



## Original Article

# Insights into Ergonomics Among Dental Professionals of a Dental Institute and Private Practitioners in Hubli–Dharwad Twin Cities, India



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## ABSTRACT

**Background:** To assess the knowledge, attitude, and practice of ergonomics among dental professionals of Hubli–Dharwad twin cities, India.

**Methods:** Investigator-developed, self-administered, closed-ended questionnaire assessing knowledge, attitude, and practices regarding ergonomics during dental practice was filled in by undergraduates, house surgeons, postgraduates, and faculty members of dental institutions and private practitioners from Hubli–Dharwad twin cities.

**Results:** Data were collected from a total of 250 participants, 50 belonging to each academic group. Overall mean knowledge, attitude, and practice scores were 52%, 75%, and 55%, respectively. Significant correlation was found for age with attitude ( $\chi^2 = 10.734$ ,  $p = 0.030$ ) and behavior ( $\chi^2 = 12.984$ ,  $p = 0.011$ ). Marital status was significantly associated with all the three domains; knowledge ( $\chi^2 = 29.369$ ,  $p = 0.000$ ), attitude ( $\chi^2 = 29.023$ ,  $p = 0.000$ ), and practices ( $\chi^2 = 13.648$ ,  $p = 0.009$ ).

**Conclusion:** Participants had considerable awareness and behavior toward ergonomics in dental practice. The high attitude score indicates stronger acceptance of ergonomics principles and guidelines during routine dental procedures. The current study highlights the situation of ergonomics in dental practice in the form of knowledge, attitude, and practices.

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## 1. Introduction

Ergonomics is the scientific study of people and their working conditions, especially done in order to improve effectiveness [1]. In Greek, “Ergo” means work, and “Nomos” means natural laws or systems. Ergonomics, therefore, is an applied science concerned with designing products and procedures for maximum efficiency and safety [2]. Dentistry is a profession that generally produces various musculoskeletal pains and soreness, which are slow to appear; consequently, the symptoms are usually ignored until they become chronic and permanent lesions become evident [3]. It is

very important to maintain an adequate work posture and that the instruments and furniture that the dentist is working with have adequate working characteristics [4].

Among the wide range of musculoskeletal disorders, back pain was the most common among dentists, followed by neck pain, high muscle tension on the trapezoids, tendinitis, carpal tunnel syndrome, nerve trapping, early arthrosis, myopia, and auditive alterations [5].

Pargali and Jowkar [6] in 2010 reported that 73% of dentists complained of back and neck pain. Even though the practice of four-handed dentistry and the use of ergonomically well-adjusted

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equipment are on the rise, literature reports have reported a rise in back, neck, shoulder, and arm pain, in almost 81% of dental professionals [6]. Work-related stress, tension, and awkward postural positions can add to back and neck problems for the dentist [7–11]. There is always a neutral zone of movement for every joint and muscle. Injury risks increase whenever work requires a person to perform tasks with body segments outside of his or her neutral range in a deviated posture [12].

In Indian scenario, abrupt mushrooming of dental institutions is occurring. The total number of dental institutions in India is currently 300. The number of students enrolling for a Bachelor of Dental Surgery (BDS) degree in various dental institutions across India is approximately 24,700 [13] and is on the rise.

According to the syllabus for BDS proposed by the Dental Council of India (DCI), undergraduates are exposed to clinical working conditions for the very first time during the 3<sup>rd</sup> year of courses, during which every student undergoes training in various subjects on a rotating basis for a fixed amount of time. This is the time during which ergonomics, as a part of the regular curriculum, should be taught to students, so that its importance in practice is emphasized and various guidelines followed. For this reason, undergraduates, i.e., both 3<sup>rd</sup>- and 4<sup>th</sup>-year BDS students, were included as study participants.

Most of the graduates end up in private practice and few are involved in academia; the faculties of dental colleges are also engaged in private practice [14]. Hence, the dentists who are in private practice should place special emphasis on ergonomic habits to improve their longevity. The age of the dentist is closely related to how many years the dentist has been practicing. One study observed increasing years of practice to be related to an increased prevalence of musculoskeletal problems [15]. Female dentists outnumber males [16], and the literature suggests that they are more likely than men to experience musculoskeletal pain [17]. Therefore, education is needed regarding various musculoskeletal problems that occur because of unhealthy postural habits during delivery of oral health services, and preventive and corrective measures for healthy lifestyles during professional practice should be promoted. In the Indian set-up there is a severe dearth of literature evaluating knowledge, awareness, and practices among dental professionals regarding optimal postures at the time of rendering oral health services. Therefore, the current observational survey was conducted to evaluate the awareness, attitudes, and practice of ergonomics during routine dental procedures among undergraduates, house surgeons, postgraduates, faculty members of Sri Dharmasthala Manjunatheshwara (SDM) College of Dental Sciences and Hospital, Dharwad, Karnataka, India and private practitioners of Hubli–Dharwad twin cities, India.

## 2. Materials and methods

The study was conducted among undergraduates (3<sup>rd</sup>- and 4<sup>th</sup>-year BDS students), house surgeons, postgraduates, and faculty members and private practitioners of the aforementioned private dental college and cities. Ethical clearance was obtained from the Ethical Review Committee of the Institutional Review Board of SDM College of Dental Sciences and Hospital. The head of the institution and other faculty members were informed about the purpose of the study and their permissions obtained. The study population consisted of 50 each from a group of undergraduates, house surgeons, postgraduates, and staff attending the institution and private practitioners, practicing in Hubli–Dharwad twin cities, through a convenient sampling method.

The questionnaire was investigator developed, self-administered, and closed-ended. The undergraduates, house surgeons, postgraduates, and staff were gathered in a lecture hall and one of

the authors gave instructions regarding the purpose of the survey and completion of the survey questionnaire. Study participants were given a format consisting of informed consent, instructions, and the questionnaire. They were given 1 hour to complete the questionnaire.

Private practitioners were approached by the same author (S.K.) who gave the instructions to the rest of the study participants at their clinics. The purpose of the survey was explained and those who gave consent for participation in the study were included. The items for the questionnaire were generated from four sources: theory, research, observation, and expert opinion [18]. The questionnaire consisted of a total of 37 items with 21, eight, and eight items assessing knowledge, attitude, and behavior, respectively. Attitude was assessed on a five-point Likert scale: definitely yes, yes, neutral, no, and definitely no. The response options for behavior were also assessed on a five-point Likert scale as follows: < 1 month, 1–6 months, 6–12 months, > 1 year, and never (for the first 2 items) and always, very often, often, rarely, and never (for items 3–8). Knowledge was assessed by a total of 21 questions on ergonomics that focused on principles of ergonomics in routine dental procedures such as cavity preparation, extraction of teeth, and various complications. Questions related to attitude assessed whether ergonomics should be part of the dental curriculum, if dentists should follow the ergonomic principles in routine dental practice, whether the dental chair and instruments play any role in following ergonomic principles in routine dental practice, whether the dentist should alternate between sitting and standing between patient appointments, and whether various dental institutions should conduct continuing dental education. Questions pertinent to behavior assessed how frequently the respondents obtained information related to ergonomics in dentistry either from the Internet or scientific journals, used dental loupes for magnification purposes, made an effort to maintain neutral posture while working, attended any workshop/lecture on ergonomics in dental career, or performed stretching exercises in between patient appointments. The range of possible scores for knowledge, attitude, and behavior were 0–21, 8–40, and 8–40, respectively. Correct answers for knowledge questions were given a score of 1 and wrong answers were given a score of 0. Attitude scores ranged from 5 (definitely yes) to 1 (definitely no), and behavior scores ranged from 5 (< 1 month) to 1 (never). Prior to the start of the study, the questionnaire was pretested on 50 study participants. Cronbach  $\alpha$  values for knowledge, attitude, and behavior were 0.684, 0.784, and 0.810, respectively. The split-half reliability values for knowledge, attitude, and behavior were 0.791, 0.881, and 0.698, respectively.

The questions underwent subsequent revisions prior to the main study. The revisions were related to the clarity of 10 questions of knowledge, and five and three questions each from attitude and behavior. The results of the pilot study were not included in the main study; only the reliability and validity was assessed. The pilot study participants did not take part in the main study.

The data were entered into the MS Excel (MS Office version 2007, Microsoft, Redmond, WA, USA) and Intercooled STATA version 9.2 (Stata Corp., College Station, TX, USA) was used to perform statistical analysis. One-way analysis of variance was used to assess the differences in knowledge, attitude, and behavior among academic positions. Scheffe's test was used to assess pairwise differences in the knowledge of study participants with respect to academic positions. Pearson's correlation analysis was used to assess associations between knowledge, attitude, and behavior of study participants. Chi-square test was used to assess associations of age, sex, religion, and marital status with knowledge, attitude, and behavior of study participants.

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