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Ergonomics and musculoskeletal disorder among dental professional and students in pondicherry and tamil nadu. A cross – sectional study

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ABSTRACT: Ergonomic hazard is a physical factor within the environment that harms the musculoskeletal system. Prosthodontists are at high risk of cervical and spine problems due to the limited access and impaired vision associated with the oral cavity. The symptoms include low back pain, stiffness and sciatica with neurological features such as tingling, paraesthesia and muscle weakness. Ergonomics is highly relevant to preventive and occupational medicine, management of musculoskeletal injuries and rehabilitation.

AIMS & OBJECTIVES : To assess the knowledge, awareness & practice towards Ergonomics and Musculoskeletal Disorders (MSDs) among dental professionals and students.

MATERIAL AND METHODS: This is a cross sectional analytical study conducted among dental professional and dental students of various dental colleges of Pondicherry& Tamil Nadu. A set of closed ended 15 questions were prepared to collect the relevant information pertaining to this study. Questions were related to assess the knowledge and practice towards ergonomics and work-related musculoskeletal disorders. Type of clinical practice, dentists working position, number of clinical

working hours, musculoskeletal problem , location of pain were included.
RESULT: The obtained data will be subjected to suitable statistical analysis and the results were derived.
CONCLUSION: The key for dental clinicians for staying healthy and fit is to adopt an ergonomic position all the times and adopting yoga/exercise in their daily routine thus preventing them from developing MSDs. Faculty in the institutions are required to teach these principles on 'need for dentist's health' basis rather than just as a curriculum since BDS first year so that prevention of MSDs can be implemented at primary level.

INTRODUCTION

Work related musculoskeletal disorders are one of the most common health problem among the dentists and the most common reason for early retirement from dentistry because in dentistry, clinical working field is confined to a very small area (oral cavity). Dental work requires very precise force application while delivering oral health. For the same dentist uses a fixed posture that causes occupational hazard for dentist.[1,2] This , inappropriate operator's and patient's position, while treating the patients on dental chair along with prolonged working hours may lead to multiple occupational hazards especially work related Musculoskeletal disorders (MSDs) among dentist population.[1,2] To overcome this kind of health hazards, dentists and their team should work in an ergonomic environment. The term ergonomics is derived from "Greek" words"ergon" and "nomos" in which "ergon" means work and"nomos" means natural laws.[3] Thus Ergonomics is a study of how the human body can be best used for maximum comfort, efficiency, safety, and productivity.[4] Ergonomics is highly relevant to preventive and occupational medicine, management of musculoskeletal injuries and rehabilitation. It helps people understand their limitations within the working area and helps them to find out the way to perform safely, effectively, and comfortably within the workingenvironment.[3]Every dentist is of different built, and has a different level of strength. Contrary to that most of the workstations, machines, tools and equipment are designed without consideration of ergonomic principles.[5] This is very important that dentists should know how to consider the ergonomics principles while designing and setting up the dental clinic. Ergonomics is highly relevant to preventive and occupational medicine, management of musculoskeletal injuries and rehabilitation. Therefore the objectives of this study was to assess the knowledge and practice towards Ergonomics and Musculoskeletal Disorders (MSDs) among dental population.

MATERIAL AND METHODS

This cross sectional analytical study was conducted among dental professional and dental students of various dental colleges of Pondicherry & Tamil Nadu. A set of closed ended 15 questions were prepared to collect the relevant information pertaining to this study.

Questions were related to assess the knowledge and practice towards ergonomics and work-related musculoskeletal disorders. Type of clinical practice, dentists working position, number of clinical working hours, musculoskeletal problem, location of pain were included.

Questionnaire was tested for its feasibility. Pilot study was conducted and all the short comings had been rectified. Study sample included dental professional and dental students of various dental colleges of Pondicherry & Tamil Nadu.
All the questions were objective in nature. The validity of the questionnaire was assessed with Cronbach's alpha internal consistency coefficient

Inclusion criteria for selecting the subjects for study were dental students, practicing dentists (practicing duration from 5 to 15 years) with no history of trauma. Informed consent was taken from the participants, Ethical approval for the study was taken from the institutional ethical committee [No:20/SVMCH/IEC-Cert/Mar22]

RESULTS

Total of 300 subjects enrolled in Indian Dental Association, Pondicherry completed the survey. The study sample consisted of 225 dental students (195 BDS interns and 30 MDS students) and 56 private practitioners. All the subjects were in the age range of 18 to 40 years in which 207 were females and 74 were males. In response to the question, whether they were taught about ergonomics principles during BDS course 42.34% dental students and 39.28%practitioners said that they were taught to some extent but 57.66% students and 60.72% practitioners said that they were not taught at all. Not even a single subject answered that they were taught about ergonomics properly during BDS.

Section: Dentistry

Majority of subjects who responded were males (52.5%), with females responding to 47.5 %. Most of the practioners (50.1%) worked for more than 5 hours, others (37.9%) for 5-8 hours and few (12%) practiced for more than 8 hours a day. Many of them (87.5%) subjects were aware that musculoskeletal disorders is related to wrong ergonomic position, however,few (12.5%) were not aware of this disorders. 69.4% subjects agreed to correlation between ergonomic positions and musculoskeletal disorders. However 11.2 % disagreed, 13.4 % were not sure of the situation and 9% had no idea about the correlation.59.3% subjects agreed that operator chair ergonomic position and clinician normal resting position are different, whereas 13.6% subjects disagreed, 18.1% and 9.1% had not sure and no idea respectively.51% of dental professionals properly followed the principles of operator's position, Patient's position and dental chair position for treating the patients in dental office whereas 33.6 % followed to some extent and 0.4 % never followed the principles of operator position.

On questions on posture during treatment procedure 51.7% followed both sitting and standing dentistry, 32.1% followed only sitting dentistry and 16.2 % followed only standing dentistry. 67.9 % of dental professionals carried out exercises or yoga for physical fitness and 32.1% never did exercises or yoga for physical fitness. While majority of dental professionals accounting to 94.5% performed all clinical procedures with good access, light and visibility, 5.5% never did that. Many of them (43.8%) felt eye strain during long treatment procedure with bright light, 25.4 % subjects never felt the strain in eye even though long treatment procedures were performed under bright light. 30.6% dental

professionals experienced strain only sometimes and 0.2 % had difficulty particularly while working with loupes. When eyes were strained 40.2% saw green light as relief and 58.9% took rest. Few professionals adjusted the light intensity, used adjustable lights, blinked eyes frequently or seeing grey background.When questioned on attending a course/workshop or online lecture etc. about dental ergonomics, almost 58.7 % attended some sort of courses while 41.3% never attended any programs on dental ergonomics. While 81.4% felt ergonomics should be included in the teaching syllabus to the present dental curriculum 18.4% subjects never felt the need. Dental professionals were consulting orthopedician [28.2%], physiotherapist [24.5 %], yoga therapy [15.1%] and self-treatment [32.2%] for MSD/Fatique after long treatment procedures.

DISCUSSION

The common proverb 'Health is wealth' is often forgottenin the process of regular professional activities. Dentistryis a profession where change in natural posture is notuncommon while working on patients. It is often seen thatdentists frequently assume static postures, which requiremore than 50% of the body's muscles to contract ,to holdthe body motionless during longer breaks which is notgood for overall health in turn giving rise to Musculoskeletaldisorders. These MSDs are many times a reason behindearly retirement from clinical dentistry. In present studymajority of the subjects told that they were not taught aboutergonomics principles during BDS course. Despite the factthat inculcating the ergonomics principles in the practice ofclinical dentistry will reduce the emergence of MSDs thishas not been the part of BDS curriculum yet

.Data of the present study revealed that only 11% of subjectswere practicing dentistry in exclusively standing posture.The fact is that multiple forces act on the spine whileperforming work from the surrounding muscles, such as theweight of the body and gravity. The spine is in its naturalcurved position (S shape) while standing, enabling thebody's line of gravity to pass through the trunk and feet, sorequiring minimal muscular activity to maintain the postureand to hold the trunk erect [8].Sitting with a 90° angle betweenthe trunk and the thighs causes the pelvis to rotate backward shifting the spine away from the line of gravity. This in turnreduces the lumbar lordosis, causing the spine to slump andincreasing the loads placed on the spine.

Following the typical principles of operator's position, patient's position and dental chair's position while treating patients in dental clinic can reduce the adverse effects of wrong posture aswell as can increase the efficiency of dental work. In present study only 55.6% students and only 8.92% practitioners werestrictly following these positioning. The difference in the usage of these principles among students and practitioners might be due to the fact that students in institutional settings are always supervised by faculty which is no more in clinical practice 87.49% practitioners and 77.78% students had the symptoms of MSDs which is almost similar to the data found by Sahu Det al (81.06%)[10], Marshal ED et al (82%)[11], Aljanakh M et al(77.9%)[12], Maryam Rabiei et al (73%)[13], whereas it was higherthan that found in research of Evangelos CA et al (62%). The prevalence of pain in present study subjects in cervicalregion/neck was (37.77%) among students and 46.42%

amongpractitioners) similar to the findings of Maryam Rabiei et al(43.4% in neck)[13], YemeniBCet al (55.5% in neck amongpractitioners)[15] and AmaniAlkhamees et al (49.1% in neckand shoulder)[16] but contrary to the findings of AljanakhM et(66% in neck)[12] and Yemineni BC et al (20.1% in neck forinterns).[15] The prevalence of pain in present study subjects inlumber region/lower back was 15.79% among students and19.64% among practitioners which was similar to the findingof Yemineni BC et al (12% in lower back for interns)[15] but different from the findings of Maryam Rabiei et al (35.8%in back)[13], Aljanakh M et al (73.5% in lower back)[12], AmaniAlkhamees et al (61% in lower back)[16], Yemineni BC et al (46% in lower back among practitioners)[15]. In present study majority of subjects (62.32% students and 44.64%practitioners) started experiencing pain during BDS course, which was similar to the finding of Evangelos CA et al(57%)[14]41.07% practitioners and 29.77% students strictly attributedtheir MSD symptoms to improper posture and nonergonomicallydesigned equipment. Despite the fact that theonly way to combat/prevent the MSDs is regular exercise/yoga, only 19.64% practitioners and 16.44% students were doing exercise/yoga regularly which is dissimilar to the findings of Yemineni BC et al for practitioner (31.8%) but similar to their findings for Interns (12.2%)[15].Surprisingly ,among subjects who had MSD symptoms, only 8% took medical advice from any physician whereas 48.21%practitioners and 52% students never consulted for their MSD symptoms shows that there is carelessness amongyoung dentists about MSD symptoms which should be given alarming concern.

CONCLUSION

Prevalance of MSDs is not uncommon among dentists andthe possible prevention is to use ergonomically designeddental workstations, sitting chairs and equipment. The keyfor dental clinicians for staying healthy and fit is to adopt anergonomic position all the times and adopting yoga/exercisein their daily routine thus preventing them from developingMSDs. Faculty in the institutions are required to teach theseprinciples on ‘need for dentist’s health’ basis rather than justas a curriculum since BDS first year so that prevention ofMSDs can be implemented at primary level.

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Questionnaire:

- Number of clinical working hours practice per day?
  Mark only one oval.

  <5hours
  5-8hours
  >8hours

- Are you aware that musculoskeletal disorders are releated to wrong ergonomic position?
  Mark only one oval.

  Yes
  No

- Ergonomic principles are applied only to clinicians position, but not to the dental laboratory work ?
  Mark only one oval.

  Agree
  Disagree
  May be
  No idea
  Other:

- Is there any correlation between ergonomic positions and musculoskeletaldisorder problems?

Mark only one oval.

- Agree
- Disagree
- May be
- No idea
- Other: _____

- Operator chair ergonomic position and clinician normal resting position are different?

Mark only one oval.

- Agree
- Disagree
- may be
- no idea
- Other:

_____

- Do you PROPERLY FOLLOW the principles of operator's position, Patient's positionand dental chair position for treating the patients in dental office?

Mark only one oval.

- Ye
- s
- N
- o
- To some extent
- Other: _____

- What is your posture during treatment procedure?

Mark only one oval.

- Only sitting dentistry
- Only standing dentistry
- Both
- Other:

- Do you carry out exercises / yoga for your physical fitness?

  Mark only one oval.

  - Ye s
  - N o

- Which one do you follow while working?

  Mark only one oval.

  - The patient's mouth at your elbow level
  - The patient's mouth below your elbow level
  - The patient's mouth above your elbow level
  - Other: _____

- Do you perform clinical procedure with good access light,and visibility?

  Mark only one oval.

  - Ye s
  - N o

- Do you feel any eye strain during long treatment procedure with bright light?

  Mark only one oval.

  - Ye s
  -
  -

N
o
SOMETIME
Other: _____

- If yes, what you will do to get relief?

Mark only one oval.

seeing green light
taking rest
Other:

- 13. Have you ever attended a course/workshop online lecture etc. about dentalergonomics?

Mark only one oval.

Ye
s
N
o

- . Do you feel ergonomics should be included in the teaching syllabus to the presentdental curriculum

Mark only one oval.

agree
disagree
Other: _____

- . what treatment modalities you have tried for musculoskeletal disorders/fatigue after long treatment procedures?
  Mark only one oval.

  - orthopedic doctor
  - physiotherpist
  - yoga therapy
  - self treatment
  -