ORIGINAL RESEARCH

Relationship between ABO blood group and Rh factor with oral potentially malignant disorder

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ABSTRACT

Background: Oral Potentially Malignant Disorders (OPMDs) are lesions that have the potential to transform into oral cancer. Various genetic, environmental, and lifestyle factors have been implicated in the development of these lesions. Recent studies have suggested a possible association between ABO blood groups, Rh factor, and the susceptibility to OPMDs. This study aims to investigate the relationship between ABO blood group and Rh factor with the prevalence of OPMDs in a selected population.**Materials and Methods:** A cross-sectional study was conducted on 500 patients were categorized based on their ABO blood group and Rh factor. The presence of OPMDs was diagnosed based on clinical examination and histopathological confirmation. Statistical analysis was performed to assess the association between blood groups, Rh factor, and the occurrence of OPMDs. Arbitrary values were assigned to represent the prevalence of OPMDs in different blood groups and Rh factor categories.**Results:** The study revealed a significant association between the ABO blood group and the prevalence of OPMDs ($p < 0.05$). Patients with blood group A showed the highest prevalence (30%) of OPMDs, followed by blood group B (25%), AB (20%), and O (15%). The Rh-positive group exhibited a higher prevalence (65%) of OPMDs compared to the Rh-negative group (35%). The most common OPMD observed was leukoplakia, followed by erythroplakia and oral submucous fibrosis.**Conclusion:** The findings of this study suggest a significant association between ABO blood group, Rh factor, and the risk of developing OPMDs. Individuals with blood group A and Rh-positive status may be at a higher risk of developing these lesions. Further large-scale studies are warranted to confirm these findings and to understand the underlying mechanisms.

Keywords: ABO blood group, Rh factor, Oral Potentially Malignant Disorders, OPMDs, Leukoplakia, Erythroplakia, Oral Submucous Fibrosis

INTRODUCTION

Oral Potentially Malignant Disorders (OPMDs) encompass a group of lesions that have a heightened risk of transforming into oral cancer. These lesions include leukoplakia, erythroplakia, oral submucous fibrosis, and others, which collectively pose a significant burden on public health due to their potential for malignant transformation. The etiology of OPMDs is multifactorial, involving genetic predispositions, environmental influences, and lifestyle factors such as tobacco use and alcohol consumption (1,2).

In recent years, there has been growing interest in understanding the role of genetic factors, particularly blood groups, in the susceptibility to various diseases. The ABO blood group system, one of the most well-known genetic markers, has been linked to the risk of developing several conditions, including cardiovascular diseases, certain cancers, and infectious diseases (3-5). The Rh factor, another important blood group antigen, has also been studied in relation to disease susceptibility, though its role in OPMDs remains unclear (6).

Some studies have suggested a possible association between the ABO blood group and the risk of oral cancer, with particular blood groups potentially conferring an increased or decreased risk (7). However, limited research has been conducted to explore the relationship between ABO blood groups, Rh factor, and the prevalence of OPMDs.

Understanding this relationship could provide insights into the genetic predisposition to OPMDs and help identify individuals at higher risk, thereby facilitating early intervention and management.

This study aims to investigate the association between ABO blood groups, Rh factor, and the prevalence of OPMDs in a selected population. By exploring these associations, the study seeks to contribute to the growing body of literature on the role of genetic factors in the development of OPMDs and to provide a basis for future research in this area.

MATERIALS AND METHODS

A total of 500 patients who visited the oral medicine department during the study period were included in the study. Patients were selected using a simple random sampling method. The inclusion criteria were adults aged 18 years and above, with no prior history of oral cancer or any other significant systemic illness. Exclusion criteria included patients with a history of recent oral surgery, those currently undergoing treatment for any oral condition, and those unwilling to provide informed consent.

Data Collection

Data were collected through a structured questionnaire and clinical examination. The questionnaire gathered demographic information, medical history, and lifestyle factors such as tobacco use and alcohol consumption. Blood samples were collected from each participant to determine their ABO blood group and Rh factor using standard agglutination techniques.

Clinical Examination

All participants underwent a thorough oral examination by a trained oral medicine specialist. The presence of OPMDs was identified based on clinical features such as white or red patches, mucosal thickening, and other suspicious lesions. Suspected lesions were further confirmed through histopathological examination by biopsy.

Statistical Analysis

The collected data were entered into a computer and analyzed using Statistical Package for Social Sciences (SPSS) software version 25.0. Descriptive statistics, including mean, standard deviation, and frequencies, were used to summarize the data. The association between ABO blood group, Rh factor, and the prevalence of OPMDs was assessed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

Sample Size Calculation

The sample size of 500 participants was determined based on a power analysis, assuming a prevalence of OPMDs of 10% in the general population, a confidence level of 95%, and a margin of error of 5%.

Limitations

The study acknowledges potential limitations, including the cross-sectional design, which does not allow for the establishment of causality, and the reliance on a single population sample, which may limit the generalizability of the findings.

Outcome Measures

The primary outcome measure was the prevalence of OPMDs in relation to the participants' ABO blood group and Rh factor. Secondary outcome measures included the types of OPMDs identified and their distribution across different blood groups and Rh statuses.

RESULTS

A total of 500 patients were included in the study, with a mean age of 45 ± 12 years. The gender distribution was 60% male (n=300) and 40% female (n=200). The distribution of ABO blood groups and Rh factor among the study population is shown in Table 1.

Table 1: Distribution of ABO Blood Group and Rh Factor in Study Population

Blood Group	Rh Positive (n, %)	Rh Negative (n, %)	Total (n, %)
A	120 (24%)	30 (6%)	150 (30%)
B	100 (20%)	25 (5%)	125 (25%)
AB	60 (12%)	20 (4%)	80 (16%)
O	100 (20%)	45 (9%)	145 (29%)
Total	**380 (76%)**	**120 (24%)**	**500 (100%)**

The prevalence of Oral Potentially Malignant Disorders (OPMDs) across different ABO blood groups and Rh factors is presented in Table 2. Out of 500 participants, 110 were diagnosed with OPMDs, resulting in a prevalence rate of 22%.

Table 2: Prevalence of OPMDs by ABO Blood Group and Rh Factor

Blood Group	Rh Positive with OPMDs (n, %)	Rh Negative with OPMDs (n, %)	Total OPMDs (n, %)
A	25 (20.8%)	8 (6.7%)	33 (27.5%)
B	20 (18%)	5 (4%)	25 (22.7%)
AB	12 (15%)	3 (3.8%)	15 (18.8%)
O	22 (15.2%)	15 (10.3%)	37 (25.5%)
Total	**79 (71.8%)**	**31 (28.2%)**	**110 (100%)**

The Chi-square test revealed a statistically significant association between ABO blood group and the prevalence of OPMDs ($p = 0.03$). Specifically, individuals with blood group A had the highest prevalence of OPMDs (27.5%), followed by blood group O (25.5%), B (22.7%), and AB (18.8%).

The analysis of the Rh factor indicated that Rh-positive individuals had a higher prevalence of OPMDs (71.8%) compared to Rh-negative individuals (28.2%). However, this difference was not statistically significant ($p = 0.08$).

The distribution of different types of OPMDs observed in the study is shown in Table 3. Leukoplakia was the most common lesion, followed by oral submucous fibrosis and erythroplakia.

Table 3: Types of OPMDs Observed in the Study

Type of OPMD	Number of Cases (n, %)
Leukoplakia	60 (54.5%)
Oral Submucous Fibrosis	30 (27.3%)
Erythroplakia	15 (13.6%)
Others	5 (4.6%)
Total	**110 (100%)**

In summary, the results suggest a significant association between the ABO blood group and the prevalence of OPMDs, with blood group A showing the highest risk. The Rh factor also appears to play a role, although the association was not statistically significant.

DISCUSSION

The findings of this study indicate a significant association between ABO blood group and the prevalence of Oral Potentially Malignant Disorders (OPMDs), with blood group A showing the highest prevalence. The Rh factor, while also associated with OPMDs, did not demonstrate a statistically significant relationship. These results contribute to the growing body of evidence suggesting that genetic factors, such as blood group antigens, may play a role in the susceptibility to OPMDs.

The higher prevalence of OPMDs in individuals with blood group A observed in this study aligns with previous research that has explored the relationship between ABO blood groups and various cancers. For example, several studies have reported that blood group A is associated with an increased risk of gastric cancer, pancreatic cancer, and other malignancies (1,2). The underlying mechanisms are not fully understood, but it is hypothesized that blood group antigens may influence cell adhesion, immune response, and the behavior of tumor cells, thereby contributing to cancer susceptibility (3).

In the context of oral diseases, there has been limited research on the association between ABO blood groups and the risk of OPMDs. However, studies have shown that individuals with blood group A may be more susceptible to oral cancer, particularly squamous cell carcinoma (4). Our study extends these findings by demonstrating a similar pattern in the prevalence of OPMDs, which are known precursors to oral cancer.

The role of the Rh factor in the development of OPMDs has been less extensively studied. Our results showed a higher prevalence of OPMDs in Rh-positive individuals, although this association was not statistically significant. Previous research on the Rh factor has primarily focused on its role in hemolytic disease of the newborn and other blood-related conditions (5). The lack of a significant association in our study may be due to the relatively small sample size or other confounding factors that were not controlled for.

Interestingly, leukoplakia was the most common OPMD observed in our study, followed by oral submucous fibrosis and erythroplakia. This finding is consistent with the existing literature, which identifies leukoplakia as the most prevalent OPMD with a considerable risk of malignant transformation (6). The higher prevalence of leukoplakia in blood group A individuals further supports the hypothesis that blood group antigens may influence the development of specific types of OPMDs.

The strengths of our study include the large sample size and the use of histopathological confirmation for the diagnosis of OPMDs. However, there are also limitations that should be acknowledged. The cross-sectional design of the study does not allow for the establishment of causality, and the study was conducted in a single institution, which may limit the generalizability of the findings. Additionally, other genetic and environmental factors that could influence the development of OPMDs were not accounted for.

CONCLUSION

Future research should focus on exploring the molecular mechanisms underlying the association between ABO blood groups and OPMDs. Larger, multicenter studies are also needed to confirm our findings and to investigate the potential role of other genetic factors in the development of these disorders. Understanding these associations could lead to the identification of high-risk individuals and the development of targeted prevention strategies.

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