



ASSESSMENT OF LIFTING POSITIONS IN CONSTRUCTION SITE BRICK STACKERS

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ABSTRACT This study assesses the lifting positions of construction site brick stackers using the Rapid Upper Limb Assessment (RULA) method. Construction workers are frequently exposed to awkward postures and heavy manual handling, leading to a high prevalence of musculoskeletal disorders (MSDs). A cross-sectional study involving 100 male brick stackers aged 21–35 years was conducted to evaluate their lifting postures and classify ergonomic risks based on RULA scores. Results indicated that 43% of workers maintained acceptable postures (RULA score 1-2), while 40% required further investigation (score 3-4), 14% needed changes soon (score 5-6), and 3% required immediate ergonomic interventions (score ≥ 7). The findings highlight the need for ergonomic awareness and intervention programs to reduce MSD risks among construction labourers.

KEYWORDS : Construction Workers, Brick Stackers, Lifting Positions, Ergonomics, RULA, Musculoskeletal Disorders

INTRODUCTION

The worldwide community, especially the people in developing countries are facing increasing risks of various systemic ailments due to working exposure in different occupational and industrial sectors. Building construction is a large, dynamic, and complex industrial sector, creating employment for millions of people worldwide in its workforce. This industry has a pivotal role in the construction of the infrastructure. The building construction workers are involved in different trades like mason, cement mixer, brick stackers, plumber, electrician, carpenter, and crane operators, etc.¹

Construction is one of the most physically demanding and dangerous occupations. The injury rate for construction workers is 70% higher than the average for other occupations. They also continue to face a high prevalence of musculoskeletal injuries or pains caused by ergonomic-related issues. Strains and sprains are the most prevalent type of injuries due to overexertion associated with manual materials handling tasks/activities, involving in awkward body postures such as bending or twisting the trunk. 2 These may include exposure to dust, and fumes, holding weighty materials, and heavy physical work in awkward working postures in the construction industry which can cause various musculoskeletal disorders. Moreover, exposure to tough environmental conditions affects the worker's health and causes various physiological, physical, and psychosocial strains and workers become victims of occupation-related musculoskeletal disorders and accidents. The health risks posed by industry are influenced by the type, nature of the job, and duration of working in various industrial sectors. Musculoskeletal disorders are the most common occupational-related health problems and are an important cause of functional impairments and disability among building construction workers.¹

Worldwide, the prevalence of musculoskeletal symptoms involving one or more body regions is higher in construction workers. The load of physical work associated with awkward prolonged working postures and manual handling of materials by the construction workers can cause various musculoskeletal pains and disorders. MSDs cause decreased health and workability, thereby increasing the costs of absenteeism due to less productivity at work.³

The job profile of manual laborers is very heavily dependent on the lifting on site. For them to lift heavy repeatedly for longer durations these workers need good hand grip strength & ergonomic lifting positions. It is important that these sets of workers are assessed as this industry is the backbone of their earnings and without good strength and maintained lifting positions they can't function well for a longer duration of years. The study aims to check for the lifting positions with the help of RULA which will give us an overview of the risk in upper limbs.

RULA scoring system will classify the workers as follows:
1 or 2 = acceptable posture

3 or 4 = further investigation, change may be needed.

5 or 6 = further investigation, change soon

7 = investigate & implement change

The construction industry is a vital sector employing millions worldwide, particularly in developing countries. However, it is characterized by physically demanding tasks and hazardous working conditions, leading to a high incidence of musculoskeletal injuries. Manual laborers, especially brick stackers, frequently perform repetitive lifting in awkward postures, contributing to musculoskeletal disorders (MSDs) that impair workability and increase absenteeism. The Rapid Upper Limb Assessment (RULA) tool offers a systematic approach to evaluating ergonomic risks associated with upper limb postures during manual tasks. This study aims to assess the lifting positions of construction site brick stackers using RULA to identify ergonomic risks and recommend interventions.

Need of Study

Construction workers, especially manual laborers like brick stackers, engage in strenuous physical tasks that expose them to ergonomic risk factors. Many workers lack awareness of these risks, leading to pain and discomfort from poor lifting techniques and unfavorable work environments. Assessing their postures is crucial to identifying ergonomic hazards and implementing preventive measures to reduce the incidence of MSDs, thereby improving their health, productivity, and longevity in the workforce.

Aims & Objectives**Aims of the Study: -**

1. To assess the lifting position of construction site brick stackers in the construction industry manual laborers.

Objectives of the Study: -

- 1) To assess the lifting positions in brick stackers using the RULA scale & to classify them as per RULA scoring.

Review of literature

1. Application of RULA and NIOSH Ergonomic Risk Assessment Methods: A Case Study in Construction Industry in Turkey: International Journal of Engineering Research & Technology (IJERT) Vol. 9 Issue 09, September-2020

This study aimed to analyse the working postures of construction workers and to make ergonomic risk assessments using RULA and NIOSH methods & reveal ergonomic hazards and risks during construction works and suggest possible prevention ways. and plumbing processes. The risk scores were evaluated, and prevention measures were recommended to prevent possible injuries.

2. Ergonomic analysis of construction worker's body postures using wearable mobile sensors: N.D. Nath et al. / Applied Ergonomics 62 (2017) 107e117

In this paper, a low-cost ubiquitous approach is presented and

validated which deploys built-in smartphone sensors to unobtrusively monitor workers' bodily postures and autonomously identify potential work-related ergonomic risks. Results indicate that measurements of trunk and shoulder flexions of a worker by smartphone sensory data are very close to corresponding measurements by observation.

3. Manual Lifting Task Methods and Low Back Pain among Construction Workers in Southwestern Nigeria; : Oluwale Adeyemi, Samuel Adejuyigbe, Olusegun Akanbi

This study evaluated manual lifting tasks methods among construction workers in Southwestern Nigeria. The aim was to determine the level of inclusion of ergonomics in the work methods. Single-task lifting analysis based on National Institute for Occupational Safety and Health (NIOSH) was used to evaluate 32 jobs involving 250 healthy workers. The result shows single task lifting index (STLI) greater than 1.0 for more than 75% of the jobs. The result indicated that more than 70% of the total workers are at an increased risk of lifting-related discomfort.

4. Ergonomics Evaluation of Manual Lifting Task on Biomechanical Stress in Symmetric Posture Vijayvargiya A1 , Bhiwapurkar MK1 , Thirugnanam A2

Manual lifting operations continue to play a key role in the industrial and service sectors, inflicting physical strain on the musculoskeletal system, despite advances in automation. As a result, an experiment is carried out to assess the impact of two lifting task parameters; weight and height, based on the estimation of subjective responses and biomechanical loading, while lifting the weight symmetrically in the sagittal plane. Also to recommend the safe limit for manual lifting tasks.

METHODOLOGY

Study Design: Cross-sectional study

Sample Size: 100

Duration of Study: 6 months

Study Subject: Construction site brick stackers

Inclusion Criteria:

1. Age: 21 – 35 years
2. Gender: Male
3. On-site manual labourers
4. With a minimum 2 years of continuous work experience

Exclusion Criteria:

1. Individuals with cognitive impairments
2. Individuals who've had pain due to a fall, slips or similar accidents (less than 6 months)
3. Non-cooperative individuals

Tools & Materials Used:

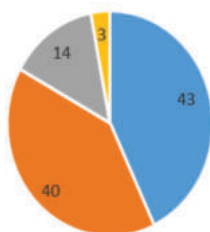
1. Stationary (pencil, pen, paper, eraser)
2. Rapid Upper Limb Assessment - RULA
3. Computer

RESULTS

Table 1: Rula Scoring

SCORE	NO. OF LABOURERS
1-2	43
3-4	40
5-6	14
7->7	3

RULA SCORING



■ SCORE 1-2 ■ SCORE 3-4 ■ SCORE 5-6 ■ SCORE 7->7

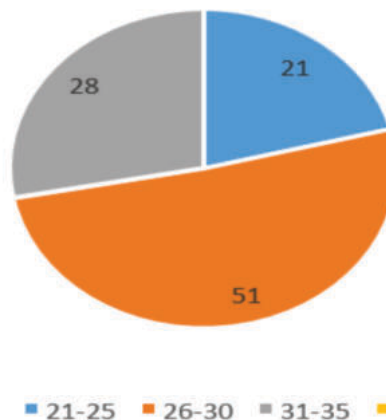
Inference:

The above graph shows that the maximum number of workers had a RULA scoring of 1-2 ie they had acceptable postures, followed by 40 workers with a scoring of 3-4 meaning further investigation is needed and changes might be needed in their posture, followed by workers with a scoring of 5-6 meaning changes are needed soon & workers with a score of more than 7 which indicates implementing changes with immediate effect.

Table 2: Age

AGE	NO. OF LABOURERS
21-25	21
26-30	51
31-35	28

AGE



Inference:

The above graph classifies the brick stackers as per the RULA scoring as follows:

Maximum workers aged 26-30(51%), followed by 31- 35 (28%)& 21-25(21%).

DISCUSSION

Building construction is a large, dynamic, and complex industrial sector, creating employment for millions of people worldwide. This industry has a pivotal role in the construction of the infrastructure. The construction industry is a risky occupation in terms of safety and health. Workers in this industry work under tough conditions to perform the desired task. They are frequently exposed to awkward work postures, and holding weighty materials.

The study aimed to assess the lifting positions in brick stackers among the construction site manual labourers using RAPID UPPER LIMB ASSESSMENT – RULA. The Rapid Upper Limb Assessment tool uses a systematic process to evaluate required body posture, force, and repetition for the job task being evaluated RULA scoring system will classify the workers as follows:

1 or 2 = acceptable posture

3 or 4 = further investigation, change may be needed.

5 or 6 = further investigation, change soon

7= investigate & implement change

100 labourers between the age of 21-35 years, who fulfilled the inclusion criteria were selected for the study. This age group was selected as they form the maximum population of this category. All the subjects were informed about the nature of the study and its course. According to the objectives, first, the workers were assessed and then classified as per the RULA scorings mentioned above. On assessment, it showed that the maximum number of laborers were from the age 26-30, followed by 31-35 and those of 21-25.

On RULA assessment, the study showed that 43 workers, the highest had a scoring of 1-2, which correlated with their years of working experience in this industry. This was followed by another group of 40 workers with a score of 3-4 in the RULA assessment, followed by 14 workers with a score of 5-6, and 3 workers with a score of 3 workers.

Lifting heavy weights often requires different postures which are not

usually ergonomic and often alter the normal ergonomic posture. Heavyweights take a toll on the neck, shoulder, upper arm, lower arm & wrist of the workers. This industry exposes them to longer working hours along with repeated heavy lifting at the same time, which makes them susceptible to dysfunctions & overuse injuries easily.¹

Scores can vary according to the duration of working years, no of working hours, age, weight & gender of the worker³. This population is usually the most neglected sector of the community, yet being the easily overused population as they suffer from poverty and illiteracy they tend to work even when experiencing any type of injury as they work on a daily wage basis².

The study confirms that a significant portion of brick stackers maintain acceptable lifting postures, but a considerable number exhibit ergonomic risks requiring intervention. Heavy manual lifting alters normal postures, stressing the neck, shoulders, and upper limbs, increasing susceptibility to overuse injuries. Factors such as years of work experience, age, and workload influence RULA scores. Many workers continue laboring despite pain due to economic necessity, underscoring the importance of ergonomic education and workplace modifications. Collaborative efforts between health professionals, workers, and management are essential to implement protective measures, promote safe lifting techniques, and provide adequate rest periods to minimize MSD risks.

It can be said that these workers are prone to musculoskeletal injuries due to their type of lifting. This can be prevented by creating awareness in this population about proper lifting methods, ergonomic postures, and the dos and don'ts. Thus, creating an awareness will help them prevent and delay the effects as much as possible which will in turn help them to work in the longer run, and also help with poverty⁴. These risks can be reduced by the mutual collaboration between health officials, building construction workers, and their management to adopt appropriate protective measures and avoid lifting heavy materials manually. Therefore, long-term work in building construction industries should be avoided and workers must be given official days off at least two times a week and two months in a year. Educational programs can be introduced to increase the workers' knowledge about their health status and workability³.

CONCLUSION

In this study, it was observed that the 3 workers with the highest scoring of RULA i.e. 7->7, were those with a greater number of working years and that they needed to implement changes in their ergonomics. 13 workers with a scoring of 5-6 meaning changes are needed soon. It shows that 43, i.e. the maximum number of workers had a RULA scoring of 1-2 i.e. they had acceptable postures. 40 workers with a scoring of 3-4 meaning further investigation is needed and changes might be needed in their posture.

The assessment revealed that while most workers had acceptable lifting postures, a notable number required ergonomic improvements. Three workers with the highest RULA scores (≥ 7) needed immediate intervention, and 14 workers required changes soon. Raising awareness about proper lifting techniques and ergonomic principles is critical to reducing musculoskeletal risks among construction site brick stackers, enhancing their health and work longevity.

Three workers exhibiting the highest RULA scores (≥ 7) demonstrated lifting postures that necessitate immediate ergonomic intervention to prevent further musculoskeletal damage. Additionally, 14 workers with scores ranging from 5 to 6 require prompt modifications to their lifting techniques and workplace ergonomics to mitigate escalating risks. These findings underscore the urgent need for targeted ergonomic training and intervention programs tailored specifically for construction site brick stackers. Implementing such initiatives will enhance workers' awareness of proper lifting mechanics and ergonomic principles, thereby reducing the prevalence of musculoskeletal disorders (MSDs) within this vulnerable population. Prioritizing ergonomic education and workplace adjustments not only promotes the health and safety of laborers but also contributes to sustained work capacity and longevity in physically demanding construction roles. Collaborative efforts involving occupational health professionals, site management, and workers themselves are essential to develop and enforce effective ergonomic practices that safeguard worker well-being and optimize productivity.

Limitations of the Study

Different ethnicities were part of the study population which led to

language barriers and translation difficulties.

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