Dr. J. B. Ashraf Ali M.D.

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Association of ABO Blood Groups with Peptic Ulcer Disease and Gastric Carcinoma

Dr. J. B. Ashraf Ali M.D.[1*], Dr. S. Jeyakumar M.D. [2]

[1*]Associate Professor, Department of Physiology, Government Thiruvarur Medical College, Thiruvarur. Tamilnadu, India.

[2] Assistant Professor, Department of Physiology, Government Medical College, Virudhunagar, Tamilnadu, India.

Abstract

Background: The ABO blood group system has been consistently associated with susceptibility to various gastrointestinal diseases, notably peptic ulcer disease and gastric carcinoma, as evidenced by epidemiological studies. However, data from Indian populations, particularly in hospital-based observational contexts, remain sparse. Methods: This prospective observational study involved 40 patients diagnosed with either peptic ulcer disease or gastric carcinoma, all of whom underwent upper gastrointestinal endoscopy at a tertiary care teaching hospital. The cohort comprised 20 patients with peptic ulcer disease and 20 with gastric carcinoma. ABO blood grouping was conducted using the rapid-slide agglutination method. The frequency distribution of ABO blood groups was analyzed separately for peptic ulcer disease and gastric carcinoma. Results: Among the patients with peptic ulcer disease, blood group O was the most prevalent, identified in 11 patients (55%), followed by blood groups A, B, and AB. In contrast, blood group A was predominant among patients with gastric carcinoma, observed in 14 patients (70%). Individuals with blood group O exhibited a higher relative risk for peptic ulcer disease, whereas those with blood group A demonstrated a higher relative risk for gastric carcinoma compared to other blood groups. Conclusion: This study corroborates the association between blood group O and peptic ulcer disease, as well as between blood group A and gastric carcinoma. These findings underscore the potential influence of genetic and biological factors linked to ABO blood groups in the pathogenesis of gastrointestinal diseases. Further extensive studies incorporating additional risk factors are necessary to elucidate these associations.

Introduction

The ABO blood group system represents one of the most thoroughly investigated genetic polymorphisms in humans.[1] These blood groups are inherited, remain unchanged throughout an individual's life, and are determined by the presence or absence of specific antigens on the surface of erythrocytes. Beyond their critical role in transfusion medicine, ABO blood groups have been linked to susceptibility to various diseases, indicating a potential role in disease pathogenesis rather than merely serving as neutral genetic markers. [2]

These associations have prompted extensive research into the role of ABO blood groups in the development and progression of various pathological conditions. Studies suggest that certain blood groups may influence the risk of cardiovascular diseases, infections, and even some cancers. Understanding these links could provide valuable insights into disease mechanisms and potential therapeutic targets.[3]

Among systemic disorders, gastrointestinal diseases exhibit the most consistent correlations with ABO blood groups. [4] Notably, peptic ulcer disease and gastric carcinoma have shown reproducible associations across diverse populations. Initial observations identified a higher prevalence of blood group O among individuals with peptic ulcer disease and an increased occurrence of blood group A among those with gastric carcinoma. These associations have been corroborated by subsequent epidemiological and clinical studies, although the underlying mechanisms remain elusive. [5]

These patterns suggest a potential role of ABO antigens in modulating host susceptibility to certain gastrointestinal pathologies.[6] Hypotheses include the influence of blood group antigens on mucosal integrity, immune response, and microbial interactions. Further research is needed to elucidate the precise biological mechanisms underlying these epidemiological associations.[7]

Several biological explanations have been proposed to elucidate these associations. Individuals with blood group O reportedly have higher gastric acid secretion, which may predispose them to mucosal injury and ulcer formation.[8] Conversely, blood group A has been associated with alterations in mucosal glycoproteins and secretor status, potentially affecting susceptibility to malignant transformation of the gastric epithelium. Thus, the interaction between ABO antigens, secretor status, gastric mucosal defense, and host immune response may contribute to disease risk. [9]

Despite extensive international literature, data examining the relationship between ABO blood groups and upper gastrointestinal diseases in Indian hospital-based populations are relatively limited. Understanding these associations in local populations may help clarify genetic predispositions and support risk stratification in clinical practice in the future.

This study aimed to evaluate the frequency distribution of ABO blood groups among patients diagnosed with peptic ulcer disease and gastric carcinoma who underwent upper gastrointestinal endoscopy at a tertiary care teaching hospital.

Materials and Methods

Study design and setting

This prospective observational study was conducted at a tertiary care teaching hospital in South India. The study encompassed patients who underwent upper gastrointestinal endoscopy at Thanjavur Medical College and Hospital during the period from April 2015 to August 2015.

Study Population: A total of 40 patients diagnosed with either peptic ulcer disease or gastric carcinoma were included in the study. Of these, twenty patients had endoscopically confirmed peptic ulcer disease, and twenty were diagnosed with gastric carcinoma. Participants were recruited from the general community in and around Thanjavur, referred for upper gastrointestinal endoscopy based on clinical indications.

Inclusion and Exclusion Criteria: Patients of either sex who underwent upper gastrointestinal endoscopy and were diagnosed with peptic ulcer disease or gastric carcinoma were included. Patients with incomplete clinical data or indeterminate endoscopic findings were excluded from the study.

Endoscopic Evaluation: Upper gastrointestinal endoscopy was performed according to standard medical procedures by an experienced gastroenterologist. Peptic ulcer disease and gastric carcinoma were diagnosed based on endoscopic findings and relevant clinical correlations.

ABO Blood Group Determination: ABO blood grouping was conducted for all study participants using the standard rapid-slide agglutination method. Blood grouping was performed at the central laboratory of Thanjavur Medical College and Hospital following routine laboratory protocols.

Data Collection: Demographic and clinical information, including age, sex, diagnosis, and ABO blood group, were recorded for each patient at the time of evaluation. All collected data were entered into a structured data collection format for analysis.

Statistical Analysis: Data were analyzed using descriptive statistical methods. The frequency and percentage distributions of ABO blood groups were calculated separately for patients with peptic ulcer disease and gastric carcinoma. Relative risk estimates were derived by comparing the frequency of specific blood groups within each disease category with that of other blood groups. Due to the limited sample size, inferential statistical testing was not emphasized, and the results were interpreted cautiously.

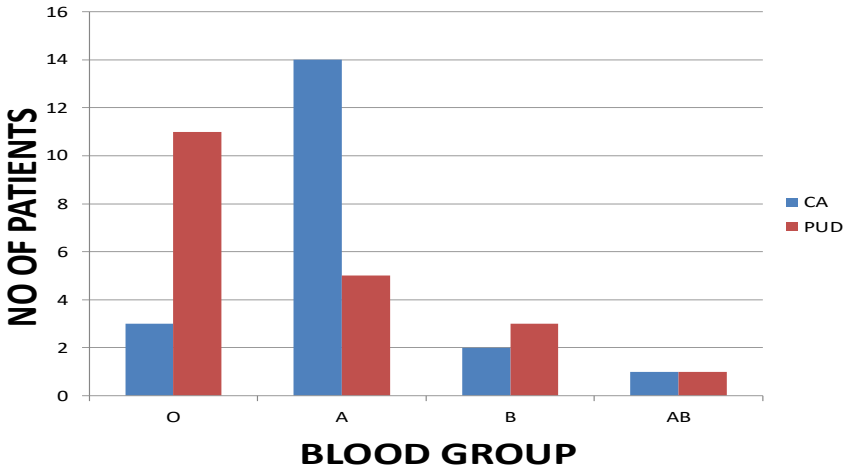
Ethical Considerations: This observational study did not involve any additional interventions beyond the standard diagnostic and laboratory procedures. Patient confidentiality was maintained throughout the study, and all data was anonymized prior to analysis. This study was conducted in accordance with institutional ethical standards.

Results

The study included a total of 40 patients, with 20 diagnosed with peptic ulcer disease and 20 diagnosed with gastric carcinoma. The distribution of ABO blood groups was analyzed separately for each disease cohort.

Distribution of ABO Blood Groups in Peptic Ulcer Disease: Among the 20 patients with peptic ulcer disease, blood group O was the most prevalent, observed in 11 patients (55%). Blood group A was identified in five patients (25%), blood group B in three patients (15%), and blood group AB in one patient (5%). Patients with blood group O demonstrated a higher relative frequency of peptic ulcer disease compared to those with other blood groups. The estimated relative risk of developing peptic ulcer disease among individuals with blood group O was approximately 2.2 times higher than that among individuals with non-O blood groups.

Distribution of ABO Blood Groups in Gastric Carcinoma: Among the 20 patients diagnosed with gastric carcinoma, blood group A was the predominant blood group, observed in 14 patients (70%). Blood group O was identified in three patients (15%), blood group B in two patients (10%), and blood group AB in one patient (5%).



Patients with blood group A exhibited a higher relative frequency of gastric carcinoma compared to patients with other blood groups. The estimated relative risk of developing gastric carcinoma among individuals with blood group A was approximately 2.3 times higher than that observed among individuals with non-A blood groups.

Discussion

The present study elucidates a marked predominance of blood group O among patients with peptic ulcer disease and blood group A among those with gastric carcinoma. These findings align with long-standing epidemiological observations, indicating a correlation between ABO blood groups and susceptibility to specific gastrointestinal diseases. [4]

The association between blood group O and peptic ulcer disease has been acknowledged for nearly a century. Numerous large-scale, population-based studies have documented a higher incidence of gastric and duodenal ulcers among individuals with blood group O compared to those with other blood groups. [5] Proposed mechanisms include increased gastric acid secretion and variations in mucosal protection associated with ABO antigens. Individuals with blood group O reportedly exhibit higher basal and stimulated acid output, potentially predisposing them to mucosal injury and ulcer formation. [10]

Conversely, blood group A is consistently linked with an elevated risk of gastric carcinomas. Alterations in gastric epithelial glycoproteins and ABO antigen expression have been suggested to influence cell adhesion, immune surveillance, and inflammatory responses, potentially facilitating malignant gastric transformation. [11]

The role of secretor status has also been emphasized, as approximately three-quarters of individuals secrete ABO antigens into their saliva and gastric secretions, which may modify the gastric microenvironment and susceptibility to neoplastic changes. The biological plausibility of these associations is further supported by studies examining the interactions between ABO blood groups and host response to gastric mucosal injury. [12]

Variations in the inflammatory response, epithelial integrity, and susceptibility to chronic infection may contribute to the observed disease patterns. Although Helicobacter pylori infection is a well-established risk factor for both peptic ulcer disease and gastric carcinoma, data regarding the infection status were unavailable in the present study. ABO blood group–related differences in immune responses to such infections may partially explain the observed associations. [13]

The findings of this study should be interpreted in light of certain limitations. The sample size was relatively small, and the study was conducted at a single center, which may limit the generalizability of our results. Additionally, the absence of data on Helicobacter pylori infection, dietary factors, lifestyle variables, and secretor status restricts the ability to explore potential confounding factors or underlying mechanisms in detail.[14–16] Therefore, statistical inference was approached cautiously, with an emphasis on observed trends rather than definitive causal conclusions.

Despite these limitations, the present study contributes to the existing evidence supporting the relationship between ABO blood groups and susceptibility to peptic ulcer disease and gastric carcinoma. The consistency of these findings with those of previous studies suggests that ABO blood group–related biological factors may play a contributory role in the pathogenesis of gastrointestinal diseases.[17]

Conclusion

This prospective observational study identified an association between ABO blood groups and specific upper gastrointestinal diseases. Notably, blood group O was more prevalent among individuals with peptic ulcer disease, while blood group A was more common among those with gastric carcinoma. These findings suggest that genetic factors associated with the ABO blood group system may influence susceptibility to gastrointestinal diseases.

Although the precise mechanisms underlying these associations remain unclear, variations in gastric acid secretion, mucosal defense, immune response, and secretor status may contribute to the development of these conditions. Given the limited sample size and observational nature of this study, the results should be interpreted with caution. Larger multicenter studies incorporating microbial, genetic, and lifestyle factors are necessary to further elucidate the role of ABO blood groups in the pathogenesis of peptic ulcer disease and gastric carcinoma.

Conflict of Interest: The authors declare no conflicts of interest regarding the publication of this article.

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