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Detection of ABH Antigen in Sudanese Patients with Chronic Renal Failure in Shendi Town, Sudan

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Abstract: ***Background:*** Patients suffering from chronic renal failure have significant challenges in their social and economic lives. In Sudan, the annual incidence of chronic renal failure is between 70 and 140 cases per million, and until more is done to address this illness, the problem is likely to persist. Blood group types appear to be associated with secretor status and certain disorders, in addition to the main therapeutic significance of the ABO blood group to organ transplantation and blood transfusions. ***Objective:*** To determine the prevalence of ABO and secretor status, a descriptive cross-sectional study was carried out among Sudanese patients receiving hemodialysis for chronic renal failure disease at the kidney treatment and surgical center in Shendi City between August and December 2021. ***Materials and Methods:*** Fifty samples total from patients with chronic renal failure were taken; of these, 42% were female and 58% were male. Two milliliters of venous blood and three milliliters of saliva were collected in sterile containers and EDTA anticoagulant containers, respectively. Slides were used to do ABO grouping, and absorption inhibition was used to determine secretor status. ***Results:*** 44% of patients with CKD were blood group O, 38% were blood group A, 16% were blood group B, and 2% were blood group AB. The data also revealed that 68% of patients with CKD were non-secretors and 32% were secretors. According to the study, there was a decrease in the frequency of the Se gene compared to the Se gene. The homozygous genotype SeSe was found to be 3%, the heterozygous genotype Sese to be 29%, and the recessive genotype Sese to be 68%. Additionally, the blood groups O and A have a higher risk of renal failure. ***Conclusions:*** Blood group O was the highest frequency among patients receiving hemodialysis for chronic renal failure, followed by blood groups A and B, while blood group AB was the least prevalent. The non-secretors had a higher genotype frequency. Renal failure is more common among non-secretors.

Keywords: Chronic Renal Failure, *Secretors, Non-Secretors,* ABO Blood Group.

Research Paper

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INTRODUCTION

In 1901, Karl Landsteiner, an Austrian scientist, discovered the ABH blood group system. It was discovered in 1926 that A and B antigens were soluble in saliva in addition to being present in red blood cells. Regarding a person's hereditary capacity to secrete ABH blood group substances in secretions, Putkonen observed in 1930 that a person may be classified as a secretor or non-secretor. The ABH blood group antigens (A, B, and H) are now recognized to be present in bone marrow, kidneys, lymphocytes, platelets, tissue cells, red blood cells, organs, bodily fluids (apart from CSF), and secretions. The qualitative and quantitative characteristics of secretors' saliva, mucus, and other bodily secretions differ fundamentally from those of non-secretors [1]. The antigens on the outer surface of red blood cells and the associated antibodies in serum make up the ABO system. Since a sizable fraction of people are secretors, the antigens in their blood will also be present in their saliva and other bodily fluids. In the secretor system's molecular base, there are two main possibilities. It suggests that someone can be an A secretor or an A nonsecretor, a B secretor or a B nonsecretor. An person can also be a Secretor (Se) or Non-secretor (se), which is entirely irrespective of whether the individual is of blood type A, B, AB, or O

[2]. Essentially, an individual is classified as a secretor if they secrete their blood type antigens into bodily fluids such as mucus and saliva. In contrast, a non-secretor does not put any, or very little, of their blood type antigens into these fluids [2]. Despite the analysis of anti-A and anti-B haem-agglutinins in saliva in 1928, the lack of adequate procedures at the time prevented the use of this evidence in medico-legal cases. Later, many changes were made to the methods in order to achieve 100% accuracy in identifying blood group antigens in bodily fluids. The Absorption Inhibition and Absorption Elution procedures are the two tests used to type blood and bodily fluids for ABO and other blood group systems. Vitorio Sieacusa created the absorption inhibition method in Italy in 1923 [3]. These antigens, which are used to identify blood types, are released in a variety of bodily fluids in addition to blood. This technique functions by weakening the antigens in the stains [2]. To unify blood grouping methods and antigen names, the International Society of Blood Transfusion (ISBT) established a Working Party on Terminology for Red Cell Antigens in 1980. The group wanted to develop more terminology that could be used with computer software, not replace existing terminology. Red cell antigens have been given numerical designations based on genetics by the ISBT Working Party, which has currently identified 30 blood group systems [4]. Genetic research and serologic evidence are needed, per ISBT criteria, before an antigen is allocated to a blood group system. The H blood group system is ISBT number 018 with one antigen, while the ABO blood group system has four antigens and ISBT number 001 [4]. There have been searches for potential links between certain diseases and ABO blood types. ABO blood types have been associated with data from research on patients with small cell carcinoma of the lung, duodenal ulcer, colorectal cancer, thyroid abnormalities, ovarian malignancies, gastric cancer, and coronary heart disease. This data has led to the hypothesis that the ABO blood group may also be linked to some other disorders [5]. The ninth chromosome contains the ABO genes. The glycosyl transferee enzymes add certain sugars to the precursor material, which causes the red blood cells to be inundated with A and/or B antigens [6]. About 80% of the population secretes ABH, meaning that their bodily secretions contain water-soluble forms of the H antigen along with A or B depending on their ABO genotype. Regardless of ABO phenotype, the remaining 20% are non-secretors and lack secreted ABH antigens [7]. Renal failure is the state in which the kidneys are unable to perform their usual activities either fully or partially. This is hazardous because it causes an accumulation of waste products, fluids, and harmful substances that the kidneys are meant to eliminate from the body. Additionally, because it interferes with the kidneys' ability to produce hormones, it can lead to various health issues like anemia, high blood pressure, acidosis, cholesterol, fatty acid, and bone damage [8].

MATERIALS AND METHODS

Study Design

To determine the prevalence of ABO and secretor blood groups in Sudanese patients with chronic renal failure disease and to correlate ABO and secretor blood groups with renal failure disease, a descriptive cross-sectional study was carried out in Shendi town between August and December 2021.

Study Area: This investigation was carried out at Almak Nimer Hospital.

Study Duration:

This descriptive cross-sectional study was carried out among Sudanese patients receiving hemodialysis for chronic renal failure disease at the kidney treatment and surgery center in Shendi City between August and December of 2021.

Study Population: Patients with chronic renal failure receiving hemodialysis made up the study's population.

Sampling and Sample Size:

Hemagglutination is the test principle. Red blood cell agglutination, a manifestation of antigen-antibody interaction, is triggered when the antibodies Anti-A, Anti-B, and Anti-AB attach to the corresponding antigen on the red blood cells under examination.

Sample Collection

After the arm was partially cut off with a tourniquet and 70% alcohol, two milliliters of venous blood were extracted. The emptied EDTA tube was filled with blood and gently mixed [9].

Data Analysis:

Data were analyzed using SPSS 25.0, descriptive statistics in terms of frequency, percentages, means and standard deviations, and Chi-square test were calculated. A p-value ≤ 0.05 is considered statistically significant.

Ethical Considerations:

Ethical approval for the study was obtained from the Board of the Faculty of Medical Laboratories Sciences, at Shendi University. The written informed consent form was obtained from each guardian of the participant as well as from the subject himself before recruitment into the study. All protocols in this study were done according to the Declaration of Helsinki (1964).

RESULTS

Table 1: The frequency of ABO Blood groups among the study group

Blood group	**A**	**B**	**AB**	**O**
Frequency	19 (38%)	8 (16%)	1 (2%)	22 (44%)

Table 2: The genotype frequency of ABO was calculated by using the Hardy-Weinberg Equilibrium

Phenotype	**Genotype**	**Genotype calculated**	**Genotype frequency%**
A	AA	0.045	4.5%
	AO	0.335	33.5%
	Aa	0.62	62%
B	BB	0.01	1%
	BO	0.15	15%
	Bb	0.84	84%

Table 3: The gene frequency of blood group A, and blood group B

Gene	**A**	**O**	**B**	**O**
Frequency	21.3%	78.7%	8%	92%

Table 4: The frequency of the study group according to secretor status

Secretor status	Secretor	Non secretor
Frequency	16 (32%)	34 (68%)

Table 5: The genotypes frequency of secretor status

Secretor status	Homozygous genotype SeSe	Heterozygous genotype SeSe	Recessive genotype SeSe
Frequency	0.03 (3%)	0.29 (29%)	0.68 (68%)

Table 6: The gene frequency of secretor

Gene	Se	Se
Frequency	17.6%	82.4%

Table 7: The frequency of ABO blood groups according to the gender

BG	**A**	**B**	**AB**	**O**
Males	12 (41.4%)	5 (17.2%)	**0**	12 (41.4%)
Females	7 (33.3%)	3 (14.3%)	1 (4.8%)	10(47.6%)

Table 8: The frequency of secretor status among the gender

Secretor status	Secretor	Non secretor
Males	9 (31%)	20 (69%)
Females	7 (33%)	14 (67%)

Table 9: The frequency of secretor and non-secretor status in A, B, AB, O blood groups

Secretor status	**A**	**B**	**AB**	**O**
Secretor	7 (36.8%)	2(25%)	1(100%)	6(27.3%)
Non secretor	12(63.2%)	6(75%)	0(0)	16(72.7%)

DISCUSSION

Fifty hemodialysis patients with renal failure who visited Almak Nimer Hospital from August to December 2021 were the subjects of this study. The primary objective of the study is to determine the prevalence of the ABO blood group system and secretor status in individuals with chronic renal failure. Males and patients between the ages of 40 and 50 years had the highest frequency of chronic kidney disease. From the findings of the study, we conclude that blood group AB had the highest frequency of secretors (100%) followed by blood group A (36.8%), blood group O (27.3%), and blood group B (25%). According to this study, O (47.6%) was the most common blood type in females, whereas A and O (41.4%) were the most common blood groups in males. Moreover, 69% of males had the highest frequency of secretor status. Blood group O had the highest frequency, followed by blood groups A, B, and AB, which had the lowest frequencies. These results were consistent with the research conducted in Iraq [10]. Additionally, current statistics contradict a study carried out in Jordan [11]. According to the current study, 68% of non-secretors were found to be more common than

secretors, which is consistent with data from Gwalior [12]. That suggests non-secretors are more likely to experience renal problems. The homozygous non-secretor genotype (sese) in the current study was greater than the secretor genotype (SeSe, Sese) at 68% and 32%, respectively; these results are consistent with research conducted in Canada [13], where authors determined secretors using various techniques. Based on the study's results, we conclude that the absorption-inhibition approach is a more precise way to identify and quantify secretors [14].

CONCLUSION

Blood group O was discovered to have the highest frequency among patients receiving hemodialysis for chronic renal failure, followed by blood groups A and B, while blood group AB was the least prevalent. In addition to being more prevalent than secretors, non-secretors also had a higher genotype frequency. The Se gene was expressed less frequently. Renal failure is more common among non-secretors.

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Conflict of Interest: The author has affirmed that there are no conflicting interests.

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