

## RELATIONSHIP BETWEEN ABO BLOOD GROUP AND CLEFT LIP/CLEFT PALATE: AN INSTITUTIONAL STUDY

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### ABSTRACT

**Background:** Cleft lip and/or palate is characterized by failure of fusion between certain embryological processes during facial morphogenesis. Cleft lip and palate is multifactorial in origin, some clefts are caused by single mutant genes, some are due to chromosomal aberrations, and the great majority are caused by interaction of genetic and environmental factors. The aim of the study is to find the relationship between ABO blood group and cleft lip/ cleft palate patients treated in our institution.

**Materials and Methods:** The data was collected from Digital Information Archiving Software (DIAS) of Saveetha Dental College. The data was collected from November 2020 to January 2021. The data included patients who had a cleft lip or cleft palate and had to undergo ABO blood group test. The data was tabulated and entered in excel and the data was analysed using SPSS package software.  $p < 0.05$  was considered to be the level of statistical significance in the study.

**Results:** In this study, females with cleft lip/cleft palate (54%) were more than males (46%) with cleft lip/cleft palate. Blood type frequency of the patients was O>B>A>AB. There was a statistically significant association between cleft lip/palate patients and ABO blood groups.

**Conclusion:** Within the limitations of the study, we found that there was a significant relationship between ABO blood group and cleft lip and cleft palate. The highest percentage of blood group was B in cleft lip and O in cleft palate patients.

**Keywords:** ABO blood group, Cleft Lip, Cleft Palate, Innovative Technology

### INTRODUCTION

Cleft lip are a group of craniofacial defects which occur at birth which arise due to several genetic and environmental influences (1,2). The orofacial clefts can be broadly classified into cleft lip which can occur with or without cleft palate and cleft palate (3). The occurrence of oral clefts globally is from 1 in 500 to 1 in 2000 live births (4). In India alone it is 1 in 1000 live births (5). A study found that in south India the prevalence of oral cleft is found to be 1.1 per 1000 total births (6). Majority of the cleft lip or cleft palates occurs non syndromically as an isolated anomaly with no other structural abnormalities (7,8).

Genetic factors have been found to play a role in the etiology of cleft lip and palate (9). There is a genetic predisposition that may possibly be triggered by environmental factors (10). Studies mentioned that no single factor could cause cleft lip and palate (11,12). A cleft lip and palate is multifactorial in origin, some clefts are caused by single mutant genes, some are due to chromosomal aberrations, the great majority are caused by interaction of genetic and environmental factors (13). Craniofacial malformations and syndromes may be caused by mutation in single genes to evaluate this possibly, one must carefully analyze the family history and examine close relatives (14). Autosomal dominant inheritance is suggested by vertical transmission from generation to generation (15).

The ABO blood group is due to an intricate pattern of carbohydrate molecules on the surface of red blood cells (16). They are inherited through genes in chromosome 9 and they don't change later in life due to any environmental influences. The ABO blood group system gets transmitted from the parent to the offspring through genetics. The ABO blood group depends upon the A and B surface antigens. When either of the antigens are present it results in A or B blood group, or when both are present together it creates AB blood group. When both the antigens are absent, it results in O blood group.

Even though there is a decline in the deaths in infants due to malnutrition and infectious diseases, the occurrence of birth defects remains constant (17). India is one of the many regions where there is no routine data collection for birth defects (5). Epidemiologic studies on cleft lip and cleft palate vary considerably in prevalence between countries and between geographic regions within countries. This would be of valuable information to oral health planners for proposing strategies helping in the development of dental health care management. Our team has extensive knowledge and research

experience that has translated into high quality publications (18–37). The aim of the present study was to find the relationship between the ABO blood group and cleft lip and cleft palate patients treated in our institution.

## **MATERIALS AND METHODS**

### **Study design and Study setting**

This present study was conducted as a retrospective cross sectional study with consecutive non probability sampling among the patients visiting Saveetha Dental College, Chennai, Tamil Nadu. The study setting was a hospital setting. The present study was ethically approved by the institution. The patients included in this study had visited the dental clinic and had a cleft lip or cleft palate and had undergone a blood group assessment. A total of 104 patients visiting the hospital were examined. The study sample included both male and female genders but were predominantly South Indian of varied populations due to the geographic limitations.

### **Data Collection**

The data collected from the patients were demographic data (Age, Sex, Marital Status, Occupation, Address). Then clinical examination was done both intraoral and extraoral. The patients were asked to undergo ABO blood group assessment to find the blood group type. All these records were recorded in DIAS- Dental information Archiving Software of Saveetha Dental College. Any incomplete data was verified from the concerned department or the patient. Any gross data which had the possibility of bias and could affect the studies was not included. The data was photographically registered for dentolegal documentation, communication and to improve the learning process . All the data collected was cross verified by another examiner.

### **Statistical Analysis**

The statistical software SPSS was used for the descriptive and inferential analysis. Data was entered into a spreadsheet using Excel version 16.37 (Microsoft Corp, Redmond, Wash).The data which was collected was analysed using Statistical Package for Social sciences (SPSS) software, version 1.0.0.1347 64 bit (IBM corp., NY, USA). The data was assessed by descriptive analysis and depicted as frequencies, percentages, mean and standard deviation. The data was also analysed by a nonparametric test. Chi square test of Independence was performed using the same SPSS software to find the statistical significance of the current study. In this present study,  $p < 0.05$  was considered to be the level of statistical significance.

## **RESULTS AND DISCUSSION**

The total number of patients in this current study was 104 patients. All the patients visited the dental clinic of Saveetha Dental College and Hospital. The patients had to undergo blood group testing. Among these study samples 48 were male and 56 were females. The age range of the study was 0 to 18 years.

In this study the blood group distribution of cleft lip patients were 12.5% A blood group, 21.15% B blood group, 20.19% O blood group and 2.88% AB blood group and cleft palate patients were 4.81% A blood group, 10.58% B blood group, 22.12% O blood group and 5.77% AB blood group. The association between cleft lip or cleft palate and the blood group types revealed that there was a higher proportion of B blood group in patients with cleft lip and O blood group in patients with cleft palate and the results were statistically significant (Chi square test,  $p = 0.032$ ). [Graph 1].

The gender distribution with A blood group was 9.62% males and 7.69% females, B blood group was 17.31% were males and 14.42% were females, O blood group 16.35% were males and 25.96% were females, AB blood group was 2.88% were males and 5.77% were females. The association between gender of the patients and the blood group types revealed that there was a higher proportion of female patients with O blood group and the results were statistically significant (Chi square test,  $p = 0.001$ ). [Graph 2].

The gender distribution with cleft lip was 26.92% were male and 29.81% female and cleft palate was 19.23% were males and 24.04% female. The association between gender of the patients and the cleft lip or cleft palate revealed that both males and females exhibited a higher proportion of cleft lip condition than the cleft palate and the results were statistically significant. (Chi square test,  $p = 0.001$ ) [Graph 3].

Among the cleft lip patients it was found that the A blood group had 13.56% males and 8.47% females and B blood group has 18.64% both males and females and O blood group has 15.25% males and 20.34% females and AB blood group 5.08% females. The association between gender of the patients and the blood group types in individuals with cleft lip revealed that a higher proportion of O blood group was present among the female patients with cleft lip and B blood group was predominantly present among the male patients with cleft lip and the results were statistically significant. (Chi square test,  $p = 0.006$ ) [Graph 4].

The age distribution was in A blood group 18.64% were 0 year 1.69% were 1 and 2 years, in B blood group 30.51% were 0 years and 6.78% were 1 year and in O blood group 27.12% were 0 year and 8.47% were 1 year and in AB blood group all 0,1 and 2 years were of 1.69%. The association between age of the participants and the blood group types in individuals with cleft lip revealed that Cleft lip patients with less than one year of age had predominantly B blood group type and the results were statistically significant. (Chi square test,  $p=0.007$ ) [Graph 5].

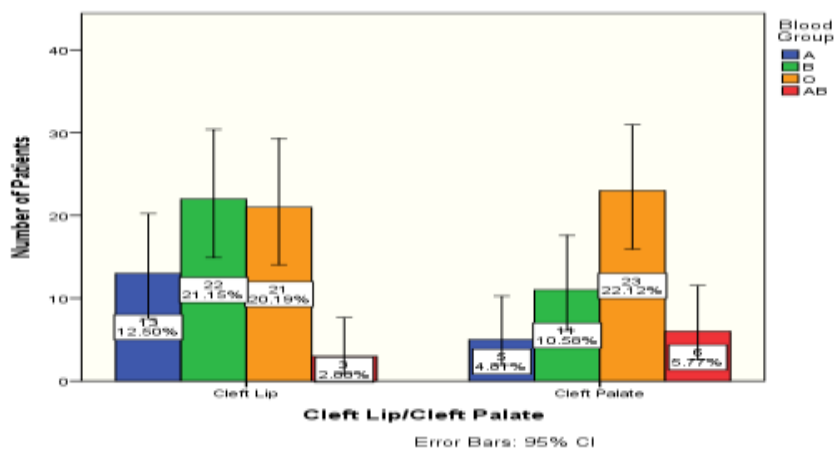
Among the cleft palate patients it was found that the A blood group had 4.44% males and 6.67% females and B blood group has 15.56% males and 8.89% were females and O blood group has 17.78% males and 33.33% females and AB blood group 6.67% both males and females. The association between gender of the patients and the blood group types in individuals with cleft palate revealed that female patients with cleft palate had predominantly O blood group type and the results were statistically significant. (Chi square test,  $p= 0.024$ ) [Graph 6].

The age distribution was in A blood group 8.89% were 0 to 5 years and 2.22% were 6 to 12 years, in B blood group 17.78% were 0 to 5 years and 2.22% were 6 to 12 years and 4.44% were 13 to 18 years and in O blood group 42.22% were 0 to 5 years and 8.89% were 6 to 12 years and in AB blood group 8.89% were 0 to 5 years and 4.44% were 6 to 12 years. The association between the age of the patients and the blood group types in individuals with cleft palate revealed that Cleft palate patients in the age range of 0-5 years had predominantly O blood group type and the results were statistically significant. (Chi square test,  $p=0.041$ ). [Graph 7].

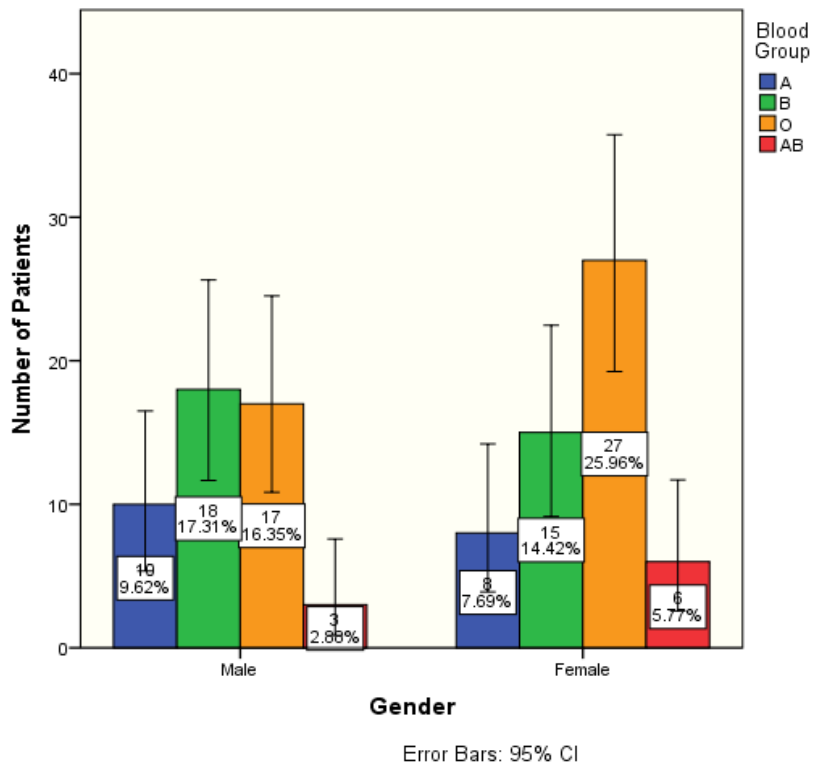
In China cleft lip and cleft palate is frequent in subjects with A blood group (38). In a study which analysed serological and biochemical genetic markers of cleft lip and palate, it found that blood group A was associated with cleft lip and cleft palate (39). Similar to our study, a study conducted in China also found that the occurrence of cleft lip and cleft palate is unrelated to the ABO blood group (40).

There are certain limitations to the study. There was a geographic limitation which had more of the South Indian population and this was a cross sectional and univariate study. The sample size and the duration of the study can be expanded for better results.

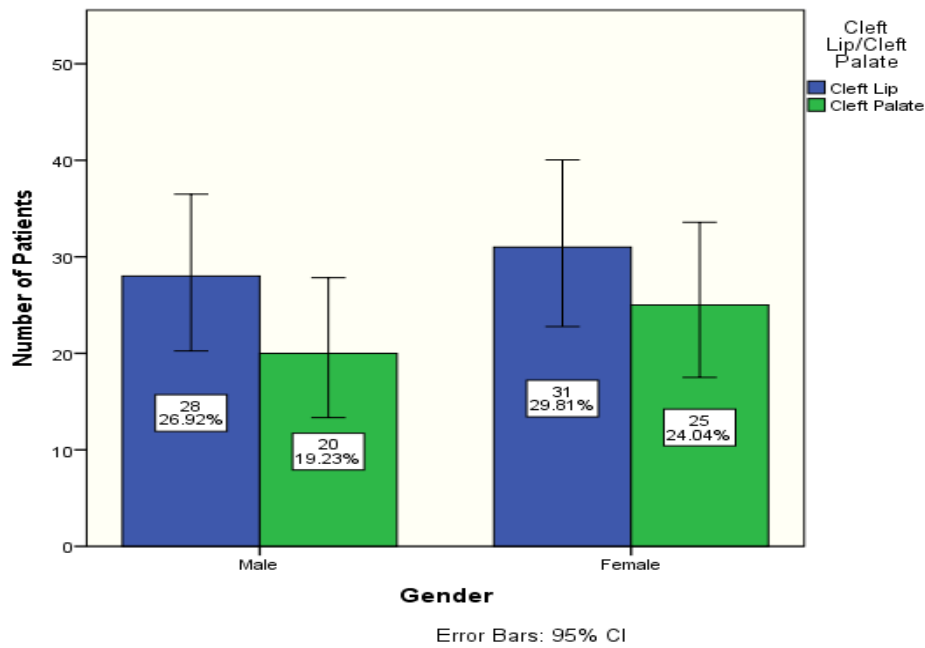
For future scope of the research larger sample size and inclusion of different ethnicity will provide better results. Longitudinal and periodic studies could be done to evaluate the status of edentulism in the patients. This study helps in giving valuable information to oral health planners for proposing strategies to help in development of dental health care management.



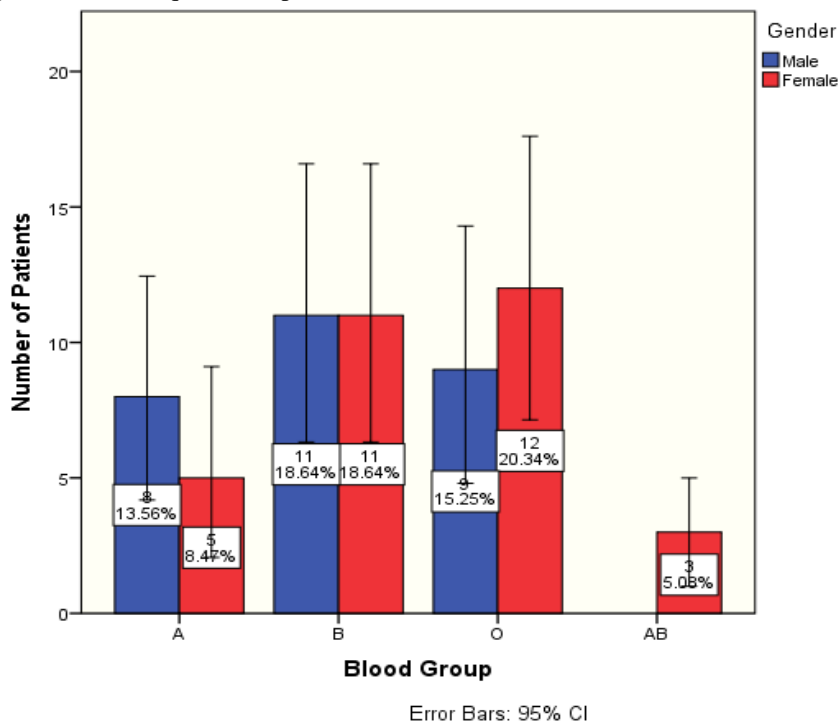
**Graph 1: Bar graph showing the association between cleft lip or cleft palate and the blood group types.** There was a higher proportion of B blood group in patients with cleft lip and O blood group in patients with cleft palate and the results were statistically significant (Chi square test,  $p=0.032$ ).



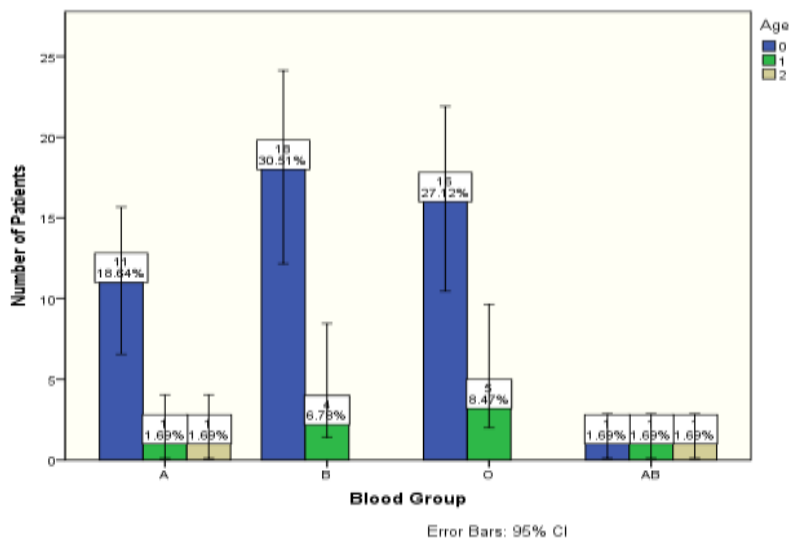
**Graph 2: Bar graph showing the association between gender of the patients and the blood group types.** There is a higher proportion of female patients with O blood group and the results were statistically significant (Chi square test,  $p=0.001$ ).



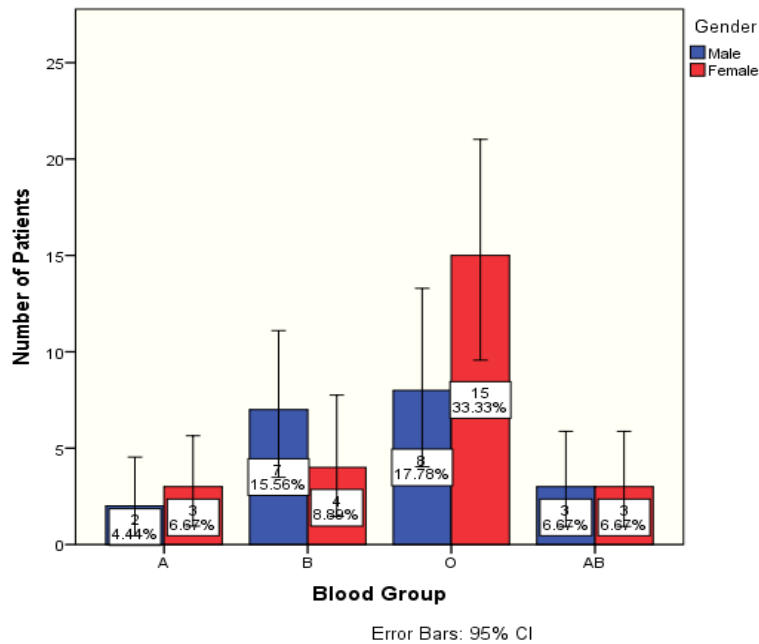
**Graph 3:** Bar graph showing the association between gender of the patients and the cleft lip or cleft palate. Both males and females exhibited a higher proportion of cleft lip condition than the cleft palate and the results were statistically significant. (Chi square test,  $p=0.001$ )



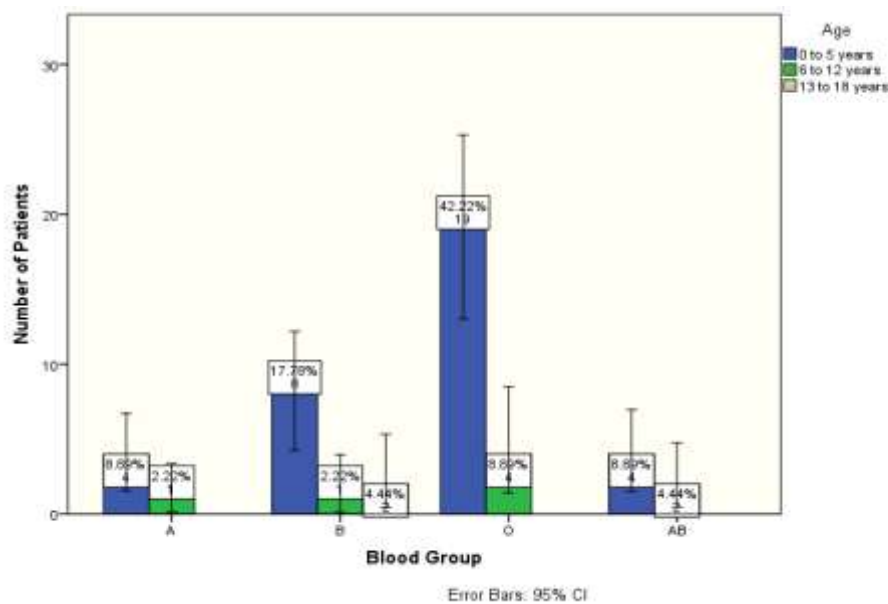
**Graph 4:** Bar graph showing the association between gender of the patients and the blood group types in individuals with cleft lip. A higher proportion of O blood group was present among the female patients with cleft lip and B blood group was predominantly present among the male patients with cleft lip and the results were statistically significant. (Chi square test,  $p=0.006$ )



**Graph 5: Bar graph showing the association between age of the participants and the blood group types in individuals with cleft lip.** Cleft lip patients with less than one year of age had predominantly B blood group type and the results were statistically significant. (Chi square test,  $p=0.007$ )



**Graph 6: Bar graph showing the association between gender of the patients and the blood group types in individuals with cleft palate.** Female patients with cleft palate had predominantly O blood group type and the results were statistically significant. (Chi square test,  $p=0.024$ ).



**Graph 7: Bar graph showing the association between the age of the patients and the blood group types in individuals with cleft palate.** Cleft palate patients in the age range of 0-5 years had predominantly O blood group type and the results were statistically significant. (Chi square test,  $p=0.041$ ).

#### CONCLUSION

Within the limitations of the study, among patients with cleft lip/cleft palate females were more than men. Blood type frequency of the patients was O>B>A>AB. There was a significant relationship between ABO blood group and cleft lip and cleft palate. The blood group B was predominantly seen in cleft lip patients and blood group O was present predominantly in cleft palate patients.

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#### CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

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