

Field report

Relationship between type A behavior patterns and risk of temporomandibular disorder in Japanese undergraduate students

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Abstract

Objective: Several studies have demonstrated the relationship between temporomandibular disorder (TMD) and emotional stress. Nonetheless, few surveys have examined the relationship between type A behavior patterns and TMD. The aim of this study was to clarify the relationships among TMD, type A behavior patterns, bruxism, and emotional stress in Japanese undergraduate students.

Methods: This study was undertaken in Nayoro City, Japan, in 2015, among students of Nayoro City University. The survey was conducted through an anonymous, self-administered, multiple-choice questionnaire. Information was gathered on items evaluating the extent of TMD symptoms, bruxism, type A behavior patterns, and proneness and sensitivity to emotional stress.

Results: The questionnaire recovery rate was 31.8% (175/551). There was a high likelihood of TMD in 16.1% of respondents, which is comparable to the findings of previous surveys on Japanese high school students. In keeping with previous studies, we confirmed significant relationships between TMD and both emotional stress and bruxism. A weak but statistically significant association was found between TMD and type A behavior patterns.

Conclusion: We propose that TMD may be one of the diseases related to the type A behavior pattern.

Key words: temporomandibular disorder, type A behavior patterns, bruxism, emotional stress, undergraduate students

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Introduction

Temporomandibular disorder (TMD) is defined as a noninflammatory disease characterized by the three major symptoms of pain and/or tenderness in the region of the muscles of mastication and the temporomandibular joint (TMJ), sounds during condylar movements, and limitation of mandibular movement. TMD more commonly affects adolescent women^{1–3}. The causal factors of TMD include psychological (proneness and sensitivity to emotional stress, behavior patterns, bruxism, etc.) as well as mechanical and functional problems of the TMJ^{2–3}. Several studies have demonstrated the relationships between TMD and both emotional stress and bruxism^{4–6}. The relationship between bruxism and emotional stress has also been investigated^{4–6}. On the other hand, surveys examining the relationship between type A behavior patterns (TABP) and TMD are scarce⁷. The aim of this study was to confirm the relationships among TMD, TABP, bruxism, and emotional stress in Japanese undergraduate students.

Methods

Subjects

In May 2015, Nayoro City University enrolled 551 undergraduate students from the first to third years of a four-year program (male: 88, female: 463), all of whom participated in the survey. Students belonged to The Faculty of Health and Welfare Science or The Department of Early Childhood Education, and were aged 18 to 21 years.

Data collection

Data collection was conducted anonymously in May 2015 by means of a self-administered, multiple-choice questionnaire. In addition to gender, the questionnaire contained

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Table 1 Items for bruxism screening

| Items |
|--|
| Do you feel orofacial jaw muscle fatigue or pain on waking up? |
| Do you have cracked or ground teeth? |
| Do your upper and lower teeth touch when you shut your mouth? |
| Are you ever aware of involuntarily clenching your teeth during computer working or driving? |
| Do you have a bite scar or teeth imprints on the inner side of your cheek? |
| Are you chronically troubled with severe stiff shoulders? |
| Do you have a headache frequently? |
| Do you feel stiffness in the jaw frequently? |
| Do you experience soreness on your gums on consuming cold food? |

There were four response alternatives, ranging from never to very often.

items concerning TMD, bruxism, TABP, and proneness and sensitivity to emotional stress. Items used to calculate the TMD score were taken from a questionnaire designed by Sugisaki *et al.*^{8,9}, which has been approved by The Japanese Society for the Temporomandibular Joint¹⁰. Items concerning bruxism consisted of nine items taken from questionnaires created by Kataoka *et al.*⁴, Winocur *et al.*¹¹, and Tsukagoshi *et al.*¹² (Table 1), modified to fit the current study. Items for the TABP score came from the screening test developed by Hosaka *et al.*¹³. Accordingly, the respondents in the present study were categorized into the following ranks: A1: extreme TABP, A2: moderate TABP, B2: moderately opposite to TABP, and B1: extremely opposite to TABP. Levels of proneness and sensitivity to emotional stress were assessed based on the following two questions: “Do you feel emotional stress these days?” (proneness) and “To what extent does emotional stress affect your behavior, if at all?” (sensitivity). Responses were made on a 4-point Likert scale ranging from *never* to *very often* for the former question, and *not at all* to *very much* for the latter.

The protocol of this study was approved by the Ethics Committee of Nayoro City University.

Statistical analysis

Data were digitized and then analyzed with descriptive and non-parametric statistics in order to clarify the relationships among TMD, bruxism, TABP scores, and proneness and sensitivity to emotional stress. Statistical methods included a contingency table (the Fisher’s exact test), rank testing (the Mann-Whitney U test and Kruskal-Wallis test followed by the Steel-Dwass test), and the Spearman’s rank correlation coefficient analysis. All *P*-values were based on a two-tailed test and a significance level lower than 0.05 was considered as significant. Statistical analyses were performed using the IBM SPSS Statistics 19.0.0 and EZR 1.28¹⁴ statistical packages.

Table 2 Relationship among TMD, bruxism, and TABP score

| | | Bruxism score | TABP score |
|---------------|----------|---------------|------------|
| TMD score | ρ | 0.421 | 0.131 |
| | <i>P</i> | < 0.001 | ns |
| | <i>n</i> | 172 | 173 |
| Bruxism score | ρ | | 0.213 |
| | <i>P</i> | | 0.005 |
| | <i>n</i> | | 173 |

ρ : Spearman’s rank correlation coefficient.

Results

Prevalence of TMD

Among the 551 subjects, valid responses from 175 students were obtained (recovery rate: 31.8%). Among respondents, the prevalence of high likelihood of TMD was 16.1% (the TMD score was equal to or higher than nine).

Relationship among TMD, emotional stress, bruxism, and TABP

A high likelihood of TMD was correlated with sensitivity to emotional stress ($P < 0.001$: Fisher’s exact test), but not to proneness. Students with a high likelihood of TMD had both higher bruxism scores ($P < 0.001$: Mann-Whitney U test) and TABP scores ($P = 0.049$: Mann-Whitney U test). To investigate the relationships among the TMD, bruxism, and TABP scores, the Spearman’s rank correlation coefficients were examined (Table 2). The TMD and bruxism scores, and the bruxism and TABP scores were both found to have significant positive correlations. The TMD and TABP scores were not statistically correlated.

Students with resilience (lower sensitivity) to emotional stress had lower TMD ($P = 0.049$: Kruskal-Wallis test) and bruxism scores ($P < 0.001$: Kruskal-Wallis test followed by Steel-Dwass test). Resilience to emotional stress was correlated with the TABP rank ($P = 0.015$: Fisher’s exact test).

Discussion

Main findings of this study

According to previous surveys conducted on Japanese high school students, the prevalence of TMD was 10 to 20%^{15, 16}. These data were based on dental check-ups conducted at school, carried out by a dentist. Although this study estimated the likelihood of TMD through a questionnaire alone, the prevalence of TMD was comparable to that reported in previous studies. This may be due to the validity of the questionnaire items used to assess the TMD score, as confirmed by previous studies^{8, 9} and The Japanese Society for the Temporomandibular Joint¹⁰.

This study also demonstrated the relationships between TMD and emotional stress, as well as between TMD and bruxism^{4–6}. The relationships between bruxism and emotional stress, and bruxism and TABP were also investigated^{4–6}. In 1974, Friedman and Rosenman proposed that TABP was an independent risk for coronary heart disease¹⁷. Recently, several diseases (arteriosclerosis¹⁸), ventricular hypertrophy¹⁹, atrial fibrillation²⁰, metabolic syndrome²¹, hypercholesterolemia²², open-angle chronic glaucoma²³, cerebral infarction²⁴, dementia²⁵, burnout syndrome²⁶) have been found to be associated with TABP. However, surveys on the relationship between TABP and TMD are rare⁷. In the present study, a weak but statistically significant association was found between TMD and TABP; a similar result was reported⁷. Thus, it is proposed that TMD may be one of the TABP-related diseases.

Limitations of this study

This study was conducted in a small university with a small sample. The relationship between the TMD and TABP score could not be confirmed by calculating the Spearman's rank correlation coefficients, mainly because of the small sample size and low questionnaire recovery rate. To elucidate a direct correlation between TMD and TABP score, studies need to be conducted on a larger sample.

Conclusion

To clarify the relationships among TMD, TABP, bruxism, and emotional stress, a questionnaire survey was conducted with Japanese undergraduate students. A weak but statistically significant association was confirmed between TMD and TABP. It is proposed that TMD may be one of the TABP-related diseases.

Conflict of interest: The authors declare that they have nothing to declare.

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