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Effectiveness Of Using Elastic Wrist Splints on The Productivity of Cigarette Rollers with Wrist Pain at Gama Cigarette Company, Karanganyar

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ABSTRACT

Human resources are a crucial factor in increasing work productivity, especially in companies that still employ manual labor, such as cigarette rolling. Prolonged repetitive wrist activities can lead to musculoskeletal pain, which can reduce productivity. The use of elastic wrist splints aims to reduce pain and improve performance. This study aimed to determine the effectiveness of elastic wrist splints on the productivity of cigarette rollers experiencing wrist pain at the Gama Cigarette Company in Karanganyar. This study used a quasi-experimental method with a one-group pre-test and post-test design. A sample of 25 respondents was selected using purposive sampling. Productivity was measured based on daily production volume, with a minimum standard of 4,500 cigarettes per day. The intervention, which involved the use of elastic wrist splints, was administered for two weeks. The results showed an increase in productivity after using elastic wrist splints, with an average score increasing from 2.12 to 3.12. A Wilcoxon test showed a p-value of 0.000 ($p \leq 0.05$), indicating a significant difference between before and after the intervention. The conclusion of this study is that the use of elastic wrist splints is an effective non-pharmacological intervention for increasing the productivity of cigarette rollers experiencing wrist pain. The reduction in pain contributes to improved work performance, enabling the achievement of production targets and even exceeding the company's minimum production standards.

Keywords: elastic wrist splints, productivity, wrist pain, cigarette rollers

ABSTRAK

Sumber daya manusia merupakan faktor penting dalam meningkatkan produktivitas kerja, terutama pada perusahaan yang masih menggunakan tenaga manual seperti pelinting rokok. Aktivitas berulang dalam waktu lama pada pergelangan tangan berisiko menimbulkan nyeri muskuloskeletal yang dapat menurunkan produktivitas. Penggunaan elastic wrist splint menjadi upaya untuk mengurangi nyeri sekaligus meningkatkan kinerja. Penelitian ini bertujuan untuk mengetahui efektivitas penggunaan elastic wrist splint terhadap produktivitas pelinting rokok yang mengalami nyeri pergelangan tangan di Perusahaan Rokok Gama Karanganyar. Penelitian ini menggunakan metode quasi experiment dengan desain one group pre-test and post-test. Sampel penelitian berjumlah 25 responden dipilih menggunakan teknik purposive sampling. Pengukuran produktivitas dilakukan berdasarkan jumlah produksi harian dengan standar minimal 4500 batang per hari. Intervensi berupa penggunaan elastic wrist splint diberikan selama 2 minggu. Hasil penelitian menunjukkan adanya peningkatan produktivitas setelah penggunaan elastic wrist splint dengan nilai rata-rata dari 2,12 menjadi 3,12. Uji Wilcoxon menunjukkan nilai $p = 0,000$ ($p \leq 0,05$) yang berarti terdapat perbedaan signifikan antara sebelum dan sesudah intervensi. Kesimpulan penelitian ini adalah penggunaan elastic wrist splint efektif dalam meningkatkan produktivitas pelinting rokok yang mengalami nyeri pergelangan tangan sebagai intervensi non-farmakologis. Penurunan nyeri berkontribusi terhadap peningkatan kemampuan kerja sehingga target produksi dapat tercapai bahkan melampaui standar minimal produksi perusahaan.

Kata kunci: elastic wrist splint, produktivitas, nyeri pergelangan tangan, pelinting rokok

INTRODUCTION

In a company, human resources are a key factor in achieving corporate success. The quality of a company's production is not only determined by the skills and knowledge of its workforce but is also influenced by the physical and mental health of its workers. In the industrial sector—particularly in industries that still rely on manual labor—the physical condition of workers plays a crucial role in maintaining productivity (Nazir, A., 2019). The cigarette industry in Indonesia still heavily relies on manual production systems, especially in the cigarette rolling process. This activity is performed repetitively at high intensity to meet daily production targets. Repetitive movements in the cigarette rolling process—such as continuous flexion and extension of the wrists and fingers over extended periods—have the potential to cause musculoskeletal disorders (Priyanto, R. A., Ma'rufi, I., & Hartanti, R. I., 2020). Work activities involving the same movements performed over a long period without adequate rest can increase the risk of pain, particularly in the wrists.

Wrist pain is pain caused by repetitive strain on muscles, tendons, and nerves—particularly in the carpal tunnel area—which can trigger inflammation and impair the function of the median nerve (Sujadi, D. (2022)). Common symptoms include pain, tingling, numbness, and decreased hand strength. If not treated promptly, this condition can develop into a musculoskeletal disorder that impacts workforce capabilities. Work productivity is a key indicator in the performance evaluation process, encompassing aspects of quality, quantity, and timeliness in completing tasks (Renza, A. D. & Susilowati T., 2023). Factors that can affect work productivity include the physical condition of workers experiencing wrist pain, which can reduce work efficiency, increase error rates, and hinder the achievement of production targets (Putri, C. T., 2022).

Based on preliminary observations at the Gama Karanganyar Cigarette Company, it was found that some cigarette rollers experienced wrist pain due to continuous repetitive work activities and a heavy workload. Of the total workforce, a number of workers experienced pain after rolling cigarettes for long periods of time. This condition indicates a potential decline in work productivity due to musculoskeletal disorders.

One non-pharmacological intervention that can be used to address wrist pain is the use of an elastic wrist splint. This device helps maintain a neutral wrist position, reduces pressure on the median nerve, and provides stabilization during work activities. Additionally, the use of a wrist splint is relatively safer and does not cause side effects like those associated with long-term medication use (Wulandari & Prihartono, 2016).

Previous studies have shown that the use of wrist splints is effective in reducing wrist pain levels among workers. However, research examining the relationship between the use of elastic wrist splints and increased work productivity, particularly among cigarette rollers, remains limited. Therefore, this study aims to analyze the effectiveness of using elastic wrist splints on the productivity of cigarette rollers with wrist pain at gama cigarette company, karanganyar.

METHOD

This study employed a quasi-experimental method using a one-group pretest–posttest design. This research design involved a single group of subjects without a control group, whose productivity levels were measured before (pretest) and after (posttest) the intervention—the use of an elastic wrist splint. This research method was used to determine whether there were changes in work productivity levels following the intervention.

The study was conducted at the Gama Karanganyar Cigarette Company, located at Jl. Adi Sumarmo No. 290, Colomadu District, Karanganyar Regency, from April to May 2023. The study population consisted of all 70 cigarette rollers. The research sample was determined using purposive sampling, which involves selecting subjects based on specific criteria established by the researcher. Inclusion criteria included workers experiencing wrist pain, aged 30–60 years, willing to use an elastic wrist splint for two weeks, and willing to follow all applicable research procedures. The exclusion criteria were workers who were taking pain relievers or were currently ill.

The variables in this study consist of an independent variable—the use of an elastic wrist splint—and a dependent variable—the work productivity of cigarette rollers. Work productivity was measured based on the number of cigarettes produced per day, which was then categorized according to company standards: score 1 (<4,500 cigarettes), score 2 (4,500–5,000 cigarettes), score 3 (5,000–5,500 cigarettes), score 4 (5,500–6,000 cigarettes), and score 5 (>6,000 cigarettes). The instrument used in this study was an observation sheet to record the respondents' daily production output.

The research procedure consisted of preparation and implementation stages. During the

preparation stage, research permits were obtained, explanations were provided to the respondents, and the sample was determined and informed consent was obtained. During the implementation phase, a pretest was conducted to record production levels before the intervention; respondents were then provided with an elastic wrist splint to use for two weeks, particularly during rest periods or at night after work. After the intervention period ended, a posttest was conducted to record the respondents' production levels again.

Data analysis was conducted using univariate and bivariate methods. Univariate analysis was used to describe the characteristics of the respondents and the distribution of the research variables in terms of frequency and percentage. The Shapiro-Wilk test was used to assess normality because the sample size was less than 50. If the data were normally distributed ($p \geq 0.05$), a parametric paired t-test was used; if the data were not normally distributed ($p < 0.05$), a non-parametric Wilcoxon test was used. The decision criteria were determined based on the significance level, where $p \leq 0.05$ indicated a significant effect of elastic wrist splint use on work productivity.

This study also took research ethics into account by obtaining informed consent from the respondents, maintaining data confidentiality, ensuring anonymity, and making sure that the study did not cause any adverse effects on the respondents.

RESULT

The results of this study will explain the effectiveness of elastic wrist splints on the productivity of cigarette rollers experiencing wrist pain. The results will describe the characteristics of the respondents, variables, and hypothesis testing to answer the research questions.

Table 1
Characteristics of Respondents

Characteristics of Respondents	Frequency	Percentage (%)
Age		
30-40	4	16%
41-50	10	40%
51-60	11	44%
Working Period		
15-19 years	10	40%
20-24 years	9	36%
25-30 years	6	24%
Rolling Production Levels (Pre-test)		
> 4,500	1	4%
4,500-5,000	20	80%
5,000-5,500	4	16%
5,500-6,000		
Rolling Production Levels (Post-test)		
> 4,500		
4,500-5,000	4	16%
5,000-5,500	14	56%
5,500-6,000	7	28%

Respondent characteristics based on age show that the majority of workers are in the 41–60 years age range, which is included in the productive age but has a higher risk of experiencing musculoskeletal disorders due to tissue degenerative processes as they age (Putri, C. T., 2022). Based on length of service, most respondents have a length of service of 15–24 years (76%), which indicates that long periods of work for company employees with repetitive activities have the potential to cause wrist pain (Repilda, N., Entianopa, E., & Kurniawati, E. 2022).

The results of the productivity measurement before the intervention (pretest) showed that the majority of respondents (80%) were in the production category of 4,500–5,000 cigarettes per day, which means they only reached the company's minimum target. In fact, 4% of respondents had production below the target (<4,500 cigarettes). After the intervention in the form of the use of elastic wrist splints, there was a significant increase in productivity, with 56% of respondents able to produce 5,000–5,500 cigarettes per day and 28% reaching 5,500–6,000 cigarettes per day.

Table 2
Normality Test

Variabel	N	Sig.
Pre test	25	0,000
Post test	25	0,000

The results of the normality test using Shapiro-Wilk showed that the data were not normally distributed ($p<0.05$), so the analysis was continued using the non-parametric Wilcoxon test.

Table 3
Hypothesis Test

	Mean	Sig. (2-tailed)	Koefisien Korelasi
Pre test	2,12	0,000	0,670
Poist test	3,12		

The Wilcoxon test results showed a p value of 0.000 ($p\leq0.05$), with an average productivity value increasing from 2.12 to 3.12, and a correlation coefficient of 0.670, indicating a strong and unidirectional relationship. Furthermore, there was a 47.16% increase in productivity after using elastic wrist splints.

DISCUSSION

The study results showed that the use of elastic wrist splints significantly increased the productivity of cigarette rollers experiencing wrist pain. This improvement occurred because the use of wrist splints maintained a neutral wrist position, thereby reducing pressure on the median nerve and surrounding tissues. This helped reduce pain and increase comfort while working, thus improving company performance and productivity.

Wrist pain among cigarette rollers is generally caused by repetitive movements performed continuously over a long period of time. This activity can lead to inflammation of the tendons and increased pressure on the carpal tunnel, triggering symptoms such as pain, tingling, and reduced hand function (Sujadi D., 2022). With reduced pain following the use of an elastic wrist splint, workers can perform cigarette rolling activities more effectively without being hindered by pain.

The results of this study also showed an increase in the average productivity value from 2.12 to 3.12, which means that workers were not only able to achieve minimum targets but also exceeded the company's production targets. This is in line with the theory that workers' physical condition is closely related to work productivity, where workers with good physical condition will be able to work more effectively and efficiently (Renza, A. D. & Susiloiwati T., 2023).

Furthermore, the results of this study support previous research showing that wrist splints are effective in reducing wrist pain. Research by Musarrofah (2017) also found a significant association between carpal tunnel syndrome and decreased work productivity ($p=0.027$), suggesting that interventions that reduce pain will contribute to increased productivity (Musarrofah, D., 2017).

Thus, the use of elastic wrist splints can be an effective and practical ergonomic solution in reducing musculoskeletal complaints in manual workers, especially in industries that involve repetitive movements such as rolling cigarettes.

CONCLUSION

Based on the research results, it can be concluded that the use of elastic wrist splints significantly increases the productivity of cigarette rollers experiencing wrist pain at the Gama Cigarette Company in Karanganyar. This is demonstrated by the Wilcoxon test results with a p-value of 0.000 ($p\leq0.05$), as well as an increase in average productivity from 2.12 to 3.12 and a 47.16% increase in productivity.

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