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Dental Ergonomics- A Questionnaire based cross sectional study

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Abstract-
Dentistry is a demanding profession, commonly conducted in very narrow work areas, resulting in static work postures. Ergonomic is defined as a systematic approach to study the relationship between the individuals, their tools and the environment they work. Due to lack of ergonomic awareness, inattention to proper posture and the need to see into areas with limited visual access, dentists in general are prone to neck and shoulder strain. The prevalence of musculoskeletal complaints in Dentists is high although relatively few studies had focus in this profession. A questionnaire survey was carried out among 159 Dentists in Jaipur. Questions include physical, psychosocial workload, need for recovery, perceived general health and the occurrence of musculoskeletal complaints.

Words- *Ergonomics, pain, Mucoskeletal, workload, dentistry*

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I. Introduction

"Ergonomics" has been become a popular term. The term has been used with most professions but increasingly in the dental profession. In Greek, "Ergo," means work and, "Nomos," means natural laws or systems. Ergonomics is a way to work smarter—not harder—by designing tools, equipment, work areas and tasks to fit the individual worker. It leads to improved productivity, reduced injuries, and greater worker satisfaction.[1] it takes account of the worker's capabilities and limitations to ensure that tasks; equipment, information and the environment suit each worker[2]

Dental professionals are commonly exposed to a variety of occupational hazards such as chemical, biological and ergonomic which create musculoskeletal disorders. Dentists and dental hygienists are at a greater risk of work-related musculoskeletal disorders than the general population. 54% to 93% of dental professionals have been reported with work-related musculoskeletal injuries with pain and dysfunction most frequently occurring in the spine (neck and back), shoulders, elbows and hands.[3]

These problems can be avoided by increasing awareness of the postures used during the work, redesigning the work station to promote neutral positions, examining the impact of instrument use on upper extremity pain, and following healthy work practices to reduce the stress of dental work on the practitioner's body[4]

The prevalence of musculoskeletal complaints in Dentists is high although relatively few studies had focus in this profession. The aim of this study was to investigate the relations between physical, psychological, and individual characteristics and different endpoints of musculoskeletal complaints of low back, neck, shoulders and hand/wrist.

II. Material and Methods

A cross sectional questionnaire study was conducted among dental professionals of Jaipur. The study included 159 practicing dentists, age group -20 years to 60 years, dentist registered to specific dental council and General as well as specialized practitioners were included in the study. This consists of general and specialised practioners as well as post graduate students of dental colleges situated in Jaipur district.. Dentists already suffering from any muco-skeletal disorder were excluded from the study. After taking the Verbal informed consent of participants questionnaire were given them and they were asked to fill the answer's accordingly.

The variables included in the study are (a) Gender, (b)Age, (c)Awareness, (d) Relaxation while working, (e)Work environment, (f) Presence of pain, (g) eye related problems due to adoption of inadequate posture h)measures taken to prevent the injury or pain.

Results- Out of 159 questionnaire distributed ,116 [73%] responded ,In which n=116, males are 70 [n=70] and females are 46[n=46], Mean age was ,Males was 35.5yr and in females it was 33 years.[Table 1,Graf 1]

Among 116 participants -72 (62%) having c/o pain--- in neck 38 participants (52%), in Lower back ,(45%) , in Upper arms 13(14%) and in Wrist-7 %, among n=116 [62%] were aware about the ergonomics.[Graf 2]. Among n=116, n=79[62%] were aware about the ergonomics – [Graf -3].Among n=116, n=67[58%] are practicing both sitting and standing and n=34 are practicing standing. Also among n=116, 62% i.e. n=72 give rest to their hands for 15 minutes.

III. Discussion

The number of the dentists familiar with the ergonomic posture (77%) is slightly lower than study conducted by Mohammed K. Yousef and Afnan O. Al-Zain (2009) [3] where (85.4%) placed their dental chairs within normal levels.

Table 1 and table 2 depicts that there is significant increase in knowledge as well as pain experience with increase in number of years of clinical practise. These results are in accordance with study conducted by Rising DW *et al*. (2005) [4.] Where significant finding was also found between pain and dental practice. The reason for this may be attributed to compromised operator posture for working on all 4 quadrants in one sitting, working under direct vision in maxillary arch etc with more number of year's clinical practice.

Present study shows 62% pain in neck, 47% pain in shoulder and 28% pain in wrist region. Similar sites of pain were found in a study done by Rabiei *et al.* (2008) but the present results

Were lower than reported in Queensland Australia, Denmark and Saudi Arabia [5, 6]

WHO defined occupational health as a multidisciplinary activity which promotes and protects the workers health[4]. This discipline also seeks to control accidents and diseases through reduction of risks.Sim, Lacey and Lewis in 2006 established that there is a positive relationship between rigid postures and muscular skeletal disorders in different professions which could include pain, weakness, and parenthesis, this is widely documented and studied for a large number of professions Unthank M. Showed in his study that Lighting at the work place: the lack or excess of light can generate myopia and irreversible retinal lesions, among others.[2] Valachi et al. Also proved a correlation between the presence of pain and specific forced postures: torsion of the trunk, moving of the shoulders towards the side, elevating the elbows, operating light too far away from the line of vision when working on the maxillary arch, working with hands close to the patients face and working for a long period of time.[3] Antonio j et al found that dentists are prone to the lesions of the skeletal muscle system due to the clinical exercise of the profession of which muscle pain in the back is most common followed by neck, shoulders and hand.[4]

Reasons for Early Retirement among Dentists are Musculoskeletal Disorders (29.5%), Cardiovascular Disease (21.2%), Neurotic Symptoms (16.5%), Tumours (7.6%), and Diseases of the Nervous System (6.1%).

Applying Ergonomics to Dentistry [5, 6, 7]

1. Provide Sufficient Space

Awkward bending, twisting, and reaching places stress on the musculoskeletal system and can lead to discomfort This can be achieved by standing upright, bending backward five or six times and walking about for few minutes. Permanently placing equipment used in every clinical procedure within comfortable reach (within 20 inches of the front of the body).Maintain a neutral, balanced position—position of an appendage when it is neither moved away from nor directed toward the body's midline; it also should not be laterally turned or twisted

2. Posture/Positioning

Try to avoid static and/or awkward position by Positioning the patient so that operator's elbows are elevated no more than 30 degrees, adjust patient chair when accessing different quadrants or alternate between standing and sitting, maintain neutral posture; reduce force requirements by Ensuring instruments are sharpened &well-

maintained, Use automatic hand pieces instead of manual instruments wherever possible, Use full-arm strokes rather than wrist strokes Varied procedures within the same appointment and also by Shorten patient's recall interval.

3. Reduce Physical Effort -Using reasonable operating forces and minimal repetitions reduces overall physical effort required by a task. Brief but frequent rest pauses can minimize fatigue and enhance productivity

4. Lighting – it should be produced even, shadow-free, colour-corrected illumination concentrated on operating field, overhead light switch readily accessible, Hand mirrors can be used to provide light intraoral Fiberoptics for hand pieces add concentrated lighting to the operating field.[2]

5. Magnification -Improve neck posture; provide clearer vision.

6. Operator Chair- promote mobility and patient access by accommodate different body sizes. Chair should be comfortable for Stability, Lumbar support, Hands-free seat height adjustment and it should be fully adjustable.

7. Patient Chair-promote patient comfort; maximize patient access by space pivoting or drop-down arm rests (for patient ingress/egress), fully adjustable head rest and Hands-free operation.

8. Personal Protective Equipment

Glasses should be Lightweight, clean, well-fitted and magnifying lenses and head lamps are encouraged.

Clothing should be fit loosely, lightweight, pliable.

When sitting at a desk, adjust your chair so that your thighs are parallel to the floor. When using a computer keyboard, use the padded wrist rest while taking a break, not while typing.

Holding your phone between your shoulder and ear can lead to a host of upper body difficulties—use a hands-free device whenever possible. But don't talk on the phone while driving!

Use caution when carrying groceries— carrying multiple plastic bags at once can strain fingers, wrists and elbows. A heavy, plastic bag can concentrate stress in a small area of your hand, increasing the likelihood of injury or damage.

IV. Conclusion

Ergonomics related health hazards is a common affliction in dentists which begins at the time they start their professional studies and it stays with them during their professional practice affecting various parts of the body.[5]The results of this study show that adopting inadequate postures to gain better vision of the oral cavity, could produce muscular pain as well as eye related problems.

Therefore, it is of vital importance to promote occupational health training and prevention programs regarding ergonomic postures which must be acquired by the dentists during their clinical practices, originating in this manner, and leads to healthy lifestyles

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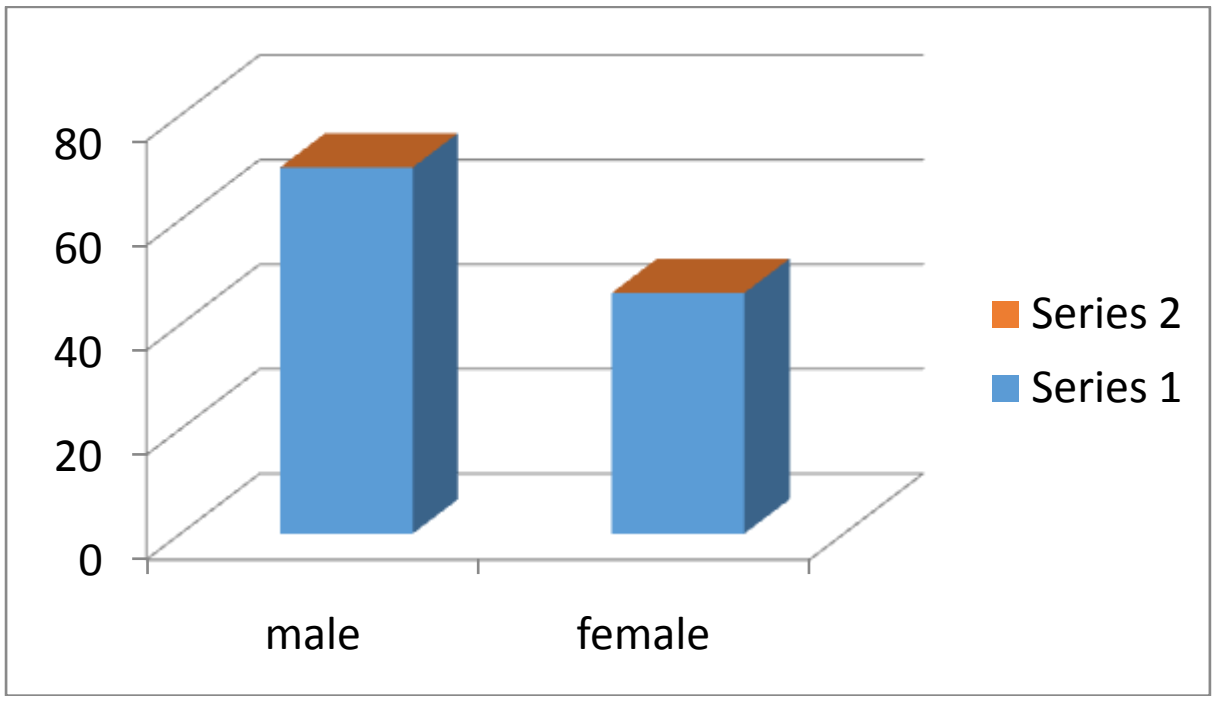
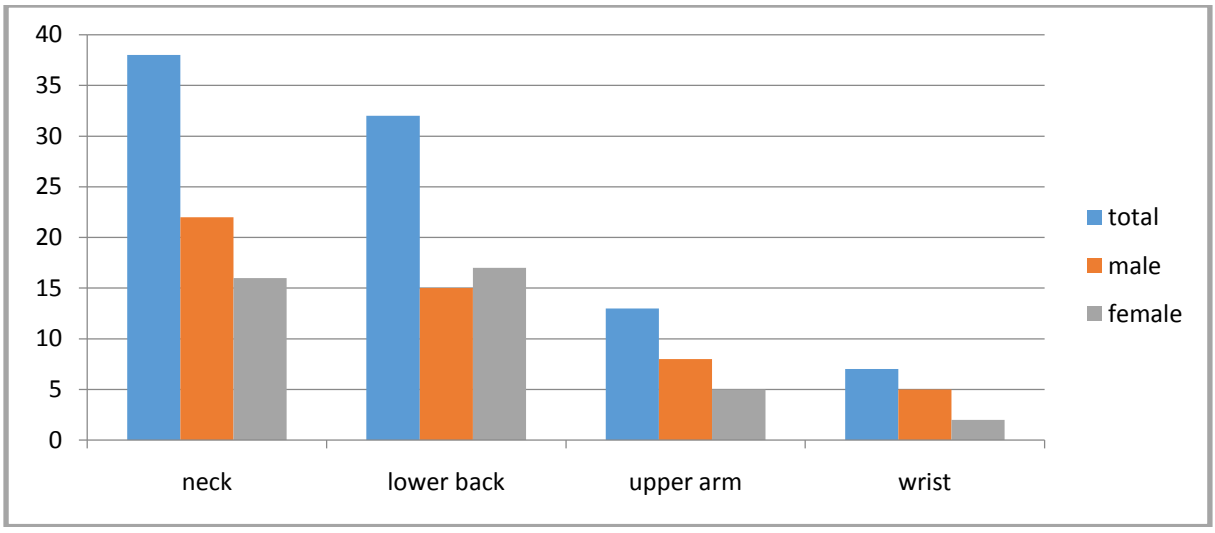
Graf -1


80
60
40
20
0
male
female
Series 2
Series 1

Graf 2


40
35
30
25
20
15
10
5
0
neck
lower back
upper arm
wrist
total
male
female

Graf -3

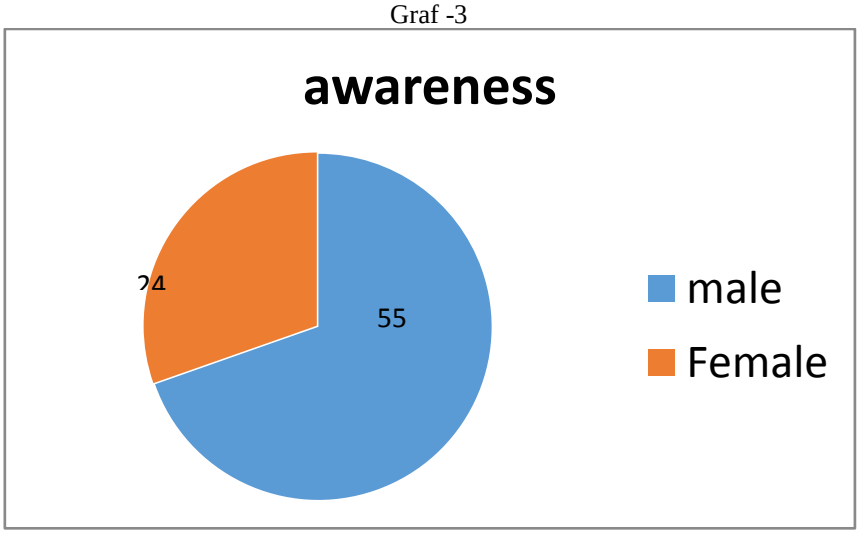

awareness
24
55
male
Female

Table -1- Age wise distribution

AGE GROUP	MALES	FEMALES	TOTAL
20-30 years	36	45	81
31-40 years	13	14	27
41-50 years	1	5	6
51-60 years	2	-	2

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