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ORIGINAL ARTICLE

Ergonomic Evaluation of Manual Material Handling Workers in a Ceramic Factory Using REBA: An Observational Study

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ABSTRACT

A ceramic is an inorganic non-metallic solid made up of either metal or non-metal compounds that have been shaped and then hardened by heating to high temperatures. In general, they are hard, corrosion-resistant and brittle. Tiles are thin objects, usually square or rectangular in shape. Ceramic factory workers are involved in lifting, pulling, bending and making models. Most of their working task are subjective and requires repetitive movements and static postures in them leading to musculoskeletal disorders.

Methodology: his study was conducted on 100 ceramic workers at the Styline factory in Morbi, with participants aged between 25 and 34 years. Their working postures were assessed using the REBA scale.

Conclusion: The findings indicate that nearly all ceramic workers are at moderate risk of developing musculoskeletal disorders. This highlights the need for intervention and increased awareness of postural correction exercises to help prevent further musculoskeletal injuries.

KEYWORDS

• Word • Ceramic workers • Posture • Rapid Entire Body Assessment (REBA) • Ergonomics • Musculoskeletal Risk

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INTRODUCTION

The ceramics manufacturing industry in Morbi (Gujarat) has been playing an important role in the growth of the national economy. To fulfill the company objectives, it is important to produce the quality products.[1,2] Musculoskeletal disorders are described as an injury or dysfunction that commonly involves the supporting structures of the body as well as the nerves, muscles, bones and cartilages.[3,4] Repetitive movements and prolonged awkward or improper postures contribute to these conditions. Various symptoms of musculoskeletal disorders (MSDs) are commonly reported by workers who perform tasks in poor, static postures, which can lead to long-term health risks and injuries.[5,6] These disorders develop when certain body parts are subjected to excessive strain due to improper working positions. Such postures negatively affect work performance and reduce labor productivity[7,8,9]

METHODOLOGY

A total of 100 ceramic factory workers were included in the study from Style in Ceramic Factory, Morbi. Written informed consent was obtained from all participants prior to the commencement of the study. On the day of reporting, participants were provided with basic information about the purpose and objectives of the research to ensure their understanding and cooperation.

Following this, a detailed assessment of the participants' working posture was conducted using the Rapid Entire Body Assessment (REBA) tool. This assessment was carried out systematically to evaluate the ergonomic risks associated with their occupational activities. Based on the REBA scores, participants were classified into categories of low, moderate, and high risk for developing musculoskeletal disorders.

Finally, appropriate preventive advice was given to each participant according to their risk category. This included recommendations for reducing ergonomic risk factors and improving workplace posture to mitigate the risk of musculoskeletal issues.

RESULT

Data was collected on a data sheet and encoded for computerized analysis. Tables were made using Microsoft Word and Figures were plotted using Microsoft Excel window-10. In this study, 100 subjects both male and female were included.

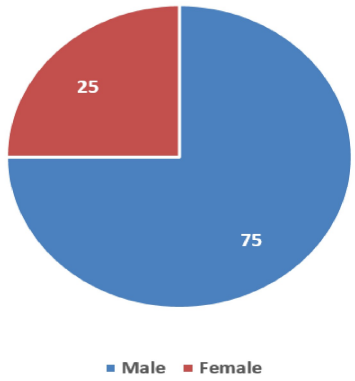

Figure 1: Gender Ratio

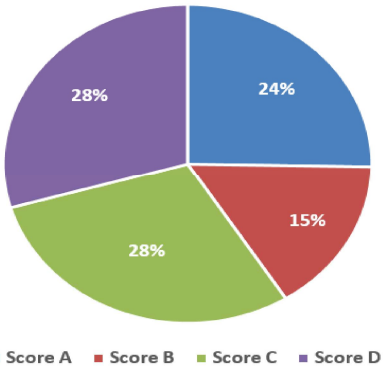

Figure 2: Components of REBA sheet

The above pie chart shows that out of 100 workers, 75 were Male and 25 were Female. Therefore, majority of working population in ceramic factory are male.

The above chart shows that total REBA score is 33% of 11, for score A it is 24% of 12, for score B it comes 15% of 11, score C it comes 28% of 12.

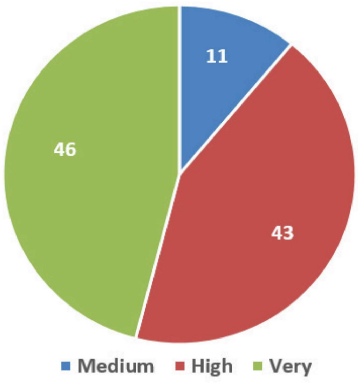

Figure 3: Risk factors prevalence

Above graph shows that the highest number of workers i.e. 46% comes under very high risk. 43% of workers come under high risk and only 11% workers come under medium risk.

DISCUSSION

Work posture is the position and condition of the body or body parts during the performance of work. Good work posture is as important for the performance of tasks as it promotes health and minimizes stress and discomfort during work. Ergonomics design of work system is pre-requisite for better health, safety and productivity.[10-12] It is important to analyses working postures for detailed understanding of relationship between the working posture and work-related musculoskeletal disorders

Muscular work in occupational activities can be roughly divided into four groups: heavy dynamic muscle work, manual materials handling, static work and repetitive work. Ceramic workers fall under the category of manual material handling as they have a significant role in lifting, shifting, bending on the field and also, they fall under the category of heavy dynamic muscle work.[13,14]

Activities like lifting and bending leads to workers acquiring faulty postures. Also sitting for prolonged period of time has caused them to attain low back pain. Excessive strain is put on their back during lifting and bending activity to while working. It was found that constant bending with flexed spine and neck over a period of time might cause a forward head posture in these workers leading to stretching of the anterior neck muscles and weak neck extensors to become short and go into spasm hence altering the neck biomechanics and later on causing neck pain. The muscles around the shoulders have to work to its maximum capacity in order to stabilize the shoulder when the upper limb is not supported so that fine movements can be carried out with the wrist and fingers. Improper rest between the work and constant repetitive movement and stress on the body can lead to muscle fatigue, discomfort and decreased muscle performance. [15-17]

This study was carried out to assess the posture related musculoskeletal disorders in the ceramic factory workers. Among MSD's reported study population, the highest risk reported area were neck, wrist and trunk.

Prolong bending and twisting movements over a long period was observed which implies increase in the work of muscles and ligaments and also stretches the elastic disc between the vertebrae to maintain upper body in balance and therefore also, increases stress in lower back. Corrective actions and ergonomic intervention are recommended.

It was found that almost all workers were at high risk if they continue to work in the posture, which may lead to musculoskeletal disorder risk in future.

LIMITATIONS

This study has been performed only on 100 workers. The effectiveness of the method on other age group may vary.

CONCLUSION

This study concludes that the REBA scale is a useful tool for assessing musculoskeletal disorders related to work posture in ceramic workers. Additionally, the findings indicate that a significant number of ceramic workers are at risk of developing musculoskeletal disorders, emphasizing the need for greater attention and intervention in this area.

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