



## PREVALENCE OF MUSCULOSKELETAL PAIN IN DIAMOND WORKERS

## Physiotherapy

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## ABSTRACT

A diamond is one of the best-known and most sought-after gemstone. The diamond trading profession includes; diamond mining, diamond cutting, diamond polishing, diamond assortment, and diamond selling. The diamond industries in India consist of two main categories; diamond polishers and sorters. The aim of this study was to find out the prevalence of musculoskeletal pain in diamond workers along with the prevalence of work absenteeism due to musculoskeletal pain. 50 diamond workers were selected for the study. A self made validated questionnaire was used as an outcome measure. There was a high prevalence of musculoskeletal pain among diamond polishers 76% (38/50) and among diamond sorters 78% (39/50). Low back and elbow were the most prevalent musculoskeletal pain areas among diamond workers. There was increased work absenteeism among diamond workers. Both diamond polishers 63% (24/38) and diamond sorters 85% (33/39) had reported increased work absenteeism.

## KEYWORDS

Prevalence, Musculoskeletal pain, Diamond workers, Polishers, Sorters, Work absenteeism

## INTRODUCTION

A diamond is one of the best-known and most sought-after gemstone. The hardness of diamond and its high dispersion of light make it useful for industrial applications and desirable as jewellery. The diamond trading profession includes; diamond mining, diamond cutting, diamond polishing, diamond assortment, and diamond selling.<sup>[1]</sup>

Many studies have shown that especially in predominant diamond exporting countries like Israel about various problems related to musculoskeletal system in diamond workers.<sup>[1]</sup> But such studies are not common in India where diamond trading is active. It is imperative to look into the problems faced by these communities since many of the working conditions are traditional and harsh. The diamond industries in India consist of two main categories; diamond polishers and sorters.

The main work of diamond polishers is to polish a stone on the grinder which is a vibrating tool and then after each polish they need to check each cuts under eyepiece. The position attained by them is either sitting or standing. The main work of diamond sorters is to segregate the diamonds according to the cut, colour, and clarity for further sell. The position attained by them is mostly sitting. As their profession demands various physical activities like repetitive/sustained movements, prolonged sitting/standing in awkward posture, exposure to vibrations (especially diamond sorter) leading to various mechanical stresses on various parts of body like neck, upper and lower back, shoulder, elbow, wrist or hand and fingers.<sup>[1,2]</sup>

The study will help to find out the commonest musculoskeletal problems in diamond polishers and sorters. The aim of this study was to find out the prevalence of musculoskeletal problems in diamond polishers and sorters along with the prevalence of work absenteeism due to musculoskeletal problems.

## METHODS

**Ethical approval:** The Institutional Research Review Committee had approved the study prior commencement. An informed consent was obtained from all the participants.

**Participants:** This study was a cross-sectional study. 50 diamond polishers and 50 diamond sorters were selected for this study based on inclusion and exclusion criteria. Diamond workers in the age group of 18 to 60 years with an experience of one or more than one year were selected. Workers with any previous musculoskeletal problems prior joining this occupation and any previous trauma or fractures were excluded from the study.

**Procedure:** A self made validated questionnaire was used as an outcome measure. Participants were interviewed with the questionnaire. Self made validated questionnaire consisted of job description, pain evaluation, absenteeism affected by pain, socioeconomic status affected by absenteeism and treatment taken for the pain.

**Statistical analysis:** Data analysis was done by using SPSS software version.16. The prevalence of musculoskeletal pain was calculated.

## RESULT

The demographic details showed that the study population majorly consists of male participants (37/50) in both diamond polishers and sorters. The mean age of diamond polishers was 32.5 years ( $\pm 5.5$ ) and of diamond sorters was 29.36 years ( $\pm 3.2$ ). Majority of the participants were right handed by dominance; 70% in diamond polishers and 68% in diamond sorters. 38 diamond polishers and 32 diamond sorters work for 6 to 8 hours a day.

There was a high prevalence of musculoskeletal pain among diamond polishers 76% (38/50) and among diamond sorters it was 78% (39/50).

The figure 1 indicates the prevalence of musculoskeletal pain in diamond polishers and sorters. The subjects performing polishing work had major complains of low back pain 55% (21/38) followed by neck pain 37% (14/38) and finger pain 34% (13/38). The subjects performing assortment work had major complains of elbow pain 67% (26/39) followed by finger pain 56% (22/39) and neck pain 49% (19/39).

**Figure 1: Prevalence of musculoskeletal pain in diamond workers**

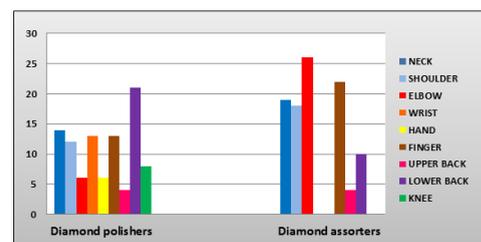
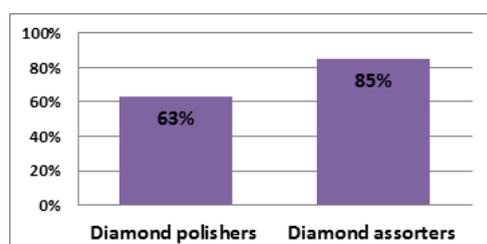


Figure 2 stated that the work absenteeism had increased in both the groups due to musculoskeletal pain. Both diamond polishers 63% (24/38) and diamond sorters 85% (33/39) had reported increased work absenteeism.

**Figure 2: Work absenteeism in diamond workers**



## DISCUSSION

The present study showed that the musculoskeletal problems were higher in diamond workers. The prevalence of musculoskeletal pain was higher in diamond polishers than diamond sorters. As the diamond polishers have to perform dual work at the same time; polishing the diamond and then viewing it under the eyeglass to see the cuts. Hence the efforts taken by musculoskeletal system among diamond polishers is considerably higher than the diamond sorters and thus the musculoskeletal problems through it.

The most prevalent musculoskeletal pain was found in low back followed by neck and fingers in diamond polishers and in elbow followed by neck in diamond sorters. The position attained by diamond workers during work was mainly the prolonged static posture that causes muscle fatigue and muscle imbalance which leads to protective muscle contraction and resulting in muscle spasm. According to the other studies, forward bending posture is a relevant risk factor for the onset of spinal pain. In bending position, the anterior structures of the spine are subjected to compression and the posterior structures undergo in tension causing pain.<sup>[2,3]</sup>

For an upper extremity, in shoulder, elbow and finger pain; prolonged abduction and forward flexion of upper arm may cause stress on the gleno-humeral capsule of the shoulder joint. Since this static posture of the arm is to be held against the gravity for long hours, it will fatigue the muscle causing pain. Repetitive elbow flexion and extension may cause minor trauma to soft tissues and prolonged placement of elbow on the table during work can cause compression of ulnar nerve leading to tingling sensation or numbness. With the minute detailing work in polishing and assorting the diamond by holding diamond in one hand and eyeglass in the other hand, there are pinch prehension involving pad of the finger and opposition of the thumb. There are repetitive small movements of wrist and fingers and thus it causes the pain.<sup>[1,3]</sup>

In a study by Gilad, they have stated that the musculoskeletal problems in diamond manufacturer are very common.<sup>[2]</sup> In such diamond workers, due to continuous repetitive work and vibration received from the diamond mill machine are aggravating factors to cause the musculoskeletal pain in them. Also in the study by Ghost et al, the authors have stated that the health of the goldsmith's workers was highly affected by improper body posture and workload. They have also listed twisting, bending, and over-reaching were the resultant of poorly designed workstation and that led to work-related musculoskeletal disorder.<sup>[4]</sup>

The rest period for diamond workers were less comprising of only 10-20 minutes as they were overloaded with the work for a time being and thus were unable to take adequate rest for a longer duration of time. The job is time consuming because there is detailing work involved, which may be a possible reason for them to take inadequate rest pause.

Work absenteeism due to musculoskeletal pain is significantly higher in both diamond polishers and sorters. The probable cause for work absenteeism is the financial conditions of the workers that halts them to seek proper medical care and deteriorates their condition. The physical, psychosocial, organizational, and the environmental all these combined effects have its impact on musculoskeletal problems and thus there is an increased work absenteeism among diamond workers.<sup>[5,6]</sup>

## CONCLUSION

Prevalence of musculoskeletal pain was higher in diamond workers. Low back and elbow were the most prevalent musculoskeletal pain areas among diamond workers. There was increased work absenteeism among diamond workers.

## ACKNOWLEDGEMENT

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## CONFLICT OF INTEREST

Author report no conflict of interest.

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