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Risk factors and causes of End stage renal failure in Tarhuna Dialysis Center

Munder Zaied [1], Hussein Salama [2*], Maryam Bougraine[3], Nisren Abdallah [4], Ali Aljadi [5]
[1,2,] Faculty of Medical Technology, Azzaytuna University, Tarhuna, Libya
[3] Dialysis center in Tarhuna, Libya
[4] Department of life science, School of basic science, The Libyan Academy, Janzour, Libya
[5] The medical services in Tarhuna, Libya
*Corresponding: Hussein_salama84@yahoo.com

عوامل خطر وأسباب الفشل الكلوي في المرحلة النهائية في مركز غسيل الكلى ترهونة

مندر زايد [1], حسين سلامة [2*], مريم بوقرين [3], نسرين عبدالله [4], علي الجدي[5]
[1,2] كلية التقنية الطبية, جامعة الزيتونة, ترهونة, ليبيا
[3]مركز غسيل الكلى بمدينة ترهونة، ليبيا
[4] قسم علوم الحياة، مدرسة العلوم الاساسية، الاكاديمية الليبية، جنزور, ليبيا
[5] الخدمات الطبية ترهونة، ليبيا

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Abstract:
End-stage renal failure (ESRF) occurs when a patient's kidneys have failed completely and can no longer filter waste products or produce adequate amounts of urine. Diabetes and hypertension are two leading causes of ESRF. Other risk factors for developing ESRF include chronic kidney diseases, genetic predisposition, lifestyle habits, and environmental exposures. A cross-sectional study of patients receiving treatment at the Tarhuna Dialysis Center (Libya) was conducted from December 2024 through February 2025. Using a demographic questionnaire (age, gender, and lifestyle factors) to collect data, researchers obtained data from 124 subjects. The most frequently reported age range was 30-45 years (34%) and 46-60 years (34%) of participants in the study. In addition to identifying risk factors associated with ESRF development, lifestyle factors associated with ESRF were also examined by gender. It appears that the following risk factors play a significant role in the development of ESRF: hypertension (27%), congenital anomalies (23%), diabetes (20%). All other risk factors for ESRF are less common (i.e. medication use without a prescription (16%), recurrent urinary tract infections (13%), protein loss in the urine (13%), cardiovascular disease (12%), dehydration (6%), and pulmonary disease (3%), and genetic disorders (1.6%). Therefore, it is important to continue education efforts to encourage early detection and treatment of chronic kidney disease and its associated risk factors before they develop into ESRF. According to the findings, many individuals with ESRF were noted to have hypertension and that by controlling hypertension, harbored the potential to reduce kidney failure rates. Identifying the types of preventative public health initiatives or identifying other prevalent causes of kidney failure could potentially aid to reduce the incidence of ESRF in individuals in Tarhuna City.

Keywords: End-Stage Renal Failure (ESRF), Risk Factors, Hypertension, Tarhuna Dialysis Center, Libya, Cross-sectional study.

الملخص
الفشل الكلوي هو مرض الكلى المزمن في مرحلته النهائية، والذي يحدث عادةً بسبب داء السكري أو ارتفاع ضغط الدم، ولكن يمكن أن يحدث أيضًا بسبب أمراض الكلى المزمنة الأخرى، والجينات الوراثية، والعوامل البيئية ونمط الحياة. أُجريت الدراسة المقطعية من ديسمبر 2024 إلى فبراير2025. تم تسجيل المرضى من مركز ترهونة لغسيل الكلى. جُمعت البيانات باستخدام استبيان للحصول على الخصائص العامة للمشاركين، مثل العمر والجنس ونمط الحياة والتاريخ الطبي. بلغ العدد الإجمالي للمشاركين 124 مريضًا. أظهرت النتائج ارتفاع معدل الإصابة بين السكان في منتصف العمر. حيث ان % 34 من المرضى في الفئة العمرية من 30 الى 45 عامًا ونفس النسبة سجلت للفئة العمرية من *46* الى 60 عاما. كان السبب الأكثر شيوعًا لفشل الكلى المزمن هو ارتفاع ضغط الدم (27%)، يليه التشوهات الخلقية، ثم داء السكري (20%)، والإفراط في استخدام الأدوية دون وصفة طبية (16%)، والتهابات الكلى المتكررة (13%)، وبروتينية البول (13%)، وأمراض القلب والأوعية الدموية (12%)، و الجفاف (6%)، وأمراض الرئة (3%) ، و الامراض الجينية (1.6%). تم التوصل الى أن نسبة كبيرة من مرضى الفشل الكلوي المزمن في مراحله النهائية يعانون من ارتفاع ضغط الدم كعامل مسبب، والذي يمكن تجنبه باتباع استراتيجية فعالة لعلاج ارتفاع ضغط الدم. إن إرساء مبادرات الصحة العامة الوقائية وتحديد الأسباب الرئيسية لأمراض الكلى يمكن أن يساعد في وقف تطور هذه الحالات إلى الفشل الكلوي في مرحلته النهائية في مدينة ترهونة.

الكلمات المفتاحية: الفشل الكلوي النهائي، عوامل الخطر، ارتفاع ضغط الدم، مركز ترهونة لغسيل الكلى، ليبيا، دراسة مقطعية.

Introduction

The term end-stage renal failure describes the stage of total kidney failure from which there is no returning function (or very little returning function of the kidneys). The total loss of function occurs when the functional capacity of the kidneys is no longer measurable (below 15 ml/min or 15% of normal) (Halper,1985). There are two major ways to classify renal failure: the first being that renal failure can be classified according to the rate at which the kidneys fail (i.e., acute renal failure) or the chronic course or prognosis progress; the second classification being the progression of the kidneys' failure as either acute (subacute) with the possibility of returning some degree of function, or chronic (Deabes & Essa, 2024). According to World Health Organization Global Burden of Disease Study (WHO 2014), approximately 850 million individuals worldwide currently have some type of renal disease. Chronic renal failure (CRF) represents a significant public health concern in developing countries (LICs) and lower middle-income (LMIC) nations with greater rates of occurrence than the general population (Jager et al., 2019). Symptoms associated with renal failure can range from nausea, edema, and loss of appetite to confusion and weakness. Symptoms of acute renal failure include hyperkalaemia (elevated potassium), excessive fluid buildup, and uremia, whereas chronic renal failure presents with anemia, heart disease, and hypertension as its most common symptoms. CRF can be caused by many different conditions, including diabetes mellitus (type 1 or type 2), hypertension, polycystic kidney disease, and nephrotic syndrome (Banaga et al., 2015).

Research problem

The study will provide insight into why patients may have an increased risk of developing CKD. A thorough understanding of these factors will enable practitioners in Libya to provide a consultative framework for patients who may develop CKD in the future. In Libya, with the combined influence of socio-economic and environmental changes, people are increasingly living sedentary lifestyles and thereby increasing the health burden on the population of Libya. It is vital to the healthcare providers in Libya that they are able to determine the major contributing factors to end stage renal failure, and be able to assess the contribution of each of

the factors to developing the medical condition, in order to provide a successful plan to manage CKD and/or prevent the occurrence of CKD.

Study Objectives:

1. To identify the most common risk factors and causes that place individuals in Tarhuna City, Libya at increased risk of developing of end-stage renal failure.
2. To determine how much of a contribution each risk factor or cause provide to the development of end-stage renal failure.
3. To develop guidelines in order to minimize the risk of developing end-stage renal failure by understanding the causes that result in the development of end-stage renal failure.

Significance of the Study:

Through the acquisition of specific knowledge regarding the causes and risk factors of end-stage renal failure within the population of Tarhuna City, we will attempt to formulate an appropriate plan of action designed to reduce the incidence of the medical condition.

Research Materials and Method

3-1 Research Subjects

Participants from the Tarhuna Dialysis Center were recruited to participate in this study (n=124) between December 2024 and February 2025.

3-2 Data Collection

The data was gathered through a questionnaire that based on the medical history of patients, which provided patient demographic information (i.e., age, gender,), and asked patients the primary cause of their kidneys failing.

3-3 Statistics

Statistical analysis of the data was performed using the Statistical Package for Social Sciences (SPSS) and the results were provided in Microsoft Excel.

3-4 Ethics

The research study was conducted with fully informed consent of all subjects prior to participation. The purpose of the study was explained to all subjects verbally prior to collecting consent. Participation in this study was completely voluntary, therefore any subject had the opportunity to decline to participate if they so desired.

Results

4.1 Gender Distribution

67% of study participants were male, whereas 33% were female. This indicates the study sample distribution is skewed toward male participants

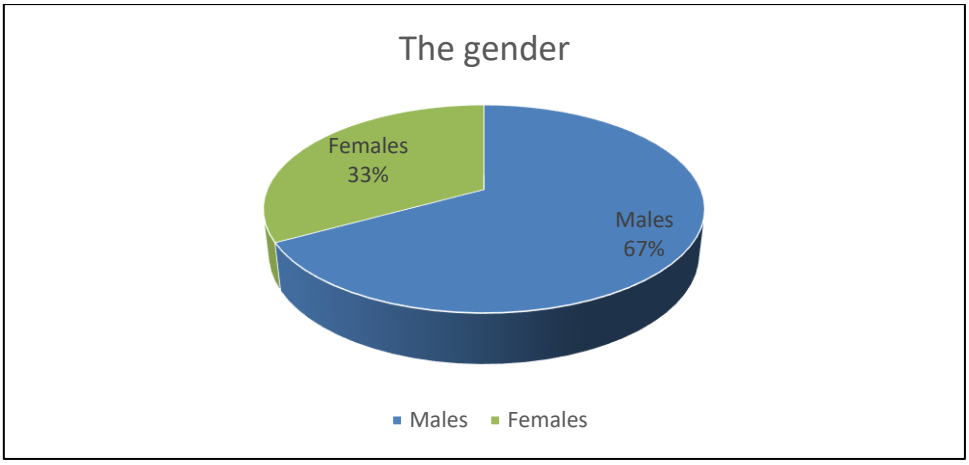

Figure 4-1: Graph representing the gender of participants.

4.2. Age Distribution of the Study Cohort

The sample distribution shows that the individuals aged between 31 and 45 (34%) and those aged between 46 and 60 (34%) had the greatest proportion of total number of individuals diagnosed with kidney failure as measured in this study. Both of these age groupings are at a greater risk for developing a chronic disease (i.e. kidney failure) when compared with younger aged individuals. In addition to the two age groupings mentioned, of the individuals older than 60 years of age, 20% of the total sample was included in this category as well as have shown an age-associated relationship with chronic diseases, such as kidney failure. Conversely, there were only two percent of individuals under 15 years (n=0), as well as only 10 percent of individuals between 15 and 30 years (n=4), thus kidney failure is relatively rare in the younger population.

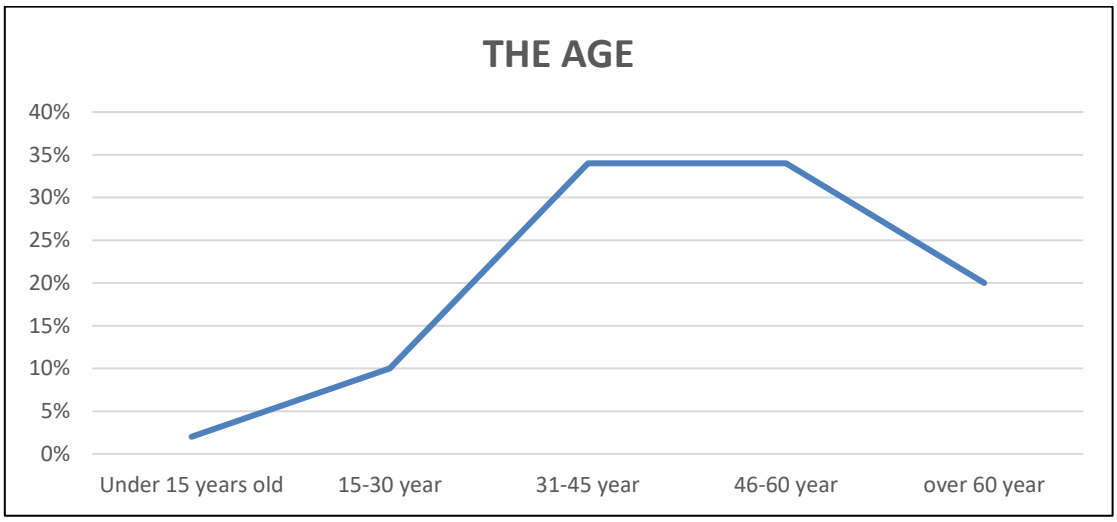

Figure 4-2: Graph representing the age of people who are suffering of end stage renal failure.

4.3 Family history

23% of study participants had a familial background of renal failure supporting the hypothesis that genetics could play a part in renal failure but since 77% of renal failure patients did not have a familial background it can be inferred that there was another risk factor causing renal failure in those patients. Therefore, this would imply there are non-genetic risk factors, in addition to genetic risk factors that can cause renal failure.

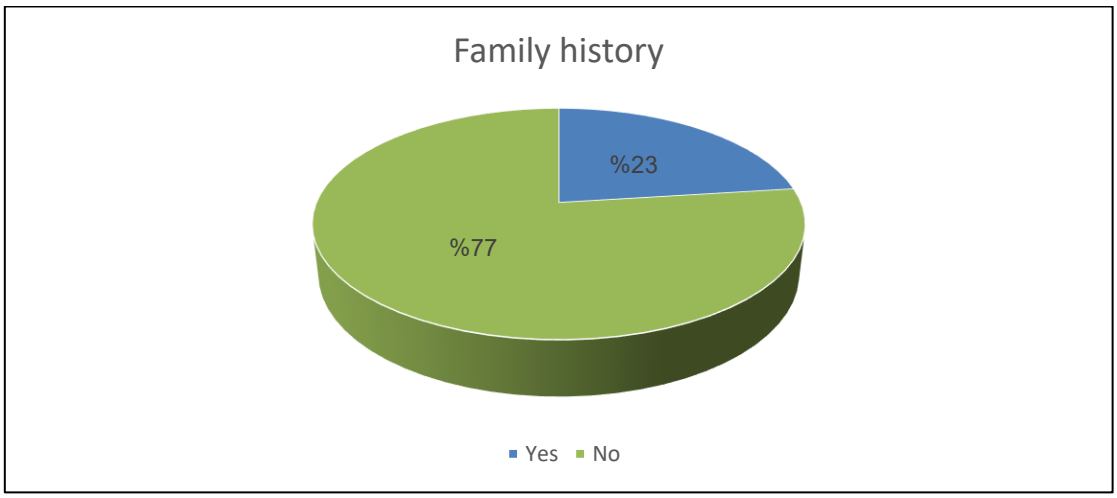

Figure 4-3: Graph representing the relation between the family history and occurrence of ESRF

4.4 . Hypertension and ESRF.

Patients who suffer of ESRF accompanied with hypertension (34 cases, 27%) as the most frequent condition in the sample.

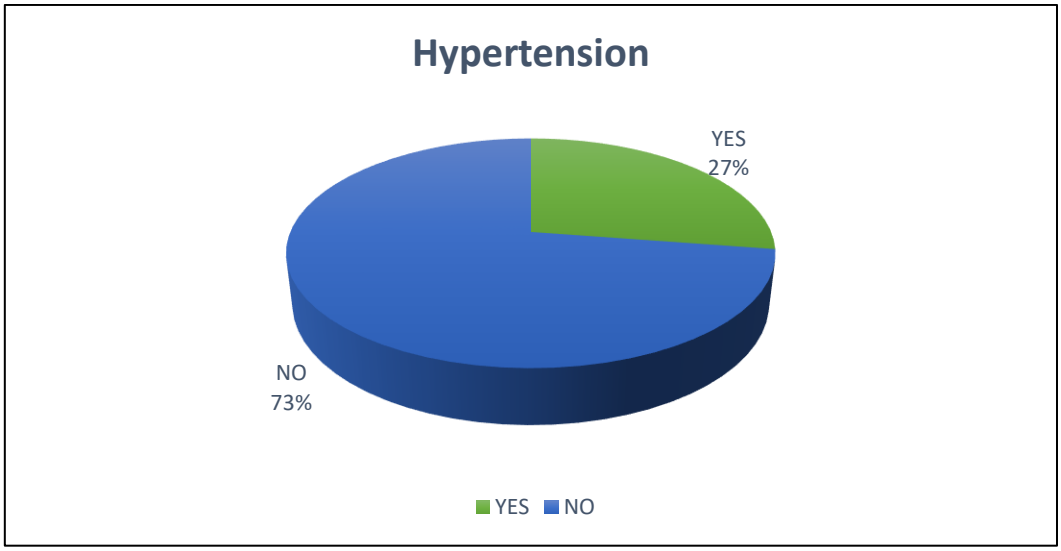

Figure 4-4: Graph representing the relation between the hypertension and occurrence of ESRF

4.5. congenital malformations and ESRF.

According to the study 28 cases that is represent 23% of ESRF cases have congenital malformations.

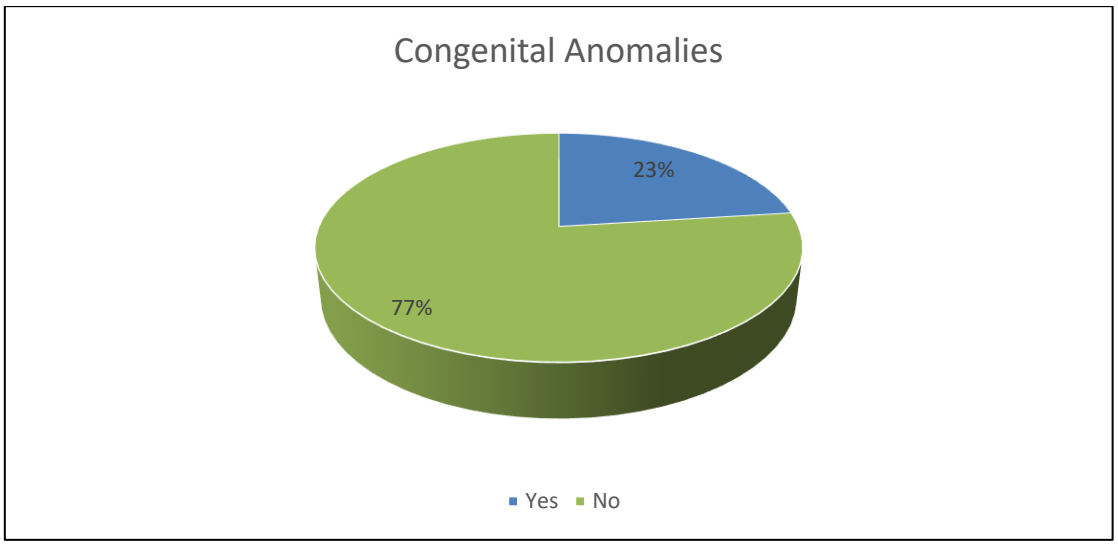

Figure 4-5: Graph representing the relation between congenital anomalies and occurrence of ESRF.

4.6. Diabetes and ESRF.

The study had found that 20% of ESRF cases (25 out of 124) had diabetes.

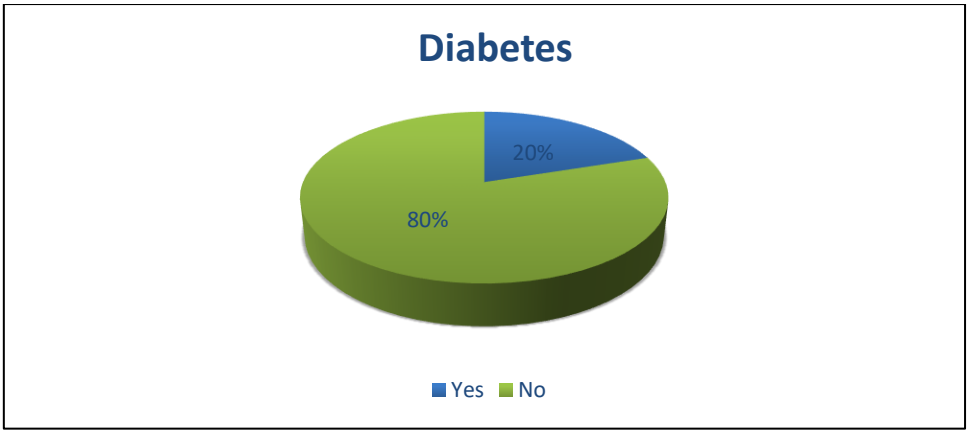

Figure 4-6: Graph representing the relation between diabetes and occurrence of ESRF.

4.7. ESRF and self-medication abuse

The study found that 20 participants (16%) in this sample had a history of self-medication abuse.

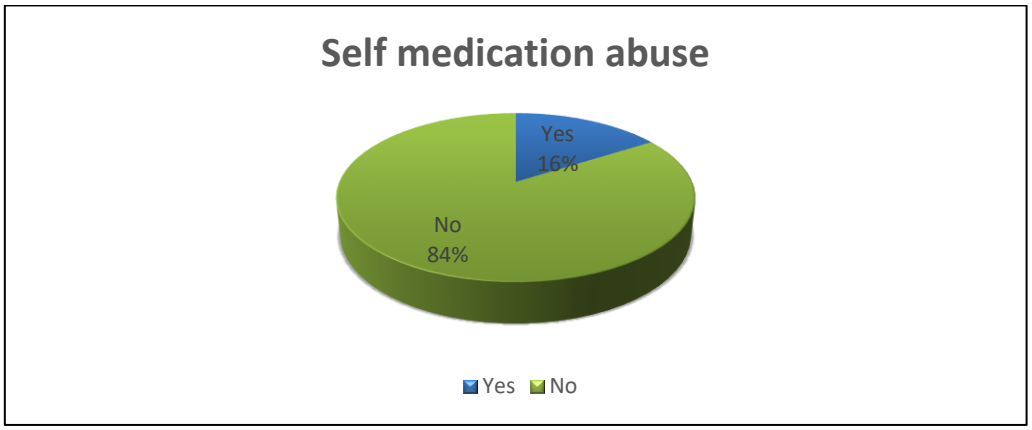

Figure 4-7: Graph representing the relation between self-medication abuse and occurrence of ESRF.

4.8. Kidney infection and ESRF.

The study also found that 13% (16 of 124) of study participants had recurrent kidney infections.

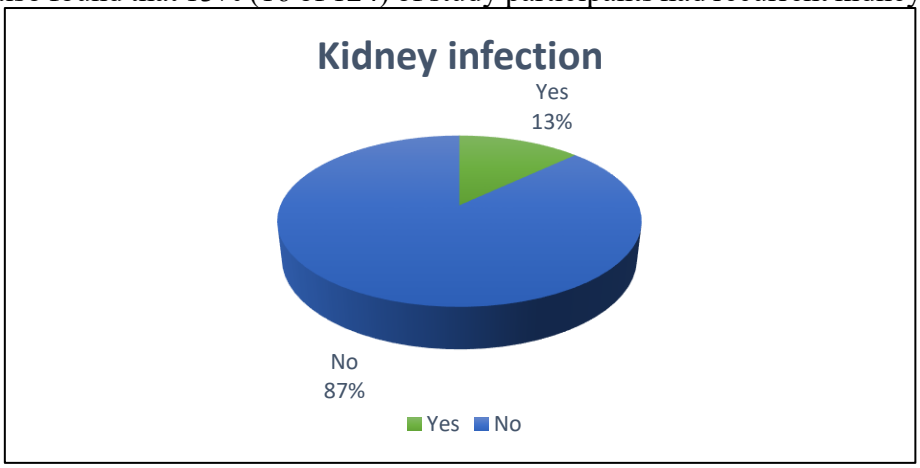

Figure 4-8: Graph representing the relation between kidney infections and occurrence of ESRF.

4.9. ESRF and proteinuria.

According to the study results, 13% (16 of 124) of study participants had proteinuria.

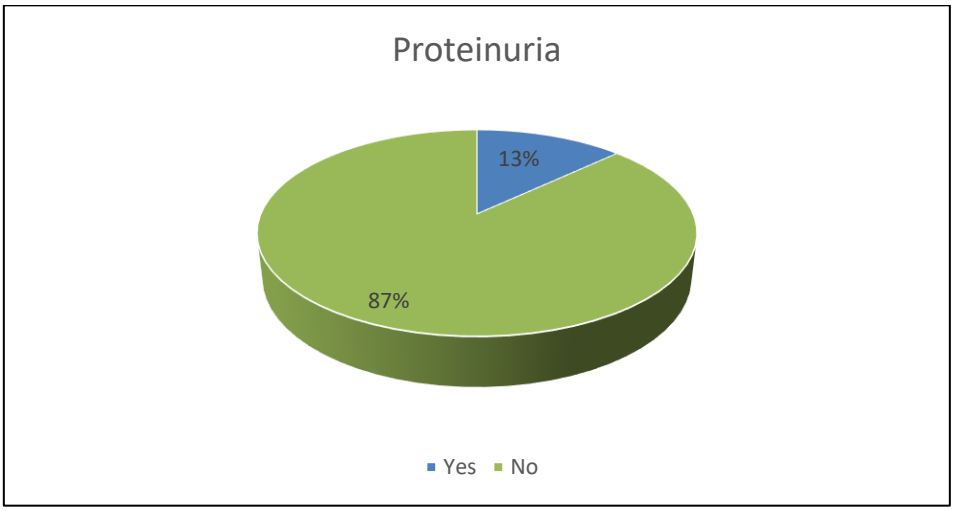

Figure 4-9: Graph representing the relation between proteinuria and occurrence of ESRF.

4.10 ESRF and cardiovascular diseases.

The study has demonstrated that 15 ESRF cases have cardiovascular diseases.

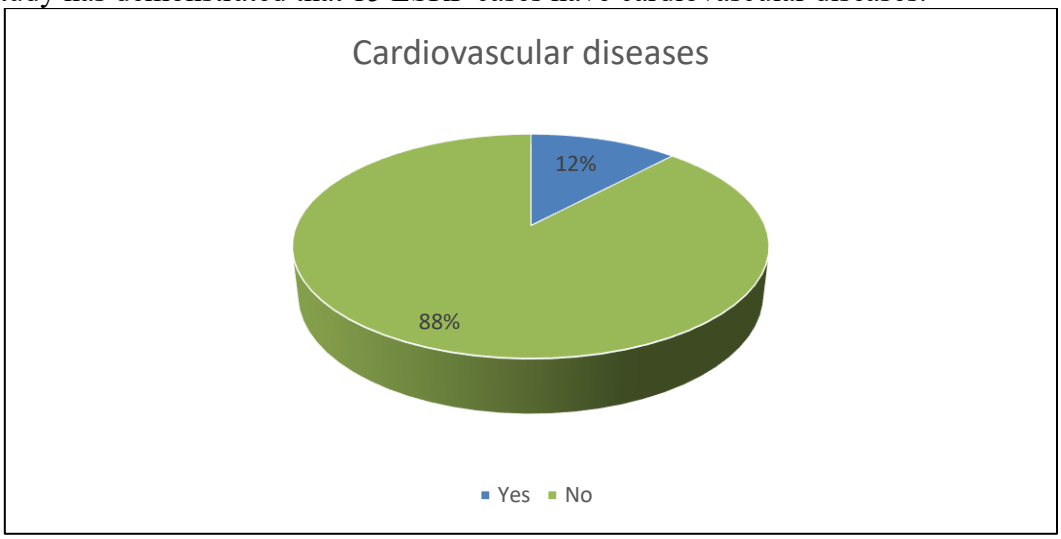

Figure 4-10: Graph representing the relation between cardiovascular diseases and occurrence of ESRF.

4.11. ESRF and infectious diseases.

The research results have revealed that 13 case (10%) of studied cases have infectious diseases such as hepatitis B and C.

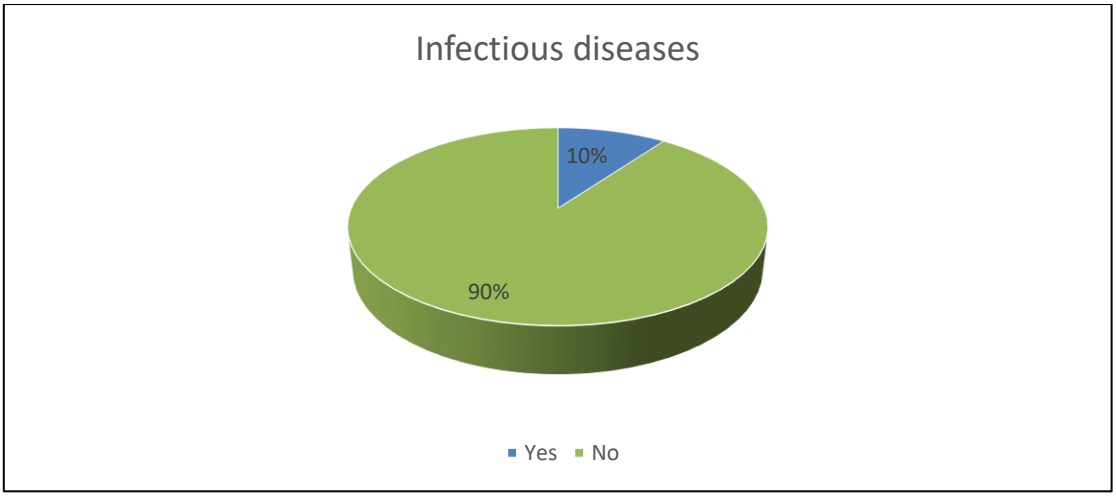

Figure 4-11: Graph representing the relation between infectious diseases and occurrence of ESRF

4.12 ESRF and dehydration.

The study group has found that 6% of study participants have suffered of dehydration.

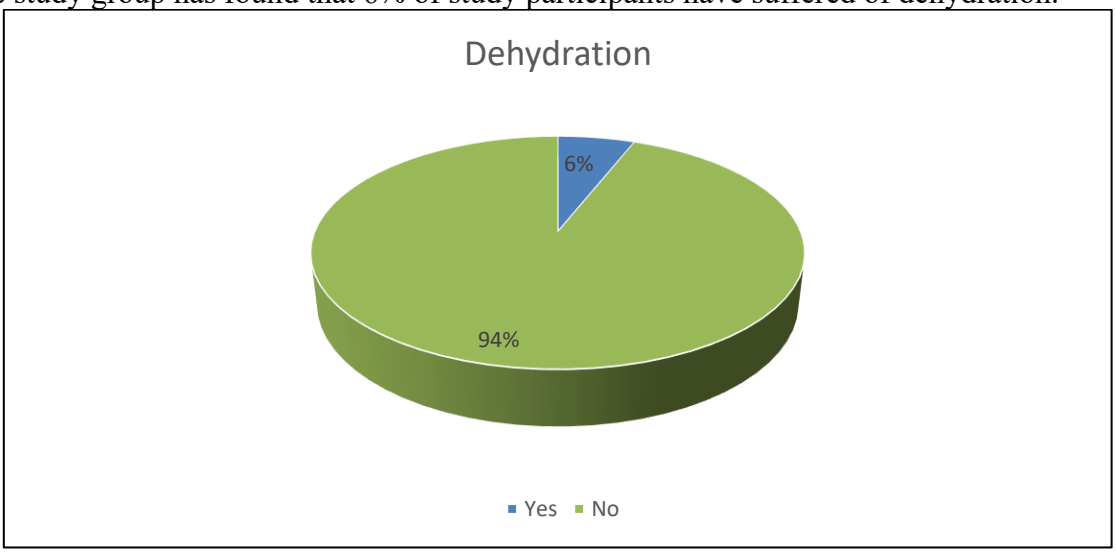

Figure 4-12: Graph representing the relation between dehydration and occurrence of ESRF

4.13. ESRF and chronic pulmonary disorders

Chronic pulmonary disorders accounted for only 3% of study participants due to their low incidence in this sample.

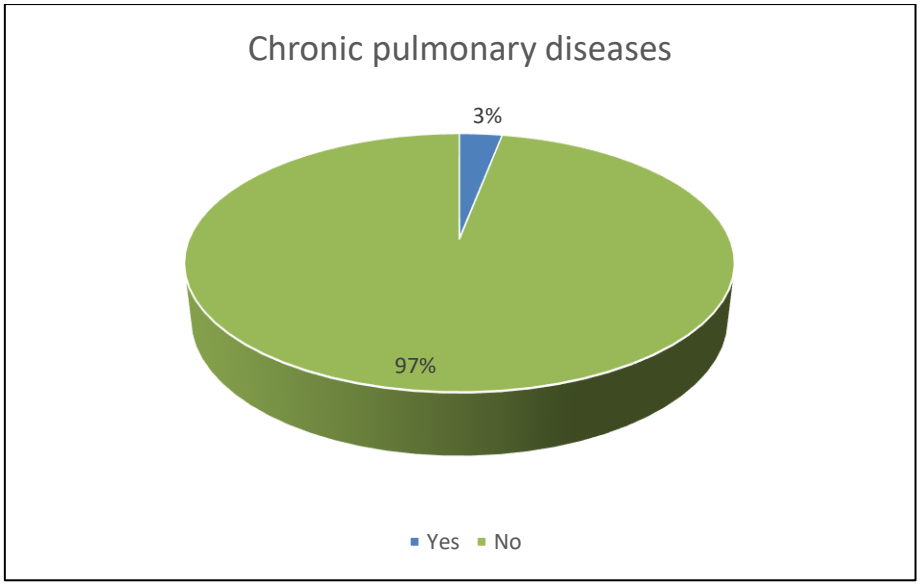

Figure 4-13: Graph representing the relation between chronic pulmonary diseases and occurrence of ESRF.

4.14. ESRF and genetic diseases (polycystic kidney).

Genetic disorders such as polycystic kidney accounted for only 1.6 % of study participants.

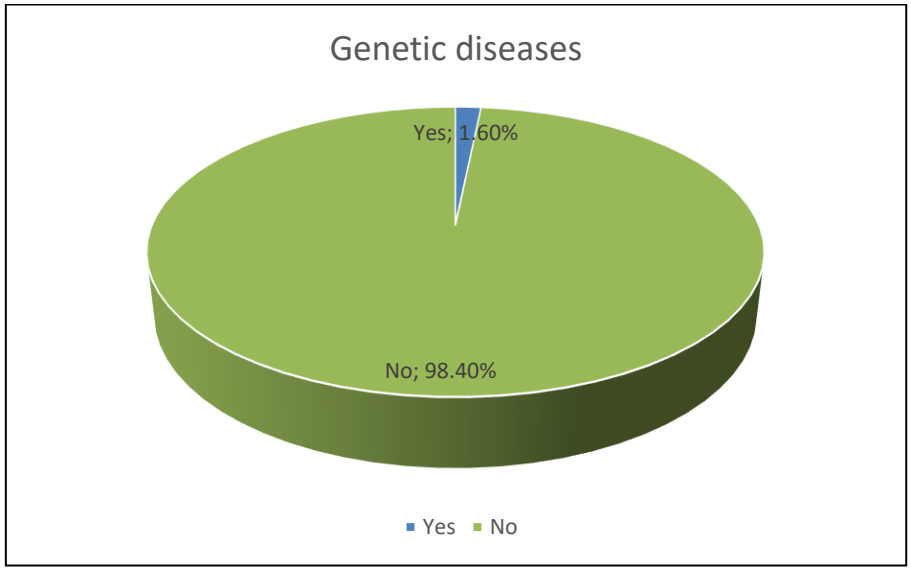

Figure 4-14: Graph representing the relation between genetic diseases and occurrence of ESRF

Discussion

According to the study, 67% of the study population are males, consistent with previous findings that males are more affected by ESRF (Alahrash, 2021) . In contradiction with other studies' evidence that females were slightly more affected than males (Al-taworghei, 2019). Results show that a high incidence rate of ESRF within the middle-aged population 34% for the age groups (31-45 years, 46-60 years), respectively. and 20% > 60 years, which is in accord with previous studies indicating that the most affected age groups were between 40-65 years (Hawkins,2011). Results indicate that 23% of kidney failure patients have a family history of the disease, consistent with previous results that family history is a significant risk factor for

ESRF (Iseki et al.,2003). Chronic and acute illnesses are frequently present in individuals diagnosed with kidney diseases; some may contribute to or facilitate the development of CKD. Based on other studies of this nature, high blood pressure (HTN) is considered the most significant contributor to the primary cause of CKD, accounting for 27% of all CKD patients in this study. CKD can be defined as kidney failure due to the inability of the kidneys to filter blood as a consequence of impaired blood vessels supplying blood to the kidneys and the surrounding tissue as a result of hypertension (Chen et al.,2019). As illustrated in these findings, the second largest cause of end-stage renal failure (ESRF) was found to be congenital anomalies, accounting for 23% of the participants in this study. There is also a discrepancy between the number of congenital anomalies causing CKD in this study compared to previous studies, and differences also occurred due to variations in the study population design and geographic location (as previously recorded) (Yerkes et al.,2021); therefore, further investigation may be needed in order to provide insight into the differences in prevalence of congenital abnormalities as a contributing factor to CKD. The proportion of patients with diabetes is twenty percent of the total population of this study; this finding coincides with that found in another study (Al-taworghei, 2019). In addition to a rise in the incidence of chronic kidney disease ("CKD"), misuse of self-medication presents another significant concern due to the adverse effects that may result from this misuse, including end-stage renal failure ("ESRF") (Miller et al., 2009). Recent studies further confirm that kidney infections, regardless of severity, represent an independent risk factor for increasing incidences of adverse outcomes associated with CKD. In fact, our study confirms prior studies indicating that major hospitalizations due to infections are independently related to increased risk of ESRF (Witte et al., 2009). According to the study findings,13% of ESRF cases have proteinuria. Prior studies have shown that even modest elevations of protein in the urine (proteinuria) are significant independent risk factors for ESRF; when screening is performed on the general population, proteinuria is a strong and independent indicator of future ESRF. Moreover, the vast majority of CKD patients develop clinically significant amounts of proteinuria (albuminuria) prior to having a significant decrease in their glomerular filtration rate ("GFR") (Ji & Kim, 2016). The study demonstrates that 12% of patients with end-stage renal failure (ESRF) have cardiovascular disease; this is consistent with other studies that show increased cardiovascular risk for individuals with ESRF (Thomas et al., 2008). There is also an association between viral infection and end-stage renal disease (10% of patients with renal failure had viral infections) which extends prior studies into more recent data. The majority of the commonly encountered virus-causing agents (e.g., Hepatitis B, Hepatitis C) have previously been found to cause both acute kidney injury and CKD due to their actions on renal cells (Du et al.,2019). Dehydration was recorded at 6%, while chronic pulmonary diseases were reported at just 3%, and genetic diseases were reported at just 1.6%, reflecting their lower prevalence in the studied sample.

Conclusion

Conclusions from the research state that males are more likely than females to be diagnosed with end-stage renal failure (ESRF). In addition to this, age is also a significant factor contributing to the development of ESRF; the vast majority of reported cases were over 40 years of age. Moreover, ESRF cases where family history of ESRF has been documented are also extremely significant. In fact, 23% of reported ESRF cases had some type of kidney disease in their parents. Based on the sample analyzed for this research, the most commonly reported causes of ESRSF are high blood pressure, congenital abnormalities, diabetes, and infections.

Recommendations

1. Controlling the blood pressure of patient especially in cases that have history of ESRF.
2. Controlling the diabetes and follow up with specialist doctors.
3. Treatment the infectious diseases that can lead to ESRF.
4. Advising people about the risk of self-medication abuse.
5. Drinking enough quantities of water based on the neediness of the case.
6. Quitting smoking and advising people about the side effects of smoking.

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