AN ASSESSMENT OF AWARENESS AND SELF-REPORT ABOUT OCCUPATION-RELATED HEALTH PROBLEMS AMONG DENTAL LABORATORY TECHNICIANS IN TURKEY

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ABSTRACT

• ***Objective:*** *The aim of this study was to assess the awareness and self-report occupational health problems among dental technicians in Izmir, Turkey.*

• ***Material and Method:*** *A total of 185 dental technicians, 27 women (mean age 25.1±3.87), and 158 men (mean age 30.2±7.89) were included. In the first set of self-administered questionnaire forms prepared, demographic data, working profile and use of protection material were recorded. In the second set, awareness, occupational-related health complaints and perception of general health status were determined.*

• ***Results:*** *Mean age was 29.5 years (±7.65) and mean duration of dental work was 12.2 years (±8.10). The prevalence of self-reported occupational-related health complaints according to systems were; musculoskeletal (23.8%), dermal (11.9%), respiratory (10.3%), eye (8.6%), and hearing (6.5%) problems. There was no gender prevalence as regards to health complaints, perception of general health status and awareness ($p>0.05$).*

The relationship between perception of general health status and self-reported occupational health problems was observed to be significant as regards to dermal ($p=0.006$) and respiratory systems ($p=0.001$). The relationship between awareness and education was significant in that the awareness in the university-educated subjects was higher ($p=0.045$).

• ***Conclusion:*** *Increasing the awareness and training about health complaints should be covered in seminars during and after education.*

•***Key Words:*** *Awareness, dental technicians, occupational disease.* ***Nobel Med 2009; 5(3): 27-32***

ÖZET

TÜRKİYE'DE DİŞ PROTEZ LABORATUVARI TEKNİSYENLERİNİN MESLEĞE BAĞLI OLUŞAN SAĞLIK SORUNLARI HAKKINDAKİ FARKINDALIK VE ÖZBİLDİRİMLERİNİN DEĞERLENDİRİLMESİ

• **Amaç:** Çalışmanın amacı, İzmir ilinde diş protez laboratuvarında çalışan kişilerin özbildirim meslek rahatsızlığı problemlerinin ve farkındalıklarının değerlendirilmesidir.

• **Materyal ve Metod:** Çalışma, 27'si kadın (yaş ort. 25,1±3,87) ve 158'i (yaş ort. 30,2±7,89) erkek toplam 185 diş protez teknisyeni üzerinde yürütüldü. Hazırlanan ilk form ile, demografik veriler, çalışma profilleri ve koruyucu materyal kullanımları kaydedildi. İkinci form ile genel sağlık durumlarına ilişkin algıları, mesleğe ilişkin sağlık yakınmaları ve farkındalıkları kaydedildi.

• **Bulgular:** Çalışmaya alınan kişilerin yaş ortalamaları 29,5 yıl (±7,65) ve ortalama çalışma süreleri 12,2 yıldı (±8,10). Mesleğe ilişkin özbildirim sağlık yakınmaları sistemlere göre şu şekilde sıralanmaktadır; kas-iskelet (%23,8), dermal (%11,9), solunum (%10,3), göz (%8,6) ve işitme (%6,5). Cinsiyet ile sağlık yakınmaları, genel sağlık durumu algısı ve farkındalık arasındaki ilişkiler arasında istatiksel anlamlılık belirlenmedi (p>0,05).

Kişilerin genel sağlık durumu algısı ve mesleğe bağlı özbildirim sağlık yakınmaları arasındaki ilişki dermal (p=0,006) ve solunum sistemleri (p=0,001) açısından anlamlı bulundu. Farkındalık ve eğitim arasındaki ilişki anlamlı olup, farkındalık üniversite eğitimi alanlarda daha yüksektir (p=0,045).

• **Sonuç:** Eğitim sırasında ve sonrasında yapılacak seminerler ile farkındalılık artırılmalı ve mesleğe ilişkin sağlık sorunları hakkında bilgilendirme yapılmalıdır.

• **Anahtar Kelimeler:** Farkındalık, diş protez teknisyenleri, meslek hastalıkları. **Nobel Med 2009; 5(3): 27-32**

INTRODUCTION

Dental laboratory technology encompasses a series of occupational hazards of chemical, ergonomic, and stress-like nature. A number of investigations have been conducted to identify different types of risks encountered in denture manufacturing workshops. Dentistry is a field of health-care work which, in addition to the different risk factors like sharp injuries, eye injuries, burns, scalds etc. due to mechanical, chemical, microbiological and electromagnetic hazards[1], includes contact with different materials for dental restoration.[2-4] Inhalation of volatile substances, such as methylmethacrylate (MMA), carries the risk of producing pathological changes of the central nervous system, respiratory system, and the liver.[5] The majority of dental restorations today are carried out with various types of acrylates (to which dental technicians are exposed to very early in their training), resin based materials and metals. Among dental personnel, an increased rate of problems about hand eczema, and irritative or allergic dermatoses has been reported.[3,6]

Dental technicians are also exposed to various dusts while working in laboratories. The main airborne contaminants during the production process are plaster, the refractory material that contains a high percentage of silica, wax, chromium, nickel and cobalt alloys, ceramic, and resin.[7] The risk is associated with inadequate local exhaust and ventilation, essentially for the preparation of plaster and refractory material, wax modeling, fusion of alloys, sanding, and hand finishing.[8] In most of the small laboratories, there are no suitable exhausts and ventilation systems in working areas, so many processes used by dental technicians probably expose them to numerous dangerous airborne contaminants responsible for complex pneumoconiosis, particularly to silica during preparation of refractory material, breaking of the mould, sandblasting, and polishing. Hand finishing exposes them to metal alloys, beryllium and resin. Most of the current chromiumcobalt alloys are free of beryllium; however, their exact composition is not always known.[7] Moreover, high-frequency vibration from rotating instruments and static, fine muscular work lead to neurological or vasomotoric finger reactions.[9]

In the laboratories, eye injuries were the most common ones. The majority of eye injuries occurred during debonding, trimming acrylic, polishing and grinding metals.[10] Methyl methacrylate monomer, if splashed into the eye, can cause a painful reaction. Plaster of Paris contains small quantities of lime and quartz which can damage the eye, while pumice can abrade it.[11] Intense, fine and prolonged muscular work in unnatural working postures, ergonomics, and work-specific stress factors were important etiological factors for the musculoskeletal reactions, whereas chemical factors of dental material origin were related to other reactions.[9,12] When unavoidable machine noise is added, dental technicians appear to be `attacked` from many angles in their jobs.[13,14] In Turkey, most of the people working in dental →

laboratories start work at a very early age and learn their jobs in the working area by working in almost all sections of the sector. Thus, the educational level of these people is primary school (5 years), or secondary high school (+3 years), and they have received certificates of apprenticeship and foreman through programs carried out in the last two years to equip them with vocational training. However, the number of people educated in vocational secondary or high schools has been gradually increasing in recent years. With the new regulation, following this transition period, only those with these diplomas will be working in these institutions and companies.

Considering with the fact that most dental technicians start working at the age of 18 and do not change their employment, it should not be ignored that this professional group will face serious problems in later ages, and this will cause a great burden on health insurances. Considering all these, this study aimed at to assess the awareness and describing self-reported occupational health problems in Turkish dental technicians.

MATERIAL and METHOD

Study population

There are a lot of private dental laboratories in Izmir and there are also 206 officially registered dental technicians who worked in there. Along with 206 people, a total of 185 dental technicians (mean age 29.5±7.65), who were able to respond to a questionnaire, were willing and gave fully informed consent were subsequently invited to participate in this study.

Between March 2006 and March 2007, 27 women (mean age 25.1±3.87), and 158 men (mean age 30.2±7.89) between the ages of 18-60, from people working in private dental laboratories of various scales in Izmir, were included in this study.

The study was approved by the Research Ethics Committee of Medical Faculty, Ege University (#06-2/7).

Questionnaire

The study was cross-sectional study and based on a self-administered questionnaire. The questionnaire included questions about age, gender, duration of work in dental technology, work profile (work hours per day, work days per week), use of protection materials, regular health control (at least one medical control by a doctor in a year), awareness of occupation-related →

Table 1: Demographic characteristics of the participants (n=185)

Demographic information	n	%
Marital status		
Married	105	56.8
Single	76	41.1
Divorced	4	2.2
Education		
Primary school	58	31.4
Secondary school	65	35.1
High school	35	18.9
University	27	14.6
Certificate		
Apprentice	53	28.6
Foreman-qualified workman	96	51.9
Secondary high school	9	4.9
University	27	14.6

Table 2: Frequencies of questionnaire answers.

Questionnairre answers	n	%
Participants' perception of their health status		
Bad	1	0.5
Not so good	24	13
Good	15	85.2
Very good	2	1.1
Regular health control		
Yes	77	41.6
No	108	58.4
Existing established diagnosis		
Yes	7#	3.8
No	178	96.2
Occupation-related health complaints*		
Musculoskeletal	44	23.8
Dermatological	22	11.9
Respiratory	19	10.3
Eye	16	8.6
Hearing	12	6.5
Awareness about occupation-related health problems		
Yes	136	73.5
No	49	26.5
Source of awareness		
Self-experience	5	2.7
From colleagues	60	32.4
Dangerous materials	26	14.1
Doctor	8	4.3
During education	18	9.7
Magazines-books-seminars	17	9.2

*One subject has marked complaints in more than one system
Lumber disc herniation, bronchitis, asthma, myalgia, ulcers.

Table 3: Relationship between awareness and education ($\chi^2_{(3)}$=8.05, p=0.045)

Education	Awareness about occupational health problems		
	Yes (%)	No (%)	Total
Primary	37 (63.8)	37 (36.2)	58
Secondary	49 (75.4)	16 (24.6)	65
High	25 (71.4)	10 (28.6)	35
University	25 (92.6)	2 (7.4)	27

Table 4: Use of protection materials

Type of protection material	Always n (%)	Frequently n (%)	Seldom n (%)	Never n (%)
Mask	59 (31.9)	9 (4.9)	69 (37.3)	48 (25.9)
Gloves	23 (12.4)	6 (27.6)	51 (27.6)	105 (56.8)
Glasses	43 (23.2)	3 (1.6)	36 (19.5)	103 (55.7)

Table 5: Relationship between gender and use of protection materials

	Gender	n	Mean	Std. deviation	Levene's test for equality		t	df	p
					F	P			
Mask	Women	27	2.77	1.281	4.940	0.027	2.363	33.146	0.024*
	Men	158	2.15	1.120					
Gloves	Women	27	2.92	1.106	0.367	0.546	-0.568	183	0.571
	Men	158	3.06	1.171					
Glasses	Women	27	3.33	0.960	24.443	0.000	2.395	45.115	0.021*
	Men	158	2.82	1.333					

* p<0.05

regular health control (at least one medical control by a doctor in a year), awareness of occupation-related health problems, a self-reported 'yes' or 'no' question about work-related health complaints (dermal, respiratory, hearing, eye reactions, musculoskeletal reactions) and self-reported perception of general health status of their own.

Statistical analysis

For the assessment of data, descriptive statistics were used. For the comparison of two independent groups, Levene's test for equality of variances and t test, and for the more populated group, Chi Square and Kruskal-Wallis H (SPSS 11.5 for Windows; SPSS, Chicago,Ill) tests were utilized. Level of significance was chosen as 0.05.

RESULTS

Demographic characteristics of the participants and the answers to the questionnaire have been reported in Tables 1 and 2. The average age was 29.5 years (±7.65, min=18, max=-59), and the duration of work in the laboratories was 12.2 years (±8.10, min=1, max=40). It was determined that all the participants worked six days a week, and 71 worked overtime, more than 8 hours a day. As regards gender, the relationship between self-reported health problems, perception of general health status and awareness was found to be not significant (p>0.05). Regarding the duration of works and age groups, it was observed that the relationship between the values of self-reported health problems, perception and awareness were not significant (p>0.05).The relationship between awareness and perception was insignificant (p>0.05).

The relationship between perception of general health status and self-reported occupational health problems was found to be significant in dermal ($\chi^2_{(3)}$=12.41, p=0.006) and respiratory ($\chi^2_{(3)}$=15.75, p=0.001) systems. The relationship between awareness and education was significant (Table 3). The relationship between regular health control and self-reported occupational health problems was observed to be not significant (p>0.05). The distribution of protection materials used by the participants during work has been given in Table 4, and use of protection materials according to gender can be seen in Table 5. The rate of using masks and glasses is higher in men than in women. Out of 27, 13 women (%48.1), and of 158, 35 men (%22.2) stated that they did not use masks, while it was found that 18 women (66.7%) and 85 men (53.8%) did not use glasses.

DISCUSSION

With the limitation self-reported studies, this kind of studies have the disadvantages of missing information and trends among the non-respondents as well as of being biased by an increased responds among those individuals having experienced occupational related health problems and also the recording was performed without clinical assessment by qualified medical personnel.The term `health problem` used in `yes` or `no` key question was particularly useful to distinguish between occupation-associated reactions regarded as a natural part of the occupational life and reactions perceived as a real health problem.[14] In their studies, Jacobsen et al.[14] assessed the prevalence and nature of occupation-related health problems among 731 Swedish dental technicians. Prevalence of health problems among the technicians was 79%, comprising musculo-skeletal (68%), dermal (34%), respiratory (31%), neurological (26%), systemic (19%), and eyesight/hearing problems (15%). In other studies, Jacobsen and Pettersen[12] investigated 201 subjects employed in dental technology in Norway. About half of the employees had experienced some kind of job-related health problem, among which musculo-skeletal and dermal reactions were common (39% and 28%). →

Other health problems were respiratory (16%), systemic (16%), sensory (10%), or neurological (7%). Rustemeyer et al.[15] reported skin lesions attributed to work in 36% of 1132 dental technicians. In this study where one subject reported complaints about more than one system, the prevalence of self-reported occupational-related health complaints according to systems were; musculoskeletal (23.8%), dermal (11.9%), respiratory (10.3%), eye (8.6%), and hearing (6.5%) problems. It can be observed that the results of this study are lower than those of the abovementioned researchers. The authors believe that this can be due to the fact that the mean age of the study population was quite low. Yoshida et al.[9] investigated the relationship between the subjective symptoms of the hands, arms and shoulders, and the work of 164 dental technicians. A high prevalence of pain in the shoulders (30.8%), neck (30.1%) and back (36.3%) was observed among them. Musculoskeletal disorders (like strained posture, prolonged standing, strenuous and repetitive shoulder/hand movements, heavy lifting and working with vibration tools) were the most reported work related diseases in dental technicians.[16] Dal et al.[17] reported at least one respiratory symptom in 81.3% of 34 dental technicians. In this study, neither the complaints about the musculoskeletal system, nor the ones in the other systems have been given in detail, unlike the researchers have done. In further studies, the complaints regarding the systems in this population can be investigated in detail. In the literature examined, no rates about perception of general health have been encountered. In this study, only one subject has stated that he perceived his general health as `bad`, while 2 commented as `very good`. 158 (85.2%) subjects replying as `good` suggests that subjects in the study population have been satisfied with their general health status although they have expressed self-reported health problems. Jacobsen and Pettersen reported that occupation-related complaints were frequent, particularly for persons older than 30 years.[12] In this study, different from the researchers', the relationship between age groups and system complaints has been found to be not significant.

In the literature studied, no data about awareness of occupation-related health problems have been traced. In this study, approximately 66% (136) subjects have reported their awareness with a rate of 73.5. With the assessment of the source of their awareness, the highest rate (32.4%) among the answers has been 'from colleagues', followed by the answer 'dangerous materials used' (14.1%). The rates of being informed during education and by means of magazines, books and seminars have been observed to be quite close to each other, and lower than the above mentioned ones. Hence, the authors of this study think that these people should be more informed during education, the number of informative seminars after education should be increased, and it is essential that the issue should be covered more frequently and comprehensively in written references they have access to. Jacobsen et al.[14] reported that female technicians reported a significantly higher level of complaints than their male counterparts. Different from the authors'; in this study no differences in self-reported occupational problems have been observed as regards gender. Although the reason for this cannot be clearly stated, it can be explained with the fact that one-to-one comparison could not be carried out due to the lower number of females in the population than males, and the mean age of the population was low. Al Wazzan et al.[10] reported that the frequency of wearing eye protectors was more common among females compared to males. Not complying with the authors, in this study; it has been observed that the use of masks and glasses was more common among males as compared to females. To explain the reason for this is quite difficult. It is believed by the authors of this study that this can be due to the fact that males are more experienced and know the materials better depending on the higher duration of work in laboratories and the higher mean age of the male population as compared to those of the female population.

CONCLUSION

Within the limitations of the study, the following conclusions have been drawn; musculoskeletal and dermal problems have been the most frequent complaints among dental technicians. Only a few of the technicians had regular health controls. Dental technicians should take efficient measures for technical protection. In order to increase the awareness and training about health problems, the issue should be comprehensively covered in seminars during and after education.

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REFERENCES

1 Porter K, Scully C, Theyer Y, Porter S. Occupational injuries to dental personnel. J Dent 1990; 18: 258-262.

2 Kanerva L, Estlander T, Jolanki R. Occupational allergic contact dermatitis from acrylates: observations concerning an aerobic

acrylic sealant and dental composite resins. In: Frosch PJ, Dooms-Goossens A, Lachapelle JM, Rycroft RJG, Scheper RJ (eds). Current topics in contact dermatitis. 1 st ed. Berlin: Springer-Verlag; 1989. p.352.
3 Munksgaards EC, Hansen EK, Engen T, Holm U. Self-reported occupational dermatological reactions among Danish dentists. Eur J Oral Sci 1996; 104: 396-402.
4 Lonnroth EC, Shahnavaz HD. Hand dermatitis and symptoms from the fingers among Swedish dental personnel. Swed Dent J 1998; 22: 23-32.
5 Vainiotalo S, Zitting A, Jacobsen S, et al. Toxicity of polymethylmethacrylate thermo degradation products. Arch Toxicol 1984; 55: 137-142.
6 Estlander T, Rajaniemi R, Jolanki R. Hand dermatitis in dental technicians. Contact Dermatitis 1984; 10: 201-205.
7 Radi S, Dalphin JC, Manzoni P, et al. Respiratory morbidity in a population of French dental technicians. Occup Environ Med 2002; 59: 398-404.
8 Choudat D. Occupational lung diseases among dental technicians. Tuber Lung Dis 1994; 75: 99-104.
9 Yoshida H, Nagata C, Mirbod SM, Iwata H, Inaba R. Analysis of subjective symptoms of upper extremities in dental technicians. Jap J Ind Health 1991; 33: 17-22.
10 Al Wazzan KA, Almas K, Al Qahtani MQ, Al Shethri SE, Khan N. Prevalence of ocular injuries, conjunctivitis and use of eye protection among dental personnel in Riyadh, Saudi Arabia. Int Dent J 2001; 51: 89-94.
11 Harley JL. Eye and facial injuries resulting from dental procedures. Dent Clin North Am 1978; 22: 505-515.
12 Jacobsen N, Pettersen AH. Self-reported occupation-related health complaints among dental laboratory technicians. Quintessence Int 1993; 24: 409-415.
13 Pätzold L. [Dental technological engine--a risk for hearing?] German. Zahntechnik. (Berl) 1987; 28: 43-47.
14 Jacobsen N, Derand T, Hensten-Pettersen A. Profile of work-related health complaints among Swedish dental laboratory technicians. Community Dent Oral Epidemiol 1996; 24: 138-144.
15 Rustemeyer T, Frosch PJ. Occupational skin diseases in dental laboratory technicians. (I). Clinical picture and causative factors. Contact Dermatitis 1996; 34: 125-33.
16 Ocek Z, Soyer MT, Aksan AD, Hassoy H, Manavgat SS. Risk perception of occupational hazards among dental health care workers in a dental hospital in Turkey. Int Dent J 2008; 58: 199-207.
17 Dal U, Özdemir D, Özdemir AK, et al. Investigation of respiratory hypersensivity due to methylmethacrylate in dental laboratory technicians working in Sivas city center. [Article in Turkish] J Fac Med Cumhuriyet Univ 2006; 28: 117-122.