

Prevalence of Carpal Tunnel Syndrome in Diamond Jewellery Workers

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ABSTRACT

Aim: The purpose of the study was to find out the prevalence of carpal tunnel syndrome in diamond jewellery workers.

Objective: To find out number of diamond jewellery workers suffering from carpal tunnel syndrome.

Methodology: 100 subjects were selected according to the inclusion and exclusion criteria. Institutional ethic committee approval was taken prior to the study. They were informed about the nature of the study and explanation was given for the questions. Informed consent was obtained. data was collected by A self-made questionnaire containing demographic details and occupational history along with the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ). A special confirmatory test (Phalen's tests test) was done. Data collected through these questionnaires was analysed for statistical differences.

Statistics & Results: 37% of diamond jewellery workers had presence of carpal tunnel syndrome. On Boston Carpal Tunnel Syndrome Questionnaire 36% showed mild symptoms and 10% showed moderate symptoms of carpal tunnel syndrome on symptom severity scale, whereas 33% and 5% of the diamond jewellery workers showed mild and moderate difficulty respectively on functional severity scale.

Conclusion: Study concludes that there is prevalence of carpal tunnel syndrome in diamond jewellery workers with functional and symptom severity scale as measured on Boston Carpal Tunnel Syndrome Questionnaire ranging from mild to moderate and needs immediate corrective as well as rehabilitative measures in diamond jewellery workers.

Clinical implications: Findings of the study can be used to make people aware and prevent the occurrence or worsening of existing carpal tunnel syndrome. Ergonomic advice like taking frequent breaks while working and resting the hand.

Key words: Carpal tunnel syndrome, Diamond jewellery worker, Boston carpal tunnel syndrome, wrist pain

INTRODUCTION

Diamond jewellery workers are skilled labourer working on a daily wages who split, saw, cut, shape, polish, or drill gems and diamonds to prepare them for use in jewellery or industrial tools. The position also involves fabricating, finishing, and evaluating gem and diamond quality. Studies have shown that knee, back, neck, wrist, shoulder and elbow pain are common musculoskeletal problems that diamond

jewellery workers experienced the most. [1]

When the hand is placed in a position outside of its neutral position, it causes the tendons to rub against the walls of the carpal tunnel and cause friction. Awkward postures such as working with the joints near their end range of motion; uneven loading and static muscle activity are all risk factors in the development of Carpal tunnel syndrome. [2]

They increase the biomechanics stress on the muscles and the surrounding joint

tissues. This causes pain in the hand, unpleasant tingling, pain or numbness in the distal distribution of the median nerve (thumb, index, middle finger and the radial side of the ring finger^[3] and a reduction of the grip strength and function of the affected hand.^[4] The work demand in diamond workers is similar to the above-mentioned causes of carpal tunnel syndrome. Symptoms tend to be worse at night, and clumsiness is reported during the day with activities requiring wrist flexion.^[5]

Studies have shown prevalence of Carpal tunnel syndrome in occupations having similar work demand like Chikan embroidery workers,^[6] office workers who use a keyboard and mouse^[7] and construction workers^[8] who have hand-intensive occupation involving repetitive use of hands and wrists.^[9] Repetitive hand movements, strain the muscles attached to the tendons traveling through the carpal tunnel. Inflammation develops and pressure increases on the median nerve. Sustained postures with the wrist bent forward or backward increase pressure on the median nerve.^[10] As per the National Institute of Health, carpal tunnel syndrome often results from physical job activities that involve using tools and hand-held vibrating equipment's.

Hence, looking at the aforementioned reasons it is necessary to find out, whether diamond jewellery workers are at risk of developing carpal tunnel syndrome considering the nature of work in which they are involved. Thus, the present study aims to find out prevalence of carpal tunnel syndrome in diamond jewellery workers.

METHODOLOGY AND PLAN OF STUDY

Study design: Survey based -cross sectional

Sample population: diamond jewellery workers

Study setting Diamond factories in Mumbai

Sample size: 100

INCLUSION CRITERIA:

Individuals with minimum one year of experience with no previous history of cervical or shoulder trauma, no previous history of cervical spine injury, no previous history of wrist or hand injury.

EXCLUSION CRITERIA:

Individuals with less than one year of work experience, history of cervical or shoulder trauma, previously diagnosed cervical radiculopathy, diabetic neuropathy, thoracic outlet syndrome, complex regional pain syndrome, alcoholic neuropathy, tendinitis of forearm muscles

PROCEDURE:

Institutional ethic committee approval was taken prior to the study. They were informed about the nature of the study and explanation was given for the questions. Informed consent was obtained. Data was collected by a self-made questionnaire containing demographic details and occupational history along with the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ). A special confirmatory test (Phalen's tests test) was done. Data collected through these questionnaires was analyzed for statistical differences.

RESULTS

The above study concludes that the average age of population involved in the study was (38 ±10) years who are working on an average of (8±3) years for average of (6±1) days in a week. They work for 6-10 hours a day on an average where they sit for 1-2 hours on a stretch with less than 15 minutes of break in between. Out of the 100 people interviewed 46% of the study population have chair with back rest and without arm rest, 36% of population have chair with back rest and arm rest this also infers that 17% have chair without arm rest and backrest while 1% of people have a chair without backrest but with arm rest in their chair. 91% of the study population feel that the table they work on is of appropriate height while 9% of the population does not find the table of appropriate height.96% of the population say that the distance between

their table and chair is comfortable and 4% say that the distance is not comfortable.

The study population uses combination of equipment's like 70% of study population uses sharp object with heavy tools, 13% of the population uses sharp and vibration object, 8% of the population uses sharp and heavy objects, 6% of the population uses sharp, heavy, vibrating tools and 1% of the remaining population uses sharp, heavy, vibrating and heat producing objects. 44% of times in Radial, ulnar deviation along with flexion followed by 20% of then choose to work in radial, ulnar deviation followed by 23% of them in ulnar deviation with flexion and the rest 13% of times in flexion, extension. According to the study population 53% of them feel pain in their wrist and 47% of them do not feel any pain in their wrist. Population who feel pain in the wrist have combination of type of pain 33% of time they have tingling pain, 33% have numbness in the wrist while 9% have throbbing pain and 3% have sharp shooting pain felt. 32% of people sometimes have pain in the wrist, 8% have pain most of the time and 7% always have pain. 63% of the people show negative result on Phalen's tests test while the other 37% of people show positive results. 33% of people from the study population do nothing for the pain, 5% of them take medication while 5% of them visit a doctor whereas only 3% of them visit a physiotherapist.

DISCUSSION

Musculoskeletal problems are faced by everyone; there is strong evidence that supports that people working in a certain fixed postures for very long period of time have pain in their wrist which suggests the presence of carpal tunnel syndrome. Many studies have suggested that age plays a significant role in Carpal tunnel syndrome, several study agree that risk of Carpal tunnel syndrome increase after the age of 30 since it is a cumulative trauma disorder. Similarly, in the present study 76% of the study population is above the age of 30. [11-

15] When force is applied repeatedly over a prolonged period to the tendons found in the carpal tunnel, the cumulative forces may cause soft-tissue micro-tears (small tears found in tendons, ligaments and muscles) and trauma. It is when fatigue is present and the muscle tension is high that a worker is placed at an increased risk. This is because the muscle becomes weaker and more susceptible to failure.

It has long been recognized that workers with predominantly repetitive tasks, or those maintaining fixed postures for long periods of time, have an increased risk of developing work-related musculoskeletal illnesses. [3,9] According to the study population 53% of them do not feel pain in their wrist and 47% of them do feel any pain in their wrist. Population who feel symptoms in the wrist have combination of type of symptoms 33 of them have tingling, 33 have numbness in the wrist while 9 have throbbing pain and 3 have sharp shooting pain. Phalen's tests test is a special diagnostic test used for confirmation of carpal tunnel syndrome similarly in the above study we can see that 37% of the study population have positive Phalen's tests test. When the hand is placed in a position outside of its neutral position, it causes the tendons to rub against the walls of the carpal tunnel and cause friction. Awkward postures such as working with the joints near their end range of motion; uneven loading and static muscle activity are all risk factors in the development of Carpal tunnel syndrome. [6] In extreme joint positions, such as flexed or extended wrist, the muscle is also not at their optimal working length. Therefore, the muscles are incapable of developing forces as efficiently as they are more likely to fatigue. Static muscle can also increase the risk of Carpal tunnel syndrome since static muscle contraction can lead to reduced blood flow and increased compression on the median nerve [16,17] Similarly we can see in the results study 44% of times workers work in Radial, ulnar deviation along with flexion followed by 20% of then choose to work in

radial, ulnar deviation followed by 23% of them in ulnar deviation with flexion and the rest 13% of times in flexion, extension.

Numbness in the area of median nerve is one of the first symptoms of Carpal tunnel syndrome, as seen in the present study 33 out of 47 people who feel pain in the wrist have numbness along with other symptoms like tingling, throbbing and sharp shooting pain. Strong gripping and pressure on the palm can also increase the risk of Carpal tunnel syndrome. This is typically known as a pinch grip. This is when an object is held between the fingers and the thumb. A person engaged in a pinch grip, is only able to generate 25% of a power grasp or gross grip. To generate a specific force, a pinch grip requires a much greater muscle exertion than a power grip (object in the palm of the hand). Hence, a pinch grip has a greater likelihood of creating injury. Vibration exposure is usually accompanied with exposures to forceful and repetitive motions and awkward postures, and seems to affect the circulatory (blood vessels), nerves, and muscles of the wrist. [18,19,20]

Vibration as the primary cause of Carpal tunnel syndrome is due to the vibration-induced edematous (swelling) reaction in the median nerve itself and in the tissues surrounding the nerve. Hand vibration reduces the circulation in the hands and fingers causing blanching. This is a result of the reduction in blood flow and a reduction of the delivery of oxygen and nutrients to the hands and fingers. Similarly, in our study combination of equipment's like 70% of study population uses sharp object with heavy tools, 13% of the population uses sharp and vibration object, 8% of the population uses sharp and heavy objects, 6% of the population uses sharp, heavy, vibrating tools and 1% of the remaining population uses sharp, heavy, vibrating and heat producing objects. Based on the results of the present study it is seen that the diamond jewellery workers do present with carpal tunnel syndrome having symptoms like pain, paresthesia along with positive phalen's tests sign similarly in this study

37% of the study population have positive Phalen's tests special test done for the confirmatory diagnosis. It requires necessary measures to be taken in terms of preventive and rehabilitative strategies to deal with the same.

CONCLUSION

We conclude that 37% of diamond jewellery worker have prevalence of carpal tunnel syndrome with functional and symptom severity scale as mentioned BCT ranging from mild to moderate and needs immediate corrective as well as rehabilitative measure.

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