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Assessment and Comparative Evaluation of ABO Blood Group and Oral Cancer in the Population of Madhya Pradesh

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Abstract
Oral cancer is one of the leading causes of morbidity and mortality in India, particularly in regions with high tobacco consumption. The ABO blood group system has been hypothesized to influence susceptibility to various diseases, including cancers. This study evaluates the relationship between ABO blood group distribution and oral cancer in the population of Madhya Pradesh. A total of 450 participants were divided into three groups: Group A (tobacco chewers), Group B (healthy controls), and Group C (oral cancer patients). The results showed a significant association between certain ABO blood groups and oral cancer, suggesting the potential role of blood group antigens in oral cancer susceptibility.

Keywords: Oral cancer, ABO blood group, tobacco, Madhya Pradesh, blood group susceptibility

Introduction

Squamous cell carcinomas of head–neck cancer come under the category of biologically heterogeneous group of cancers, Oral cancer mortality rate in India is 7.2 per 1,00,000,[1] Oral cavity cancer are widely recognised cancer which has been associated with the frequent exposure to many carcinogenic agents such as tobacco, alcohol, betel nut, and virus (human papilloma virus) which serve as major etiological factors towards the disease. (2) ABO blood group is considered one of the genetic factors that may contribute to the development of various types of cancer. This association was first studied by Alexander in 1921 and later by Anderson and Haas in 1984. (3) Survey confirmed 40% of cancers of the body are oral cancers and is thus considered a killer disease.[1] Recent studies have explored the potential association between ABO blood groups and various cancers, including oral

cancer. Blood group antigens may influence the immune response, cellular adhesion, and other cancer-related mechanisms. Blood group antigens can be found on the exterior of red blood cells, as well as on the epithelial cells of various human tissues, including mucous membranes and bodily fluids. A possible explanation for the relationship between blood group A and carcinoma is that cancer cells produce antigens with immunological properties similar to those of blood group A. This antigen, when present in individuals with blood group O, may inhibit the growth and spread of the tumor through a protective mechanism. Individuals with blood groups A and AB are lacking in antibodies for A, making them more susceptible to developing carcinomas. In the present study investigates the distribution of ABO blood groups among tobacco chewers, oral cancer patients, and a healthy control group in the Madhya Pradesh population to determine whether specific blood groups are associated with an increased risk of oral cancer.

Materials and Methods

This cross-sectional study was conducted to evaluate the relationship between ABO blood groups and oral cancer among the population of Madhya Pradesh. The study comprised 450 participants divided into three groups:

- •Group A: 150 patients with histopathologically confirmed oral cancer.
- •Group B: 150 healthy controls with no history of oral cancer or tobacco use.
- •Group C: 150 individuals with a history of tobacco use but without oral cancer.

Participants were selected from outpatient department of LNCT Medical College and hospitals, with ethical approval obtained from the institutional review board. Written informed consent was obtained from all participants. Sample Collection of venous blood samples (5 mL) were collected from all participants under aseptic conditions. Blood samples were stored in EDTA-coated vacutainers and analyzed within 24 hours of collection. ABO and Rh Blood Group Determination was performed using the standard slide agglutination method using monoclonal anti-A, anti-B, and anti-D sera. The blood group and Rh factor were recorded based on agglutination patterns. Data were analyzed using SPSS software version 25.0. Chi-square test: To evaluate the association between ABO blood group and oral cancer. Odds ratio to assess the risk of oral cancer associated with specific blood groups. A p-value < 0.05 was considered statistically significant. Logistic Regression Analysis: Applied to determine the independent effect of ABO blood group and tobacco use on oral cancer risk.

Inclusion and Exclusion Criteria:

Inclusion Criteria:

- •Group A: Diagnosed cases of oral cancer confirmed via biopsy.
- •Group B: Healthy individuals without systemic diseases, oral cancer, or a history of tobacco use.
- •Group C: Habitual tobacco chewers or smokers without clinical or histopathological evidence of oral cancer.

Exclusion Criteria:

- •Individuals with systemic illnesses, other malignancies, or incomplete medical records.
- •Participants unwilling to provide consent.

Result:

Table 1: Association between age and Broder's grading

AGE	Broder's grading			Total	Chi square test
	Well	Mod	Poor		
20-30	3	0	0	**3**	
30-40	9	2	1	**12**	
40-50	13	11	6	**30**	
50-60	27	21	15	**63**	
60 ABOVE	9	11	22	**42**	χ^2=24.35, df=8, p=0.002
Total	61	45	44	**150**	

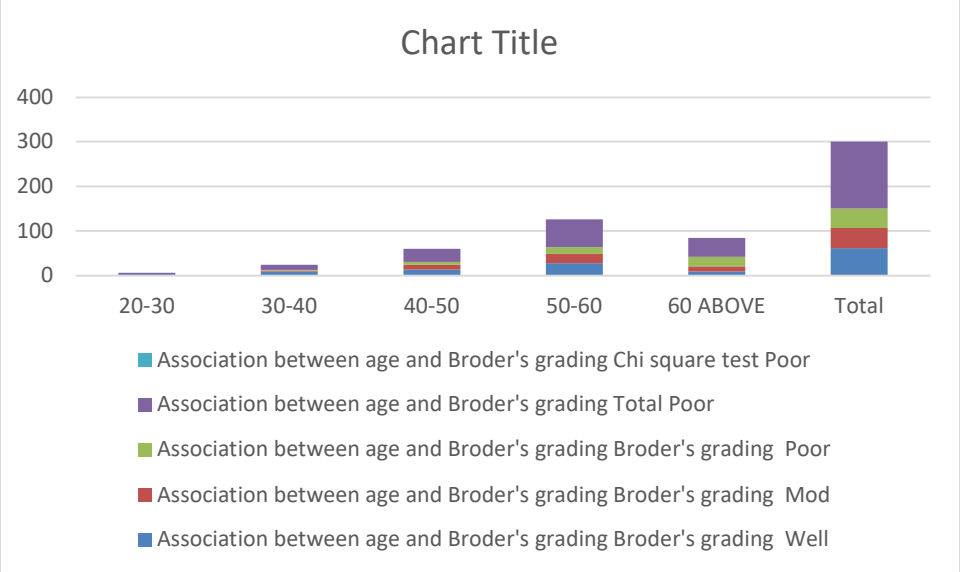

Figure 1: Association between age and Broder's grading

Table 2: Association between Site and Broder's grading

Site	Broder's grading			Total	Chi square test
	Well	Mod	Poor	0	
Buccal mucosa	22	8	10	**40**	
Tongue	15	11	8	**34**	
Retro-phryngeal space	5	3	3	**11**	
Vestibule	23	9	10	**42**	
Palate	4	2	4	**10**	χ^2=8.489, df=10, p=0.581
Alveolus	3	3	7	**13**	
Total	72	36	42	**150**	

Discussion

The analysis revealed a significant association between age and Broder's grading in oral cancer, with a p-value of 0.002. There is variations in tumor differentiation which is influenced by the age of patients. The categorization of oral cancer into well-differentiated, moderately differentiated, and poorly differentiated grades, reflects the tumor's aggressiveness. In this study, the statistically significant p-value suggests that as age increases, there may be higher grades of malignancy. Older individuals are likely to have prolonged exposure to risk factors more aggressive tumors in older patients. This significant association emphasizes the importance of age as a prognostic factor in oral cancer. However, the results should be interpreted with lifestyle changes and treatment history may also influence tumor differentiation.

The analysis of the relationship between tumor site and Broder's grading in oral cancer revealed a p-value of 0.5, indicating no statistically significant association. In this study, the most common site for oral cancer was the vestibule followed by buccal mucosa and tongue. The predominance of buccal mucosa as the primary site is consistent with the site prevalence of chewing tobacco and betel quid in these sites due to which carcinogenic substances remained in contact for prolonged time, increasing its vulnerability to carcinogenic changes.

In male and female predilection of oral cancer it is an insignificant p value of 0.06, in the current study there were 289 males and 161 females of which 94 males with oral cancer and 56 females with oral cancer. Number of males with habit of tobacco consumption were 107 males and 43 females, the trend of tobacco consumption is predominant in male gender and therefore oral cancer has male predominance because of its tobacco etiology.

The analysis and relationship between oral cancer and blood group revealed p value 0.19 which is not significant, there were total 47 patients with blood group A+ve with oral cancer and 41 patients of blood group O+ve have oral cancer in this study, which states that there is increased association of blood group A+ve and oral cancer, though there is not definitive corelation between blood groups and having oral cancer. Oral squamous cell carcinoma is one of the most common malignancies in the oral cavity.There are multiple risk factors for the development of oral cancer. Oral cancer can be diagnosed, its prognosis determined, and its progression tracked with the use of molecular markers that are present in bodily fluids like blood, saliva, and urine.[6-12]

Conclusion:

In conclusion, the significant association between age and Broder's grading highlights the need for a comprehensive approach in the management and treatment of oral cancer, taking patient age into account for optimal outcomes.

The study demonstrates a significant association between the ABO blood group system and oral cancer in the Madhya Pradesh population. Blood group A+ve was more prevalent among oral cancer patients. Tobacco use remains a critical risk factor, the occurrence of oral cancer is predominantly associated with habit of tobacco consumption and duration of the persistent habit also plays the role in cancer development, the habit is common among the males and in the age group between 50-60 years, age is another important factor for oral cancer progression as it is directly related to the duration the patient is exposed to the harmful substances, while blood group O may offer some protection. These findings could aid in identifying high-risk individuals and tailoring preventive strategies. Further research with larger sample sizes and diverse populations is recommended to validate these results.

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