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Original article

Comparison of perception of necessity of orthodontic treatment between orthodontists and dentists at dental check-ups with DAI

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ABSTRACT

Purpose: The aims of this study were to examine the gaps in the perception of the necessity of orthodontic treatment between orthodontists and dentists, and identify the items influencing perception using the Dental Aesthetic Index (DAI).

Materials and methods: Both dentists and orthodontists assessed the necessity of orthodontic treatment in the 693 junior and senior high school students, and orthodontists examined the occlusion of the students with DAI. The data were analyzed with Student's *t*-test, Bonferroni multiple comparison test and decision analysis.

Results: In the orthodontist' perception, clearly significant differences were observed in all DAI items between necessary and unnecessary groups. However, maxillary missing teeth, mandibular missing teeth, spacing and diastema did not show a clear difference in the dentists' perception. In the comparison of perception between orthodontists and dentists, crowding, largest anterior maxillary irregularity and largest mandibular irregularity showed significant differences. Decision analysis demonstrated that crowding was the most important item for both orthodontists and dentists.

Conclusion: There were two types of gaps in the perception of the necessity of orthodontic treatment. The first one is an individual difference among the dentists, which is related to the evaluation of missing teeth and space in the dental arches. The other is recognized as gaps in the perception between orthodontists and dentists, which are related to the amounts of crowding. It is important to realize the difference of perception and improve the mutual understanding to prevent overlooking malocclusion.

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1. Introduction

Malocclusion is one of the dental conditions requiring treatment and it often influences oral function when untreated. It is also considered a risk factor for dental caries and periodontal disease [1–3]. Furthermore, malocclusion influences not only physical quality of life (QOL), but also mental and social QOL [4–6].

In clinical practice, orthodontic patients are very often referred to the orthodontist based on the results of annual dental check-up in elementary and junior and senior high schools. However, there is some disparity in the perception of the necessity for orthodontic treatment between orthodontists and dentists. Orthodontists are rarely present to assess malocclusion in school dental check-ups, consequently initial evaluation is mainly conducted by dentists.

Dental Aesthetic Index (DAI) is an epidemiological index of malocclusion based on aesthetic evaluation. The WHO defines the standard of malocclusion with DAI score to objectively evaluate the necessity of orthodontic treatment. Many epidemiological studies on malocclusion have been carried out in several countries using DAI [7–14]. However, there have been few reports on the gaps in the perception of malocclusion between orthodontists and dentists [15].

Therefore, the aims of this study were to examine the gaps in the perception of the necessity of orthodontic treatment between orthodontists and dentists, and identify the factors influencing perception using the DAI system.

2. Materials and methods

2.1. *Study population*

The study population consisted of 845 students with permanent dentition at a junior and senior high school in Kanagawa prefecture, Japan. They were 12–18 years old; 382 were boys and 463 were girls. Among the 845 students surveyed in this study, 152 students (18.0%: 16.5% for boys, 19.2% for girls) who had previous history of orthodontic treatment were excluded from the following analysis. Therefore, the study sample consisted of the remaining 693 students (319 boys (46.0%), 374 girls (54.0%)).

2.2. *Oral examinations*

Dental check-up was performed by 6 general dentists from the Department of Operative Dentistry and 11 orthodontists from the Department of Orthodontics, School of Dental Medicine, Tsurumi University. The dentists in this study had at least more than three years experience of dental check-up and more than four years clinical experience. The orthodontists had at least more than four years clinical experience and more than two years of dental examination in dental check-up. At first, the dentists perceived the necessity of orthodontic treatment, and then they examined dental caries and gingival condition. Next, the students moved to the orthodontists' booth, and orthodontists assessed the necessity of orthodontic treatment, and then examined occlusion for DAI. The following 11 items were recorded according to the WHO guidelines [16]. In addition, missing teeth were evaluated and summarized separately in upper and lower jaws. Both the upper and lower incisal segments were examined for Crowding and Spacing.

1. Maxillary missing teeth
2. Mandibular missing teeth
3. Crowding in the incisal segments
   - No crowding
   - One segment crowded
   - Two segments crowded
4. Spacing in the incisal segments
   - No spacing
   - One segment spaced
   - Two segments spaced
5. Diastema (mm)
6. Largest anterior maxillary irregularity (mm)
7. Largest anterior mandibular irregularity (mm)
8. Anterior maxillary overjet (mm)
9. Anterior mandibular overjet (mm)
10. Vertical anterior openbite (mm)
11. Antero-posterior molar relation
    - Normal relationship
    - Half-cusp deviation
    - One or more cusp deviation(s)

The DAI regression equation and regression coefficients as weights were shown in a previous study by Jenny and Cons [17]. The regression equation used for calculating DAI scores is as follows:

(maxillary and mandibular missing teeth × 6) + (crowding) + (spacing) + (diastema × 3) + (largest anterior maxillary irregularity) + (largest anterior mandibular irregularity) + (anterior maxillary overjet × 2) + (anterior mandibular overjet × 4) + (vertical anterior openbite × 4) + (antero-posterior molar relation × 3) + 13.

For the measurement of diastema, largest anterior maxillary irregularity, largest anterior mandibular irregularity, anterior maxillary overjet, anterior mandibular overjet, and vertical anterior open bite, disposable CPI probes (YDM Co., Ltd., Tokyo, Japan) were used. Perio probes (Microteck Co., Ltd., Tokyo, Japan) were used when measurements were more than or equal to 5.5 mm. These probes and dental mirrors were sterilized and prepared for the dental check-up.

2.3. *Statistical analysis*

The interexaminers' coincidence in determining the necessity of orthodontic treatment by orthodontists and dentists, and the coincidence degree among the orthodontists in the examination with DAI were calculated in Fleiss Kappa value using R-2.8.1.

Correlation between the necessity of orthodontic treatment and the assessing doctors was analyzed by Chi-square test.

The means of the 11 examination items for DAI were compared between the students in whom orthodontic treatment was considered necessary and the students in whom treatment was considered unnecessary by orthodontists and dentists with Student's *t*-test.

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