

Prevalence of ANA and Anti-GBM Antibodies among Patients with Renal Failure in Tikrit City

Saba Talal Ahmed¹, Nadia Ibrahim Salih²

¹M.Sc. Medical Microbiology Stud. Salah Aldin Health Directorate, Ira. Email : st230086pme@st.tu.edu.iq

²Ph.D. Medical Microbiology. College of Medicine Tikrit Universit. Email : st230086pme@st.tu.edu.iq

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ABSTRACT

Background: End-stage renal disease (ESRD) people need regular hemodialysis because they have chronic renal disease, which is a major health issue. Aim: This study aimed to evaluate the prevalence and characteristics of ANA and Anti-GBM antibodies, associated infections, and bacterial isolates in hemodialysis patients, comparing the findings with a healthy control group. Materials and Methods: A cross-sectional hospital-based study was conducted from December 1, 2023, to May 31, 2024, at Tikrit Teaching Hospital. The study comprised a cohort of 240 patients, aged 15-75 years, who were diagnosed with chronic renal disease and were receiving hemodialysis. Additionally, a control group of 40 healthy persons was included. Enzyme-linked immunosorbent assay (ELISA) technology was utilized to collect blood samples for the purpose of detecting ANA and Anti-GBM antibodies. Results: There was a modest preponderance of men in the sex distribution of hemodialysis patients. The age distribution was adequately represented throughout several decades. The investigation revealed notable disparities in the occurrence of ANA and Anti-GBM antibodies between hemodialysis patients and the control group. Out of the patients undergoing hemodialysis, 32.29% were found to have ANA antibodies, and 29.17% were found to have Anti-GBM antibodies. In contrast, none of the individuals in the control group tested positive for either type of antibody. The prevalence of Hepatitis C and B viruses among hemodialysis patients was 8.33% and 5.21% respectively. 52.08% of the patients had diabetes, whereas 57.29% had hypertension. In addition, the bacteria obtained from the mouth exhibited a varied microbial composition, with the most common species being *Staphylococcus epidermidis* and *Streptococcus viridans*. Conclusion: This study emphasizes the notable occurrence of ANA and Anti-GBM antibodies in hemodialysis patients, which is associated with a heightened susceptibility to urinary tract infections (UTIs). Implementing efficient infection control techniques and enhancing oral hygiene practices are crucial for effectively controlling infections in hemodialysis patients. Additional investigation is required to examine the intricacies of the microbial composition in this particular group and to formulate thorough measures for preventing infections.

1. Introduction

Chronic kidney disease (CKD) often refers to the long-term failure of the kidneys, characterized by an abnormal function and/or structure of the kidneys. It often arises with an acute kidney illness, such as acute glomerulonephritis, nephrotic syndrome, or acute renal failure caused by acute hypervolemia (1). The likelihood of getting chronic kidney disease (CKD) likewise grows with advancing age. As kidney function deteriorates, the prevalence and severity of concomitant diseases rise. Individuals with Chronic Kidney Disease (CKD) have a significantly higher risk of premature mortality compared to their likelihood of advancing to end-stage renal disease. This risk is typically five to 10 times greater. In recent decades, several studies have concentrated on the etiology of kidney illnesses that are mediated by the immune system. Autoimmunity is the phenomenon when the body's immune system mistakenly attacks its own tissues and organs due to a breakdown in self-tolerance. In order for autoimmunity to develop, several conditions that function as triggers have been identified, with infections being recognized as one of the primary contributors(3). Renal involvement in autoimmune illnesses, either through targeted attacks on the organ or as a component of a broader systemic disease, is widely recognized. Autoimmune illnesses are long-term ailments defined by a loss of the body's ability to recognize its own cells, leading to an immune response that attacks the body's own tissues. Autoimmune illnesses are characterized by their chronic nature, early start in young individuals, and high prevalence, affecting around 5% of the global population. Consequently, the burden of these diseases is substantial and presents a significant therapeutic challenge. Similar to other intricate illnesses, the processes responsible for generating autoimmunity are mostly unknown in the majority of instances. It is hypothesized that they result from a mix of genetic predisposition and exposure to environmental factors. Bacterial, viral, and parasite infections have been hypothesized to have a role in stimulating the immune system, which can lead to an abnormal immunological response in certain

individuals. This abnormal response increases the growth of leukocytes that recognize the body's own cells (6,7). Nevertheless, despite several offered hypotheses, there is still a dearth of information about the precise processes behind autoimmune diseases. The kidneys have a tight relationship with the immune system, as they play a role in filtering cytokines and bacterial toxins. Additionally, they contribute to the maintenance of peripheral immunological tolerance (8). Over the past several years, there has been a substantial increase in the incidence of Urinary tract infections (UTIs) caused by microbial strains that are resistant to many drugs. These multidrug-resistant bacteria have become a major problem in public healthcare systems (9). Urinary tract infections can occur in both males and females of all age groups, including adults, pregnant women, children, young adults, and babies. They are particularly prevalent in patients who rely on hemodialysis due to end-stage renal disease (ESRD). Nevertheless, hemodialysis-dependent ESRD patients have challenges while undergoing a urine test. Urinalysis and urine bacterial cultures are often not part of routine exams at hemodialysis clinics and hospitals. As a result, patients with end-stage renal disease (ESRD) who rely on hemodialysis may be reluctant to discuss urination symptoms with physicians on their rounds due to the lack of privacy. Regarding urinary tract infections (UTIs), the symptoms of bacterial cystitis, such as frequent urination, urgency, and discomfort during urination, can significantly impact one's quality of life. Additionally, pyelonephritis, if left untreated, can progress to urosepsis, a severe and potentially life-threatening condition. This is particularly concerning for those with end-stage renal disease (ESRD) who rely on hemodialysis. It is essential to comprehend urinalysis and urine bacterial cultures in patients with end-stage renal disease (ESRD) who rely on hemodialysis (12,13). The aim of this study was to assess the interplay between bacterial factors and autoimmunity in the progression of renal failure.

2. Materials and Methods

A cross-sectional hospital based study was done from 1st December 2023 to the end of May 2024 including 240 patients with chronic renal disease whose ages were between 15-75 years and they admitted to hemodialysis unit of Tikrit Teaching Hospital. The individuals were diagnosed with end-stage renal disease (ESRD) by nephrologists. This diagnosis was made based on their medical history, clinical examination, renal function tests, and other laboratory testing. These individuals are now getting hemodialysis treatment. The research also incorporated 40 healthy individuals as a control group. Patients with kidney failure who did not receive renal dialysis, patients with chronic and autoimmune diseases, and patients with chronic infection were not included in the study. The research committee of the Saladin Health Directorate, Ministry of Health, Republic of Iraq, approved the study proposal, and the practical study will be conducted at Tikrit Teaching Hospital on August 3, 2023. A comprehensive medical examination conducted by a physician is necessary to rule out other potential causes listed in the exclusion criteria, such as kidney failure without renal dialysis, patients with chronic and autoimmune diseases, and chronic infections. Additionally, the examination should include an assessment of biochemical parameters, imaging studies, and renal biopsy if necessary.

Methods

Five milliliters of blood were obtained from each patient in this study through vein puncture using a 5 ml syringe. Three milliliters of the collected blood were placed in plain tubes and left for 30 minutes at 37 °C to allow clotting. The tubes were then centrifuged at 3000 rpm for 15 minutes. The resulting sera were aspirated using an automatic micropipette and transferred to Eppendorf tubes. The sera were stored at -20°C for the detection of ANA and anti GBM using the enzyme-linked immunosorbent assay (ELISA) technique. The second portion was introduced into EDTA tubes to ascertain the complete blood count (CBC) values and blood types.

Collection of oral swab

In this investigation, sterile cotton swabs were used to obtain oral swab samples from all patients. The swabs were gently rubbed across the buccal mucosa, tongue, and gingival borders to achieve a thorough sampling of the oral microbiota. The swabs were promptly put in sterile transport media, such as Amies transport medium, to preserve the vitality of the bacteria. The samples were thereafter

conveyed to the laboratory within a time frame of two hours from the moment of collection. The oral swab was applied to several culture medium plates using streaking technique. The plates were placed in an incubator at a temperature of 37°C for a period of 24 to 48 hours, with the presence of oxygen.

Statistical analysis.

A computerized statistical analysis was conducted using the Minitab version 17 statistical software package. The comparison was conducted using the Chi-square (X²) test to get the probability value, which was then interpreted according to the following guidelines.

- A p-value greater than 0.01 is considered highly significant (HS).
- The P value falls within the range of 0.1 to 0.5, indicating statistical significance (S).
- P value less than 0.05: Not statistically significant (NS).

3. Results and Discussion

The present investigation reveals a marginal male preponderance, with 54 male patients (56.25%) as opposed to 42 female patients (43.75%). The age groups are evenly distributed over several decades, with the highest proportion found in the 50-59 age range (21.88%), followed by the 60-69 age range (19.79%) and the 40-49 age range (16.67%). The sample consists of 11.46% of patients who are between the ages of 20 and 29. The distribution of patients between rural and urban dwellings is about equal, with a tiny majority of patients residing in urban regions (51.04%) compared to rural areas (48.96%). A total of 96 participants were included in the research.

Table 1: General characteristics of studied hemodialysis patients

Demographic characteristics of hemodialysis patients		No.	%
Sex	Male	54	56.25%
	Female	42	43.75%
	Total	96	100%
Age groups (years)	20-29	11	11.46%
	30-39	12	12.50%
	40-49	16	16.67%
	50-59	21	21.88%
	60-69	19	19.79%
	70-79	17	17.71%
	Total	96	100%
Residence	Rural	47	48.96%
	Urban	49	51.04%
	Total	96	100%

There is a notable disparity in the presence of ANA antibodies between hemodialysis patients and the control group, as indicated by the ANA ELISA findings. Out of the 96 hemodialysis patients, 31 of them (32.29%) tested positive. However, none of the 40 participants in the control group tested positive. In contrast, 65 out of 96 hemodialysis patients (67.71%) and all 40 persons in the control group (100%) produced negative test results..

Table 2: Distribution of hemodialysis patients according to ANA result

ANA ELISA results	Hemodialysis patients		Control group	
	No.	%	No.	%
Positive	31	32.29%	0	0%
Negative	65	67.71%	40	100%
Total	96	100%	40	10%

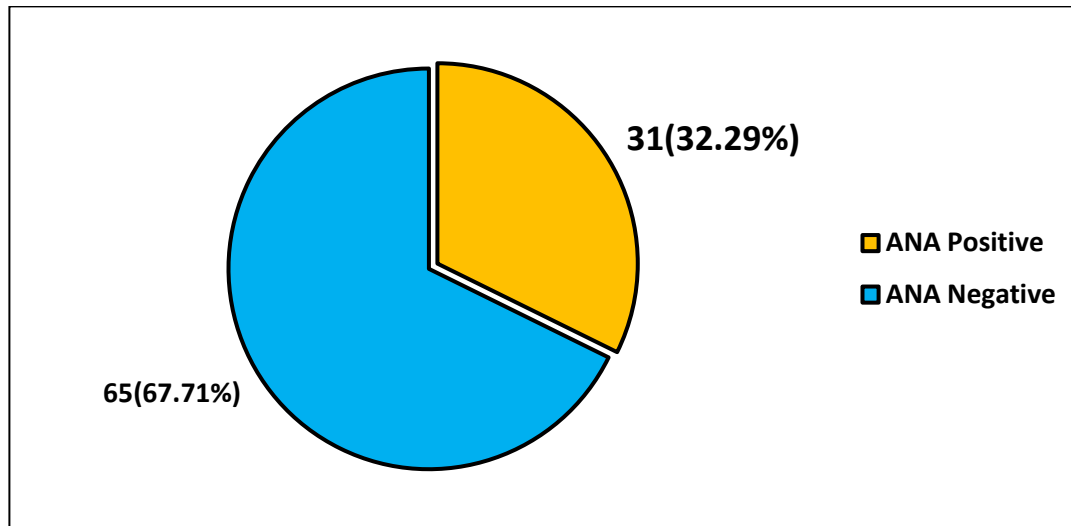


Figure 1: Distribution of hemodialysis patients according to ANA result

This study examined the Anti-GBM ELISA results in hemodialysis patients and a control group. The findings revealed that 29.17% (28 out of 96) of the hemodialysis patients tested positive for Anti-GBM antibodies, but none (0 out of 40) of the control group did. In contrast, 70.83% (68 out of 96) of the hemodialysis patients yielded negative test results, whereas the control group had a 100% (40 out of 40) negative rate.

Table 3: Distribution of hemodialysis patients according to Anti GBM result

Anti GBM ELISA results	hemodialysis patients		Control group	
	No.	%	No.	No.
Positive	28	29.17%	0	0
Negative	68	70.83%	40	40
Total	96	100%	40	40

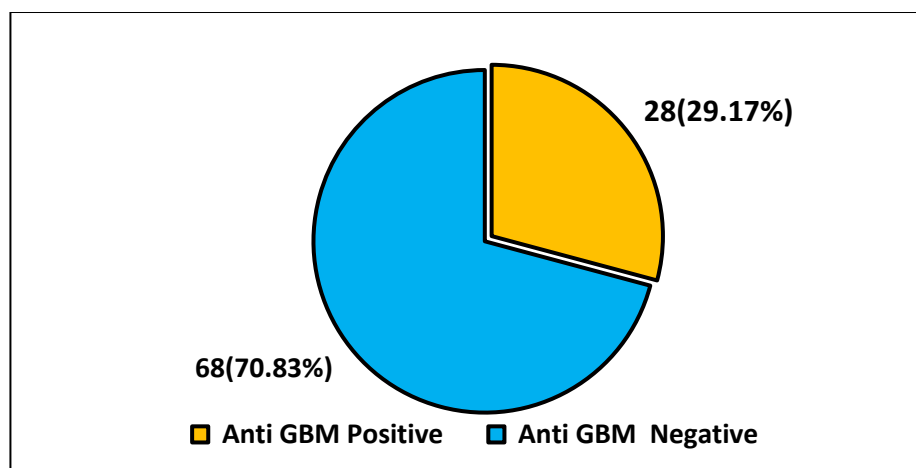


Figure 2: Distribution of hemodialysis patients according to Anti GBM result

Out of the total number of patients, 8 individuals (8.33%) tested positive for Hepatitis C Virus (HCV), whereas the remaining 88 patients (91.67%) tested negative for HCV. The prevalence of Hepatitis B Virus (HBV) was rather low, with only 5 individuals (5.21%) testing positive, whereas 91 individuals (94.79%) tested negative. The patients had a high prevalence of diabetes, with 50 individuals (52.08%) being diagnosed with diabetes, while 46 individuals (47.92%) did not have the condition. The prevalence of hypertension was 57.29%, with 55 individuals affected, whereas 42.71% did not have hypertension, totaling 41 individuals.

Table 4: Distribution of hemodialysis patients according to associated diseases and infections

Associated diseases and infection among hemodialysis patients		No.	%
HCV	Positive	8	8.33%
	Negative	88	91.67%
	Total	96	100%
HBV	Positive	5	5.21%
	Negative	91	94.79%
	Total	96	100%
Diabetes	Present	50	52.08%
	Absent	46	47.92%
	Total	96	100%
Hypertension	Present	55	57.29%
	Absent	41	42.71%
	Total	96	100%

The Tables 4.6 provide a summary of the demographic features of hemodialysis patients in connection to their ANA and Anti-GBM ELISA test findings. Regarding ANA findings, the proportion of positive results was larger in males (64.52%) compared to females (35.48%), although this difference did not reach statistical significance ($P = 0.26$). Age-wise, the highest ANA positivity was in the 40-49 age group (29.03%), followed by the 20-29 age group (16.13%), with no significant age association ($P = 0.14$). The proportion of ANA positive and negative groups was similar in rural and urban homes ($P = 0.42$).

Table 5: Demographic characteristics of hemodialysis patients in relation to their ANA ELISA test results

Demographic characteristics		ANA				P-value
		Positive		Negative		
		No.	%	No.	%	
Sex	Male	20	64.52%	34	52.31%	0.262
	Female	11	35.48%	31	47.69%	
	Total	31	100%	65	100%	
Age (years)	20-29	5	16.13%	6	9.23%	0.143
	30-39	4	12.90%	8	12.31%	
	40-49	9	29.03%	7	10.77%	
	50-59	6	19.35%	15	23.08%	
	60-69	3	9.68%	16	24.62%	
	70-79	4	12.9%	13	20%	
	Total	31	100%	65	100%	
Residence	rural	17	54.84%	30	46.15%	0.421
	urban	14	45.16%	35	53.85%	
	Total	31	100%	65	100%	

The demographic characteristics of hemodialysis patients in relation to their ANA Anti-GBM ELISA test results are summarized in Table 4.7 . For Anti-GBM results, males had a significantly higher positivity rate (71.43%) compared to females (28.57%), with a statistically significant P-value of 0.045. Age distribution showed a significant difference ($P = 0.041$), with the 40-49 age group having the highest positivity (32.14%), and the 20-29 age group also showing a notable percentage (17.86%). Residence did not significantly affect Anti-GBM results ($P = 0.81$).

Table 6: Demographic characteristics of hemodialysis patients in relation to their Anti-GBM ELISA

test results

Demographic characteristics		Anti GBM				P-value
		Positive		Negative		
		No.	%	No.	%	
Sex	Male	20	71.43%	34	50%	0.045
	Female	8	28.57%	34	50%	
	Total	28	100%	68	100%	
Age (years)	20-29	5	17.86%	6	8.82%	0.041
	30-39	3	10.71%	9	13.24%	
	40-49	9	32.14%	7	10.29%	
	50-59	6	21.43%	15	22.06%	
	60-69	2	7.14%	17	25%	
	70-79	3	10.71%	14	20.59%	
	Total	28	100%	68	100%	
Residence	rural	14	50%	33	48.53%	0.81
	urban	14	50%	35	51.47%	
	Total	28	100%	68	100%	

The study showed that the majority of ANA-positive patients had blood group O (41.94%) followed by blood group A (35.48%). This distribution showed a marginal association ($P = 0.085$). For Anti-GBM results, the pattern was similar, with blood group O (46.43%) being the most common among Anti-GBM positive patients, followed by blood group A (32.14%). This also showed a marginal association ($P = 0.16$). Regarding Rh factors, the majority of both ANA-positive (90.32%) and ANA-negative (96.92%) patients were Rh-positive, with no significant difference ($P = 0.17$). Similarly, for Anti-GBM results, 92.86% of Anti-GBM positive patients and 95.59% of Anti-GBM negative patients were Rh-positive, again showing no significant difference ($P = 0.48$).

Table 7: The distribution of blood groups and Rh factors among hemodialysis patients with positive and negative ANA and Anti-GBM

Blood groups and Rh		ANA				Anti GBM			
		Positive		Negative		Positive		Negative	
		No.	%	No.	%	No.	%	No.	%
Blood group	A	11	35.48%	10	15.38%	9	32.14%	12	17.65%
	AB	1	3.23%	2	3.08%	0	0%	3	4.41%
	B	6	19.35%	26	40%	6	21.43%	26	38.24%
	O	13	41.94%	27	41.54%	13	46.43%	27	39.71%
	Total	31	100%	65	100%	28	100%	68	100%
	P-value	0.085				0.16			
Rh	Positive	28	90.32%	63	96.92%	26	92.86%	65	95.59%
	Negative	3	9.68%	2	3.08%	2	7.14%	3	4.41%
	Total	31	100%	65	100%	28	100%	68	100%
	P-value	0.17				0.48			

The study showed that patients with a dialysis duration of 2-4 years were the most common in both ANA-positive (48.39%) and ANA-negative (47.69%) groups. This was followed by those with 5-7 years of dialysis, comprising 22.58% of ANA-positive and 35.38% of ANA-negative patients. Patients with 8 or more years of dialysis constituted 29.03% of ANA-positive and 16.92% of ANA-negative groups. This distribution did not show a significant association ($P = 0.27$). Similarly, for Anti-GBM

results, the majority of patients in both the positive (46.43%) and negative (48.53%) groups had been on dialysis for 2-4 years. Those with 5-7 years of dialysis made up 25.00% of the Anti-GBM positive and 33.82% of the negative groups. Patients with 8 or more years of dialysis represented 28.57% of the Anti-GBM positive and 17.65% of the negative groups. This distribution also did not show a significant association ($P = 0.43$).

Table 8: The distribution of dialysis duration among hemodialysis patients with positive and negative ANA and Anti-GBM

Dialysis duration (year)	ANA test				Anti GBM			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
2-4	15	48.39 %	31	47.69 %	13	46.43%	33	48.53 %
5-7	7	22.58 %	23	35.38 %	7	25%	23	33.82 %
≥8	9	29.03 %	11	16.92 %	8	28.57%	12	17.65 %
Total	31	100%	65	100%	28	100%	68	100%
P-value	0.27				0.43			

bacteria isolated from the oral cavity of hemodialysis patients shows a diverse microbial profile. The study showed most prevalent bacteria were *Staphylococcus epidermidis* and *Streptococcus viridans* with 38 isolates (39.58%). *Escherichia coli* was found in 18 isolates (18.75%), while *Enterobacter spp.* and *Klebsiella pneumoniae* each constituted 9 isolates (9.38%). *Citrobacter spp.* and *Streptococcus viridans* (as a separate category) were both present in 8 isolates (8.33%). Lastly, *Staphylococcus epidermidis* (again listed separately) was found in 6 isolates (6.25%). This distribution highlights the variety of bacterial species present in the oral cavity of hemodialysis patients, with a total of 96 isolates accounting for 100% of the identified bacteria.. Table 4.19.

Table 9: Distribution of isolated bacteria from oral cavity of hemodialysis patients

Bacteria isolated from oral cavity of hemodialysis patients	No.	%
S. epidermidis and Streptococcus viridans	38	39.58%
Escherichia coli	18	18.75%
Enterobacter spp	9	9.38%
Citrobacter spp.	8	8.33%
Klebsiella pneumoniae	9	9.38%
Streptococcus viridans	8	8.33%
S. epidermidis	6	6.25%
Total	96	100

Discussion

The study demonstrates a marginal male preponderance among hemodialysis patients, with 54 men (56.25%) and 42 females (43.75%). The most populous age bracket is the 50-59 years group, accounting for 21.88% of the population. It is closely followed by the 60-69 years group, which makes up 19.79% of the population. The 40-49 years group is the third biggest, comprising 16.67% of the population. The sample consists of 11.46% of younger patients. 51.04% of patients reside in urban regions. The study observed a slight prevalence of male patients (56.25%) compared to female patients, which aligns with previous research conducted by Bello et al. (1) and Somji et al. (2). These

studies also found a larger proportion of males receiving hemodialysis treatment. The gender discrepancy in chronic kidney disease prevalence can be attributable to greater rates among males, which may be influenced by variations in lifestyle variables and comorbidities. The age distribution in our study is characterized by a predominant group of individuals aged 50-59 years, followed by those aged 60-69 and 40-49 years. This distribution aligns with the usual age range of patients who require hemodialysis. Chou et al. (3) and Takahashi et al. (4) have shown similar age distributions, observing that middle-aged and older persons are at a higher risk of developing end-stage renal disease (ESRD) due to the cumulative impact of chronic illnesses such as hypertension and diabetes. The inclusion of people aged 20-29 in our sample underscores the fact that while end-stage renal disease (ESRD) mostly affects older persons, it can also have an impact on younger individuals, as evidenced by study conducted by Alkhlaif et al. (5). The almost equal proportion between rural and urban dwellings, with a little majority in urban regions, corresponds to the results obtained from national renal registries in different nations. In a comparative investigation, Bello et al. (1) and Somji et al. (2) shown that a significant proportion of hemodialysis patients with positive blood culture were from metropolitan regions. Rural patients face limited choices for maintenance dialysis as there is a scarcity of dialysis clinics in rural locations. Consequently, these patients are sometimes compelled to migrate, resulting in adverse effects on their work and overall life (5). The findings of our study's ANA ELISA analysis indicate a notable disparity in the occurrence of ANA antibodies between hemodialysis patients and the control group. Out of the 96 hemodialysis patients, 31 of them (32.29%) tested positive, whereas none of the 40 participants in the control group tested positive. In contrast, 65 out of 96 hemodialysis patients (67.71%) and all 40 persons in the control group (100%) produced negative test results. The significant difference highlights a notable link between hemodialysis and the existence of ANA antibodies, which might suggest the presence of autoimmune processes or immune system dysregulation in patients receiving hemodialysis. The discovery that a substantial proportion of hemodialysis patients exhibited positive results for ANA antibodies is consistent with prior research investigating the correlation between chronic kidney disease (CKD) and autoimmune indicators. For example, Nascimento et al. (6) conducted study and discovered that the prevalence of ANA among hemodialysis patients was 4.4%, but the current findings indicate a lower rate. The increased occurrence of ANA antibodies in hemodialysis patients may indicate the long-term inflammatory condition and modified immune reaction linked to renal failure and the hemodialysis technique. This finding provides evidence that either the hemodialysis procedure or the underlying renal disease may have a role in the generation of autoantibodies. Hemodialysis patients often face challenges to their immune system, including repetitive exposure to dialysis membranes, the buildup of uremic toxins, and numerous infections. These circumstances might potentially lead to the development of autoimmunity. The study findings indicate a notable prevalence of Anti-GBM antibodies in hemodialysis patients as compared to the control group. More precisely, 29.17% of the patients undergoing hemodialysis were found to have tested positive for Anti-GBM antibodies, but none of the participants in the control group exhibited any signs of positivity. The significant difference highlights a clear connection between hemodialysis and the existence of Anti-GBM antibodies, indicating potential immunological reactions or diseases associated with renal failure and hemodialysis therapy. The high occurrence of Anti-GBM antibodies in hemodialysis patients corresponds with other studies suggesting that chronic kidney disease (CKD) and hemodialysis are linked to increased immunological reactions. Sowa et al. (7) and Ishikawa et al. (8) also observed increased levels of Anti-GBM antibodies in patients with chronic kidney disease (CKD) and undergoing hemodialysis, along with fast progressing glomerulonephritis. These investigations indicate that the persistent inflammatory condition and disrupted immunological modulation observed in these individuals have a role in the formation of these antibodies. Although Anti-GBM antibodies are typically associated with disorders such as Goodpasture syndrome, their occurrence in hemodialysis patients may be a result of other immune responses that are caused by renal failure and its therapy (9). Out of the total number of patients, 8 individuals (8.33%) tested positive for Hepatitis C Virus (HCV), whereas the remaining 88 patients (91.67%) tested negative for HCV. The prevalence of Hepatitis B Virus (HBV) was rather low, with only 5 individuals (5.21%) testing positive, whereas 91 individuals (94.79%) tested negative.

Among the hemodialysis patients, diabetes was shown to be common, with 50 individuals (52.08%) having diabetes, whereas 46 individuals (47.92%) did not have diabetes. The prevalence of hypertension was 57.29%, making it the most prevalent ailment, whereas 42.71% of individuals did not have hypertension. Hemodialysis involves the extraction of blood from the patient using needles and plastic tubing, which is then circulated via the dialysis membrane. Toxins and poisons permeate through the dialysis membrane into the dialysate, which is subsequently disposed of, while the purified blood is reintroduced to the patient (10). In patients undergoing hemodialysis (HD), viral hepatitis infection is a leading cause of both death and morbidity. Hepatitis B and C are exacerbated by the specific immunological dysfunction that occurs in renal failure and hinders the patient's capacity to clear these viruses from their system. Regarding HD, hepatitis B virus (HBV) and hepatitis C virus (HCV) are the predominant viruses that cause morbidity in virtually all patients (11). The incidence of viral hepatitis in hemodialysis patients is significantly greater than the incidence of this illness in the general population (12).

In Kirkuk city, Iraq, Albayati et al (12) discovered that the prevalence of hepatitis C among patients undergoing hemodialysis was 18%. In Mosul city, Amen (13) discovered that the incidence of hepatitis B in hemodialysis patients was 17%, whereas Malik et al (14) reported a 36.5% occurrence of HCV in hemodialysis patients at Al-Kadhimiya Teaching Hospital. The incidence of HCV infections ranges from 7.1% at the Iraqi renal transplant hospital in Baghdad (15) to 26.7% at the Sulaimania dialysis unit (16). In Iran, the frequency of HBsAg was 6.72% (17). The incidence of Hepatitis B Virus (HBV) among Hemodialysis (HD) patients in Arab nations varied from 2% in Morocco to 11.8% in Bahrain. Similarly, the prevalence of Hepatitis C Virus (HCV) among HD patients has been found to range from 27% in Lebanon to 75% in Syria (18). The frequency of HBV infection among patients undergoing long-term HD was 0.9% in the USA and 16.8% in Taiwan (19). The prevalence of HBV infection in dialysis centers in Brazil ranges from 7.5% to 28.0% (20). In India, the prevalence rates for HBV in the dialysis population vary from 3.4% to 45%, whereas the prevalence rates for HCV range from 4.3% to 45.2% (21). The observed disparity in HCV infection rates might be attributed to differences in the risk variables that can influence the spread of the virus, or it could be related to variations in the extent to which universal procedures are used to prevent transmission within healthcare settings (22). Machines, nursing, and patient isolation significantly contribute to the transmission of hepatitis infection. The variation in the ratios seen in the various research may be attributed to differences in sample size, as well as the sensitivity and specificity of the methodologies employed. The prevalence rate of HCV and HBV infection is higher in dialysis patients compared to the general population, suggesting a greater risk of HCV transmission in dialysis centers (11,12). Prior research conducted by Bansal et al (23) and Trandafir et al (24) revealed that the majority of patients referred to dialysis wards with problems had immune deficiencies and frequently had concurrent chronic conditions, such as systemic hypertension and type 2 diabetes. Patients with weakened immune systems are more prone to infections and other health problems, which worsens the challenges related to dialysis therapy (1,2).

The individuals with Huntington's disease (HD) had a more severe periodontal health condition and showed a greater variety of microorganisms in their saliva, but a smaller number of different types of microorganisms. The presence of periodontal infections was notably higher in the HD patients (25,26,27). The analysis revealed that the most often found bacteria were *Staphylococcus epidermidis* and *Streptococcus viridans*, accounting for 38 isolates (39.58%). *Escherichia coli* was detected in 18 isolates, accounting for 18.75% of the total. *Enterobacter* spp. and *Klebsiella pneumoniae* each included 9 isolates, or 9.38%. Both *Citrobacter* spp. and *Streptococcus viridans* were found in 8 isolates, accounting for 8.33% of the total. Finally, *Staphylococcus epidermidis* (also mentioned individually) was detected in 6 isolates, accounting for 6.25%. The distribution of bacterial species in the oral cavity of hemodialysis patients is diverse, with a total of 96 isolates representing 100% of the detected bacteria. *Staphylococcus epidermidis* and *Streptococcus viridans* were the predominant bacterium, comprising 39.58% of the isolates. This data aligns with other research, such as the investigations conducted by Costa et al. (28), which indicated a substantial occurrence of these bacteria in the oral cavities of individuals with chronic illnesses, including those receiving hemodialysis

treatment. *Escherichia coli* was present in 18.75% of the samples, while *Enterobacter* spp. and *Klebsiella pneumoniae* each accounted for 9.38%. The existence of these Gram-negative bacteria, commonly linked to the bacteria found in the digestive tract, indicates the potential movement or establishment of these bacteria in hemodialysis patients with weakened immune systems. This conclusion is consistent with the findings of many investigations, which have shown comparable bacterial profiles in individuals with impaired immune systems (29,30,31). *Klebsiella pneumoniae* and *Citrobacter* spp. were detected in 9.38% and 8.33% of the samples, respectively. These bacteria are opportunistic pathogens and their presence in the oral cavity might indicate the general susceptibility of hemodialysis patients to infections(32). The research conducted by Gaetti-Jardim et al. (33) provides evidence that individuals with renal failure are at a higher risk of infections caused by these bacteria. End-stage renal disease (ESRD) treated with hemodialysis (HD) causes changes in the gut microbiome and perhaps affects the oral microbiome in humans. Changes in microbial ecology are associated with both oral and systemic illnesses, such as periodontitis. A recent research characterized the composition of the subgingival microbiota in peritoneal dialysis patients who had periodontitis (30). Immunocompromised hemodialysis patients are at a higher risk of developing systemic infections, especially due to the prevalence of opportunistic bacteria such *Escherichia coli*, *Enterobacter* spp., and *Klebsiella pneumoniae* (25,26).

Conclusion: This study highlights the significant presence of ANA and Anti-GBM antibodies in hemodialysis patients, which correlates with an increased risk of UTIs. Effective infection control strategies and improved oral hygiene practices are essential to managing infections in hemodialysis patients. Further research is needed to explore the dynamics of the microbial profile in this population and to develop comprehensive infection prevention protocols.

Reference

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