Tabari Biomedical Student Research Journal

OPEN ACCESS

ORIGINAL: Prevalence of Impacted and Semi-Impacted Teeth and Determination of Impaction Angle of Teeth in Patients of Tooba Clinic, Sari, Iran in 2013-2019

Amirhossein Moaddabi — Dental Research Center, Mazandaran university of Medical Sciences, Sari, Iran. Department of Oral and Maxillofacial Surgery, School of Dentistry, Mazandaran University of Medical Sciences, Sari, Iran.

Seyede Fatemeh Rezaei Taleshi — Student Research Committee, School of Dentistry, Mazandaran University of Medical Sciences, Sari, Iran.

Negin Rasoolzadeh Fard — General Dentist, Mazandaran University of Medical Sciences, Sari, Iran.

Mona Alimohammadi — Department of Oral and Maxillofacial Radiology, School of Dentistry, Mazandaran University of Medical Sciences, Sari, Iran

Anahita Lotfizadeh — Student Research Committee, School of Dentistry, Mazandaran University of Medical Sciences, Sari, Iran.

ARTICLE INFO

Submitted: 28 May 2021
Accepted: 13 Jun 2021
Published: 01 Sep 2021

Keywords:
Impaction angle;
Impacted tooth;
Panoramic radiographs

Correspondence:
Anahita Lotfizadeh, Student Research Committee, School of Dentistry, Mazandaran University of Medical Sciences, Sari, Iran.
Email:
anahitalotfizadeh@gmail.com
ORCID: 0000-0002-6466-6026

Citation:
Moaddabi A, Rezaei Taleshi SF, Rasoolzadeh Fard N, Alimohammadi M, Lotfizadeh A. Prevalence of Impacted and Semi-Impacted Teeth and Determination of Impaction Angle of Teeth in Patients of Tooba Clinic, Sari, Iran in 2013-2019. Tabari Biomed Stu Res J. 2021;3(3):1-7.

10.18502/tbsrj.v3i3.6927

ABSTRACT

Introduction: Impaction is one of the most common tooth abnormalities which has multiple pathological consequences. The purpose of this study is to assess the prevalence of impacted and semi-impacted teeth and to determine the impaction angle of different teeth in patients referred to the maxillofacial radiology department of dental school, Mazandaran University of medical sciences in years 2013-2019.

Material and Methods: The panoramic radiographs of patients who were referred to oral and maxillofacial radiology department of Mazandaran dental school were observed. Impaction or semi-impaction angle of third molars were determined by Winter's classification. Statistical analysis were conducted by using Chi-square test, Fisher's exact test, Mann Whitney U test and Spearman correlation test (α=0/05).

Results: 3200 panoramic radiographs were analyzed, and the prevalence of impaction, complete impaction and semi-impaction were calculated to be 25/8%, 3/7% and 23/6% respectively. The mesioangular impaction (48/3%) was the most prevalent kind of impaction. Statistically, age was correlated with the jaw involving tooth impaction (P=0/01), this correlation wasn't observed about sex (P=0/161).

Conclusion: Impacted teeth were observed in approximately one third of the radiographs. Impaction was more common in the mandible and the most prevalent kind of impaction was determined to be the mesioangular impaction. As the impacted tooth can cause problems we conclude that they must be extracted at an early age.

Introduction

Impacted tooth is a tooth which is covered by gingiva and/or bone, which prevent the tooth from erupting (1). The root of the impacted tooth may be completed, however, it's eruption without auxiliary force is impossible (2). Tooth impaction is one of the most frequent dental disorders, which has consequences such as: periodontal complications, adjacent tooth caries, dental crowding, pulpal and periapical lesions, temporoman-

[DOI: 10.18502/tbsrj.v3i3.6927]

dibular joint disorders, and root resorption of adjacent tooth (formation of cyst and odontogenic tumors) (1, 3). Multiple local and systemic factors cause tooth impaction (4, 5). The most common causes are tooth bud impaction in an improper place, primary teeth being retained in mouth for a long time, local pathological lesions, and lack of jaw arch length (6). Tooth absence causes several complications in masticatory system and aesthetics because anterior teeth have a key role in aesthetics and any problems with these teeth directly impacts mental health (7-10).

The best way to diagnose impacted teeth in the first place, is tooth absence in the concerning area and in the second place, is radiographic evaluation. Primary diagnosis in a proper time causes a better prognosis, consequently timely and appropriate actions can be taken (11). Since the prevalence of these cases varies in different regions and statistics presented by other researchers are not generalizable to Iranian society, we decided to provide a comparable statistics with other researches by an accurate presentation of permanent teeth absence. Therefore, by recognizing its contributing factors, the necessary prevention techniques, giving advice to parents, early appropriate treatment can be implemented and as a result, dental and mental problems following tooth absence will decrease.

The aim of this study is to evaluate the prevalence of impacted and semi-impacted teeth and to determine the impaction angle of different teeth in patients referred to the maxillofacial radiology department of dental school, Mazandaran University of Medical Sciences in years 2013-2019.

Methods

This study is a cross-sectional descriptive-analytical study, in which the data in panoramic radiographs of patients referred to maxillofacial department of dental school, Mazandaran University of Medical Sciences in years 2013-2019 were analyzed. The inclusion criteria included all patients in ages 17 to 45 and the exclusion criteria was patients who were not in this age range and the patients who were completely edentulous. The data collection method was field research and the collection tool was observation. Patients were classified into 4 age groups, 17 to 21 years old, 22 to 30 years old, 31 to 40 years old and older than 40. The radiographs were taken by a specialist or dentist's prescription for diagnostic and therapeutic purposes. Radiographs were taken digitally by panoramic imaging device model Sordex Carnex D. The data was collected through observation and accuracy by an information form. In this study, the impacted tooth was the tooth in which its normal eruption was prevented by bone, adjacent tooth or soft tissue. Although more than two years had passed since it's normal eruption time, it had not yet erupted in the jaw arch and was invisible (12). Third molars angle determination was done according to winter's classification based on the angle between the third molar's long axis and the second molar's long axis.

- Vertical impaction: the angle between -10º to 10º.
- Mesioangular impaction: the angle between 11º to 72º.
- Distoangular impaction: the angle between -11º to -72º.
- Horizontal impaction: the angle between 80º to 100º (13).

The collected data from observing panoramic radiographs were entered in in SPSS 22 statistical software and were analyzed by Chi-Square test and Fisher's exact test.

Results

3200 panoramic radiographs were evaluated. 826 patients had impacted teeth and 2374 patients did not have any impaction. Most of the participants in this study were in the age range 22-30 years old. 22% (182 patients) were under 21 years old, 47.5% (391 patients) were 22-30 years old, 22.1% (183 patients) were in the age range 31-40 and 4.4% (36 patients) were older than 41 years old. 66.4% (548) of patients were female and 33.6% (278) of patients were male. 3.7%

[DOI: 10.18502/tbsrj.v3i3.6927]

(119) of patients had semi-impacted tooth and 23.6% (756) of patients had fully impacted teeth.

Findings show that 26.5% (219) of patients had impacted tooth in the maxilla, 33.8% (279) of patients had impacted tooth in the mandible and 31.6% (261) of patients had impacted teeth in both jaws.

The mean number of impacted tooth was 2.01, the mean number of fully impacted tooth was 1.78 and the mean number of semi-impacted tooth was 0.22.

Table 1. Frequency distribution of impaction according to impaction type among patients with history of aphthous

	Group	Abundance (%)
Impaction type	Mesioangular	399 (36.3)
	Distoangular	235 (21.3)
	Vertical	235 (21.3)
	Horizontal	122 (11.1)
	Mandibular	3 (0.3)
	Maxillary	1 (0.1)
	Premolar	4 (0.4)
	Canine	59 (5.4)
	Molar	16 (1.5)
	Third molar	5 (0.5)
	Lingubuccal	20 (1.8)
	Total	100 (100)

Table 1 shows that in 36.3% (399) of cases the impaction was mesioangular, in 21.3% (235) of cases the impaction was vertical and in 11.1% (122) of cases the impaction was horizontal. Due to the non-compliance with the normal distribution in the variables of age, number of impacted, semi-impacted and fully impacted teeth, non-parametric spearman correlation coefficient test was used. The results of this test mentioned in ***Table 2*** shows that there is a significant negative correlation between age and impacted and semi-impacted teeth (P-Value<0.05), so with the age increasing the number of impacted and fully impacted teeth decreases and vice versa. Chi2 test showed that there was not any statistically significant difference among gender groups in terms of jaws with impacted teeth. Due to the non-compliance with the normal distribution in the variables of the number of impacted, semi-impacted and fully impacted teeth at the gender levels, Mann-Whitney U non-parametric test was used. The mean number of impacted, fully impacted and semi-impacted teeth in the participants of this study, separately male and female did not have any statistically significant difference (P>0.05).

Chi2 test showed that there was not any statistically significant difference among gender groups in terms of jaws with impacted teeth (***Table 3***). Due to the non-compliance with the normal distribution in the variables of number of impacted, fully impacted and semi-impacted teeth in terms of involved jaw, nonparametric Kruskal-Wallis test was used. The mean number of impacted, semi-impacted and fully impacted teeth separately involved jaw (Maxilla, Mandible, both jaws) in participants had a statistically significant difference (P<0.05).

Chi 2 test showed that there is a statistically significant difference between different types of impaction and involved jaw (***Table 4***).

Discussion

The findings of this study show that total prevalence of impacted and semi-impacted teeth was %3/7. The mandible had a higher prevalence of tooth impaction than the maxilla. The most prevalent impaction angle

Table 2. Frequency distribution of jaw with impacted tooth according to the age of participants

		Abundance (%)			
		Upper jaw	**Lower jaw**	**Both jaws**	**Total**
Age	<21	46 (28.4)	45 (27.8)	71 (43.8)	162 (100)
	21-30	109 (29.3)	134 (36)	129 (34.7)	372 (100)
	31-40	49 (28.2)	78 (44.8)	47 (27)	174 (100)
	>40	11 (32.4)	16 (47)	7 (20.6)	34 (100)
Chi2 test		X^2=16.74			
P-value		0.01			

[DOI: 10.18502/tbsrj.v3i3.6927]

Table 3. Frequency distribution of jaw with impacted tooth according to the gender of participants

		Abundance (%)			
		Upper jaw	**Lower jaw**	**Both jaws**	**Total**
Gender	Female	157 (31.1)	183 (36.2)	165 (32.7)	505 (100)
	Male	62 (24.6)	96 (38.1)	94 (37.3)	252 (100)
Chi2 test			X^2=3.654		
P-value			0.161		

Table 4. Frequency distribution of jaw with impacted tooth according to the type of impaction of participants

		Abundance (%)			
		Upper jaw	**Lower jaw**	**Both jaws**	**Total**
Impaction type	Mesioangular	68 (18.2)	131 (35.2)	174 (46.6)	373 (100)
	Distoangular	71 (32.8)	36 (16.7)	109 (50.5)	216 (100)
	Vertical	174 (50.6)	62 (18)	108 (31.4)	344 (100)
	Horizontal	8 (7)	63 (55.3)	43 (37.7)	114 (100)
Chi2 test			X^2=169.02		
P-value			0.001		

in the maxilla was the vertical impaction (%50/6), and in the mandible was the mesioangular impaction (%46/6). The results showed that there was a significant negative correlation between age and the number of impacted and fully impacted teeth. In other words, when age increases, the number of impacted and fully impacted teeth decreases.

As the current study is a cross-sectional study of the current situation, and the data was collected from panoramic radiograph archives, it wasn't possible to determine the history of tooth extraction. In justification of the relationship between age and the number of impacted teeth it can be concluded, that history of tooth extraction may be the cause of this correlation.

It was found that there is a significant statistical difference between age groups in terms of jaw involving impacted tooth. The most impacted teeth were seen in the age range of 21-30, simultaneously, in the next age range of 31-40 a sudden decrease was observed. This may be the result of the impacted teeth being extracted. The mean number of impacted, fully impacted and semi-impacted teeth, also the involved jaw, was not statistically meaningful between men and women.

In the study which was carried out in 2017 by Bokhari among Saudi Arabian population in Alba, it was found that the most common impaction was related to the mandibular molars rather than the maxillary molars. In terms of teeth angulation, the most prevalent in the mandible was mesioangular and the lowest prevalence belonged to distoangular. In the maxilla the most prevalent kind of impaction was vertical and the horizontal impaction was the lowest. Tooth impaction was mostly seen among 20-25 years old patients (14). These findings coincides with current study.

Khosravi examined and determined the angle of impacted third molars in the mandible. In this study impacted third molars were more prevalent in men (%62.7) rather than women. The impacted third molars in %44.1 of cases were on the left side, in %46/6 of cases were on the right side, and in %9/3 of cases were bilateral. Mesioangular impaction (%41/7) and distoangular impaction %3/5 had the highest and lowest prevalence, respectively. In bilateral cases mesioangular-mesioangular (%48/8) were the most prevalent cases. In this study, as well as Khosravi's study, it was shown that the most common angle of third molar placement was mesioangular (15).

Abdorazzaghi evaluated the prevalence of impacted teeth among the patients referring to the selected clinics in Qom, Iran. Findings showed that the third molars impaction was mostly seen on the left side. The most prevalent impaction angle in the mandible was the mesioangular impaction and in the maxilla it was the vertical impaction. The difference in the prevalence of impaction between men and women was not statistically

[DOI: 10.18502/tbsrj.v3i3.6927]

significant. In terms of evaluating the prevalence of impaction among different Age groups, this research is more accurate (16).

In 2013, by observing the patients referred to Medina teaching hospital, Wahid found that the highest prevalence of third molar impaction is among patients within the 18-25 age range, and as the current study the most prevalent angulation of the mandibular third molars were mesioangular and in the maxilla is vertical. They also stated that impaction is more common in men and impacted teeth are mostly seen in the mandible. These findings coincides with the results obtained in this research (17).

Secic in 2013 evaluated the prevalence the prevalence of impacted third molars in Bosnia and Herzegovina population and found that among 2000 available panoramic radiographs, %38 were in the third decade of their lives and had at least one impacted tooth in mandible and statistically men had more impacted teeth than women. This study showed that vertical angulation was the most prevalent type of angulation. We can justify that their study was an epidemiological study and its findings depend on time, place and race, so as the study population are different the controversy which was seen is expected (18).

Al-Delaimi in 2012 by evaluating the number of impacted third molars in panoramic radiographs found out that there were totally 1037 impacted teeth in 312 patients (%53 female %47 male), among these impacted 468 teeth (%45/13) belonged to the maxilla and 569 teeth (%54/87) belonged to the mandible. This study showed that one half of the mandibular impacted third molars and mesioangular angulation, both findings coincides with this study (19).

Conclusion: findings of this study express that the total prevalence of impacted and semi-impacted teeth was %3/7. Maxilla compared to mandible had more impacted teeth the most prevalent impaction angulation in maxilla was vertical (%50/6) and in mandible was mesioangular (%46/6). The total mean of impacted teeth was 2/01 teeth. Analysis showed that there was a significant negative correlation between age and the number of impacted and fully impacted teeth. In another analysis it was found that there is a meaningful statistical difference in terms of the jaw that the impacted tooth is involved and different age groups, age group 21-30 had the most impacted teeth and the next age group (31-40 years old) had a sudden decrease in the number of impacted teeth. The mean number of impacted, fully impacted and semi-impacted teeth didn't have a meaningful statistical difference between men and women, also there wasn't any significant statistical difference between men and women in term of the jaw that the impacted tooth is involved.

Conclusion

The prevalence of impacted and semi-impacted teeth was 26.8%. As the impacted teeth are usually ignored and considering the problems such as causing cysts and tumors, dental caries and periodontal problems. We suggest the determination of impacted teeth in the other parts of the country so that, more accurate assessments can be done to prevent diseases and to take action towards extracting impacted teeth.

Ethical standards statement

This study was approved by the Research Ethics Committee of Mazandaran University of Medical Sciences (IR.MAZUMS.REC. 1398.444).

Acknowledgments

We would like to express our sincere gratitude towards Oral and Maxillofacial Radiology and Oral and Maxillofacial Surgery Departments and Student Research Committee of Mazandaran University of Medical Sciences.

Conflicts of interest

The authors declare that there is no conflict of interest regarding publication of this article.

[DOI: 10.18502/tbsrj.v3i3.6927]

Authors' contributions

All authors have intellectually committed to the study design and process. The final manuscript was revised and accepted by all authors.

References

1. Al Feeli D, Sebaa Y, Al-Asfour A. Prevalence of impacted teeth in adult patients: A radiographic study of Kuwaiti population. Kuwait University: Health Science Center/faculty of dentistry Elective Project Study Course. 2012.
2. Becker A, Chaushu S. Success rate and duration of orthodontic treatment for adult patients with palatally impacted maxillary canines. American Journal of Orthodontics and Dentofacial Orthopedics. 2003;124(5):509-14.
3. Ricketts RM. A principle of arcial growth of the mandible. The Angle Orthodontist. 1972;42(4):368-86.
4. Bishara SE, Ortho D. Impacted maxillary canines: a review. American Journal of Orthodontics and Dentofacial Orthopedics. 1992;101(2):159-71.
5. Levy I, Regan D. Impaction of maxillary permanent second molars by the third molars. J Paediatr Dent. 1989;5:31-4.
6. Sarnat H, Kaplan I, Pertzelan A, Laron Z. Comparison of dental findings in patients with isolated growth hormone deficiency treated with human growth hormone (hGH) and in untreated patients with Laron-type dwarfism. Oral surgery, oral medicine, oral pathology. 1988;66(5):581-6.
7. Chai W, Ngeow W. Familial cases of missing mandibular incisor: three case presentations. Dental update. 1999;26(7):298-302.
8. Newman GV, Newman RA. Report of four familial cases with congenitally missing mandibular incisors. American journal of orthodontics and dentofacial orthopedics. 1998;114(2):195-207.
9. Omarov O, Persin L, KhO O. Functional state of maxillofacial muscles in patients with dentition defects depending on the number of missing antagonist pairs. Stomatologiia. 2002;81(3):49-50.
10. Silva Meza R. Radiographic assessment of congenitally missing teeth in orthodontic patients. International journal of paediatric dentistry. 2003;13(2):112-6.
11. Mason RM. A retrospective and prospective view of orofacial myology. International Journal of Orofacial Myology. 2008;34.
12. Tavakoli A, Aqdasi, Mehdi Dam, Montaseri, Bardia d. Prevalence and occlusion status of impacted teeth in patients referred to Shahid Beheshti Dental School between 2003-2009. Journal of Dentistry of the Islamic Society of Dentists. 2003; 15 (3): 30-8.
13. Patil S, Maheshwari S. Prevalence of impacted and supernumerary teeth in the North Indian population. Journal of clinical and experimental dentistry. 2014;6(2):e116.
14. Sabri R. Management of congenitally missing second premolars with orthodontics and single-tooth implants. American journal of orthodontics and dentofacial orthopedics. 2004;125(5):634-42.
15. Khosravi H, Taziki MH, Mohammadi R. Determination of the angle of impacted mandibular third molar. Journal of Gorgan University of Medical Sciences. 2013;15(2):77-81.
16. Mahmood Hashmei H, Seyed ashrafi M. An investigation on the cause of the removal of mandibular impacted third molar and its relationship with various types of impaction. The Journal of Islamic Dental Association of IRAN (JIDA). 2005;17(3):35-40.
17. London GM, Marchais SJ, Metivier F, Guerin AP. Cardiovascular risk in end-stage renal disease: vascular aspects. Nephrology, dialysis, transplantation (Print). 2000;15:97-104.
18. Huang I-Y, Chen C-M, Chang S-W, Yang C-F, Chen C-H, Chen C-M. Surgical management of accidentally displaced mandibular third molar into the pterygomandibular space: a case report. The Kaohsiung journal of medical sciences. 2007;23(7):370-4.
19. Kugelberg CF, Ahlström U, Ericson

[DOI: 10.18502/tbsrj.v3i3.6927]

S, Hugoson A. Periodontal healing after impacted lower third molar surgery: a retrospective study. International journal of oral surgery. 1985;14(1):29-40.

[DOI: 10.18502/tbsrj.v3i3.6927]