Original Research Paper

Secretors in Manipuri Population: A Study

[1]A. Sylvia Devi, [2]Th. Meera, [3]Kh. Pradipkumar Singh, [4]H. Nabachandra, [5]Ibungo Shah

Abstract

The term 'secretor' is used for an individual who secretes ABO blood group antigens in body fluids such as saliva, sweat, tears, gastric juice, semen, urine, etc. The present study has been taken up to find out the distribution of secretors and non-secretors in the Manipuri population.

In this study, saliva samples from 400 individuals, 213 males and 187 females who were in the age group of 15 to 60 years were collected, and the samples were examined by haemagglutination inhibition technique. The samples were also examined at different time intervals from the time of collection of samples. The findings were entered in proforma and statistically analyzed. It is observed that 49.5% of the Manipuri subjects in this study are secretors and 50.5% are non-secretors. The percentage of agglutinins is the highest in the blood group 'O'. The ABO group antigens can be detected from the saliva of secretors up to 180 days or 6 months from the time of collection of samples. A relatively higher number of people in the Manipuri population are non-secretors and the percentage of agglutinins is highest in blood group 'O'.

Key Words: ABO blood group, Secretor, Non-secretor, Manipuri population

Introduction:

In the investigation of crimes, such as murder, dacoity, rape, etc., the examination of biological materials plays an important role in connecting the criminal with the crime.

Such biological specimens may be in the form of body fluids, stains or other materials viz. blood, saliva, semen, urine, faecal matter, milk and hair. The existence of serological differences among the individuals described by Landsteiner K [1] in 1901 was a landmark discovery. According to him, people of this world, irrespective of age, sex, caste, colour, etc., can be broadly divided into four main groups: A, B, AB and O.

The basis for classification was antigenic character present on RBC membrane. Workers like Weiner AS [2] observed that blood group antigens are not only present on RBC membrane, but also secreted in various body fluids like saliva, gastric juice, semen, amniotic fluid, sweat, urine, tears, etc.

Corresponding Author:

[3]Demonstrator, Department of Forensic Medicine, Regional Institute of Medical Sciences, Imphal-795004
E-mail: pradipkhangem2000@yahoo.co.in
[1]Post Graduate Trainee,
[2]Assoc. Prof,
[4]Prof
[5]Senior Toxicologist, Dept. of Forensic Medicine
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The agglutinogens of the ABO system present in the body tissues appear in lipoidal and water soluble forms. In about 80 percent of the people they appear in water soluble form and can be demonstrated in all the body fluids except the cerebrospinal fluid. They are not found in nerve tissues, epithelium, skin appendages, bone and cartilages. A person who possesses only the lipoidal form are known as 'non secretors', while those who possesses a water soluble form are known as 'secretors'.

In other words, a 'secretor' is an individual who secretes ABO blood group antigens in body fluids. It has been established that, secretion of group specific substance is controlled by a pair of alleles Se and se. Thus, individuals can be homozygous (SeSe), heterozygous (Sese) or homozygous (sese). The first two classes are called secretors and the third group is known as non-secretors.

Secretors possess H antigens on their red cell irrespective of their blood groups of their ABO system. However, the amount of H antigen is the highest on the red cells of 'O' group persons. The ability to secrete agglutinogens into the body fluids remains constant throughout and transmitted as Mendelian dominant.

The Rh agglutinogens are distributed widely in the body tissues but are not found in the body fluids, except the amniotic fluids. [3] One of the richest and most readily available sources of group specific substance is saliva. However, in other body fluids such as sweat, tears and urine the concentration is fairly low. [4]

In Caucasians, approximately 80% are secretors & 20% are non-secretors, whereas in Negroes, 60% are secretors and 40% are non-secretors. [5]

Keeping this knowledge in mind, the present study has been taken up to determine the distribution of blood groups, secretors & non-secretors in the normal healthy population of Manipur and this may act a useful tool in medico-legal investigations of crimes.

Materials and Methods:

The study, which was conducted during the period of August 2010 to July 2012, was a community based cross sectional study in a study population of any Manipuri subject in the age group of 15 to 60 years residing in and around Imphal city area.

Exclusion Criteria: (1) History of recently transfused non-specific group blood, (2) History of bone marrow transplantation, (3) Subjects with malignancies like Leukemia which leads to weakening or loss of blood group antigens on cells, (4) Subjects with gram negative septicaemia, intestinal obstruction and carcinoma of colon or rectum leading to acquired 'B' antigen like activity. [6]

The sample size was calculated based on the prevalence rate of 80% from previous study. [5] The allowable error was taken as 5%; and so the study was conducted on 400 normal healthy Manipuri subjects. Of these, 213 subjects are male and 187 subjects are female. The method of sampling was random sampling.

Method:

After obtaining approval of the Institutional Ethics Committee and taking informed consents, the saliva samples were collected from 213 males and 187 females from Imphal city and surrounding areas.

The saliva samples were collected on a piece of washed cotton cloth and were air dried and placed in coded envelopes. The ABO and Rh blood group were determined by slide agglutination method.

The secretor status was determined by 'Haemagglutination Inhibition technique' which was introduced by Weiner AS, [2] and later modified by Roy MN and Chatterjee JB. [7]

The dried saliva stained cloth was cut into small pieces, about $1cm^2$ and the pieces were soaked in 1ml of 0.9% saline for about 10-15 minutes. Then, 0.1ml of the saliva solution was taken in each of 3 well marked test tubes - one drop of each diluted anti sera was added in corresponding tubes containing diluted saliva.

The tubes containing the saliva-antisera mixture were kept in the refrigerator for 2 hours at 4^o C. After 2 hours, the tubes were taken out and then brought to room temperature and one drop of blood of known blood group was added in each test tube containing saliva-antisera mixture. After shaking the tubes, one drop of the solution from each tube were taken on a clean glass slide and examined under the microscope for agglutination reaction.

The samples with no agglutination i.e. no clumping, were taken as secretors and the samples with agglutination i.e. clumping, were taken as non-secretors.

Then, examination of the saliva for the detection of ABO (secretor) was done at different time intervals viz. 30 days, 60 days, 90 days, 120 days, 150 days and 180 days.

All the observations of the work were recorded systematically in proforma and statistical analysis was done by chi-square test.

Results:

In this present work, out of these 400 subjects, 213 were males and 187 were females who were above 15 years and below 60 years. (Fig. 1) The predominant blood group in the present study was 'B' group which was 35%, followed by group 'O' which was 33.25% and the least dominant was 'AB' group which was 9.25%. (Table 1)

In our study 198 subjects (49.5%) were secretors and 202 subjects were non-secretors (50.5%) and the difference is statistically significant. (Fig. 2) Amongst the blood groups, highest number of secretors was observed in 'O' group, whereas the least number of secretors were observed in group 'AB'. (Table 2)

Out of 213 males, 116 subjects (54.46%) were secretors and 97 subjects (45.54%) were non-secretors; whereas in 187 female subjects, 82 subjects (43.85%) were secretors and 105 subjects (56.15%) were non-secretors. (Fig. 3)

In this study, the ABO group was examined and detected from saliva (secretors) at different time intervals from the time of collection of samples. The secretor status can be detected in all the samples up to 180 days i.e. 6 months and the difference is statistically not significant. (Table 3)

Discussion:

Blood group factors in body fluids are of medico-legal importance in detection of crime, and saliva testing is of particular medico-legal importance in the examination of bite marks.

At the same time, it may also be required in the investigation of sexual cases. Saliva may be identified on stamps, envelopes, cigarette ends and the like and saliva stain

grouping on such articles from the scene of crime is very helpful in the identification of the criminal. In case of salivary stains on fabrics, the fibers of the stained part of the cloth can be subjected to mixed agglutination test to find out any group specific substances secreted by the person and this helps in identification of the person. [8]

Many other workers [9-11] have studied and confirmed the presence of ABO blood group agglutinins in saliva. Haemagglutinins are more stable in blood stains than in stains of saliva because of the presence of higher concentrations of various salts and a much greater buffering capacity than saliva. [12]

In the present study, haemagglutination inhibition method has been selected for the detection of secretors and non-secretors from saliva as it was done by workers like Boettcher B [10] , Akhter S [11] Karpoor C [13] , and the slides were examined under the microscope for antigen – antibody reaction.

In the present work, 49.5% were secretors and 50.5% were non secretors in the Manipuri population who generally belong to the Mongoloid race. But, according to Race RR and Sanger R [5] in Caucasians approximately 80% are secretors and 20% are non-secretors and in Negroes 60% are secretors and 40% are non-secretors. In Bangladeshi population, 60% are secretors and 40% are non-secretors as observed by Akhter S et al [11]

In a study by Vyas GN et al [14] in Gujarat population, 79.6% were secretors and 20.4% were non secretors. In Karnataka, Kulkarni DG and Venkatesh D [15] observed that 76.78% of the population was constituted by secretors and 23.22% were non-secretors.

These findings are in contrast with the findings of the present study, and this may be attributed to racial variations in these study populations. Interestingly, the finding of the present study may be favourably compared with the findings of an earlier study by Loitongbam BC [16] who studied the frequency of ABO secretor status in Manipuri youth population, and observed that 39% were secretors and 61% were non-secretors.

The difference in the percentage may be due to the difference in sample size. In the present study, the predominant blood group was B group (35%) followed by O group (33.25%) and in blood group O, 54.14% were secretors and 45.86% were non secretors.

Here, the percentage of agglutinins is highest in blood group O. This finding is similar to the findings of Wilson RM and Green GE [9] who found agglutinins in a higher proportion of saliva from group O persons than in those from A or B individuals. It is also comparable with that of Boettcher B who detected ABO agglutinins in a significantly higher proportion of saliva from O individuals than those from B or A individuals.

In this study, the ABO group was examined and detected from saliva of secretors at different time intervals from the time of collection of samples. The secretor status can be detected in almost all the samples up to 180 days i.e. 6 months which is similar to the findings of Harrington JJ et al [12] who observed that the salivary haemagglutinins may be sufficiently stable over periods of one to several days at ambient room temperatures to be of aide to forensic science investigation.

Conclusion:

From the present work, it may be concluded that a relatively higher number of people in the Manipuri population are non-secretors. The percentage of agglutinins is highest in blood group 'O'.

The effect of environmental factors was negligible on the detectability of blood group from saliva as they could be detected up to 180 days i.e. 6 months after the collection of the sample However, no attempt was made beyond this time period in the present study for detection of blood group from saliva and more studies may be taken up in the future to establish the time limit for detection of blood group from saliva sample.

References:

1. **Landsteiner K.** About agglutination phenomenon in normal human blood. Wiener Klinische Wochenschrfit. 1901;14:1132-4
2. **Weiner A S.** Blood groups and transfusion 3rded. New York: Hafner Publishing Co, 1962; p.387.
3. **Reddy KSN.** The Essentials of Forensic Medicine and Toxicology 27th ed. Hyderabad: Suguna Devi K; 2008; 396-8.
4. **Camps F E, Robinson A E, Lucas B G B.** Gradwohl's Legal Medicine. 3rd ed. Bristol: John Wright & sons Ltd; 1976.p.163.
5. **Race RR, Sanger R.** Blood groups in man. 6th ed. Oxford: Blackwell Scientific Publications. 1975; p.313.
6. **Godkar PB, Godkar DB.** Text Book of Medical Laboratory Technology. 2nd ed. Mumbai: Bhalani Publishing House; 2003: 860-5.
7. **Roy MN, Chatterjee JB.** Some Observation on the secretion of blood group substances in the body fluids of man. J Ind Med Ass. 1965; 45: 413-17.
8. **Nandy A.** Principles of Forensic Medicine. 2nd ed. Calcutta: New Central Book Agency (P) Ltd. 2005; p.131.
9. **Wilson RM, Green GE.** Genetic aspect of salivary secretion of isolagglutinins. Proc Soc Exp Biol. 1964; 115: 982-5.
10. **Boettcher B.** ABO Blood Group Agglutinins in Saliva. Acta Haematologica. 1967; 38: 351-60.
11. **Akhter S, Kibria G M, Akhter NR, Habibullah MM, Islam SMK, Zakariah M.** ABO and Lewis Blood Grouping with ABH secretor and non-secretor status: A cross sectional study in Dhaka. Faridpur Medical College Journal. 2011; 6(1): 38-40.
12. **Harrington JJ, Rolf M, Kobilinsky L.** Detection of Haemagglutinins in Dried saliva stains and their potential use in Blood Typing. Journal of Forensic Sciences. 1988; 33(3): 628-37.

13. **Karpoor C, Shettar SS, Jatti VB, Kulkarni V.** Study of secretors and non-secretors in normal healthy population – Its forensic implication in human identification. Indian Journal of Forensic Medicine &Toxicology. 2010; 4(1):11-13.
14. **Vyas GN, Bhatia HM, Sukumaran PK, Balkrishnan V, Sanghvi LD.** Study of blood groups, abnormal haemoglobin and other genetical characters in some tribes of Gujarat. Am. J. Physi. Anthropol.1962; 20(3):255-65.
15. **Kulkarni DG, Venkatesh D.** Non-secretor status; a predisposing factor for vaginal candidiasis. Indian J Physiol Pharmacol. 2004 Apr; 48(2):225-9.
16. **Loitongbam BC.** A study on secretor status of Manipuri youths. Journal of Medico-legal Society of Manipur. 2005; 1: 14-16.
17. **Boyd WC.** Genetics and the Races of Man: An Introduction to Modern Physical Anthropology. Little Brown, Boston, 1950; 1-453.

Table 1: Distribution of Cases According to Blood Groups

Blood Group	Subjects	Percentage (%)
O	133	33.25
A	90	22.50
B	140	35.00
AB	37	9.25
Total	400	100

Table 2: Frequency of Secretors and Non-secretors in Different Blood Groups

Blood group	Subjects	Secretors (%)	Non-secretors (%)	Chi-square (x^2)
O	133	72(18.0)	61(15.25)	98.80
A	90	46(11.5)	44(11.0)	
B	140	65(16.25)	75(18.75)	
AB	37	15(3.25)	22(5.50)	
Total	400	198(49.5)	202(50.5)	

(P <0.001, Significant)

Table 3: Detection of ABO from Saliva (Secretor) in Relation to Time of Examination of Samples

No. of Days	No. of samples	Positive Cases	Percentage
30	16	16	100
60	16	16	100
90	16	16	100
120	16	15	93.75
150	16	15	93.75
180	16	14	87.50

Fig. 1: Sex wise Distribution of Cases

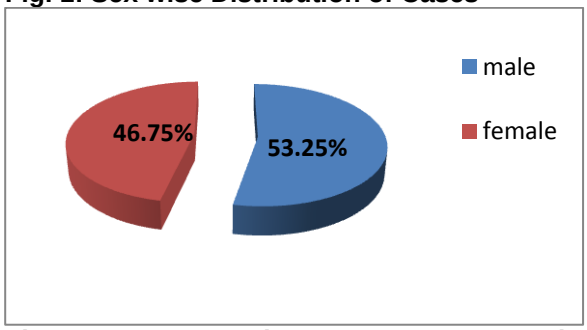

Fig. 2: Secretor and Non-secretor status (P <0.001, Significant)

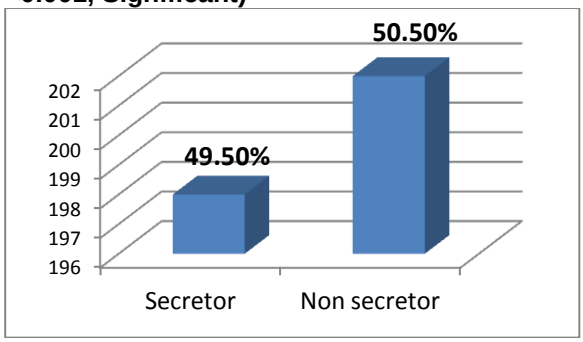

Fig. 3: Secretor and Non-secretor Status in Males and Females