Original Article

ERGONOMICS RELATED DISORDER AMONG DENTISTS IN PESHAWAR – A QUESTIONNAIRE SURVEY

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ABSTRACT

Objectives: *To assess the level of awareness about ergonomics among dentists in addition to preventive measures undertaken by them to avoid musculoskeletal disorders.*

Materials and methods: *Specially designed questionnaires were distributed among dental practitioners at a private dental hospital, Sardar Begum Dental College (SBDC) and various private clinics throughout Peshawar, to evaluate the awareness about ergonomics and its hazards in a dental setting. Those dentist with work experience of 1-25 years were included in the study, barring those with significant medical conditions such as rheumatoid arthritis, congenital skeletal disorder, scoliosis, spinal surgery and pregnancy.*

Results: *According to the present study 65.8% of the dental practitioners work with an assistant. Majority of the participants practice dentistry in sitting position. In this study 27.5% of the dentists worked without any break, 38.2% had one break and only 6.1% took a break after every patient. Only 06% of dentists exercise regularly. The MSDs was recorded among 90% of participants with 49.4% neck pain, 28% in shoulders, 15.3% in wrist, and 17.3% in elbow. Discomfort and pain in hip, knee and foot was 37%, 12% and 17.3% respectfully.*

Conclusion: *It was concluded that limited ergonomics in the work environment of the dentist's results in MSDs, and its prevalence is very high. The symptoms of MSDs increase with the number of years of practice. The prevention and reduction of MSDs among dentists should include their education in dental ergonomics and awareness regarding the importance of work-related risk factors.*

Key words: *Musculoskeletal disorders (MSD), Ergonomics, Dental Surgeons, Occupational hazards.*

INTRODUCTION

The term occupational hazard refers to a danger due to the nature of his/her particular job[1]. In 18th century, Bernadino Ramazzini recognized the role of occupation in dynamics of health and diseases[2,3]. Ergonomic-related risk factors for development of health disorders can be categorized as personal variables such as age and hereditary factors or related to work such as monotonous motion, awkward position, force, high static muscle and joint load, vibration, temperature, biological factors, non-neutral body postures, radiation[4-8].

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Dentistry is known to be a challenging profession where Musculoskeletal disorders (MSDs) is a biggest threat among dental care workers as indicated in many studies[9-13]. A study done in Sweden showed that dentists had higher prevalence of musculoskeletal symptoms at neck and shoulder region[12]. In spite of 88% of dentists report good health, a few studies prove that one out of ten dentists reports having poor general health and three out of ten dentists report having poor physical state[32]. The greatest risk factor for MSDs is various working postures[14] including rotation and flexion of the cervical spine, flexion of the elbow, and repetitive forceful hand grip which are natural in dental work[15]. Since dental work consists of precision tasks, involving a high degree of visual and manipulative elements, sometimes in combination with exertion of force[16].

Poor working postures as well as repetitive tasks, such as root canal treatment, filling. cavities preparation, scaling or root planning, contribute greatly to both, musculoskeletal disorders (MSDs) and psychological stress. Such postures cause fatigue and trauma in the neck, upper back and shoulders, and also work-related injury among professionals[17,18]. It is a well-known fact that stress can induce muscular contraction and pain, especially in the trapezius muscle[17, 19, 20] in combination with muscles and joints pain along headache and backache[21]. Comparing prevalence of body symptoms among dentists with other professionals such as office employees, pharmacists and farmers, dentists are on the top with more terrible symptoms[21,22,23].

In Peshawar, limited information is available regarding MSDs among dental personnel. This study was conducted to determine the prevalence of musculoskeletal pain and its associated factors among dentists in Peshawar Khyber Pakhtunkhwa.

MATERIAL AND METHODS

Ethical approval was obtained from the institutional ethical committee of Sardar Begum Dental College Hospital for conducting the study. A cross sectional study was carried out at Sardar Begum Dental College and Hospital and private dental clinics in Peshawar, Pakistan from 1st February 2013 to 10th February 2013. In this survey a total of 196 dentists provided information by filling an anonymous questionnaire focused on MSDs. Written Informed consent was obtained from all the participants. No incentives were promised for the participants and no effort was done to involve the non-respondents. Confidentiality of data was strictly observed by restraining access to the data only to the researchers.

The study criteria for dentists was based on working experience between 01 to 25 years duration without any significant medical conditions such as rheumatoid arthritis, congenital skeletal disorders, scoliosis or any surgery of spine and with no history of pregnancy during data collection. Dentists with more than 70% involvement in administrative work were also excluded from the study.

Research Tools

Data was collected on a proforma with three specific sections. The first section included demographic questions regarding age, gender, work duration and acquired specialization. Section two included questions with work conditions (on neck and back pain and routine working postures, work with or without an assistant and number of breaks and their purpose). The third section concerned with MSDs. Respondents were explained about pain as if they experience any pain or discomfort at upper and lower back for one day or more in the last 12 months. Respondents were considered as having back pain if they had any pain, ache or discomfort from the bottom of the neck and extends to the lower back, including gluteal regions with or without radiating pain into the legs in the past 12 months which lasted for one day or longer[24, 25].

Statistical Analysis was analyzed using Statistical package for Social Science (SPSS 17.0). The data has been presented as frequency tables, bar charts and chi square test and t-test was used to assess the significant difference between the genders for their responses. A p-value of <0.05 was considered as significant.

RESULTS

According to data collected from 196 surveyed dentists, 46.2% or respondents were general practitioners while 16.6% dentists were specialists in Conservative Dentistry, 12.1% Orthodontics, 10% Maxillofacial Surgery, 11.68% Prosthetic Dentistry, 1.62% paediatric dentistry, 1.8% periodontology. Respondents mean age was 22.37 years. Among these respondetns, 57.14% were males and 42.86% were females. It was found that the majority of dentists works with an assistant 65.8%, among them male dentists were 44.1% and female dentists were 55.9%. The details are given in Table 1.

Male dentists who practice dentistry in sitting position were 85.7% and 14.2% practice in standing position. Similarly 73.8% Female dentists practice dentistry in sitting position and 26.2% practice in standing position. Our results show that 27.5% of the dentists worked without any break, 38.2% had one break, the details of the distribution are shown in Table 2. Only 06% of dentists exercise regularly and nearly 32% exercise occasionally. While 62% of the respondents claim that they do not need any kind of exercise.

Table 3 represents the complete list of surveyed dentists with MSDs. The MSDs was recorded among 90% of participants with neck pain in 49.4% and tho-

racic area with 17.3%. Regarding the upper limb, 37% of participants reported pain in hand and fingers and only 17.3% reported pain in the elbow region. Analysis of the lower limb showed that majority of the participants exhibited pain in the hip region (37%) whereas only 17.3% complained of foot pain.

Treating a patient in a standing position was significantly more often (p = 0.01) related to pain in the knees and feet, as reported by the respondents working in a standing position. Pain in knees was reported by 78.3% cases reported and 88.2% dentists reported pain in feet while working in standing position as shown in Table 3. Statistically no significant correlation was found between MSDs and working with or without an assistant, exercise and rest breaks. (p=1.13) It was establish statistically that more females experienced pain in their fingers and more males experienced pain in lower back. (p=0.01)

Table-1 Gender Distribution

	Male		Female		Total	
Gender	**n**	**%**	**n**	**%**	**n**	**%**
With Assistant	57	44.1	72	55.9	129	65.8
Without Assistant	40	60.0	27	40	67	34.0
Total	**97**	**49.4**	**99**	**50.5**	**196**	**100**

Table-2 Distribution of Break

Rest breaks	**Yes**	**Male**	**Female**	**%**
Not at all	54	34	20	27.6
Once a day	75	34	41	38.2
Twice a day	24	10	14	12.2
After every 2 patients	31	13	18	15.9
After every patient	12	4	8	6.1
Total	**196**	**95**	**101**	**100**

DISCUSSION

The results of the present study have established that the majority of dentists in Peshawar do experience physical health problems. A similar situation was reported in the Netherlands where one out of ten dentists indicated having poor general health and three out of ten poor physical health[26].

In this study 75.8% dentists agreed with the statement that their work is physically difficult. The high prevalence of fatigue may be associated with specific features of their work. According to our findings, physical disorders and illnesses appear early in dental careers. The high prevalence of physical disorders may result from the lack of understanding of ergonomic principles and uncomfortable working environment which was a common practice due to outdated equipment. However, no correlation was found between work and MSDs, apart from the influence of

Table-4

Position	**Knees pain**		**Feet pain**	
	n	**%**	**n**	**%**
Sitting	5	21.7	4	11.8
Standing	18	78.3	30	88.2
Total	**23**	**100**	**34**	**100**

Table-3 Distribution of Muscloskelatal Disorders

MSDs	Number of dentists according to the duration of employment (n)					Total	
	1-5 years	6-10 years	11-15 years	16-20 years	>20 years	n	%
Back/spine							
Neck	06	12	24	17	38	97	49.4
sacral area	12	19	14	6	32	83	42.3
lumbar area	08	14	22	14	12	70	36.0
thoracic area	02	08	06	04	14	34	17.3
Upper limb							
fingers/hand	11	12	20	11	18	72	37
Shoulder	6	9	7	1	32	55	28
Wrist	2	5	2	1	20	30	15.3
Elbow	2	1	8	11	12	34	17.3
Lower limb							
Hip	22	1	13	4	32	72	37
Knee	3	2	4	2	12	23	12
Foot	2	6	5	11	10	34	17.3

standing work position on pain in knees and feet. Thus, the present study did not allow for finding direct relationships between the causes and the effects.

Grabauskas et al[27] reported that to reduce musculoskeletal disorders are often only partially implemented even in a highly motivated group. Barriers that made a change difficult included changing old routines and financial aspects of dental practice.

Åkesson et al[17] assumed that the work posture of dentists plays an important role as a risk factor for the development of work-related disorders. A high frequency of MSDs among dentists was confirmed in numerous subsequent studies[5,28,29]. As it is commonly known, maintaining poor posture for long periods of time can result in chronic muscular fatigue, discomfort or pain, even if the soft tissues are not structurally altered. More significantly, prolonged exposure to high static muscle and joint load may lead to pathological effects and permanent disability[5,8,18].

It should be noted that dentists perform hard and intensive work. They often work long hours, sometimes in poorly designed working environments and in harmful working conditions. The results of our study suggest that physical health disorders are a major health problem among Peshawar dentists. These disorders could be defined as profession-related and suggest that there is an increased vulnerability of dentists to certain disorders and illnesses.

Newell and Kumar[28] confirmed that in recent year's attention and awareness of MSDs in the dental profession has noticeably increased due to a rise in the number of reported MSDs.

Szymañska et al[30] studied the ergonomic work and relationship between working postures of dental operators, and the health hazard or occupational diseases in a population of Polish dentists[28]. Similar to the results obtained in the present survey, the most frequent MSDs were located in the upper and lower back region. Also, the findings regarding work position and four-handed dentistry reported by Szymañska[28] are consistent with our results.

In general, the MSDs in the study group were consistent with those reported by dentists in other countries, both in previous and current investigations[4,28,29,31,32,33]. Earlier studies showed that neck and shoulder disorders, and a combination of both, are common among Swedish and Danish dentists[10,11]. In recent years, for Canadian orthodontists in Alberta, low back pain was the most prevalent of MSDs (59%), followed by neck (56%) and shoulder pain (47%)[28]. The MSDs predominant in Italian dental professionals occur in the spine, shoulder, elbow and hand [29]. In another study[26] dental workers reported hand and wrist disorders less often than symptoms in the neck and/or back. The above results are in accordance with the findings presented in this study.

The number of years of practice plays an important role in the occurrence of MSDs, although both younger and older dentists report the same symptoms, as confirmed in other studies[32]. Our findings show that pain in the hip, feet, shoulders and elbows is reported significantly more often after 20 years of practice. However, dentists working in a standing position experience pain significantly earlier, that are, after approximately 10 years of practice. Young general dental practitioners work very intensively in the first years of practice, often over 8 hours a day, which causes an early occurrence of MSDs, even within 3 years. Possibly due to experiencing pain and muscle stiffness they start to keep fit and work less intensively, this is why they do not experience the pain in the next few years. Another explanation could be that over months and years, the body adapts to the abnormal posture caused by these muscle imbalances[8]. Nevertheless, after the next 9–10 years the pain recurs. Meanwhile, some reports showed the prevalence and distribution of symptoms of MSDs occurring even among dental students[21, 25]. Findings suggest that by raising awareness of these problems among students, the risk of MSDs can be reduced. It has been recommend that as a preventive measure; students should be taught, from the beginning of their undergraduate studies, about optimal working postures and good work habits[18]. In order to protect their health, all dentists, regardless of their dental specialty, should receive education about all aspects of dental ergonomics, including rest breaks. Regular rest breaks and physical exercise are recommended to prevent the accumulation of harmful agents[18].

Szymañska[30] found no significant relationship between the lack of rest breaks and presence of physical activity, and the number of MSDs. In our study, we observed that the respondents who did not use rest breaks, statistically more often experienced hip pain, and the respondents who did not use physical

exercise reducing MSDs felt pain in the neck and spine. Although almost 20% of the surveyed dentists know the relaxation exercises, only 10% of them exercise regularly. According to Newell and Kumar[28], dentists can reduce the risk of developing MSDs by using proper body posture and positioning during clinical procedures, incorporating regular rest breaks, maintaining good general health, and performing exercises for the affected regions of the body.

CONCLUSION

From this study it is concluded that:

1. Limited ergonomics in the work environment of the dentist's results in MSDs, and its prevalence is very high.
2. The symptoms of MSDs increase with the number of years of practice.
3. The prevention and reduction of MSDs among dentists should include their education in dental ergonomics and awareness regarding the importance of work-related risk factors.
4. Further research is therefore needed to elucidate the causes of physical health problems among dental practitioners, as this will be a major step towards finding the solutions of this occupational health problem.

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