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RESEARCH ARTICLE

KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDSERGONOMICS AND POSTUREAMONG DENTAL STUDENTS OF THE ABULCASIS INTERNATIONAL UNIVERSITY OF HEALTH SCIENCES INRABAT, MOROCCO

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Abstract

Introduction: do not adopt correct working posture can lead to occupational diseases. The objective of this work is to evaluate the knowledge, attitudes and practices of 4th and 5th year dental students regarding work positions.

Material and Methods: This was a cross-sectional observational study conducted among 4th, 5th and 6th year dental students at Abulcasis International University of Health Sciences in Rabat, Morocco. The medium of the survey was an anonymous and individual questionnaire. The collected data were analyzed using Jamovi software. A difference was considered significant when $p < 0.05$.

Result: Out of the 123 students participating in the study, Fourth-year students were the most represented in this study with 48 (39%) participants. 111 (90.2%) respondent students had received training on ergonomics and working postures. 99 (80.5%) students reported applying ergonomics principles to their daily practice. Student levels of knowledge regarding ergonomics and working postures were average overall. Students stated that they always adjusted their working posture depending on the procedure to be performed in 53 (48%) of the cases. In practice, working postures adopted depending on the area to be treated were highly variable.

Conclusion: The present study provides an overview of students' knowledge, attitudes and practices regarding work positions. The finding was positive even though the study only reflects students' opinions on work positions.

Introduction:-

The term “ergonomics” is derived from two Greek words: ergon, which means “work”, and nomos, which means “natural law” or “system”. Ergonomics is the study of the relationship between people and their work resources, methods, and environments [1, 2]. Therefore, working ergonomically means adapting one’s technique, environment, and organization in such a manner as to perform a task as efficiently as possible while being able to recognize a bad posture and remedy it [1, 2]. Ergonomics in dental practice is defined as cognitive and physical stress reduction in order to prevent occupational diseases, thus improving efficacy, quality, and comfort for practitioners and patients [1, 2].

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Among health professionals, dental practitioners represent a population particularly exposed to musculoskeletal disorders (MSDs) [1–4]. MSDs are defined as a number of periarticular conditions that may have an impact on soft tissues (muscles, tendons, cartilage, etc.) and the skeleton. These disorders result from an excessive use of musculoskeletal structures, most often by the repetition of a particular pathogenic or inappropriate motion [1, 2, 3].

Numerous epidemiological studies have reported a prevalence of MSDs in dental practitioners of between 64% and 93%; they occur primarily in the neck, lumbar region, and shoulders [2– 9]. Other authors [10–16] observed that there is a high risk of developing MSDs even in dental students. These MSDs can appear at the beginning of their clinical practice as students, and stay with them through the rest of their working lives. Indeed, throughout the training given to dental practitioners, instruction on working posture is often theoretical. Teaching is more focused on the indications for, technicality, and results of the therapeutic procedure. Yet, when dental students enter working life, technical gestures are quickly mastered, and their concerns switch then to how to perform them in such a way as to avoid MSDs—a skill in which they have not been sufficiently trained [10–16].

It therefore seems very interesting to examine the knowledge, attitudes, and practices of fourth-
 fifth-, and sixth-year dental students in the areas of ergonomics and working postures, and to identify possible obstacles to their implementation in daily practice. Finally, this study might also serve as a reference for the development of recommendations of good practices, adapted to local and regional contexts, regarding working postures within the community of dental students.

Materials and Methods:-

This is a cross-sectional knowledge, attitudes, and practices (KAP) study, which was conducted among fourth-, fifth-, and sixth-year students in dentistry at the Abulcasis International University of Health Sciences in Rabat, Morocco. All participants were informed of the purpose of the study. We carried out the systematic recruitment of all such students enrolled during the 2021–2022 academic year. The criteria for exclusion were not being fourth-, fifth-, or sixth- year dental students or not being enrolled at the University. The survey instrument was an anonymous and individual questionnaire developed on the basis of previous studies [9–19]. The 31-question questionnaire transmitted to students consisted of three parts:

1. 14 questions concerning demographic data (age, gender, and year of studies).
2. 10 questions concerning students' knowledge of ergonomics, MSDs, and principles of correct posture.
3. 17 questions concerning student attitudes and practices, as well as the frequency ("Yes, always"; "Yes, regularly"; "Yes, sometimes"; "No, never") of application of ergonomic principles in patient care.

The questionnaire was made available online on the Google Forms platform. It was posted on social media (student groups on Facebook and WhatsApp) and sent by email, in collaboration with the secretariat of the faculty, to fourth-, fifth-, and sixth-year dental students. The questionnaire was available during the period April, 22, 2022 to June 15, 2022, with several reminders to the participants. Students could only respond to the questionnaire once. Students' knowledge, attitudes, and practices were compared against the principles of good posture as recommended in reference publications [4 and 17–20].

A common scoring standard was used for each question. We categorized the responses as "right" or "wrong" for single-response questions. A score of 1 or 0 was given, respectively, to responses "right" or "wrong". A score for correct responses was calculated for each KAP section by adding together scores for each item, as well as a total score by adding together scores for all three sections (Knowledge, Attitudes, and Practices). The maximum scores were 15 for Knowledge, 8 for Attitudes, and 9 for Practices. The maximum score a student could obtain was 32. Student levels of knowledge, attitudes, and practices were sorted into three groups: good (score 3) when more than 75% of the responses were correct, average (score 2) when between 50% and 75% of the responses were correct, and low (score 1) when less than 50% of the responses were correct.

Data entry and statistical analysis was performed using Jamovi 1.6.23 software. Qualitative variables were expressed in Number and percentage, and compared using the Chi-square test and Fisher's exact test (when the theoretical number of individuals was lower than five). Quantitative variables were expressed in means ± standard deviation (symmetrical distribution). A p-value <0.05 was considered as statistically significant.

Results:-

Out of the 123 students who took part in the study, 70 (57%) were female. The average age of participants was 22.6 ± 1.18 years. Fourth-year students were the most represented in this study with 48 (39%) participants. 111 (90.2%) respondent students had received training on ergonomics and working postures, most of whom, 108 (97%), in the form of a theory course (Table 1).

Ergonomics was a familiar concept in the study population. 99 (80.5%) of the students reported applying ergonomics principles to their daily practice. 55 (44.4%) students were familiar with the precise definition of the term "ergonomics", and 104 (84.6%) of them considered that ergonomics was always useful in dental practice. 84 (68.3%) students were aware of the importance of ergonomics in the prevention of MSDs. 83 (67.5%) students reported that the sitting posture had always been a reference posture in dental practice. And 92 (74.8%) students indicated the standing posture could sometimes be appropriate in dental practice. The design rules for a workstation were not perfectly known. Only 41 (33.3%) students gave a correct response regarding the appropriate distance from the eyes to the work area, and 92 (75%) recognized the movements to be favored to allow for better conditions of manual dexterity and avoid excessive muscle fatigue (Table 2). The average Knowledge score obtained by students was 9.4 ± 2.03, for a maximum score of 15 (Table 5). Overall Knowledge scores were average, with 98 (79%) students sorting into score 2 (Table 6). The number of correct answers was not statistically significant depending on the year of study ($p = 0.7$).

99 (80.5%) students ("Yes, always" and "Yes, regularly") believed they had an ergonomically suitable workstation in their clinical practice. Students stated that they always adjusted their working posture depending on the procedure to be performed in 53 (48%) of the cases, that they regularly did so in 64 (37.4%) of the cases, and that they did so sometimes in 18 (14.6%) of the cases. 90 (73%) of the students indicated that the reference area occupied by the practitioner was correct. 49 (40%) of the students regularly worked with four hands, and only 3 (2%) of them worked without a dental assistant. 64 (37.4%) of the students indicated that the reference area occupied by the assistant was correct (Table 3). The average Attitudes score obtained by students was 4.71 ± 1.4, for a maximum score of 8 (Table 5). Overall Attitude scores were average: 60 (48.8%) students sorted into score 2, and 35 (28.5%) into score 1 (Table 6).

The practices of students regarding working postures adopted depending on the area to be treated were highly variable (Table 4). The average Practices score obtained by students was 4.4 ± 1.5 for a maximum score of 9 (Table 5). Overall Practices scores were average, with 80 (65%) students sorting into score 2 (Table 6).

Discussion:-

In the present study, most of the participants were female (56.9%), with an average age of22.6 ± 1.18 years. Fourth-year students were the most represented (39%) in this study. Perhaps it may be that the other students feel less concerned with ergonomics and working postures. 99 (80.5%) students reported applying ergonomics principles to their daily practice. 44.4% of the students were familiar with the precise definition of the term "ergonomics", and 68.3% of them were aware of the importance of ergonomics in the prevention of MSDs. Indeed, it is essential to make students aware of ergonomics and working postures at the very beginning of their dental education program, before bad ergonomic habits begin to set in [21]. Similarly, according to some authors, the appearance of MSDs in dental students increases significantly between the first and final year of studies [22].

Student levels of knowledge regarding ergonomics and working postures were average overall. Indeed, the results of the present study cannot easily be compared with the results of similar studies due to the variability of the judgement criteria adopted by each study and the target population. A study carried out in Egypt by El-Sallamy et al. in 2018 involving 45 fourth-year dental students, 409 fifth-year dental students, and 25 hospital interns reported a good level of knowledge in 24.4% of the students, average level of knowledge in 26.7% of the students, and low level of knowledge in 48.9% of the students. The questionnaire used included 16 knowledge questions [9]. In the present study, only 23 (18.7%) of the students had a good level of knowledge, 98 (79%) had an average level of knowledge, and 2 (1.6%) had a low level of knowledge.

The present study showed no statistically significant difference in knowledge level based on the year of study ($p = 0.7$). This lack of improvement in working posture gives cause for concern, as one would logically expect an improvement of postural hygiene over the course of student careers. In the study conducted by Cervera-Espert et al. in 2018 involving first- to fifth- year dental students, the authors reported a lowering of student level of knowledge in ergonomics and working postures through the years of studies, particularly among female students in their fifth

year [10]. The authors attributed this lack of improvement to the focus of fifth-year students on the indications for and results of a particular procedure, rather than on how to carry it out and practitioner and patient positioning [10].

Student attitudes were average overall. Students stated that they always adjusted their working posture depending on the procedure to be performed in 53 (48%) of the cases, regularly did so in 64 (37.4%) of the cases, and sometimes did so in 18 (14.6%) of the cases. However, in practice, working postures adopted depending on the area to be treated were highly variable. Indeed, the beginning of clinical practice is a stressful period for students as they find themselves partly autonomous in patient care, which forces them to juggle two parameters: successfully performing the medical procedure technique, while developing a relationship with the patient. This demonstrates the importance of simulation sessions [23].

Finally, we should be aware that the results of the present study only reflect the opinion of the students, which may or may not reflect the working postures actually adopted. Therefore, the results of the present study cannot in any way reflect the existence of a gap in the teaching of ergonomics and working postures. As a result, we propose the use of simple methods to improve the teaching of ergonomics, including pre-clinical practices to learn the correct working postures and the use of video tutorials on correct posture depending on the area to be treated. In this context, we propose the implementation of a training guide on working postures in order to raise awareness among students and train them on how to avoid bad posture.

This study has a number of limitations, one of which is the use of an anonymous questionnaire for the assessment of students' knowledge, attitudes, and practices in the area of ergonomics. Participants' practices could not be overseen. The sample was not large enough. It would be advisable to conduct a multicenter study to improve the reliability of results. Another major limitation of our study was the lack of assessment of student practices using reference tools such as the Rapid Upper Limb Assessment (RULA) method [24].

Tables

Table 1:- Characteristics of the surveyed dentists.

Characteristics	**Frequency(n=123)**
Responserate*	123(68%)
Sex*	
Homme	53(43%)
Femme	70(57%)
Age(years) °	22.6±1.18ans
School year * 4ème année 5ème année 6ème année	48(39%) 37(30%) 38(31%)
Continuous training in ergonomics andworkingposition*	
NonOui	12(10%)
yes which one * Cours théoriques Atelier Autres	111(90%) 108(97%) 1(1%) 2(2%)
Application of ergonomic principles in yourdailypractice*	
Oui	99(80.5%)
Non	24(19.5%)

*Number andpercentage;°means±standarddeviation

Table 2:-Theknowledgeof thepopulationstudied.

Question*	**Answers**
Doyouknow whatergonomicsis?	
Yes completelyYes probablyNo	**55(44.7%)**
Idon'tknow	**67(54.5%)**

	1(0.8%)
	0%
Doyouthinkergonomicsisusefulinyourclinicalpractice?	
Yes alwaysYes sometimesNo never	**104(84.6%)**
Idon'tknow	**18(14.6%)**
	0%
	1(0.8%)
Doyouthinkthatergonomicscanreducetheriskofmusculoskeletaldisorders?	
YesalwaysYes sometimesNonever	**84(68.5%)**
Idon'tknow	**36(29.3%)**
	1(0.8%)
	2(1.6%)
Doyouthinkstanding postureisasuitablepositionindentistry?	
Yes alwaysYes sometimesNo never	**3(2.4%)**
Idon'tknow	**92(74.8%)**
	25(20.3%)
	3(2.4%)
Doyouthinksittingpostureisthereferencepositionindentalpractice?	
YesalwaysYes sometimesNonever	**83(67.5%)**
Idon'tknow	**29(23.6%)**
	8(6.5%)
	3(2.4%)
Accordingtoyoutheseat ofthepractitioner:	
mustbeadjusted inheighttoallowthethighstobeverytilted upwardsmusthaveabackrestfitted against thesmall oftheback	**30(24.3%)**
	54(44%)
shouldbetiltedupandforward	**13(10.5%)**
mustputthepractitionerinahigh positioninrelationto hispatient	**26(21.2%)**
Thepractionermusthave	
shouldersrelaxedandelbowsagainstthebody	**23(18.6%)**
theforearmsraised forwardatanangle>45°(betweentheforearmandtherestofthebody)head andbackstraight	**14(11.3%)**
	15(12.3%)
thighs apartflatfeet	**30(24.4%)**
	41(33.4%)
Accordingtoyou,thetask-eyedistanceshouldbe:	
15-30cm	**19(15.4%)**
25-30cm	**41(33.3%)**
10-30cm	**2(1.6%)**
15-40cm	**61(49.6%)**
The movementstobefavoredtoallowforbetterconditionsof manualdexterity	
finger movements onlyfingerandwristmovements	**18(14.7%)**
movementsofthefingers,wristsandelbows	**7(5.7%)**
movementsofthefingers, wrists,elbows,forearmsandshouldersmovementsinvolvethewhole body	**67(54.6%)**
	15(12%)
	16(13%)

*Numberand percentage;

Table 3:-Theattitudesof thepopulationstudied.

Question*	**Answers**
Isyourworkstationintheclinicadaptedintermsofergonomics?	
Yes alwaysYesregularly	28(22.8%)
Yesfromtimetotime	71(57.7%)
Nonever	0%
	24(19.5%)
Doyoupay attentiontotheorganizationofyourclinicalworkplan?	
Yes alwaysYesregularly	32(26%)

Yesfromtimetotime	49(40%)
Nonever	38(31%)
	4(3%)
Doyouthinkyouhaveagoodworkingposture?	
Yes alwaysYesregularly	11(9%)
Yesfromtimetotime	33(27%)
Nonever	71(58%)
	8 (6%)
Doyouthinkaboutadoptingthepositionofthepatientaccordingtothe procedure?	
Yes alwaysYesregularly	59(48%)
YesfromtimetotimeNonever	64(37.4%)
Ifso,youtaketheposition	18(14.6%)
between 7-11hbetween 7-12hbetween 6- 2hbetween 6-3h	0%
	22(18%)
	90(73%)
	9(7%)
	2(2%)
Doyouworkwithassistance?	
Yes alwaysYesregularly	47(38%)
Yesfromtimetotime	49(40%)
Nonever	24(20%%)
Ifyes,yourassistanceoccupies thearea between	3(2%)
2et4h	
4et6h	64(37,4%)
3et6h	52(42,2%)
2et5h	14(11,4%)
	11(9%)
Doyouworkinindirectvision(withthemirror)	
Yes alwaysYesregularly	103(84%)
Yesfromtimetotime	0%
Nonever	0%
	20(26%)

* Numberandpercentage

Table4:-Thepractices of thepopulationstudied.

Question	Correctanswers yes	No
whatpositionyouandyourpatientadoptinthefollowingareas*		
Rightmaxillarysector		
Anteriormaxillarysector	**39(31.8%)**	**84(68.2%)**
Leftmaxillarysector	**42(34%)**	**81(66%)**
Rightmandibularsector	**51(41.4%)**	**58(58.6%)**
Anteriormandibularsector	**74(60%)**	**49(40%)**
Leftmandibularsector	**75(61%)**	**48(39%)**
	25(20%)	**98(80%)**

* Numberandpercentage

Table5:-Scoresof knowledge,attitudesandpracticesof thepopulationstudied.

Scores*	Frequency(N=123)
knowledgeAttitudesPractices	**9.4±2.03**
totalScore	**4.71±1.4**
	4.4±1.5
	13.8±3.3

***Mean±standarddeviation**

Table 6:-Evaluation of knowledge, attitudes and practices of students of 4th 5th 6th yeardentistry.

Scores	Frequency(N=123)
nowledgePoorAveragegood	
titudesPoorAveragegood	2(1.6%)
aticesPoorAveragegood	78(79.7%)
	23(18.7%)
	35(28.5%)
	60(48.8%)
	28(22.8%)
	0%
	80(65%)
	43(35%)

*Numberandpercentage

Conclusion:-

This study provides an overview of students' knowledge, attitudes and practices in terms ofergonomics and work position. The finding was average even if this study only reflects theopinions of students on work positions. Learning working positions at an early stage of initialtrainingwherehabits have notyet beenacquiredremains the best solution to consider.

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