



## The correlation between ABO Blood Groups and Oral Cancer susceptibility- An Observational Study

Fithrath-E- Qudrath<sup>1\*</sup>, Dilbanu Trishna<sup>2</sup>, Farabi Ahmed<sup>3</sup>, Quazi Zakia Nusrat<sup>4</sup>, Jesmin Sultana<sup>5</sup>

<sup>1</sup>Registrar, Department of Transfusion Medicine, Labaid Cancer Hospital and Super Speciality Centre, Dhaka, Bangladesh

Email: qudrath16@gmail.com

Orcid ID: 0009-0007-8264-7789

<sup>2</sup>Assistant Professor, Department of Transfusion Medicine, International Medical College, Gazipur, Bangladesh.

Email: dilbanutrishna091@gmail.com

Orcid ID: 0009-0003-4869-5710

<sup>3</sup>Registrar, Department of Transfusion Medicine, Evercare Hospital, Dhaka, Bangladesh

Email: dr.farabidbst@gmail.com

Orcid ID: 0009-0001-3025-1789

<sup>4</sup>Assistant Professor, Department of Transfusion Medicine, Mugda Medical College, Dhaka, Bangladesh

Email: z.nusrat.suchana@gmail.com

Orcid ID: 0009-0003-8321-1224

<sup>5</sup>Junior Consultant, Department of Transfusion Medicine and Apheresis Centre, Delta Hospital Limited, Dhaka, Bangladesh

Email: jesmin.huq@gmail.com

Orcid ID: 0009-0001-4919-7911

\*Corresponding author

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### Abstract

**Background:** Oral cancer (OC) in Bangladesh accounts for about 40% of all cancers of the body. Since the majority of human cancers are derived from epithelial cell changes in blood group antigens, it is an important aspect of human malignancies. Recently, it has been suggested that the ABO blood group may affect the development of oral cancer. The aim of this study was to evaluate the association between ABO blood group type and OC. **Material & Methods:** This observational study was conducted in the Labaid Cancer Hospital and Super Speciality Center, Dhaka, Bangladesh during the period from April 2021 to January 2023. **Results:** In total 110 patients from both male and female patient who were histopathologically diagnosed of oral cancer were included in the study. In our study we found the most common age group affected in OC was 51-60 years and more in males. The most common site affected by OC was buccal mucosa. Blood group A patients were more common in OC. **Conclusion:** The presence of antigen A on cells may increase the risk of oral cancer according to our study, while blood type O was less common in these patients.

**Keywords:-** Oral cancer, ABO blood group, Rh.

## INTRODUCTION

Oral cancer is a prevalent and significant public health issue, being one of the commonly occurring malignant diseases. It accounts for approximately 5% of all cancers in humans.<sup>[1]</sup> According to the 2020 prediction by Globocan, oral cancer had an incidence rate of 8.9% in Bangladesh, ranking as the third most common cancer in males and the fifth most common in females.<sup>[2]</sup> In South East Asia, the cultural use of betel quid and various forms of tobacco are the

primary risk factors for oral cancer, making it the most prevalent type in the region. While the occurrence of oral cancer varies among Asian countries, the risk factors remain the same, including tobacco use through smoking or smokeless methods and betel nut chewing.<sup>[3]</sup> Many studies have indicated that genetic factors also have an influence on the etiology of cancer as the genes have been implicated in development and progression of oral cancer.<sup>[4]</sup> Additionally, ongoing research is exploring

other potential factors such as viral infections and variations in the expression of ABO blood group antigens that may contribute to the development of oral cancer.<sup>[5]</sup>

The knowledge of association between blood groups and disease frequencies evolved in the early part of the last century. Since then, we have come a long way in the study of association between blood groups and specific diseases, i.e. both systemic and oral diseases.<sup>[4]</sup> The potential connection between ABO blood groups and malignancy was initially investigated by Alexander in 1921. Following a long gap thereafter Aird et al. (1953) and Walter (1956) reported a close association between gastric cancer and blood group A.<sup>[6]</sup>

According to the reports of the World Health Organization, oral cancer ranks sixth among all malignancies in the world. Incidence rate is 12.8% men and 7% women.<sup>[7]</sup> It commonly occurs in elderly from fifth to sixth decades of life but rarely seen in younger age group. In buccal mucosa and tongue have been noted to be quiet common sites in Bangladesh. This study was conducted to investigate the association between ABO blood groups and oral cancer.

## Objectives

The main objective of the study was to evaluate the association between ABO blood group type and OC.

## MATERIAL AND METHODS

This was an observational study and was conducted in the Labaid Cancer Hospital and Super Speciality Center, Dhaka, Bangladesh

during the period from April 2021 to January 2023.

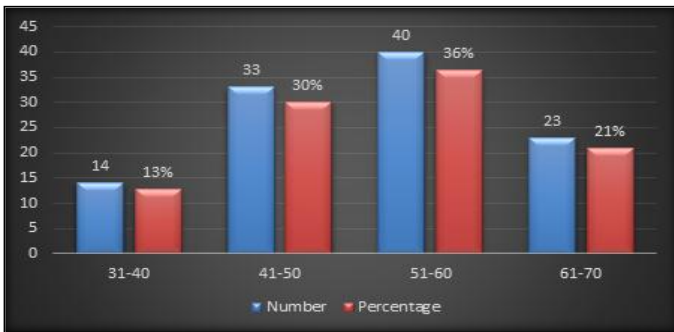
A total of 110 patients were included in the study. Both male and female patient who were histopathologically diagnosed of oral cancer were included in the study. Data regarding the patient's personal details, blood groups and Rh status, and oral habits of smoking/betel nut chewing, site of the tumor (6 different sites, i.e., buccal mucosa, tongue, vocal cord, gingivo-buccal sulcus, retromolar trigon, floor of the mouth), were obtained from their case sheets available in the hospital. Inclusion criteria included oral cancer based on histopathological examination and patients with unknown malignancies were excluded.

**Statistical Analysis:** All data were recorded systematically in preformed data collection form and quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed by using SPSS (Statistical Package for Social Sciences) for windows version 10. 95% confidence limit was taken.

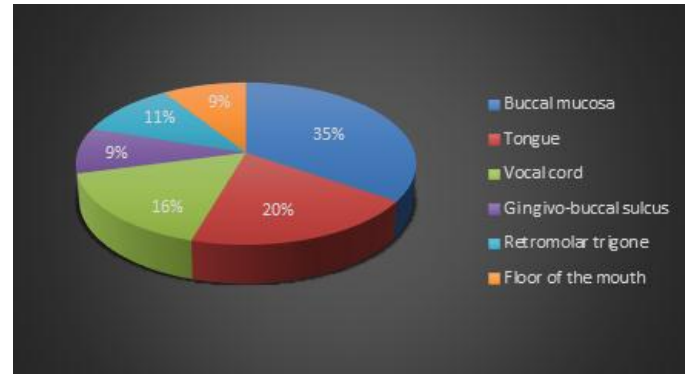
## RESULTS

[Figure 1] shows that majority (36%) of our patients were aged 51-60 years old, followed by 30% aged 41-50 years old. Among all participants 21% & 13% were aged between 61-70 years & 31-40 years old respectively. The mean age was  $48 \pm 12$  years.

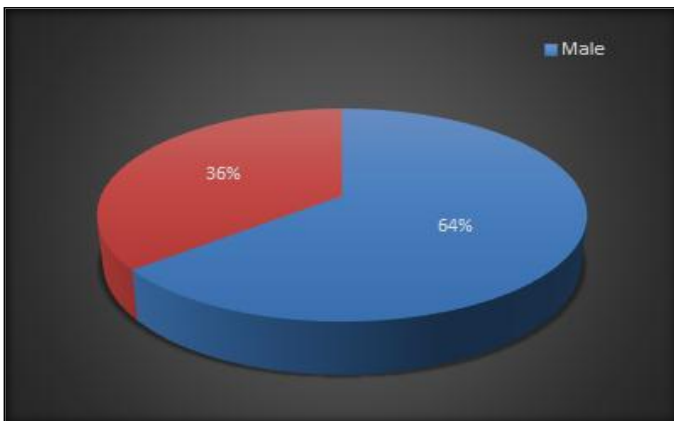
[Figure 2] shows the gender distribution of the patients where most of the patients (64%) were male and (36%) were female.



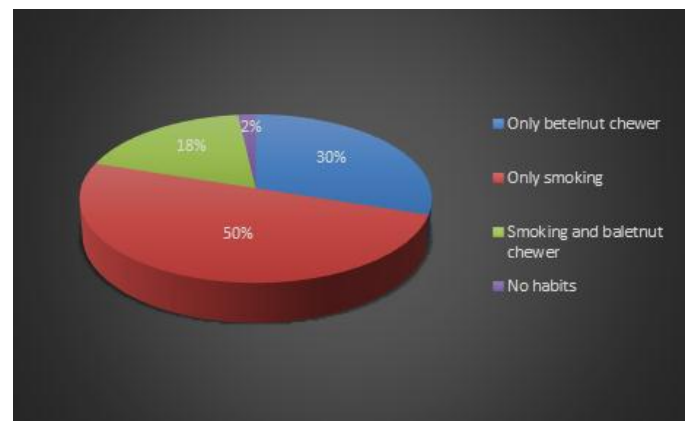
**Figure 1:** Age distribution of our study subjects (N=110)



**Figure 3:** Site distribution of patients



**Figure 2:** Distribution of our patients by gender (N=110)



**Figure 4:** Association of habits with oral cancer patients

**Table 1:** Site distribution of patients.

Site	Number	Percentage
Buccal mucosa	38	35
Tongue	22	20
Vocal cord	18	16
Gingivo-buccal sulcus	10	9
Retromolar trigone	12	11
Floor of the mouth	10	9

[Table 1] Site-wise distribution showed the buccal mucosa as the most common site (35%) for OC and least common in the floor of the mouth accounting for 9%.

[Table 2] association of habits with OC showed that a majority of OCs (50%) were associated with only smoking, followed by 30% were only betelnut chewer, 18% patients with multiple habits and 2% cases of OC was recorded because of their have no habits.

[Table 3] a majority of patients with blood Group A were affected by OC accounting for 45%, followed by blood Group 23% were B, 20% were O & 12% were AB.

**Table 2:** Association of habits with oral cancer patients.

Habits	N (110)	Percentage
Only betelnut chewer	33	30
Only smoking	55	50
Smoking and beletnut chewer	20	18
No habits	2	2

**Table 3:** Association of blood group Rh factors with oral cancer.

Blood type	Rh factor		Total (%)
	Rh +ve (N)	Rh -ve (N)	
A	35	15	45
B	15	10	23
AB	8	5	12
O	13	9	20

## DISCUSSION

Oral cancer is recognized as the sixth most common cancer worldwide. Having a good understanding of the risk factors and epidemiology of oral cancer can aid in the early detection and timely treatment of affected individuals. The male: female ratio (3.29:1) was reported higher than in most of other studies, except for a Greek populated-based study, where they found a ratio of 9.2:1.<sup>[8]</sup> The higher incidence of OC among males can be attributed to the easy acceptance of habits by males. The deleterious habits of tobacco and betel nut consumption as a means of stimulants renders males more susceptible to the development of OCs. Although the consumption of tobacco and betel nut in India is considered a taboo among females, the custom is gradually fading nowadays as females cutting across socioeconomic lines and age are turning to these habits. The average age of oral cancer patients, as recorded by the US National Cancer Institute, is 65 years.<sup>[9]</sup> In this study, the most affected age group was 51-60 years, with the youngest reported patient being 31 years old and the

oldest being 70 years old. A study conducted in Eastern India by Chattopadhyay reported a similar mean age of 52.07 years for oral cancer patients, which closely aligns with the findings of the present study ( $51.25 \pm 13.66$  years).<sup>[10]</sup> According to Philips et al., it was believed that 25-year latency exists between the initial exposure to a carcinogen and the development of a clinically recognizable cancer.<sup>[11]</sup> This could be explained by the fact that, ease with which tobacco, betel nut, and related products are available at very affordable prices in the market, leading to youth adopting this pernicious habit in the country. The occurrence of OC differs widely according to various epidemiological studies. In this study, Buccal mucosa (35%) especially the most frequent site because most of the patients tend to keep the tobacco quid that close to Buccal mucosa. A study in western Uttar Pradesh reported that the buccal mucosa was the most common OC site, followed by retromolar area, floor of mouth, and lateral border of tongue.<sup>[12]</sup> In the present study, tongue (20%) was reported as the second most common site of OC and gingivo buccal sulcus





and retromolar trigone OC being reported least, this could be due to regional difference in consumption of various deleterious habits. The rampant use of chewable tobacco can be linked to the relatively high incidence of involvement of buccal tissues, as associated potentially malignant mucosal lesions located in the cheeks are also more common in South Central Asian countries, possibly related to the tobacco chewing habits.<sup>[13]</sup> In our study, the third most commonly involved anatomical site observed was the Vocal cord (16%), while in western countries, it was observed as the most common subsite of OC in every race/ethnicity. In Bangladesh, besides betel nut quid chewing, the trends of alcohol consumption show an increasing intake in recent decade, a sign of the westernization of cultural habits that influence OC incidence. In our study, maximum number (50%) of OC patients reported with only smoking. The habit of betelnut chewing alone (30%) was noted as the second most common cause deleterious habit noted among the OC patients, as long term areca nut chewing can cause oral submucous fibrosis which itself is a premalignant condition. Many researchers have studied the relationship between ABO blood groups and oral cancer.<sup>[14]</sup> Red blood cell membranes contain blood group antigens in addition to epithelial cells of various other tissues, including the oral mucosa. Therefore, certain blood group is considered more prone to develop premalignancy and subsequently convert to malignancy. The relative downregulation of glycosyltransferase that is involved in the biosynthesis of A and B antigen is observed in involvement with tumor development.<sup>[15]</sup> The precursor for the formation of A and B antigen is H antigen which is present in all the individuals irrespective of

blood group types. In A and B blood group people, H antigen is converted into A and B antigens, whereas H antigen remains in its original form in O blood group individuals. People with O blood groups have the highest amount of H antigen which affords protection, hence the least susceptible to develop OC.<sup>[16]</sup> In our study, blood group A patients were more commonly affected by OC which accounts for 45% of cases, followed by blood group B and least common was blood group AB. Jaleel and Nagarajappa conducted a study to evaluate whether ABO blood groups are associated with an increased risk for OC.<sup>[17,18,19]</sup> The results showed that people with blood group A had 1.46 times higher risk of developing OC compared to people of other blood groups. Very few studies have reported the relationship between the Rh factor and malignancies. In our study, there was no relationship between the Rh factor and OC; the results were accordance with Motazavi et al.'s study.<sup>[20]</sup>

### Limitations of the study

Our study had many limitations. Firstly, to detect an association between the ABO blood group and oral cancer, salivary gland, and other soft-tissue malignancies of maxillofacial region were not included. Future studies with larger sample size in different geographical areas are required to better elucidate this topic. Similar studies regarding the relationship of ABO blood group and other types of cancers are also recommended.

### CONCLUSIONS

According to our study, the presence of antigen A on cells may increase the risk of oral cancer, whereas O blood type was less common in these

patients. Given the higher prevalence of oral cancer in A blood type and people over the age of 50, we can target people over the age of 50 with A blood type who are used to smoking and

teach them that they are more susceptible to oral cancer, compared to people with other blood types. We can also consider a screening schedule for this group.

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