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14th FDI-IDA

CONTINUING DENTAL EDUCATION PROGRAMME

"Advancing Dentistry with Innovative Sciences and Technology"

Manado, 21-22 September 2018

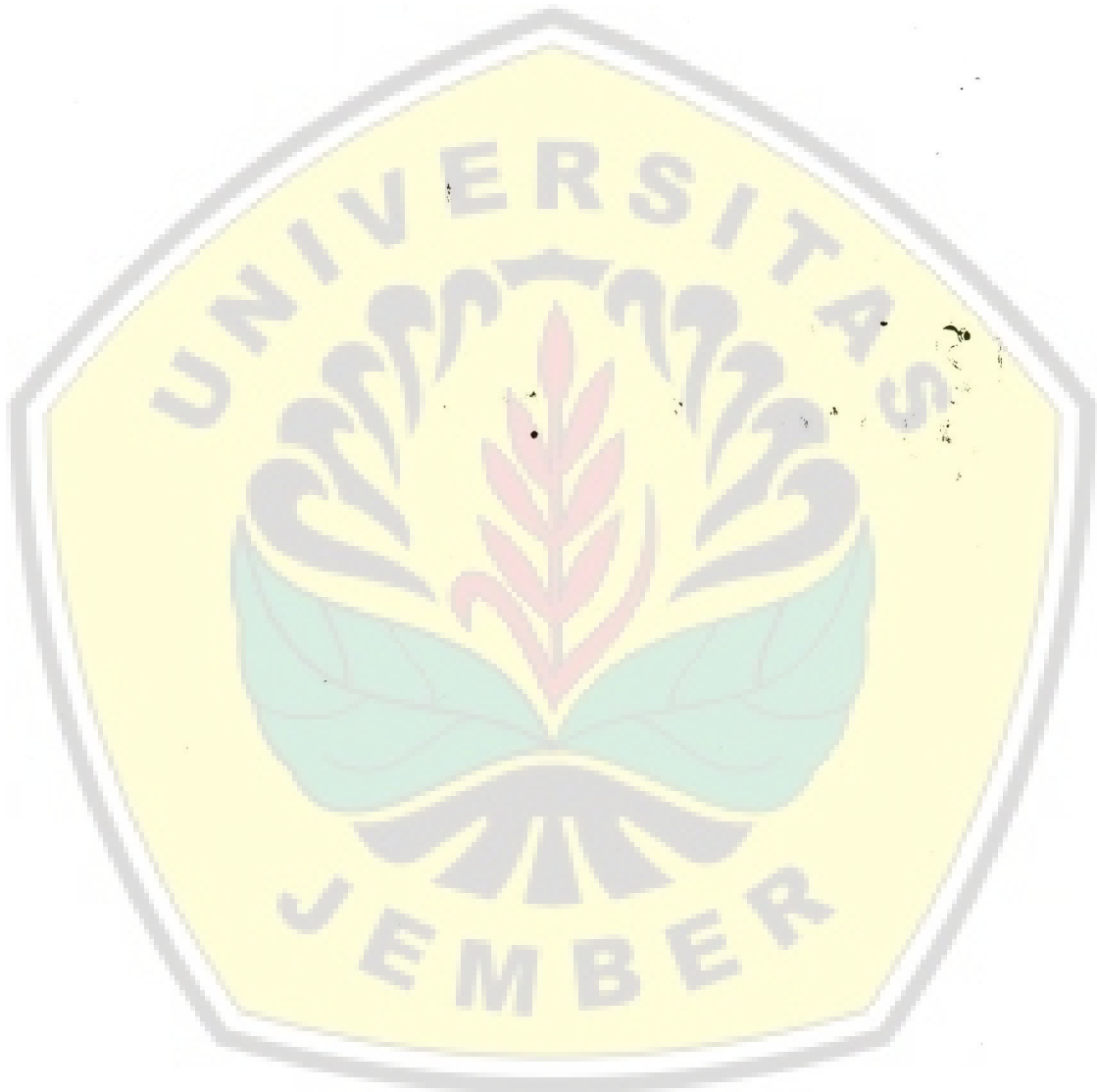
LSKI

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Dental Education Programme**

“Advancing Dentistry with Innovative Sciences and Technology”



Novotel Manado Convention Center, Manado September 20-22, 2018



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editor :

Aurelia Steffanie Rachel Supit

Dinar Arum Wicaksono

Mirsarinda Anandia Leander

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FOREWORD

Continuing dental education is a lifelong process for dentists who seek excellence in providing the best and current service to their patients. Scientific and technological advances in dentistry has been progressing rapidly in the last few years. Consequently, patients' needs and expectations to receive the highest standard of dental care has also increase.

World Dental Federation (FDI) in conjunction with Indonesian Dental Association hold international scientific meeting and dental exhibition annually. This year, the event will be organized in Manado. It provides a great opportunity for dentists and dental students, in the eastern part of Indonesia especially, to gain knowledge and update their skills.

The theme of this year's meeting is "Advancing Dentistry with Innovative Sciences and Technology" which will enable an international platform for the discussion of the latest findings and future technologies in dentistry.

Chairman,
Sanil Marentek



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RESEARCH

Maxillary First Molar and Mandibular Canine Size of Female Student Faculty of Dentistry Universitas Jember

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Abstract

Introduction: Mass disaster happen frequently in Indonesia. Sex identification is one of the important things for determining the identity of the victims. Sex can be identified based on the tooth size as a result of sexual dimorphism between male and female. Highest value of sexual dimorphism is found in permanent mandibular canine, followed by permanent maxillary first molar. This research aims to determine the mean value of permanent maxillary first molar and mandibular canine tooth size of female to be used as a reference in sex identification. **Method:** The sample of this study consisted of 34 tooth models of female students in Faculty of Dentistry Universitas Jember in which mesiodistal and buccolingual width of permanent maxillary first molar and mandibular canine was measured with a digital caliper. Data were collected and analyzed to get the mean value of maxillary first molar and mandibular canine size in female. **Result:** This study shows that the mean value of mesiodistal and buccolingual width of maxillary first molar and mandibular canine respectively are 10.16 mm, 11.16 mm, 6.66 mm, and 7.08 mm. The data shows that there were variations in the tooth size among the samples but can still be used as a reference because it is in the same range. **Conclusion:** It can be concluded that sex can be identified based on the reference size of the teeth.

Keywords: sex, identification, mesiodistal, buccolingual

Introduction

In recent years, there has been an increase in the incidence of natural disasters in Indonesia with the scale of natural disasters that are categorized as major disaster that claimed enough victims to be called mass disaster. Mass disaster in Indonesia can be earthquake, tsunami, flood, landslide, fire, volcano eruption, acts of terror bomb, transportation accident, tornado, etc. The existence of such mass disaster requires identification process to identify the identity of the victim. One of the important things in determining the identity of the victim is sex identification. Sex identification can be done with primary and secondary identification. Primary identification can be done using fingerprints, teeth, and DNA which have proven to be the most effective identification method.^{1,2}

Forensic Odontology is a subdivision of forensic medicine that deals with the proper evaluation, management and presentation of evidence of dental findings in a court of law for justice. There are several methods of sex identification by utilizing teeth or by using forensic odontology. The advantage of the identification using teeth is applicable to all ages with permanent teeth. This is because the size of teeth that tend to remain since the first eruption and along with the age of a person. Teeth also contain enamel substance which is the hardest structure in the human body so that it can survive in prolonged immersion, decomposition, drying, trauma, and direct heat with temperatures exceeding 1000° F and easily identifiable to mass disaster.^{3,4}

Sex identification using dental findings can be done by determining the reference size of the tooth. The size of the tooth can be measured based on the mesiodistal length of the tooth that is the maximum diameter between the mesial contact point and the distal contact point on each tooth. The size of the tooth can also be determined by measuring the buccolingual length of the tooth, which is the maximum diameter between the most buccal surfaces and the most lingual surface of the dental crown parallel to the long axis of the tooth.⁵

Teeth size differences between male and female are found in some teeth. It is a sexual dimorphism as a result of greater gene expression in male. Sexual dimorphism was found with the highest values in the mandibular canine teeth, followed by maxillary first molar teeth. Mesiodistal and buccolingual widths of teeth tend to be larger in males than females so tooth size can be used as a tool of sex identification in cases of mass disaster with a very damaged body where only teeth are available for sex determination.^{6,7}

Sex identification by using mandibular canine will be difficult on victims with impacted canine teeth or children with mandibular canines which have not been erupted or are not fully formed. In such cases, the maxillary first molars can be used as an alternative tool of identification because it is the first permanent tooth erupted in the oral cavity, at the age of 6-7 years.⁸

This study aims to determine the mean value of maxillary first molar and mandibular canine size in female.

Methods and Materials

This is an observational descriptive research with cross sectional approach. Ethical clearance was submitted to the Ethics Commission of Faculty of Dentistry Universitas Jember prior to the research. This research was conducted at Prosthodontics Clinic at Dental Hospital of Universitas Jember from February to March 2018.

The subjects of this study are 34 female students of Faculty of Dentistry Universitas Jember. The purposive sampling technique (non random sampling) was chosen for the sampling technique in this study, with the following criteria: Willing to be a research subject; female students Faculty of Dentistry Universitas Jember year 2015-2017; currently not in orthodontic treatment; first maxillary maxillary and permanent mandibular canine teeth (right and left) with following condition no extraction/lost, fully erupted, normal dental arch, no crown fracture, no widespread caries and/or restoration involving mesial, distal, buccal, and/or lingual surfaces, no deformity and any anomaly of the teeth.

The dental model of the research subjects was obtained by taking impression of the teeth using alginate and then filling the result of the mold with type IV gyps material. The mesiodistal and buccolingual width of the maxillary first molar and mandibular canines was measured using a digital caliper with a precision of 0.01 mm (Fig. 1) and performed by three observers.

The result data of the research was tabulated first, then calculated the mean on each variable to determine the reference value of permanent maxillary first molar and mandibular canine size in female.

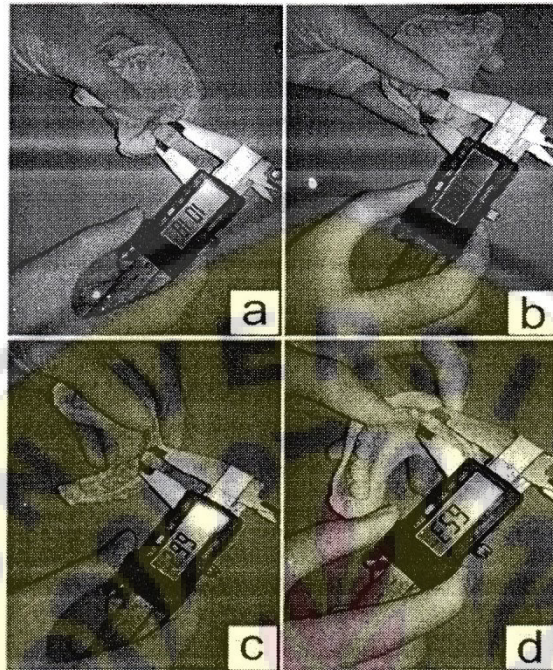


Fig1. Measurement of permanent maxillary first molar and mandibular canine model; a) mesial width measurement of maxillary first molar, b) buccolingual width measurement of maxillary first molar, c) mesiodistal width measurement of mandibular canine, d) buccolingual width measurement of mandibular canine

Results

The result of this research showed that there were variations of maxillary first molar and mandibular canine size in each sample on mesiodistal dimension. The same result was also found in the buccolingual dimensions of maxillary first molar and mandibular canines. This study shows the mean value of mesiodistal and buccolingual width of maxillary first molar and mandibular canine. Mean value of mesiodistal and buccolingual width of maxillary first molar and mandibular canine are shown in Table 1.

Table 1. Mean value of mesiodistal and buccolingual width of maxillary first molar and mandibular canine

Variable	Tooth Size
Mesiodistal width of maxillary first molar	10.16 mm
Mesiodistal width of mandibular canine	11.16 mm
Buccolingual width of maxillary first molar	6.66 mm
Buccolingual width of mandibular canine	7.08 mm

Although there are variations in size of the maxillary first molar and mandibular canine in each sample, the size of the maxillary first molar and mandibular canine in female are in the same range. Variations in size of the maxillary first molars and mandibular canines are presented in Fig. 2 and Fig. 3.

Results

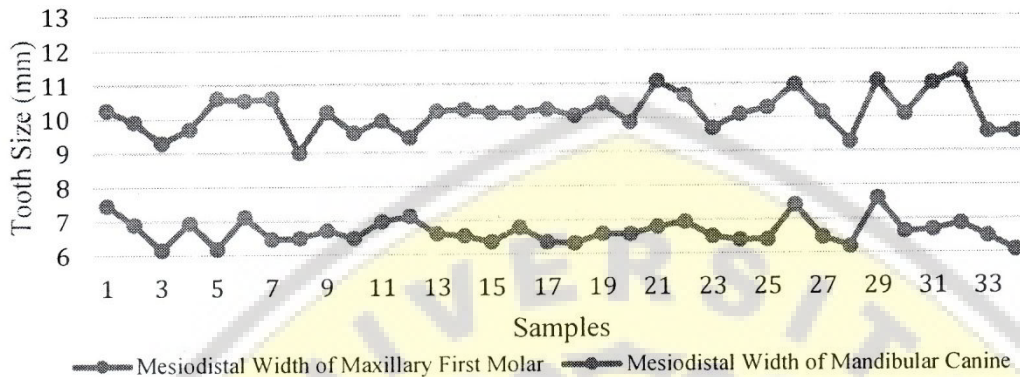


Fig.2. Variation in mesiodistal width of maxillary first molar and mandibular canine in each female sample

Results

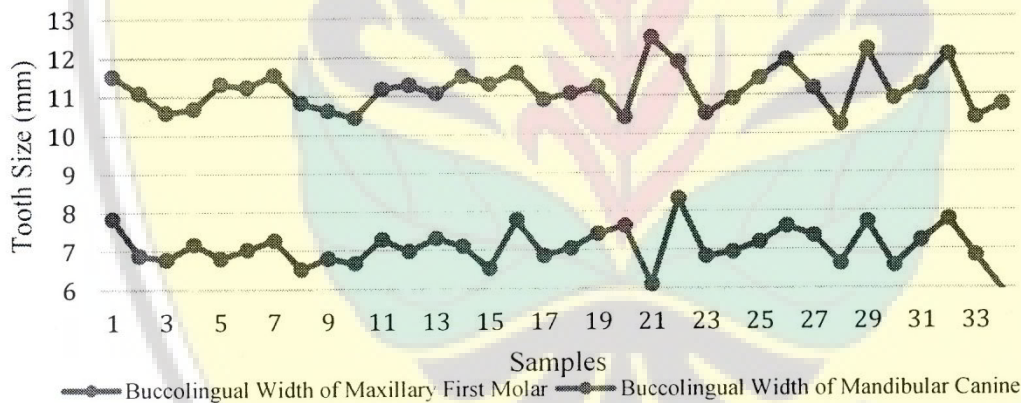


Fig.3. Variation in buccolingual width of maxillary first molar and mandibular canine in each female sample

Discussion

The results of this study shows that there are variations in size of maxillary first molar and mandibular canine in each individual. It can be due to different dental morphology as the result of the growth of maxillary first molar and mandibular canine in each individual. These morphological differences can be differences in the number of cusps and the presence of Carabelli cusp in the maxillary first molars.⁹

Genetic factors influence the variation in individual tooth size. Human chromosomes contain molecules of DNA (Deoxyribonucleic Acid) that responsible for inheriting genetic information from one generation to the next. The genetic code in DNA is interpreted as a genotype that determines the character of an individual and is fixed. Differences in gene expression in each individual cause differences in the size of the teeth.¹⁰

Hereditary or racial factors also cause variations in the size of the teeth in each individual. Each race has a morphological character that causes the size variation between

racess. Mongoloid race has a distinct dental morphology characteristic of a shovel-shaped incisor. Characteristics of the Caucasian race are the prominent cusp Carabelli and the presence of canine fossa, whereas in African American populations show the presence of cholving (squiggly) on its molars.¹¹

Research by Hanihara and Ishida suggests that the tooth size of population of Western Europe which is a Caucasian race tends to have the smallest teeth. Indigenous Australians, Melanesians, Micronesians, Sub-Saharan Africans and Native Americans tend to have large teeth. East and Southeast Asian populations were found to be intermediate in dental measures between the groups. The largest size of teeth respectively are Negroid, Mongoloid, and Caucasian. Variations in size and dental morphology can be used as indicators for each population with different racial and cultural backgrounds.^{12,13}

Dental size variations can also be caused by environmental factors that are the intake of nutrients that are very important for the growth of teeth both in the prenatal and post natal, one of which is calcium. Calcium is an important nutrient in the process of growing teeth. If a pregnant woman lacks calcium intake, it will affect the teeth of the baby after birth. Vitamin A deficiency during the pregnancy process also affects the formation of teeth. This will lead to decrease in development of epithelial tissue, dental morphogenesis dysfunction and odontoblast differentiation. Vitamin A deficiency can cause chemical changes in the dentin, which reduces the mineralization process. Differences in nutritional intake between individuals during the pregnancy process will cause the variation in the size of the teeth in each individual.¹⁴

Based on this study, although there are variations of maxillary first molar and mandibular canine size on each individual, the size of the tooth in female remains in the same range. This shows that the size of the teeth can be used as a reference in the sex identification.

Sex can be determined based on the size of the tooth because there is sexual dimorphism in size of the teeth in both males and females. The size of the maxillary first molar and mandibular canine can be used to identify sex due to its difference dental morphology as the result of the growth of teeth in males and females. The morphological differences are the number of cusps and the presence of Carabelli cusps in the maxillary first molars. The specific morphology of canine teeth in the form of ridge accessories is also commonly found and is more prevalent in males than in females.

Studies in the South Indian population indicate that sex can be determined by the size of the maxillary first molars. Studies in Turkish populations also show a variety of mandibular canine sizes in female samples but can be used as references in sex identification as evidenced by mandibular canine studies using several different methods, including mesiodistal width, buccolingual width, and servicoinsisal width measurements.^{15,16}

Sexual dimorphism in size of a tooth can be caused by the influence of gene expression in both males and females. The amelogenin gene can be found on every X chromosome and Y chromosome. This amelogenin (AMEL) gene is a single-copy gene that encodes a specially characterized dental enamel protein (size and pattern in the nucleotide sequence) in males and females.^{17,18,19}

Research by Townsend (2011) shows the percentage of sexual dimorphism in the permanent dentition was higher than in the primary dentition and this may be associated with greater hormonal influence on permanent teeth that form over a longer period of time than primary teeth. Testosterone levels in men are higher than women during the growth process. Men have increased testosterone hormones three times during the growth process that does not occur in women. The highest increases in testosterone levels occur around the 14th week of intrauterine when the primary teeth have already passed through all soft tissue stages of tooth

formation but before commencement of calcification, while at this time permanent teeth are just starting to develop. This proves that hormonal factors affect development of teeth and cause dental sexual dimorphism.²⁰

Teeth in men tend to be bigger than women. The results of the study in other populations that also support the statement include research on Uva Bintenna Vedda population in Sri Lanka, research on South Indian populations, and research on the Nigerian population.^{21,22,23,24}

The above explanation is considered able to support the results of this study that the size of the teeth can be used as a reference for the sex identification in forensic identification.

Conclusions

The conclusion of this study is sex can be identified based on the reference size of the teeth. The mean value of mesiodistal and buccolingual widths of maxillary first molar and mandibular canine in female are 10.16 mm, 11.16 mm, 6.66 mm, and 7.08 mm, respectively.

Based on this research can be done further research about the size of teeth other than the maxillary first molar and mandibular canines to determine the reference value of each tooth in female for sex identification.

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