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Abstract

The purpose of this study was to evaluate the risk of developing musculoskeletal disorders in preclinical and clinical dental students in Beirut Arab University (BAU) clinics. 190 students were recruited from the Faculty of Dentistry at BAU: 95 preclinical and 95 clinical dentistry students, and asked to fill the Ergonomic Awareness Questionnaire (EAQ). Then the students were blindly assessed by a physical therapist using Rapid Entire Body Assessment Scale (REBA) scale. Results indicated that 90% of the preclinical and clinical students are at medium to high risk of developing musculoskeletal problems. In addition, 78% of preclinical students showed awareness regarding ergonomics compared to 83% of clinical students. However, only 44% of preclinical students and 62% of clinical students follow good ergonomic practices in their work. On the other hand, 58% of preclinical students and 81% of clinical students suffer from musculoskeletal disorders, but only 23% and 33% of preclinical and clinical students, respectively, are seeking medical consultation. Even though dental curricula integrates the work-related ergonomic challenges in several courses, measures seem to be unsatisfactory to lower the risk of musculoskeletal disorders. Adoption of more interactive and effective means to foster proper ergonomics is recommended. Incorporating good ergonomics should start in dental practice in order to avoid illnesses and injuries and to increase efficiency and productivity.

Keywords

Ergonomics, musculoskeletal disorders, Rapid Entire Body Assessment scale

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ABSTRACT: *The purpose of this study was to evaluate the risk of developing musculoskeletal disorders in preclinical and clinical dental students in Beirut Arab University (BAU) clinics. 190 students were recruited from the Faculty of Dentistry at BAU: 95 preclinical and 95 clinical dentistry students, and asked to fill the Ergonomic Awareness Questionnaire (EAQ). Then the students were blindly assessed by a physical therapist using Rapid Entire Body Assessment Scale (REBA) scale. Results indicated that 90% of the preclinical and clinical students are at medium to high risk of developing musculoskeletal problems. In addition, 78% of preclinical students showed awareness regarding ergonomics compared to 83% of clinical students. However, only 44% of preclinical students and 62% of clinical students follow good ergonomic practices in their work. On the other hand, 58% of preclinical students and 81% of clinical students suffer from musculoskeletal disorders, but only 23% and 33% of preclinical and clinical students, respectively, are seeking medical consultation. Even though dental curricula integrates the work-related ergonomic challenges in several courses, measures seem to be unsatisfactory to lower the risk of musculoskeletal disorders. Adoption of more interactive and effective means to foster proper ergonomics is recommended. Incorporating good ergonomics should start in dental practice in order to avoid illnesses and injuries and to increase efficiency and productivity.*

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1. INTRODUCTION

Ergonomics is an arrangement of logical principals linked to the comprehension of the collaborations amongst people and different components of a system (Moon and Jang, 2007). Ergonomic appraisal of Work-Related Musculoskeletal Disorders (WMSDs) includes the assessment of risk to develop a scope of diseases to muscles, nerves and joints, basically to the upper limb and low back, which are work-related (Al Madani and Dababneh, 2016). Musculoskeletal diseases are among the most generally spread occupational-related disorders in both developed and developing nations, with expanding health costs, decreased productivity and poorer quality of life (Kee and Karwowski, 2007)

Recently, dentistry has been thought to be a tough occupation because of the requirement for high focus and exactness (Gandavadi et al., 2007). Occupation-related musculoskeletal diseases, particularly of the neck and upper limbs, have turned out to become more frequent among dental specialists, most prominently with low back pain took after by neck pain, carpal tunnel syndrome and cervical spondylitis (Gandavadi et al., 2007, Alexopoulos et al. 2004, Myers and Myers, 2004). These kind of injuries may lead to early retirement (Burke et al., 1997). As a result of the limited work area (the mouth), and the requirement for skill, the dentist may need to take resolute work postures; this outcomes in static movement of the muscles in cumbersome stances and may prompt musculoskeletal diseases (Lake, 1994).

Precise posture limits the strain on the human body by keeping up balance of the muscles and skeleton. This adjusted musculoskeletal state ensures the supporting structures in the body and prevents harm or

dynamic twisting in all positions, including standing, resting, and sitting. Also, correct posture infers not slanting the body forward, backward, left, or right (Chen et al., 2008).

One of the vital prerequisites for assessing work exercises is postural examination. The risk of musculoskeletal damage related to the working positions can be helpful in executing change in the working practices, concerning a full ergonomic workplace assessment. The ergonomics specialist can enormously profit by the accessibility of task-sensitive field methods (McAtamney and Hignett, 2000).

The aim of this study was to evaluate the awareness and the risk of developing musculoskeletal disorders in preclinical and clinical dental students in Beirut Arab University (BAU).

As a prerequisite for parametric assumption, data was screened for normality. Normality assumption was assessed using the tests of normality in addition to assessing for the presence of extreme scores, and skewness and kurtosis. Descriptive analysis using histograms with the normal distribution curve showed that the REBA were not normally distributed and violates the parametric assumption for REBA score. All these findings allowed the researchers to conduct non-parametric analysis. So, the Mann-Whitney tests" was conducted to compare REBA score between both groups. While, the Chi square tests was conducted to compare the total response of the nominal variable (Ergonomic Awareness Questionnaire) between both groups. The level of significance was set at ($P < 0.05$).

2. RESULTS:

The frequency distribution and percentage of different responses for each question in the questionnaire was answered by the participants in both groups (as indicated in Table1). Chi-square test revealed there was significant difference in answering response between both groups ($p < 0.05$) at Q3 that clinical group had higher awareness of musculoskeletal disorders than preclinical, as well clinical group had experienced symptoms in neck, shoulders, hands or back pain during work more than preclinical ($p < 0.05$) this represent Q4, while both clinical and preclinical had the same awareness of back, hand , and shoulder strengthening exercises (Q5) ($p > 0.05$) but the preclinical practice these exercises more than clinical (Q6) ($p < 0.05$). In addition, the preclinical had noticed that their practice with awkward postures higher than clinical Q7 ($p < 0.05$). However the clinical group had higher awareness of magnification and visualization aids that helps them than preclinical Q10 ($p < 0.05$). Additionally, the preclinical workplace was more adequately lit than the clinical workplace Q13 ($p < 0.05$). While the clinical group practiced four handed dentistry more than the preclinical group Q14 ($p < 0.05$). In spite of that both the clinical and preclinical groups seek for medical consultant Q15 ($p > 0.05$), but the clinical was administrated treatment more than the preclinical Q16 ($p < 0.05$). Finally, the preclinical group performed regular exercises more than the clinical group Q17 ($p < 0.05$).

Table 1. Frequency and percentage of responses to Ergonomic Awareness Questionnaire for students at preclinical and clinical stages.

Questions N (%)	Preclinical	Clinical	Preclinical	Clinical	χ^2	<i>p</i>
	Response by "No"		Response by "Yes"			
Q1	8 (7%)	5 (6.8%)	106 (93%)	68 (93.2%)	0.002	0.965
Q2	32 (28%)	14(19.2%)	82 (72%)	59 (80.8%)	1.897	0.223
Q3	25 (22%)	7 (9.5%)	89 (78%)	66 (90.5%)	4.778	0.03*
Q4	48 (42%)	14(19.2%)	66 (58%)	59 (80.8%)	10.555	0.001*
Q5	24 21%)	8(11%)	90(79%)	65 (89%)	3.197	0.074
Q7	23 (20%)	30 (41%)	91 (80%)	43 (59%)	9.59	0.002*
Q8	68 (59.6%)	40 (54.8%)	46 (40.4%)	33 (45.2%)	0.43	0.512
Q9	53 (46.5%)	26 (35.6%)	61 (53.5%)	47 (64.2%)	2.157	0.142
Q10	53 (46.5%)	12 (16.5%)	61 (53.5%)	61 (83.5%)	17.724	0.0001*

Q11	80 (70%)	44 (60%)	34 (30%)	29 (40%)	1.953	0.162
Q12	20 (17.5%)	21 (28.7%)	94 (82.5%)	52 (71.3%)	3.275	0.07
Q13	8 (7%)	14(19.2%)	106 (93%)	59 (80.8%)	6.34	0.012*
Q14	97 (85%)	14(19.2%)	17 (15%)	59 (80.8%)	80.137	0.0001*
Q15	88 (77.2%)	49 (67%)	26 (22.8%)	24 (33%)	2.304	0.129
Q16	100 (87.7%)	48 (65.8%)	14 (12.3%)	25 (34.2%)	13.009	0.0001*
Q17	57 (50%)	55(75.3%)	57 (50%)	18 (24.7%)	11.898	0.001*

*Significant level is set at $p < 0.05$.

Concerning the REBA score, the frequency distribution and percent of score (presented in Table 2). Mann-Whitney.

U test" revealed that there was no significant difference between both groups ($p > 0.05$) in REBA score.

Table 2. Frequency and percentage of REBA scores for students at preclinical and clinical stages.

	Preclinical N (%)	Clinical N (%)	U-value	Z-value	<i>p</i>
Negligible risk	0 (0)	0 (0)	4133	-1.116	0.265
Low Risk	1 (1.05)	4 (4.22)			
Medium Risk	46(48.42)	49 (51.57)			
High Risk	41 (43.17)	37 (38.95)			
Very High Risk	7 (7.36)	5 (5.26)			

*Significant level is set at $p < 0.05$.

3. DISCUSSION:

Dentistry is one of the highest potential hazard occupations for WMSDs. The long working hours, troublesome stances and high visual requests make the dentists vulnerable to develop MSDs (Batra et al., 2015). The results of this study revealed many observations.

The REBA tool is one of the simpler observation based exposure assessment tools (David, 2005). The current study has demonstrated that the 90 % of the preclinical and 90 % of the clinical dentistry students are at medium to high risk of developing musculoskeletal problems based on the REBA SCORE obtained during their practice; in addition almost the rest of both groups are at very high risk of developing musculoskeletal problems.

In dentistry, dynamic and static activities incline dental specialists for musculoskeletal diseases; however, a study demonstrated that neck and lower back pain have significant association with the risk levels found by the utilization of the REBA assessment tool (Rafeemanesh et al., 2013).

The most significant explanations of the increased REBA mean for the neck and lower back were horrible position of the instrument table, absence of help and absence of appropriate ergonomic seat. Research demonstrated REBA's comfort for postural appraisal of jobs in several work-related settings, including industrial and healthcare occupations, development, sawmill tasks, supermarket and food industry, computer-based employments, bundling, school workshop, odontological services and for firefighters and crisis therapeutic experts (Al Madani and Dababneh, 2016).

Seventy-eight percent of preclinical dentistry students showed awareness regarding ergonomics comparing to 83% of clinical dentistry students - This was noted as a higher consider contrasted with the results published by (Kanteshwari et al., 2010) and (Gupta et al., 2015) which demonstrated just half of the

respondents knew about ergonomics and 59.6% in another investigation done by (Gopinadh et al., 2013). However, regardless of 78% and

83% mindfulness about ergonomics, just 44% of preclinical dentistry students and 62% of clinical dentistry students dependably take after great ergonomic practices in their work. In the other hand the current study demonstrates that 58% of preclinical dentistry students and 81% of clinical dentistry students are suffering from musculoskeletal disorders, however only 23% and 33% of preclinical and clinical dentistry students respectively are seeking medical consultation. These statistics correspond with many other studies done on the subject (Marshall et al., 1997, Rising et al., 2005).

Several dependent factors were assessed and the utilization of miniaturized scale breaks ended up being valuable in diminishing fatigue and further harming to the body. (Åkesson et al., 2001) noted consistent vibrations in the handpiece prompt nerves' irritation causing carpal tunnel syndrome, unsafe impacts of these vibrations in their study. The practice of four- handed dentistry verified to be critical in decreasing stress as complimented by (Finkbeiner, 2001) in his investigations. In spite of the fact that in a study done by (Ananya et al., 2014), results demonstrated that exclusively 27% of the dental specialists practiced four-handed dentistry, our study showed that of preclinical dentistry students and 81% of clinical dentistry students practiced four handed dentistry.

4. CONCLUSION:

Even though dental curricula integrates the work related ergonomic challenges in several courses starting first academic year and despite the good intellectual skills among dental students regarding correct posture, the findings seemed to be not satisfactory to lower the risk of musculoskeletal disorders. This means that adoption of more interactive and effective means to foster proper ergonomics is required by including more awareness sessions on the danger of having musculoskeletal disorders and more training and implementation of exercise sessions during prolonged working time, taking micro breaks during a long procedure, using of magnification and visualization aids. In addition, it is very important to advise the students to seek prompt medical consultation/care as soon as they experience any symptoms in neck, shoulders, hands and back.

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