

## Frequency of ABO blood group and Rhesus factor (D) in patients of type 2 diabetes mellitus attending tertiary care teaching hospital of South India

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### Abstract

**Introduction and Objective:** Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. After discovery of ABO human blood group system by Landsteiner, many researchers had tried to correlate between ABO phenotype and disease susceptibility. Many reports have appeared in recent past suggesting an association between blood groups and DM but published literature has produced conflicting results. The objective of the present study is to estimate the prevalence of ABO and Rh (D) blood group type among diabetics attending tertiary care teaching hospital.

**Materials and Methods:** With institutional ethical committee approval and permission from Medical Director, we collected data of diabetic patients from medical records section for a 12 months period from 1<sup>st</sup> Jan 2015 to 31<sup>st</sup> Dec 2015. Study design was descriptive and retrospective. Data of ABO and Rh (D) blood groups were represented in simple number and percentage distribution.

**Results:** A total of 1,038 diabetic patients' medical records were collected during the study period for ABO grouping and Rh (D) typing. Out of these 59.34 % were males and Rh (D) positive was seen in 95.56%. The frequency of blood groups O, A, B, AB was 32.36%, 29.95%, 29.28% and 8.37% respectively. The most prevalent blood group in both males and females was 'O' and least prevalent was 'AB' blood group.

**Conclusion:** Our study findings suggested DM was more frequently seen in individuals with blood group 'O' and these individuals should be closely monitored by the treating physicians. The trend of observed prevalent percentage of blood groups for DM was O>A≥B>AB.

**Keywords:** ABO blood groups, Rh (D) typing, Diabetes, Tertiary care hospital, Retrospective.

### Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. According to World Health Organization's fact sheet, DM was the direct cause of 1.5 million deaths<sup>1</sup> with more than 80% of deaths occurring in low and middle-income countries.<sup>2</sup> By 2030, it will be the 7<sup>th</sup> leading cause of death.<sup>3</sup>

According to statistics from the International Diabetes Federation (IDF) in India the prevalence of diabetes increased tenfold, from 1.2% to 12.1%, between 1971 and 2000.<sup>4</sup> India has more diabetics than any other nation of the world and so it is known as "Diabetes capital of the world". It was estimated that 61.3 million people aged 20-79 years live with diabetes in India (2011 estimates). This number is expected to increase to 101.2 million by 2030<sup>5</sup> and 77.2 million people in India are said to have pre-diabetes.<sup>6</sup> About 1 million people died from diabetes in India in 2012.<sup>6</sup> All these statistics leads to a potential epidemic status of DM in India.

In 1900, Landsteiner discovered the major human blood group system i.e. ABO. Since then many researchers had tried to correlate between ABO phenotype and disease susceptibility. There are certain

diseases which show strong evidence of association with the ABO blood groups, notably duodenal ulcer with blood group 'O'<sup>7</sup> and carcinoma of the stomach with blood group 'A'.<sup>8</sup> Many reports have appeared in recent years suggesting an association between blood groups and DM.<sup>9-11</sup> However, extensive search on published literature produced conflicting results. This study has been done to know the frequency of ABO and Rh (D) blood group in diabetics of local population attending a tertiary care teaching hospital.

### Materials and Methods

This is a retrospective study carried out during the period March 2016 – March 2017 in department of Biochemistry, KLE University's J. N. Medical college and Dr. Prabhakar Kore Charitable Hospital, Belagavi, Karnataka. The study was approved by the Institutional Ethics Committee on human subject research, J.N.Medical College, Belagavi, India. The medical records of DM patients whose blood group was examined between 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2015 were collected after getting permission from Medical Director, KLE hospital. A total of 1038 DM patients' medical record data were collected and analysed for frequency of ABO blood group and Rh (D) typing.

### Statistical Analysis

Data of ABO and Rh (D) blood groups were represented in simple number and percentage distribution.

### Results

A total of 1038 DM patients' medical record data were collected and analysed for frequency of ABO blood group and Rh typing in this study. Table 1 shows percentage distribution of data according to gender and Rh (D) factor. Out of total 1038, 616 (59.34%) were male and 992 (95.56%) were Rh (D) positive.

**Table 1: Percentage distribution of data according to gender and Rh (D) factor**

Data	Groups	Number	Percentage (%)
Sex	Male	616	59.34
	Female	422	40.66
	<b>Total</b>	<b>1038</b>	<b>100</b>
Rh	Rh <sup>+ve</sup>	992	95.56
	Rh <sup>-ve</sup>	46	4.44
	<b>Total</b>	<b>1038</b>	<b>100</b>

Data represented in simple number and percentage of total data collected (n=1038)

Table 2 summarizes the distribution of ABO blood group and Rh (D) typing among DM patients. The frequency of blood group 'O' in our study was the highest i.e. 32.36% (30.73% 'O' Rh (D) positive and

1.63% 'O' Rh (D) negative) and blood group 'AB' was the lowest i.e. 8.37% (7.89% 'AB' Rh (D) positive and 0.48% 'AB' Rh (D) negative). The total Rh (D) negative was 4.44% (Table 1 and Table 2)

**Table 2: ABO blood group and Rh (D) factor distribution among patients of DM**

Blood group	Rh <sup>+ve</sup>		Rh <sup>-ve</sup>	
	Number	Percentage (%)	Number	Percentage (%)
A	299	28.80	12	1.15
B	292	28.13	12	1.15
AB	82	7.89	<b>5</b>	<b>0.48</b>
O	<b>319</b>	<b>30.73</b>	17	1.63
<b>Total</b>	992	95.56	46	4.44

Table 3 shows the percentage prevalence of ABO and Rh (D) positive blood group among male and female DM patients. Among male and female DM

patients, blood group 'O' was the most prevalent and 'AB' was least prevalent blood group.

**Table 3: Percentage prevalence of different blood groups of Rh (D)<sup>+ve</sup> in male and female patients of DM (n=992)**

Blood group	Males (n=585)		Females (n=407)	
	Number	Percentage (%)	Number	Percentage (%)
A	174	29.74	125	30.71
B	175	29.91	117	28.74
AB	51	8.71	31	7.61
O	185	31.62	134	32.92

### Discussion

The purpose of present study was to find the frequency of ABO blood group and Rh (D) factor in persons suffering from DM in southern India. ABO blood group system is genetically determined and is inherited in a Mendelian fashion with stable characteristics.<sup>12</sup> ABO and Rh antigen genes are present on different chromosomes i.e. 9<sup>th</sup> and 1<sup>st</sup> chromosomes respectively.<sup>13</sup> All human populations share the same blood group systems but they differ in the frequencies of specific types. The occurrence of ABO and Rh groups varies noticeably in different races, ethnic

groups, and socioeconomic groups in different parts of the world. The frequencies of ABO and Rh blood groups vary from one population to another. The study of distribution of blood groups is important as it plays a vital role in blood transfusion and organ transplantation. There are certain diseases which show strong association with the ABO blood groups such as duodenal ulcer and gastric cancer.

The present study has shown blood group 'O' (32.36%) to be the most common blood group followed by 'A' (29.95%), 'B' (29.28%) and 'AB' (8.37%) in DM in southern India. This prevalence is in

concordance with the some studies done in India<sup>14,15</sup> except for the northern region where blood group B was found to be the most common. The study done by Sharma Sandhya et al in the year 2014 had shown the blood group 'B' was the most frequent in DM followed by 'O', 'A' and 'AB' in Jodhpur city<sup>9</sup> and Shyamal Koley et al reported blood group 'B' was more frequent in DM individuals in Madhya Pradesh.<sup>16</sup> The same results were observed in different parts of India where blood group 'B' was more frequent in DM.<sup>17</sup>

**Limitations:** Sample size and hospital bias were the limitations of our study. We have only considered the patients admitted in the hospital for the present study. Any further study based on this topic should be done by overcoming these limitations and the findings need to be confirmed by large community based studies.

### Conclusion

The present study suggested DM was more frequently seen in individuals with blood group 'O' and the trend of observed prevalent percentage of blood groups for DM was  $O > A \geq B > AB$ . The individual with blood group 'O' should be, closely monitored by the treating physicians.

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**Conflicts of Interest:** All authors declare no competing or conflicts of interests.

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