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Prevalence of ABH Secretor and non-secretor Among Population of Lahore

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A B S T R A C T

Background: ABO blood groups and secretor status of person are genetically inherited and have imperative role in forensic and clinical medicine. Although the distribution of secretor's status and non-secretor status diverges widely in relation to ABO groups in populations across the world due to racial and geographical differences. In Pakistan, there is no specific work done on ratio of secretor and non-secretor particularly in the population of Lahore.

Objective: The main objective of the study was to assess the ABO grouping and secretor status of different ABO groups among the general population of Lahore (Pakistan).

Methodology: Samples of saliva and blood were collected from 101 study participants (26 girls and 75 boys) of Lahore who participated in this study. Conventional tile and tube methods were performed to find out the blood group and the presence of secretor and non-secretor status by using Hemagglutination Inhibition technique.

Results: It was found that 56.4% individuals were secretors and 43.6% were non-secretors. In 101 individuals, the percentage of A, B, AB and O group was 23.8%, 39.6%, 7.9% and 28.7% respectively. Among A, B, AB and O groups observed frequency of secretors was 58.3%, 60%, 75% and 44.8% respectively. The prevalence of Rh +ve and Rh –ve in given individuals were 84.2% and 15.8% respectively.

Conclusion: Current study concluded that the order of ABO grouping is B>O>A>AB and rate of secretor status is much higher than non-secretor status. The ABH non-secretors have high acceptance rate of getting auto-immune disorder like multiple sclerosis and reactive arthritis etc.

Key Words: Hemagglutination inhibition, Secretors, No Non-secretors, ABH substance, ABO blood groups.

Introduction

The blood is involved in the body's homeostasis in addition to its imperative role in the blood group recognition. RBC antigens are inherited traits and therefore their expression is constant throughout the life of an individual.[1] Although various factors are responsible for it variation such as geological place, race, ethnicity, life style, genetics, internal and external environment and racial multiplication of anthropoid population. Austrian Scientist, Karl Landsteiner in 1901 introduced the ABH blood grouping scheme that further lead to recognition of major blood groups for example A B and O types. [2] In mature red cells, there are 8 lacs to 1 million ABH antigens are present in one cell. [3]Maturation of these antigens is managed by genes, inherited by Mandelian pattern and show up in the beginning of fetal life and remains undisturbed throughout the life. At the moment 33 blood groups defined more than 300 antigens which are defined by the International Society of Blood Transfusion (ISBT).[4] The genes associated with blood grouping scheme are autosomal, excluding XG and XK that are X-borne whilst alternatively MIC2 is present on chromosomes X and Y.[2] The ABO scheme gets its significance that the plasma containing the corresponding powerful antigens A and B are lacking with their counterpart anti A and B naturally as in vivo these antibody causes hemolysis.[5]

ABO blood groups and Rh blood groups are confirmed immunogenic marker. [1] In spite of discovery of different blood groups, ABO groups still have crucial role in transfusion

medicine particularly in the domain of transplantation.[6] The ABO grouping and Rh system is not only essential for transplantation or transfusion protection b u t also essential for genetics, clinical studies, immune hematology, and evolutionary biology, studying migration patterns, unmatched pregnancy and disputed paternity. The Rhesus system contain 50 known blood group antigens and among all just five are significant.[7]

In 1940, the findings of the Lewis groups introduced one more blood group system that is independently inborn but linked with the ABO groups coded by an allele Le (a) and called as Lewis b.[8] There is a relationship among the secretion of ABH group and the Lewis system in those persons whose red cells sort as Le (a + b -) are called as non-secretor whilst persons whose red cells are Le (a-b+) are called as secretors. [9] Further, there are two tests for the secretor status that can be either done on individual's body fluids such as saliva, and test for the Lewis system of the red cells.[8,10] A small percentage of the people (about 6%) have red cells which sort as Le (a-b-) and those are maybe secretors or non-secretors. [9]

A previous study determined that blood group-A was a common group of District lower Dir and AB blood group was the rarest blood group[1], while Anees in 2005 reported that blood group percentage of people of Gujarat was same as the Asian populations, in the series of B>O>A>AB, with the maximum allele percentage of Rh positive that was observed in Pakistani people.[11]

The ABO groups and the rate of secretors and non-secretors are inherited independently. ABH secretors produce ABH substance right related to their blood groups. In group "O" produce just substance-H. Secondly "A "group produce substance-A, and substance-H while "B" group releases substance-B and substance-H in the fluids of body.[12] Non-secretors are said to be on the verge of getting potential health disadvantages as compared to secretors because high number of diseases are linked with the inability to produce ABH substance.[13] Antigens in intestinal and urinary tract secretions allow micro-organisms to grow which eventually increases the risk duodenal ulcer, celiac diseases and candida Albicans infections.[14] Different studies found the relation between ABO blood group system and different systemic diseases.[15] A high prevalence of diabetes mellitus may be found in the participants of blood groups O and A.[16] This study aimed to evaluate the Prevalence of ABO grouping, Rh grouping and Status of non - secretors and secretors.

Methodology

The aim of this study was to determine the status of ABH secretors and non- secretors in general Lahore (Pakistani) residents**.** After taking ethical approval from University of Lahore, this study was conducted in University Institute of Medical Laboratory Technology (UIMLT) from (December-March) 2019- 2020. Total 101 clinical samples (Blood and saliva) from adults were collected after taking informed written consent**.** With all suitable aseptic safety measures and proper protocol 2 ml blood from vein was drawn in EDTA tube and 5ml of saliva was taken in a sterile leak proof container. The sample (saliva) was centrifuged in tube for 10 minutes at 2000 rpm. Inactivation of the salivary amylase was done by placing the tubes at 56℃ for 30 minutes. Sample tube was re-centrifuged after cooled down for 10 minutes at 2000 rpm. Supernatant was then collected in other new tube for the performance of hemagglutination inhibition test.

Total 2ml of blood was taken in Ethylene-diamine tetra-acetic acid sample tube. Then centrifuged the sample for 3 minutes at 1500 rpm. After centrifugation plasma was separate into other tube and used for reverse grouping. Cells holding tube was filled with normal saline. Then mixed the tubes containing suspension and re-centrifuged the tube for 3 minutes at low speed (1500 rpm). This washing practice was repeated two times. In final washing, tube was centrifuged for3 minutes (3000rpm) and supernatant was discarded.

Ten test tubes were labeled according to the titer 1:2, 1:4 till 1:1024 (tube 10). To all 10 test tubes 200 ml saline and 1, 200 ml antisera was mixed well. From the tube 1, 200 microliters dilution was transferred to the second tube and mixed well. From tube 2 till tube 10 this same process was repeated. And from the last tube 200 ml diluted antisera was discarded. All the tubes contained equal volume. This double dilution was utilized for the Hemagglutination inhibition test. In row one, double dilution of the specific antisera was set. All tubes were already marked as 1:2,1:4 and till 1:1024. 100 micro liter specific antisera of blood group with each dilution and 100 micro liter of saline was added in the row II and III. All glass tubes of row II and III were capped tightly and well mixed. Then these glass tubes were placed in a water bath to incubate with a set temperature of 37°C centigrade for half an hour. After incubation period 100 micro liter of RBCs (3%) suspension (group specific) was transferred to each tube in second and third row. Tubes were mixed well and placed in water bath for 30 minutes at 37 °C and centrifuged again.

Results

Total 101 samples (75 males and 26 female) of blood and saliva were collected. The order of ABO groups in study from maximum to minimum were B>O>A>AB with percentage of A 23.8%, B 39.6%, AB 7.9% and O 28.7% in figure 1.

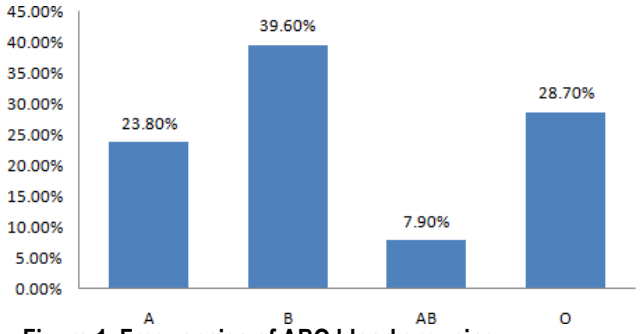

Figure 1. Frequencies of ABO blood grouping.

Gender dissimilarity among secretors was (61.3% male, 42.3% female) and non-secretors (male 38.7%, female 57.7%). The state of secretors was little higher (56%) than non-secretors (44%).

The percentage frequency of secretors and non-secretors in ABO grouping was assessed. The percentage of secretors and non-secretors in group A was 58.3%, B 60%, O 44.8%, AB 75% and A 41.7%, B 40%, O 55.2%, AB 25% respectively in table I.

There was gender dissimilarity among secretors (61.3% male, 42.3% female) and non-secretors (male 38.7%, female 57.7%).

Similarly, among Rh positive samples secretors 56.5% including (male 62.1%, female 36.8%) and non-secretors are 43.5% including (male 37.9%, female 63.2%). Variation was also observed in Rh negative which showed secretors 56.3% including (male 55.6%, female 57.1%) and non-secretors 43.7% including (male 44.4%, female 42.9%) described in Table II .

Discussion

Blood group is an absolute identification of any human being and it remains unchanged throughout the life of an individual. Till now about 400 different blood group antigens have been reported but the most significant are still ABO and Rh.[6,8] Many individuals secrete A and B antigens in their body fluids which are useful for grouping and also it has association with some diseases. We collected 101 samples of blood and saliva. All the 101 samples were examined to check the prevalence of ABO and secretor or non-secretor status. The remaining 44 samples were non secretors. We observed that the frequency of secretor status was greater (56.4%) than non-secretors (43.6%). This observation is compatible with the work done by previous study that reported 60% secretors whereas 40% were non-secretors study.[10] A frequency of secretor was lower by previous study in which 31.8% were secretor and 68.2% were non-secretor.[12]The Predominance of B group (35.6%) was reported by Saboor et al.[13] while 36% predominance of O group was reported by Akhter et al.[10] These findings support our results related to the distribution of ABO groups in current study. In our study 85 (84.2%) samples were Rh positive and 16 (15.8%) samples were Rh negative. Distribution of secretors and non-secretors state among various ABO blood groups was: In blood group A 58.3% were secretors and 41.7% non- secretors, in blood group B 60% were secretors and 40% non-secretors, in blood group AB 75% were secretor and 25% non-secretor, in group O 44.8% were secretor and 55.2% non-secretors. These findings are also compatible with the previous study that reported 65.9% secretor and 34.1% non-secretors in blood group A , While in blood group B 70.4% were secretors and 29.6% were non-secretor, in blood group AB 70% secretor and 30% non-secretor and in blood group O 86.2% secretor and 13.8% non-secretor.[12,13] In present study, the ratio of secretor status was

Table I: The percentage of secretor and non-secretor in ABO and Rhesus groups

Status	Groups					
	A n (%)	**B n (%)**	**AB n (%)**	**O n (%)**	**Rh+ ve n (%)**	**Rh -ve n(%)**
Secretors	14(58.3)	24(60)	6 (75)	13(44.8)	48 (56.5)	9(56.3)
Non Secretors	10(41.7)	16(40)	2(25)	16 (55.2)	37(43.5)	7(43.7)

Table II: Frequency of secretor in male and female in Rhesus group

Status	Rhesus Positive	Rhesus Negative	Status	Rhesus Positive
	Men n (%)	Women n (%)	Men n (%)	Women n(%)
Secretors	41(62.1)	7 (36.8)	5 (55.5)	4 (57.1)
Non-secretors	25(37)	12(63)	4(44)	3(42)
Total	66	19	9	7

higher (56.4%) than non- secretors (43.6%) which is in association with the previous research conducted among the population of Karachi.[17]The ratio of male secretors was also higher than females (61.3% in males and 42.3% in females) and is compatible with the previous study that revealed females were more likely to be non-secretors.[15]

Similarly in this study, individuals with blood group AB had the highest frequency of being secretors with a percentage of 70% and results are in consistent with a research done by Ullah et al.[13]The incidence of secretors was observed as 58.3% in blood group A. This finding is also in accordance with a previous study. [5,18] In total 101 samples, the order of ABO blood grouping was observed from maximum to minimum with a percentage of 39.60% in blood group B, 28.70% in blood group O, 23.80% in blood group A and 7.90% in blood group AB. These findings correlates well with a study which reported ABO grouping as 33% 'B' group, 36% 'O' group, 24% 'A' group,7% 'AB' group.[10] In this study the frequency of ABH secretors was 56% and 44% in non-secretors .Likewise, the frequency ofABH secretors and non-secretors were observed as 60% and 40%.[15]

Conclusion

We concluded from the study that the prevalence of secretor individuals is higher than non-secretors. The non-secretor individuals are at the verge of getting autoimmune diseases. Percentage of secretor rate among the ABO grouping was recorded from maximum to minimum:group AB with 75% followed by group B with 60% then group A with 58.3% and group O with 44.8% respectively. Results of our study could be utilized to describe the incidence and distribution pattern of various diseases that have been correlated with the secret or status.

Limitations & recommendations:

Due to the short span of time and limited budget, we did not explore other blood groups like Kell, Lewis, Lutheran, Duffy and Kidd. This scientific study will be very helpful for the researchers who want to explore ABO blood groups and other blood groups like Kell, Lewis, Lutheran, Duffy and Kidd.

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