

A Study to Assess the Prevalence of ABO and Rh Blood Groups among Subjects with Type 2 Diabetes Mellitus

Tinju James¹, Femina Jose², Jerry Joseph³

¹Department of Physiology, Amala Institute of Medical Sciences, Amala Nagar, Thrissur, Kerala, India. ²Medical student, Department of Physiology, Amala Institute of Medical Sciences, Amala Nagar, Thrissur, Kerala, India.

³Department of Ophthalmology, Ahalia Foundation Eye Hospital, Pattambi, Kerala, India.

ABSTRACT

BACKGROUND

ABO blood group system was defined based on the presence of blood group antigens present on the cell membrane of erythrocytes. Though human beings possess the same blood group system, the prevalence of blood group system varies markedly across races, ethnic groups etc. This study aimed to look at the prevalence of ABO and Rh blood group among the medical students.

METHODS

An observational study was conducted among the type 2 diabetic subjects. Details of demographic data were collected along with ABO and Rh blood group details. The data was analysed.

RESULTS

Total 513 subjects were selected for the study. Among the study population, there were 200 females and 313 males. The order of prevalence of diabetes mellitus noted in the blood group types were O, B, A and AB respectively. The maximum prevalence of type 2 diabetes mellitus was noted with O blood group with 35.3 % and the least with blood group AB with 10.5 %.

CONCLUSIONS

The most common blood group linked to type 2 diabetes mellitus among this study population is O and B. Least prevalence is noted with blood group AB. 92% of the diabetics was Rh positive, while the rest of the population was Rh negative.

KEYWORDS

Prevalence, ABO Blood Group, Rh Typing, Diabetes

Corresponding Author:

*Dr. Tinju James,
Assistant Professor,
Department of Physiology,
Amala Institute of Medical Sciences,
Amala Nagar, Thrissur-680 555,
Kerala, India.*

E-mail: tinjuabel@gmail.com

DOI: 10.18410/jebmh/2020/436

How to Cite This Article:

James T, Jose F, Joseph J. A study to assess the prevalence of ABO and RH blood groups among subjects with type 2 diabetes mellitus. J Evid Based Med Healthc 2020; 7(38), 2101-2104. DOI: 10.18410/jebmh/2020/436

Submission 17-06-2020,

Peer Review 21-06-2020,

Acceptance 21-07-2020,

Published 21-09-2020.

Copyright © 2020 JEBMH. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]

BACKGROUND

Diabetes Mellitus (DM) is one of the major public health problems across the world contributing to significant morbidity and mortality.⁽¹⁾ It is like an epidemic rapidly emerging in the developing countries and the current global number of diabetic patients estimated is 382 million which is likely to rise over the subsequent years. Moreover, there are many people who are unaware of the fact that they have diabetes.⁽²⁾ A genetic predisposition has been explained for this illness and the studies have shown that environmental factors do influence in its genetic expression.⁽³⁾ ABO is the major human blood group system and there is marked variation in the incidence of ABO groups in different races, socioeconomic groups and ethnic groups in different parts of the world.⁽⁴⁾ Though human population have the same type of blood group systems, the frequency of blood group types are different across population. Susceptibility to certain diseases could be explained by the presence of blood group antigens.⁽⁵⁾ Diseases like gastric ulcer, duodenal ulcer,⁽⁶⁾ abdominal aortic aneurysm, vascular diseases, cancer etc were associated with ABO blood group system.⁽⁷⁻⁹⁾ Limited studies are conducted regarding the correlation of blood groups and diabetes mellitus in South Indian population. The aim of the present study was to find out the association of ABO blood group system with type 2 diabetes mellitus.

METHODS

This study was carried out among the patients visited various departments of a tertiary care hospital, Central Kerala. 513 patients, already diagnosed with type 2 diabetes mellitus were enrolled in the study after getting informed consent. Blood grouping and Rh typing was noted from the previous record of doing the blood grouping and Rh typing.

Statistical Analysis

The mean age of the study population was represented as mean $\pm$ SD. Data were tabulated as frequencies and percentages for categorical data.

RESULTS

A total of 513 subjects with type 2 diabetes in the age group 40-80 years were enrolled in the study. The mean age of the study population was 58.75 ± 11.30 years. 61 % of the study population was males and 39% were females and is represented in the Figure 1. The prevalence of diabetes was found to be more in blood group O followed by B, A and AB. This study also noted an increased prevalence of Rh positive blood group than Rh negative blood group in this population and is demonstrated in Figure 2. The frequency distribution of different blood group types across the entire study population is demonstrated in the Figure 3. On comparing males and females, there was no significant difference in the

blood group type associated with type 2 diabetes mellitus ($p > 0.05$) and is represented in Figure 4.

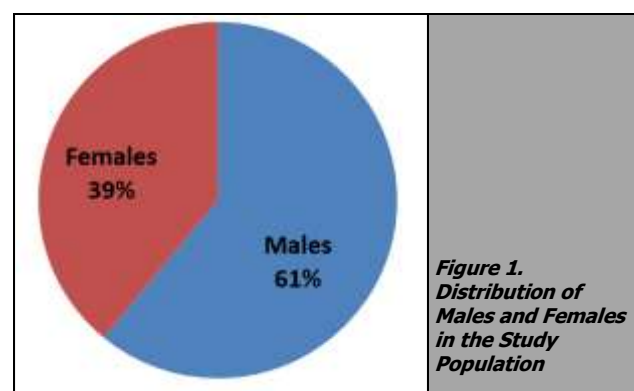


Figure 1.
Distribution of
Males and Females
in the Study
Population

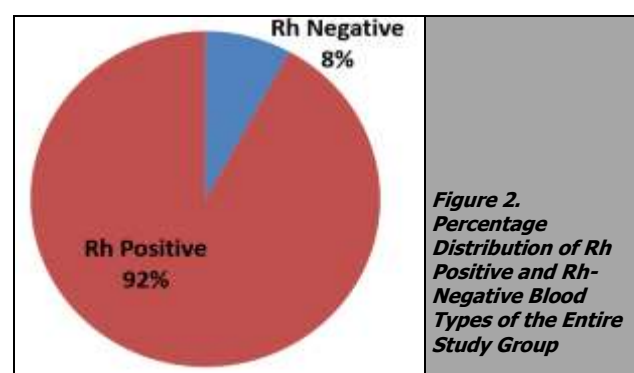


Figure 2.
Percentage
Distribution of Rh
Positive and Rh-
Negative Blood
Types of the Entire
Study Group

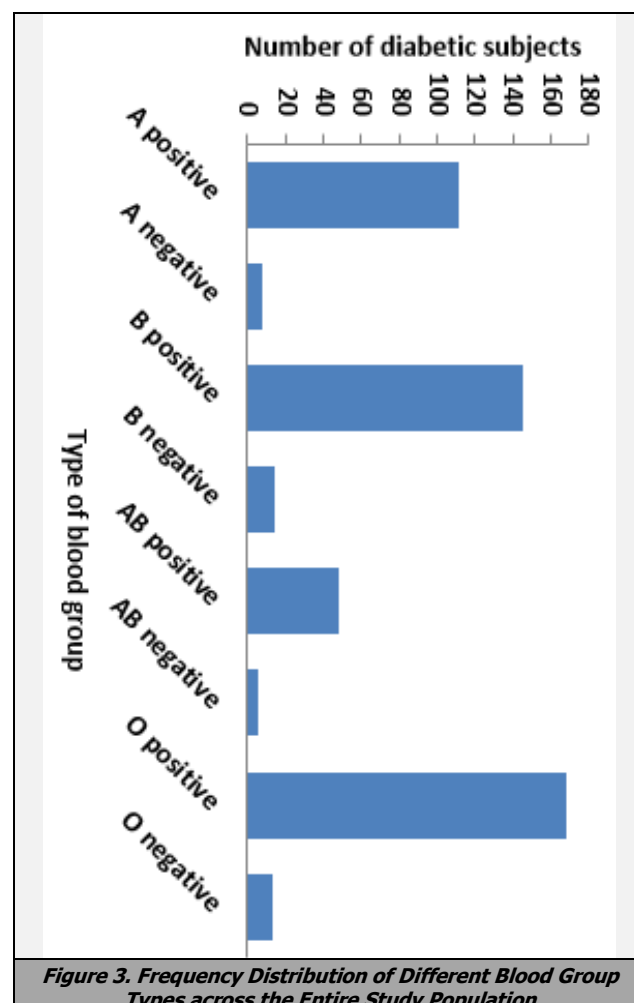
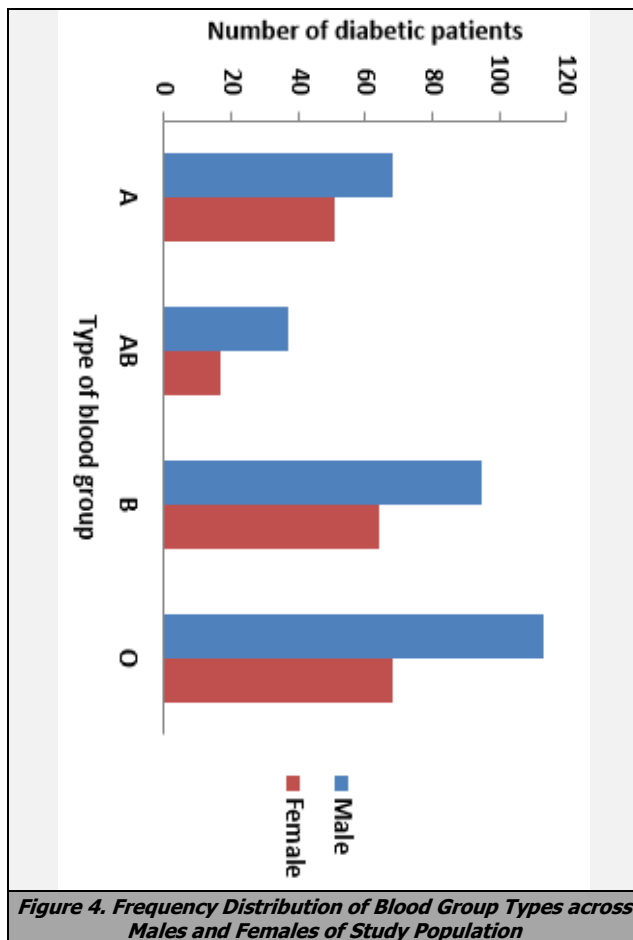


Figure 3. Frequency Distribution of Different Blood Group Types across the Entire Study Population



DISCUSSION

The present study aimed to look for the prevalence of ABO and Rh blood group system among type 2 diabetics. The prevalence seemed to be different in different population. This study showed that individuals with blood group O and B were more likely to have type 2 diabetes mellitus in this population. This could be due to the increased prevalence of the blood group O and B among this population.⁽¹⁰⁾ Least association was noted among blood group AB in this population. This is similar to the studies done by Zhang et al⁽¹¹⁾ among Chinese population and Buckwalter et al⁽¹²⁾ which showed a reduced association of blood group AB with diabetes mellitus.

According to the studies done by Bener et al and Henry et al,⁽¹³⁾ blood group B was significantly more common in diabetic patients as compared with healthy population. But the results of the present study were contrary to the studies done by Aggarwal et al⁽¹⁴⁾ as well as Sidhu et al⁽¹⁵⁾ among Indian population, Waseem et al⁽¹⁶⁾ among Pakistan population and Karagoz et al⁽¹⁷⁾ among Turkish population and in all these studies, they demonstrated a high percentage of blood group AB in diabetics. Study done by Bibawi and Khatwa⁽¹⁸⁾ showed an increased frequency of blood groups A and AB in patients with diabetes and Okon et al⁽¹⁹⁾ in their study done on from Nigeria had noted a strong association of blood group A with diabetes. The reason for the conflicting results related to the association

between ABO blood groups and DM could be explained by the racial as well as geographical variations affecting the genetic expression of diabetes. There was no significant difference of gender on type 2 diabetes mellitus (chi square = 0.515, $p > 0.05$). This is similar to studies among other population which didn't note any significant difference of gender on diabetics as well as controls, except for a study done in Algeria⁽²⁰⁾ which showed a significantly greater proportion of blood groups O and AB among diabetic men compared with healthy controls.

The exact mechanism regarding the association of blood groups with is not explained till now. Recent genomic studies have shown that antigens of "ABO" blood group increase the inflammatory state of the body in general. Single nucleotide polymorphisms at the "ABO" locus are associated with increase of tumour necrosis factor (TNF)-alpha and soluble intercellular adhesion molecule, which are identified as serum markers of inflammation^(21,22) Systemic inflammation is considered to be one of major cause of insulin resistance, which ultimately playing a role in developing type 2 diabetes.⁽²³⁾

CONCLUSIONS

Maximum prevalence of type 2 diabetes mellitus was noted with O blood group followed by B and least prevalence was noted with blood group AB. 92% of the study population was Rh positive. Further studies should be done in a larger population along with genomic studies to establish the same and to look for any association of gender on type 2 diabetes mellitus.

Financial or Other Competing Interests: None.

REFERENCES

- [1] World Health Organization, the prevention of diabetes and its complications, WHO report (2006). <http://www.who.int/diabetes/preventionflyer/en/> [Last accessed on 2013 Sep 20].
- [2] IDF-Diabetes Atlas. 6th edn. <http://www.idf.org/diabetesatlas/data-visualisations>. [Last cited on 2014 Feb 20].
- [3] Bener A, Yousafzai MT. The distribution of the ABO blood groups among the diabetes mellitus patients in Qatar. *Nigerian Journal of Clinical Practice* 2014;17(5):565-568.
- [4] Barua S. Human Genetics: an anthropological perspective. Kolkata: Classique Books 2002.
- [5] Huston AM, Atmar RL, Graham DY, et al. Norwalk virus infection and disease is associated with ABO histo-blood group type. *J Infect Dis* 2002;185(9):1335-1337.
- [6] Tanikawa C, Urabe Y, Matsuo K, et al. A genome-wide association study identifies two susceptibility loci for duodenal ulcer in the Japanese population. *Nat Genet* 2012;44(4):430-434.

- [7] Fatic N, Lukac H, Radojevic N, et al. O blood group as an indicator for abdominal aortic aneurysm. *Eur Rev Med Pharmacol Sci* 2015;19(16):2997-3000.
- [8] Zakai NA, Judd SE, Alexander K, et al. ABO blood type and stroke risk: The reasons for geographic and racial differences in stroke study. *J Thromb Haemost* 2014;12(4):564-570.
- [9] Gates MA, Wolpin BM, Cramer DW, et al. ABO blood group and incidence of epithelial ovarian cancer. *Int J Cancer* 2011;128(2):482-486.
- [10] Joson DC, James T. Prevalence of ABO and Rh blood groups among medical students of a teaching institution. *J Evid Based Med Healthc* 2020;7(13):675-678.
- [11] Zhang C, Li Y, Wang L, et al. Blood groups AB is protective factor gestational diabetes mellitus: a prospective population-based study in Tianjin, China. *Diabetes Metab Res Rev* 2015;31(6):627-637.
- [12] Buckwalter JA. Diabetes mellitus and the blood groups. *Diabetes* 1964;13:164-168.
- [13] Herry MU, Poon-King T. Blood groups and diabetes. *West Ind Med J* 1961;10:156-160.
- [14] Aggarwal T, Singh D, Sharma B, et al. Association of ABO and Rh blood groups with type 2 diabetes mellitus in Muzaffarnagar city. *Natl J Physiol Pharm Pharmacol* 2018;8(2):167-170.
- [15] Sidhu LS, Malhotra P, Singh SP. ABO and Rh blood groups in diabetes mellitus. *Anthropol Anz* 1988;46(3):269-275.
- [16] Waseem AG, Iqbal M, Khan OA, et al. Association of diabetes mellitus with ABO and Rh blood groups. *Ann Pak Inst Med Sci* 2012;8(2):134-136.
- [17] Karagoz H, Erden A, Ozer O, et al. The role of blood groups in the development of diabetes mellitus after gestational diabetes mellitus. *Ther Clin Risk Manag* 2015;11:1613-1617.
- [18] Bibawi E, Khatwa HA. The blood groups in relation to diabetes. *J Egypt Med Assoc* 1961;44:655-659.
- [19] Okon UA, Antai AB, Osim EE, et al. The relative incidence of diabetes mellitus in ABO/Rhesus blood groups in South-Eastern Nigeria. *Niger J Physiol Sci* 2008;23(1-2):1-3.
- [20] Sahi DM, Metri AA, Belmokhtar F, et al. The relationship between ABO/rhesus blood groups and type 2 Diabetes in Maghnia, Western Algeria. *S Afr Fam Pract* 2011;53(6):568-572.
- [21] Paré G, Chasman DI, Kellogg M, et al. Novel association of ABO histo-blood group antigen with soluble ICAM-1: results of a genome-wide association study of 6,578 women. *PLoS Genet* 2008;4(7):e1000118.
- [22] Melzer D, Perry JR, Hernandez D, et al. A genome-wide association study identifies protein quantitative trait loci (pQTLs). *PLoS Genet* 2008;4(5):e1000072.
- [23] Schmidt MI, Duncan BB, Sharrett AR, et al. Markers of inflammation and prediction of diabetes mellitus in adults (Atherosclerosis Risk in Communities study): a cohort study. *Lancet* 1999;353(9165):1649-1652.