

# Ergonomic Hazards and Control Measures among Sewing Machine Operators

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**Abstract**— The workplace has the potential to negatively impact employees; performance in a variety of ways, including dissatisfaction, exhaustion, frustration, minor or serious injuries that limit worker; capacity to complete everyday duties, and even death in extreme situations. Ergonomics, often known as human factors engineering, aims to match the job to the worker rather than the worker to the job. The role of ergonomics in textile sewing machine operators was investigated in this research. In a group of twenty people, individual and work-related risk factors in the development of occupational musculoskeletal problems were investigated primarily in the sewing sector. Musculoskeletal diseases are one of the most common causes of decreased productivity in today's workplace. The situation is supposedly far worse in developing countries, with many industries reporting terrible conditions. Additionally, in developing countries, there may be a major lack of understanding of ergonomics issues, education and training programmes, and accreditation. So this study adopted a descriptive cross sectional design in which textile sewing machine operators were analyzed using REBA method.

**Keywords:** Musculoskeletal Problems, Ergonomics Issues, Frustration, Sewing Sector, Terrible Conditions

## I. INTRODUCTION

Afonso et al., 2014 have reported 38% of workers complained about severe temperatures. It's possible that workers are suffering from a lack of ventilation and lighting. In this study, the working environment was also observed. The workers were impacted by the odor of chemicals from the fabric, which led to Irritation, sneezing, and coughing are all symptoms of allergies. Workers were also exposed to dust or other contaminants. When cutting or sewing, you may develop a fiber allergy. It could possibly be related to the chemicals used to make the fabric. [1]

Akinpelu et al., 2016 have studied on Nigerian sewing machine operators, found that the prevalence of 12 months and 7 days was 98 percent and 69 percent, respectively. Another reason this could be high in Nigeria is that, in comparison to other developed countries, occupational health and safety issues are not given the attention they deserve. [2]

Akodu et al., 2013 have reported that in the recent 12 months, there was a higher prevalence of work-related musculoskeletal problems among textile sewing machine operators than in the previous 7 days. This discovery is in line with the findings of a study conducted. [3]

Athit, 2005 have studied on the odor of chemicals from the fabric irritated the workers, causing sneezing and coughing. When cutting or sewing, workers were also allergic to dust or fibers. This could be attributed to the owners and sewing machine operator's safekeeping of the materials. It

could also be related to the chemicals employed in the fabrics production. This was similar to what was found in a study. [4]

Chavalitsakulchai and Shahnavaz, 1993 have studied a survey of 50 percent of female workers in five industries (garment, fertilizer, pharmaceutical, textile, and cigarette), musculoskeletal problems in the lower back were common (95 percent), especially among textile workers. When compared to other body parts, garment workers reported more pain in their hips/thighs (61%) and low back (56%) [5].

Crawford, 2007 have reported to compare those who had pain in the previous 7 days to those who had pain in the previous 12 months, because those who had pain recently can more clearly describe the nature of the pain than those who had pain in the previous 12 months. [6]

Fatusin, 2014 have studied on textile sewing machine operators in small-scale enterprises are sometimes overlooked because to the assumption that worker exposure to hazards/injuries is less compared to large-scale industries. [7]

Herber et al., 2001 have studied that workers in many other industries have greater rates of work-related comorbidities, which compound over time. The goal of this study was to identify health and safety risks as well as the prevalence of body pain among Ibadan textile sewing machine operators. [8]

Kuorinka et al., 1987 have reported that person being interviewed questionnaires in English and Yoruba have been used to collect data. The questionnaire was administered by trained research assistants. The questionnaire contained responses to identify health hazards in the workplace and assess safety procedures, as well as socio-demographic variables (gender, age, marital status, years of working experience, educational status). The prevalence of pain among participants in the last 12 months and 7 days was determined using a standard Nordic questionnaire and a body map. [9]

Maduagwu et al., 2015 reported a research found a lower incidence of 43.4 percent. This could be attributed to differences in cultural and religious activities, urbanization, which shapes social behaviors, and civil turmoil in this area. Sewing machine operators were also found to have a reduced prevalence of pain in research conducted outside of Nigeria. [10]

Malik et al., 2010 have reported that more over a fifth of the sewing machine operators polled believe it is unnecessary to remove their feet from the treadle when changing the who do provide reasons of electric shock. [11]

Mehta, 2012 reported that workers in the cutting and sewing divisions had trouble breathing due to allergies caused by dust and loose fibers. The workers inhaled contaminants from the cloth as a result of prolonged interaction, according to the study. [12]

Nag et al., 1992 have studied that more than half of the workers labor for more than 8 hours a day without getting enough rest. In addition, pain/complaints were shown to be substantially higher in this study. Those who sat on stools with or without cushions had a higher score. It had been Workers were found to adopt unnatural positions such as a bowed neck. Due to unsuitable seating, whether too high or too low, Seats are excessively low. This was a critical sewing machine operator safety practice that should be addressed. Those who followed safety precautions, on the other hand, stated they withdrew their feet to avoid needle damage. [13]

Parimalam et al., 2006 reported that major garment manufacturing continues to take place in small, inhospitable enterprises with little regard for workplace design and circumstances, putting employees in danger. Poorly constructed workstations, unsuitable furniture, a lack of ventilation, improper lighting, loud noises, inadequate protective measures from hazardous chemicals, dust, poor housekeeping, and a lack of personal protective equipment are just a few of the hazards that make workers vulnerable to pain and occupational diseases. [14]

Punnett et al., 1985 have studied that Sewing machine operators have been identified as a group of employees who are at risk of getting pain as a result of the monotony and repetitive use of bodily parts. [15]

Saidu et al., 2011 reported that textile sewing machine operators complain constantly of pain or discomfort in various portions of their bodies as a result of their challenging roles. In this study, the prevalence of pain or discomfort in the last 12 months was highest in the lower back, followed by pain in the neck, upper back, and shoulders. The lower back, along with the hips/thighs, upper back, and knees, was also higher among sewing machine operators in the previous week. In the recent 12 months and 7 days, the prevalence of discomfort at the elbow and wrist was decreased. This outcome was consistent with findings from earlier investigations. [16]

Salik and Ozcan, 2004 have studied that work-related musculoskeletal discomfort is caused by an occurrence at work and accounts for around 34% of all injuries and illnesses. [17]

Serratos-Perez and Mendiola-Anda, 1993 reported that in the previous 12 months, the prevalence of pain or discomfort was highest in the lower back, followed by pain in the neck, upper back, and shoulders. The lower back, along with the hips/thighs, upper back, and knees, was also higher among sewing machine operators in the previous week. In the recent 12 months and 7 days, the prevalence of discomfort at the elbow and wrist was decreased. This outcome was consistent with findings from earlier investigations. [18]

Wang et al., 2007 have studied that pain in the neck/shoulders occurred more frequently among sewing machine operators than in any other portion of the body because the pressure placed on it when workers assume bent neck positions while sewing causes pain in this area to manifest earlier than in any other part of the body. [19]

Westgaard and Jansen, 1992 reported findings that contradicted those of this study. A study in Norway discovered a higher prevalence of neck and shoulder pain. [20]

### A. Objective of the Study

The extensive literature surveys the presence of work-related musculoskeletal disorders among the workers involved in manual works in the sewing machine operators. It can be identified that the maximum number of musculoskeletal problems are related to the awkward posture line bending, twisting, etc. Moreover, mostly this problem is still faced in small-scale industries application of ergonomic problems and even safe working positions are negligible. Hence the present study's main objective is to identify and assess the Work-Related Musculoskeletal Disorder due to unnatural/awkward posture by REBA.

## II. MATERIALS AND METHODS

The present study assessing the ergonomic risks in working postures used tool like REBA.

### A. Rapid Entire Body Assessment

REBA – Rapid Entire Body Assessment was first developed by Hignett, s and McAtamney, L. in the year 2000. The posture assessment tool provides a quick observational analysis of the whole-body parts activities (static and dynamic giving musculoskeletal risk action level). REBA also gives the score level of each position body part indicating the urgency for changing the worker's body postures. The development of REBA aimed to divide into body segments group A and group B. Group A consists of truck, neck, and legs. Group B consists of the upper and lower arm and wrists. Other items are included load-handled couplings with the load and physical activity is specified in the assessment tool. The risk level and action required are shown in the table 2.

REBA Score	Action Required
1	Acceptable posture
2-3	May be necessary
4-7	Change Necessary
8-10	Change soon
11-15	Change immediately

Table 1: Classification of Risk According to REBA

### B. Methodology

The present study was carried out analyses the ergonomic risk involved in sewing machine operators, 20 workers will be analyzed. At the time of the operations working with daily 5-6 hours. The awkward postures like bending, twisting etc., lead to serious health problems such as neck pain, shoulder pain, etc.,

At the time of the survey, all the jobs were observed thoroughly before starting the work and detailed information will be collected from the workers to ensure the completion of ergonomic risk assessment tools. A video recording and photographs were taken to record the different movements of workers and working postures. The photographs are used to analyze to fill the scores like REBA and to evaluate the risk assessment of a job or task use REBA.

The REBA assessment tool used for analyzing such activities such as whole body and motion of limbs. Similar to RULA in REBA also body parts will be divided into different segments and each part can be analyzed to the risk level scores will be assigned. In such body parts, high scores are allocated the postures will have more risk factors, and low

scores are allocated the posture will have low-risk factors. The score is categorized into different levels such as negligible, low risk, medium risk, high risk, and very high risk.

### C. Observational Methods

The observational methods, most commonly used method, can be apply to evaluate the ergonomic hazards at workplace, monitor the ergonomic improvements, and conduct research on ergonomic issues. It is a quantitative measurement of the exposure of ergonomic risk. In this method, data can be easily track. Due to low assessment cost quick and easy assessment process, the observational methods have very positive appearances in identifying ergonomics hazard in the workplace. In the workplace, a simple observational method is need to recognize risk and control the ergonomic hazards. Therefore, observational method can simply investigate the ergonomic risks and their severity in the work place. In REBA, along with postural score the static force or load score coupling score and activity scores are consider to achieve final score. The ironing workers while accomplishing their tasks move their trunk, neck, leg, arm and wrist.

## III. RESULT AND DISCUSSION

The total number of population is 20 participants participated effectively in the survey. The 20 participants were first classified based on gender i.e. male and female, where the male participant is around 40% (N = 8) and female participant were around 60% (N = 12).

### A. Rapid Entire Body Assessment

The result obtained from the REBA assessment work are shown in chart 1. Around 10% of the workers are at medium risk and need some necessary changes, whereas 40% of the workers are at a high-risk level and make changes as soon as possible. Around 50% of the workers are at a very high-risk level and immediate changes will be needed.

The total number of participant is 20 and out of the total participants around 99.99% (20) of participants were suffering from any one of the musculoskeletal disorder problem. The 70 % participants have the shoulder pain, which is the most frequent pain symptom among the total male and female respondents. The shoulder is then followed by the elbow (60%), wrist (40%), hips/thighs (60%), knees (80%), anklets\feet (40%), upper back (40%), lower back (70%) and neck (80%). Among all other parameters the most significant parameters are shoulder pain, lower back pain, knee pain, neck pain and the wrist/hand pain.

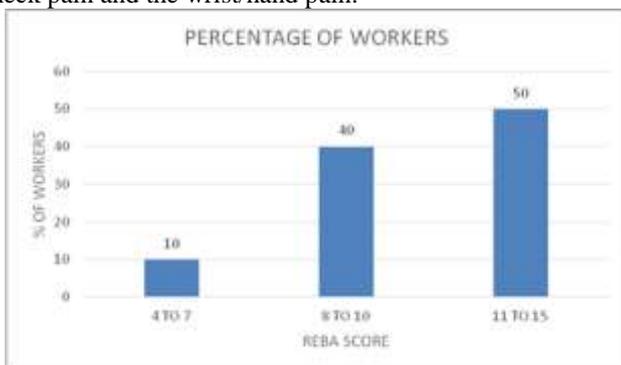


Chart 1: Percentage level of REBA Assessment

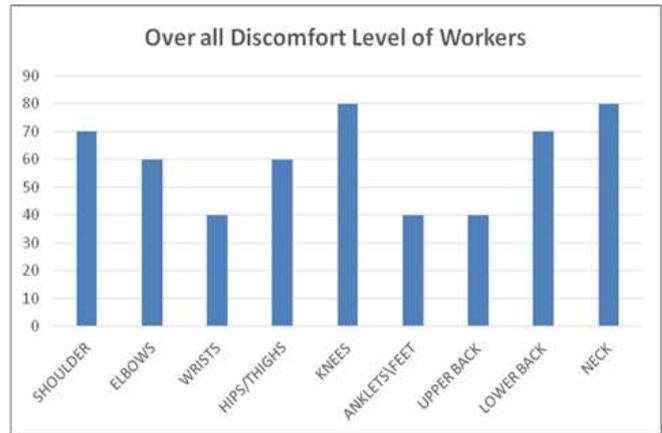


Chart 2: Over all Discomfort Level of Workers

## IV. CONCLUSION

The study shows that there is evidence to suggest that the general working conditions of workers are poor and must be seriously improve to reduce MSD risk factor. According to the scoring level workers are adapted in the awkward postures like bending, twisting which are a result of the poorly designed workplace and working methods and lack of awareness about ergonomics in the working method in the sewing machine workers. Sewing machine workers were shown to be more vulnerable to physical and ergonomic dangers than anyone else. Textile sewing machine operators should be educated and informed on safe techniques in order to reduce the risks and long-term pain associated with their daily operations, which could result in temporary or permanent health problems. It's vital to note that cohort effects were found as a major flaw in our research. Backrest (flexible curve with vertical position) should be given to avoid back stresses, back pain in the chair by giving proper lumbar support. In order to avoid musculoskeletal pain, sewing machine operators must be given proper awareness and training due to the prolonged working time in sewing machine. To avoid back pain, posture stresses, hip and thighs effective seat width is measured at a 125mm forward of the lumbar support when the backrest is in its most forward position (It is based on 98 percentile female hip breadth).Finger and body pain (repetitive stress injury) of the operators due to prolonged usage of sewing machine was rectified by doing stretches for about twice an hour. It can be concluded that the majority of the workers are working with uncomfortable and unnatural postures as found by the assessment. It is recommended to investigate further and to implement the low cost of ergonomic interventions properly educate the workers for safe working, encourage the workers to increase the efficiency and productivity.

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