ABSTRACT

Marble industry in Kishangarh comprises of more than 500 marble industries. The area has employed a large number of direct and indirect labourers. It has more than thousand persons employed in marble cutting units. The marble industry is emerging as an important industry for the construction agencies. The marble cutting in tiles is done on marble cutting workstation. For better functioning of the industry health of the worker is important because it affects the efficiency and the production of the industry worker but at the same time affects the total production of the industry. The loss of human resource is the loss to the economy of the nation.

While performing the marble cutting activity, body segments are manipulated in the space available resulting in changes to posture. The industrial working environment, the environmental factors like illumination, noise, humidity, temperature affect the productivity of the worker.

Stone quarrying, cutting and masonry is one of the many industries which involve moderate to heavy manual work. Due to the nature of manual work and use of tools, stonecutting job may potentially cause work-related upper limb musculoskeletal disorders.

The anthropometric data of the marble cutters involved in marble industry, their working environment, physiological cost of work, their posture analysis and occupational related disorders experienced by them is yet to be explored. Thus, the present study is conceptualized. The present research aims to assess the musculoskeletal pain and postural discomfort experienced by the marble cutting workers in the marble industry.

The research design of the study was descriptive because information regarding the musculoskeletal pain experienced by the marble cutting workers, physiological cost of work and fatigue experienced by the respondents was also collected. The sample comprised of 220 marble cutting workers working on the marble tile cutting workstation in the marble industry. Purposive sampling design was utilized for selecting the sample. An interview schedule cum observation sheet was resorted to gather the data. The

interview schedule cum observation sheet comprised of five sections. The interview schedule cum observation sheet contained six sections namely Demographic profile, Anthropometric data and Workstation Dimensions of the respondents, Perceived Musculoskeletal Information on Perceived Musculoskeletal Pain, Postural Discomfort for which The Rapid Entire Body Assessment (REBA) checklist was used Environment of the Workplace, Physiological Cost of Work and Perceived Fatigue which was measured by the researcher through prevalidated FACIT Scale. The content validity was established. An ergonomic intervention programme for the selected owners and marble cutting workers to improve the environment of the workplace and maintaining appropriate work postures during the work was designed. Brochures and posters were prepared in English and Hindi Language and distributed among the industrial owners. The posters were displayed at the workstation for the respondents to remember the information.

The mean age of the respondents was 36.77 years. Less than one half of the respondents belonged to the age group of 35- 40 years. More than one-third of the respondents had educational qualification upto Primary Education (upto 5^{th} standard). The mean years of experience was 12.26 years. Slightly less than on half of the respondents had experience of working since 11-15 years in the marble industry. Slightly more than two-third of the respondents had a less than or equal to 5 years of working experience in the present industry. Majority of the respondents were right handed. More than one-half of the respondents were found to be feeling “Very Good” regarding their physical wellness before the start of their work as compared to during work and after work.

The mean anthropometric measurements of the respondents were calculated in the present study. The mean height of the respondents was logged as 67.09 inches. The height of the workstation was measured 34.5 inches. The width of the workstation was 43 inches. The length of the workstation was 77 inches. Shoulder was ranked first followed by elbows and back in perceived musculoskeletal pain since past 7 days. The perceived musculoskeletal pain in the past 12 months revealed that back was ranked highest followed by palms and shoulder. Majority of the respondents were at ‘high risk’ of

Musculoskeletal Disorder requiring further investigation and changes on an immediate basis. Less than two third of the industries had light below recommended levels (1000 lux). The analysis of the perceived comfort level of the respondents revealed that slightly more than one half respondents perceived that the lighting was “comfortable”. Slightly less than one-half of the industries had Very High noise level 107- 112 dB. The lowest humidity recorded was 33% and highest humidity recorded while the respondents were working was 46%. Slightly less than two third of industries were having temperature ranging from 36-38 ^{o}C. The vibration produced by the marble cutting workstation was 46.67 Hertz.

Majority of the respondents were not provided any training for vibration and posture. It was also observed that slightly less than on-half of the respondents were provided training for avoiding repetition of work. Majority of the respondents were not provided any rest breaks to relieve stress from repetitive motions. The use of any protection of hands was not found to be a practice by majority of the respondents. Majority of the respondents were not found to be using ear plugs for protection from excessive noise. Almost half of the respondents were found to be severely fatigued and slightly less than one half of the respondents experienced “Less Fatigue”. Slightly less than two third of the respondents had “Moderately Heavy” physiological workload of the task performed by them.

A significant variation was found in the Perceived Musculoskeletal Pain of the marble cutting workers in various parts of the body with their Perceived Health Status during work. The F values were not found to be significant for the Physiological Cost of Work of the respondents with their Age, Years of Working Experience and Perceived Health Status (during work) and (after work). The results showed a significant relationship with the physiological cost of work and the Noise level. The results showed a significant variation in the Perceived Fatigue experienced by the respondents with their Health Status before and after work. The results revealed there was a significant positive relationship between the Perceived Fatigue and Perceived Musculoskeletal Pain experienced by the respondents.

An ergonomic intervention programme was organized for the selected marble industry respondents and marble cutting workers. A brochure was prepared with detailed description on the use, benefits and availability of the protective aids. The owners were sensitized by the researcher by giving brochures which included the benefits of providing protective aids to the workers. Posters were also developed and designed for the workers in Hindi language as they did not have a command on English. The intervention programme was packed with knowledge and a discussion was conducted with the owners and the marble cutting workers.

The study reflected clear implications for the need to educate the stakeholders regarding Ergonomic Practices in Marble Industry. An ergonomic intervention programme can be used to create awareness and promote training to the employees and using protective aids while working in the industry. The Kishangarh Marble Industry, labour laws need to meet the challenges faced by the daily wage workers in unorganized sector.