Title: Relationship between Eichner Index and number of present teeth.

Author(s): Yoshino, K; Kikukawa, I; Yoda, Y; Watanabe, H; Fukai, K; Sugihara, N; Matsukubo, T


URL: http://hdl.handle.net/10130/2701
Short Communication

Relationship between Eichner Index and Number of Present Teeth

Koichi Yoshino, Ikuo Kikukawa*, Yasushi Yoda**, Hidehiko Watanabe***, Kakuhiro Fukai****, Naoki Sugihara and Takashi Matsukubo

Department of Epidemiology and Public Health, Tokyo Dental College, 1-2-2 Masago, Mihama-ku, Chiba 261-8502, Japan
* Kikukawa Dental Clinic, 2-8-21-3F Shakujii, Nerima-ku, Tokyo 177-0041, Japan
** Yoda Dental Clinic, 1-2-12 Yushima, Bunkyo-ku, Tokyo 113-0034, Japan
*** Department of Adult Restorative Dentistry, University of Nebraska Medical Center, College of Dentistry, 40th and Holdrege Sts., Lincoln, Nebraska 68583-0750, USA
**** Fukai Institute of Health Science, 3-86 Hikonari, Misato, Saitama 341-0003, Japan

Received 13 May, 2011/Accepted for publication 16 November, 2011

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 51.4%; 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 Japan\(^1\), while providing important data on oral health status, includes none on occlusal status. In our previous study\(^2\) 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, Eichner\(^3\) 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, Eichner\(^4\) 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 \(^{16}\) suggested a strong corre-
lation 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 par-
ticipants 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, num-
ber 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 Japan\(^ {16}\).

Number and distribution of occlusal sup-
ports 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
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. 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. 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 Landt, 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 2005 and our previous study 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, masticatory ability (self-reported), and bite force) 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 1989. 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 health. 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 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. 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.

References

5) Haase G, Eichner K (1979) Determination and position of the masticatory surface complex and clinically necessary corrections (with special regard to Fehr’s calotte articulation). Dtsch Zahnarztl Z 34:582–590. (in German)

Reprint requests to:

Dr. Koichi Yoshino
Department of Epidemiology and Public Health,
Tokyo Dental College,
1-2-2 Masago, Mihama-ku,
Chiba 261-8502, Japan
Tel: +81-43-270-3746
Fax: +81-43-270-3748
E-mail: ko-yoshi@d8.dion.ne.jp