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Association of ABO blood group with Oral cancer: An Institutional study

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ABSTRACT

Objectives: Oral Cancer is characterized by abnormal growth of cells which have the ability to invade the adjacent tissues and sometimes even distant organs. It has multifactorial etiology and is significantly associated with risk factors of the individual's lifestyle, particularly, chronic use of tobacco, spicy food, alcohol and smoking. Blood groups may directly or indirectly affect the susceptibility of the individual to oral cancer. The present study was done to correlate ABO blood groups with the occurrence of oral cancer and evaluate the risk.

Materials and Methods: This is a Retrospective cross sectional study conducted in a University setting. The data of patients with oral cancer was retrieved from the case sheets. The necessary data such as Age, Gender, Blood group and site of cancerous lesion were collected and tabulated in Excel. The tabulated data from Excel was imported to SPSS for statistical analysis. p value <0.05 was considered statistically significant.

Results: In this study, the age group of 40-60 years were more susceptible to oral cancer (72%) . 78% of patients were males and 22% were females. Oral cancer was more prevalent among males than females. Among the total patients, buccal mucosa was found to be the most common site of oral cancer (29%) followed by posterior 1/3rd of the tongue (21%) and anterior 1/3rd of the tongue (18%). In males , the most common site of oral cancer was Buccal mucosa. In females, anterior 2/3rd of the tongue was found to be the most common site of oral cancer. Majority of the oral cancer patients belong to the B blood group (46%), therefore patients with B blood group were more susceptible to oral cancer.

Conclusion: As the study indicates the susceptibility of B blood group followed by A blood group to the development of oral cancer, awareness needs to be spread among the mass. Early and regular cancer screening has to be advised to the patients of susceptible blood groups if any known and established etiologic factor like tobacco or alcohol abuse is found.

Keywords: Blood groups, Antigen, oral cancer, risk, Innovative technology.

INTRODUCTION

Oral cancer is said to be the third most common malignancy after the cervix and stomach in developing countries(1). Multifactorial etiology of oral cancer include an individual's lifestyle, chronic use of tobacco, spicy food, alcohol and smoking(2). Viral infections can also lead to development of oral cancer . Many studies on expression of ABO blood group antigens are also being performed. In India and South East Asia, chronic use of betel/paanchewing in the mouth has been strongly associated with an increased risk for oral cancer. Etiology of cancer is also influenced by genetic factors(2,3) .

Progression of a tumour is commonly associated with alterations in the glycosylation of the cell-surface proteins and lipids(4). These cell-surface glyco- conjugates often carries carbohydrate structures in their peripheral part which is related to the ABO blood group antigens.The type of differentiation of the epithelium and the expression of histo-blood-group antigens in normal human tissues are dependent on each other(5) . In the majority of the carcinomas seen in humans, including oral carcinoma, decreased expression of histo-blood-group antigens A and B is seen. ABO antigens are not only seen in red blood cells, they can also be found on epithelial cells of mucosa and body fluids(6).

In recent studies, ABO blood group is said to influence the prevalence of oral cancer, so studies are being conducted to evaluate the association between ABO blood group and oral cancer. In malignant tissues ,altered blood group antigens may indicate increase in cell migration(7). This is also supported by few studies showing that normal migrating oral epithelial cells such as malignant cells show a lack of expression of A/B antigens(7,8). Diagnosis of oral cancer at an early stage is crucial, since the management of small and localized tumors involves less morbidity and mortality than more advanced-stage disease, where treatment must be more aggressive(9). The stage of diagnosis of a disease is directly associated with the long- term survival of the patient.

Our team has extensive knowledge and research experience that has translated into high quality publications(10),(11),(12),(13),(14–23)(24),(25–27)(28,29). The present study was an attempt to correlate the prevalence of ABO blood groups among oral cancer patients and to assess the utility of ABO blood groups in relation to oral cancers

as a preclinical tumor marker. Thus, the objective of this study is to evaluate the association of oral cancer with ABO blood group among oral cancer patients in Chennai.

MATERIALS AND METHODS

This is a Retrospective cross sectional study conducted in a hospital setting.The study setting had certain advantages like flexibility in data collection and less expenditure. However it had few disadvantages as it is anunicentric study and had geographical limitations. The ethical approval for the current study was obtained from the Institutional Review Board of Saveetha University, Chennai . The data of patients with oral cancer and their blood groups were retrieved from the case sheets. The required data from September 2019 to March 2021 were collected and reviewed. The inclusion criteria for the study were patients who had oral cancer and those who had undergone treatment for the same. Exclusion criteria were the incomplete data and were excluded from the study.

The necessary data such as Age, Gender, site of cancerous lesion and the blood groups were collected and tabulated in Excel. The data was cross verified by the analyser. The tabulated data from Excel was imported to SPSS version 23.0 for statistical analysis. The data was represented by the means of bar graphs and the statistical tests used were Chi- square analysis. The association of oral cancer with age, gender and blood groups were analysed. p value <0.05 is considered statistically significant.

RESULTS

In this study, 6% of patients belong to the 20-40 years age group, 72% of patients belong to the 40-60 years age group and 22% of patients belong to the 60-80 years age group. The age group of 40-60 years were more susceptible to oral cancer (Figure 1). 78% of patients were males and 22% were females. Oral cancer was more prevalent among males than females (Figure 2). Among the total patients, buccal mucosa was found to be the most common site of oral cancer (29%) followed by posterior 1/3rd of the tongue (21%) and anterior 1/3rd of the tongue (18%) (Figure 3). 28% of patients belong to A blood group , 46% belong to B group , 21% belong to C group and 5% belong to AB blood group. Majority of the oral cancer patients belong to the B blood group (Figure 4).

Among the 20-40 years age group, 1.1% had A blood group, 2% had B blood group ,1.8% had O blood group and 1% had AB blood group. Among the 40-60 years age group, 22% had A blood group, 35% had B blood group, 12% had O blood group and 3% had AB blood group. Among the 60-80 years age group, 5% had A blood group, 9% had B blood group, 7% had O blood group and 1% had AB blood group. There was no statistically significant association between age and blood groups of the patients (Figure 5). Among males, 23% had A blood group, 37% had B blood group, 14% had O blood group and 4% had AB blood group. Among females, 5% had A blood group, 9% had B blood group, 7% had O blood group and 1% had AB blood group. The association between gender and blood groups of the patient was statistically not significant (Figure 6).

In the 20-40 years age group, Anterior 2/3rd of the tongue was the most common site of oral cancer. In the 40-60 years and 60-80 years age group, Buccal mucosa was the most common site of oral cancer followed by posterior 1/3rd of the tongue (Figure 7). No statistically significant association was seen between the site of oral cancer and the age group of patients. In males , the most common site of oral cancer was Buccal mucosa. In females, the anterior 2/3rd of the tongue was found to be the most common site of oral cancer . However, the association between the site of oral cancer and gender was statistically not significant (Figure 8). Blood group B was most commonly associated with cancer involving various sites in the oral cavity. There was no statistically significant association between the site of cancerous lesion and the blood group of patients (Figure 9).

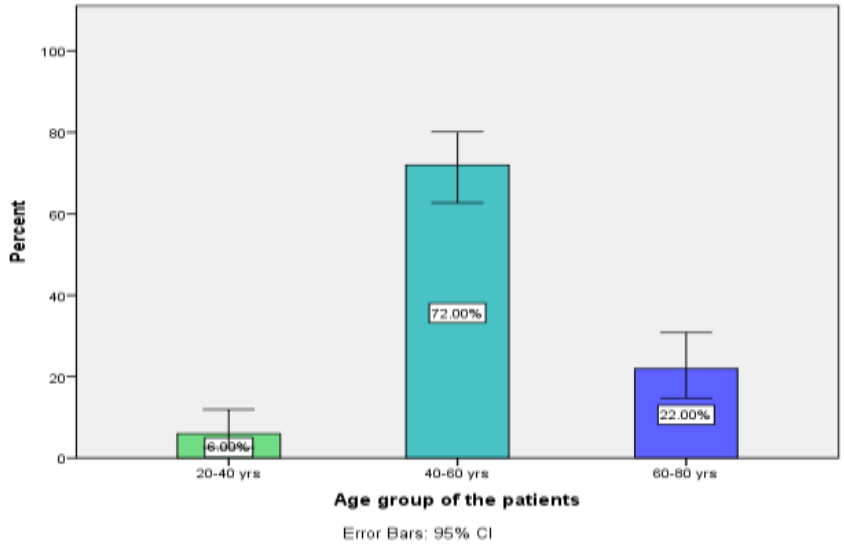

Figure 1 : Bar graph representing the age group of oral cancer patients taken for the study.

X axis represents the age group of the patients and Y axis represents the percentage of patients. 6% of patients belong to the 20-40 years age group, 72% of patients belong to the 40-60 years age group and 22% of patients belong to the 60-80 years age group . Oral cancer was most prevalent among the age group of 40-60 years.

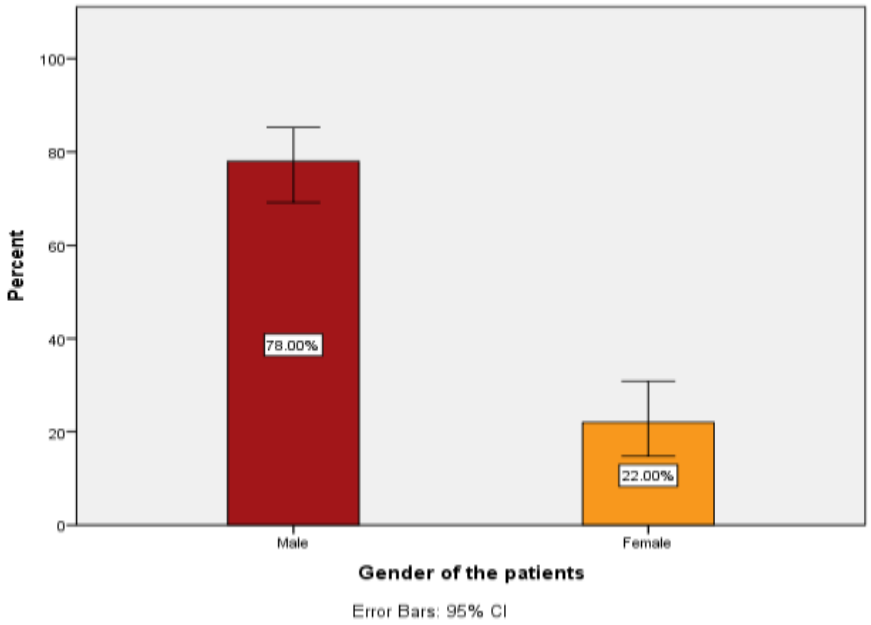

Figure 2: Bar graph representing the gender of oral cancer patients taken for the study.

X axis represents the gender of the patients and Y axis represents the percentage of patients. 78% of patients were males and 22% were females. Oral cancer was more prevalent among males than females.

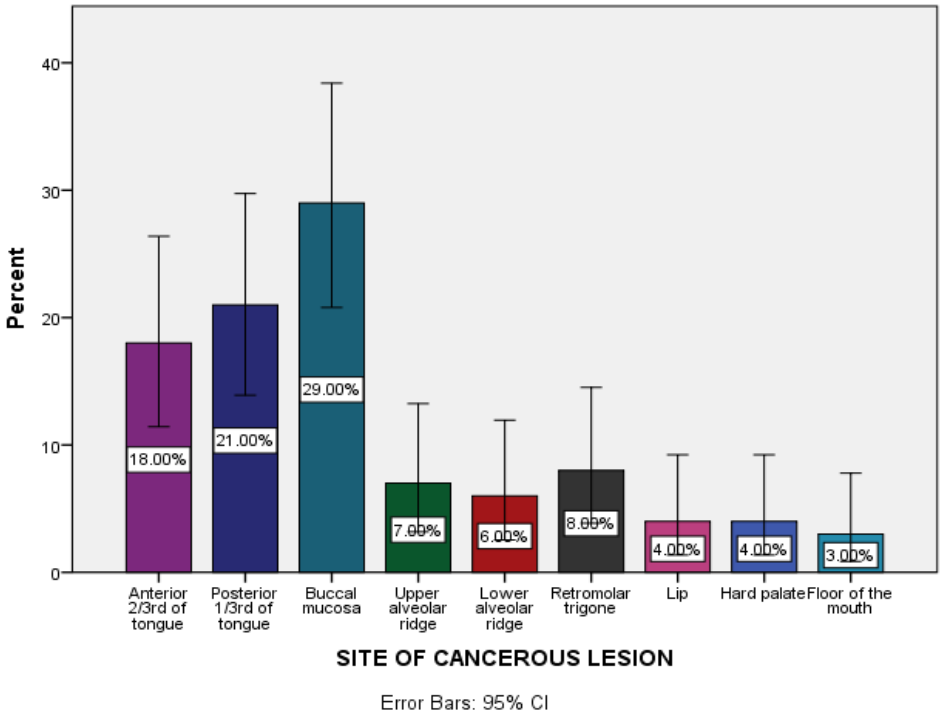

Figure 3: Bar graph representing the common sites of cancerous lesions in patients . X axis represents the site of cancerous lesion and Y axis represents the percentage of patients. Buccal mucosa was found to be the most common site of oral cancer (29%) followed by posterior 1/3rd of the tongue (21%) and anterior 1/3rd of the tongue (18%).

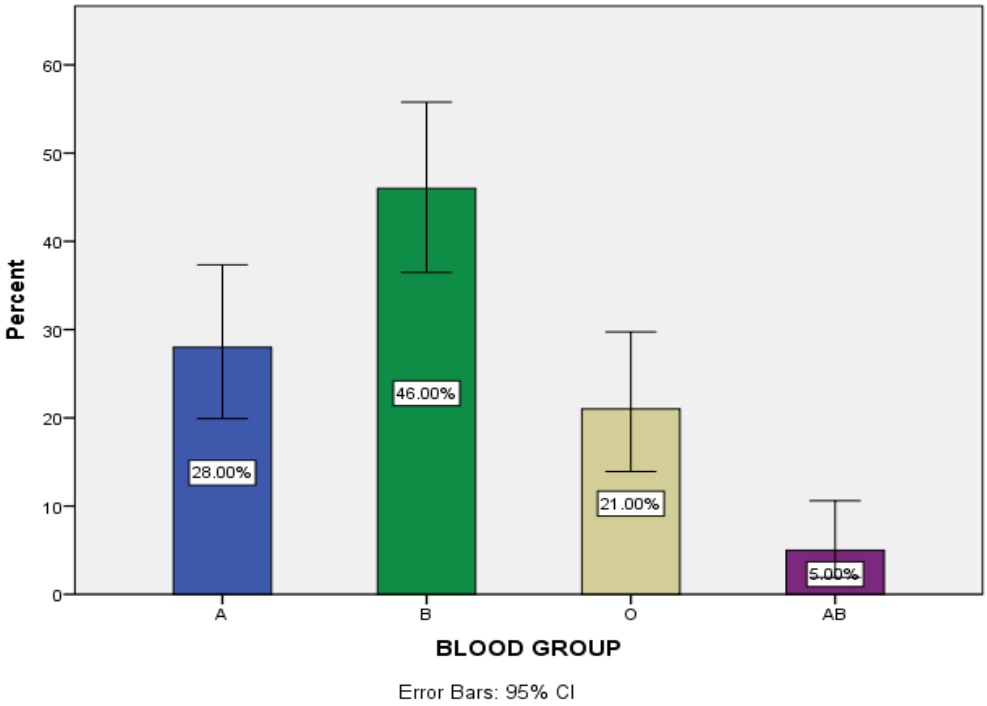

Figure 4: Bar graph representing the blood groups of oral cancer patients. X axis represents the blood group and Y axis represents the percentage of patients .28% of patients belong to A blood group , 46% belong to B group , 21% belong to C group and 5% belong to AB blood group. Oral cancer was more prevalent among patients with B blood group.

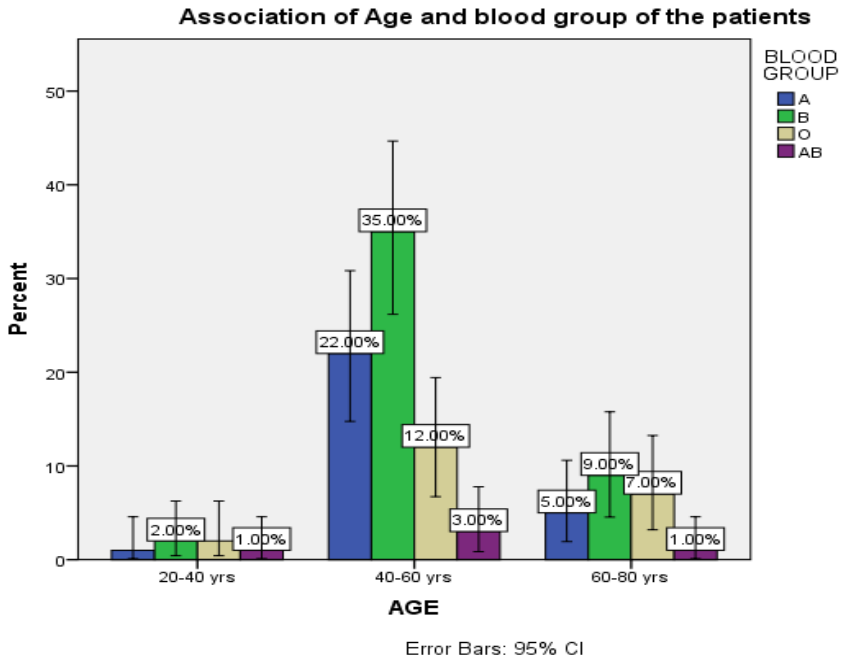

Figure 5: Bar graph representing the association between age and blood groups of oral cancer patients. X axis represents the age group of patients and Y axis represents the number of patients. Among the 20-40 years age group, 1.1% had A blood group, 2% had B blood group ,1.8% had O blood group and 1% had AB blood group. Among the 40-60 years age group, 22% had A blood group, 35% had B blood group, 12% had O blood group and 3% had AB blood group. Among the 60-80 years age group, 5% had A blood group, 9% had B blood group, 7% had O blood group and 1% had AB blood group (p value >0.05, statistically not significant).

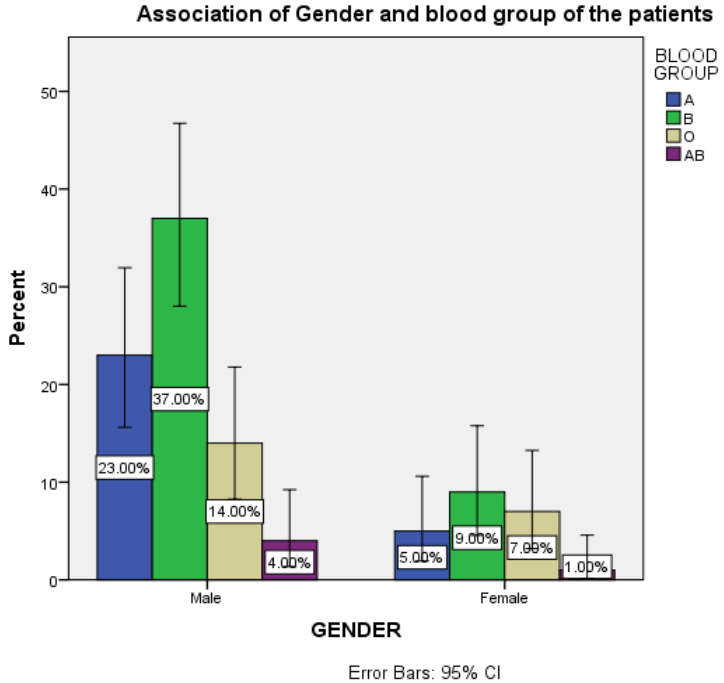

Figure 6: Bar graph representing the association between gender and blood groups of patients. X axis represents the gender of patients and Y axis represents the number of patients. Among males , 23% had A blood group, 37% had B blood group, 14% had O blood group and 4% had AB blood group. Among females, 5% had A blood group, 9% had B blood group, 7% had O blood group and 1% had AB blood group. (p value >0.05, statistically not significant).

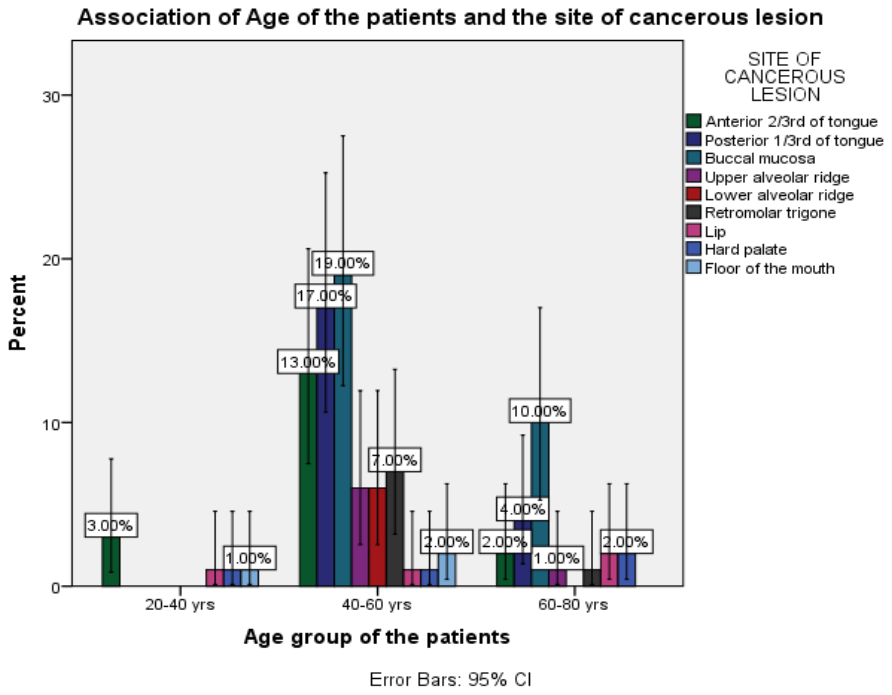

Figure 7: Bar graph representing the association between age group of patients and site of cancerous lesion. X axis represents the age group of patients and Y axis represents the number of patients. In the 20-40 years age group, Anterior 2/3rd of the tongue was the most common site of oral cancer. In the 40-60 years and 60-80 years age group, Buccal mucosa was the most common site of oral cancer followed by posterior 1/3rd of the tongue (p value >0.05, statistically not significant).

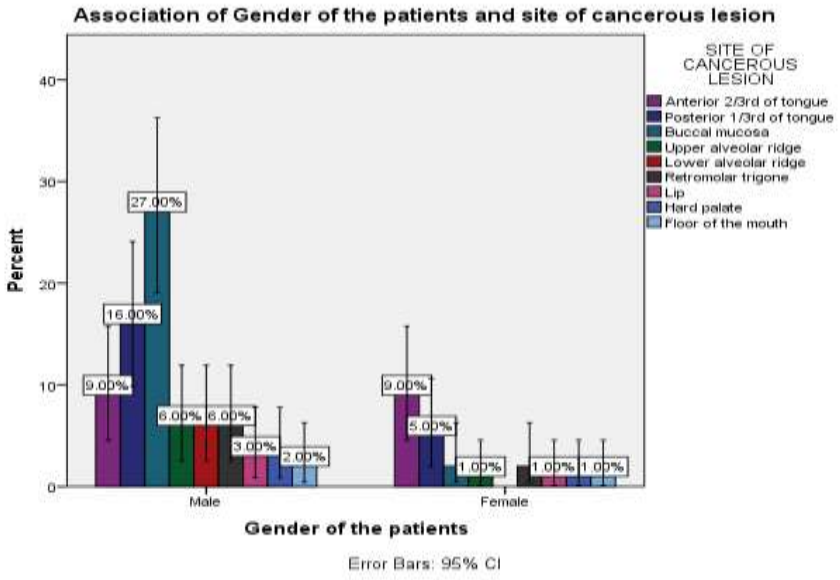

Figure 8: Bar graph representing the association between gender of the patients and site of cancerous lesion. X axis represents the gender of the patients and Y axis represents the number of patients. In males , the most common site of oral cancer was Buccal mucosa. In females, anterior 2/3rd of the tongue was found to be the most common site of oral cancer (p value >0.05, statistically not significant).

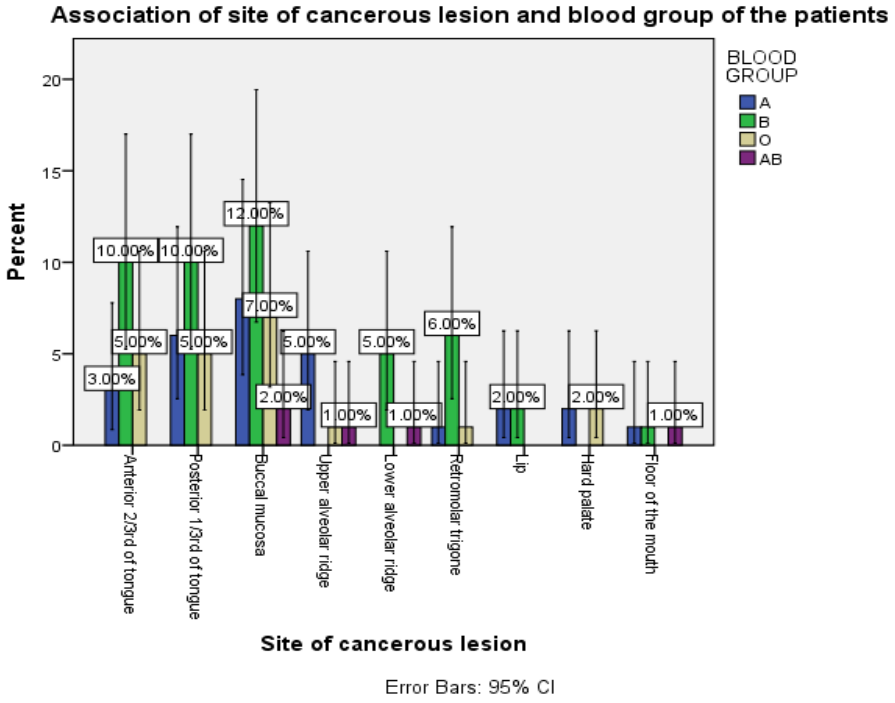

Figure 9: Bar graph representing the association between the site of cancerous lesion and the blood group of patients. X axis represents the site of cancerous lesions in patients and Y axis represents the number of patients belonging to various blood groups. Blood group B was most commonly associated with cancer involving various sites in the oral cavity. (p value >0.05, statistically not significant).

DISCUSSION

In this study, Oral cancer was found to be more prevalent among patients with B blood group. However the association of blood groups with oral cancer were not statistically significant. In accordance with our studies, previous research had shown that incidence of blood group B was higher (37.5%) in patients with oral cancer followed by blood group A (35%), O blood group (28%) and AB blood group (7.5%). Cancer of the buccal mucosa was also found to be more prevalent among patients with B blood group(30). However , other studies have shown that people with A blood group had 1.4 times higher risk of developing oral cancer followed by B blood group. O and AB blood groups were least susceptible to oral cancer(31).

Our study has shown that oral cancer was most commonly seen among the age group of 40-60 years and males had a higher prevalence of oral cancer than females. Buccal mucosa was found to be the most common site of oral cancer followed by posterior 1/3rd of the tongue. It is attributed to paan chewing, smoking etc(32). In previous studies, male:female ratio of oral cancer patients was found to be 2:1. And most of the patients were older than 50 years of age(33). Oral cancer was also considered as an age related disease , however in recent years an upward trend has been observed in the number of oral cancer cases among younger age groups and women(34).

Several mechanisms have been proposed by various authors explaining the relationship between oral cancer and ABO blood groups. Down regulation of glycosyltransferase which is involved in the biosynthesis of A and B antigens and the linkage disequilibrium between ABO genes with other genes help in promoting carcinogenesis(35). The deletion or reduction of A or B antigens in tumours of A or B blood group individuals is related to malignancy and metastatic potential of the tumour(36). It may be due to the lack of adhesiveness a cancer cell achieves when it loses the blood group antigens. Tumour cells may gain the ability to move and circulate throughout the body due to loss of blood antigens, because blood antigen loses its ability to express cell adhesion proteins like integrin and control cell movement(37,38).

A blood group antigen known as H antigen is present in all individuals irrespective of blood group types. H antigen is said to be the precursor for the formation of A and B antigens(39). In A and B blood groups patients , the precursor H antigen is converted to A and B antigens. However in O blood group individuals, H antigen remains in its original form. O blood group individuals have the highest amount of H antigen which offers protection against oral cancer. Therefore ,

people with O blood group were least susceptible to oral cancer(40). Therefore, the blood group of the individual needs to be considered with other risk factors to evaluate the patient's risk of oral cancer.

Limitations of the study

This study is limited by a few factors. The sample size can be expanded and it is also a short duration study. Some of the patients may be asymptomatic and may be left undiagnosed. The study also has geographical limitations since it is a hospital setting. Rh grouping was not considered in this study. However, various difficulties were faced when studying the association of blood groups and oral cancer , which includes doctors or clinicians with variations in levels of knowledge, skill and experience, inconsistencies in judgments and research bias.

Future scope of the study

A large sample size of patients from different ethnicities would give better results for the study. Other epidemiological studies covering extended time periods would help in collecting important information and validate the findings further. The significance of intraoral diagnosis during the overall clinical examination of the patient, especially for older patients and patients with smoking/tobacco chewing habits should be considered. Further studies on association of blood group and oral cancer should have adequate sample size for an accurate determination of the prevalence, causes and associated factors of anterior pulpectomy.

CONCLUSION

As the study indicates the susceptibility of B blood group followed by A blood group to the development of oral cancer, awareness needs to be spread among the mass. Early and regular cancer screening has to be advised to the patients of susceptible blood groups if any known and established etiologic factor like tobacco or alcohol abuse is found. The genetic and environmental factors should advance opportunities to better understand the control and development of cancer.

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CONFLICT OF INTEREST

Authors declare no potential conflict of interest

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