

Comparative Study of Ergonomics among Manufacturing Industry Workers in Rural and Urban Industries

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ABSTRACT

Background: Workers working in manufacturing industries are often prone to various musculoskeletal disorders owing to their tedious and physically demanding work. Long working hours, lifting heavy weights, Use of outdated machineries, improper lighting and so on are main causes of all the occupational disorders and hazards that workers suffer from. Introduction of ergonomics was boon to the workers working in industrial sectors, Since it has reduced the pain and other discomforts workers go through. Even though there seem to be a paucity regarding ergonomics among the workers working in Industries. In order to find out the knowledge workers have in both rural and urban sector in India this study has been carried out.

Methods: We carried out research by handing self-administered questionnaires based on previous research and literature on ergonomics to workers in both rural and urban industries. A total of 50 participants from the sectors took part in our study. The workers were asked to fill out the form based on their knowledge and perception about ergonomics. Later a comparison was made based on the responses collected from the workers.

Results: It was found that 31 participants in urban while 39 participants in rural industries have never heard about ergonomics previously, 27 workers in

urban and 29 workers in rural suffer from pain or other discomforts very often. About 26 participants in urban while and 21 in rural do stretching or take small breaks to avoid injury or strain during work. Only 3 participants from urban whereas no participant from rural industries have received training on ergonomics from their respective companies.

Conclusion: From the responses collected in both the regions it can be concluded that there is lack of awareness about ergonomics and various workers safety regulations that can ensure workers safety and lower the burden on the workers, reducing prevalence of occupational hazards and musculoskeletal disorders among the industrial workers. It can be ruled that there more requirement of awareness in the rural industries compared to urban industries.

KEYWORDS: Ergonomics, Awareness, Rural, Urban, Manufacturing Industries.

INTRODUCTION

In the industrial sector, varied working procedures often lead to incorrect postures, repetitive motion, and other issues¹. Manufacturing industry employees are more likely to get work-related injuries because of the heavy lifting, repetitive motions, extended static postures, heat exposure, and hazardous chemicals they must perform as part of their job. The human operator, equipment, task, workplace, environment, and management are the six main components of a system, according to research by Shikdar et al. published in 2002². Such work practices and routines can put employees at risk for several health problems. In the population of industrial workers, musculoskeletal diseases (MSDs) are the most prevalent issue¹. According to Takala (2005), 2.2 million individuals lose their lives to illnesses and accidents at work each year³. Leigh et al. (1999) estimated that there were 9,900 fatal injuries and 770,000 non-fatal injuries in Sub-Saharan Africa per year. 9.02 million injuries per year were expected by them³.

A balance between worker characteristics and job demands can be achieved via effective use of ergonomics in work system design⁴. Ergonomics is a science that focuses on understanding the interactions between humans and other system components⁵. The profession of applying theory, concepts, data, and methodologies to design in order to maximize human well-being and overall system performance is known as ergonomics⁵. According to Riel and Imbean (1995), every firm would be sensible to utilize ergonomics for financial reasons⁵. In a similar spirit, Spilling (1986) investigated how workplace design affected musculoskeletal issues and shown that ergonomics might be financially justified⁵. This can increase employee productivity, cater for their physical and emotional welfare, and increase their sense of job satisfaction⁴. Numerous studies have demonstrated the benefits of incorporating ergonomic concepts into workplace design, machine design, job design, environment design, and facility design⁴. Proper application of ergonomics and technology, may

decrease or even eliminate OHS issues at work while improving performance. Less injuries translate into cheaper medical and compensation expenses, less lost pay and working days, and financial gain for the organization⁴.

The use of ergonomics will improve job satisfaction, which will in turn raise worker productivity, provide worker safety, which will lower compensation costs, and minimize musculoskeletal diseases (MSDs)². The goal of the science of ergonomics, which deals with these measures, is to lessen or even avoid chronic illnesses². The physical, organizational, and social aspects of employment and job design typically cause long-term one-sided postures and exposures that lead to these disorders according to Landau, 2001⁶. However, despite the significant advantages that may be gained using ergonomics, developing industries don't appear to be paying much attention to this issue (Rogan and O'Neill, 1993)⁶. Numerous research on the awareness of ergonomics in various industrial sectors have been conducted. Our study's main objective is to compare the awareness levels of manufacturing employees in India's urban areas to those in the country's rural parts.

Leigh et al. 2) have estimated an annual incidence of occupational disease between 924,700 and 1,211,000 deaths in India⁵. The recent industrial boom and 7% yearly economic growth brought forth by globalization have made occupational health concerns even more challenging⁷. In India, a sizable portion of the workforce works in unorganized industries⁷. Because they are mostly illiterate, the working masses are uninformed of the risks connected to their line of employment⁷. In a similar vein, the owners are also ignorant of the risks brought on by unsafe *working* conditions, place⁷. Outdated machinery, vibration, operational setup, fatigue, and poor ventilation and lighting are the top five factors inducing ergonomic-related problems and hampering the production of the leather garment companies in India⁸. According to research conducted by Bontrup et al. [71], an unfavourable industrial workplace environment may have a negative impact on workers' health and increase absenteeism⁸. The usage of outdated machinery triggers other ergonomic factors, such as low back pain, neck pain, and vibrations, which hinder the production rate of leather garments⁸. Developing nations do not take ergonomic problems seriously because of a lack of knowledge about them and the accessibility of a cheap labour force. Basic Metal industries was ranked among top ten for all body parts for male workers, but none for female workers⁹.

METHODOLOGY

A comparative study was carried out in rural and urban industries in the state of Maharashtra in India. A total of 50 participants were involved from each region working manufacturing industries. The study was carried out for a duration of 6 months. A consent form was filled out by all the workers willing to participate in the study. Questionnaire were administered face to face with each worker and the results were recorded based on the responses from the participants. The questions included were regarding age, gender, working procedure done by the laborer, frequency of work-related injury, awareness of ergonomics and their knowledge about role of PT in ergonomics. The questionnaire was prepared based on previous studies, theory a

standard questionnaire on industrial ergonomics.50 workers working in manufacturing industries in both rural and urban areas were selected.by random sampling method. Comparison was made based on the responses gained for each question in the questionnaire between the two groups

RESULTS:

Showing Question wise results of the survey

Questions	Options	Urban Workers	Rural Workers
Gender	Male	45%	65%
	Female	55 %	55 %
Mode of work	Prolonged standing	40%	37%
	Lifting and bending	25%	40%
	Use of Machine	20%	12%
	Twisting and Turning	15%	11%
Have Heard about ergonomics before	Yes	19	11
	No	31	39
Is the working environment at your work friendly?	Yes	17	23
	No	32	28
Do you face challenges or Concerns related to layout or organization of you of work that may impact your work safely or efficiently?	Yes	27	31
	No	23	19
Population experiencing	Never	11	8
Pain and discomfort during work	Sometimes	12	13
	Very often	27	29
Are there any tasks in your work that require awkward or sustained postures such as overhead reaching or stooping forward?	Yes	29	32
	No	21	18
Do you use any devices or tools to improve your	Yes	33	20

comfort or ease your work?	No	17	30
Do you take small breaks from during work to stretch or relax to avoid strain from sustained postures or repetitive tasks?	Yes	26	21
	No	24	29
Have you received any ergonomic training from your company?	Yes	3	47
	No	0	50
Have you discussed about Problems faced during work With your supervisor or Manager?	Yes	30	37
	No	20	13

DISCUSSION:

One awareness survey was conducted among 100 industrial workers in India's rural and urban areas. It was comparative research to determine the level of knowledge or awareness that workers in India's rural and urban manufacturing industries had. A self-administered questionnaire based on ideas and earlier studies concerning occupational health and ergonomics in industries was given to the participants. The results shows that there were almost equal responses in few areas of the questionnaire while some showed more lack of awareness among the workers in the rural industries. While just 31 people in urban regions and almost 39 in rural areas had never heard the phrase ergonomics before, respectively. Our findings are consistent with a survey on ergonomic awareness that was conducted in Nigeria, where just 3.4% of the 950 participants were unaware of ergonomics⁵. Due to poor architecture or workstation organization, about 27 employees in urban areas had concerns about working safely and effectively, compared to 31 in rural areas. Her study argues that "the single most influential factor in maximizing operator productivity is operator comfort," citing Steve Krause, marketing director for Ergotron Inc. (Eagan, MN), and Edwin Lochridge, CEO of Metamorphosis Design and Development (Atlanta, GA). Comfort is the lack of discomfort, including the absence of pain, loud noises, harsh lighting, high temperatures, and offensive scents⁶. Ergonomic problems will continue in even the best designed jobs if employees do not know how to use the equipment properly, or if they do not have a basic knowledge of ergonomic principles⁶. Even projects with

the finest design will still have ergonomic issues if workers are unable to utilize the tools effectively or do not understand the fundamentals of ergonomics⁶. The use of ergonomics had significantly decreased industrial accidents and improved workers' productivity and general health¹⁰. The worker population were also asked about if they have experienced pain or discomfort during work, 27 workers in urban area while 29 workers in rural areas experience very often while 12 percentage and 13 percentage experienced it sometimes. In comparison to the other replies, the group that had never felt pain or discomfort was quite small.

Further we asked participants if there any tasks involved in their work that required prolonged bending forward or working in a sustained or uncomfortable posture for prolonged hours to which 29 in urban industries and 32 in rural industries replied positively. The second-most prevalent ergonomic issue among workers in the apparel industry is knee joint discomfort. Standing for a long time in a small area increases the risk of developing knee joint discomfort⁸. Furthermore, low back discomfort may develop as a result of the use of tables that are not the right height. The top personal element is "fatigue". When employees are fatigued, they only produce low-quality goods⁸. We asked employees if they used any tools or equipment's that lowered their burden during work. About 33 working in cities were benefitted using tools while 20 employees in rural industries used tools and equipment. Further, when asked if they took short breaks to stretch or unwind to prevent strain, injury, or other pain brought on by their workday, 26 workers in the urban sector and 21 workers in the rural sector replied affirmatively. It is important to understand that the majority of occupational disorders are preventable, making prevention the best course of action in dealing with them. Furthermore, it has been found via extensive study that strengthening exercises, microbreaks, and stretching can all help to lessen pain intensity and ease the challenges associated with musculoskeletal diseases¹¹. Muoz Poblete et al. [16] investigated the efficacy of a workplace-based muscle resistance training exercise program for the intervention group and a gentle stretching program for the control group and concluded that after 16 weeks of intervention, there was a decrease in upper extremity pain in favor of the intervention group¹¹. In research by Gram et al. [20], the impact of individually designed exercise regimens for male construction workers that included both aerobic activity and strengthening was examined¹¹. Comparing the group that participated in the exercise sessions to the control group, they saw a statistically significant rise in maximum aerobic capacity¹¹. A comparable scheme that required periodic 5-minute breaks every 30 minutes of work increased staff productivity¹¹.

Even after asking the employees if they had gotten any ergonomics training from their industry, just 3 persons in the urban sector responded positively. employees in rural areas had not previously received any ergonomics training from their industry. Many emerging nations suffer from inadequate infrastructure and a lack of basic amenities. The use of outdated machinery causes other ergonomic factors, such as low back pain, neck pain, and vibrations, which slow down the production rate Although there is a lack of awareness in both urban and rural areas of the nation, it can be inferred from the responses to our questionnaire that workers in rural areas are less aware of the fundamental practices and regulations that should be adhered to while at work in

order to prevent any musculoskeletal disorders or other potential health risks.

CONCLUSION

After carrying out research in both rural and urban industries in India, we found out that the workers in working rural industries lack more awareness about ergonomics when compared to that of workers working in urban industries .

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