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Ergonomic analysis to study the intensity of MSDs among practicing Indian dentists

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Abstract

Throughout the world background literature reviews have shown a high prevalence of musculoskeletal disorders (MSDs) among dental practitioners. Prevalence of MSDs among dental practitioners in India is not well documented. Aim of this study is to determine the prevalence and distribution of MSDs among dental practitioners in Pune city in the state of Maharashtra, India. A cross sectional descriptive study in which a self-administered questionnaire (Body part discomfort survey) was used to assess the musculoskeletal symptoms among dental practitioners. In this study (n=57) in total, 47% of the respondents were males and 52% were females. The recorded data was analyzed. This questionnaire results (for all body parts), showed neck trouble to be the most predominant MSDs (69%), followed by shoulder (51%), upper back (51%), and lower back problem (39%). This results suggest that there is a need for change of body posture. This mean can be achieved by using a proper body support or change in work area. A prototype design is suggested to overcome this problem. The deployment of the prototype has reduced the RULA scoring and proved by t-test calculation. Results were verified by using the p-chart. The fraction of defects for all 12 areas and each respondent were calculated for further study.

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1. Introduction

Musculoskeletal disorders (MSDs) are injuries and disorders of the musculoskeletal system. Documented studies in the literature across the world have shown a high prevalence of MSDs among the dentists [1,2,3,4,5,6,7,8,11]. The dentists will generally have a chair-side assistant sitting at the other side of the patient. Because of the restricted work area (the mouth) and the need for dexterity, the dentist may need to adopt inflexible work postures [3]. So far some studies show that one out of ten dentists' report having poor general health, and three out of ten dentists report having poor physical state [1] (MSDs) can be avoided by increasing awareness of the postures used during work, redesigning the workstation to promote neutral positions [9]. Proper ergonomic design is necessary to prevent repetitive strain injuries, which can develop over time and can lead to long-term disability. Ergonomics is concerned with the efficiency of people in their working environment. It takes account of the worker's capabilities and limitations to ensure that tasks, equipment, information and the environment suit each worker. [9]

India has been battling traditional public health problems like communicable diseases, malnutrition, growing population, and inadequate medical care, apart from the occupational health problems. MSDs is one of the major occupational health problems in India and estimates have shown that MSDs contributes to about 40% of all costs. Towards the treatment of work related injuries. The prevalence of MSDs among dental practitioners is not well documented in India [10]. Due to the importance of understanding the impact of MSDs among dentists, this study developed and conducted a survey among a mix of dental students (at the junior level) and experienced faculty at a dental college in western India. The next section will discuss the materials and methods used to accomplish this objective.

2. Materials and Methods

This descriptive study was conducted in 2014 to assess the prevalence of MSDs amongst dental practitioners in western India. The purpose of the study was explained to the respondents and approval was obtained.

A total of 57 dentists were randomly selected and were asked to complete the developed questionnaire. (Cornell musculoskeletal discomfort questionnaires, CMDQ) [12]. The self-administered questionnaire was handed over to the dental practitioners at the respective clinics. This questionnaire was prepared on the basis of the guidelines for surveying the body parts discomfort. Questionnaires were used to collect the required data on occupational and demographic variables and the data related to the prevalence of MSDs. The symptoms of MSDs in this study are defined as discomfort, pain, fatigue, limited range of motion and loss of motor control in neck, shoulders, and wrists/hand, lower and upper back. The research framework used in this study is shown in Figure 1.

2.1. Questionnaires

The questionnaire (CMDQ) used in this study is comprised of three sections, as follows:

- Section A: In this section, a questionnaire was designed to cover personal work related profile information such as sex, age, work experience in years, height and current weight, and medical history (if any) of relevance to the ergonomic study.
- Section B: In this section, the part of the (CMDQ-part 1) questionnaire^[12] that covers objective pain related questions in different parts of body such as neck, shoulder, arm, back and lower limbs, etc.
- Section C: In this section, the part of the (CMDQ- part 2) questionnaire^[12] covers pain in the fingers, palm, and operational body parts which dentists use more vigorously.

In terms of the musculoskeletal symptoms prevalence of the MSDs is recorded in this questionnaire like (ache, pain, discomfort) in preceding 4 months. The Cornell Musculoskeletal Discomfortable Questionnaires (CMDQ) includes a diagram of human body (viewed from the back, divided into the twelve anatomical areas) to help the participants in identifying pain in the areas of the body. The questions are directed to three parameters: frequency, discomfort level and interference^[12-12]. Pain or discomfort felt by the respondents performing the same task for various body parts was ascertained in the same questionnaire. All dentists could not answer all the questions in a

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