우리 나라 치과 기공사의 신체 자각 증상과 직업 관련 건강 위험 요인

고려대학교 보건대학 치기공과 · 가톨릭 대학교 의과대학 예방의학 교실*

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=Abstract=

Subhective Symptoms and Work-related Health Risk Factors in Korean Dental Laboratory Technicians

Woong-Chul Kim, Se-Hoon Lee

Dept. of Dental Technology, College of Health Science, Korea University
Dept, of Preventive Medicine, College of Medicine, The Catholic University of Korea

Although dental laboratory technicians are prone to be exposed to various work-related health hazardous materials such as dusts, chemicals, etc., the prevalence and nature of work-related health problems of them have not been a matter of great concern in the field of occupational health service in Korea.

The purpose of the present investigation was to describe a collected profile of subjective health symptoms and their attributable factors in Korean dental laboratory technicians.

A questionnaire listing five groups of health symptoms and five health symptom-related factors was mailed to randomly selected 1,900 dental laboratory technicians. Among them, 1,344 dental laboratory technicians filled out the questionnaires and returnde them.

Five groups of health symptoms included musculoskeletal symptom, dermal symptoms, respiratory symptoms, eys symptoms, and ear symptoms. Five health symptom-related factors were occupational envirement-related health risk factors, work history, health related habits and status, use of personal protective equipment and general characteristics.

Detailed parameters of health risk factors were work posture, vibration, and chemical or physical hazards such as dust, fume, vapor, solvent, light, and noise for occupational environment-related factors; work place, area, number of employees, work hours, career, work part, and work load for work history; Broca's index, hours of sleep, eating, smoking, alcohol, exercise, health examination, and self assessed health status for health habits and status; face masks, goggles, and so on for use of personal protective equipment, and; age, sex, marital status, and education for general characteristics.

Before the start of main survey, a pilot survey was carried out for validity and reliability tests of the questionnaire. All the data obtained were coded and analyzed with PC/SAS 6.12 program.

The prevalence of health symptoms was the highest in musculoskelton (87.3%), and followwe by eyes (78.9%), respiratory organs (64.3%), ears (57.8%), and skin (52.2%) in descending order. Statistically signficant risk factors by multiple logistic regression analyses were sex, health examination, self assessed health status, and hand/finger posture in musculoskeletal symptoms; sex, self assessed health status, career, acid gas, and hand contact with resin mixture in deraml symptoms; Broka' s smoking, exercise, self assessed health status, and face mask in respiratory symptoms; sex, hours of sleep, self assessed health status, work hours, work load, plaster dust, inadequate lighting, and goggle in eys symptoms, and eating, smoking, self assessed health status, and work load in ear symptoms.

With the above considerations in mind, prevalence of subjective symptoms among Korean dental laboratory technicians was relatively high, and they were attributable to most of the occupational envirnment-related factors, work history, use of personal protective equipment, health habits and status, and general characteristics . Particularly, it is suggested that health promotion programs for promoting self- assessed health status and smoking cessation, preventive measures for protection of the female technicians' health, and reducing work load be necessary, since those factors were associated with more than one subjective symptom.

Key words: Dental laboratory technicians, Work-related health risk factors, Subjective symptoms, Occupational health, Musculoskeletal symptoms, Respiratory symptoms, Dermal symptoms

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Table 1. Variables used in the study

Variable	Content		
Dependent variable			
Subjective symptom			
Musculoskeletal symptom	1. no	2. yes	
Skin symptom	1. no	2. yes	
Respiratory symptom	1. no	2. yes	
Eye symptom	1. no	2. yes	
Ear symptom	1. no	2. yes	
Independent variable			
General characteristics			
Age	years		
Sex	1. male	2. female	
Marital status	1. unmarried	2. married	
Education	3 categories		
Health habits and status			
Broca's index	heght. weight		
Hours of sleep	3 categories		
Eating	1. regular	2. irregular	
Smoking	1. no smoking	2. current smoking	
	3. ex-smoker		
Alcohol(times/wk)	1. moderate or no drink	2. 1-2 drinks	
	3. 3 drinks or more		
Exercise	1. never	2. regular	
Health examination	1. regular	2. no	
Self assessed health status	1. good	2. not bad	3. poor
Work history			
Work place	name		
Work area	name		
Number of employees	number of employees		
Career	years		
Position	1. owner, 2. staff		
	3. general technician 4. others		
Work hours	4 categories		
Work part	9 categories		
Work load	number of appliances which he made		

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2)   1/2

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68   .

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Karl Pearson   0.50~ 0.58

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(0.42~ 0.58

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                                                ## 1. 치과 기공사의 일반적 특성, 직업 특성
                                                  및 자각 증상

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(62.7%)

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Table 2. Distribution of the study subjects by general characteristics

Characteristics		n(%)
Age(yrs)	≤ 29	401(29.8)
	30-39	696(51.8)
	≥ 40	247(18.4)
Sex	Male	1159(86.1)
	Female	185(13.8)
Marital status	Unmarried	394(29.3)
	Married	950(70.7)
Education	High school	36(2.7)
	Junior college	1219(90.8)
	College	88(6.6)

Table 3. Distribution of the study subjects by health habits and status

Characteristics		n(%)
Broca's index (%)*	Normal <120	1218(90.6)
	Obesity ≥120	126(9.4)
Hours of sleep (hour/day)	≤ 6	414(30.8)
	7～8	910(67.8)
	≥ 9	19(1.4)
Eating	Regular	729(54.4)
	Irregular	611(45.6)
Smoking	No smoking	515(39.1)
	Current smoking	719(54.6)
	Ex-smoker	84(6.4)
Alcohol (times/wk)	Moderate or no drink	548(40.9)
	1～2 drinks	584(43.6)
	3 drinks or more	207(15.5)
Exercise	Regular	197(14.7)
	Irregular	1147(85.3)
Health examination	Regular	216(16.2)
	No	1120(83.8)
Self assessed health status	Good	295(22.1)
	Not bad	838(62.7)
	Poor	204(15.3)

* Broca's index: [height(cm)-100] × 0.9

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Table 4. Distribution of the study subjects by work history

Characteristics		n(%)
Work place	Commercial lab	1029(83.3)
	Clinical lab	207(16.7)
Work area	Large city	940(69.9)
	Others	404(30.1)
Number of	≤ 5	908(67.6)
employees	≥ 6	436(32.4)
Career(yrs)	1-5	391(29.6)
	6-10	432(32.7)
	11-15	271(20.5)
	≥ 16	228(17.2)
Position	Owner	389(29.1)
	Chief	436(32.6)
	General technician	492(36.8)
	Others	19(1.4)
Work hours	≤ 8	156(11.7)
(hours/day)	8-9	350(26.2)
	9-10	395(29.5)
	≥ 10	437(32.7)
Work part	Porcelain build up	70(5.4)
	Porcelain contouring	41(3.2)
	Resin work	26(2.0)
	Wax carving	68(5.3)
	Investing and casting	8(0.6)
	Metal polishing	29(2.3)
	Plaster work	7(0.5)
	2-6 parts	703(54.6)
	7 parts	336(26.1)
Work load	≤ 8	1016(75.6)
(number of products)	≥ 9	328(24.4)

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41.1%,   3.3%   .

Table 5. Distribution of the study subjects by working hours with repetitive or static posture and vibration

Posture, vibration	Hours	n(%)
Neck	no	7(0.5)
	< 2	101(7.5)
	2~3	139(10.4)
	3~4	173(12.9)
	≥ 4	922(68.7)
Shoulder	no	60(4.5)
	2 <	190(14.2)
	2~3	175(13.1)
	3~4	201(15.0)
	≥ 4	711(53.2)
Forearm/elbow	no	77(5.8)
	< 2	221(16.6)
	2~3	171(12.8)
	3~4	176(13.2)
	≥ 4	689(51.6)
Wrist	no	94(7.1)
	< 2	299(22.5)
	2~3	211(15.9)
Wrist	3~4	178(13.4)
	≥ 4	544(41.0)
Hand/finger	no	34(2.6)
	< 2	269(20.2)
	2~3	183(13.7)
	3~4	180(13.5)
	≥ 4	666(50.5)
Back/waist	no	32(2.4)
	< 2	185(13.9)
	2~3	141(10.6)
	3~4	192(14.4)
	≥ 4	784(58.8)
Vibration	no	94(7.1)
	< 2	405(30.4)
	2~3	206(15.5)
	3~4	202(15.2)
	≥ 4	426(32.0)

Table 6. Distribution of the study subjects by chemical or physical risk factors related to occupational environment

Exposure	n(%)	Exposure	n(%)
Chemicals, dust		Metal dust	
Wax gas		No	162(12.2)
No	152(11.3)	Medium	865(65.0)
Medium	993(74.0)	High	304(22.8)
High	197(14.7)		
		Resin dust	
Investment gas		No	195(14.6)
No	374(27.9)	Medium	829(62.1)
Medium	799(59.6)	High	312(23.4)
High	168(12.5)		
		Abrasive dust	
Metal fume		No	108(8.1)
No	337(25.3)	Medium	874(65.4)
Medium	831(62.3)	High	354(26.5)
High	166(12.4)		
		Dermal exposure	
		Hand contact with resin mixture	
Resin vapor		No	161(12.1)
No	202(15.1)	Medium	758(57.0)
Medium	767(57.4)	High	411(30.9)
High	368(27.5)		
Acid gas		Hand contact with plaster	
No	301(22.6)	No	72(5.4)
Medium	797(59.7)	Medium	748(56.0)
High	236(17.7)	High	515(38.6)
Plaster dust		Hand contact with polished matter	
No	103(7.7)	No	55(4.1)
Medium	920(68.8)	Medium	717(53.7)
High	315(23.5)	High	562(42.1)
Investment dust		Hand contact with detergent	
No	192(14.4)	No	111(8.3)
Medium	887(66.3)	Medium	715(53.4)
High	258(19.3)	High	514(38.4)
Asbestos dust		**Physical agent**	
No	528(39.9)	Hazardous light during casting	
Medium	657(49.6)	No	314(23.8)
High	139(10.5)	Medium	766(58.1)
		High	239(18.1)
Sand dust			
No	293(22.1)	Inadequate lighting	
Medium	794(59.9)	No	312(23.5)
High	239(18.0)	Medium	786(59.1)
		High	231(17.4)
Porcelain dust			
No	296(22.6)	Noise	
Medium	809(61.8)	No	44(3.3)
High	205(15.6)	Medium	547(41.1)
		High	739(55.6)

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87.3%

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64.3%, 57.8%,

52.2%

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(72.5%), /

(72.3%), (71.4%) /

(43.9%), (42.6%) /

Table 7. Distribution of the study subjects by use of personal protective equipments

Protection		n(%)	Protection		n(%)
Height	Never	156(11.7)		Frequent	328(24.5)
adjustment	Almost never	172(12.9)		Always	533(39.8)
of work	Sometimes	214(16.0)		Needless	8(0.6)
table and	Frequent	242(18.1)			
chair	Always	523(39.1)	Face	Never	237(17.8)
	Needless	29(2.2)	mask	Almost never	211(15.8)
				Sometimes	239(17.9)
Protective	Never	341(25.5)		Frequent	259(19.4)
wear	Almost never	258(19.3)		Always	368(27.6)
	Sometimes	201(15.0)		Needless	21(1.6)
	Frequent	178(13.3)			
	Always	343(25.7)	Goggle	Never	250(19.0)
	Needless	16(1.2)		Almost never	147(11.2)
				Sometimes	172(13.1)
Gloves	Never	701(53.8)		Frequent	205(15.6)
	Almost never	326(25.0)		Always	514(39.0)
	Sometimes	119(9.1)		Needless	30(2.3)
	Frequent	61(4.7)			
	Always	54(4.1)	Local	Never	359(27.0)
	Needless	41(3.1)	lighting	Almost never	255(19.1)
				Sometimes	125(9.4)
Local	Never	11(0.8)		Frequent	173(13.0)
exhaust	Almost never	34(2.5)		Always	395(29.7)
system	Sometimes	68(5.1)		Needless	25(1.9)
	Frequent	289(21.6)			
	Always	927(69.3)	Ear	Never	1109(83.1)
	Needless	9(0.7)	plug	Almost never	153(11.5)
				Sometimes	19(1.4)
Air cleaner	Never	54(4.0)		Frequent	9(0.7)
	Almost never	126(9.4)		Always	12(0.9)
	Sometimes	289(21.6)		Needless	32(2.4)

(40.3%) 40%   .   (40.0%),   (24.3%)

                                                    (38.7%)   .

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2. 다변량 분석

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Table 8. Distribution of the study subjective symptoms

	Organ	Symptom, n(%)	
		no	yes
Musculo-skeleton	Neck	384(28.6)	960(71.4)
	Shoulder	369(27.5)	975(72.5)
	Forearm/elbow	803(59.7)	541(40.3)
	Wrist	772(57.4)	572(42.6)
	Hand/finger	754(56.1)	590(43.9)
	Back/waist	372(27.7)	972(72.3)
	Total	171(12.7)	1173(87.3)
Skin	Finger	824(61.3)	520(38.7)
	Back and palm of the hand/wrist	949(70.6)	395(29.4)
	Face/neck/arms	1092(81.3)	252(18.8)
	Others	1203(89.5)	141(10.5)
	Total	643(47.8)	701(52.2)
Respiratory organ	Cough, phlegm	888(66.1)	456(33.9)
	Wheezing	1279(95.2)	65(4.8)
	Dyspnea	651(48.4)	693(51.6)
	Total	480(35.7)	864(64.3)
Eyes	Congestion, pain	584(43.5)	759(56.5)
	Lacrimation	773(57.6)	568(42.4)
	Fatigue	804(60.6)	537(40.0)
	Problems in visual activity	1013(75.7)	326(24.3)
	Dry, foreign body sensation, itching, tenderness	572(42.7)	767(57.3)
	Total	283(21.1)	1061(78.9)
Ears	Impaired hearing	604(45.0)	737(55.0)
	Tinnitus, acousma	1113(84.6)	206(15.4)
	Total	567(42.2)	777(57.8)

Table 9. Adjusted risk ratio of selected variables for subjective musculoskeletal symptoms

Variable	Parameter estimate	Standard error	Model OR(95%CI)
Age	0.0530	0.2259	1.054(0.677-1.642)
Sex	1.0114	0.3959	2.749(1.265-5.974)*
Marital status	−0.1047	0.2300	0.901(0.574-1.413)
Education	0.0371	0.2806	1.038(0.599-1.799)
Self assessed health status	0.6342	0.2975	1.886(1.053-3.378)*
Health examination	0.7712	0.2093	2.162(1.435-3.259)*
Position	0.00765	0.2072	1.008(0.671-1.512)
Work hours (hours/day)	0.3656	0.2394	1.441(0.902-2.304)
Neck posture	0.4686	0.3135	1.598(0.864-2.954)
Shoulder posture	−0.0768	0.2663	0.926(0.550-1.561)
Back/waist posture	0.4315	0.2822	1.540(0.886-2.677)
Forearm/elbow posture	0.0431	0.2564	1.044(0.632-1.726)
Wrist posture	−0.2458	0.2505	0.782(0.479-1.278)
Hand/finger posture	0.5708	0.2314	1.770(1.124-2.785)*
Vibration	0.0826	0.2037	1.086(0.729-1.619)
Height adjustment of work table and chair	0.2742	0.2197	1.315(0.855-2.024)

* P< .05

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Table 10.   Adjusted risk ratio of selected variables for subjective dermal symptoms

Variable	Parameter estimate	Standard error	Model OR(95%CI)
Age	-0.0957	0.1726	0.909(0.648-1.275)
Sex	0.6973	0.2015	2.008(1.353-2.981)*
Marital status	-0.1340	0.1498	0.875(0.652-1.173)
Self assessed health status	0.3525	0.1615	1.423(1.037-1.953)*
Health examination	0.0955	0.1644	1.100(0.797-1.519)
Career	-0.3211	0.1487	0.725(0.542-0.971)*
Position	0.1829	0.1433	1.201(0.907-1.590)
Wax gas	0.2032	0.2113	1.225(0.810-1.854)
Investment gas	-0.0470	0.1491	0.954(0.712-1.278)
Metal fume	0.2421	0.1690	1.274(0.915-1.774)
Resin vapor	-0.0925	0.2067	0.912(0.608-1.367)
Acid gas	0.6634	0.1608	1.941(1.417-2.660)*
Plaster dust	0.4620	0.2668	1.587(0.941-2.678)
Asbestos dust	-0.0152	0.1350	0.985(0.756-1.283)
Sand dust	-0.0238	0.1595	0.976(0.714-1.335)
Porcelain dust	-0.0496	0.1565	0.952(0.700-1.293)
Metal dust	-0.00125	0.2591	0.999(0.601-1.659)
Resin dust	0.0549	0.2424	1.056(0.657-1.699)
Abrasive dust	0.2511	0.3248	1.285(0.680-2.429)
Hand contact with resin mixture	0.4812	0.2342	1.618(1.022-2.561)*
Hand contact with detergent	0.4081	0.2467	1.504(0.927-2.439)
Gloves	0.1598	0.1406	1.173(0.891-1.545)

* P< .05

Table 11. Adjusted risk ratio of selected variables for subjective respiratory symptoms

Variable	Parameter estimate	Standard error	Model OR(95%CI)
Age	0.0165	0.1704	1.017(0.728-1.420)
Sex	0.3808	0.2117	1.464(0.967-2.216)
Broca's index	0.5867	0.2423	1.798(1.118-2.891)*
Eating	0.1094	0.1312	1.116(0.863-1.443)
Smoking	0.6275	0.1447	1.873(1.410-2.487)*
Alcohol	0.2235	0.1334	1.250(0.963-1.624)
Exercise	0.3861	0.1768	1.471(1.040-2.081)*
Self assessed health status	0.7006	0.1909	2.015(1.386-2.929)*
Health examination	0.2535	0.1833	1.289(0.900-1.845)
Work place	-0.2318	0.1732	0.793(0.565-1.114)
Wax gas	0.0651	0.2196	1.067(0.694-1.641)
Investment gas	0.1407	0.1588	1.151(0.843-1.571)
Metal fume	-0.0160	0.1806	0.984(0.691-1.402)
Resin vapor	0.2027	0.2101	1.225(0.811-1.849)
Acid gas	0.0615	0.1719	1.063(0.759-1.490)
Plaster dust	0.2992	0.2705	1.349(0.794-2.292)
Asbestos dust	0.1959	0.1442	1.216(0.917-1.614)
Sand dust	-0.00249	0.1701	0.998(0.715-1.392)
Porcelain dust	0.2993	0.1686	1.349(0.969-1.877)
Metal dust	-0.1818	0.2778	0.834(0.484-1.437)
Resin dust	0.2085	0.2455	1.232(0.761-1.993)
Abrasive dust	-0.0278	0.3317	0.973(0.508-1.863)
Face mask	0.3054	0.1350	1.357(1.042-1.768)*

* P< .05

Table 12. Adjusted risk ratio of selected variables for subjective eye symptoms

Variable	Para-meter estimate	Standard error	Model OR(95%CI)
Age	0.3998	0.2075	1.492(0.993-2.240)
Sex	0.8810	0.2654	2.413(1.435-4.060)*
Hours of sleeping	0.4855	0.1643	1.625(1.178-2.242)*
Self assessed health status	0.6348	0.2484	1.887(1.159-3.070)*
Health examination	0.3659	0.1972	1.442(0.980-2.122)
Work hours	0.4343	0.2163	1.544(1.010-2.359)*
Work part	0.2124	0.1869	1.237(0.857-1.784)
Work load	0.4788	0.1931	1.614(1.106-2.357)*
Wax gas	0.1793	0.2338	1.196(0.757-1.892)
Investment gas	0.0163	0.1788	1.016(0.716-1.443)
Metal fume	0.1632	0.2054	1.177(0.787-1.761)
Resin vapor	0.2665	0.2201	1.305(0.848-2.009)
Acid gas	0.2446	0.1856	1.277(0.888-1.838)
Plaster dust	0.6475	0.2659	1.911(1.135-3.218)*
Asbestos dust	0.0317	0.1695	1.032(0.740-1.439)
Sand dust	0.1332	0.1855	1.142(0.794-1.643)
Porcelain dust	0.1319	0.1846	1.141(0.795-1.638)
Metal dust	-0.2878	0.2956	0.750(0.420-1.338)
Resin dust	0.2176	0.2569	1.243(0.751-2.057)
Abrasive dust	0.1671	0.3383	1.182(0.609-2.294)
Light during casting	0.2086	0.1422	1.232(0.932-1.628)
Inadequate lighting	0.3115	0.1313	1.365(1.056-1.766)*
Goggle	0.3644	0.1786	1.440(1.014-2.043)*
Local lighting	0.2034	0.1626	1.226(0.891-1.685)

* P< .05

Table 13. Adjusted risk ratio of selected variables for subjective ear symptoms

Variable	Parameter estimate	Standard error	Model OR(95%CI)
Age	0.0145	0.1699	1.015(0.727-1.415)
Sex	0.3688	0.1977	1.446(0.981-2.130)
Eating	0.3552	0.1169	1.426(1.134-1.794)*
Smoking	0.3114	0.1302	1.365(1.058-1.762)*
Self assessed health status	0.6710	0.1691	1.956(1.404-2.725)*
Health examination	0.2170	0.1605	1.242(0.907-1.702)
Career	-0.1409	0.1431	0.869(0.656-1.150)
Position	0.2377	0.1377	1.268(0.968-1.661)
Work hours	0.0873	0.1824	1.091(0.763-1.560)
Work load	0.3175	0.1352	1.374(1.054-1.790)*
Ear plug	0.3778	0.2351	1.459(0.920-2.313)

* P< .05

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