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FREQUENCY OF ABH SECRETORS AND NON-SECRETORS AMONG THE STUDENTS AT INSTITUTE OF PARAMEDICAL SCIENCES, KHYBER MEDICAL UNIVERSITY, PAKISTAN

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Abstract:

Introduction: *There are variations in the distribution of secretors and non-secretors in relation to ABO blood group which influence disease susceptibility from one region to another. Significant extents of people are secretors, which secret antigens in body fluids such as saliva, tears, Semen etc. Due to some unknown geographic and racial factors there are differences in the frequency of secretors and non-secretor Individuals.*

Objectives: *The objective of the current study was to find out the frequency of secretor status among students of Khyber Medical University (KMU), Institute of Paramedical Sciences (IPMS) Peshawar.*

Methodology: *This descriptive cross-sectional study was conducted at the Institute of Paramedical Sciences Khyber Medical University Peshawar (IPMS KMU). We have recruited 188 participants of age ranging from 18- 40 years, out of which 155 were males and 33 were females. Tube method was used for ABO blood typing and Absorption inhibition method was used to determine the secretor status of ABH antigen using saliva samples.*

Results: *Our study showed that 68.62% of the population was secretors and 31.38% were non-secretors. The frequencies of secretor status in different ABO blood groups were 70.37% in group A, 64.15% in group B, 80.0% in group AB, and 67.21% in group O.*

Conclusion: *Our study shows that the secretor status in Peshawar is high than non-secretor. Furthermore, Blood group AB has highest secretor status while Blood group B has the lowest secretor status.*

Key words: *ABO group, secretor, Non-secretor, Body fluids, Absorption inhibition method*

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INTRODUCTION:

ABO blood group system was discovered by an Austrian Scientist named Karl Landsteiner [1]. He discovered ABO blood group antigens and later on it was he found that the A and B antigen were not only present on RBCs but are also present in body fluids such as saliva, semen, tear drops, amniotic fluid, urine etc. and in 1930 he was awarded the Nobel Prize for this revolutionary discovery in medical science. ABH substances present on the surface of red blood cells are fat soluble glycolipids while in secretions they are water soluble glycoproteins [2,3]. In 1930, Putkonen discovered that a person could be classified as either secretor or non-secretor, which depends upon the person's ability to secrete ABH antigens in their body fluids [4].

A gene is responsible for the secretion of ABH antigens in body fluids known as Fucosyltransferase2 (FUT2) or Secretor gene. FUT2 gene is located on the short arm of chromosome 19 [5]. FUT2 is present in the form of two alleles "Se" and "se". "Se" is dominant while "se" is recessive allele. The FUT2 gene is expressed in goblet cells, and mucous glands of gastrointestinal tract (saliva, bile, gastric juice, and mucus), urinary genital tract (seminal fluid, vaginal secretions, urine) and respiratory tract as well as in sweat, tears, milk and amniotic fluid. H antigen that is present on the red cells is the base for "A" and "B" antigens. Antigens "A" and "B" differ only in their added terminal sugars. H antigen is also controlled by inherited H gene (FUT1) on chromosome number 19 in the form of two allele (HH/Hh or hh) as FUT2 gene. The major difference between FUT1 and FUT2 genes are their pattern of expression. FUT1 (H) gene is expressed predominantly on erythroid precursors giving rise to H enzyme i.e. Fructosyltransferase whose product resides on erythrocyte, whereas FUT2 gene is expressed predominantly in secretor tissues giving rise to secretor enzyme i.e. α-2-L-Fucosyl transferase and its product reside on mucin in secretions [6].

ABH secretors, secretes their corresponding ABH substances in secretions, such as A blood group individual secretes A antigens, B group individuals secretes B antigens and O blood group individuals secretes H antigens. While H is a precursor antigen, so it is in all ABH blood groups. Rh antigens are not secreted in the secretions secreted [7].
Various conditions may effect RBC antigens and result in weak agglutination during forward grouping method [8].The anti-A, anti-B or anti-AB also may be weak or absent in some leukemias and non-Hodgkin's lymphoma. In such cases saliva studies to detect secretor status may help to confirm the patient's true ABO group if the person is secretor [9].
Previous studies also have reported correlation between non-secretors and some diseases. For example, Non-secretors are more exposed to the cardiac and thrombotic diseases. It has been reported that recurrent urinary tract infection and persistent candida infection are more common in non-secretors. ABH non-secretors also have higher prevalence of different varieties of auto-immune diseases including ankylosing spondylitis, reactive arthritis, psoriatic arthropathy, Sjogren's syndrome, multiple sclerosis and Grave's disease [10]. Previous studies have reported that there is variation in the distribution of secretor status in the country. Furthermore, as secretor status changes from region to region. Therefore, this study was conducted to determine the secretor status of the individuals in Peshawar.

MATERIALS AND METHODS:

This cross-sectional study was conducted at Institute of Paramedical Sciences, Khyber Medical University Peshawar (KMU IPMS) in 2018. We included 188 healthy adult students of both genders. Those students who had any active disease of the oral cavity were excluded from the study. Informed consent was taken from all the participants. These students were randomly selected, and 2 ml saliva sample was collected from all the students in sterilized disposable plastic containers. Similarly, 2-3 ml venous blood was also collected in EDTA tubes. Saliva samples were transferred to another sterilized glass tubes and placed in a water bath at 90^{o}C for 10 minutes to degrade salivary amylase. The tubes were then cooled for 10 minutes at room temperature and were centrifuged for 10 minutes at 3000 rpm. Supernatant from each tube was transferred to another tube and were used to determine the secretor and non-secretor status of the individual through absorption inhibition method. From blood sample we performed forward and reversed blood grouping to determine blood group of the participants using tube method. For tube method we prepared 3% suspension of red blood cells.

We took tubes and labeled it as A, B, AB, O and control respectively. Processed Saliva samples were added to all tubes while in control tube normal saline was added instead of saliva. Then we added 3% red cells suspension in all tubes. Then we add known anti sera to the corresponding tubes. After 10 minutes agglutination was observed macroscopically. Agglutination was also confirmed microscopically.

Absence of agglutination indicates secretor status while presence of agglutination indicates non-secretor. This study was approved by the under graduate research committee of Institute of Paramedical Sciences, Khyber Medical University.

RESULTS:

We have recruited a total of 188 subjects, out of which 155 (82%) were males and 33 (18%) were females Out of 155 were male, 107 (69%) were found secretors while 48 (31%) were non-secretors. On the other hand, out of 33 female participants 22 (67%) were secretors while 11 (33%) were non-secretors (Table 1).

Table-1: Gender wise distribution of secretor and non-secretor of the participants

Females		**Males**	
33 (18%)		155 (82%)	
Secretors	**Non-Secretors**	**Secretors**	**Non-Secretors**
22	11	107	48
67%	33%	69 %	31%

Out of 188 study subjects, 54 (29%) were having blood group A ,54 (29%) were blood group B, 20 (11%) were blood group AB and 60 (32%) were blood group O. The secretor and non-secretor status for these blood group is given in table 2.

Table-2: Distribution of secretor and non-secretor status based on ABO blood group system

S. No	**Blood Group**	**Total Cases**	**Secretors**	**Non-Secretors**
1	**A**	54 (29%)	38 (70%)	16 (30%)
2	**B**	54 (29%)	35 (65%)	19 (35%)
3	**AB**	20 (19%)	16 (80%)	4 (20%)
4	**O**	60 (32%)	40 (67%)	20 (33%)

Based on Rh group system out of 188 subjects, 178 (95%) were Rh positive, and 10 (5%) were Rh negative. Out of 178 Rh positive subjects, 125 (70%) were secretors while 53 (30%) were non-secretors. Likewise, in 10 Rh negative cases 4 (40%) were secretors while 6 (60%) were non-secretors (Table 3).

Table-3: Distribution of secretor and non-secretor status based on Rh blood group system

Rh Positive		**Rh Negative**	
178 (95%)		10 (5%)	
Secretors	**Non-Secretors**	**Secretors**	**Non-Secretors**
125	53	4	6
70%	30%	40%	60%

DISCUSSION:

There are 33 known blood groups including ABO, Rh, Kell, KID and Bombay etc. ABO blood group system has a clinical significance due to its strong antigenicity and having natural occurring antibodies. The ABO antigens are not only present on the surface of RBC's but also present in the different body fluids. All the individuals are divided into two groups based on presence or absence of ABO antigens in body fluids; Secretors and Non-secretors. An individual is said to be a secretor if his or her body is able to secrete ABO antigens in body fluids [1, 10].

As 80% of the world population is secretor and the remaining 20% non-secretor. Due to some racial or geographical factors secretor status might be different in different populations [1, 7].

In the current study we enrolled 188 volunteer participants for typing of ABH secretor status. We determined that 69% of the participants were secretors while 31% non-secretors in Peshawar, Khyber Pakhtunkhwa, Pakistan. A study was conducted by Saboor et. al, in 2014 in which they reported that the frequency of secretor was 64% and 36% was non-secretor [1]. Similarly, another study conducted by Woike et al in India indicates 72.4% secretors and 27.6% non-secretor status [4]. In

contrast to these findings, those findings of Rashmi et al. reported 99% secretors and 1% non-secretors. As blood group system are genetically controlled and inherited. As Rashmi conducted his study in families therefore, the percentage of secretor was increased as compared to our study. Furthermore, Rashmi took small sample size which could be the other reason of deviation [11].

Pawan Motghare et al. reported 83% secretors and 17 non-secretors [12], Sikandar et al. reported 93% secretors and 7% non-secretors [10]. As Sikandar et al, conducted their study in Karachi which has large number of immigrants from India.

In our study out of 188 participants the differential values of ABO were 54 (28.7%) of A, 54 (28.7%) of B, 20 (10.6%) of AB and 60 (31.9%) of O blood group respectively. It indicates that in our region O blood group have the highest prevalence while AB blood group have the lowest prevalence. This was also reported by Ali et al who conducted his study on various population of Pakistan [13].
In our study the frequency of Rh-positive individuals are 178 (94.7%) while Rh negative are 10 (5.3%) respectively. We have found that in Rh positive, the secretors are 125 (70.2%) while the non-secretors are 53 (29.8%). M. Salih Jaff et al also have similar findings [14].

Secretor status comprising in different ABO blood groups are, 38 (70.3%) secretors and 16 (29.7%) non-secretors in A, 35 (64.8%) secretors and 19 (35.2%) non-secretors in B, 16 (80%) secretors and 4 (20%) non-secretor in AB and lastly 40 (66.7%) secretors and 20 (33,3%) non-secretors in O blood group respectively. While the finding of M.Salih jaff et al (14) study the distribution of ABO secretors and non-secretors were, 70.1% and 29.9% A, 67.8% and 29.9% B, 67.9% and 32.1% AB, 88.3% and 16.7% O blood group which are almost similar to our findings.

CONCLUSION:

We conclude that the secretor status among the students of Peshawar is high as compared to non-secretor status. Furthermore, blood group O individuals are also prevalent than other blood groups. Although AB blood group is the least frequent, but still the secretor status of the AB blood group is high than other blood group system.

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