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To Assess The Perception and Knowledge Of Correct Ergonomics Among Dentist In Tertiary Care Hospital.

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Abstract: Objective: To assess the perception and knowledge of correct ergonomics among dentist. **Study design:** Cross sectional study. **Place and duration**: Dentists were selected from the department of Dentistry of Fatima Memorial Hospital and Combine Military Hospital, Lahore after taking permission from the respective department. Duration of the study was 6 months. **Methodology:** The cross-sectional study includes 151 dentist that were recruited using non probability convenience sampling. Informed consent was taken from the participant before filling of the questionnaire. All participants were given a standard questionnaire 'Ergonomics Awareness Questionnaire' which consists of 20 questions, to find out the knowledge, behavior and attitude of the principle of ergonomics in their practice. Descriptive statistical analyses were done on sample of 151 by using SPSS 22.0 version. **Results:** In n=151 participants, 76(50%) were aware of term ergonomics and equal number of participant 76(50%) were not aware. Chi square test was used for Cross tabulation; between awareness of ergonomics and practical application of ergonomics that showed significant association with p value =.000 (< 0.05), between experienced any symptoms and constant vibration in the instruments that showed significant association with p value =.000(< 0.05), between experienced any symptoms and micro breaks during procedure that showed significant association with p value =.000(< 0.05) and between musculoskeletal symptoms and practice of strengthening that showed significant association with p value =.000 (< 0.05). **Conclusion:** The study concluded that there were a good perception and knowledge of Ergonomics among dentist but their implications in the practice were average and improper. There were many problems identified due to improper ergonomics among dentist.
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Key Words: Dentists, Ergonomics, Knowledge, attitude, musculoskeletal disorder (MSD)

Introduction:

Ergonomics is a logical discipline engage with awareness between individuals and develop benefits and effectiveness.(1). Therefore, ergonomics is the science that deals with the product designing and procedures for maximum effectiveness and protection.(2).

In dentistry the knowledge of ergonomics is very important as there clinical practice and operational skills is limited to the region that covers a few tens of millimeters (the mouth) and requires repetitive accurate forces while delivering oral health.(3) Dentistry is a profession that generally produces different kind of musculoskeletal pains and soreness, that appear slow that's why, the symptoms are usually not assessed and they become chronic and permanent pains and deformity become evident. It is very important to keep up a good working posture and that the treatment instrument and treatment table on which dentist are working should have optimal working characteristics(2)

Good ergonomics during work is very important to maintain work capacity, efficacy and high treatment level clinically all through dentists working life. in dentistry the ergonomics significance is enormous ranging between dental team chemistry to noise, lighting, and aromatic condition and the software and equipment used naturally. There should be flexibility in the treatment ambiance. Adaptation is required in abundant lighting, good posture of working equipment easy access procedures to the clinic, types at patient and different materials for working posture.(4)

When the working place for the practice is set up inappropriate or is not suitable to the individual dentist's measure this can put dentist body in to excessive stress. As the work of dentist consists of accurate task which includes repeated tasks, such as root canal, operational skills, filling cavities preparation, scaling, contribute greatly to both, musculoskeletal disorders (MSDs) and to bad posture. Sometimes in combination with exertion of force with each movement, and these positions are repetitive

throughout the day.(5). By being not aware of all ergonomics knowledge this can causes them to adopt harmful postures, which can lead them to different musculoskeletal disorders. There are some of the problems which are faced in the dental practice as they do not work in an ergonomically friendly atmosphere. Which are musculoskeletal disorders, these are the disorders of the nerves, muscles, ligaments, tendon, cartilage and joints or spinal disc. Dentistry is the profession where the workers are more prone to MSD and causing the following pathologies such as tendinitis, tenosynovitis, and bursitis.(6)

Dentistry is the profession where practice of proper ergonomics is very important as there work is at one place and in static posture all day. Due to the poor ergonomics practice many musculoskeletal disorders were identified.(7) It is observed that restriction in ergonomics lead to musculoskeletal disorders among dentist(8). Knowledge practice and work environment factors related to ergonomics were unsatisfactory among dentists.(9) Dentists can be relived from bad posture in their work place if the knowledge towards ergonomics is increased.(10). The good posture of dentist give them an ideal working condition and an ideal physical comfort.(11). Use of conventional chairs among dentist students lead to the bad posture.(12)

The rational of my study is to give the awareness of proper ergonomics in dentist to prevent them from different kind of musculoskeletal injury.

Objective

The objective of my study is to assess the perception and knowledge of correct ergonomics among dentist.

Methodology

The cross sectional study carried out including 151 participants selected by non-probability convenient sampling technique. Sample size (n) was 151 according to following formula:

$$n = \frac{Z^2_{1-\alpha/2} P(1-P)}{d^2}$$

Keeping confidence level 95%, anticipated population proportion 0.89 (Batra et al) and Absolute precision 0.05, calculated sample size is 151 or more respondents. The Participants were selected from the department of Dentistry of Fatima Memorial Hospital and Combine Military Hospital, Lahore after taking permission from the respective department. Duration of the study was 6 months (October 2017 to April 2018). The inclusion criteria included all the programs such as orthodontics, periodontics, and prosthodontics of dentistry male and female working for 10-15 years. The exclusion criteria included all other medical health care professionals, staff, and undergraduates. An informed consent was obtained from participants for including data. A detailed demographic data was obtained enquiring their working experience and domains of dentistry. A questionnaire 'Ergonomics awareness questionnaire' was used for assessment(7). Any participant, if refused to participate in the study his/her decision was respected. The confidentiality of the participants was highly maintained. Study was commended to institutional review board (IRB) after the approval from respected committee of Fatima Memorial Hospital.

Analysis

Statistical Package for Social Sciences (SPSS 22) was used to analyze data. Descriptive statistics including frequencies and percentages was extracted for demographics. The sample size was n= 151. Pie Chart, Bar Chart was used for categorical data in demographics. Histogram with normal curve was drawn for continuous variables. Chi-Square was used to see the association of categorical variables.

Results

According to the practice in awkward posture 140(92.1%) work in awkward.

Posture while 12(7.9%) do not work in awkward posture.

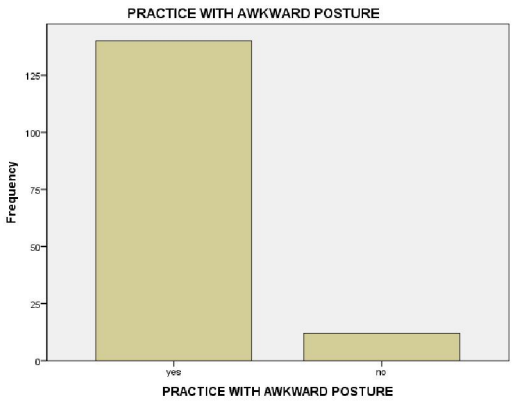


Figure 1 graphical presentation of cases for practice in awkward posture

Table 1: Distribution of cases according to practice with awkward posture

Practice With Awkward Posture					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	140	92.1	92.1	92.1
	no	12	7.9	7.9	100.0
	Total	152	100.0	100.0	

Table 2: Cross Tabulation between wareness of term ergonomics * Principle of ergonomics in practice

			Principle Of Ergonomics In Practice			Total
			never	sometimes	always	
Awarness Of Term Ergonomics	yes	Count	31	42	3	76
		Expected Count	53.0	21.5	1.5	76.0
	no	Count	75	1	0	76
		Expected Count	53.0	21.5	1.5	76.0
Total		Count	106	43	3	152
		Expected Count	106.0	43.0	3.0	152.0

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	60.357[a]	2	.000
Likelihood Ratio	73.099	2	.000
Linear-by-Linear Association	47.568	1	.000
N of Valid Cases	152		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.50.			

Cross tabulation between awareness of ergonomics and practical application of ergonomics has showed that there is significant association with p value =.000 (< 0.05) between awareness level and practice level of ergonomics as subjects who were having awareness regarding ergonomics were either some time or always try to incorporate principle of ergonomics in practice.

Table 3: Cross tabulation between experienced any symptoms * constant vibration in the instruments

			Constant Vibration In The Instruments		Total
			yes	no	
Experienced Any Symptoms	yes	Count	125	1	126
		Expected Count	106.9	19.1	126.0
	no	Count	4	22	26
		Expected Count	22.1	3.9	26.0
Total		Count	129	23	152
		Expected Count	129.0	23.0	152.0

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	117.919[a]	1	.000		
Continuity Correction[b]	111.482	1	.000		
Likelihood Ratio	95.206	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	117.143	1	.000		
N of Valid Cases	152				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.93.					
b. Computed only for a 2x2 table					

Cross tabulation between musculoskeletal symptoms and usage of constant vibration instruments has showed that there is significant association with p value =.000 (< 0.05) between musculoskeletal symptoms either in a term of pain or discomfort and constant vibration instrument usage as out of 129 (100%) who were using vibration instruments, 125 (96.89) were having musculoskeletal symptoms.

Table 4: Cross Tabulation Between experienced any symptoms * micro breaks during procedure

			Micro Breaks During Procedure		Total
			yes	no	
Experienced Any Symptoms	Yes	Count	14	112	126
		Expected Count	33.2	92.8	126.0
	No	Count	26	0	26
		Expected Count	6.8	19.2	26.0
Total		Count	40	112	152
		Expected Count	40.0	112.0	152.0

Chi-Square Tests					
	Value	Df	Asymptotic Significance (2-Sided)	Exact Sig. (2-Sided)	Exact Sig. (1-Sided)
Pearson Chi-Square	87.822[a]	1	.000		
Continuity Correction[b]	83.298	1	.000		
Likelihood Ratio	87.300	1	.000		
Fisher's Exact Test				.000	.000
Linear-By-Linear Association	87.244	1	.000		
N Of Valid Cases	152				
A. 0 Cells (0.0%) Have Expected Count Less Than 5. The Minimum Expected Count Is 6.84.					
B. Computed Only For A 2x2 Table					

Cross tabulation between musculoskeletal symptoms and micro breaks during the procedure has showed that there is significant association with p value =.000 (< 0.05) between musculoskeletal and micro breaks as out of 112 (100%) who were not having micro breaks during procedures, all of them were having musculoskeletal symptoms.

Table 5: Cross tabulation between experienced any symptoms * strengthening exercise practice

			Strenthening Exercise Practice		Total
			yes	no	
Experienced Any Symptoms	Yes	Count	3	122	125
		Expected Count	23.8	101.2	125.0
	No	Count	26	1	27
		Expected Count	5.2	21.8	27.0
Total		Count	29	123	152
		Expected Count	29.0	123.0	152.0

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	126.798[a]	1	.000		
Continuity Correction[b]	120.789	1	.000		
Likelihood Ratio	111.299	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	125.963	1	.000		
N of Valid Cases	152				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.15.					
b. Computed only for a 2x2 table					

Results:

Cross tabulation between musculoskeletal symptoms and practice of some sort of strengthening exercise has showed that there is significant association with p value =.000 (< 0.05) between musculoskeletal symptoms and practice of exercise as out of 29 (100%) subjects who were practicing any kind of exercise 26 (89.65) were not having any musculoskeletal symptoms, showing that exercise have positive impact musculoskeletal system.

Discussion:

The purpose of my study was to find out the awareness of ergonomics among the dentist and how much they apply the knowledge of ergonomics in their professional practice. my study showed relationship between awareness of ergonomics and practical application of ergonomics has showed that there is a significant association with p-value =.000 (< 0.05) between awareness level and practice level of ergonomics as subjects who were having awareness regarding ergonomics were either some time or always try to incorporate principle of ergonomics in practice. Study showed that there were good knowledge of ergonomics among dentist but there implication was average. Most of the dentists was not aware of MSD problems related to the improper ergonomics. The physical activity status of the clinician certainly is an important factor as it affects the strength, endurance, and overall fitness of the body. Surprisingly, the temperature and lighting of the working area seems to have no effect on symptoms of MSDs among the dentists who participated in this study.

A study was conducted in 2015, and there results showed that 89% dentist were aware of ergonomics and its implication in the dental office,57.5% use sometimes and 8% always follow principle of ergonomics(7)

A study was conducted in 2013, showed that most of dentist practice in sitting position. in this study 27.5% of the dentist worked without any break, 38.2% had one break and 6.1% took break after every one patients.

In this study they also mention that 6%dentists exercise regularly and 32% exercise occasionally.(5)there is a strong relationship between bad posture and muscular pain. Bad posture is assumed due to lack of ergonomics knowledge. To study the ergonomic factor causing pain a study was conducted. In the study there was a exposure group and a control group. In exposure group dentist was assessed with REBA method while treating patients. Results found that 80.8% of the subject have no knowledge of ergonomically correct posture. The pain severity of muscles were more.(13). The results between the musculoskeletal symptoms and usage of constant vibration in instruments has showed that there were a significant association of Musculoskeletal pain or discomfort in dentist. The results of my study showed that 129(100%) who were using vibration instruments 125(96.89%) were having symptoms. A study in 2013 showed that repetitive trauma or constant posture causes musculoskeletal pain in neck, hand, shoulder and back pain.(14). The results between musculoskeletal symptoms and practice of some sort of strengthening exercise has showed that there is significant association with p value =.000 (< 0.05) between musculoskeletal symptoms and practice of exercise as out of 29 (100%) subjects who were practicing any kind of exercise 26 (89.65) were not having any musculoskeletal symptoms, showing that exercise have positive impact on musculoskeletal system. A study showed that training of deep cervical muscles improves forward head posture causing pain and disability in dentists having chronic neck pain.(15). The results between musculoskeletal symptoms and micro breaks during the procedure has showed that there is significant association with p value =.000 (< 0.05) between musculoskeletal and micro breaks as out of 112 (100%) who were not having micro breaks during procedures, all of them were having musculoskeletal symptoms. As it is very important to take the micro breaks during the procedure or important to break the bad posture and maintained the right posture to avoid pain and discomfort in muscles.

The overall mean knowledge, practice and attitude scores were 52%, 55%, and & 75%, respectively(2). There is an increased incidence of musculoskeletal disorders among dentists due to prolong static bad posture and lack of awareness of ergonomic knowledge. This research shows the causing of musculoskeletal disorders in dentists and also prescribes the exercises that can be used to prevent the problems. Exercises are – stretching exercises -that concentrate on the muscles that tend to tighten in prolonged dental postures – aerobic exercises – concentrating on total body fitness, and strengthening exercises – that concentrate on the muscles that are opposite to the tight muscles. These exercises are made easy and of low intensity so that a dentist can perform any time and alone.(16)

Conclusion:

It is concluded that awareness and knowledge of ergonomics is very important in the professional practice of the dentist. emphasize should be made to use proper ergonomics knowledge and awareness should be given to dentist. They should apply the knowledge of the ergonomics in there practice to

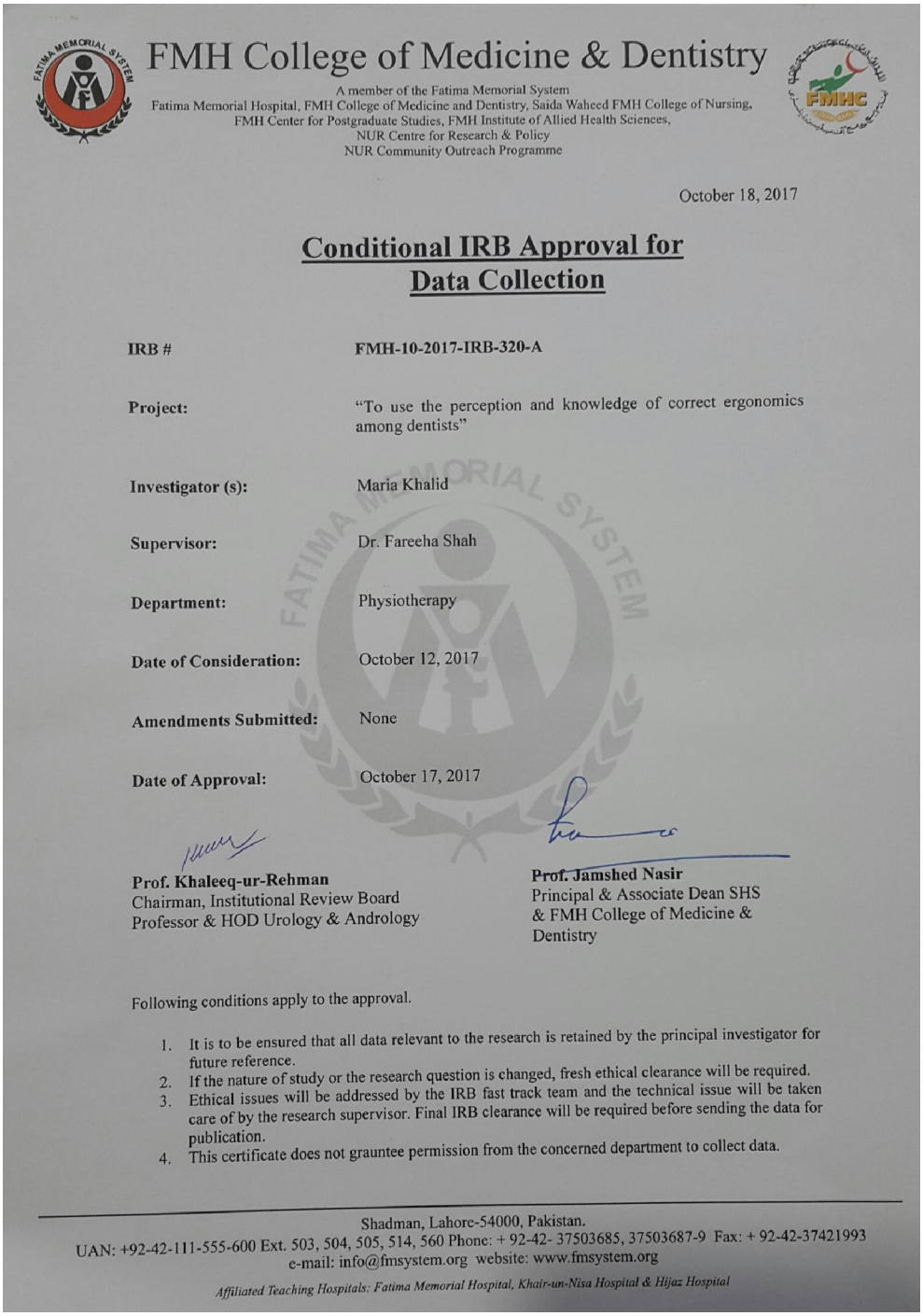
avoid MSD problem and can live the healthy professional life.

Recommendations:

1. Proper awareness should be given to the dentist about ergonomics.
2. Importance of micro breaks should be taught.
3. Physical activity status should be maintained.

Limitations:

1. The participants were not randomly allocated.
2. Male and female ratio were unequal. Females were predominate.
3. There were confounders factors such as use of different kind of equipment, lightening effects, vibrating tools can cause symptoms.
4. It's a cross sectional study.
5. Time for date collection was less.



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October 18, 2017

Conditional IRB Approval for Data Collection

IRB #	**FMH-10-2017-IRB-320-A**
Project:	"To use the perception and knowledge of correct ergonomics among dentists"
Investigator (s):	Maria Khalid
Supervisor:	Dr. Fareeha Shah
Department:	Physiotherapy
Date of Consideration:	October 12, 2017
Amendments Submitted:	None
Date of Approval:	October 17, 2017

Prof. Khaleeq-ur-Rehman
Chairman, Institutional Review Board
Professor & HOD Urology & Andrology

Prof. Jamshed Nasir
Principal & Associate Dean SHS
& FMH College of Medicine & Dentistry

Following conditions apply to the approval.

1. It is to be ensured that all data relevant to the research is retained by the principal investigator for future reference.
2. If the nature of study or the research question is changed, fresh ethical clearance will be required.
3. Ethical issues will be addressed by the IRB fast track team and the technical issue will be taken care of by the research supervisor. Final IRB clearance will be required before sending the data for publication.
4. This certificate does not grauntee permission from the concerned department to collect data.

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