

Research Article

Detection of secretor gene among Sudanese patients with chronic renal failure in Shendi town: A cross sectional study

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Abstract:

Background: Secretor status is valuable with some diseases in clinical and forensic medicine.

Objectives: This study aimed to evaluate the status of secretors and non-secretors in chronic renal failure patients under hemodialysis in Shendi town at the kidney treatment and surgery center (Sudan).

Method: Saliva samples were collected from fifty patients (58% were male) aged from 15 to 65 years and secretor status was studied by the hemagglutination inhibition method of saliva. **Result:** results showed that 68% of the study population were non-secretors. probable frequency of the Se and se genes was 17,6% and 82,4% while the frequency of SeSe, Sese, and sese allele genes was 3%, 29%, and 68% respectively. were calculated by utilizing Hardy-Weinberg Theorem for probabilities and possibilities. Frequencies of the non-secretor status among various ABO blood groups were 63.2% in group A, 75% in group B, and 72.7% in group O. **Conclusion:** We conclude that non-secretors are more prevalent in chronic renal failure. In the present study observed that non-secretors were more common as compared to secretors, non-secretors are more prone to renal failure.

Keywords: ABO group, ABH, Secretors, Non-secretors, Renal failure.

Introduction:

An Austrian Scientist Karl Landsteiner discovered the ABH blood group system in 1901[1]. In 1926 it was found that A and B antigens were not only present on red cells but they were exhibit in soluble beget in saliva. In 1930, Putkonen acclaimed that an individual could be either a secretor or non-secretor regarding his genetic aptitude to secrete ABH blood group substances in secretions [2]. It is now known that ABH blood group antigens (A, B, and H) are found on red blood cells, lymphocytes, platelets, tissue cells, bone marrow, organs such as the kidneys, Body fluids (except CSF), and in secretions [3,4]. Core differences between secretors and non-secretors are qualitative and quantitative components of their saliva, mucus, and other body secretions [5].

Blood group ABH substances are carbohydrate structures, which are formed by the sequential addition of specific monosaccharides to the carbohydrate side chains of glycolipids and glycoproteins [6,7]. Their expression is under genetic control, where the primary gene products are glycosyltransferases [8].

ABH secretions are controlled by the fucosyl transferase 2 (FUT2) secretor gene located on the short arm of chromosome number 19 in the form of two alleles denoted "Se" and "se". The Se is dominant whereas the se is recessive (or amorphic) in their sample of inheritance's and Sese build a dominant secretor phenotype

whereas sese generates a recessive non-secretor phenotype. The FUT2 gene encodes for the enzyme glycosyltransferase (α -2-L- Fucosyl transferase) which becomes active in goblet cells, and mucus glands of the gastrointestinal tract (saliva, bile, gastric juice, mucus), urogenital tract (seminal fluid, vaginal secretions, and urine) and respiratory tract as well as in the sweat, tears, milk and amniotic fluid [9].

The H, Fucosyl transferase 1 (FUT 1) gene codes for the ABO blood group. The secretor, Fucosyl transferase 2 (FUT 2) gene interact with FUT 1 gene to determine the ability to secrete blood group antigens into body fluids and secretions. The absence of the blood group antigen in secretions is a health disadvantage, as this seems to double the susceptibility to there are numerous diseases. Certain diseases show evidence of association with non-secretor status [10].

Materials and methods

Study design

This is a descriptive cross-sectional study conducted in Shendi town at the kidney treatment and surgery center in Elmek-Nemir Hospital in Sudan during the period from August to December 2021 among Sudanese patients with chronic renal failure disease under Hemodialysis to detect the prevalence of secretor gene in Sudanese patients and to correlate its association between secretor status with renal failure disease.

Study sample

3 ml of saliva was collected in a sterile container after washing the mouth.

Data collection tools

All information about participants was gathered by utilizing a questionnaire.

Sample processing

Certain blood group substances in the soluble form are found in a large proportion of individuals in secretions such as saliva and gastric juice. These individuals are termed “secretors” (they possess the Se gene) and secrete ABH- soluble antigens. These water-soluble blood group substances are readily detected in very minute quantities because they have the property of reacting with their corresponding antibodies and thereby neutralizing or inhibiting the capacity of the antibody to agglutinate erythrocytes possessing the corresponding antigen. The reaction is termed hemagglutination inhibition and provides a means of assaying the relative activity or potency of these water-soluble blood group substances.¹¹ To know the secretor status 3 ml of saliva was collected in a sterile tube. Then the saliva was centrifuged at 1000 RPM for 10 minutes. After that, the supernatant was transferred to a clean test tube, and placed in a coppered tube in a boiling water bath for 10 minutes. “This inactivates enzymes that might otherwise destroy blood group substances”. The boiled supernatant was recentrifuged at 1000 RPM for 10 minutes then the clear

supernatant was collected into a clean tube. And the saliva was diluted with an equal volume of saline “undiluted saliva contains nonspecific glycoprotein that can inhibit antisera and lead to incorrect results”. One drop of diluted antisera was added to an appropriately labeled tube (anti – A, anti – B, anti – H). For dilution anti-A (1:10) and anti-B (1:10), Anti-H (2:3). Then one drop of supernatant saliva was added to each tube. Then the mixture was incubated at room temperature for 8 to 10 minutes. After that one drop of the appropriate indicator cells (A, B, or O cells) was added to the properly labeled tube. The mixture was incubated at room temperature for 30 to 60 minutes. Then all the tubes were centrifuged and finally, the reaction was observed macroscopically.

Data analysis

Data was analyzed by utilizing the statistical package for the social sciences (SPSS) computer program.

Ethical considerations

Verbal consent of the participants in the study was taken after being informed with all detailed objectives of the study.

Results:

In the understudy group, the males were the highest prevalence with (58%) (**Table1**). Among CKD, the results found that (68%) out of fifty saliva samples were non-secretors and (32%) were secretors (**Table2**). then the frequency of secretor genes and frequency of

secretor genotypes (Table3,4). respectively, were calculated by, Hardy-Weinberg formula. When looking for the association of secretor status with ABH expression on RBCs, 36.8% of the A phenotype was secretor, In the B phenotype 25% was secretor then in the O phenotype 27.3% was secretor (Table5). when correlate gender with secretor status, most frequent secretor status in males was non

secretor (69%) and most frequent secretor status in females was non secretor(67%) (Table6). When looking for age in the analyzed data, the highest patients' group was (40-50) years while the lowest was (less than 30) years (Table7). Also, the data reveal the most common disease besides CKD was hypertension (60%) (Table8).

Table-1: The frequency of study group according to gender

<i>Gender</i>	<i>Frequency</i>	<i>Percent %</i>
<i>Males</i>	29	58%
<i>Females</i>	21	42%
Total	50	100%

Table-2: The frequency of study group according to secretor status.

<i>Secretor status</i>	<i>Frequency</i>	<i>Percent %</i>
<i>Secretor</i>	16	32%
<i>Non secretor</i>	34	68%
Total	50	100%

Table-3: The gene frequency of secretor.

<i>Gene</i>	<i>Frequency</i>
Se	17.6%
se	82.4%
Total	100%

Table-4: The genotypes frequency of secretor status.

<i>Secretor status</i>	<i>Frequency</i>	<i>Percent</i>
Homozygous genotype SeSe	0.03	3%
Heterozygous genotype Sese	0.29	29%
Recessive genotype sese	0.68	68%

Table-5: The frequency of secretor and non-secretor status in A, B, AB, and O blood groups.

<i>Secretor status</i>	<i>A</i>	<i>B</i>	<i>AB</i>	<i>O</i>
<i>Secretor</i>	7	2	1	6
<i>Frequency%</i>	36.8%	25%	100%	27.3%
<i>Non secretor</i>	12	6	0	16
<i>Frequency%</i>	63.2%	75%	0	72.7%

Table-6: The frequency of secretor status among the gender.

<i>Secretor status</i>	<i>Males</i>	<i>Percent%</i>	<i>females</i>	<i>Percent%</i>
<i>Secretor</i>	9	31%	7	33%
<i>None secretor</i>	20	69%	14	67%
Total	29	100%	21	100%

Table-7: The frequency of study groups according to age groups.

<i>Age groups</i>	<i>Frequency</i>	<i>Percent %</i>
<i>Less than 30 years</i>	5	10%
<i>30-40 years</i>	8	16%
<i>40-50 years</i>	19	38%
<i>50-60 years</i>	7	14%
<i>More than 60 years</i>	11	22%
Total	50	100%

Table-8: The frequency of the study group according to another disease.

<i>Other disease</i>	<i>Frequency</i>	<i>Percent %</i>
<i>Hypertension</i>	30	60%
<i>Diabetes</i>	2	4%
<i>None</i>	18	36%
Total	50	100%

Discussion:

The current study reflects the prevalence of non-secretor was more than secretors, it was (68%), which agreed with the data that was conducted in Gwalior¹² which means non-secretors are more prone to renal disorders. In the present study, The homozygous non-secretor genotype(*sese*) was higher than the secret or genotype (*SeSe*, *Sese*) 68% and 32% respectively, this finding is similar to a study done in Canada [13]. In this study, the highest frequency of secretors was found in blood group AB (100 %), followed by blood group A (36.8%), followed blood group O (27.3%), then blood group B (25%). Also In this study, the highest frequency of secretor status in males was (69%). This study showed there is a relationship between hypertension and renal failure, this result corresponds to the study done in England by Rostand and his colleagues [14].

Conclusion:

From this study, we conclude that non-secretors were more common as compared to secretors, also the genotype frequency of non-secretor was more than secretors. The expression of the *Se* gene was less frequent. Non-secretors are more prone to renal failure.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Sources of Funding:

There was no specific grant for this research from any funding organization in the public, private, or nonprofit sectors.

Conflict of Interest:

Authors have declared that no competing interests exist.

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