



Prevalence of Third Molar Agensis in the Turkish Subpopulation

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ABSTRACT

Purpose: The aim of this study is to investigate the prevalence and distribution of third molar (3M) agensis in the Turkish subpopulation in a wide age range.

Material and Methods: Clinical examination and radiographic evaluations were performed in a total of 1479 patients (905 females, 574 males) aged between 15 and 83 years. Gender and age information of the patients, presence/absence of 3M agensis, number of agensis, jaw localization (maxilla/mandible) and relevant tooth number were noted. Data were analyzed using chi-square test ($p < 0.05$).

Results: The prevalence of one or more third molar agensis was determined 25.3% (374 individuals). The prevalence of third molar agensis was higher in females than in males, but there was no significant difference between the genders ($p = 0.380$). The group with at least 3M deficiency was between the ages of 15-22 with a prevalence rate of 22.1%. Agensis was most common in the right maxillary 3M (18) (16.7%). All third molars were missing in 4.9% of the patients.

Conclusions: In the Turkish subpopulation, the different prevalence rates of third molar agensis in various age groups, especially the low rates in the new generation, may provide important clues in the investigation of genetic variations and adaptations as well as third molar extraction protocols. It would be useful to conduct new, more comprehensive studies on this subject.

Keywords: Agensis, Prevalence, Third Molar.

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Introduction

Dental agensis is the congenital absence of one or more primary or permanent teeth. It also refers to a tooth that has not erupted in the oral cavity and is not visible on radiographs.¹ Today, most people have problems with agensis or eruption position of their third molar (3M) teeth.² Compared to other teeth in the dental arch, agensis is thirteen times more common in 3M teeth.³

Factors such as systemic diseases, environmental and genetic factors, dietary habits and chewing function play a role in the etiology of tooth agensis.¹ It is also argued that lack of space in the jaw is an important factor.⁴ Since 3M teeth are the last teeth to develop and erupt in the dental arch, they are considered to be the most sensitive teeth to environmental factors.⁵

Although agensis does not directly cause pathology, it can be the cause of developmental problems, especially in the maxillofacial region.⁶ For this reason, the morphological, demographic and developmental determinants of M3 agensis are a frequently researched topic among dentists.⁷

The incidence of 3M agensis also varies between geographical regions.⁷ In general, most researchers have focused on certain age groups in assessing the prevalence of agensis.^{1,6,8-11} There are a limited number of studies including different age groups.^{4,12,14} The aim of this study was to

investigate the prevalence and distribution of 3M agensis in age groups of different generations in a group of Turkish patient population.

Materials and Methods

The approval was received from Ankara Yıldırım Beyazıt University Ethics Committee for the study, which was planned as a randomized cross-sectional study, in accordance with the Declaration of Helsinki (ID: 2022-1117). Between 11.2022 and 03.2023, 1479 patients, male and female of Turkish origin, aged 15 and over, who applied to Ankara Yıldırım Beyazıt University Faculty of Dentistry Oral and Maxillofacial Radiology Clinic for various reasons and required panoramic radiography for diagnostic purposes, were included in the study.

Exclusion criteria were determined as individuals under the age of 15, congenital systemic diseases and syndromes, the presence of pathologies that may affect the maxillofacial region, history of any surgery or trauma in the head region, lack of clear information about third molar tooth, and inadequate radiographic image quality. Informed consent was obtained from the patients included in the study.

Demographic information of the patients, such as age and gender, was recorded. Then, the presence/absence of 3M teeth was noted as a result of detailed anamnesis and clinical examination. All evaluations were supported by records from

the hospital automation system and digital image archive. Agenesis was defined as the absence of tooth mineralization on the panoramic radiograph and the absence of any recorded operation information from the patient's anamnesis and hospital system. In patients with 3M agenesi s, the tooth number with agenesi s, jaw location (maxilla/mandible) and the number of 3M teeth with agenesi s were recorded.

The patients were divided into four different groups according to their date of birth. 1st group 15-22 years old (date of birth 2000-2007), 2nd group 23-32 years old (date of birth 1990-1999), 3rd group 33-42 years old (date of birth 1980-1989), 4th group was determined as those aged 43 and over (date of birth in 1979 and earlier).

All radiographs were taken with the same orthopantomography device (Planmeca Promax, Helsinki, Finland; irradiation parameters 64-70 kVp, 6-12.5 mA, 15-16s). Clinical examination of the patients, detailed anamnesis information and all radiographic image evaluations were performed by an Oral and Maxillofacial Radiologist (B.Ç) with at least 6 years of experience.

The statistical software program SPSS version 26.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Fundamentals characteristics were summarized as frequencies and percentages for categorical variables. Pearson's chi-square test was used to analyze the relationships between categorical variables. $P < .05$ was accepted as statistically significant values.

Results

In this study, 1479 patients aged between 15 and 83 years (36.07±14.54) were examined. 905 patients were female

(61.2%) and 574 were male (38.8%). When the presence of 3M agenesi s was evaluated, 374 patients (25.3%) had agenesi s in one or more 3M teeth, while no agenesi s was found in 1105 patients (74.7%) (Table 1). There were 339 patients (22.9%) aged 15-22 years, 301 patients (20.4%) aged 23-32 years, 390 patients (26.4%) aged 33-42 years, and 449 patients (30.4%) aged 43 years and older.

Table 1 shows the prevalence of 3M agenesi s in the study population according to gender and age groups. The prevalence of 3M agenesi s was higher in female (26.1%) than in male (24.0%), but this difference was not statistically significant ($p = 0.380$). The age group in which 3M agenesi s was most frequently observed was determined as 23-32 years of age (28.2%). However, there was no statistically significant difference between the groups ($p = 0.200$) (Table 1).

When evaluated according to tooth numbers, it was observed that agenesi s was most common in right maxillary 3M (18) (16.7%), followed by left maxillary 3M (28) (15.6%), right mandibular 3M (48) (12.2%) and left maxillary 3M (38) (11.3%) (18>28>48>38) (Table 2). Of the total 1479 individuals, 4.9% were missing four 3M teeth, 3.7% were missing three 3M teeth, 8.5% were missing two 3M teeth, and 8.2% were missing one 3M tooth (Figure 1).

The distribution of 3M agenesi s according to age groups and tooth number was statistically significant only for left maxillary 3M (28) ($p=0.038$). According to tooth number, the most common tooth with agenesi s in the age groups was right maxillary 3M (18) (16.7%). The prevalence rate of agenesi s in all 3M teeth was lowest in the 15-22 age group (43.4%, Table 2). There was no significant gender difference, but 3M agenesi s was more common in females in both jaws (Table 3).

Table 1. Distribution of 3M agenesi s according to gender and age

		Third Molar Agenesi s		χ^2	p-value
		N	%		
Gender	Female	236	26.1	0.770	.380
	Male	138	24.0		
	Total	374	25.3		
Age groups	15-22	75	22.1	4.641	.200
	23-32	85	28.2		
	33-42	107	27.4		
	43 and over	107	23.8		
	Total	374	25.3		

N: number of cases. Note: χ^2 ; chi-square test * $P < .05$; statistically significant.

Table 2. Distribution of 3M agenesi s according to age groups and tooth number

Tooth number	AGE								χ^2	p
	15-22		23-32		33-42		43 and over			
	N	%	N	%	N	%	N	%	N	%
18	41	12.1	53	17.6	74	19.0	79	17.6	247	16.7
28	36	10.6	53	17.6	66	16.9	76	16.9	231	15.6
38	34	10.0	35	11.6	44	11.3	54	12.0	167	11.3
48	36	10.6	38	12.6	55	14.1	52	11.6	181	12.2
Total	147	43.4	179	59.5	239	61.3	261	58.1	826	55.8

N: number of cases. Note: χ^2 ; chi-square test * $P < .05$; statistically significant.

Table 3. Distribution of 3M agenesi s according to jaw localization (maxilla/mandible) and gender

	Maxilla		Mandible		χ ²	P value
	N	%	N	%		
Female	191	62.6	151	64.8	0.332	.564
Male	114	37.4	82	35.2	1.524	.217
Total	305	100	233	100		

N: number of cases. Note: χ²; chi-square test *P<.05; statistically significant

Table 4. Some previous studies on 3M agenesi s in Turkey

Year of Publication	Author Name	Prevalence	Population	Sample size
2010	Çelikoğlu et al. ⁶	17.3%	20-26 years	351
2010	Kazancı et al. ⁹	23.8%	12-16 years	2579
2011	Topkara ve Sari ⁸	23.9%	9-46 years	2761
2017	Kili nç et al. ¹⁰	23.3%	12-18 years	773
2020	Atay et al. ²³	10.3%	9-15 years	1471
2020	Pamukcu et al. ¹²	24.9%	12-19 years, 20 and over	1036
	Present study	25.3%	15 years and over	1479

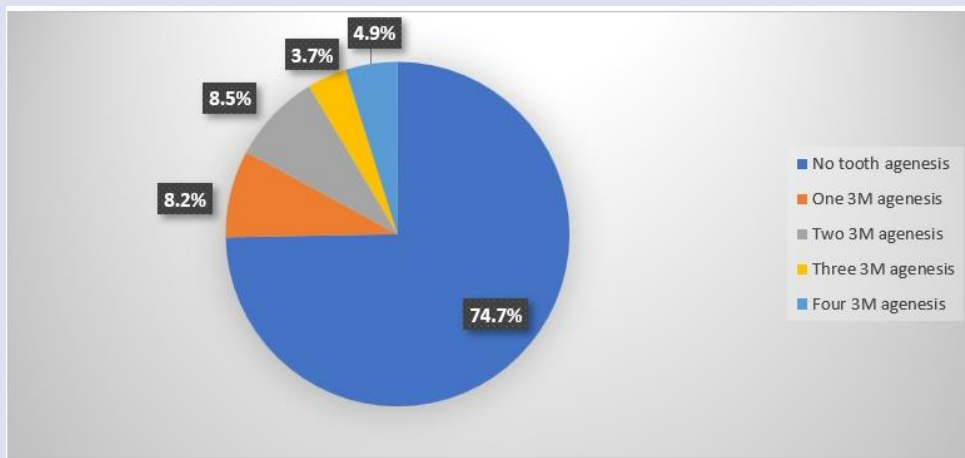


Figure 1: Distribution of the prevalence of 3M agenesi s according to the number of deficiency tooth

Discussion

Agenesi s is a common anomaly in teeth and occurs more commonly in third molars than in other teeth.⁷ This is considered an important issue in both dentistry and anthropology. Tooth development in humans plays a critical role in the evolutionary process.¹⁰ Therefore, understanding the etiology, prevalence and associated factors of agenesi s is extremely important for accurate diagnosis and treatment planning.

The prevalence of 3M agenesi s has been investigated for many years.⁷ It has been emphasized that ethnicity and dietary habits may also cause tooth deficiency.^{11,15,16} It has also been argued that there are large differences in the frequency of agenesi s depending on the geographical region. In a study, the worldwide rate of 3M agenesi s was found to be 22.6%. In previous studies, the lowest rates of 3M agenesi s were found to be 0.5% and 1.8% in the Sub-Saharan-African and Australian aboriginal populations, respectively. In other populations, this rate was reported as 44% in East Asians and Native Americans, 20.9% in South East Asians, and 14.5% in Europeans.⁷

Studies conducted on the prevalence of 3M agenesi s in Turkey have shown different rates (Table 4). Among these studies, Kazancı *et al.*⁹ reported a 3M agenesi s rate of 23.8%, Topkara and Sari⁸ reported 23.9%, and Pamukcu *et al.*¹²

reported 24.9%. These findings are very close to the 25.3% 3M agenesi s rate in the present study. Much of the heterogeneity in the rate of 3M agenesi s can be attributed to genetic or environmental variations between populations and between individuals with different numbers of 3M deficiencies.²

When the results of the present study were evaluated in terms of gender, although there was no statistically significant difference, the frequency of 3M agenesi s was higher in females than in males (Female 26.1%, Male 24.0%). This result can be explained as a result of gender differences in craniofacial morphology. In general, females tend to have smaller dental arch dimensions than males.¹⁷ There are different opinions in the literature regarding the relationship between 3M deficiency and gender. Some studies show that this relationship is statistically insignificant,^{6,9,10,16,18,19} while others show that it is significant.^{11,15,20-22} At the same time, some studies argue that this deficiency is more common in males.^{11,20,21,23,24} Sample sizes, distributions and random variations in the sample may explain all these differences.

There are limited number of studies evaluating different age groups in the literature.^{4,12-14} The present study included individuals with a wide age range. The age group with the lowest prevalence of 3M agenesi s was the youngest age group (15-22 years). This result may be interpreted as 3M agenesi s

decreases over time. Consistent with our findings, the prevalence of 3M agenesis in Japan has decreased slightly in generations born in the 20th century.¹³

Sujon *et al.*¹, Kazanci *et al.*⁹, Kiliç *et al.*¹⁰, Pamukcu *et al.*¹², Kaur *et al.*²⁰ reported that 3M agenesis was more common in the maxilla compared to the mandible. In our study, 3M agenesis in the maxilla was more common in both sexes.

In the present study, agenesis was most common at right maxillary 3M (18) (16.7%), followed by left maxillary 3M (28) (15.6%), right mandibular 3M (48) (12.2%) and left mandibular 3M (38) (11.3%) (18>28>48>38). Consistent with this study, some studies have also reported the regional distribution of the prevalence of 3M agenesis (according to tooth number) as 18>28>48>38.^{10,12,22,26} However, there are also studies where the order is different.^{1,9,11,15,23}

In this study, the highest frequency of agenesis according to the number of teeth was in individuals with two missing 3M teeth and the order was 2>1>4>3. The present result is consistent with the studies of Endo *et al.*¹⁶, Alam *et al.*²⁴ In other studies, this situation was reported in different order. Sujon *et al.*¹, Kazanci *et al.*⁹, Kiliç *et al.*¹⁰, Pamukcu *et al.*¹² reported an agenesis frequency of 1>2>4>3, Çelikoğlu *et al.*⁶, Moreno *et al.*²⁷ 1>2>3>4, Atay *et al.*²³ 4>1>2>3. According to the results of this study, the rate of individuals with missing four 3M teeth was found to be 4.9%. Previous studies have reported that this rate varies between 3.4% and 5.4% in the Turkish population.^{6,8-10,12,23} The results are similar to the present study.

In the patient population, there are a limited number of studies investigating 3M agenesis based on clinical examination-anamnesis.^{6,8,12,26} Since most studies have a retrospective design, they usually focus on specific age groups in the patient population. However, in this study, since clinical and radiographic examinations were performed, a wide age range (15-83 years) was included. Thus, different generations were evaluated and false positive evaluations were prevented by confirming that the 3M tooth deficiency is a true agenesis.

Considering the limitations of the current studies, larger, long-term, multidisciplinary studies that include genetic analysis and take into account environmental factors should be conducted to better understand the other causes of 3M tooth agenesis. Such studies may help to improve clinical practice and treatment strategies by providing a more comprehensive perspective.

Conclusions

This study examined the prevalence and distribution of 3M agenesis in a Turkish subpopulation and obtained remarkable findings. In our population of 1479 patients ranging in age from 15 to 83 years, 3M agenesis was 25.3%. There was no significant gender difference in these patients, with a higher prevalence of agenesis in females. There was a higher rate of agenesis in the maxilla compared to the mandible. The age group with at least 3M agenesis was the youngest group. As a result, the reduced incidence of agenesis third molars in the younger generation may be an indicator for understanding the effects on human genetics and environmental factors. It can also have important implications in shaping future research for

various aspects of dental research, clinical practice, and public health initiatives.

Conflict of interest

The author has no conflicts of interest to declare.

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