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DISTRIBUTION OF THIRD MOLAR AGENESIS BASED ON SEX, JAW INVOLVEMENT, AND NUMBER OF MISSING TEETH

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ABSTRACT

Background: The third molar is the final tooth to emerge in the oral cavity, distinguished by variability in its developmental timing and the potential for its presence or absence, rendering it particularly susceptible to environmental fluctuations during odontogenesis. Consequently, the prevalence of third molar impaction or hereditary absence is the highest among all teeth. The third molar is linked to various clinical problems, such as impaction, ectopic eruption, hard and soft tissue disorders, and agenesis. Tooth agenesis refers to the congenital absence of one or more teeth and is among the most prevalent defects in individuals. **Purpose:** This study aimed at exploring the distribution of third molar agenesis cases according to gender, jaw involvement, affected side, and the quantity of missing teeth. **Methods:** This research employed a quantitative methodology characterized by a descriptive observational design. Data were acquired from secondary sources, comprising panoramic radiographs and medical data sourced from Wahab Sjahranie regional General Hospital (RSUD). **Results:** Agenesis's gender distribution showed more frequency in females (69.2%) than in males (30.8%). Agenesis mainly impacted the maxilla (44.2%), then the mandible (26.9%), then both jaws (28.8%). Furthermore, on the frequency of absent third molars, the most often occurring situation was the absence of one tooth (50.0%), followed by two teeth (28.8%), three teeth (9.6%), and four teeth (11.5%). **Conclusion:** The findings of this study demonstrate that third molar agenesis is more prevalent in females, predominantly occurs in the maxilla, is more frequently unilateral, and typically entails the absence of a single tooth.

Keywords: agenesis, panoramic, third molar

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INTRODUCTION

The third molar is the last tooth to develop in the oral cavity and is characterized by variability in its formation time and presence, making it the most sensitive tooth to environmental changes during odontogenesis^{1,2}. Therefore, the incidence of impacted or genetically missing third molars is the highest among all teeth, and thus, third molars can be considered "vestigial"³. Third molars are known to be associated with pathological conditions, including impaction, ectopic eruption, hard and soft tissue pathologies, and agenesis⁴.

Tooth agenesis refers to the congenital absence of one or more teeth and is one of the most common dental anomalies in individuals⁵. In addition, the presence or absence of third molars, the age at which they emerge, their eruption timing, position, and eruption direction are important across all branches of dentistry, particularly forensic dentistry³.

Aesthetic and functional problems are especially apparent when anterior teeth are affected, influencing self-confidence, communication ability, and overall quality of life. In the case of third molar agenesis, the consequences either positive or negative are not always clear, and clinicians may never directly encounter them. However, the origin of this condition remains controversial, not only in dentistry but also in evolutionary biology and biological anthropology. Certain morphological changes have also been linked to congenital absence, such as reduced maxillary and mandibular bone size, shorter jaw length, lower facial height, decreased mandibular plane angle, and reduced gonial angle. Fernandez et al. reported an association between third molar agenesis and cleft lip and palate^{6,7}.

Radiographic examination using orthopantomogram (OPG) is conducted to determine the presence of third molar tooth buds. A tooth is considered developmentally absent when it has not erupted into the oral cavity, there is no surgical extraction history in the patient record, and the tooth is classified as congenitally missing due to the absence of crown mineralization or crypt development (radiolucent area) on panoramic radiography, and it is not visible on radiographs at the expected time^{8,9}.

Based on the above background, it is understood that with the course of human evolution, both biological and cultural changes have occurred in modern humans in terms of food processing. Third molar agenesis has become a commonly reported finding across different populations worldwide, with genetic and ethnic differences contributing to variations in prevalence and patterns^{4,10}. Therefore, the researchers were interested in conducting a study on the frequency distribution of third molar agenesis at Abdoel Wahab Sjahranie Regional General Hospital, the main referral hospital in East Kalimantan.

MATERIALS AND METHODS

This study employed a descriptive observational design to illustrate phenomena occurring in a specific population. The study used secondary data in the form of panoramic radiographs to describe third molar agenesis based on specific variables and inclusion criteria. The descriptive design used in this study is a morbidity survey, which is a survey aimed at determining the distribution, incidence, and/or prevalence of a disease within a certain population or community.

The study was conducted using secondary data consisting of panoramic radiographs from 2020 to 2022 obtained from the Radiology Unit, along with medical records accessed from the Medical Records Unit at Abdoel Wahab Sjahranie General Hospital, Samarinda. These data were analyzed based on the relevant research variables to determine case distribution. Sampling was carried out using the total sampling technique, resulting in 52 samples. All data obtained were processed using Microsoft Excel and univariate analysis was performed using Statistical Product and Service Solutions (SPSS) version 29.0. This study was conducted in accordance with the approval of the Health Research Ethics Committee under reference number 570/KEPK-AWS/X/2024.

RESULTS

The prevalence of third molar agenesis in individuals aged 12–25 years at Abdoel Wahab Sjahranie General Hospital, Samarinda, from 2020 to 2022 was recorded as 52 cases among 559 individuals, representing 9.3%.

Table 1. Third Molar Agenesis Distribution by Sex

Sex	Frequency (N)	Percentage (%)
Male	16	30,8
Female	36	69,2
Total	52	100

Table 1 Indicates that third molar agenesis was more common in females, with 36 individuals (69,2%) compared to males with 16 individuals (30,8%).

Table 2. Third Molar agenesis distribution by Jaw Involvement

Jaw	Frequency (N)	Percentage (%)
Maxilla	23	44,2
Mandible	14	26,9
Maxilla and Mandible (Both)	15	28,8
Total	52	100

According to Table 2 third molar agenesis was more prevalent in the maxilla affecting 23 individuals (44,2%), in contrast to the mandible, which had 14 individuals (26,9%) and both jaws, which involved 15 individuals (28,8%).

Table 3. Third Molar agensis distribution by side involvement

Side	Frequency (N)	Percentage (%)
Bilateral	24	46,2
Unilateral	28	53,8
Total	52	100

Table 3 indicates a higher prevalence of unilateral third molar agensis, observed in 28 individuals (53.8%), in contrast to bilateral agensis, which was noted in 24 individuals (46.2%).

Table 4. Third Molar agensis distribution by FDI Tooth Numbering System

Single (1 tooth)		
18	7	13,5
28	8	15,4
38	4	7,7
48	7	13,5
Multiple (More than 1 tooth)		
18, 28	8	15,4
18, 38	1	1,9
18, 48	1	1,9
28, 38	1	1,9
28, 48	1	1,9
38, 48	3	5,8
18, 28, 38	2	3,8
18, 28, 48	1	1,9
18, 38, 48	1	1,9
28, 38, 48	1	1,9
18, 28, 38, 48	6	11,5
Total	52	100

Table 4 indicates that third molar agensis was most commonly observed in tooth 28, with 8 cases (15.4%), and in the combination of teeth 18 and 28, also with 8 cases (15.4%).

Table 5. Third Molar agensis distribution by number of teeth

Number	Frequency (N)	Percentage (%)
1 tooth	26	50,0
2 teeth	15	28,8
3 teeth	5	9,6
4 teeth	6	11,5
Total	52	100

Table 5 indicates that third molar agensis was most commonly observed in 1 tooth, with 26 cases (50.0%).

DISCUSSION

The global average incidence of third molar agensis is 22.6%, with Asian populations exhibiting the highest rate at 29.7%^{2,4}. The lowest documented prevalence of third molar agensis is 0.5% in Sub-Saharan Africa and 1.8% in Australia. The prevalence is 20.9% in Southeast Asian populations and 14.5% in European populations¹¹. Third molar agensis is commonly found across different populations worldwide due to genetic and ethnic variations, resulting in differences in the reported prevalence and patterns among various populations.^{4,10} Third molar agensis shows a significant correlation with jaw size, sex, and the count of absent third molars. A higher incidence of absent third molars is associated with reduced jaw size¹².

The dimensions of the dental arch in females are typically smaller than those in males, which might hinder the development of third molars. Following the age of 12 to 13, the growth of the maxilla and mandible in females diminishes, while in males, this growth persists until approximately the age of 16^{7,13}. Skeletal growth changes in males continue until the end of adolescence, whereas facial skeletal growth in females slows down and even ceases shortly after puberty¹⁴. Racial variation, diet, masticatory function, and genetics are factors that can influence jaw size and facial growth¹³. Race influences craniofacial development, subsequently affecting the

morphology of the cranium and jaw¹⁵. Diet influences jaw size; the consumption of softer- textured foods may decrease the engagement of masticatory muscles and teeth, potentially resulting in a smaller mandible and a narrower maxilla¹⁶. Modern individuals with tooth agenesis tend to have smaller facial configurations compared to those without tooth agenesis¹⁷. The growth and development of the alveolar process are influenced by tooth formation and eruption; thus, permanent tooth agenesis correlates with reduced jaw size.⁹

The mandible has a variety of ways to grow, which makes it more stable and able to adjust to mechanical stimuli. The mandible's increased functional stimulation and ability to adjust to complicated functional demands have likely led to a lower rate of anomalies such tooth agenesis. Because the mandible can adapt, it can make up for problems caused by agenesis, which makes the issue less common. The maxilla, on the other hand, grows through intramembranous ossification and stops growing before the mandible¹⁷.

Third molar agenesis was observed more frequently in females, with a prevalence of 69.2%. Jaw involvement predominantly occurred in the maxilla, accounting for 44.2% of cases. In terms of side, unilateral cases exhibited a higher prevalence at 53.8%. Third molar agenesis predominantly affected a single tooth, accounting for 50.0% of cases, as indicated by the number of missing teeth.

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