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Original research

Effect of Using Custom Foot Orthosis on Musculoskeletal Disorders Security Bank

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ABSTRACT

Backgrounds: *Musculoskeletal disorders are one aspect that can hinder productivity and work activity. According to the Riskesdas from 2018, non-ergonomic working postures are to blame for 8.3% of back pain, 36% of upper limb pain, and 63.3% of lower limb pain. Prevention and treatment of musculoskeletal disorders can be Standing on a softer surface can produce smooth muscle movements, reduce muscle tension, increase blood flow, reduce discomfort and fatigue, and help prevent and treat musculoskeletal disorders. For optimal weight distribution, an insole can serve as a supporting mat between the floor and the feet.*

Methods: *This research is quantitative with one group pretest posttest pre-experimental designs. The NBM questionnaire was completed during the pre-intervention and post-intervention tests with a custom foot orthosis for observations. This study used 30 security personnel as samples.*

Results: *The results of the Wilcoxon test, wearing a custom foot orthosis affected musculoskeletal disorders, with a significance level of 0.000 ($p < 0.05$). The value of reducing pain was 17.47 on average.*

Conclusion: *When working in a standing position for too long, using a custom foot orthosis can help distribute weight more evenly and reduce pain from musculoskeletal disorders.*

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INTRODUCTION

An unnatural posture at work can make it harder for the body to maintain a working position by maintaining static muscle contractions, which can lead to musculoskeletal disorders. A static position for an extended period puts more pressure on the muscles, which compresses the blood vessels in the muscles and lowers the amount of oxygen in the blood. The body develops anaerobic metabolism as a result of the low oxygen content, which causes a buildup of lactic acid in the muscles. Musculoskeletal disorders like pain, aches, and fatigue can be brought on by this buildup of lactic acid in the muscles (Yosineba, T. P., 2020).

Workers in the security industry face a significant risk of developing musculoskeletal disorders. Security guards are required to stand for a significant amount

of time during work hours. By always wearing formal shoes that are stiff and hard, security workers work an average of 7-8 hours per day. Utilizing an insole as a base that supports the floor and feet to optimize body weight distribution, a prosthetist orthotist can provide services. In addition, custom insoles can enhance foot biomechanics by altering sensorimotor control and reducing shear forces (Speed, G., 2018).

According to the findings of a study conducted by Siti Khadijah in 2018, the insole is capable of reducing peak pressure in four out of five areas of the worker's foot, with a pressure shrinkage percentage ranging from 6% to 28%. The researcher intends to use the findings of this study to investigate the impact of custom foot orthoses on musculoskeletal security bank complaints and to offer prosthetic orthotic services to the general public so that prosthetic orthotics can also serve the disabled community.

MATERIALS AND METHODS

This study used quantitative research with one *group pretest-posttest design*, which was to assess the user's musculoskeletal disorders using the Nordic Body Map questionnaire in relation to their custom foot orthoses. Musculoskeletal disorders were assessed prior to using the custom insole (pretest), followed by treatment or intervention, and finally after using the custom insole during working hours (posttest) to observe the changes that took place before and after treatment or intervention.

The research sample is male and female security employees at Bank BNI Surakarta, ages 20 to 40, who make up the study's sample. 30 individuals were used as samples in this study. Purposive sampling was used to select subjects based on the researcher's predetermined characteristics. In order to create a custom foot orthosis, the researcher assessed musculoskeletal disorders on 30 subjects using the Nordic Body Map questionnaire and scored the respondent's feet using a cast roll.

Each respondent received a one-month intervention consisting of a custom foot orthosis and biweekly monitoring. Comparative analysis was used in the data analysis to compare the assessments of musculoskeletal disorders performed before and after the use of a custom foot orthosis.

RESULTS

The following are the results of the characteristics of the respondents who have been studied.

Table 1. Characteristics of Respondents

Frequency	Number of Subjects	Percentage (%)
Gender		
Man	30	100
Age		
17-25	5	17
26-35	10	33
36-45	11	37
46-55	4	13

The 30 study participants were men, with an average age of 17 to 55. The study will provide the same treatment or intervention to all respondents.

Table 2. Normality Test for Musculoskeletal disorders

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	Df	Sig.	Statistics	Df	Sig.
PRE_NBM	.138	30	.148	.955	30	.227
POST_NBM	.231	30	.000	.873	30	002

Because the basis for taking the value of p> 0.05, it is possible to conclude that the distribution of the data is not normal, and the Wilcoxon test is used to test the hypothesis based on the research data.

Table 3. Wilcoxon Test for Musculoskeletal disorders

Test Statistics	
	POST_NBM - PRE_NBM
Z	-4.797b
Symp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on positive ranks.	

The Wilcoxon test revealed a significance value of 0.000 (p 0.05), indicating that musculoskeletal disorders have an impact on security both before and after wearing a custom foot orthosis. The following table displays the pretest and posttest data to determine which is superior:

Table 4. Data Analysis of Pretest and Posttest Musculoskeletal disorders

Descriptive Statistics					
	N	Minimum	Maximum	Means	std. Deviation
PRE_NBM	30	53	63	58.97	2,632
POST_NBM	30	36	48	41.43	3,559
Valid N (listwise)	30				

The respondent group's average result before treatment was 58.97, while its average result after treatment was 41.43. This demonstrates that, in comparison to before receiving treatment, the average value of musculoskeletal disorders is lower or that patients experience less pain after receiving a custom foot orthosis.

DISCUSSION

The purpose of this study is to see if custom foot orthoses have an impact on musculoskeletal disorders in security. Taking into consideration certain characteristics, such as gender, age, and duration of employment. The Nordic Body Map questionnaire was used in the pre-test to determine the prevalence of musculoskeletal disorders among the 30 participants in this study.

After that, the prosthetic orthotic team intervened by printing a custom foot orthosis for each patient's feet. Within a month, a custom foot orthosis will be used at work. The researcher will administer a posttest of the Nordic Body Map questionnaire after a month of use to assess the custom foot orthosis' effectiveness in treating musculoskeletal disorders.

Custom foot orthoses are effective in reducing musculoskeletal disorders in security guards while they are working, as evidenced by the results of the posttest, which show that there has been a decrease in the number of musculoskeletal disorders following treatment. Before receiving treatment, the average value of musculoskeletal security complaints was 58.97, and after receiving treatment, it was 41.43. According to these findings, the heaviest complaints about musculoskeletal security were in the lower extremities, where the average value of musculoskeletal security complaints was a decrease in pain of 17.47 with a significance value of 0.000 ($p < 0.05$).

This assertion is supported by research conducted by Umang Parashar in 2020, who found that total contact inserts, heel cups, arch support, metatarsal pads, and other modifications to foot orthotics had positive effects on foot pressure and lower leg dynamics. Some of the most important factors that influence foot comfort and muscle activation in the lower legs are the shoe's design, fit, and features like the toe box, heel height, and thickness of the sole. By optimally aligning the foot and improving functional balance and the function of the lower leg muscles, ergonomically designed footwear and appropriate orthotic intervention will increase comfort and prevent injury (Parashar, U., 2020).

CONCLUSION

Based on the results of the study on the effect of using a custom foot orthosis on musculoskeletal disorders in 30 security workers, 64% of security workers experience moderate to high pain in the lower extremities as a result of standing, while 36% report experiencing low pain in the upper extremities. Using the Wilcoxon test, a custom foot orthosis has an effect on musculoskeletal disorders with a significance level of 0.000 ($p < 0.05$). After receiving a custom foot orthosis for one month, the average value of musculoskeletal disorders decreased by 17.47 among security workers, according to the findings.

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