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Occupational health and safety of dental personnel in Korea

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ABSTRACT

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This study aimed to investigate occupational risk among dental practitioners and its associated factors. Materials and Methods. A total of 505 dentists and other dental staff from Korean dental institutions were included in this study. A self-report questionnaire on demographic characteristics, perception and experience of occupational hazards, the prevalence of chronic diseases, and type of musculoskeletal problems, were distributed to the participants. A logistic regression model was used to identify factors affecting the perception of occupational hazards. Results. Among the participants, 61.58% were dentists and 38.42% were dental staff (dental hygienists, dental technologists, and other office workers). Overall, 48.12% had a serious perception of occupational hazards, and 77.53% had experienced occupational hazards. The common occupational hazards encountered were stress (20.58%), exposure to hazardous materials (15.44%), and cross-infections (14.75%). Regardless of participants' occupation and their perception of occupational hazards, musculoskeletal problems had the highest prevalence (35.94%) (neck/shoulder pain [35.53%], lower back pain [24.74%], and wrist pain [19.07%]). Those with experience of occupational hazards and musculoskeletal problems were more likely to recognize occupational hazards (odds ratio 5.186 and 1.535, respectively; $p<0.05$). Conclusion. Approximately half of the dental workers were aware of the risk of occupational hazards. This study highlighted that the more the participants experience occupational hazards, the more likely they are to recognize occupational hazards. The high prevalence of physical and mental occupational hazards indicates the need for preventive measures to reduce occupational risk in dental practices.

Key words : musculoskeletal disorders, stress, cross-infection, sedentary workstyle, occupational hazards

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I. Introduction

Even though dental practitioners take part in maintaining one's health, their health is threatened by various occupational hazards. According to the World Health Organization, occupational hazards in the health sector include occupational infections, unsafe patient handling, exposure to hazardous chemicals, exposure to radiation, occupational stress, burnout and fatigue, violence and harassment, risk in the ambient work environment, occupational injuries, and environmental health hazards[1].

Musculoskeletal disorders, caused by incorrect or strained postures, repeated movements during procedures, and the use of vibrating tools, is one of the most common occupational hazards encountered by dental practitioners[2,3]. These vary from mild and temporary pain in the neck to more severe and chronic conditions, such as carpal tunnel syndrome and Guyon's canal syndrome[4~9]. Such disorders have detrimental effects and are mainly responsible for sick leave and early retirement[10~13].

Burnout is a significant occupational hazard that affects dental practitioners. Burnout is characterized by emotional exhaustion, cynicism, and depersonalization[14,15]. Its main contributing factors include stress, excessive workload, anxiety, repetitive procedures, staffing issues, and legal hazards[16]. Continuous exposure to burnout may lead to increased mortality or even suicide[17,18]. Burnout is one of the leading contributors to depression[19].

Occupational infections in dental settings often occur due to blood-borne percutaneous injuries and/or aerosols[20]. Since the start of the coronavirus disease-2019 (COVID-19) pandemic, interest in cross-infection has increased. COVID-19 infections have been found to occur in airborne aerosols produced by infected individuals[22]. This poses an additional threat to dental practitioners, as aerosols are often produced during dental procedures due to the use of equipment, such as three-in-one syringes and high-speed handpieces[21]. However, this does not mean that airborne infections have been overlooked in the past, as aerosols and droplets have always been effective modes of transmission for tuberculosis[22]. The rise of interest in cross-infection via aerosols has not undermined the awareness of the dangers of blood-borne infections from percutaneous injuries, as these are the leading causes of hepatitis B, hepatitis C, and human immunodeficiency virus infection[23].

A sedentary workstyle is one of the most serious occupational hazards among dental practitioners. Similar to sedentary lifestyles, sedentary workstyles can lead to obesity and even death[24]. Other occupational hazards, such as allergens, mercury, noise, and radiation, continuously threaten the health of dental practitioners[25~28]. Previous studies have elaborated the detrimental effects of occupational hazards in dental procedures on the health of dental practitioners worldwide. However, there is an absence of comprehensive research comparing the severity of occupational hazards faced by South Korean

dental practitioners before, during, and after procedures. Hence, this study aimed to evaluate how dental practitioners in South Korea perceive occupational hazards.

II. Materials and Methods

1. Study design

The study was approved by the ethics committee of the Wonkwang University in Iksan, South Korea (IRB No. WKIRB-202209-SB-082).

This cross-sectional study was conducted among dentists, dental hygienists, dental technologists, and dental coordinators in South Korea (N=505). Data were collected from July 14, 2022, to September 6, 2022. The survey was conducted using Google questionnaires, and links were distributed via text messaging and email.

2. Questionnaire

The demographic data collected included (1) sex, (2) age (20-29, 30-39, 40-49, 50-59, ≥60 years), (3) occupation (dentist, dental hygienist, dental technologist, etc.), (4) years of experience (〈1, 1-5, 6-10, 11-20, ≥21); (5) place of employment (dental clinic, dental hospital, training center, dental school hospital, etc.), (6) location of the working area (metropolitan city, medium or small city, rural area), and (7) average working days in a week (1 day, 2 days, 3 days, 4 days, and 5 or more days).

The questionnaire was formulated using information from previously conducted systematic reviews. The questions were divided into two categories: occupational safety and occupational disorders of dental practitioners.

1) Occupational safety

This section aimed to understand dental practitioners' perceptions of occupational hazards and to investigate how many have experienced occupational hazards. This section includes four questions. First, the participants were asked to rate the occupational safety of dental practitioners using a 5-point Likert scale. One point was deemed as "very serious" while five points were deemed as "not serious at all." After asking for previous experiences of occupational hazards, the participants were asked to elaborate by choosing what they had experienced among the occupational hazards listed below: fatigue, stress, exposure to hazardous materials, cross-infection, prolonged sedentary work, allergens, noise, radiation, and others. The participants also rated the perceived seriousness of each occupational hazard. Additionally, participants ranked each occupational hazard in the order they perceived it to be most severe among the occupational hazard types.

2) Occupational health of dental practitioners

This section was dedicated to determining the number of dentists with temporary or chronic disorders related to their occupation. After inquiring whether the participants were suffering from chronic illnesses, the participants were

asked to indicate their chronic condition from the ones listed below: musculoskeletal disorders, respiratory disorders, hyperlipidemia, liver diseases, allergies, heart diseases, hypertension, kidney diseases, ocular disorders, rheumatic disorders, otorhinolaryngologic (hearing) diseases, depression, and diabetes. Those with musculoskeletal disorders were asked to indicate the affected body region: lower back, neck and shoulder, wrists, legs, or others. If the practitioner's chronic condition was not listed above, they were asked to answer two open-ended questions.

3. Statistical analysis

Although the number of participants in this study is 505, the number of participants may differ in the analysis of multiple responses depending on the analysis method. The respondents were divided into two subgroups according to the hazard perception (serious or not serious) and the occupation (dentists or others). Responses to hazard perception were divided into two categories to judge whether the respondents were aware of the seriousness of the hazard perception as follows: 1) serious (very serious, severe) and 2) not serious (moderate, not serious, not serious at all). The chi-squared test was used to compare the distribution of responses between the two subgroups. A logistic regression model was used to identify factors affecting the perception of occupational hazards. Statistical analyses were performed using R program (v.4.1.2; R Foundation for Statistical Computing, Vienna, Austria).

III. Results

Although the number of female participants was slightly higher, the sex ratio was almost the same (Table 1). Among the participants, 62% were dentists. Considering that most dental assistants were women, the participation rate of male dentists was high. Those in their 40s had the highest participation rate, but those over 60 years old had a relatively low participation rate (<2%). Participants were dental personnel in large cities, and approximately 90% worked for more than five days a week. Approximately half of the dental workers were aware of the risk of occupational hazards, and 77.53% had experienced occupational hazards.

Table 2 displays the occupational hazards experienced by the participants. In general, respondents stated that the most common occupational hazard experienced was stress (20.58%). This was followed by exposure to hazardous materials (15.44%), cross-infection (14.75%), and fatigue (12.31%). Others included obesity, benign prostatic hyperplasia, reflux esophagitis, chronic atrophic gastritis, disorders of the thyroid gland (including cancer), diseases of the female reproductive system, and gout.

The perceived seriousness of dental practices showed a similar trend to that of the rate of occupational hazards the respondents experienced (Table 2). The top three occupational hazards did not differ between the two groups. However, there was a slight difference in the ranking of the remaining occupational hazards. Among respon-

Table 1. Distribution of respondents according to the perception of occupational hazards

Variables	Hazard perception		Total (N=505)	P-value*
	Not Serious	Serious		
	n (%)	n (%)	n (%)	
Sex				
Male	114 (43.51)	118 (48.56)	232 (45.94)	0.255
Female	148 (56.49)	125 (51.44)	273 (54.06)	
Age, years				
20 - 29	73 (27.86)	61 (25.10)	134 (26.53)	0.587
30 - 39	69 (26.34)	64 (26.34)	133 (26.34)	
40 - 49	69 (26.34)	79 (32.51)	148 (29.31)	
50 - 59	47 (17.94)	36 (14.81)	83 (16.44)	
≧60	4 (1.53)	3 (1.23)	7 (1.39)	
Job				
Dentist	150 (57.25)	161 (66.26)	311 (61.58)	0.038
Other staff	112 (42.75)	82 (33.74)	194 (38.42)	
Job experience, years				
≦10	138 (52.67)	115 (47.33)	253 (50.10)	0.028
11-20	56 (21.37)	77 (31.69)	133 (26.34)	
〉20	68 (25.95)	51 (20.99)	119 (23.56)	
Affiliation				
Dental clinic	143 (54.58)	143 (58.85)	286 (56.63)	0.334
Dental hospital†	119 (45.42)	100 (41.15)	219 (43.37)	
Region				
Rural areas	8 (3.07)	6 (2.47)	14 (2.77)	0.385
Medium/small cities	81 (31.03)	63 (25.93)	144 (28.51)	
Metropolis	172 (65.09)	174 (71.60)	346 (68.51)	
Working days per week				
1 - 4 days	27 (10.34)	26 (10.70)	53 (10.50)	0.897
≧5 days	234 (89.66)	217 (89.30)	451 (89.31)	
Previous hazard experience				
No	96 (36.78)	17 (7.00)	113 (22.47)	〈0.001
Yes	165 (63.22)	225 (92.59)	390 (77.53)	

*Chi-square test;
†Dental hospital: dental hospital, teaching hospital/training center, or others

Table 2. Distribution of responses to occupational hazard experiences and their types

Occupational hazards	Hazard perception		Job		Total* (N=1885)
	Not Serious (n=815)	Serious (n=1070)	Dentist (n=1191)	Others (n=694)	
	n (%)	n (%)	n (%)	n (%)	n (%)
No previous experience	12 (1.47)	2 (0.19)	5 (0.42)	9 (1.30)	14 (0.74)
Fatigue	101 (12.39)	131 (12.24)	146 (12.26)	86 (12.39)	232 (12.31)
Stress	184 (22.58)	204 (19.07)	238 (19.98)	150 (21.61)	388 (20.58)
Exposure to hazardous materials	117 (14.36)	174 (16.26)	175 (14.69)	116 (16.71)	291 (15.44)
Cross-infection	113 (13.87)	165 (15.42)	174 (14.61)	104 (14.99)	278 (14.75)
Prolonged sedentary work	102 (12.52)	116 (10.84)	171 (14.36)	47 (6.77)	218 (11.56)
Allergens	21 (2.58)	33 (3.08)	33 (2.77)	21 (3.03)	54 (2.86)
Noise	76 (9.33)	112 (10.47)	124 (10.41)	64 (9.22)	188 (9.97)
Radiation	81 (9.94)	118 (11.03)	116 (9.74)	83 (11.96)	199 (10.56)
Others	8 (0.98)	15 (1.40)	9 (0.76)	14 (2.02)	23 (1.22)
P-value†	0.032		<0.001		

* Multiple responses; †Chi-square test.

dents with "not serious" hazard perception, prolonged sedentary work (12.52%) ranked fourth, and radiation (9.94) ranked sixth. In contrast, among those with "serious" hazard perception, radiation (11.03%) ranked fifth, and prolonged sedentary work (10.84%) ranked sixth.

There was also a noticeable difference between the responses of the dentist group and the other staff group (Table 2, Fig. 1). Approximately 14% of dentists responded that prolonged work was the fourth most experienced occupational hazard. In contrast, only 7% of the other staff group answered that they had experienced the said occupational hazard. This may be attributed to the use of a stool during dental procedures.

Table 3 shows the analysis of occupational hazards deemed most serious. Stress (31.92%) was deemed the most serious occupational hazard, followed by cross-infection (15.44%), fatigue (14.41%), and exposure to hazardous materials (14.16%). Allergen exposure was deemed the least serious of mentioned occupational hazards (1.54 %).

Among the group of people who reported that they considered occupational hazards to be a serious problem, aside from stress, exposure to hazardous materials (16.71%), cross-infection (14.46%), and fatigue (13.97%) were deemed as the most serious occupational hazards (Table 3). On the other hand, among the group of people who reported that they did not consider occupational hazards to be a major threat, cross-infection (16.47%) ranked second, and exposure to

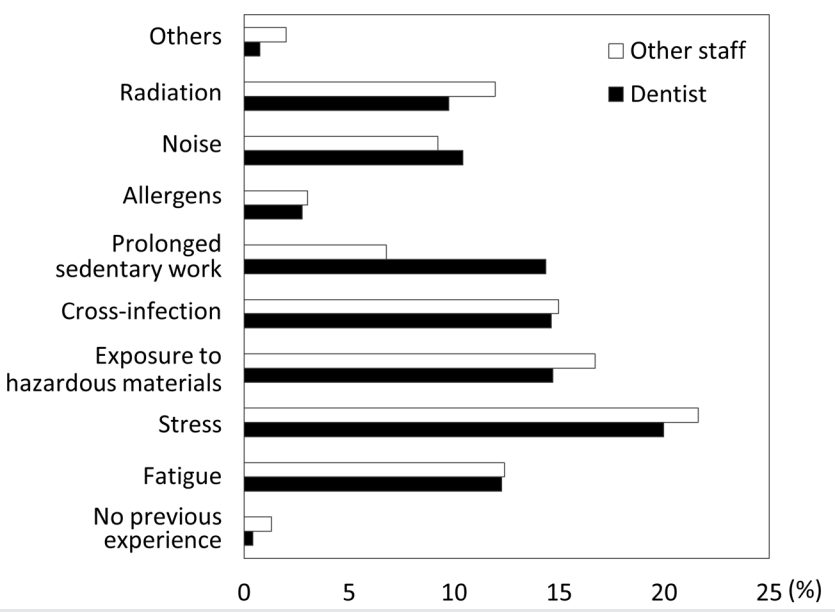

Figure 1. Rate of experiencing occupational hazards in the dental setting, according to occupation

Table 3. Distribution of responses to the question asking about the occupational hazard types considered to be the most serious according to the hazard perception and the occupation

Occupational hazards	Hazard perception		Occupation		Total* (N=777)
	Not Serious (n=376)	Serious (n=401)	Dentist (n=491)	Others (n=286)	
	n (%)	n (%)	n (%)	n (%)	n (%)
Fatigue	56 (14.89)	56 (13.97)	78 (15.89)	34 (11.89)	112 (14.41)
Stress	127 (33.78)	121 (30.17)	155 (31.57)	93 (32.52)	248 (31.92)
Exposure to hazardous materials	43 (11.44)	67 (16.71)	68 (13.85)	42 (14.69)	110 (14.16)
Cross-infection	62 (16.49)	58 (14.46)	65 (13.24)	55 (19.23)	120 (15.44)
Prolonged sedentary work	39 (10.37)	34 (8.48)	56 (11.41)	17 (5.94)	73 (9.40)
Allergens	3 (0.80)	9 (2.24)	10 (2.04)	2 (0.70)	12 (1.54)
Noise	15 (3.99)	16 (3.99)	20 (4.07)	11 (3.85)	31 (3.99)
Radiation	23 (6.12)	26 (6.48)	24 (4.89)	25 (8.74)	49 (6.31)
Others	8 (2.13)	14 (3.49)	15 (3.05)	7 (2.45)	22 (2.83)
P-value†	0.271		0.017		

* Multiple responses; †Chi-square test.

hazardous materials (11.44%) ranked fourth.

Fig. 2 illustrates the perceived seriousness of occupational hazards, according to occupation. Excluding stress, the most serious occupational hazards perceived by the dentists were fatigue (15.89%), exposure to hazardous materials (13.85%), cross-infection (13.24%), prolonged sedentary work (11.41%), radiation (4.89%), noise (4.07%), others (3.05%), and allergens (2.04%). Meanwhile, responses from the "others" group showed noticeable differences. Cross-infection ranked second (19.23%), while fatigue ranked fourth (11.89%).

Table 4 summarizes the presence of chronic diseases among the participants. The majority of the participants responded that they were suffering from chronic diseases. The most common chronic illness reported was a musculoskeletal disorder (35.94%), and this trend remained consistent with the perception of occupational hazards and occupation of the respondents.

Among those who considered occupational hazards serious, the percentage of those who suffered from chronic diseases was approximately double that of those who did not (Table 4). Conversely, among those who responded that occupational hazards were not serious, the percentage of those who experienced chronic diseases did not show a large difference from those who did not experience chronic diseases. The presence of

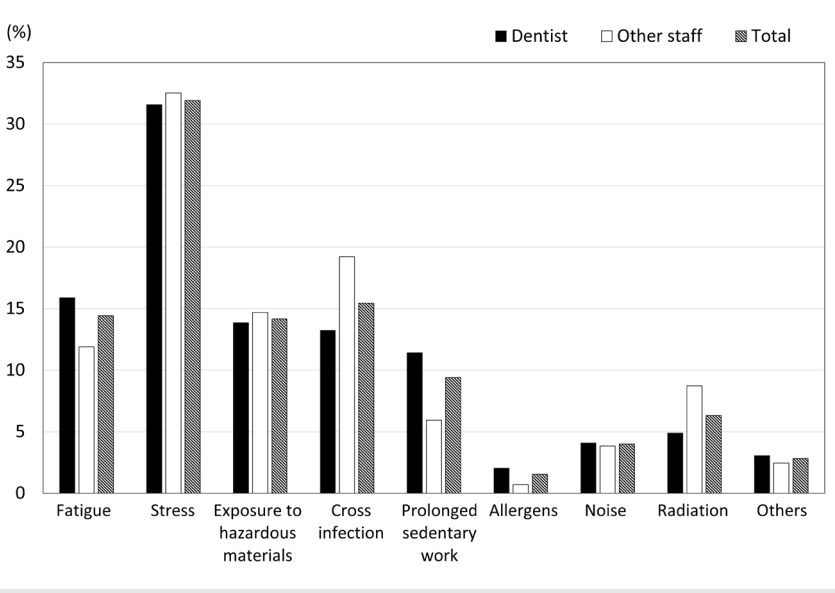

Figure 2. Occupational hazards considered to be the most serious by occupation

Table 4. Distribution of responses to the question asking about the prevalence of chronic diseases and their types according to the hazard perception and the occupation

Chronic disease	Hazard perception		Occupation		Total*
	Not Serious	Serious	Dentist	Others	
	n (%)	n (%)	n (%)	n (%)	n (%)
Morbidity*					
No	205 (52.30)	155 (38.08)	181 (35.56)	179 (61.72)	360 (45.06)
Yes	187 (47.70)	252 (61.92)	328 (64.44)	111 (38.28)	439 (54.94)
p-value†	<0.001		<0.001		
Types*					
No disease	100 (30.67)	61 (15.14)	81 (16.23)	80 (34.78)	161 (22.09)
Musculoskeletal problem	117 (35.89)	145 (35.98)	178 (35.67)	84 (36.52)	262 (35.94)
Hyperlipidemia	15 (4.60)	26 (6.45)	37 (7.41)	4 (1.74)	41 (5.62)
Allergic disease	21 (6.44)	29 (7.20)	30 (6.01)	20 (8.70)	50 (6.86)
Hypertension	18 (5.52)	26 (6.45)	44 (8.82)	0 (0.00)	44 (6.04)
Ocular disorder	17 (5.21)	44 (10.92)	47 (9.42)	14 (6.09)	61 (8.37)
Depression	6 (1.84)	14 (3.47)	16 (3.21)	4 (1.74)	20 (2.74)
Diabetes	7 (2.15)	6 (1.49)	12 (2.40)	1 (0.43)	13 (1.78)
Respiratory disease	5 (1.53)	14 (3.47)	14 (2.81)	5 (2.17)	19 (2.61)
Hepatopathy	6 (1.84)	9 (2.23)	15 (3.01)	0 (0.00)	15 (2.06)
Heart disease	0 (0.00)	5 (1.24)	2 (0.40)	3 (1.30)	5 (0.69)
Kidney disease	2 (0.61)	2 (0.50)	2 (0.40)	2 (0.87)	4 (0.55)
Rheumatism	2 (0.61)	2 (0.50)	4 (0.80)	0 (0.00)	4 (0.55)
Hearing disease	6 (1.84)	13 (3.23)	12 (2.40)	7 (3.04)	19 (2.61)
Others	4 (1.23)	7 (1.74)	5 (1.00)	6 (2.61)	11 (1.51)
p-value†	<0.001		<0.001		

* Multiple responses; †Chi-square test.

eye disorders had the greatest difference between the two groups (10.92% in the group that considered occupational hazards serious vs. 5% in the group that considered otherwise).

Among dentists, the percentage of respondents who reported that they had at least one chronic disorder was twice as that of those who reported otherwise (Table 4). The opposite trend was observed for dental personnel. Among dentists, eye disorders and hypertension were ranked the second most common chronic disorder (approximately 9% of respondents). In contrast, among the dental personnel, allergic reactions were the second most common chronic disorder (approxi-

mately 8.7%).

The most common regions in which dental practitioners were experiencing musculoskeletal pain were the neck and shoulders (Table 5). This was apparent regardless of the perception of the seriousness of occupational hazards and occupation. This was followed by the lower back (24.74%). Other areas included the hip, fingers, upper back, and head. The leg was the area with the least pain. Among the group that considered occupational hazards serious, 22.28% reported having musculoskeletal pain afflicting the wrist, followed by the lower back (21.45%). On the other hand, among those that considered occupational hazards not serious, 27.01% reported that they felt musculoskeletal pain in their lower back, which was approximately 10% more than that reported in the wrist (16.88%). More dentists (6%) did not experience musculoskeletal pain. However, the percentage of dentists with wrist pain was approximately 4% higher than that of other dental personnel.

No difference in the perception of the seriousness of occupational hazards between groups divided according to sex, occupation, years of experience, work days per week, affiliation, location, and the presence of more than one chronic disorder, was noted on the logistic regression model (Table 6). On the other hand, if the groups were divided according to hazard experience and the experience of musculoskeletal pain, the groups who replied positive to such questions perceived the occupational hazards 5.2 times and 1.5 times more serious than their counterparts, respectively.

Table 5. Distribution of responses to the question asking about the affected regions among those suffering from musculoskeletal problems

Areas	Hazard perception		Job		Total* (N=881)
	Not Serious (n=552)	Serious (n=359)	Dentist (n=405)	Others (n=476)	
	n (%)	n (%)	n (%)	n (%)	n (%)
No pain	65 (12.45)	53 (14.76)	73 (18.02)	45 (9.45)	118 (13.39)
Lower back	141 (27.01)	77 (21.45)	95 (23.46)	123 (25.84)	218 (24.74)
Neck/shoulder	204 (39.08)	109 (30.36)	140 (34.57)	173 (36.34)	313 (35.53)
Wrist	88 (16.86)	80 (22.28)	68 (16.79)	100 (21.01)	168 (19.07)
Legs	20 (3.83)	35 (9.75)	24 (5.93)	31 (6.51)	55 (6.24)
Others	4 (0.77)	5 (1.39)	5 (1.23)	4 (0.84)	9 (1.02)
P-value†	<0.001		0.010		

* Multiple responses; †Chi-square test.

Table 6. Logistic regression results for determinants of the occupational hazard perception

Variables		Perception of occupational hazards		
		Coefficient	95% C.I.	p-value
Sex	Male (Ref.)			
	Female	0.890	0.578 - 1.373	0.596
Occupation	Dentist (Ref.)			
	Other staff	0.732	0.475 - 1.125	0.155
Job experience , years	≦10 (Ref.)			
	11-20	1.299	0.863 - 1.960	0.211
	〉20	0.920	0.587 - 1.441	0.717
Affiliation	Dental clinic (Ref.)			
	Dental hospital	0.977	0.698 - 1.369	0.892
Region	Rural areas (Ref.)			
	Medium/small cities	0.782	0.252 - 2.419	0.666
	Metropolis	1.224	0.402 - 3.738	0.719
Working days in a week	1-4 days (Ref.)			
	≧5 days	0.601	0.339 - 1.047	0.076
Previous hazard experience	No (Ref.)			
	Yes	5.186	3.336 - 8.275	〈0.001
Most serious occupational hazard	Allergens (Ref.)			
	Fatigue	0.384	0.054 - 1.705	0.253
	Stress	0.361	0.052 - 1.549	0.215
	Exposure to hazardous materials	0.633	0.090 - 2.822	0.585
	Cross-infection	0.362	0.051 - 1.603	0.224
	Prolonged sedentary work	0.312	0.044 - 1.424	0.170
	Noise	0.428	0.056 - 2.198	0.345
	Radiation	0.580	0.078 - 2.794	0.532
	Others	0.670	0.083 - 3.781	0.669
Chronic disease	No (Ref.)			
	Yes	1.164	0.825 - 1.639	0.387
Musculoskeletal pain	No (Ref.)			
	Yes	1.535	1.029 - 2.295	0.036

95% C.I.: 95% confidence interval; Ref.: reference.

IV. Discussion

Through a survey, this study measured occupational safety risks and risk factors experienced by dentists and dental staff. Approximately 50% of dental professionals rated the dental environment to be hazardous, and 77.53% have experienced occupational hazards. Stress, fatigue, cross-infection, and exposure to hazardous substances were identified as major risk factors. Moreover, musculoskeletal problems were common in the dental profession, regardless of occupation.

Among the occupational safety hazards, stress was most frequently experienced by dentists and their assistants. Previous studies in other countries identified burnout, which is the depletion of physical and mental stamina caused by stress and depression, as major hazard factor for dentists. According to a study conducted in 2015 among 97 dentists[15], 46.8% complained that they were very tired after work, 39.27% reported that they felt mentally fatigued, and 47.83% reported severe burnout due to work. Among them, women reported feeling more mentally fatigued than men, to a statistically significant degree ($p<0.05$). Another study reported that 5.15% of dentists had high levels of burnout syndrome[29]. A 2021 study reported that only 13.2% of dentists displayed symptoms of burnout16). Examination of the correlation between burnout and workload for dentists revealed a statistically significant correlation between these two[17].

In this study, 35.67% of dentists and 36.52% of other dental personnel responded that they had musculoskeletal disorders, which accounted for the highest percentage among chronic diseases in both groups. The most affected regions were the shoulder and the neck. This was followed by the lower back. Among dentists, 14.36% responded that they sat for long periods of time, which is one of the occupational safety hazards. Conversely, only 6.77% of the assistants answered that they sat for long periods of time. This is presumed to be related to dental hygienists and other personnel performing tasks, such as scaling, while standing.

While the effects of posture on musculoskeletal disorders have been reported in previous studies, the different postures of dentists during treatment were relatively insignificant in our study. Previous studies in France on musculoskeletal disorders and sitting for long periods of time have shown that the rate of chronic musculoskeletal pain differed according to sex and years of job experience. A total of 81.38% of women and 71.74% of men reported chronic musculoskeletal pain[30]. Although it did not show a statistically significant correlation, sitting accounted for 93.2% of the work posture. Logistic regression analysis showed that one's sex, presence or absence of medical history due to pain (i.e., experience of symptoms of the relevant musculoskeletal disease), and experience, were variables that had a statistically significant effect on musculoskeletal pain. In a study conducted in 2016, 63.5% of dentists reported that they had musculoskeletal disorders[8]. Among the responses, sitting for a long time had the highest response rate, and the most affected

areas were the neck, shoulder, upper waist, and lower waist. According to a study in Italy[31], the rate of musculoskeletal disorders in the past 12 months reached 84.6%. Women had higher rates than men, and musculoskeletal disorders correlated with working hours per week. The areas that experienced the most pain were the neck, shoulders, lower back, and upper back.

According to our survey, 14.61% of the dentists and 14.99% of the assistants responded that they experienced cross-infection. Cross-infection is often caused by punctures by sharp instruments, droplets, aerosols containing pathogens, and contamination of water pipes. In a study conducted in 2018 that focused on stabbing accidents, 83% of dentists reported that they were at risk of stabbing accidents[32]. A total of 58.8% of dentists working in cities and 63% working in rural areas reported at least one puncture accident. Another study in Australia, that focused on stabbing incidents, showed that only 308 stabs were reported in Australia's dental environment over the last six years, and the annual rate of stabbing accidents was only 0.109%[23]. From this, it can be inferred that cross-infection caused by stabbing accidents can vary depending on the healthcare environment and perceptions of safety.

In this study, 10.41% of the dentists and 9.22% of the assistants responded that they were exposed to noise. However, the rate of hearing impairment was only 2.4% and 3.04%, respectively. This contrasts with those reported in previous studies on hearing impairment in dentistry, where 76% of a group of 38 dentists reported some degree of hearing impairment in both ears[33]. Another study on dentists and assistants also reported that 46% of dentists, 55.3% of dental technicians, and 64.4% of dental hygienists had difficulty hearing[34].

In Korea, the occupational safety of dentists has been neglected. Patient and patient safety issues during the COVID-19 pandemic have been thoughtfully put into policies, but the occupational environment and health of dental providers remain at the level of personal issues. This study suggests that the dental health environment in Korea is severe, and that the occupational safety of dental personnel is a policy agenda that can no longer be delayed. While the government has neglected this issue, it is time for us to take it seriously.

Conflict of Interest

The authors declare that they have no competing interests.

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