

Temporomandibular disorders and risk factors in office workers, service workers, and teachers

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측두하악장애의 유병률과 관련요인에 관한 연구 -일부 일반사무직, 서비스직, 교직원을 대상으로-

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국문초록

목적 : 본 연구는 업무형태에 따른 측두하악장애의 유병률과 업무 시 노출되는 직무스트레스 및 구강 내 악습관이 측두하악장애와 어떠한 연관성이 있는지 알아보아 보건학적 기초자료를 제공하고자 실시되었다.

방법 : 본 연구의 자료 수집을 위하여 서울과 경기 일부지역에 근무하고 있는 일반사무직, 서비스직, 교직원으로부터 편의 추출된 452명을 대상으로 2010년 1월부터 2010년 4월까지 설문조사를 실시하였고, 수거된 353명을 연구대상으로 하였다. 설문지는 측두하악장애의 증상, 하악사용에 관한 구강 내 악습관, 직무스트레스, 인구사회학적 특성으로 구성되었다. 측두하악장애의 증상의 정도를 구분하기 위해 설문지의 양성응답 수의 빈도에 따라 무증상인 1단계에서 양성응답 수가 가장 많은 4단계 까지 총 4그룹으로 나누었다. 측두하악장애의 유병률을 알아보기 위하여 빈도분석을 시행하였고, 측두하악장애의 증상의 정도에 따른 여러 요인들 간의 연관성 및 관련요인을 알아보기 위하여 교차분석 및 경향성 분석과 다항로지스틱회기 분석을 시행하였다.

결과 : 측두하악장애의 유병률은 75.4%였고, 측두하악장애에 대한 주관적 증상으로는 관절잡음이 56.4%로 가장 주된 증상 중 하나였으나 남녀 간의 차이는 통계적으로 유의하지 않았다. 다음으로는 두통이나 목의 통증이 36.5%이었고, 귀, 관자놀이, 볼 주위의 통증이 22.1%로 높았다. 측두하악장애의 주관적인 증상 수에 따른 인구사회학적 특성은 증상이 없는 경우 여성에서 19.1%, 남성에서 36.6%로 여성에서 더 높은 유병률을 보였다. 연령별로는 40세 이상의 그룹보다 20 - 30대그룹에서 측두하악장애 증상수가 높아지는 경향을 보였다. 하악 사용과 관련된 악습관 및 직무스트레스는 측두하악장애 증상수와 유의한 관련성이 있는 것으로 나타났는데, 하악 사용과 관련된 습관의 개수가 많아질수록 측두하악장애의 증상의 개수도 많아졌고, 습관이 한 가지씩 늘어날수록 측두하악장애 증상이 없는 1단계보다 3단계가 될 위험이 1.45배, 4단계가 될 위험이 1.57배 높아졌다. 스트레스 수준도 가장 하위단계에서 한 단계 높아지면 측두하악장애 1단계에서 4단계가 될 위험이 2.49배, 두 단계 높아지면 3.43배 높아졌다.

결론 : 본 연구의 결과 측두하악장애와 업무특성에 따른 연관성은 설명하지 못하였지만, 직무스트레스가 높은 경우 측두하악장애 증상의 개수 또한 높아짐을 확인할 수 있었다. 이는 측두하악장애의 주관적인 증상을 발생시키는데 있어서 업무형태 보다는 심인적인 부분이 더 중요한 인자임을 의미한다. 그러므로 측두하악장애 평가 시 신체적인 문제뿐 아니라 행동적, 심리 사회적 문제로 예측인자를 폭넓게 인식함으로써 다각적인 접근을 하는 것이 필요하며, 측두하악장애 증상이 발생된 경우 임상적 치료뿐 아니라 행동요법 및 심리 치료와 자가 관리 등이 함께 수반되어 기여요인 조절을 조절하는 것이 중요하다 하겠다.(J Korean Soc Dent Hygiene 2012;12(3):563-576)

Keywords : habits, occupational stress, prevalence, temporomandibular disorders

색인 : 구강 악습관, 유병률, 직무스트레스, 측두하악장애

1. Introduction

Temporomandibular disorder (TMD) is a collective term used to describe a number of disorders involving the temporomandibular joint (TMJ), masticatory muscles, and occlusion with common symptoms such as pain, restricted range of jaw movement, muscle tenderness, and variable joint sounds¹⁾. The etiological causes of TMD are multifactorial, and can be classified into 5 categories; an occlusal condition, trauma, deep pain, psychological factors, and parafunctional activities. Of the numerous contributing factors related to TMD, some may initiate symptoms, some are perpetuating, and some are the product of the disorder²⁾.

According to the 2010 report of the Organization for Economic Cooperation and Development (OECD), the average annual hours worked per person worldwide is 1,740; in the Netherlands it is 1,392, and in Korea, it is 2,256. Second only to Chile (2,402 hours), Korea has the world's longest average annual hours worked per person. Long work hours and certain job characteristics, specifically occupational stress, have been associated with an increased risk of depression³⁾.

Among working populations, many physical symptoms are initiated and perpetuated by workplace stressors⁴⁾. Although extensive efforts have improved

the work environment, the psychosocial workload has become an integral part of modern life. Several studies have shown associations between TMD symptoms, neck pain and headache, and psychosocial factors⁵⁻⁸⁾.

Studies have been conducted to determine whether behavioural and psychosocial factors influence the acquisition of TMD⁹⁻¹³⁾. However, TMD symptoms have not been analyzed in the context of specific occupations. We used a self-administered questionnaire to assess the prevalence of TMD and to investigate the relationship between TMD symptoms and occupation, occupational stress, and parafunctional activity.

2. Materials and Methods

2.1. Subjects

Subjects (452) were selected by judgmental non-probability sampling from the populations of Seoul and Gyeonggi Province, based on their occupation as office workers, service workers, or teachers. Questionnaires were collected from January 2010 to April 2010. The 353 respondents included 112 males and 241 females aged 20 to 60 years.

2.2. Questionnaire

The questionnaire addressed TMD symptoms, habits related to jaw use, the contracted version of occupational stress, and demographic characteristics. Items regarding TMD symptoms were adapted from the screening questionnaire set forth by the American Academy of Orofacial Pain¹⁴⁾ and answers were given dichotomously. If at least one affirmative answer is provided among the 10 items, TMD may be diagnosed¹⁵⁾. The number of TMD symptoms was classified into 4 grades, calculating the sum of affirmative answers as follows: grade 1 (no affirmative answers), grade 2 (one affirmative answer), grade 3 (2–3 affirmative answers), and grade 4 (4–10 affirmative answers). Information regarding habits related to jaw use was obtained by asking questions requiring dichotomous answers on the presence or absence of the following: (i) teeth clenching or bruxing, (ii) biting lips, nails, pencils, or foreign objects, (iii) sleeping on one side, (iv) leaning the head or chin on the palm, and (v) chewing food on one side. The total score was the sum of affirmative answers for each item from 0 to 5.

A contracted version of the Korean Society of Occupational Stress (KOSS) was used to measure occupational stress, and the scores were converted to a 100-point scale. The 7 subscales included (i) high job demand, (ii) insufficient job control, (iii) inadequate social support, (iv) job insecurity, (v) organizational injustice, (vi) lack of reward, and (vii) discomfort in occupational climate. Items were scored using a conventional 4-point Likert scale (3). Occupational stress was classified in quartiles, shown in (Table 1).

Age, gender, marital status (married or single), daily use of the jaw, and type of work were included as demographic characteristics. Daily use

Table 1. A condensed version of the Korean occupational stress scale

Gender	Quartile levels of occupational stress (%)*			
	< 25	25–49	50–74	≥ 75
Male	≤ 42.4	42.5–48.5	48.5–54.7	≥ 54.8
Female	≤ 44.4	45.5–50.0	50.1–55.6	≥ 55.7

*The Korean Society of Occupational Stress

of the jaw during work time was classified as almost none, occasionally, often, or very often. Type of work was classified by whether the work required talking or interacting with people such as office workers, service workers, and teachers.

2.3. Statistical analysis

The data obtained from the questionnaire and the severity scores were statistically analyzed. A frequency analysis was used to determine prevalence. The relationship between TMD severity and independent variables was analyzed by the chi-square test. A linear trend test between age group and the grade of the number of TMD symptoms, or the level of occupational stress and the grade of the number of TMD symptoms was performed by a linear by linear association test between those ordinal variables. Based on the results of a multinomial logistic regression analysis, variables associated with TMD symptoms were estimated as possible factors related to TMD. The strength of association between the 4 grades and these factors was described by odds ratios and 95% confidence intervals. All analyses were conducted using SPSS 12.0 for Windows (SPSS, Inc., Chicago, IL, USA) with a p-value of 0.05.

3. Results

Demographic characteristics with respect to type

of work are shown in <Table 2>. The gender distribution was 31.7% males and 68.3% females. Subjects in their 20s and 30s were frequent among the 3 groups, and subjects in their 40s were mostly teachers. The frequency of daily use of the jaw during work time was the highest in office workers. However, teachers showed countertrends opposite to those of office workers.

At least one TMD symptom was reported by 75.4% of subjects. Approximately 25.0% of subjects were classified into grade 2, 28.3% were into grade 3,

and 22.1% were into grade 4 <Table 3>.

The frequency of affirmative answers for TMD symptoms is shown in <Table 4>. The most frequently reported symptom was TMJ sounds; however, no significant difference was observed between genders (56.4%). Headache or neck pain was the secondly most frequent symptom reported by both genders (36.5%), followed by frequent pain in or about the ears, temples, or cheeks (22.1%). Other symptoms such as a stiff, tight, or tired feeling in the jaw, and getting the jaw stuck or

Table 2. Demographic characteristics of the subjects according to their type of work N(%)

Variable	Office workers	Service workers	Teachers	Total	p-value*
	126 (35.7)	131 (37.1)	96 (27.2)	353 (100.0)	
Gender					
male	61 (48.4)	26 (19.8)	25 (26.0)	112 (31.7)	<0.001
female	65 (51.6)	105 (80.2)	71 (74.0)	241 (68.3)	
Age (year)					
20–29	53 (42.1)	61 (46.5)	38 (39.6)	152 (43.1)	<0.001
30–39	62 (49.2)	64 (48.9)	34 (35.4)	160 (45.3)	
≥40	11 (8.7)	6 (4.6)	24 (25.0)	41 (11.6)	
Marital status					
single	74 (58.7)	79 (60.3)	51 (53.1)	204 (57.8)	0.537
married	52 (41.3)	52 (39.7)	45 (46.9)	149 (42.2)	
Daily use of the jaw during work time					
almost none	89 (70.6)	32 (24.4)	12 (12.5)	133 (37.7)	<0.001
occasionally	20 (15.9)	44 (33.6)	15 (15.6)	79 (22.4)	
often	16 (12.7)	22 (16.8)	23 (24.0)	61 (17.3)	
very often	1 (0.8)	33 (25.2)	46 (47.9)	80 (22.6)	
No. of habits related to jaw use					
0	17 (13.5)	13 (9.9)	9 (9.4)	39 (11.1)	0.256
1	32 (25.4)	24 (18.3)	21 (21.9)	77 (21.8)	
2	24 (19.0)	41 (31.3)	35 (36.5)	100 (28.3)	
3	33 (26.2)	27 (20.6)	19 (19.8)	79 (22.4)	
4	15 (11.9)	18 (13.8)	8 (8.3)	41 (11.6)	
5	5 (4.0)	8 (6.1)	4 (4.1)	17 (4.8)	

* Analyzed by Chi-square test

Table 3. Prevalence of and criteria for the number of temporomandibular disorders symptoms N(%)

Number of TMD symptoms		Male	Female	Total
Grade 1	0	41 (36.6)	46 (19.1)	87 (24.6)
Grade 2	1	30 (26.8)	58 (24.1)	88 (25.0)
Grade 3	2–3	25 (22.3)	75 (31.1)	1100 (28.3)
Grade 4	4–9	16 (14.3)	62 (25.7)	78 (22.1)

TMD, temporomandibular disorders

Table 4. Frequency of affirmative answers on the temporomandibular disorder symptoms questionnaire N(%)

Question of symptoms of TMD		Male	Female	Total	p-value*
1. Difficulty or pain on opening mouth	Yes	14 (12.5)	51 (21.2)	65 (18.4)	0.051
	No	98 (87.5)	190 (78.8)	288 (81.6)	
2. Getting stuck or locking of jaw	Yes	10 (8.9)	48 (19.9)	58 (16.4)	0.010
	No	102 (91.1)	193 (80.1)	295 (83.6)	
3. Difficulty or pain on chewing or talking	Yes	12 (10.7)	43 (17.8)	55 (15.6)	0.086
	No	100 (89.3)	198 (82.2)	298 (84.4)	
4. TMJ sounds	Yes	59 (52.7)	140 (58.1)	199 (56.4)	0.340
	No	53 (47.3)	101 (41.9)	154 (43.6)	
5. Stiff, tight, tired feeling in the jaw	Yes	11 (9.8)	50 (20.7)	61 (17.3)	0.012
	No	101 (90.2)	191 (79.3)	292 (82.7)	
6. Pain in or about ears, temples or cheeks	Yes	17 (15.2)	61 (25.3)	78 (22.1)	0.033
	No	95 (94.8)	180 (74.4)	275 (77.9)	
7. Change in bite	Yes	16 (14.3)	39 (16.2)	55 (15.6)	0.647
	No	96 (85.7)	202 (83.8)	298 (84.4)	
8. Headache or neck pain	Yes	21 (18.8)	108 (44.8)	129 (36.5)	<0.001
	No	91 (81.2)	133 (55.2)	224 (63.5)	
9. Injury to head, neck or jaw	Yes	4 (3.6)	9 (3.7)	13 (3.7)	1.000 †
	No	108 (96.4)	232 (96.3)	340 (96.3)	
10. Treatment for facial pain or jaw joint problem	Yes	8 (7.1)	28 (11.6)	36 (10.2)	0.196
	No	104 (92.9)	213 (88.4)	317 (89.8)	

*Analyzed by Chi-square test

†Analyzed by Fisher's exact test

TMD, temporomandibular disorders; TMJ temporomandibular joint

locking of the jaw were 20.7% and 9.8%, and 19.9% and 8.9% in females and males, respectively. Females exhibited higher frequencies of each of these TMD symptoms than did males.

⟨Table 5⟩ shows the distribution of subjects and the number of habits related to jaw use according to the 4 grades of the number of TMD symptoms. Female subjects were likely to report more symptoms than male subjects with was turned out to be statistically significant ($p < 0.001$). The trend test showed that the number of TMD symptoms tended to increase in younger subjects ($p = 0.005$). The over-40 group had significantly fewer subjects than the 20s and the 30s group in the grade 3 and 4 categories, and the 20s and the 30s were the most frequently classified into the grade 3 category. The incidence of the subjects without

any of the 5 habits related to jaw use in 4 grades were 43.6%, 33.3%, 10.3%, and 12.8%, and subjects with all 5 habits were 17.6%, 17.6%, 23.6%, and 41.2%, respectively. The number of TMD symptoms increased significantly each time an additional habit was acquired ($p < 0.001$). The number of TMD symptoms did not differ by level of occupational stress; however, the trend test indicated that the number of TMD symptoms tended to increase with higher occupational stress ($p = 0.011$). The level of occupational stress (total score) was classified in quartiles and is shown in ⟨Table 5⟩.

The risk factors associated with the 4 grades based on the number of TMD symptoms were analyzed after adjusting for independent variables and contemplating potential confounders and their interactions. First, the interaction of the 7

Table 5. Distribution of demographic characteristics, the number of habits related to jaw use, and the level of occupational stress according to 4 grades of the number of temporomandibular disorders symptoms

N(%)

Variable	The number of TMD symptoms				p-value*
	Grade 1 87 (24.7)	Grade 2 88 (24.9)	Grade 3 100 (28.3)	Grade 4 78 (22.1)	
Gender					
male	41 (36.6)	30 (26.8)	25 (22.3)	16 (14.3)	<0.001
female	46 (19.1)	58 (24.1)	75 (31.1)	62 (25.7)	
Age (year)					
20–29	29 (19.1)	40 (26.3)	49 (32.2)	34 (22.4)	0.005 †
30–39	38 (23.8)	38 (23.8)	45 (28.1)	39 (24.3)	
≥40	20 (48.8)	10 (24.4)	6 (14.6)	5 (12.2)	
Marital status					
single	40 (19.6)	54 (26.5)	63 (30.9)	47 (23.0)	0.08
married	47 (31.6)	34 (22.8)	37 (24.8)	31 (20.8)	

* Analyzed by Chi-square test

† Analyzed by Trend test

TMD, temporomandibular disorders

(Continue)

Table 5. Distribution of demographic characteristics, the number of habits related to jaw use, and the level of occupational stress according to 4 grades of the number of temporomandibular disorders symptoms

N(%)

Variable	The number of TMD symptoms				p-value*
	Grade 1 87 (24.7)	Grade 2 88 (24.9)	Grade 3 100 (28.3)	Grade 4 78 (22.1)	
Daily use of the jaw during work time					
almost none	35 (26.3)	36 (27.1)	37 (27.8)	25 (18.8)	0.580
occasionally	20 (25.3)	23 (29.1)	22 (27.9)	14 (17.7)	
often	12 (19.7)	16 (26.2)	17 (27.9)	16 (26.2)	
very often	20 (25.0)	13 (16.2)	24 (30.0)	23 (28.8)	
No. of habits related to jaw use					
0	17 (43.6)	13 (33.3)	4 (10.3)	5 (12.8)	<0.001
1	23 (29.9)	24 (31.2)	21 (27.2)	9 (11.7)	
2	30 (30.0)	21 (21.0)	25 (25.0)	24 (24.0)	
3	7 (8.9)	22 (27.8)	30 (38.0)	20 (25.3)	
4	7 (17.1)	5 (12.2)	16 (39.0)	13 (31.7)	
5	3 (17.6)	3 (17.6)	4 (23.6)	7 (41.2)	
Type of work					
office workers	32 (25.4)	31 (24.6)	40 (31.7)	23 (18.3)	0.361
service workers	30 (22.9)	36 (27.5)	29 (22.1)	36 (27.5)	
teachers	25 (26.0)	21 (21.9)	31 (32.3)	19 (19.8)	
Level of occupational stress (%)					
<25	42 (27.6)	41 (27.0)	48 (31.6)	21 (13.8)	0.011 †
25–49	19 (23.2)	25 (30.5)	17 (20.7)	21 (25.6)	
50–74	10 (17.6)	13 (22.8)	17 (29.8)	17 (29.8)	
≥75	16 (25.8)	9 (14.5)	18 (29.0)	19 (30.7)	

* Analyzed by Chi-square test

† Analyzed by Trend test

TMD, temporomandibular disorders

variables was tested in a multinomial logistic regression analysis; however, it was not significant, so the main effects were tested.

Gender and the number of habits related to jaw use increased the risk of the TMD symptoms in grade 3 and 4, referring to grade 1 analysed by multinomial logistic regression. The relative risk of developing grade 4 vs. remaining grade 1 would be expected to increase by a factor of 2.26 for females vs. males if the other variables in the model were held constant. If a subject acquired a single habit related to jaw use, the relative risk for grade 3 vs. remaining grade 1 would be expected to increase by a factor of 1.45 and for grade 4 vs.

grade 1 it would be expected to increase by a factor of 1.57. The number of TMD symptoms tended to be positively associated with occupational stress. The odds of having grade 4 vs. remaining grade 1 increased by a factor of 2.49 between the lowest and second levels of stress. The third level of stress increased the odds of developing TMD by a factor of 3.43 after controlling for other variables in the model (Table 6).

4. Discussion

The prevalence of TMD is high in the working-age

Table 6. Multinomial logistic regression analysis of risk factors associated with the 4 grades based on the number of temporomandibular disorders symptoms.

Variable	The number of TMD symptoms [§] [OR(95% CI)]					
	Grade 2		Grade 3		Grade 4	
Gender						
male	1.00		1.00		1.00	
female	1.43	(0.70-2.92)	1.86	(0.90-3.88)	2.26 [†]	(1.02-5.03)
Age (year)						
20-29	1.00		1.00		1.00	
30-39	0.94	(0.42-2.13)	0.95	(0.43-2.10)	1.10	(0.46-2.60)
≥40	0.51	(0.15-1.74)	0.33	(0.09-1.22)	0.56	(0.14-2.25)
Marital status						
single	1.00		1.00		1.00	
married	0.77	(0.34-1.71)	0.83	(0.38-1.81)	0.83	(0.35-1.92)
Daily use of the jaw during work time						
almost none	1.00		1.00		1.00	
occasionally	1.06	(0.46-2.47)	1.19	(0.50-2.84)	1.00	(0.38-2.64)
often	1.36	(0.51-3.64)	1.48	(0.55-4.00)	1.76	(0.63-4.96)
very often	0.54	(0.19-1.53)	0.96	(0.35-2.58)	1.04	(0.37-2.94)
No. of habits related to jaw use	1.09	(0.85-1.41)	1.45 [‡]	(1.13-1.87)	1.57 [‡]	(1.19-2.06)
Type of work						
office workers	1.00		1.00		1.00	
service workers	1.05	(0.46-2.41)	0.54	(0.23-1.25)	1.08	(0.44-2.62)
teachers	1.03	(0.38-2.78)	1.00	(0.38-2.63)	0.92	(0.31-2.69)
Level of occupational stress (%)						
<25	1.00		1.00		1.00	
25-49	1.55	(0.71-3.39)	0.97	(0.42-2.24)	2.49 [†]	(1.04-4.96)
50-74	1.48	(0.59-3.87)	1.60	(0.63-4.08)	3.43 [†]	(1.26-9.30)
≥75	0.59	(0.23-1.52)	0.90	(0.39-2.10)	2.00	(0.81-4.96)

[†] p-value < 0.05, [‡] p-value < 0.001

[§] The risk of the TMD symptoms was multinomial logistic analysis and described in terms of odds ratio (OR) with confidence interval (CI) referring to the group 1(symptomless).

population and the association between TMD and parafunctional activities or stress has been acknowledged¹⁶⁻¹⁸. However, putative associations between the number of TMD symptoms and occupational stress with respect to work environment are unclear. We conducted this study to determine the prevalence of TMD symptoms and to define the risk factors affecting the number of TMD symptoms among office workers, service workers, and teachers. Multinomial logistic regression analysis revealed that gender; the number of habits related to jaw use, and the level of occupational stress were risk factors for TMD and were related to the number of symptom.

The type of work was categorized 3 groups according to how much the subjects are required to speak during their working day. As indicated by the frequency of daily jaw use during work time, office workers speak less than service workers and teachers speak in their respective work environments. Daily use of the jaw during work time was mostly due to speaking (data is not shown), and the frequency of daily jaw use increased from office workers to service workers and teachers.

Very good reliability and high validity have been reported for self-reported questionnaires regarding TMD pain¹⁹. Accordingly, we sought to characterize the association between TMD symptoms and type of work and to help assess subjective TMD symptoms using a self-administered questionnaire. Although over 40% of the population is thought to exhibit at least one symptom of TMD²⁰, the prevalence of perceived TMD symptoms varies significantly depending on the criteria used^{15,17,21}. Subjects in the present study reported an equal or slightly more frequent prevalence of TMD than did those in previous studies^{22,23,24}, and females had a statistically higher TMD prevalence than males. It

was assumed that this was because there were many young females in our cohort who were at greater risk for TMD.

TMJ sounds were the most frequently reported symptom in our study cohort, consistent with the findings of earlier studies^{16,25,26}, but we found no significant difference between genders, and the frequency of TMJ sounds was higher than previously reported^{25,27,28}. It may be that the methods and criteria for recording joint sounds varied among studies. The next most frequently reported symptom was headache and neck pain, followed by pain in or about ears, temples or cheeks, and significant differences in these symptoms were found between males and females. These results corresponded with earlier reports^{15,29}.

Females had more TMD symptoms than males, which was consistent with other studies^{30,31}. Gender differences could be explained by mental factors; young females seem to have a lower pain threshold³¹. Other factors such as stress are well known from TMD investigations, and females are more affected than males^{31,32}.

Clenching, bruxing, biting foreign objects, and chewing on one side increase the risk of TMJ noise and pain¹⁶, congruent with our results. The number of habits related to jaw use was correlated with the number of TMD symptoms in this study. The subjects of grade 4 had a higher frequency of the habits related to jaw use compared to those who were grade 1. According to a previous report, parafunctional activities are closely related to TMD occurrence, and susceptibility to stress could be associated with a high frequency of parafunctional activities³³.

In this study, the level of occupational stress was significantly and highly associated with the number of TMD symptoms; as occupational stress

increased, the incidence of grade 4 subjects increased. Whether these psychological factors are the cause or the result of TMD symptoms is unknown; previous studies have reported that the level of tension increases with TMD severity and found an association between anxiety and depression and subjective TMD symptoms^{34,35}. Marital status was not a significant factor in this study, consistent with a previous report³⁶. However, a sudden change in environment, such as a divorce or bereavement, often aggravates TMD symptoms, indicating that the emotional stress caused by such events can influence TMD severity³⁶.

Collectively, Occupational stress is more important in the occurrence of TMD symptoms than the work type, and should be considered whenever TMD symptoms are assessed. The present study had a methodological limitation that should be considered. One must be cautious in generalizing our results because of the small sample size of the study. A prospective cohort study will be performed to address various type of work-related jaw use to identify potential risk factors.

5. Conclusions

The study was to identify the prevalence and risk factors for temporomandibular disorders (TMD) and to reveal the relationship between occupation and habits related to jaw use, occupational stress, and TMD. We surveyed office workers, service workers and teachers by self-administered questionnaires. Respondents (353 of 452 self-administered questionnaires) addressed TMD symptoms, habits, and occupational stress.

1. 75.4% of the respondents exhibited at least one

TMD symptom. Approximately 19.1% of females and 36.6% of males were symptomless. Female subjects were likely to show more symptoms than male subjects, and to place in grade 3 and 4 categories.

2. The most frequently reported symptom was TMJ sounds in the frequency of affirmative answers for TMD symptoms. However, no significant difference was observed between genders (56.4%). Headache or neck pain was the most frequent symptom reported by both genders (36.5%), followed by frequent pain in or about the ears, temples, or cheeks (22.1%).
3. The subjects of grade 3 (31.1%) and grade 4 (25.7%) in females were significantly higher than those of males were (22.3% and 14.3%). The over-40 group had significantly fewer subjects than the 20s and the 30s group in the grade 3 and 4 categories.
4. The number of TMD symptom increased significantly each time an additional habit was acquired ($p < 0.001$). The number of TMD symptoms did not differ by level of occupational stress. The relative risk for grade 4 vs. grade 1 was 2.26-fold greater in females than in males; acquiring one habit increased the odds for grade 3 (OR, 1.45) and 4 (OR, 1.57) after controlling for other variables. The number of TMD symptoms was positively associated with higher levels of occupational stress. The odds of having the grade 4 vs. grade 1 were increased by a factor of 2.49 for subjects at the second stress level and by a factor of 3.43 for those at the third stress level.

The type of work was not associated with TMD, while the relationship between TMD symptoms and occupational stress described subjectively

confirmed. These results imply that psychological factors are more important in the occurrence of TMD symptoms than the tasks themselves. Consequently, it is postulated that whenever TMD symptoms are assessed, the possible psychosocial and behavioural impacts on symptoms should be considered, and that TMD treatment requires a diversified approach including cognitive behavioural and psychosocial therapy as well as clinical therapy and self-care.

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Appendix

Main symptoms of jaw joint

	Yes	No
1. Difficulty or pain on opening mouth	()	()
2. Getting stuck or locking of jaw	()	()
3. Difficulty or pain on chewing or talking	()	()
4. TMJ sounds	()	()
5. Stiff, tight, tired feeling in the jaw	()	()
6. Pain in or about ears, temples or cheeks	()	()
7. Change in bite	()	()
8. Headache or neck pain	()	()
9. Injury to head, neck or jaw	()	()
10. Treatment for facial pain or jaw joint problem	()	()

Habits related to jaw use

	Yes	No
1. Have you a habit of teeth clenching or bruxing?	()	()
2. Have you a habit of biting lips, nails, pencils or foreign objects?	()	()
3. Do you sleep on one side?	()	()
4. Have you a habit of leaning the head or chin on the palm?	()	()
5. Do you chew food on one side?	()	()

Habits related to jaw use

Question	Never	Sometimes	Often	Always
1. I have constant time pressure due to a heavy workload.				
2. Workload is getting increased noticeably.				
3. I have enough time to relax during work time.				
4. I have to do work all at once.				
5. My work is needed creativity.				
6. My work demands a high level of skill or expertise.				
7. My job requires me to take the initiative.				
8. You have a choice in deciding your workload or schedule.				
9. I get help and support from my superiors.				
10. I get help and support from my colleagues.				
11. There is someone who understanding me whenever I'm down.				
12. Things are unstable at work and the future looks uncertain.				
13. I expect to experience an undesirable change in my work situation.				
14. Personnel and work performance appraisal are fair and logical.				
15. People, facilities, equipments and so on are well supported for work.				
16. My department has no trouble and has partnership with other departments.				
17. I have a chance to reflect my thoughts about work.				
18. Considering all my efforts and achievements receive the respect and prestige I deserve at work.				
19. I work hard under the thinking that things will get better with me.				
20. There is an opportunity of improving my ability.				
21. I feel uneasy at office dinners.				
22. I am asked an inconsistent job.				
23. My work environment is authoritative.				
24. I get disadvantages by gender discrimination.				

