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Correlation between Kidney Failure Disease and Parathyroid Gland with Family Genetic History

Salwa Muftah Eljamay[1], Hameda Asrafel[2]
[1]Public Health Department, College of Medical Technology, Libya
[2]Lab Medicine Department, College of Medical Technology, Libya
Corresponding Author: Salwa Muftah Eljamay; Email: salwaeljamay@cmtd.edu.ly

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ABSTRACT

Family-based and genome-wide studies suggest that genetic differences significantly influence an individual's lifetime risk for kidney disease. Aimed to: find out if there are relationship between kidney failure disease and family genetic history. Material and Methods: Data were collected using interviewer-administered questionnaires. Data from the biochemical analysis and questionnaire with a Google form survey were recorded in Microsoft Excel. Results: The percentage of Gender for hemodialysis patients males 61(57.6%) more than females 45(42.5%), the correlation between age and other variables is quite weak (R = 0.098, P = 0.315). Gender also shows a weak correlation with other variables (R = 0.049, P = 0.616). There is a significant correlation between having a family member with a parathyroid gland issue and other factors (R = 0.248, P < 0.010). The strongest correlation found is between having a family member who suffers or has suffered from kidney failure and other factors (R = 0.277, P = 0.004). Conclusion: The weak correlations with age and gender indicate that these factors might not be central to the study's main findings. The strongest correlation found is between having a family member who suffers or has suffered from kidney failure and other factors.

INTRODUCTION

A widespread and growing healthcare burden, chronic kidney disease (CKD) is significant (Bakshi et al. Published by Elsevier Ltd. in 2023, Relationships between genotypes and phenotypes for many types of CKD are valuable tools for individualized medicine approaches in patients with kidney disease. (Groopman et al. Genetic Counsell Past (Cookson et al., 2019) Latitude Journal Volume Page No.2020), Genetic counselors are healthcare specialists with specialized schooling in hereditary stipulations, genetic attempting out, danger analysis, and counseling, and they may be good at addressing those needs and offering tools to clinicians. Genetic counseling is a fully identified area in health care, with an outstanding record inside subfields like oncology, perinatology as well as cardiology. Incorporation into the arena of nephrology is a relatively new development. (Stein et al. 2023), the connection of a few of the kidney, salt, and immoderate blood strain (BP) brought about the development of a large genetic-primarily based experimental model of hypertension. Blood strain, a heritable quantitative trait affected by numerous organic and environmental factors, is a major reason for contamination and death internationally. It's miles the number one detail that may be modified in renal, cardiovascular, and cerebrovascular illnesses. (Pandey 2024), people with comparable genetic backgrounds, researchers determined that positive immoderate-chance APOL1 gene versions had been linked to a better threat of kidney failure and a quicker decline in kidney capabilities. There has been a clean dating between specific excessive-threat gene variations and a decreased occurrence of kidney disorders due to an unmarried gene.

Moreover, they take a look at the advice that uncommon genetic versions in the inflammasome pathway should have an impact on the results of APOL1 on kidney ailment. (Elliott et al. 2023), The gene is present in the Uzbek populace, with G1+G1

and G1+G2 genotypes recognized. This gene mutation has diagnostic and prognostic significance in the improvement of the terminal stage of CKD. (Akhmedova and Makhmudov 2024), Genetics plays an essential feature in chronic kidney disease, raising a large number of technical, logistical, moral, and studies questions. These embody the definition and prevalence of monogenic and complex kidney sicknesses, combining genetic discoveries into scientific exercise, and the usage of genomics to categorize and recognize CKD. The usage of figuring out commonplace flooring and outlining destiny regions of research, we can pave the manner for genomics to meet its capacity in nephrology and genomic medicine. (Köttgen et al. 2022), In analyses of genetic threat elements for Congenital anomalies of the kidney and urinary tract (CAKUT) associated with kidney failure, it changed into observed that certain model businesses skilled worse outcomes. However, there have been few multivariate analyses that encompass genetic analysis executed on big cohorts of children with CAKUT to determine the chance factors for kidney failure (Liu et al. 2023). Using familial genetic screening has helped us pick the right donor for our circle of relatives with a record of persistent Kidney ailment. Having facts about the ideal kidney disease may be very important for assessing the risks and planning a kidney transplant. (Shah et al. 2024). there can be full-size proof indicating that intercourse hormones affect kidney capabilities and contribute to the versions of chronic kidney ailment (CKD) among sexes.

Increased stages of intercourse hormone-binding globulin (SHBG), which regulates diverse sex hormones, has been linked to a decreased danger of CKD. (Scholz et al. 2024), At the same time as most nephrologists use genetic checks in medical practice, they understand immoderate prices and bad availability, or loss of ease of use as the fundamental boundaries to routine adoption. Those observations advise that educational packages protect a variety of subjects, from the genetics of continual kidney ailment to check preference, ought to assist deal with those boundaries and developing the usage of genetic trying out in nephrology exercise. (Mrug et al. 2021), past diagnostic finding out for kidney troubles, series annotation diagnosed monogenic problems related to not unusual post-transplant complications in 9.1% of KTR, with vital clinical implications. Incorporating genetic diagnostics for transplant morbidities would enable personalized management in pre-and post-transplant care. (Ma et al. 2024), In adults with quit-degree renal sickness (ESRD) because of inherited kidney disorder, the scientific evaluation is often misguided. A Dutch examination in 2018 looked at 5 worldwide companies and determined that out of 5606 sufferers with grownup-onset ESRD, 26 (0.5%) had homozygous NPHP1 deletions and had been genetically diagnosed with nephronophthisis. However, only 3 (12%) of them were efficaciously identified with nephronophthisis, whilst the others had been misdiagnosed with one-of-a-kind kidney sicknesses or had been diagnosed with persistent kidney disorder (CKD) of unknown motive. (Fujimaru et al. 2024), Moreover, continual kidney sickness (CKD) is the primary cause of demise globally. In adults, CKD is frequently the result of non-inherited illnesses like diabetes, high blood pressure, and chronic glomerulonephritis (CGN). However, with upgrades in genetic evaluation, it is been determined that approximately 10% to 15% of adults with CKD have inherited kidney disorder. (Fujimaru et al. 2024), Natural selection determines which genes will be efficiently surpassed at once by future generations. However, the substantial growth in human lifespan over the past century has posed a sudden mission to our organ systems.

The nearly half-million Americans with up-stage renal disease (ESRD) and the numerous millions with continual kidney sickness (CKD) suggest that for lots of people, retaining kidney functions limits durability. (Friedman and Pollak 2011).

METHODS

Study design and setting: An institutional-based cross-sectional and interview, the study was conducted from February 1 to Jun 28, 2024, at the hemodialysis department in al-Wahda Hospital, Derna City, Libya. *Study participants and size:* All volunteer patients in the hemodialysis department aged between 10 and more than 71 years who were in the department during the hemodialysis period participated in this study. The study participants give them informed consent before the start of data collection. The study participants were selected

based on a convenient sampling technique and a total of 96 study participants were included.

Data collection and variables: Data were collected using an interviewer-administered questionnaire with a Google form survey recorded in Microsoft Excel, the questionnaires were prepared based on the previous related literature and Kidney Disease Improving Global Outcomes (KDIGO) guidelines. It was developed in the English language since the source populations of the study were fully communicated in English. The questionnaire includes socio-demographic variables (sex, age, resident place, source of drinking). *Data analysis:* Data from the biochemical analysis was then cleaned and transferred into a statistical package for the social science (SPSS) version 26 software for the statistical analysis. The descriptive data analysis was conducted and presented as frequency and percentage. We also used a chi-square test to check the significance differences and P- value < 0.05 was used as a statistical significance.

Table 1 shows the distribution of gender among the participants. There are 61 males, which accounts for 57.5% of the total participants, and 45 females, making up 42.5% of the participants. The total number of participants is 106.

Table 1. Frequency and percentage of gender

Gender	N(%)
Male	61(57.5)
Females	45(42.5)
Total	106(100.0)

RESULTS AND DISCUSSION

Figure 1 some binary data (Yes/No responses) for specific questions, such as the presence of thyroid disorders and family history of kidney failure. However, it seems there might be a formatting issue data presentation in some parts. Illustrated the Family with Kidney Failure: P-value = 0.004.

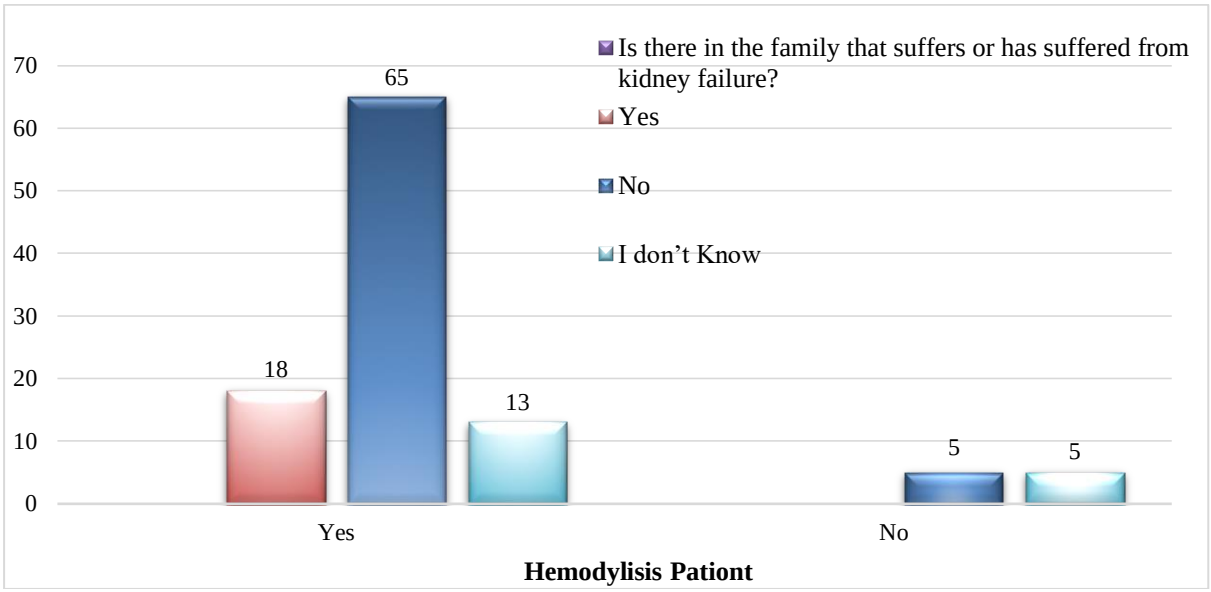

Figure 1. The correlation between kidney failure and a family history of kidney failure

Figure 2 illustrates some binary data (Yes/No responses) for specific questions, such as the presence family history of kidney failure. However, it seems there might be a formatting issue data presentation in some parts. Illustrated the Family with Kidney Failure: P-value = 0.004.

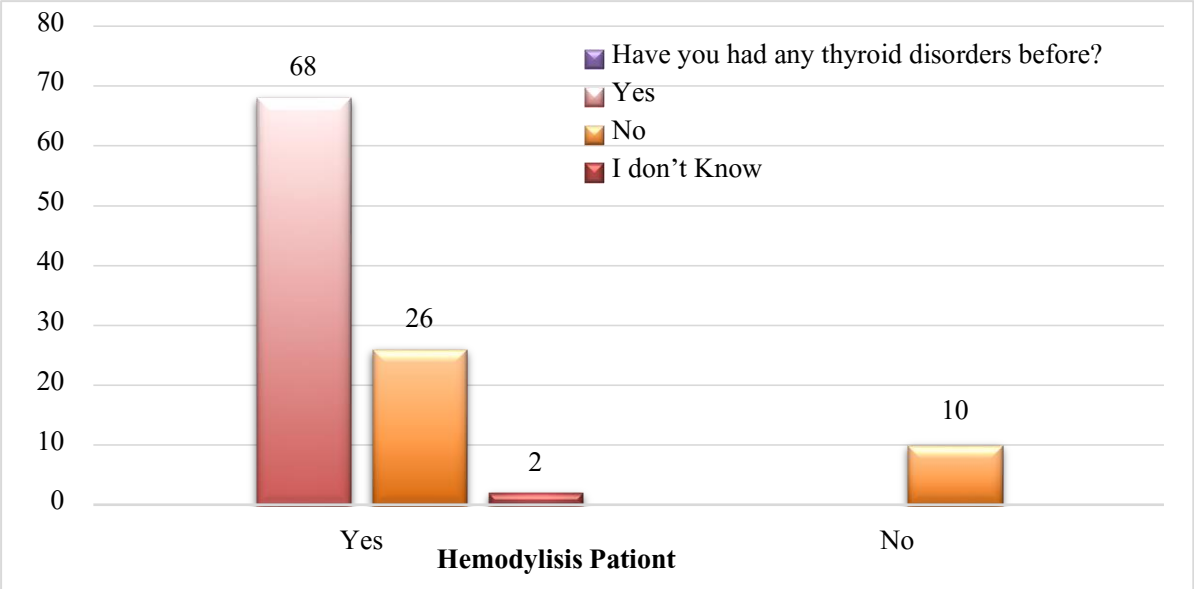

Figure 2. The correlation between kidney failure and a family history of thyroid disorder

Table 2 shows the correlation between age and other variables is quite weak (R = 0.098, P = 0.315). Gender also shows a weak correlation with other variables (R = 0.049, P = 0.616). There is a significant correlation between having a family member with a parathyroid gland issue and other factors (R = 0.248, P < 0.010). The strongest correlation found is between having a family member who suffers or has suffered from kidney failure and other factors (R = 0.277, P = 0.004).

Table 2. The correlation between kidney failure and family history of parathyroid gland, kidney failure patients

Correlations		Age	Gender	In the family with the parathyroid gland	In the family that suffers or has suffered from kidney failure
Hemodialysis Patient	R	0.098	0.049	0.248*	0.277**
	P-Value	0.315	0.616	< **0**.010	**0**.004
	N	106	106	106	106
**. Correlation is significant at the 0.01 level (p-value).					
*. Correlation is significant at the 0.05 level (p-value).					

Male Participants: The table shows that there are 61 male participants, constituting 57.5% of the total sample. This indicates a higher representation of males in the study. Female Participants: There are 45 female participants, making up 42.5% of the total sample. Although fewer than males, this is still a substantial proportion. Total Participants: The total number of participants is 106, ensuring that the percentages provided are accurate and the sum equals 100%. The gender distribution appears to be somewhat imbalanced, with a higher proportion of males compared to females. This may need to be considered when interpreting the results, as gender-based differences could influence the outcomes. Correlation Coefficient (R): Age: Shows a weak positive correlation with other variables (R = 0.098). Gender: Also shows a weak positive correlation (R = 0.049). Family with Parathyroid Gland Issues: Moderate positive correlation (R = 0.248), significant at the 0.05 level. Family with Kidney Failure: Stronger positive correlation (R = 0.277), significant at the 0.01 level. Age and Gender: P-values (0.315 and 0.616, respectively) are above 0.05, indicating that these correlations are not statistically significant. Family with Parathyroid Gland Issues: P-value < 0.010, indicating a statistically significant correlation at the 0.05 level. Family with Kidney Failure: P-value = 0.004,

indicating a statistically significant correlation at the 0.01 level.

The significant correlations suggest that there may be noteworthy relationships between having a family member with parathyroid gland issues or kidney failure and other variables within the study. The weak correlations with age and gender imply that these factors may not play a significant role in the outcomes measured.

Our study agreed with previous studies in that "Accurate diagnosis is a crucial goal in medical practice. While genetic testing has traditionally focused on pediatric populations, it has now become an important diagnostic tool in adult nephrology. This has significant implications for diagnosis and treatment. As genetic testing becomes more common in clinical practice, several challenges need to be addressed. These include improving the accuracy of interpreting genetic variants, making genetic testing more affordable on a larger scale, and enhancing education for physicians and patients. Further research is necessary to understand the long-term impact of establishing a molecular diagnosis on healthcare utilization and outcomes, to facilitate coverage for diagnostic testing from third-party payers". (Cocchi, Nestor, and Gharavi 2020), A diagnostic workflow for genetic kidney diseases that includes WES is cost-saving, especially if implemented early, and is feasible in a real-world setting (Becherucci et al. 2023), broad panel genetic testing by clinical nephrologists had a high success rate, similar to results obtained by academic centers specializing in genetics. (Bleyer et al. 2022), The variations in both mitochondrial DNA (mtDNA) and nuclear-encoded mitochondrial genes (NEMG) may account for some of the unexplained genetic influence on chronic kidney disease (CKD) and kidney-related traits. Our research confirmed the importance of the MT-ND5 gene and mitochondrial haplogroup H in relation to kidney disease and serum markers. We also found that the MT-ND5-rs41535848G variant, in conjunction with mitochondrial haplogroup X, is associated with an increased risk of end-stage kidney disease (ESKD). Although many of these associations were not influenced by diabetes, our study also suggested potential connections between NEMG and type 1 diabetes mellitus (T1DM)". (Cañadas-Garre et al. 2024), And agree with these results Kidney stone disease is a common issue with a complex origin. It can result from a single genetic disorder or multiple genetic factors. Research on single-gene disorders related to kidney stones has improved our understanding of the proteins and receptors that regulate the composition of urine, shedding light on the pathways contributing to stone formation risk. It's likely that the prevalence of single-gene stone disease has been underestimated, and an accurate diagnosis can guide treatment, facilitate screening for other health issues, and support genetic counseling. Additionally, as genomic medicine progresses, personalized drug therapies based on genetic factors may become available in the future (Howles and Thakker 2020).

Our study did not correspond to the results, (Cañadas-Garre et al. 2019) in the efforts to identify the genetic basis of CKD, it remains challenging to account for all of the heritability using current methods and datasets. Although additional biomarkers such as telomeres, CNVs, mt DNA, and sex chromosomes have been investigated in less common cases, uncovering hidden heritability in CKD is still elusive. A more comprehensive approach, particularly through the integration of multiple "omics" data, is needed.

CONCLUSIONS

The gender distribution and correlations among different variables in the study. The significant findings related to a family history of parathyroid gland issues and kidney failure suggest areas for further investigation. The weak correlations with age and gender indicate that these factors might not be central to the study's main findings. The strongest correlation found is between having a family member who suffers or has suffered from kidney failure and other factors.

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