

Research on the Level of Job Stress and Musculoskeletal Disorders and the Presence of Pain from Work in Dental Hygienists

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Abstract

The purpose of this study is to assess the job stress and level of discomfort related to musculoskeletal disorders by body parts of dental hygienists in some regions, determine the presence of pain from work in dental clinics, and identify the type of work that might make dental hygienists feel the most uncomfortable level of pain. As for job stress, the married subjects were relatively unstable about relational conflicts associated with interpersonal relationships and support and about their job ($p < .05$). The more educated subjects received greater pressure from their job ($p < .05$), and those with more than 36 months of career who received greater pressure by their job ($p < .01$), who had more relational conflicts ($p < .01$), and whose organization was less systematic ($p < .01$) experienced more stress. Rewarding inadequacy was strongly negatively correlated. The part in which they felt pain most frequently was the neck (93.6%), followed by the shoulders (89.7%), the waist (86.4%), the hands/wrists (74.9%), the knees (67.4%), the back (67.2%), the arms/elbows (47.5%), and the feet/ankles (65.1%). Since job stress may occur in such a working and medical practice environment, it is necessary to change the environment; dental hygienists need to be willing to treat any uncomfortable part in their body and prevent it. It is necessary to develop a safety management program for their health.

Keywords: *body discomfort, job stress, pain, work-related musculoskeletal disorder*

1. Introduction

The healthcare field has recently been characterized by advanced medical facilities and high qualitative levels. It also required competent and specialized healthcare personnel with up-to-date medical technology. As competition becomes keener with specialization, pursuit of scale, networking, and group practicing, dental hygienists play a crucial role in the oral area, make a critical contribution to the quality of dental care service, and take increasingly significant roles day by day [1]. Medical service providers, including doctors, nurses, and medical technicians, who personally deal with human life, reportedly get more seriously stressed than those belonging to other professions. Such a change in social environment, tasks, duties to be familiar with, and excessive workload put dental hygienists under greater physical and mental stress. Job stress is defined as a harmful physical or mental response that may occur when a work-related requirement is inconsistent with a worker's ability, resources, or needs, and diseases related to job stress are becoming important factors of industrial disasters [2]. Stress itself is becoming an inevitable part of life and is regarded as such an important concept that the cause of every disease usually gets connected with it [3]. Dental hygienists have been required to have high levels of know-how as their work areas and roles were expanded, they

received more pressure from the need to improve practical performance and make continuous self-development, and most of all they suffered from high levels of job stress due to excessive requirements for job performance in working practice [4]. Stress may cause physiological, mental, and behavioral changes. It may lead to heart and cerebrovascular diseases [5], musculoskeletal disorders [6], and depression and anxiety [7]. Choi [8] noted that blood pressure, heart rate variability, and living habits, including smoking, alcohol intake, and exercise, were strongly correlated with job stress. Among lots of responses to job stress, musculoskeletal disorders are found in many types of occupation.

The research on musculoskeletal disorders in South Korea started in manufacturing, shipbuilding, and automobile industries. It has recently been conducted in medical institutions and the service industry and is now conducted in the hospital-related industry as well [8]. A musculoskeletal disorder may be caused by incorrect posture, repetitive work, insufficient rest, temperature in the working environment, long-term work, and great intensity of labor. It may principally involve muscular and nervous injuries in the joints of the shoulders, the neck, and the waist. These injuries may cause pain and abnormal senses. Once pain occurs, it may last a week or longer or recur at least once or more a month for a year. It can be defined as an occupational disease only if the person has no similar diseases, such as diabetes, rheumatoid arthritis, lupus, or gout, in the same part of the body, has no history of having an accident, and has the condition occurring after he/she starts the current job [2].

In general, abnormal symptoms may specifically occur in upper body: the neck, the shoulders, and the arms [9]. Musculoskeletal disorder has recently become an important health problem in the occupational group related to healthcare. It has been reported that dentists who principally use the upper limbs to treat patients are also highly susceptible to musculoskeletal disorders [10]. Dental hygienists are likely to get the condition as an occupational disease since their job is characterized by inappropriate work movements, excessive workload, and long-term performance of repetitive tasks. Milerad *et al.*, [10] noted that dentists could suffer from musculoskeletal disorders due to wrong treatment postures and habits, which might injure muscles or ligaments. They reported that this was because of repetitive tasks, including scaling and periodontal treatment, along with inappropriate postures needed to treat the narrow oral cavity of patients. Jeon *et al.*, [11] indicated some risk factors of musculoskeletal disorders: 1) the need to repeat skilled, delicate musculoskeletal motions constantly, taking unstable postures for a long time and 2) mental stress from concerns about patient satisfaction. Dental hygienists suffer from musculoskeletal disorders and body discomfort due to treatment postures almost identical to those of dentists. Such discomfort in each part of the body may not only exert adverse effects on daily life, lowering productivity, it may also increase medical use, consequently increasing social costs [12]. High levels of job stress may prevent one from growing to be a professional and make him/her less satisfied with job. As a result, healthcare consumers who visit dental clinics may get lower-quality healthcare service [1]. In other words, healthcare consumers who visit dental clinics may become satisfied only if the dental hygienists working there are healthy.

This study aims to assess job stress and the level of discomfort related to musculoskeletal disorders by body parts of dental hygienists in some regions. To determine the presence of pain from work in dental clinics, an attempt was made to identify the type of work that might make dental hygienists feel the most uncomfortable level of pain. Since little research has been conducted on the presence of work pain in dental hygienists, this study intended to provide basic data that could help ensure prevention through health promotion and improvement in the working environment.

2. Method

This is a cross-sectional research involving a survey in 300 female dental hygienists who had a membership in the Busan and Gyeongnam branches of the Dental Hygienists' Society and were employed in dental hospitals and clinics. The survey was conducted from May 2012 to August 2014. 287 questionnaires were finally analyzed, with the exception of those of the respondents who made an insincere response, failed to answer all the items, or made unreliable responses.

2.1. Job Stressors for Dental Hygienists

To determine the occurrence of musculoskeletal disorders due to standing in an unstable posture for a long time and job stress among dental hygienists, the Korean version of the job stress scale developed by the Korea Occupational Safety Health Agency (KOSHA), taking into account the industrial sites and cultural characteristics of South Korea, was used. This scale is composed of 43 items in 8 areas: physical environment, job demands, job autonomy, relational conflicts, job instability, organizational systems, reward inadequacy, and workplace culture. This questionnaire can be used to make a comparative analysis with the results from research on job stress in other occupational types and jobs. The job stressors in each item are as follows:

1) Physical environment (3 items): This refers to the general physical environment which can affect job stress and in which workers are present. It includes risks in the working type, air pollution, and burden on the body.

2) Job demands (8 items): This refers to the burden and degree of job and includes time pressure, an increase in workload, a sense of responsibility, and excessive job burden.

3) Job autonomy (5 items): This refers to the usability of authority to make a decision about a job and discretion in the job and includes technical discretion and autonomy, work predictability, and authority to perform a job.

4) Relational conflicts (4 items): This assesses interpersonal relationships, such as lack of help or support from a boss and among colleagues at workplace and includes colleagues' support, a boss' support, and support in general.

5) Job instability (6 items): This refers to the level of stability in one's occupation or job and includes a chance to get a job and employment instability.

6) Organizational system (7 items): This aims to assess such job stressors as organizational policies and operation systems, organizational resources, intra-organizational conflicts, and rational communication.

7) Reward inadequacy (6 items): This determines if the level of reward expected from work is adequate and includes respect, motivation for informal decision, and expectation inadequacy.

8) Workplace culture (4 items): This ascertains if the collectivist culture, the irrational communication system, and the informal workplace culture—all of which are specific to South Korea and contrary to the formal and rational workplace culture of the West—serve as stressors.

Job stress can be assessed simply by adding up the actual scores for items in each area or by presenting the eight areas equally in percentage. The first method may fail to have the same number of items among the eight areas and reflect the scores for some areas excessively in scoring stressors in a single way. Therefore, this study used the method of presenting each area in percentage to avoid a skewed distribution of measurements and get measurements close to a regular distribution.

Percentage in each area = (actual score - number of items)*100/maximum predictable score - number of items

In the area of workplace culture that is composed of four items, each of which may score from 1 to 4, the maximum predictable score is 16; with four items, the actual score of 16 can be expressed in percentage. A higher score in percentage in the job stress scale means a higher level of job stress; as for reliability of the scale in this study, Cronbach's α was 0.722.

2.2. Related to Musculoskeletal Disorders by Body Parts

A survey was conducted to assess the level of discomfort related to musculoskeletal disorders in body parts. The respondents were asked to indicate smarting, numbness, stiffness, glowing, and pain that they had experienced in all the parts of their body (neck, shoulders, back, waist, arms/elbows, hands/wrists, knees, feet/ankles) for the past 12 months.

2.3. Presence of Work Pain among Dental Hygienist

To identify the works causing pain and the parts vulnerable to pain, 11 works currently performed in clinical practice of dental care frequently were selected with reference to the expansion of dental hygienists' works [13]. The works were categorized into X-ray taking, fissure sealants and topical fluoride application, hyperaesthetic teeth treatment, assistance to treatment (preservation, installation of prosthesis, infant treatment, orthodontic treatment), surgical assistance (periodontal surgery, oral surgery, implant, and other minor surgeries), impression, installation of prosthesis and cement removal, temporary crown placement, personal tray manufacturing, SP crown manufacturing, and administration and management.

2.4. Data Analysis

SPSS ver. 21.0 was used to test the collected data at the .05 significance level. Frequency analysis was performed for the variables related to the occupational environment and health. With some variables related to the occupational environment and health as independent variables and job stress as a dependent variable, t-test and ANOVA were used to assess significant relations with the eight items for job stress, while Duncan test was used as post-test. Discomfort related to the musculoskeletal system by body parts and the presence of pain from dental hygienists' work were examined in terms of the presence of discomfort. Bivariate correlation analysis was performed to determine the association between job satisfaction and sub-factors of job stress.

3. Results

3.1. Variables related to Working Environment and Health

Table 1 presents the general characteristics of dental hygienists, which are related to working environment and health. In terms of the working environment, the subjects were female dental hygienists aged 27.38, with 79.4% of them being unmarried. 83.3% were three-year college graduates, 43.6% had less than 36 months of career, and 56.4% had 36 months of career or longer, with 60.22 months being the average. 73.9% worked at dental hospitals, 23.7% at dental clinics, and 2.4% at general hospitals. 51.9% worked in cities and counties and 47.1% worked in metropolitan cities. In terms of health, 94.8% were non-smokers and 82.2% had alcohol intake. 85.0% did no exercise, 54.0% had no hobby, 38.7% enjoyed a hobby, and 7.3% had no time for a hobby. 78.9% had less than 8 hours

of sleep, 46.0% felt physically fatigued sometimes, and 45.3% felt mentally fatigued frequently. 80.7% scored 5 out of 10 for work satisfaction, with 5.64 being the average.

Table 1. General Characteristics of Dental Hygienists

		N	%	Mean(S.D)
Age(year)	< 27	142	49.5	27.38(4.19)
	>= 27	145	50.5	
Marital status	Single	228	79.4	
	Married	59	20.6	
Education	Junior college	239	83.3	
	4-year college	32	11.1	
	Master's	13	4.5	
	Ph.D.	3	1.0	
Work Experience	< 36	125	43.6	50.22(44.45)
	>= 36	162	56.4	
Working institution	Dental Clinic	68	23.7	
	Dental Hospital	212	73.9	
	Hospital	7	2.4	
Region	County	149	51.9	
	Metropolitan	138	48.1	
Drinking	No	51	17.8	
	Yes	236	82.2	
Exercise	No	244	85.0	
	Yes	43	15.0	
Leisure	No	155	54.0	
	Yes	111	38.7	
	No time	21	7.3	
Sleep time	>= 8	59	21.1	6.75(1.05)
	< 8	221	78.9	
Physical fatigue	All the time	28	9.8	2.36(0.65)
	Frequently	127	44.3	
	Sometimes	132	46.0	
Mental fatigue	All the time	48	16.7	2.21(0.71)
	Frequently	130	45.3	
	Sometimes	109	38.0	
Job satisfaction	>= 5	230	80.7	5.64(1.74)
	< 5	55	19.3	

3.2. Comparison of Job Stressors by Job-related Characteristics

Table 2 presents the comparison of job stressors by job-related characteristics. The unmarried subjects (52.22) scored significantly higher statistically for job autonomy among the job stressors than the married ones (46.89); that is, the former felt more job stress than the latter ($t=3.094$, $p<.01$). The unmarried subjects (32.79) scored significantly lower statistically for relational conflicts, which serves as an indicator of interpersonal relationships at workplace, than the married subjects (39.27). In other words, the latter felt more job stress than the former ($t=-2.552$, $p<.05$). The unmarried subjects (40.86) scored significantly lower statistically for job instability, which serves as an indicator of a chance to get a job or employment instability, than the married subjects (45.48); this means that the latter felt more job stress than the former ($t=-2.461$, $p<.05$).

As for the job stressors by education, significant differences were found in job demands: three-year college graduates scored 57.9, university graduates 62.11, Masteral graduates 68.59, and Doctorate graduates 73.61 ($F=3.417$, $p=.018$). The post-test found that doctors had significantly higher levels of stress than three-year college or university graduates or masters. That is, a higher level of education may lead to a significantly higher level of job stress. Job demands didn't differ significantly among three-year college graduates, university graduates, and Masteral graduates, or among university graduates, Masteral graduates, and Doctorate graduates. Significant differences were

found in job autonomy: three-year college graduates scored 51.85, university graduates 46.88, Masteral graduates 53.33, and Doctorate graduates 28.89 ($F=5.489$, $p=.001$). The post-test found that doctors had significantly lower levels of job stress than three-year college or university graduates or masters. No significant difference was found among three-year college graduates, university graduates, and Masteral graduates. Significant differences were found in relational conflicts: three-year college graduates scored 33.51, university graduates 46.88, Masteral graduates 49.36, and Doctorate graduates 30.56 ($F=3.558$, $p=.015$). The post-test found that doctors had significantly lower levels of job stress than three-year college or university graduates or masters. The level didn't differ significantly among three-year college graduates, university graduates, and Masteral graduates, or among three-year college graduates, university graduates, and Doctorate graduates. Significant differences were found in reward inadequacy: three-year college graduates scored 52.84, university graduates 45.31, Masteral graduates 50.43, and Doctorate graduates 38.89 ($F=3.287$, $p=.021$). The post-test found that doctors had significantly lower levels of stress than three-year college or university graduates or masters. Three-year college graduates had the highest level of stress from reward inadequacy. The level didn't differ significantly among three-year college graduates, university graduates, and Masteral graduates, or among three-year college graduates, university graduates, and Doctorate graduates.

The respondents with more than 36 month of career (61.96) scored significantly higher statistically for job demands among the job stressors than those with less than 36 months of career (55.20); that is, the former felt more job stress than the latter ($t=3.719$, $p=.000$). The respondents with more than 36 month of career (49.05) scored significantly lower statistically for job autonomy than those with less than 36 months of career (55.20); that is, the latter felt more job stress than the former ($t=-3.402$, $p=.001$). The respondents with more than 36 month of career (36.52) scored significantly higher statistically for relational conflicts than those with less than 36 months of career (31.00); that is, the former felt more job stress than the latter ($t=2.671$, $p=.008$). The respondents with more than 36 month of career (49.62) scored significantly higher statistically for organizational systems than those with less than 36 months of career (43.66); that is, the former felt more job stress than the latter ($t=3.569$, $p=.000$).

Table 2. Comparison of Job Stressors by Job-Related Characteristics

	Physical Environment	Job demands	Job autonomy	Relational conflicts	Job instability	Organizational system	Reward inadequacy	Workplace culture	
	3	8	5	4	6	7	6	4	
	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	
Marital status	Single	52.53(14.47)	58.66(15.97)	52.22(11.79)	32.79(18.04)	40.86(13.42)	46.53(14.73)	52.53(15.30)	40.90(16.49)
	Married	48.78(13.21)	60.38(14.15)	46.89(11.81)	39.27(14.52)	45.48(10.29)	48.91(12.50)	48.68(12.82)	40.82(14.82)
	t	1.809	-.753	3.094	-2.552	-2.461	-1.138	1.779	.034
	p	.276	.452	.002**	.011*	.014*	.256	.076	.973
Education	Junior college	52.07(14.03)	57.90(15.35) a	51.85(11.16) b	33.51(16.90) a,b	41.93(12.91)	47.12(14.00) b	52.84(14.89) b	41.25(15.67)
	4-year college	49.31(15.95)	62.11(15.31) a,b	46.88(13.39) b	32.81(19.96) a,b	43.06(14.18)	47.02(16.22) b	45.31(14.87) b	39.84(19.14)
	Master's	52.99(12.95)	68.59(16.98) a,b	53.33(16.56) b	49.36(19.38) b	37.61(11.15)	49.45(13.26) b	50.43(10.51) b	41.03(15.01)
	Ph.D.	48.15(25.66)	73.61(14.63) b	28.89(10.18) a	30.56(4.81) a	37.04(11.56)	28.57(16.50) a	38.89(11.11) a	22.22(20.97)
	F	.446	3.417	5.489	3.558	.695	1.806	3.278	1.429
	p	.720	.018*	.001**	.015*	.556	.146	.021*	.234
Career	≥ 36	51.03(13.71)	61.96(15.70)	49.05(12.42)	36.52(16.77)	42.90(12.34)	49.62(13.60)	51.85(14.78)	39.76(17.23)
	< 36	52.71(14.99)	55.20(14.69)	53.81(10.82)	31.00(18.10)	40.40(13.63)	43.66(14.56)	51.60(15.06)	42.33(14.53)
	t	-.989	3.719	-3.402	2.671	1.626	3.569	.142	-1.340
	p	.323	.000***	.001**	.008**	.105	.000***	.887	.181

* $p < .05$, ** $p < .01$, *** $p < .001$, a,b; Duncan test by ANOVA

3.3. Comparison of Job Stressors by Fatigue

Table 3 presents the comparison of job stressors by fatigue. Fatigue was categorized into physical and mental fatigue. As for physical fatigue, significant differences were found in the physical environment: *feel sometimes* scored 55.39, *feel frequently* 50.22, and

feel all the time 41.67 ($F=12.994$, $p<.001$). The post-test found that the respondents feeling physical fatigue sometimes had significantly higher levels of job stress than those feeling it frequently or all the time. This result implies that those feeling physically fatigued more frequently may get more stressed from the factor of the physical environment. Significant differences were found in job demands: *feel sometimes* scored 63.38, *feel frequently* 55.68, and *feel all the time* 53.57 ($F=10.425$, $p<.001$). The post-test found that the respondents feeling physical fatigue sometimes had significantly higher levels of job stress than those feeling it frequently or all the time. No significant difference was found between those feeling it frequently and all the time. Significant differences were found in job instability: *feel sometimes* scored 40.99, *feel frequently* 44.14, and *feel all the time* 35.12 ($F=6.269$, $p<.01$). The post-test found that the respondents feeling physical fatigue sometimes had significantly higher levels of job stress than those feeling it frequently or all the time. No significant difference was found between those feeling it sometimes and frequently. Significant differences were found in reward inadequacy: *feel sometimes* scored 55.89, *feel frequently* 49.08, and *feel all the time* 44.25 ($F=11.504$, $p<.001$). The post-test found that the respondents feeling physical fatigue sometimes had significantly higher levels of job stress than those feeling it frequently or all the time. No significant difference was found between those feeling it frequently and all the time.

As for mental fatigue, significant differences were found in the physical environment: *feel sometimes* scored 57.00, *feel frequently* 49.23, and *feel all the time* 46.94 ($F=13.112$, $p<.001$). The post-test found that the respondents feeling mental fatigue sometimes had significantly higher levels of job stress than those feeling it frequently or all the time. No significant difference was found between those feeling fatigued frequently and all the time. This result implies that those feeling mentally fatigued sometimes may get more stressed from the factor of the physical environment. Significant differences were found in job demands: *feel sometimes* scored 67.32, *feel frequently* 55.51, and *feel all the time* 50.00 ($F=32.665$, $p<.001$). The post-test found that those feeling mentally fatigued sometimes got more stressed from the factor of job demands. Statistically significant differences were found in job autonomy: *feel sometimes* scored 53.46, *feel frequently* 49.59, and *feel all the time* 50.17 ($F=3.366$, $p<.05$). Significant differences were found in relational conflicts: *feel sometimes* scored 36.19, *feel frequently* 34.42, and *feel all the time* 28.74 ($F=3.116$, $p<.05$). Posttest found that those feeling mental fatigue sometimes or frequently got statistically significantly more stressed from relational conflicts than those feeling it all the time. Significant differences were found in organizational systems: *feel sometimes* scored 50.40, *feel frequently* 45.93, and *feel all the time* 42.47 ($F=6.066$, $p<.01$). The post-test found that those feeling mental fatigue sometimes got significantly more stressed statistically from organizational systems than those feeling it frequently or all the time. No significant difference was found between those feeling it frequently and all the time. Significant differences were found in reward inadequacy: *feel sometimes* scored 58.49, *feel frequently* 49.06, and *feel all the time* 43.99 ($F=22.898$, $p<.001$). The post-test found that those feeling mental fatigue sometimes got significantly more stressed statistically from reward inadequacy than those feeling it frequently or all the time. Those feeling mentally fatigued sometimes got more stressed from reward inadequacy. Significant differences were found in workplace culture: *feel sometimes* scored 45.37, *feel frequently* 38.72, and *feel all the time* 36.73 ($F=7.270$, $p<.01$). The post-test found that those feeling mental fatigue sometimes got significantly more stressed statistically from workplace culture than those feeling it frequently or all the time. Those feeling mentally fatigued sometimes got more stressed from workplace culture.

Table 3. Comparison of Job Stressors by Fatigue

	Physical Environment	Job demands	Job autonomy	Relational conflicts	Job instability	Organizational system	Reward inadequacy	Workplace culture	
	3	8	5	4	6	7	6	4	
	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	Mean(S.D)	
Physical	sometimes	55.39(12.88)a	63.38(15.69)a	52.12(12.24)	34.09(17.79)	40.99(13.18)a	47.26(13.59)	55.89(15.51)a	43.12(15.43)
	frequently	50.22(12.74)b	55.68(12.82)b	50.87(10.68)	44.14(10.87)a	44.14(10.87)a	46.98(13.53)	49.08(11.56)b	39.17(15.51)
	all the time	41.67(20.43)c	53.57(21.02)b	47.62(15.47)	35.12(17.57)b	35.12(17.57)b	46.09(20.45)	44.25(19.45)b	38.10(20.84)
	F	12.994	10.425	1.697	6.269	6.269	.078	11.504	2.421
p	.000***	.000***	.185	.002**	.002**	.925	.000***	.091	
Mental	sometimes	57.00(13.68)a	67.32(14.55)a	53.46(12.69)	36.19(19.10)a	41.05(13.73)	50.40(14.56)a	58.49(15.83)a	45.37(16.13)a
	frequently	49.23(12.29)b	55.51(13.06)b	49.59(10.98)	34.42(16.32)a	42.99(11.67)	45.93(12.80)b	49.06(10.85)b	38.72(14.78)b
	all the time	46.94(17.01)b	50.00(15.82)c	50.07(12.26)	28.74(16.32)b	40.36(14.38)	42.47(16.06)b	43.99(16.15)c	36.73(17.59)b
	F	13.112	32.665	3.366	3.116	1.032	6.066	22.898	7.270
p	.000***	.000***	.036*	.046*	.357	.003**	.000***	.001**	

*p<.05, **p<.01, ***p<.001, a,b; Duncan test by ANOVA

3.4. Correlation between Job Satisfaction and Job Stressors

Table 4 presents the correlation between job satisfaction and job stressors. The physical environment was negatively correlated with job satisfaction ($r=-.276$, $p<.001$); that is, a relatively poorer physical environment may lead to lower levels of job satisfaction. Negative correlation was found between job demands and job satisfaction ($r=-.197$, $p<.01$); that is, relatively greater job demands may lead to lower levels of job satisfaction. Job autonomy was negatively correlated with job satisfaction ($r=-.263$, $p<.001$); that is, a relatively lower level of job autonomy, or a higher level of stress from the factor of job autonomy, may lead to lower levels of job satisfaction. Negative correlation was found between organizational systems and job satisfaction ($r=-.193$, $p<.01$); that is, a relatively less systematic organization, or a higher level of stress from the factor of organizational systems, may lead to lower levels of job satisfaction. Reward inadequacy was negatively correlated with job satisfaction ($r=-.406$, $p<.001$); that is, a relatively inadequate reward system, or a higher level of stress from the factor of reward inadequacy, may lead to lower levels of job satisfaction. Workplace culture was negatively correlated with job satisfaction ($r=-.245$, $p<.001$); that is, relatively more problems with workplace culture, or a higher level of stress from the factor of workplace culture, may lead to lower levels of job satisfaction. In general, job stressors were negatively correlated with job satisfaction; particularly, reward inadequacy was strongly negatively correlated.

Table 4. Correlation between Job Satisfaction and Job Stressors

	1	2	3	4	5	6	7	8	9
1	1								
2	.362*** .000	1							
3	.171** .004	.014 .816	1						
4	.171** .004	.091 .125	.136* .021	1					
5	.173** .003	-.084 .156	.078 .185	.263*** .000	1				
6	.409*** .000	.188** .001	.202** .001	.348*** .000	.312*** .000	1			
7	.404*** .000	.288*** .000	.354*** .000	.261*** .000	.184** .002	.586*** .000	1		
8	.299*** .000	.218*** .000	.190** .001	.130* .028	.274*** .000	.461*** .000	.416*** .000	1	
9	-.276*** .000	-.197** .001	-.263*** .000	-.065 .271	-.046 .437	-.193** .001	-.406*** .000	-.245*** .000	1

*p<.05, **p<.01, ***p<.001

1;Physical environment, 2; Job demands, 3; Job autonomy, 4; Relational conflicts, 5; Job instability, 6;Organizational system, 7; Reward inadequacy, 8; Workplace culture, 9; Job satisfaction

3.5. Discomfort related to Musculoskeletal Disorders by Body Parts

The Figure 1 shows an analysis of smarting, numbness, stiffness, glowing, and pain that dental hygienists have experienced in some parts of their body (neck, shoulders, back, waist, arms/elbows, hands/wrists, knees, feet/ankles) for the past 12 months. Severity of pain was divided into extremely mild, mild, moderate, severe, and extremely severe pain in order. Figure 1 shows the presence of pain by body parts. The part in which dental hygienists had pain most frequently was the neck (93.6%), followed by the shoulders (89.7%), the waist (86.4%), the hands/wrists (74.9%), the knees (67.4%), the back (67.2%), the arms/elbows (47.5%), and the feet/ankles (65.1%).

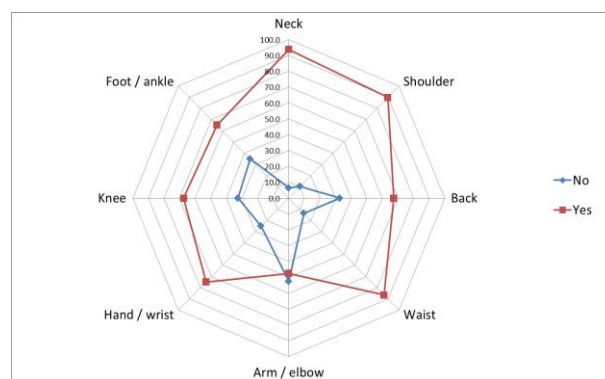


Figure 1. Discomfort Related to Musculoskeletal Disorders by Body Parts

3.6. Presence of Pain in Body Parts by Work for Dental Hygienists

As for the presence of work pain in the body parts of dental hygienists, 11 works frequently performed in the clinical practice of dental care were selected to identify the works causing pain and the parts vulnerable to pain Figure 2. The works were categorized

into X-ray taking, fissure sealants and topical fluoride application, treatment of hypersensitivity, assistance to treatment (preservation, installation of prosthesis, infant treatment, orthodontic treatment), surgical assistance (periodontal surgery, oral surgery, implant, and other minor surgeries), impression, installation of prosthesis and cement removal, temporary crown placement, modeling of individual tray, SP crown manufacturing, and administration and management. The dental hygienists complained of relatively severe pain related to their work in the neck, the shoulders, the waist, and the wrists. Scaling caused the most serious pain and the neck (66.6%) was most vulnerable to pain, followed by the shoulders (56.4%), the hands/wrists (43.6%), and the waist (38.7%). Surgical assistance (periodontal surgery, oral surgery, implant, and other minor surgeries) caused the second most serious pain and the neck (56.4%) was most vulnerable to pain, followed by the waist (53.0%), the shoulders (48.1%), and the hands/wrists (39.0%). Assistance to treatment (preservation, installation of prosthesis, infant treatment, orthodontic treatment) caused the third most serious pain and the neck (56.4%) was most vulnerable to pain, followed by the waist (53.0%), the shoulders (48.1%), and the hands/wrists (39.0%).

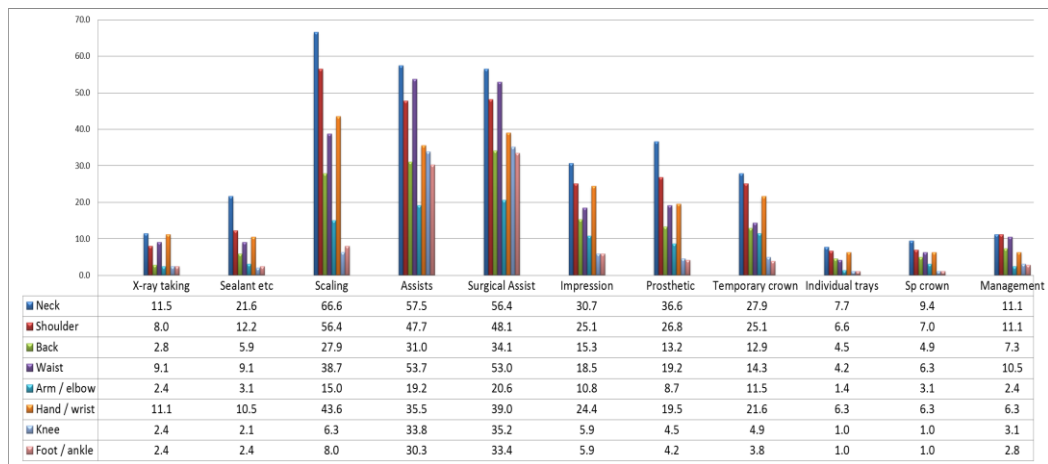


Figure 2. Presence of Work Pain in the Body Parts of Dental Hygienists

4. Discussion

Most of the clinical dental hygienists complain of high levels of job stress in dental care practice and get more stressed from the requirements to acquire excellent job performance ability and to achieve self-development continuously at hospitals. If a high level of job stress is accumulated, it can cause individuals to suffer from a diversity of health disorders which will lower the quality of the subjects' life. They contend that chronically accumulated job stress may lead to fatigue, give immediate effects on the turnover intention due to an increase in dissatisfaction with the job and a negative view of the occupation, and exert negative effects on the quality of dental care service itself.

To assess the job stressors and discomfort related to musculoskeletal disorders for dental hygienists in some parts of the body (neck, shoulders, back, waist, arms/elbows, hands/wrists, knees, feet/ankles) and determine the presence of pain in some parts of the body by their work, an attempt was made to determine if they felt smarting, numbness, stiffness, glowing, or pain for the past 12 months. This attempt aimed to identify the type of work most frequently causing pain for dental hygienists and to reduce such pain or find out a way to promote their health.

In terms of marital status, the unmarried subjects were less likely to be autonomous by using authority to make a decision about a job and discretion in the job ($p < .01$), in agreement with Park and Lee [1], while the married subjects felt

relatively unstable about relational conflicts associated with interpersonal relationships or support or about their occupation or job ($p < .05$). The married subjects had higher levels of job stress probably because of the restrictions from childrearing or marriage or because of poor consideration at the workplace. Those who were more educated felt a greater burden from their job ($p < .05$) probably because they might often have greater expectation from hospitals and feel a sense of responsibility and burden from their job. The Masteral graduates got highly stressed from job autonomy ($p < .01$) and from relational conflicts ($p < .05$) and the three-year college graduates expected inadequate levels of reward from their work ($p < .05$). The item of relational conflicts aims to assess interpersonal relationships, such as lack of help or support from a boss and among colleagues at the workplace. This item involves colleagues' support, a boss' support, and support in general while the Masteral graduates are expected to get highly stressed because of jealousy or envy about studies among colleagues or because directors don't recognize their education. The subjects with more than 36 months of career and who felt a greater burden from their job ($p < .01$), who had higher levels of relational conflicts ($p < .01$), or whose organization was less systematic ($p < .01$) were more stressed whereas those with less than 36 months of career were more stressed due to relatively lower levels of job autonomy ($p < .05$).

Given the higher turnover rate for dental hygienists than for other types of occupation, longer career is expected to lead to less stress and higher levels of satisfaction with the job; however, lots of dental hygienists with longer career actually feel more anxious. This result is consistent with that of Kim *et al.*, [15], which says that dental hygienists with more than seven years of career have the highest level of job stress. The respondents feeling physical fatigue sometimes due to the physical environment, job demands, and reward inadequacy get more stressed than those feeling it all the time ($p < .01$). The respondents feeling mental fatigue sometimes due to physical environment, job demands, organizational systems, reward inadequacy, and workplace culture get more stressed than those feeling it all the time ($p < .01$). The respondents feeling fatigue sometimes due to relational conflicts get more stressed than those feeling it all the time ($p < .05$). This is probably because dental hygienists, who are fatigued due to excessive workload all the time, may rather get more stressed when they feel fatigued in their mind sometimes although they feel fatigued all the time. As for correlation between job satisfaction and job stressors, those who were in a relatively poor physical environment ($p < .001$), who had relatively higher levels of job demands ($p < .01$), who had relatively lower levels of job autonomy ($p < .001$), whose organization was relatively less systematic ($p < .01$), who had an inadequate reward system ($p < .001$), and whose workplace culture had more problems ($p < .001$) were less satisfied with their job. Park and Kim [16] noted that individuals could reduce job stress by becoming more satisfied with themselves.

Of several factors, reward inadequacy was strongly negatively correlated. Wage is one of the economic incentives in the incentive system that promotes efficiency and a willingness to work among dental hygienists and may become a criterion for the level of their work, for assessing their ability, and for determining their dignity as a professional. That is, they would see job stress reduced with a certain level of reward for their work and level. It is necessary to review the reward for dental hygienists on the basis of work and wage for dental hygienists in Busan and South Gyeongsang Province.

The part in which dental hygienists had pain most frequently was the neck (93.6%), followed by the shoulders (89.7%), the waist (86.4%), the hands/wrists (74.9%), the knees (67.4%), the back (67.2%), the arms/elbows (47.5%), and the feet/ankles (65.1%). This point is somewhat inconsistent with the results from Kim

and Yoo [14] that 45.9% had pain in the shoulders, 31.7% in the neck, 28.8% in the hands/wrist/fingers, 27.9% in the waist, 27.2% in the legs/feet, and 11.6% in the arms/elbows. Scaling caused the most serious pain among dental hygienists, followed by surgical assistance (periodontal surgery, oral surgery, implant, and other minor surgeries) and assistance to treatment (preservation, installation of prosthesis, infant treatment, orthodontic treatment). Since job stress and musculoskeletal discomfort may occur in such a working and medical practice environment, it is necessary to change the environment. Dental hygienists need to be willing to treat any uncomfortable part of their body and prevent the pain [18]. It is necessary to develop a safety management program based on human engineering for their health. While this study was conducted to promote health for dental hygienists who are in charge of the people's oral health and work positively at clinical practice, it cannot be generalized since it was conducted among dental hygienists in some metropolitan cities. Cities, counties, and districts and care should be taken in over interpretation of the results. As cross-sectional research is conducted at a certain point of time, it can hardly explain the causality of the relevant factors.

5. Conclusion

When the guidance period based on the Medical Technician Act ends, the technicians come to have an obligation to provide more specialized and higher-quality oral health service due to accurate division of duties and activities for dental hygienists. To provide patients with high-quality oral health service, it is necessary to improve the working and medical practice environment at dental hospitals and clinics.

It is believed that the research on pain in some parts of the body for dental hygienists by common works in clinical practice of dental care is meaningful. On the basis of the results, dental hygienists need to make some efforts to maintain their health. It is necessary to develop a health promotion program, through job stress management and simple stretching before starting work activities that may cause pain, to prevent the onset of pain in each body part.

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