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Exploring the Association between Impacted Third Molars and Blood Group

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ABSTRACT

Background: Impaction third molar can be linked to genetic pathway like blood group. Considering this genetic tie, certain blood groups might be more susceptible to this issue
Objective: To examine the association between pattern of impacted third molars and blood group.
Materials and Methods: This cross-sectional study, conducted at Saidu College of Dentistry, included 165 participants using consecutive non-probability sampling. Inclusion criteria were age 20-80 with high-quality panoramic radiographs, at least one impacted third molar, and willingness to participate. Exclusion criteria comprised systemic problems and craniofacial deformities. Third molar impaction was assessed through panoramic radiographs, and blood grouping was done in participants. Descriptive statistics and the Chi-Square test were used to analyze ABO blood groups' association with impacted teeth patterns. Statistical analysis was performed using Stata 14, with a significance level set at $p < 0.05$.
Results: The mean age was 41.10±12.12 years, with a gender distribution of 73 (44.24%) females and 92 (55.76%) males. Regarding molar impaction, 56 (33.94%) had four impacted molars, 34 (20.61%) had a single impacted molar, 59 (35.76%) had two impacted molars, and 16 (9.7%) had three impacted molars. In terms of blood group distribution, Blood Group A comprised 18.79%, Blood Group AB was the most prevalent at 47.27%, Blood Group B accounted for 15.15%, and Blood Group O constituted 18.79% of the total cohort. The statistical analysis revealed no significant association between blood group and the pattern of third molar impaction (P=0.198).
Conclusion: There is no significant association of pattern of third molar impaction and blood group.
Keywords: Association, Blood group, Molar impaction, Third molar.

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INTRODUCTION

The third molar is the last tooth in the human dental arch. It erupts last among all teeth and typically appears between the ages of 17 and 25 years.[1] Due to its posterior position in the jaw, it often fails to emerge into the oral cavity because jaw growth ceases before this tooth's eruption, resulting in impaction.[2] By definition, an impacted tooth is an unerupted tooth obstructed by physical barriers.[3] The impaction of the third molar can lead to a myriad of dental complications, such as caries, gum disease, and overcrowding, which can affect the third molars. This situation may necessitate their removal to ensure proper oral health and alignment.[4]

The impaction of third molars can be influenced by a variety of factors. These include congenital problems and genetic diseases such as cleidocranial dysplasia and primary failure of eruption.[5] Significant involvement of genetic factors has been recognized in the development of impacted third molars.[6] Alongside genetics, impaction is influenced by factors within the local environment.[7] These factors include misaligned or fused teeth, early loss or retention of baby teeth, jaw irregularities, tooth overcrowding, improper eruption, and the twisting of tooth buds. Additionally, impaction can stem from pathological conditions like cysts or odontomas, which obstruct the typical tooth eruption process.[8]

Blood types, inherited traits, are associated with various diseases. The ABO system categorizes blood into four types based on A and B antigens: O (neither antigen), AB (both antigens), A (A antigen), and B (B antigen). The Rhesus (Rh) system classifies blood by the presence of the R protein: Rh-positive (with the antigen) or Rh-negative (without it).[9]

Previous research has indicated possible links between blood types and oral health problems like periodontal diseases and dental caries.[10] The evidence suggests that individuals with blood type A might be less prone to dental caries, while children with blood group AB could be more susceptible to early childhood caries.[10]

The investigation into the connection between impacted third molars and blood groups stems from the potential interplay between genetic factors and tooth impaction. Blood group, an inherited trait linked to specific antigens on red blood cells, shares genetic origins with impacted third molars. Earlier research has highlighted genetic influence on impacted molars. Considering this genetic tie, certain blood groups might

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be more susceptible to this issue. Studying the blood group-impaction relationship could uncover genetic predisposition and underlying mechanisms, aiding in predicting tooth impaction likelihood. This knowledge may guide treatment and prevention strategies for individuals with specific blood groups

The objective of this study is to examine the potential association between impacted third molars and blood group.

MATERIALS AND METHODS

This cross-sectional study was conducted at the OPD of Saidu College of Dentistry, employing a consecutive non-probability sampling technique. The sample size consisted of 165 participants, with a 5% margin of error and a 95% confidence interval, based on a 19% frequency of third molar impaction in the AB blood group.[9] Ethical approval was secured from the respective hospital (74-ERB/023, dated:23/06/2023). Written informed consent was obtained from all participants after explaining the study's objectives and potential advantages.

The inclusion criteria consisted of individuals aged from 20 to 80 years, who possessed high-quality panoramic radiographs, at least one third molar impacted and willingly took part in the study. Exclusion criteria encompassed systemic problem like blood diseases, autoimmune disorders, craniofacial deformities, congenital syndromes, jaw pathology lesions, retained.

The assessment of third molar impaction was conducted using panoramic radiographs among patients seeking dental treatment (whether one, two , three of four impaction was there), for whom panoramic radiographs were necessary as a component of their dental care, aiming to minimize unwarranted radiation exposure. Blood information was collected from the participants, and if they had not undergone blood grouping previously or did not recall their blood type, they were referred to the pathology laboratory at Saidu Medical College for blood grouping.

Descriptive statistics, comprising the mean, standard deviation, and frequency, were utilized to summarize the data. The Chi-Square test was employed to analyze the association between ABO blood groups and the pattern of impacted teeth. Statistical analysis was conducted using Stata 14, with a significance level set at $p < 0.05$.

RESULTS

The mean age of the participants was 41.10±12.12 years. Gender distribution among the participants revealed that 73 (44.24%) were females, while 92 (55.76%) were males. When assessing age distribution within distinct groups, it was observed that 66 (40.00%) participants fell within the age group of 20-35, 56 (33.94%) were between 36 and 50 years old, and 43 (26.06%) were 51 years and above. The results indicated that 33.94% of the participants presented with four impacted molars, while 20.61% had a single impacted molar. Impaction of two molars was observed in 35.76% of the participants, and the least prevalent scenario was the presence of three impacted molars, accounting for 9.70% of the cohort. (Table 01)

Blood Group A was identified in 31 participants, constituting 18.79% of the total cohort. The most prevalent blood group within the study was AB, observed in 78 participants, accounting for 47.27% of the cohort. A total of 25 participants (15.15%) were categorized as Blood Group B, while the same number, 31 participants (18.79%), were classified as Blood Group O. (Fig 01)

Table 02 presents the association between blood group and the pattern of molar impaction. The distribution of blood groups across different impaction patterns reveals some interesting trends. Blood group A was found in 23.53% of participants with one impacted molar, 14.29% of those with four impacted molars, 18.75% of individuals with three impacted molars, and 20.34% of cases with two impacted molars. Blood group AB exhibited varying frequencies among impaction patterns, being present in 32.35% of participants with one impacted molar, 57.14% with four impacted molars, 43.75% with three impacted molars, and 47.46% with two impacted molars. Blood group B was identified in 11.76% of those with one impacted molar, 14.29% with four impacted molars, 31.25% with three impacted molars, and 13.56% with two impacted molars. Blood group O appeared in 32.35% of participants with one impacted molar, 14.29% with four impacted molars, 6.25% with three impacted molars, and 18.64% with two impacted molars. There was no significant association between blood group and pattern of third molar impaction (P= 0.198).

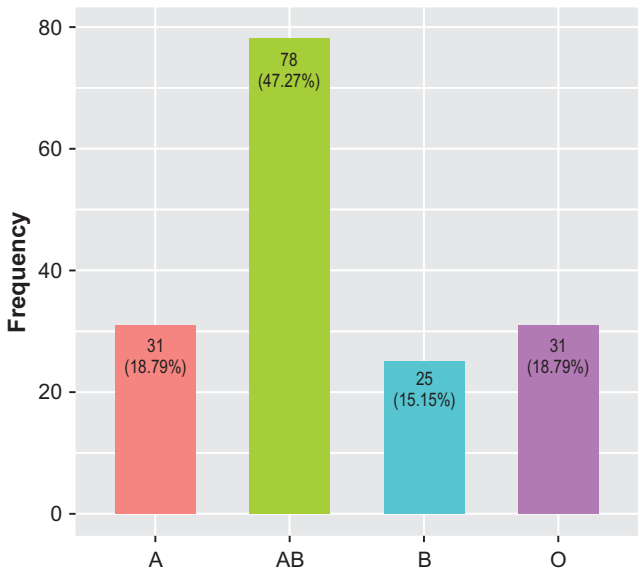


Figure 01. Distribution of blood group

Table 01. Distribution of age and genders

Variable	Characteristic	N = 165
Age (Years)	Mean ± SD	41.10±12.12
Gender, n(%)	Female	73 (44.24)
	Male	92 (55.76)
Age Group (Years) , n(%)	20-35	66 (40.00)
	36-50	56 (33.94)
	51 & above	43 (26.06)
Impaction, n(%)	Four impacted molar	56 (33.94)
	One impacted molar	34 (20.61)
	Three impacted molar	16 (9.70)
	Two impacted molar	59 (35.76)

Table 02. Association of blood group with impaction pattern

Blood Group	One Impacted Molar, N = 34	Four Impacted Molars, N = 56	Three Impacted Molars, N = 16	Two Impacted Molars, N = 59	p-value*
A	8 (23.53)	8 (14.29)	3 (18.75)	12 (20.34)	0.198
AB	11 (32.35)	32 (57.14)	7 (43.75)	28 (47.46)	
B	4 (11.76)	8 (14.29)	5 (31.25)	8 (13.56)	
O	11 (32.35)	8 (14.29)	1 (6.25)	11 (18.64)	

*Fisher exact test

DISCUSSION

This study aimed to know association between impacted third molars and blood group. Our findings showed non-significant association of blood group with pattern of third molar impaction.

Third molars, commonly referred to as wisdom teeth, are most frequently impacted among diverse global populations. The participants in this study predominantly belonged to the age range of the second to third decade, in line with similar findings in other research that identified a peak prevalence of impacted third molars within comparable age groups.[11,12] Importantly, this study stands out as the first investigation into the prevalence of impacted third molars in Khyber Pakhtunkhwa, Pakistan. It introduces a novel aspect by exploring the potential association between the impaction of third molars and the ABO blood groups of the participants. This adds a unique dimension to dental research in this specific geographic region, shedding light on previously unexplored connections between third molar impaction and blood group characteristics.

Our research revealed no significant association between blood group and the pattern of third molar impaction. The categorization of third molar impaction patterns in our study included classifications of one, two, three, or four teeth impaction. A previous study conducted in Malaysia involving 241 subjects determined patients' blood groups using Tyle's method. Orthopantomograph (OPG) was employed to assess the angulation of impaction based on Winter's and Pell & Gregory's classifications. However, the results of the study indicated nonsignificant findings regarding the association between third molar impaction patterns and blood groups.[11] Another study carried out in Iran aimed to assess the association between the pattern of third molar impaction (single, two, three, and four impactions) and blood groups in a cohort of 320 participants. The results of their investigation revealed that these associations were not statistically significant.[13] Another study conducted in India aimed to explore the correlation between ABO blood grouping and impacted third molars among 510 patients with impacted third molar teeth. The patients were categorized into those with maxillary third molar impaction and those with mandibular third molar impaction. The findings indicated that no statistically significant results were observed when comparing the distribution of different blood groups among mandibular third molar impacted patients (p-value > 0.05).[14]

The findings of our study should be interpreted in light of certain limitations that may have influenced the results. A crucial limitation is that all participants in our study were from a single center of Swat populations. This mono-ethnicity composition raises a concern, as investigating various ethnicities is essential to accurately gauge the relationship between blood group and impacted teeth. To enhance the generalizability of

our results, it is imperative to include a more diverse participant pool encompassing individuals from multiple centers. Moreover, for a more comprehensive understanding, an increased number of participants should be included in future investigations on this subject. Another limitation can be lack of studying Rh group.

CONCLUSION

Based on our findings, it can be concluded that the most prevalent blood group was AB, and the most common pattern of third molar impaction was two molars. The association of blood group with third molar impaction was not statistically significant.

Ethical Consideration

This study was approved by Institutional Review Board of Saidu College of Dentistry, Swat, Pakistan.

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Conflict of Interest

Authors declared no conflict of interest.

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DATA SHARING STATEMENT: The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

AUTHORS' CONTRIBUTION

The following authors fulfill authorship criteria as per ICMJE guidelines;

Saeed JR, Alam S:	Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Safwan AA, Hilal N:	Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.
Ali R:	Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.
Hassan S:	Analysis and interpretation of data, critical revision, final approval, agreed to be accountable for all the work.

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