

Five-year follow-up of temporomandibular disorders and other musculoskeletal symptoms in dental students

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Aim. The aim of this epidemiologic study was to evaluate the intensity and variation of temporomandibular disorders and other musculoskeletal symptoms in a population of dental students during the five years of Dental School.

Methods. A 0-to-3 numeric scale questionnaire (0=absence of the symptom, 1=mild intensity, 2=moderate intensity, 3=severe intensity) was submitted to all the students enrolled in the first year of the Dental School at the University of Saint Joseph (Beirut, Lebanon). The same questionnaire was filled out by the same students every year until they reached the fifth (last) year.

Results. Temporomandibular disorders and musculoskeletal symptoms were generally of mild intensity and fluctuating in time. No significant differences were found among years in the intensity of earache, headache, face pain, arm symptoms, neck pain, and toothache. Ear stuffiness decreased from the first to the third and fifth year. Temporomandibular joint pain, temporomandibular joint sounds, upper back pain, and lower back pain showed a similar trend generally increasing from the first and second years to the third year, and then decreasing until the fourth and fifth years.

Conclusion. A higher risk of developing such symptoms associated with dental work in the laboratory can be hypothesized in case of improper ergonomics.

Key words: Temporomandibular joint disorders - Musculoskeletal system - Epidemiology - Students.

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Temporomandibular disorders (TMD) are relatively common in the general population, with approximately 40% to 75% of persons displaying at least one sign, and approximately 33% reporting at least one symptom of mandibular dysfunction.¹

However, such symptoms are usually of mild or moderate intensity, and fluctuating in time, therefore only 3.6% to 7% of the individuals are estimated to be in need of treatment.¹

Especially in children and adolescents TMD signs and symptoms are usually mild and fluctuating. Temporomandibular joint (TMJ) clicking particularly, increases in frequency with age and is extremely variable intra-individually. However, progression to locking is rare.²

Magnusson *et al.*,³ examined a group of 15 year old children for 20 years, until they reached the age of 35, and confirmed the substantial oscillation of signs and symptoms of TMD, with rare progression to severe pain and dysfunction. Older subjects instead, generally report less frequent TMD symptoms, that decrease with increasing age.²

TABLE I.—Prevalence of musculoskeletal symptoms from the 1st to the 5th year of Dental School.

		1st Year	2nd Year	3rd Year	4th Year	5th Year
Earache	No/ Mild	97%	93.9%	100%	97%	94%
	Moderate/ Severe	0%	6.1%	0%	0%	6.1%
Ear stuffiness	No/ Mild	87.9%	100%	96.9%	97%	100%
	Moderate/ Severe	12.1%	0%	3%	0%	0%
TMJ pain	No/ Mild	96.9%	97%	90.9%	97%	100%
	Moderate/ Severe	3%	3%	9.1%	3%	0%
TMJ sounds	No/ Mild	100%	100%	87.8%	97%	100%
	Moderate/ Severe	0%	0%	12.1%	3%	0%
Headache	No/ Mild	78.8%	87.9%	66.6%	84.8%	81.8%
	Moderate/ Severe	21.2%	12.1%	33.3%	15.2%	18.2%
Face pain	No/ Mild	100%	100%	100%	100%	100%
	Moderate/ Severe	0%	0%	0%	0%	0%
Arm symptoms	No/ Mild	97%	96.9%	94%	96.9%	100%
	Moderate/ Severe	3%	3%	6.1%	3%	0%
Neck pain	No/ Mild	93.9%	90.9%	78.8%	94%	90.9%
	Moderate/ Severe	6%	9.1%	21.2%	6.1%	9.1%
Upper back pain	No/ Mild	96.9%	97%	81.9%	97%	94%
	Moderate/ Severe	3%	3%	18.2%	3%	6.1%
Lower back pain	No/ Mild	93.9%	87.8%	72.7%	90.9%	84.8%
	Moderate/ Severe	6.1%	12.1%	27.2%	9.1%	15.2%
Toothache	No/ Mild	100%	100%	100%	100%	100%
	Moderate/ Severe	0%	0%	0%	0%	0%

TMJ: temporomandibular joint.

Some upper body symptoms related to TMD, such as headache, neck and back pain, and arm symptoms, can be associated to poor body posture. Dental practice and dental work obliges the clinicians, either dental students or dentists, to assume positions of the body that can cause suffering, pain and discomfort. In fact, dentists often work with

their body bent forward and rotated to the left side, with their arms held forward unsupported. According to several studies this habit can represent a predisposing factor for the development of musculoskeletal symptoms.⁴⁻⁸

In a previous study, low back pain was more prevalent in dental students than in a group of students in psychology matched for

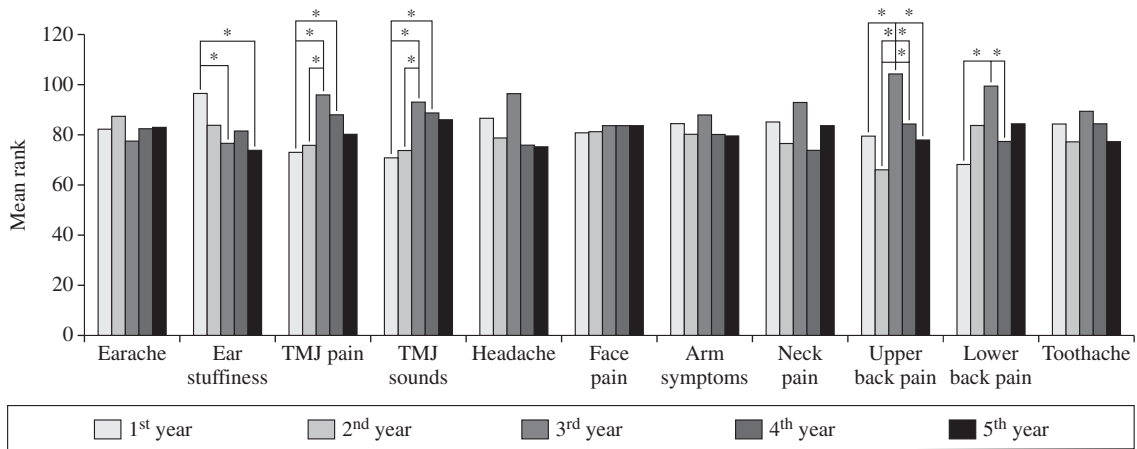


Figure 1.—Results.

age and gender,⁹ confirming the results of other studies that compared dentists to subjects working in a different environment, such as farmers, pharmacists, and office employees.^{5, 7, 10, 11} Dentists, in fact, in the latter surveys, showed higher prevalence of radiological signs and symptoms of upper body pathology,^{5, 10, 11} and more severe symptomatology.⁷

Higher prevalence of upper body symptoms among dentists was also reported by Rundcrantz *et al.*⁴ who found that 72% of the clinicians they examined complained about pain and discomfort either from the head, neck, or shoulders; and by Kerosuo *et al.*⁷ who discovered that a similar percentage (70-72%) of dental practitioners (general practitioners and orthodontists, respectively) suffered from musculoskeletal symptoms, most commonly in the neck and shoulders (respectively 53% and 56% of pain sufferers).

The aim of this study was to evaluate the intensity of temporomandibular disorders and other musculoskeletal symptoms in a population of dental students during their five years of Dental School.

Materials and methods

Thirty-three dental students (21 males and 12 females, mean age 18.45 years) representing all the students enrolled in the first

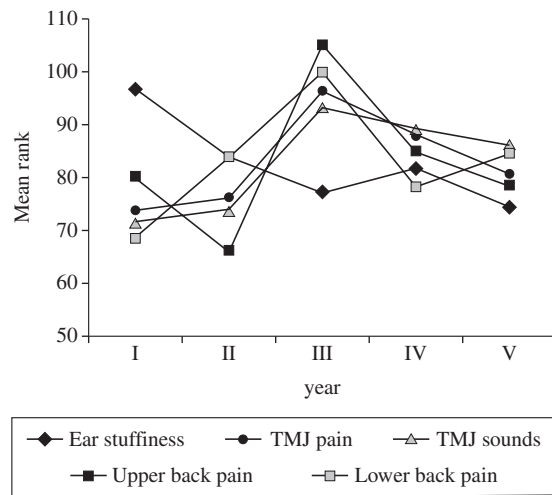


Figure 2.—Results.

year of the Dental School of the University of Saint Joseph (Beirut, Lebanon) were asked to fill out a 0-to-3 numeric scale questionnaire (0=absence of the symptom, 1=mild intensity, 2=moderate intensity, 3=severe intensity) to indicate the level of the following symptoms: earache, ear stuffiness, TMJ pain, TMJ sounds, headache, face pain, arm symptoms (pain/numbness), neck pain, upper back pain, lower back pain, toothache, within the last seven days. The questionnaire was submitted to them every year, starting during the first year of Dental School, and finishing during the fifth (last) year.

TABLE II.—Hours of theory, practical training, and clinical training of dental students.

	Theory	Practical training	Clinical training	Total
1 st year	510	147	0	657
2 nd year	402	276	0	678
3 rd year	360	440	0	800
4 th year	261	0	1106	1367
5 th year	205	0	1359	1564

Theory hours consist of theoretical lectures; practical training consists of practical work in the laboratory; clinical training consists in clinical work on patients.

Statistical analysis

The difference among the values for the different years was first analyzed by the Kruskal-Wallis analysis of variance (ANOVA). When statistically significant difference was observed, the difference between the groups was analyzed by pair wise multiple comparisons using the Mann-Whitney test. The difference was considered significant for $P < 0.05$.

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA).

Results

The results of the analyses showed that there were no significant differences among the years for the following symptoms: earache, headache, face pain, arm symptoms, neck pain, and toothache ($P > 0.05$). The differences were significant for ear stuffiness ($P = 0.01$), TMJ pain ($P = 0.02$), TMJ sounds ($P = 0.05$), upper back pain ($P = 0.001$) and lower back pain ($P = 0.05$).

There was a significant decrease in ear stuffiness from the first to the third year ($P = 0.014$) and from the first to the fifth year ($P = 0.003$). TMJ pain and TMJ sounds showed a similar trend increasing significantly from the first to the third year ($P = 0.007$ for TMJ pain and $P = 0.016$ for TMJ sounds), from the second to the third year ($P = 0.018$ for TMJ pain and $P = 0.035$ for TMJ sounds), and from the first to the fourth year ($P = 0.048$ for TMJ pain and $P = 0.038$ for TMJ sounds). Symptoms then decreased from the third to the fourth and the fifth years for both variables, however this latter difference was not statistically sig-

nificant ($P > 0.05$). Upper back pain increased from the first and second years to the third year (respectively $P = 0.014$ and $P < 0.001$), and from the second to the fourth year ($P = 0.021$), then decreased significantly from the third to the fourth year ($P = 0.043$) and the fifth year ($P = 0.011$). Lower back pain increased from the first to the third year ($P = 0.004$), and then decreased from the third to the fourth year ($P = 0.042$).

Apart from earache, ear stuffiness, and face pain, all the other symptoms were observed to be more intense during the third year, although such differences in intensity were not always statistically significant. The results are shown in Table I, and Figures 1 and 2.

Discussion

The overall level of pain and dysfunction reported by the students examined was low. Except for headache, neck pain, and lower back pain, over 80% of the subjects reported no or mild intensity of the related symptom regardless of the year of Dental School, with only 0% to 3% of them reporting severe intensity. If we consider earache, TMJ pain, face pain, arm symptoms, and toothache only, over 90% of the students reported no or mild intensity of the related symptom, with no subjects reporting severe intensity (Table I).

It is to be noticed that almost all the symptoms, although generally of mild intensity, were more intense during the third year of dental school, increasing from the first and second year to the third year, and then decreasing until the fifth year. This increase of symptoms in the third year was statistically

significant for TMJ pain, TMJ sounds, upper back pain, lower back pain, and was not statistically significant, but still present for headache, arm symptoms, neck pain, toothache. We tried to examine the possible reason for this increase in symptomatology during the third year by analyzing the effective work carried out by the students during the five years of Dental School. In Table II and Figure 3 the outline of the hours of theoretical lectures, practical training (practical work in the laboratory), and clinical training (clinical work on patients) in the different years is reported. As we can notice, hours of theoretical lectures progressively decrease from the first to the fifth year, the hours of practical training instead increase from the first to the third year, while they are absent in the fourth and fifth years. On the other hand, the hours of clinical training start in the fourth year and increase in the fifth year. The total work hours increase from the first to the fifth year especially in the fourth and fifth years because of the high number of hours of clinical training.

If we try to correlate symptomatology with work hours, it is evident that it is neither the clinical training nor the total work hours that can be a risk for the development of TMD and other musculoskeletal symptoms. In fact, clinical training starts in the fourth year, when the symptoms start decreasing, and the total work hours reach their maximum in the fifth year, when again the symptoms decrease. As we already mentioned, the hours of practical training, instead, increase from the first to the third year, and then stop, resembling the behavior of the symptomatology. Practical training consists of practical work in the laboratory, where incorrect posture can be relevant. Students work on a desk, sitting on a chair, and are very likely to have a posture with the back, the neck, and the head bent forward, and the center of gravity moved forward. This position causes overwork of the posterior muscles of the back and the neck, which can be a risk factor for development of musculoskeletal symptoms such as headache, arm symptoms, neck pain, lower and upper back pain. On the other hand, clinical

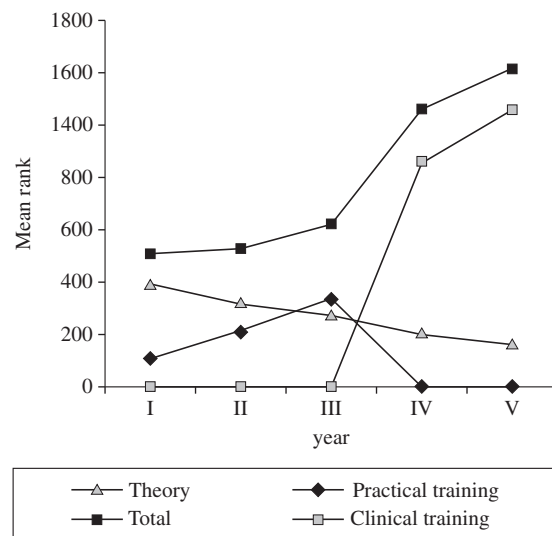


Figure 3.—Outline of the hours of lesson.

work consists of clinical work on patients. In this case, incorrect posture can also be relevant, as we already mentioned, but can be significantly reduced by adopting ergonomic techniques; particularly, working in a standing position, altering the working position in relation to the patient, according to the specific area of the mouth the dentist needs to work on, using the mirror for a better view of tooth surfaces difficult to access directly, using a wedge cushion to better position the head of the patient, adopting properly selected surgical telescopes and co-axial illumination headlights, interrupting work by short pauses.^{4, 5, 12}

Since during the five years of dental school lectures on ergonomics are included, our hypothesis is that dental students are taught how to correct posture during clinical work, and therefore they can reduce the impact of such work on the occurrence of TMD and other musculoskeletal symptoms. Conversely, no instructions are probably given on ergonomics during practical work in the laboratory, therefore such work can predispose to the development of musculoskeletal symptoms, as we detected, especially in the third year, when the number of practical work hours is higher.

A diverse explanation for the differences

detected between the years in the intensity of the related symptoms can be the characteristic fluctuation of TMD symptoms in the general population independently of the effect of the work in dental school,^{3, 13-15} in agreement with the results achieved by Abou-Atme *et al.*¹⁶ who found that dental studies were not consistently related to a particular risk of TMD.

Another result that needs to be evaluated is the reduction of ear stuffiness from the first to the fifth year, which was statistically significant. The meaning of such improvement is difficult to evaluate. In fact such symptom is frequently associated with TMD,¹⁷ but can also be present regardless of the presence of joint and facial muscle pain and dysfunction, as a symptom of ear pathology. It is also unlikely that ear stuffiness reported by the students be related to the presence of TMD, because its variation during the five years of Dental School does not follow the same trend of the other more typical TMD symptoms such as TMJ pain, and TMJ sounds (Figure 1).

Limits of the present study suggest to consider carefully the outcome that was obtained.

First of all it is possible that, for many of the symptoms assessed, the difference among the years did not reach statistical significance because the number of the subjects (N=33) was not sufficient, and probably a larger number of students, for example assessing more classes together, would have allowed to reach more evident results.

Another limit is related to the fact that we did not assess whether the subjects were taking any medication, especially anti-inflammatory drugs and muscle relaxants, or whether they were under treatment for TMD or other musculoskeletal conditions (for example using oral appliances, chiropractic treatment, physical therapy, etc.). In these cases the effect of treatment, either pharmacologic or non-pharmacologic, would certainly have affected the symptomatology. We cannot also exclude that some of the symptoms, especially pain symptoms, could be related to injury after trauma or could be influenced by bruxism, because such information was not available.

Conclusions

The results of this study confirm that TMD and musculoskeletal symptoms are generally of mild intensity and fluctuating in time. A higher risk of developing such symptoms associated with dental work in the laboratory can be hypothesized in case of improper ergonomics.

Based on the results of the present study, clinical dental work does not seem to represent a risk factor for TMD and musculoskeletal symptoms.

Riassunto

Follow-up di cinque anni dei disturbi temporo-mandibolari e di altri sintomi muscoloscheletrici in studenti di odontoiatria

Obiettivo. L'obiettivo di questo studio epidemiologico è stato di valutare l'intensità e la variazione dei disturbi temporo-mandibolari e di altri sintomi muscoloscheletrici in una popolazione costituita da studenti di odontoiatria durante i cinque anni del corso di studi.

Metodi. Un questionario a scala numerica da 0 a 3 (0 = assenza di sintomi, 1 = sintomi di lieve intensità, 2 = sintomi di intensità moderata, 3 = sintomi di grave intensità) è stato somministrato a tutti gli studenti arruolati durante il primo anno del corso di studi in odontoiatria presso la University of Saint Joseph (Beirut, Libano). Lo stesso questionario è stato compilato dagli stessi studenti con cadenza annuale sino al quinto (e ultimo) anno di corso.

Risultati. I disturbi temporo-mandibolari e i sintomi muscoloscheletrici sono stati generalmente di lieve intensità e fluttuanti nel tempo. Non sono emerse differenze significative tra i vari anni per quanto riguarda l'intensità del dolore alle orecchie, della cefalea, del dolore al volto, dei sintomi agli arti superiori, della cervicalgia e del mal di denti. Il senso di orecchie tappate è diminuito dal primo anno al terzo e al quinto anno. Il dolore all'articolazione temporo-mandibolare, gli schiocchi della stessa articolazione, il dolore alla schiena e quello lombare hanno evidenziato un andamento simile, aumentando dal primo e secondo anno al terzo anno e quindi diminuendo nel quarto e quinto anno.

Conclusioni. Si può ipotizzare un maggior rischio di sviluppare sintomi associati al lavoro pratico in laboratorio in caso di posture ergonomicamente improprie.

Parole chiave: Disordini temporo-mandibolari - Sistema muscoloscheletrico - Epidemiologia - Studenti.

References

1. Okeson JP. Differential diagnosis and management considerations of temporomandibular disorders. In: Okeson JP, editor. *Orofacial pain. Guidelines for assessment, diagnosis, and management*. Chicago: Quintessence Publishing Co, Inc; 1996. p. 113-84.
2. Carlsson GE. Epidemiology and treatment need for temporomandibular disorders. *J Orofac Pain* 1999;13:232-7.
3. Magnusson T, Egermark I, Carlsson GE. A longitudinal epidemiologic study of signs and symptoms of temporomandibular disorders from 15 to 35 years of age. *J Orofac Pain* 2000;14:310-9.
4. Rundcrantz BL, Johnsson B, Moritz U. Cervical pain and discomfort among dentists. Epidemiological, clinical and therapeutic aspects. Part 1. A survey of pain and discomfort. *Swed Dent J* 1990;14:71-80.
5. Rundcrantz BL, Johnsson B, Moritz U. Occupational cervico-brachial disorders among dentists. Analysis of ergonomics and locomotor functions. *Swed Dent J* 1991;15:105-15.
6. Rucker LM, Sunell S. Ergonomic risk factors associated with clinical dentistry. *J Calif Dent Assoc* 2002;30:139-48.
7. Kerosuo E, Kerosuo H, Kanerva L. Self-reported health complaints among general dental practitioners, orthodontists, and office employees. *Acta Odontol Scand* 2000;58:207-12.
8. Rundcrantz BL, Johnsson B, Moritz U. Pain and discomfort in the musculoskeletal system among dentists. A prospective study. *Swed Dent J* 1991;15:219-28.
9. Melis M, Abou-Atme YS, Cottogno L, Pittau R. Upper body musculoskeletal symptoms in Sardinian dental students. *J Canad Dent Assoc* 2004;70:306-10.
10. Katevuo K, Aitasalo K. Skeletal changes in dentists and farmers in Finland. *Community Dent Oral Epidemiol* 1985;13:23-5.
11. Powell M. The health and work of two professional groups: dentists and pharmacists. *Dent Pract* 1970;20:373-8.
12. Chang BJ. Ergonomic benefits of surgical telescope systems: selection guidelines. *J Calif Dent Assoc* 2002;30:161-9.
13. Magnusson T, Carlsson GE, Egermark I. Changes in clinical signs of craniomandibular disorders from the age of 15 to 25 years. *J Orofac Pain* 1994;8:207-15.
14. Morinushi T, Ohno H, Ohno K, Oku T, Ogura T. Two year longitudinal study of the fluctuation of clinical signs of TMJ dysfunction in Japanese adolescents. *J Clin Pediatr Dent* 1991;15:232-40.
15. Wanman A, Agerberg G. Temporomandibular joint sounds in adolescents: a longitudinal study. *Oral Surg Oral Med Oral Pathol* 1990;69:2-9.
16. Abou-Atme YS, Zawawi KH, Melis M. Prevalence, intensity, and correlation of different TMJ symptoms in Lebanese and Italian subpopulations. *J Contemp Dent Pract* 2006;7:71-8.
17. Lam DK, Lawrence HP, Tenenbaum HC. Aural symptoms in temporomandibular disorder patients attending a craniofacial pain unit. *J Orofac Pain* 2001;15:146-57.