Factors affecting symptoms of temporomandibular disorders in adolescents

Hiroyuki Karibe, Kisaki Shimazu, Yuichi Kato, Sachie Warita-Naoi, Tomomi Kawakami
Department of Pediatric Dentistry, Nippon Dental University, Tokyo, Japan

BACKGROUND

- Patients with chronic temporomandibular disorder (TMD) frequently develop symptoms of other pain conditions or psychological comorbidities (Svensson, 2007).
- Our previous study revealed an association between young TMD patients with myofascial pain and headache symptoms (Karibe et al., 2010).
- In adults, postural imbalance and parafunctional habits have been suggested to induce TMD symptoms (Wright et al., 2000).
- However, no such associations have been established in adolescents with TMD.

OBJECTIVE

To assess the relationship of TMD symptoms with other orofacial pain conditions, daily activities, and anxiety trait in a cross-sectional survey of adolescents.

Hypotheses:

(1) Subjects with TMD symptoms have higher prevalence of headache than do subjects without TMD symptoms.

(2) Subjects with TMD symptoms have higher prevalence of postural imbalance and parafunctional habits than do subjects without TMD symptoms.

METHODS

1) Participants

Overall, 1415 adolescents at elementary and junior high schools in Tokyo, Japan, participated in this study (Table 1).

Table 1 Number of participants in the study sample

Age (years)	N	Female (%)	Male (%)
11	212	109 (51.4)	103 (48.6)
12	268	143 (53.4)	125 (46.6)
13	277	113 (40.8)	164 (59.2)
14	328	150 (45.7)	178 (54.3)
15	330	142 (43.0)	188 (57.0)
Total	1415	657 (46.4)	758 (53.6)

2) Subjective symptom measurement

All participants self reported the presence/absence of TMD symptoms, headache, neck pain, and toothache (Table 2) and completed scales assessing 15 daily activities (Table 3).

Anxiety trait was assessed using the State Trait Anxiety Inventory for Children-Trait (STAIC-T) scale (Spielberger, 1973).

On the basis of the presence/absence of TMD symptoms, 2 groups were formed: TMD group (with one or more TMD symptoms, n = 182) and Control group (without TMD symptoms, n = 1233).

Table 2 Questionnaire for TMD symptoms

Do you have any symptoms or physical problems as follows? Please circle the number that best represents your symptoms or problems.			
		Yes	No
1	My jaw hurts during opening or chewing.	1	2
2	My jaw pops.	1	2
3	My jaw is stuck.	1	2
4	Headache	1	2
5	Neck pain	1	2
6	Toothache	1	2

Table 3 Questionnaire for daily activities

Please circle the number that best represents your ordinary daily life.						
		Always	Often	Some-what	A little	Never
1	I chew gum.	1	2	3	4	5
2	I eat hard foods.	1	2	3	4	5
3	I sit at a desk for more than 2 hours.	1	2	3	4	5
4	I play video games for more than 1 hour.	1	2	3	4	5
5	People say that my posture is head forward.	1	2	3	4	5
6	I rest my chin on a hand.	1	2	3	4	5
7	I clench my teeth during the day.	1	2	3	4	5
8	I grind my teeth at night.	1	2	3	4	5
9	I sleep in a prone position.	1	2	3	4	5
10	I use a hard pillow.	1	2	3	4	5
11	I use a high pillow.	1	2	3	4	5
12	I open my mouth widely and practise vocal training.	1	2	3	4	5
13	I practise a musical instrument using jaw or mouth.	1	2	3	4	5
14	I exercise more than 3 times a week.	1	2	3	4	5
15	I study for exams late at night.	1	2	3	4	5

3) Statistical analysis

Data were analyzed using the *t*-test, chi-square test, and multivariate logistic regression.

RESULTS

1) Sample characteristics by TMD symptom status

Subjects in the TMD group were significantly older than those in the Control group, and scored significantly higher STAIC-T scores than did those in the Control group (Table 4).

Table 4 Sample characteristics by TMD symptom status

	TMD group (n = 182)	Control group (n = 1233)	*P*-value*
Age (year)	13.6 ±1.2	13.2 ±1.4	< 0.001
STAIC-T score	38.9 ±9.3	35.2 ±7.8	< 0.001

* *t*-test

2) Sex ratio and prevalence of other pain conditions

Significantly more female subjects were assigned to the TMD than Control group. The prevalences of headache, neck pain, and toothache were significantly higher in the TMD than Control group (Table 5).

Table 5 Sex ratio and prevalence of other pain conditions

	TMD group (n = 182)		Control group (n = 1233)		*P*-value*
	N	%	N	%	
Sex					
Female	100	54.9	557	45.2	0.014
Male	82	45.1	676	54.8	
Headache					
Yes	80	44.0	304	24.7	< 0.001
No	102	56.0	929	75.3	
Neck pain					
Yes	99	54.4	370	30.0	< 0.001
No	83	45.6	863	70.0	
Toothache					
Yes	28	15.4	113	9.2	0.009
No	154	84.6	1120	90.8	

* Chi-square test

3) Comparison of daily activities between the 2 groups

Figures 1–15 show the comparison of prevalence of daily activities between the 2 groups.

The prevalences of head-forward posture, resting chin on a hand, daytime clenching, nighttime tooth grinding, and sleeping in a prone position were significantly higher in the TMD than Control group (Figures 5–9).

However, in other daily activity items, no significant differences were observed between the 2 groups (Figures 1–4, 10–15).

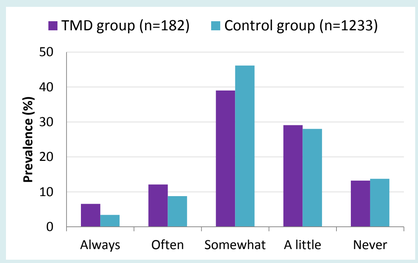

Fig. 1 Gum chewing

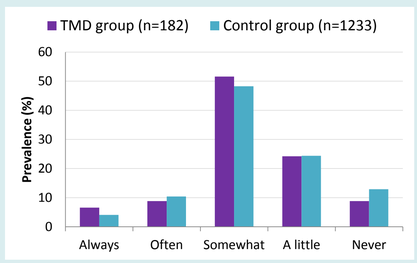

Fig. 2 Eating hard foods

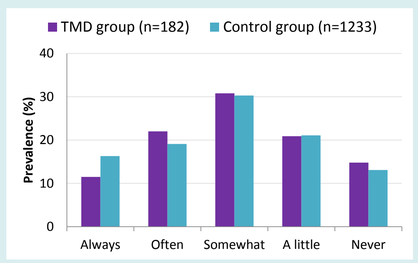

Fig. 3 Sitting at a desk for more than 2 hours

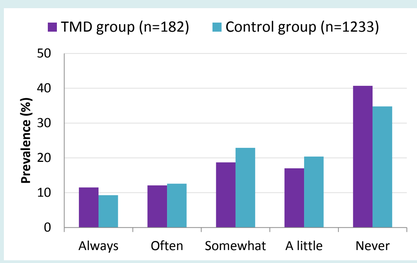

Fig. 4 Playing video games for more than 1 hour

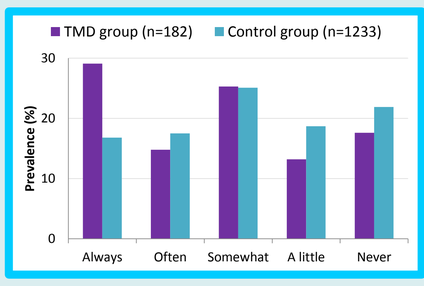

Fig. 5 Head-forward posture**

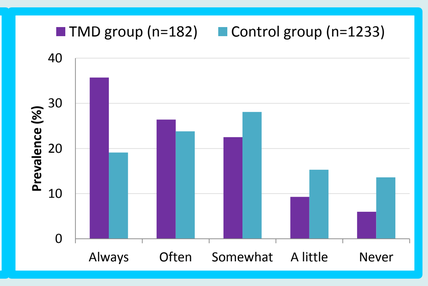

Fig. 6 Resting chin on a hand***

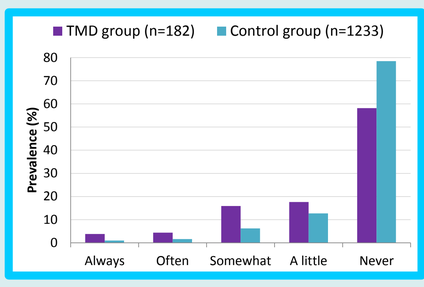

Fig. 7 Diurnal clenching***

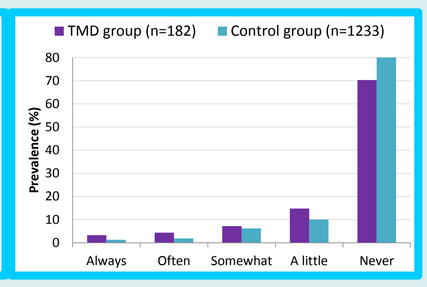

Fig. 8 Nocturnal tooth grinding**

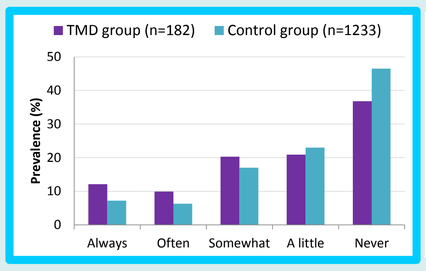

Fig. 9 Sleeping in a prone position*

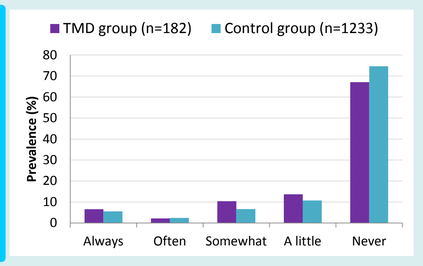

Fig. 10 Using a hard pillow

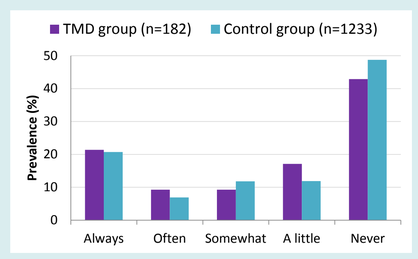

Fig. 11 Using a high pillow

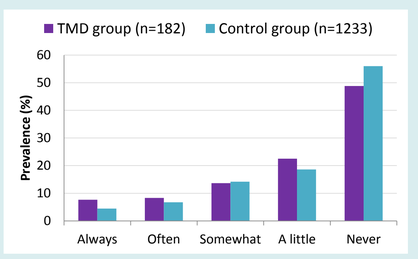

Fig. 12 Vocal training

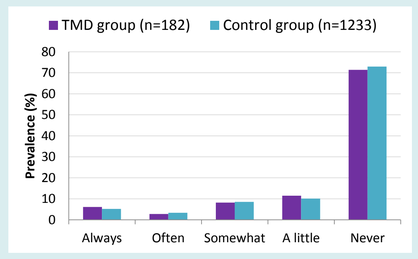

Fig. 13 Playing a musical instrument using jaw/mouth

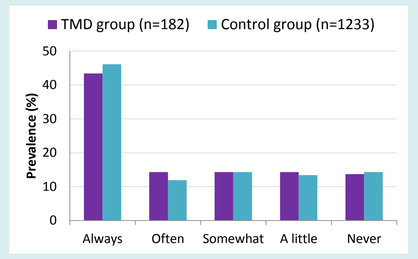

Fig. 14 Exercise more than 3 times a week

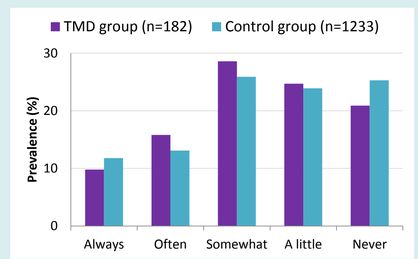

Fig. 15 Studying late at night

Chi-square test
*: $P < 0.05$; **: $P < 0.01$; ***: $P < 0.001$

4) Multiple logistic regression analysis of risk factors for self-reported TMD symptoms

The odds ratio of TMD symptoms in subjects with neck pain and frequent diurnal clenching was 2.08 ($P < 0.001$) and 3.69 ($P = 0.011$), respectively. Moreover, high STAIC-T score indicated high risk of TMD symptoms (Table 6).

Table 6 Risk factors for self-reported TMD symptoms

	B[a]	Wald	*P*-value	OR[b]	95% CI[c]
Age	0.215	11.329	0.001	1.239	1.094–1.404
Sex (female)	0.334	3.965	0.046	1.397	1.005–1.941
Neck pain (yes)	0.732	18.526	< 0.001	2.079	1.490–2.902
STAIC-T[d] score	0.028	7.374	0.007	1.029	1.008–1.050
Diurnal clenching (always)	1.304	6.387	0.011	3.685	1.340–10.132

[a] Regression coefficient; [b] Odds ratio; [c] Confidence interval; [d] State Trait Anxiety Inventory for Children-Trait

CONCLUSIONS

- Even in adolescents, TMD symptoms are associated with anxiety trait and other orofacial pain conditions, especially neck pain.
- Head-forward posture, resting chin on a hand, nocturnal grinding, and sleeping in a prone position may relate to TMD symptoms.
- Diurnal clenching greatly affected TMD symptoms in adolescents.
- Dentists should carefully consider these factors when developing appropriate management strategies for TMD in adolescents.

REFERENCES

Svensson P: Muscle pain in the head: overlap between temporomandibular disorders and tension-type headaches. Curr Opin Neurol 2007;20:320-325.

Karibe H, Goddard G, Kawakami T, Aoyagi K, Rudd P, McNeill C: Comparison of subjective symptoms among three diagnostic subgroups of adolescents with temporomandibular disorders. Int J Paediatr Dent 2010;20:458-465.

Wright EF, Domenech MA, Fischer JR Jr.: Usefulness of posture training for patients with temporomandibular disorders. J Am Dent Assoc 2000;131:202-210.

Spielberger C, Edwards C, Lushene R, Montuori J, Platzek D: *STAIC Preliminary Manual for the State-Trait Anxiety Inventory for Children ("How I feel questionnaire")*. California: Consulting Psychological Press, Inc 1973.