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Functional Evaluation of Lower Extremity Performance in Sewing Machine Operators: An Assessment Study

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ABSTRACT

BACKGROUND: Musculoskeletal disorders have been progressively common throughout the world. It is one of the most common work-related disorders in sewing machine operators. Sewing machine involves continuous, repetitive task like foot paddling, pressing and working in this faulty posture for a long time increases chance of developing work related musculoskeletal disorder among them. So, the aim of study is assessment of lower extremity function in sewing machine operators.
METHODS: An observational study was conducted in the sewing machine operators of Ahmedabad city. Lower Extremity Functional Scale (LEFS) questionnaire were filled from 104 sewing machine operators of both the gender between age group of 25 to 45 through online Google forms. Ethical clearance has been taken.
RESULT: The Statistical analysis of this study shows that Components No.2 (Quite a Bit of Difficulty) of LEFS had the most number of response (Mean±SD=40.38±15.74). The result of the study shows that 54.77% of sewing machine operators has difficultly in lower extremity function.
CONCLUSION: The study concluded that 54.77% of Sewing Machine Operators had Moderate to Higher Difficulty in Lower extremity function. Appropriate strategies should be designed to improve the lower extremity function of sewing machine operators like Self stretching exercises, Physical fitness training, Ergonomic advice, etc.

Keywords: Lower extremity function, Sewing machine operators.

INTRODUCTION

Disorders of the musculoskeletal system are the second leading cause of disability worldwide. Musculoskeletal disorders refer to conditions that affect the muscles, joints, ligaments, or tendons of the body. Musculoskeletal disorders are also associated with cognitive and psychosocial factors [(1)]. These reviews of epidemiological and laboratory studies have shown that specific biomechanical factors like repetition, force, and posture play a significant role in the aetiology and course of work-related musculoskeletal disorders (WRMSDs) [(2)].

High force, repetitive motion, and awkward posture are biomechanical hazards; additional risks include vibration, temperature, and contact stress; and individual risks are caused by age, body size, previous injuries and genetic predisposition. Disorders of the musculoskeletal system which also affect socioeconomic status. Individuals, their families and the community may suffer financial loss. Psychological disturbances may also result[(3)]. Sewing machine operators poor posture led to dangerous physical and mental complications as demonstrated by gait analysis and physical

activity. Awareness of these issues includes on the one hand health problems and on the other losses in money, the environment, family and community. Musculoskeletal disorders are prevalent in the shoe manufacturing industry due to the constant sewing work performed by workers which can cause permanent harm to the body if done improperly [4].

The needle and driving mechanism pose the greatest dangers to sewing machine operators. Mechanism with a long line driving the foot. Injury to the hip, knee, and especially the ankle from the long drive mechanism. It could twist the ankle and cause lateral ligament damage. The sewing machine's driving mechanism, particularly the long line mechanism that drives the foot, can also increase the risk of injury. Overuse injuries and strain on the lower extremities, particularly in the hip, knee, and ankle regions, can result from prolonged and repetitive foot pedal use. Due to the repetitive nature of the work and the prolonged use of the driving mechanism, injuries to the hip, knee, and ankle may occur. Musculoskeletal conditions like hip bursitis, knee tendinitis, and ankle sprains or ligament injuries can arise as a result of the strain placed on these joints [5,6].

88% of those who worked on sewing machines had experienced lower back pain in the previous year, according to the study. Knee torment was the second most normal issue, announced by 86% of the laborers and neck torment was the third most normal issue, revealed by 76% of the specialists. The significant prevalence of musculoskeletal pain and discomfort among sewing machine operators, particularly in the lower back, knees, and neck regions, is brought to light by these findings [7]. Therefore, the purpose of the study was to evaluate the lower extremity function of sewing machine operators.

MATERIALS & METHODS

The cross-sectional observational review was conducted among 104 sewing machine operators in Ahmedabad, Gujarat. The study was explained to all operators and they were asked to complete a self-administered questionnaire and give their consent. The inclusion and exclusion criteria were used to select each participant. Inclusion criteria were age of 25 to 45, both gender, minimum working on a sewing machine for more than six hours and willing to participate in the study. Participants with musculoskeletal disorders (such as osteoarthritis, sprains, or strains), history of surgery within the past eight to ten months, as well as adults participating in recreational activities like sports and marathons were excluded. A brief questionnaire with demographic information like age, gender, phone number, and number of working hours was completed by participants.

The Lower Extremity Functional Scale (LEFS) is a popular tool for assessing a person's functional status in their lower extremities. "Patients' initial function, on-going progress, and outcome" for a wide range of lower-extremity conditions is the goal of the Lower Extremity Functional Scale (LEFS). The LEFS is a questionnaire for self-report. The question, "Today, do you or would you have any difficulty at all with:" is answered by patients. regarding twenty distinct daily activities. It consists of a series of twenty questions about various everyday activities that call for the use of the lower limbs. On a scale from 0 to 80, the scale measures the individual's perceived difficulty performing these tasks with higher scores indicating improved function. With r=0.86, the LEFS has a high Test-retest reliability [8].

RESULT

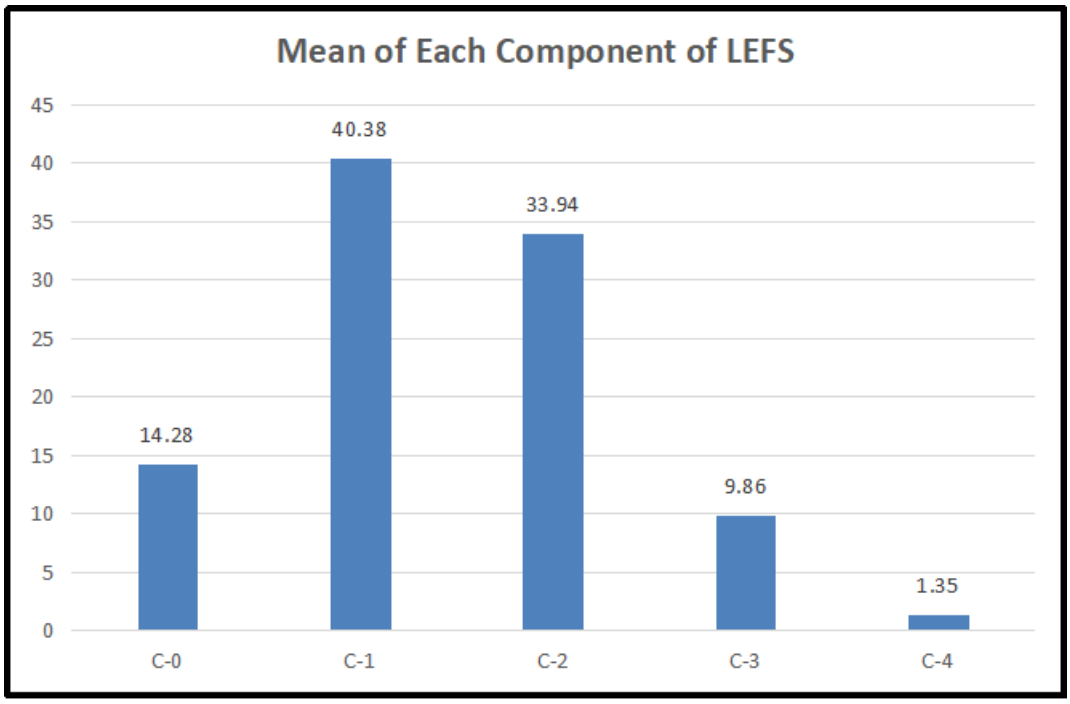
The statistical analysis was done using Microsoft Excel 2021 Software. The mean age of 104 participants was 34.80 ± 4.35 years (range 25-45 years), of which 70 (67.31%) were male. The analysis of the study reveals that among the various components of the Lower Extremity Functional Scale, Component No.2 (Quite a Bit of Difficulty) exhibited the highest

number of responses with a mean score of 42 ± 15.74.

Furthermore, the study's results indicate that 54.77% of sewing machine operators experienced difficulty in lower extremity function. This finding suggests that a significant portion of sewing machine operators in the study population faced challenges related to their lower extremities.

LEFS	C-0	C-1	C-2	C-3	C-4
Mean	14.28	40.38	33.94	9.86	1.35
Percentage	14.31	40.46	34.01	9.87	1.35

Table -1: Mean and Percentage of each component of LEFS



Graph -1: Mean and Percentage of each component of LEFS

DISCUSSION

A significant proportion of sewing machine operators in Ahmedabad had difficulty performing lower extremity work, ranging from moderate to severe, according to the study's assessment of lower extremity function. In the particular setting of Ahmedabad, this finding has significant implications for the musculoskeletal health and occupational well-being of sewing machine operators. According to the findings of the study, the prevalence of problems with the lower extremities among sewing machine operators in Ahmedabad emphasizes the significance of addressing the particular difficulties faced by this occupational group. The findings of the study emphasize the importance of focusing on enhancing the ergonomic conditions and working environment for sewing machine operators in Ahmedabad in order to minimize the impact on their ability to use their lower extremities.

A similar research was carried out by T. Sakthi Nagaraj et al. focused on determining, the prevalence of pain and musculoskeletal disorders (MSDs) in the lower limbs in comparison to standing sewing machine operators. In this particular group of workers, the prevalence of MSDs and discomfort was found to be higher in the lower limbs than in the upper limbs, according to the findings. Standing sewing machine work can have a significant impact on the lower extremities, as this finding demonstrates. Standing for an extended period of time can put more stress and strain on the lower limbs, which could cause pain and the onset of musculoskeletal disorders. According to the findings, the lower limbs are more susceptible to the negative effects of this kind of work [(9)].

Iman Dianat et al. also carried out another study. furthermore, inspected the predominance of outer muscle torment and inconvenience among sewing machine operators. The study found that musculoskeletal symptoms can be caused by a number of different things in different parts of the body. Long periods of sitting work without breaks and long shifts of work were significant factors. Based on these factors, sewing machine work may be a contributing factor in the development of musculoskeletal pain and discomfort. The vulnerable parts of the body that are impacted by the demands of sewing machine operators' jobs are highlighted by the high prevalence of musculoskeletal symptoms in the neck, shoulders, upper back, and hands/wrists [(10)].

Overall, the study highlights that sewing machine operators in Ahmedabad face significant challenges with lower extremity function and prolonged sitting contribute to musculoskeletal pain and discomfort and hence the need for improved working conditions.

CONCLUSION

According to the results of a survey conducted among sewing machine operators in Ahmedabad, a significant number of these users had moderate to severe lower extremity difficulty. Specifically, the survey revealed that 54.77% of sewing machine operators in Ahmedabad had lower limb problems. This suggests that many sewing machine operators in Ahmedabad have problems with their lower limbs that can affect how well they do their job and how well they feel in general. The study highlights the importance of addressing these issues and measures to improve lower extremity function among sewing machine operators working in this environment. Daily working time was not taken into account which is one of the limitations of the study. Similar research can be done in the future on the relationship between sewing machine operators and different age groups.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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