

Signs of disease occur in the majority of third molars in an adult population

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I. Ventä, M. M. Vehkalahti, S. Huuononen, A. L. Suominen: Signs of disease occur in the majority of third molars in an adult population. Int. J. Oral Maxillofac. Surg. 2017; xxx: xxx–xxx. © 2017 International Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Abstract. The purpose of this study was to assess clinical and radiographic signs of disease in third molars within a population that is representative of the Finnish adult population aged 30 years and older. A two-stage stratified cluster sampling method was used to collect the 6005 subjects, who were examined clinically and also by panoramic radiography. The state of impaction, presence of dentinal caries and/or restorations, presence of root canal fillings, periodontal pocket depth, and additional pathological findings such as over-eruption and widened follicle were assessed. Signs of disease in the third molars were found in 47% of the adult population and in 97% of those subjects with third molars. At least one sign of disease occurred in 82% of erupted third molars compared to 74% of those impacted in soft tissue and 33% impacted in bone ($P < 0.001$). A diseased third molar was more often located in the mandible (60%) than in the maxilla (40%) ($P < 0.001$), and was more often found in men (57%) than in women (43%) ($P < 0.05$). It is concluded that signs of disease in third molars in the target population are more common than has been reported previously.

Key words: third molar; pathology; adult population; epidemiology; panoramic radiographs.

Accepted for publication

Third molars in young adults have been researched and reported widely, especially those of patient-based samples related to surgery. Less is known about third molars in non-patient populations older than 30 years of age. National health surveys report very few details about third molars other than the prevalence of clinically visible teeth in such adult populations.

The most comprehensive population-based adult dental health surveys have until now been carried out in Germany¹,

the UK^{2,3}, the USA⁴, South Korea⁵, and Finland^{6–8}. All of these surveys included clinical oral examinations but not panoramic radiographs, except the Health 2000 Survey conducted in Finland⁸. The prevalence of all clinically visible teeth was reported in all of these studies. However, the prevalence of third molars was frequently omitted^{1,2,5}. Data on the prevalence of third molars were presented in two studies. In the first study, clinically visible third molars were reported for 30%

of dentate subjects aged 30–34 years and for 5% of those aged 65 years and older in Finland⁸. In the second study it was reported that the mean number of visible third molars in a US population decreased from 1.48 to 0.81 per person between 20 and 69 years of age⁴.

In addition to the nationwide surveys mentioned above, data on third molars obtained from smaller subsamples exist. The most comprehensive survey has been the Swedish study of 693 dentate and 91

edentulous individuals in the city of Jönköping⁹. This study included both extra-oral and intraoral radiographs⁹. In addition to the prevalence of third molars, certain pathological findings were reported such as impaction rates and the numbers of retained third molar roots. The proportion of at least one impacted third molar in the mandible per person was found to decrease from 37% to 12% between the ages of 30 and 80 years⁹. The corresponding proportion in the maxilla was found to decrease from 27% to 12% between 30 and 80 years of age⁹. Similar examinations were performed in the same city every 10 years, but third molars were excluded from the analyses¹⁰. In another epidemiological study performed in Sweden, impacted teeth were reported in 8% of 1418 women older than 38 years, and certain pathologies such as a widened follicle or resorption of the crown were reported in 16% of impacted teeth¹¹. In a study performed in the USA, caries and periodontal pathologies in clinically visible third molars were found to occur in subsamples of older Americans¹².

Population-based studies that include both clinical and radiographic findings of third molars are clearly rare. Radiography reveals conditions that cannot be found by clinical examination alone. However, comprehensive third molar data including radiographic findings have not been published to date. Therefore, the aim of this study was to identify clinical and radiographic pathological findings of third molars in the Finnish population aged 30 years and older.

Materials and methods

Study design and subjects

This study formed part of the Health 2000 Survey (BRIF8901, Bioresource Research Impact Factor), organized by the National Institute for Health and Welfare (THL) in Finland¹³. The survey was conducted during the years 2000 and 2001 and represented the whole adult Finnish population¹⁴. The survey was based on a two-stage stratified cluster sampling design and methodology, which has been reported previously¹⁵. The main sample included 8028 subjects aged 30 years and older, of whom 6335 underwent a clinical oral examination, during which panoramic radiographs were obtained for 6115 participants (Fig. 1). The present study is based on 6005 participants who were examined both clinically and radiographically, as 110 radiographs were excluded due to inadequate quality around at least one of

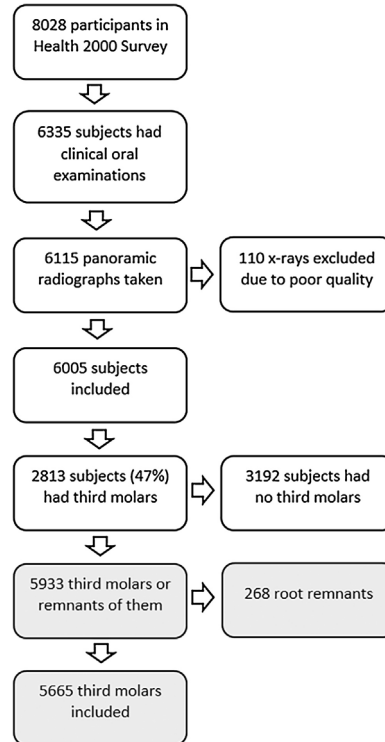


Fig. 1. Flow diagram of the participants and third molars in the study.

the third molar areas. The sample examined radiographically accounted for 95% of the participants who underwent a clinical oral examination. The year of birth of the subjects ranged from 1903 to 1970 (age range 30–97 years). The mean age of the 6005 participants was 52.5 (± 14.6) years, and 46% were men and 54% were women.

Clinical examination

The field teams that performed the clinical oral examinations consisted of a dentist and an assistant nurse. The examiners were trained and calibrated before the study and regularly during the study to standardize study evaluation procedures⁸. The presence and identification of teeth, dental caries, and restorations were recorded for each tooth. The depth of the periodontal pockets of second molars adjacent to third molars was measured and categorized as follows: <4 mm, between 4 and 6 mm, and >6 mm. The pockets were measured at four points around the tooth and the deepest measurement was recorded.

Radiographic examination

Participation in the radiographic examination was voluntary. Panoramic radio-

graphs were taken with a Planmeca 2002 CC Proline unit (Planmeca, Helsinki, Finland) using settings of 58–68 kV and 4–10 mA depending on the size of the subject. Images were examined using the software Dimaxis (Plandent, Helsinki, Finland), and more recently in this study using Romexis version 3.6.0.R (Planmeca). Measurement tools of the Romexis software were used to determine the width of follicles when necessary.

The panoramic radiographs were re-examined for this study by the first author in relation to third molar findings, which included the following: the state of impaction, the presence of dental caries or fillings, the presence of root canal fillings, and any additional pathological findings. The state of impaction was classified as follows: (1) erupted (cemento-enamel junction mesially and distally above the bone surface), (2) impacted in soft tissue (less than two thirds of the crown covered by bone), and (3) impacted in bone (two thirds or more of the crown covered by bone)¹⁶. The presence of caries was recorded when caries had been diagnosed clinically or could be diagnosed from the radiograph, or when there was an existing restoration. A tooth was recorded as having a root canal filling when one or more canals were filled. Additional pathological findings by tooth included the following: retained/residual root, tumour, pericoronitis (width of follicle 3–5 mm), cyst (width of follicle more than 5 mm), supernumerary tooth in the third molar region, periapical radiolucent lesion, over-eruption, bone loss (horizontally or vertically extending at least to the middle third of the root), rudimental size of the tooth, resorption of the crown, sclerosis of the bone around the tooth, and mandibular fracture through the third molar. Only one if any of these additional pathological findings was recorded per tooth, in the order presented above.

When examining the panoramic radiographs, 2879 (47%) radiographs were examined a second time after 6 weeks before proceeding with the rest of the radiographs. This was done as training for the harmonization of interpretations, and especially to recognize second and third molars in a partially edentulous dentition. Following the examination of all panoramic radiographs, 610 (10%) of them were selected randomly and re-examined to assess the intra-examiner reliability of the measurements. The agreement was 93% for the recognition of third molars, 97% for state of impaction, and 92% for pathological findings. Kappa-values were 0.882 for recognition, and ranged from 0.882 to 0.945 for

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