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Short Communication

Relationship between Eichner Index and Number of Present Teeth

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Abstract

The aim of this study was to determine the percentage of participants in each of the six Eichner Index groups by number of present teeth (PT). The data were obtained from a periodontal disease examination carried out under a health promotion law in a city located northeast of Tokyo, Japan, in 2005. Data from a total of 1,549 (524 male and 1,025 female) 60-year-old participants were analyzed in this study. Number of occlusal supports was counted by analyzing dental charts. The Eichner Index was used to group the participants into six groups based on distribution of occlusal support teeth. The percentage of patients in Group A with 24 PT was 31.4%; none in Group A had fewer than 19 PT. The percentage in Groups A, B1, and B2 with between 20 and 28 PT was above 50%; the number of participants in these groups with fewer than 20 PT decreased rapidly. Those with fewer than 16 PT were almost found in Groups B3, B4 and C. Only a few patients in Group C had between 10 and 14 PT; those with fewer than 9 PT were only found in Groups B4 or C. Based on these results, the Eichner Index category of a given participant can be estimated from number of PT.

Key words: Eichner Index — Present teeth — Adults

Introduction

The Survey of Dental Diseases in Japan¹⁴⁾, while providing important data on oral health status, includes none on occlusal status. In our previous study²²⁾ investigating the relationship between occlusal support and number of present teeth (PT), we demonstrated that number of PT allowed estimation of number of occlusal supports.

More than five decades ago, Eichner³⁾

developed a new system for classification of partial edentulous arches. The Eichner Index is based on occlusal contact between naturally existing teeth in the premolar and molar regions. These regions are divided into four supporting zones, two in the molar and two in the premolar regions. A patient is classified as belonging to one of six groups based on the presence or absence of intermaxillary tooth contact in these four zones. After that, Eichner²⁾ classified partial edentulous arches

by the Eichner Index once again, showing that this classification provided a standard for degree of mortality of the dentition and that it was suitable for application to studies on morbidity statistics. Many studies have used the Eichner Index or a modified version thereof^{1,5-9,11,13,18,19,21}.

Concerning the relationship between the Eichner Index and number of PT, Österberg and Landt *et al.*¹⁶ suggested a strong correlation between Eichner Index classification and number of teeth. Although the mean number of PT by the Eichner Index has been reported^{16,17}, to our knowledge, no studies have investigated the percentage of participants in each Eichner Index category by number of PT. Our hypothesis was that percentage of participants in each group would change rapidly with tooth loss, due to the tendency for tooth loss to begin from the posterior region.

The aim of this study was to determine the percentage of participants in each of the six Eichner Index groups by number of PT. Determining the relationship between Eichner Index classification and number of PT would allow estimation of occlusal status from number of PT and number of PT from Eichner Index classification. This would enable researchers to use data and reports which do not include occlusal status. Conversely, number of PT could be estimated from research reporting only Eichner Index data.

Methods

Data were collected from a periodontal disease examination conducted in a city located northeast of Tokyo, Japan, in 2005. This examination targeted people aged 40, 50, and 60 years, and was based on a municipal health promotion law. Data obtained from 1,549 60-year-olds (524 male and 1,025 female) were analyzed in this study. This age was selected as tooth loss increases rapidly from around the age of 60 years in Japan¹⁴. Number of PT was obtained from the individual dental charts. Completely and partially erupted permanent teeth were defined as “present teeth” (*i.e.*, existing teeth) in this study. Supernu-

Table 1 Classification by Eichner Index

Eichner Index	Example from typical patient's dentition
A	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
B1	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
B2	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
B3	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
B4	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7
C	7 6 5 4 3 2 1 1 2 3 4 5 6 7
	7 6 5 4 3 2 1 1 2 3 4 5 6 7

merary teeth, third molars, pontics of bridge prostheses, and implant-supported superstructures were not counted as PT.

Number and distribution of occlusal supports were determined by analyzing dental records. Any opposing pair of maxillary and mandibular teeth with the same tooth number was counted as one occlusal support. We used the Eichner Index^{2,3} to classify the patients into six groups based on distribution of occlusal support teeth (Table 1). The Eichner Index is based on the presence or absence of occlusal contact in each of the premolar and molar regions, which are called supporting zones. A maximum of four supporting zones can exist, each of which must have at least one tooth in contact with an antagonist in order to be counted. In this study, the participants were divided into six groups as follows: A (four supporting zones), B1 (three supporting zones), B2 (two supporting zones), B3 (one supporting zone), B4 (anterior tooth contact but no supporting zones), and C (no occlusal contact among the few remaining teeth).

Results

The percentage of participants in each of the six Eichner Index groups by number

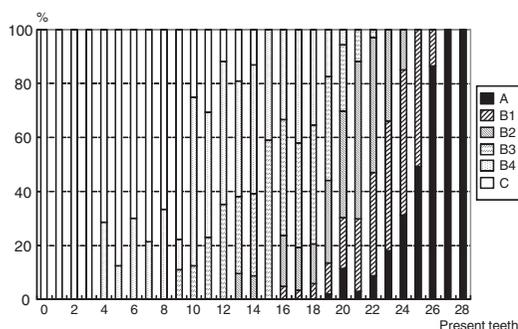


Fig. 1 Percentage of participants in each of Eichner Index category by number of PT
n = 1,549, 60-year-olds.

of PT is shown in Fig. 1. The percentage in Group A decreased with decrease in number of PT. In Group A, patients with 24 PT occupied 31.4%; none in Group A had fewer than 19 PT. Over 50% of patients in Groups A, B1, and B2 had between 20 and 28 PT; the number of patients with fewer than 20 PT in these groups decreased rapidly, however. Those with fewer than 16 PT were found almost in Groups B3, B4 and C. Only a few participants with between 10 and 14 PT were found in Group C; those with fewer than 9 PT were only found in Groups B4 or C.

Discussion

Rules concerning how to count occlusal supports remain to be well established. In fact, although the term “occlusal supports” is frequently used, there is still no consensus on its definition. For example, Österberg *et al.*¹⁵⁾ used a modified Eichner classification which included contact with and between artificial teeth in bridges and dentures in addition to contact between natural teeth. Lachmann *et al.*¹⁰⁾ investigated dentition including implant-supported segments. In this study, we analyzed patient dental records. Number of occlusal supports may also be influenced by malocclusion, but this is rare enough to be ignored in this case due to the large sample size.

In this study, a direct relationship was observed between number of PT and Eichner Index classification. This result is consistent

with that of Österberg and Landt¹⁶⁾, in which mean number of PT decreased as Eichner Index classification moved from Group A to C. The Survey of Dental Diseases in Japan in 2005¹⁴⁾ and our previous study²²⁾ showed a certain sequence of tooth loss—first molars were the first teeth to be lost, followed by mandibular second molars, maxillary second molars and then maxillary first molars in people around 60 years of age. This tendency has a strong impact on the direct relationship between number of PT and Eichner Index classification.

The relationships between Eichner Index classification and masticatory efficiency (assessed as comminution efficiency)^{6-9,11,13,18,21)}, masticatory ability (self-reported)^{6,11,18,21)}, and bite force^{6,8,11,18,21)} has been reported. Of course, a precise evaluation of occlusal function cannot be obtained from number of PT. However, the results of this study show that a patient must maintain 20 PT or more in order to have at least two occlusal support zones.

In Japan, the 8020 campaign, which encourages the elderly to retain at least 20 teeth until the age of 80, has been in place since 1989¹²⁾. The WHO stated in 1992 that throughout life, the retention of a functional, aesthetic, natural dentition of 20 teeth, without prostheses, should be the treatment goal for oral health²⁰⁾. However, in this study, 70% of subjects with 20 PT did not have more than two occlusal support zones. Of course, 20 teeth is a good target for oral health instruction, but the relationship between occlusal support (as measured by the Eichner Index) and masticatory efficiency^{6,7,11)} must also be considered. In this study, 5% of those with 20 PT only had anterior occlusal contact, and 20% only had occlusal contact in one posterior zone in addition to anterior contact. Therefore, even for patients with 20 PT, dental professionals may need to consider prosthodontic treatment options in some cases.

The results of the present study also show that there will be only anterior support, if any at all, when number of PT is lower than 9. Fukai *et al.*⁴⁾ reported on the mortality of a cohort of community-residing older people.

That study indicated that, above the age of 80 years, participants with fewer than 10 functional teeth showed a significantly higher rate of overall mortality than those with 10 PT or more.

The results of this present study provide the means to estimate the approximate Eichner Index classification of a patient from number of PT.

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