. Several studies in Indonesia have even reported high CTS prevalence in this group, such as 68.8% among batik workers and 79.2% among garment workers. These conditions indicate that CTS is a significant occupational health issue in the informal sector, although some data are still subjective and have not been fully confirmed through clinical diagnosis (Khomairoh & Widajati, 2020).

Previous research in Indonesia has focused more on clinical populations or formal sector workers, so evidence regarding the management of CTS in non-formal sector workers with repetitive workloads is still limited (Sujadi, 2022). Although conservative interventions such as kinesiotaping have shown benefits in reducing pain and improving hand function in CTS patients, the effectiveness of kinesiotaping specifically in the informal worker population with high ergonomic risks has not been optimally studied (Chen et al., 2024).

Kinesio taping is a therapeutic method primarily used to reduce pain in musculoskeletal conditions, typically combined with other primary therapies. This taping technique has demonstrated positive effects on pain reduction through improved blood and lymphatic circulation, as well as enhanced range of motion, strength, proprioception, and joint functionality (Wu et al., 2015). Most studies highlight kinesio taping as an additional technique that provides benefits, particularly in reducing pain intensity, albeit only in the short term (Tomás-Escolar et al., 2023). Therefore, it is important to study the specific effects of kinesio taping on various musculoskeletal conditions. Several clinical studies on the potential benefits of kinesio taping for treating symptoms of median nerve conditions have been conducted.

The positive effects of kinesiotaping can include pain reduction, increased muscle strength, joint stability support, and improved postural stability (Mao et al., 2021). Several negative effects may also occur, such as inconsistent effectiveness, skin irritation, psychological dependence, and lack of application standards (Cheatham et al., 2021).

The purpose of this study is to determine whether kinesio taping has an effect on carpal tunnel syndrome in informal sector workers. Pain radiating to the wrist can cause productivity issues that may lead to a decline in work capacity. Based on the aspects discussed, the researcher is interested in examining the effect of kinesio taping on carpal tunnel syndrome in workers.

METHOD

This study used an experimental design with a quasi-experiment and purposive sampling technique. The quasi-experiment was intended to test the hypothesis or evaluate the effect of the independent variable on the dependent variable, which was carried out on workers in the area around Gonilan Village with a total of 36 respondents. This study recruited respondents based on inclusion criteria, such as informal sector workers who experienced pain, tingling, and functional decline in the palm of the hand, and exclusion criteria, such as open wounds in the wrist area and allergies to kinesio taping.

RESULTS

Table 1. Analysis of Respondent Characteristics

	Variable	Frequency	Percentage
Age	17-27 years	34	94
	28-35 years old	2	6
Gender	Male	31	86
	Female	5	14

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Based on Table 1, which shows the distribution of subjects by age, there were 34 subjects aged 17-27 years and 2 subjects aged 28-35 years. There were 31 male subjects and 5 female subjects.

Table 2. Normality Data Test

Normality Test of BCTQ Scores Against Variables	Sig
Age	0.000
Interpretation of Repetitive Movements	0
Interpretation of Night Pain	0
Interpretation of daytime pain	0.000
Δ BCTQ	0.000

From the data Table 2, the normality test used the Shapiro-Wilk test because the number of data points was less than 50, and the results of the variable age, interpretation of repetitive movements, night-time pain, daytime pain, and Δ BCTQ had a sig value of 0.000 where p<0.05, so the data was not normally distributed.

Table 3. Correlation Test

Spearman's Correlation Test BCTQ Score	Sig. (2-tailed)	R
Age	0.170	-0.234
Interpretation of Repetitive Movements	0.020	-0.385
Night-time Awakening Pain	0.000	0.928
Daytime pain	0.000	0.928
Effectiveness Test of Intervention with Wilcoxon		
Z	-3.276	
Asymp. Sig. (2-tailed)	0.001	

From the data Tabel 3, the correlation between age and BCTQ scores was calculated using Spearman's correlation because the data was not normally distributed, with a sig value of 0.170 and R = -0.234, indicating a weak and insignificant negative correlation. For the correlation between the repetitive movement variable and the BCTQ score, Spearman's correlation was used because the data was not normally distributed, with a significance value of 0.020 and R = -0.385, indicating a moderate and significant negative correlation. For the correlation between the variable of night pain and the BCTQ score and the variable of daytime pain and the BCTQ score, Spearman's correlation was used because the data were not normally distributed, with both having a sig. of 0.000 and R = 0.928, indicating a very strong and highly significant correlation.

The table interpreting the results of the intervention effectiveness test using Wilcoxon shows that the Wilcoxon Signed-Rank Test was used to assess changes in BCTQ scores before and after the application of kinesiotaping intervention. The analysis results showed a Z value of –3.276 with a significance value of p = 0.001. A p-value below the significance threshold of 0.05 indicates a significant difference between the pre- and post-intervention BCTQ scores. A negative Z value indicates a decrease in scores after the intervention, which shows an improvement in symptoms among participants. These findings indicate that kinesiotaping is effective in reducing BCTQ scores in informal sector workers with Carpal Tunnel Syndrome.

DISCUSSION

The Relationship Between Kinesiotaping Administration and Age

The results of the Spearman correlation test showed that age had no significant correlation with BCTQ scores (p = 0.170; r = -0.234). This means that the severity of symptoms was not influenced by the age of the respondents. This is in line with previous studies that found no significant differences in symptom intensity based on age groups in CTS patients. Although some studies indicate increased severity in elderly patients, this does not always correlate with the symptoms experienced, and the relationship between age and symptoms in CTS is inconsistent (Ferhan et al., 2014).

The Relationship Between Kinesiotaping Administration and BCTQ Scores as Seen from the Interpretation of Repetitive Movements

The Spearman correlation test showed a significant negative correlation with the BCTQ score (p = 0.020; r = –0.385). This correlation indicates that the more frequently respondents

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perform repetitive activities, the higher the level of complaints they experience. Kinesiotaping theoretically works by increasing subcutaneous space, reducing pressure on soft tissues, improving blood and lymphatic flow, and modulating sensory input through the *gate control* mechanism. These mechanisms have the potential to reduce pain, including night pain that often disturbs sleep in CTS sufferers. Several studies have shown that the application of kinesiotaping can reduce pain intensity and improve CTS symptoms, including reducing the frequency of sleep disturbances (Artioli & Bertolini, 2014). In line with previous research findings, repetitive movement activities have been shown to be significantly associated with an increase in the incidence and complaints of CTS. Research indicates that workers with higher frequencies of repetitive movements have a greater risk of CTS complaints (Aswin et al., 2022). This finding is also supported by others who report a relationship between the intensity of pressing and repetitive movements and the occurrence of CTS in informal sector workers. Repetitive activities are consistently reported to increase intra-canal pressure, thereby exacerbating sensory and functional symptoms (Nurullita et al., 2023).

The Relationship Between Kinesiotaping Application and BCTQ Scores and Night and Day Pain

Test results showed that night-time pain and daytime pain had a very strong and significant positive correlation with BCTQ scores ($p = 0.000$; $r = 0.928$, respectively). This very high correlation indicates that pain intensity, both at night and during the day, is a clinically significant indicator of symptom exacerbation and disability in CTS. This is consistent with studies where CTS patients often report significant sleep disturbances, including waking up at night due to pain or numbness in the hands, as well as poorer sleep quality compared to the control population (Patel et al., 2012). Sleep disturbances, including short sleep duration, difficulty falling asleep, and frequent night-time awakenings, were found to be significantly correlated with increased symptom severity and functional impairment in CTS. CTS patients reporting *night-time awakening* (NTA) symptoms showed improved BCTQ scores after release procedures, indicating that night-time symptoms are an important aspect in the clinical evaluation of CTS (Khomairoh & Widajati, 2020).

Effectiveness of Kinesiotaping Intervention on BCTQ Scores Using the Wilcoxon Test

In the analysis of intervention effectiveness using the Wilcoxon test, a Z value of –3.276 with $p = 0.001$ was obtained, indicating a significant difference between BCTQ scores before and after the intervention**.** Another study showed that the application of kinesio taping significantly reduced BCTQ scores and improved symptoms and function in CTS patients (Sahin & Kara, 2025). In another study, the group that received kinesio taping showed significant improvement in BCTQ function and symptom scores (de Sire et al., 2022).

CONCLUSION

Based on the results of the analysis and discussion of the study, it can be concluded that kinesiotaping has a significant effect on improving the symptoms of Carpal Tunnel Syndrome (CTS) in informal sector workers. Age does not show a significant relationship with the severity of CTS symptoms, so age is not a major determinant of sensory or functional complaints in this population. Repetitive movement activities were found to have a significant negative relationship with BCTQ scores, indicating that the higher the frequency of repetitive activities, the more severe the CTS complaints experienced. Pain intensity at night and during the day showed a very strong positive correlation with BCTQ scores, confirming that pain is an important indicator in determining the severity of symptoms and disability in CTS.

Effectiveness analysis using the Wilcoxon test showed a significant decrease in BCTQ scores after kinesiotaping intervention, indicating that this modality is effective in reducing CTS symptoms and improving hand function. These findings are consistent with previous studies reporting that kinesiotaping can reduce pain, improve clinical symptoms, and enhance daily function through mechanisms such as increasing

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subcutaneous space, reducing tissue pressure, and modulating sensory perception.

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