Libyan Journal of Medical Research

www.ljmr.ly/

eISSN:2413-6096

Original Article

DOI: https://doi.org/10.54361/LJMR.20.1.06

Diabetes Mellitus and Hypertension as Risk Factors for Chronic Kidney Disease in Young Adults Attending Benghazi Nephrology Center: A Cross-Sectional Study (2019–2022)

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Abstract:

Background: Chronic kidney disease (CKD) is kidney damage or a low glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m² for more than 3 months. Diabetes mellitus, hypertension, glomerulonephritis, and polycystic kidney disease are the main underlying causes of CKD.**Aim:** To assess diabetes mellitus and hypertension as risk factors for chronic kidney disease (CKD), in the AL-Hawari Nephrology Center, in Benghazi, Libya, in young adults aged between 18 and 40 years, through the period from 2019 to 2022.**Materials and methods:** This study was a retrospective cross-sectional design. The data were collected from the medical records of admitted patients and the outpatient clinic at Al Hawari Nephrology Center in Benghazi, Libya. **Results:** The total number of patients during the study period was 408. The mean age± SD was 30 ± 7 years, with male to female ratio of 1.3:1; the prevalence of CRF in the aged 18 to 40 years was 81.6 patients per 100,000 population. In our study, regarding the risk factors the hypertension was identified 195 patients (47.8%), diabetes mellitus was 77 patients (18.9%), single kidney patients in 53 patients (13%), polycystic kidney disease in 40 patients (10%), glomerulonephritis in 26 patients (6.4%), and autoimmune diseases among 19 patients (4.7%). The combined of both risk factors, hypertension and diabetes mellitus, is together (13.9%). Regarding CKD outcome, stage 4 and 5 CKD among 48 patients (11.8 %), hemodialysis patients in 41 patients (10%), and 123 patients (30%) were lost to follow-up. **Conclusion:** Hypertension and diabetes mellitus were the main causes of CKD. Near quarter of patients progressed to the advanced stage of CKD.

Key words: Chronic kidney diseases, young adults, hypertension, diabetes mellitus, hemodialysis

Introduction:

Chronic kidney disease (CKD) is a common chronic condition that affects millions of people in our world, with an increase in its prevalence [1]. CKD is an abnormality in kidney structures or functions that persists for three months or more [2]. CKD is associated with high morbidity and mortality because its course is slow and progresses to renal failure before the diagnosis is detected [3]. Renal failure needs a high cost for management, including renal replacement therapy (4). Early diagnosis of kidney disease is very important to decrease the risk of progression to kidney failure and cardiovascular events [5,6,7]. In 2019 Global Burden of Disease (GBD), Injuries, and Risk Factor Study (GBD), the incidence, deaths, and morbidity - adjusted life years' rates for CKD among adolescents and young adults from 1990 to 2019 were reported as (32.210) per (100,000) populations, (2.86) per (100,000) populations, and (236.85) per (100,000) populations [8].cAlso GBD reported that the age-standardized incidence rate (ASIR) of global chronic kidney disease due to hypertension rose from (15.97) to (19.45) per (100,000) populations, while the age-standardized death rate (ASDR) rose from (5.1) to (5.88) per (100,000) populations from 1990 to 2019 [9]. Hypertension is the main cardiovascular risk factor in the world and is also closely related to CKD (10). The prevalence of CKD among hypertensives in the United States of America adults was (35.8%) in 2011 to 2014, compared with the prevalence of (14.4%) in prehypertensives and (10.2%) among nonhypertensive subjects [11]. A significant relationship between hypertension and the prevalence of CKD was also recorded in a meta-analysis that included 75 studies in the world global [12]. Diabetes is the other chronic disease that has a significant risk factor for chronic kidney disease, specifically diabetic nephropathy. The estimates recorded a significant percentage, ranging from 20% to 40%, of individuals diagnosed with diabetes mellitus who develop diabetic nephropathy, highlighting its risk in clinical practice. Chronic hyperglycemia is the main pathophysiology in diabetic nephropathy, which results in progressive damage to the renal microvasculature [13]. Chronic kidney disease (CKD) has recorded as one of the most important causes of death and suffering in the 21st century. Due in part to the rise in risk factors, such as obesity and diabetes mellitus, the number of patients affected by CKD has also been increasing, affecting an estimated [8,4,6] million individuals the world in 2017 [14]. Although mortality has declined in patients with end-stage kidney disease (ESKD), (15) still CKD is still a

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

leading cause of death among the populations as estimated by the GBD studies [16,17]

Methods: **and methods:**

Study Design and Setting:

A retrospective cross-sectional study was conducted at the Al Hawari Nephrology Center, Benghazi, Libya, from January 2019 until June 2022, providing specialized renal care

Study Population:

Young adults aged 18–40 years with chronic kidney disease.

Data Collection:

The data were collected from the medical records of admitted patients and the outpatient clinic with chronic kidney disease, included the demographics data, clinical history, comorbidities (included hypertension and diabetes mellitus), laboratory investigations (serum creatinine, eGFR, and urine protein), and outcomes (progression to ESRD)

Exclusion Criteria:

Those patients with acute kidney failure or injury, previous renal transplant, or incomplete medical records were excluded.

CKD Classification:

Chronic kidney disease (CKD) was staged according to the 2012 kidney disease: Improving Global Outcomes (KDIGO) clinical practice guidelines, which provide standardized criteria based on glomerular filtration rate and markers of kidney damage [6].

Statistical Analysis:

Data were analyzed using SPSS v26. The continuous variables were presented as mean ± SD and categorical variables as percentages. Multivariate logistic regression was performed to identify independent predictors of CKD progression. A p-value <0.05 was considered statistically significant.

Results:

Our study aimed to assess the prevalence, underlying causes, and outcome of CKD in the AL-Hawari Nephrology Center in Benghazi, Libya, in young adults aged between 18 and 40 years, during the period from January 2019 until June 2022.

In our study, a total of 408 patients were diagnosed with chronic kidney disease.

The prevalence of CRF in the population aged 18 to 40 years in Benghazi, from January 2019 to June 2022 were 81.6 patients per 100,000 people.

According to age group classification, patients aged 18 to 30 years were 169 patients (41.4%), while those aged 31 to 40 years were 239 patients (58.6%).

Patients with CRF aged 18 to 40 years (18%) of the total 408 patients across all age groups during the study period from January 2019 to June 2022.

Regarding the age distribution in our study, the highest number of patients were in the 31–40 years age group, with a mean age of 30 years.

The highest percentage of patients was in 2019 (36.5%) with a decline in value throughout the period of the study. Table 1, Figure 1. According to age group classification, patients aged 18 to 30 years were 169 patients (41.4%), while those aged 31 to 40 years were 239 patients of (58.6%). The mean age was 30.6 ± 6.35 years, with a median age of 31 years. Table (2), Figure (2). Table (2), Figure 2.Regarding the gender distribution, in our study, males were 228 patients (55.9%), which was higher than females, 80 patients (44.1%), and the male to female ratio was 1.3:1. The gender distribution per year: as in Table (3), Figure 3A, 3B.Regarding the risk factor, hypertension was identified as the main primary cause (risk factor) in (47.7 %) of patients, and diabetes mellitus was the second most common cause (19%), followed by polycystic kidney disease (10%), and glomerulonephritis was (6.4%). Hypertension was the main primary cause (risk factor) of CKD among young adults aged 18 to 40 years, with a total of 195 patients (47.8%), and diabetes mellitus was the second most common risk factor, with 77 of patients (18.9%)**.**In our study, we found that 57 patients (27.4%), had a combination of both hypertension and diabetes mellitus, were both risk factors contribute to the progression of CRF in young adults, other causes included polycystic kidney disease were 40 of patients.

Single kidney patients were 53 of patients (13%), nephrotic syndrome was 18 of patients (4.4%), Glomerulonephritis were 26 of patients (6.4%), Autoimmune diseases were 19 of patients (4.7%), post-COVID complications were 5 of patients (1.2%), Rare causes were 12 of patients (2.9%) of chronic renal diseases in young adults in this period of study were vesicoureteral reflux, rhabdomyolysis pyelonephritis, and obstruction.

Among 408 patients, 44 of patients (10.8%) were classified as having unknown or undefined causes of chronic kidney disease. In summary, regarding the risk factors in our study, hypertension was identified as the primary cause (risk factor) of chronic kidney disease, in 195 patients (47.7%).

Diabetes mellitus was the second most common cause, with 77 of patients (18.9 %).

The combination of both risk factors, hypertension and diabetes mellitus, is together (13.9%). The association between risk factors of hypertension and diabetes mellitus, and the outcome of CKD in the study group.

Regarding CKD progression and outcome, we found that OPD A (stage 1, 2,3 CKD according to eGFR) had the highest percentage of patients (48%), followed by OPD ES (stage 4 and 5) (12%), and hemodialysis (10%) Table 5.

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

Libyan Journal of Medical Research
www.ljmr.ly/
eISSN:2413-6096

DOI: https://doi.org/10.54361/LJMR.20.1.06

Statistical analysis:
The Statistical analysis of the relationship between the outcome and the years of diagnosis revealed a highly statistically significant difference (p-value < 0.000), table 6.

There are big statistically significant differences between the outcome and the main causes of chronic kidney disease in young adults, including hypertension and diabetes mellitus (p-value < 0.000). Table 6.

Table 1. Number and percent of patients with CKD in the study group

Age groups	Year of Diagnosis					Total
	% of total	2019	2020	2021	2022	
18-30 year	Count	64	54	29	22	169
	% within year of diagnosis	43.2%	37.8%	42.0%	46.8%	41.4%
	% of total	15.7%	13.2%	7.1%	5.4%	41.4%
31-40 year	Count	84	89	40	25	239
	% within year of diagnosis	56.8%	62.2%	58.0%	53.2%	58.6%
	% of Total	20.6%	21.8%	9.8%	6.1%	58.6%
otal	Count	148	143	69	47	408
	% within year of diagnosis	100.0%	100.0%	100.0%	100.0%	100.0%
	% of total	37.3%	35.0%	16.9%	11.5%	100.0%

Table 2. Age groups per years of CKD in the study group.

year	Number	Percent	Valid Percent	Cumulative Percent
2019	149	36.5	36.5	36.5
2020	143	35.0	35.0	71.6
2021	69	16.9	16.9	88.5
2022	47	11.5	11.5	100.0
Total	408	100.0	100.0	

Table 3. Gender distribution per year of CKD in the study group.

Gender	Year of Diagnosis					Total
	% of Total	2019	2020	2021	2022	
Male	Count	78	83	36	30	228
	% within year of diagnosis	52.7%	58.0%	52.2%	63.8%	55.9%
	% of total	19.1%	20.3%	8.8%	7.4%	55.9%
Female	Count	70	60	33	17	180
	% within year of diagnosis	47.3%	42.0%	47.8%	36.2%	44.1%
	% of Total	17.2%	14.7%	8.1%	4.2%	44.1%
Total	Count	148	143	69	47	408
	% within year of diagnosis	100.0%	100.0%	100.0%	100.0%	100.0%
	% of total	36.3%	35.0%	16.9%	11.5%	100.0%

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Table 4. Number of patients with risk factors per year of CKD in the study group.

Risk factors	Year of Diagnosis					Total
	% of total	2019	2020	2021	2022	
HTN	Count	79	77	25	13	195
	% within year of diagnosis	53.4%	53.8%	36.2%	27.7%	47.8%
	% of total	19.4%	18.9%	6.1%	3.2%	47.8%
DM	Count	26	28	13	9	77
	% within year of diagnosis	17.6%	19.6%	18.8%	19.1%	18.9%
	% of total	6.4%	6.9%	3.2%	2.2%	18.9%
Single kidney	Count	21	13	13	6	53
	% within year of diagnosis	14.2%	9.1%	18.8%	12.8%	13.0%
	% of total	5.1%	3.2%	3.2%	1.5%	13.0%
Polycystic kidney disease	Count	10	14	9	7	40
	% within year of diagnosis	6.8%	9.8%	13.0%	14.9%	9.8%
	% of total	2.5%	3.4%	2.2%	1.7%	9.8%
Nephrotic syndrome	Count	3	5	5	5	18
	% within year of diagnosis	2.0%	3.5%	7.2%	10.6%	4.4%
	% of total	0.7%	1.2%	1.2%	1.2%	4.4%
Glomerulonephritis (GN)	Count	8	10	5	3	26
	% within year of diagnosis	5.4%	7.0%	7.2%	6.4%	6.4%
	% of total	2.0%	2.5%	1.2%	0.7%	6.4%

Table 5. Association between risk factors and the outcome of CKD in the study group.

Risk factors	Outcome of CKD					Total
	% of total	Unknown	ES	HD	Stag A	
HTN	Count	101	29	31	34	195
	% within year of diagnosis	82.1%	60.4%	75.6%	17.3%	47.8%
	% of total	24.8%	7.1%	7.6%	8.3%	47.8%
DM	Count	35	13	9	20	77
	% within year of diagnosis	28.5%	27.1%	22.0%	10.2%	18.9%
	% of Total	8.6%	3.2%	2.2%	4.9%	18.9%

Table 6. Statistical analysis Chi-Square Tests

Risk factors		Value	df	Asymptotic Significance sided)
HTN	Pearson Chi-Square Likelihood Ratio Linear-by-Linear Association N of Valid patients	146.662^{a} 158.432 126.531 408	3 3 1	**.000** .000 .000
DM	Pearson Chi-Square Likelihood Ratio Linear-by-Linear Association N of Valid patients	19.364^{a} 19.925 18.113 408	3 3 1	**.000** .000 .000

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

DOI: https://doi.org/10.54361/LJMR.20.1.06

Figures of the CKD in the study group.

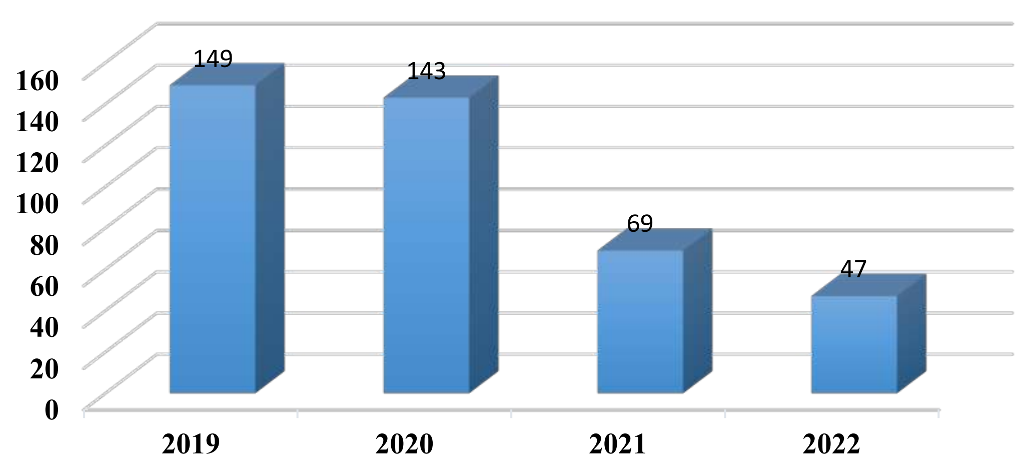

Figure 1.Total number of patients per year of CKD in the study group.

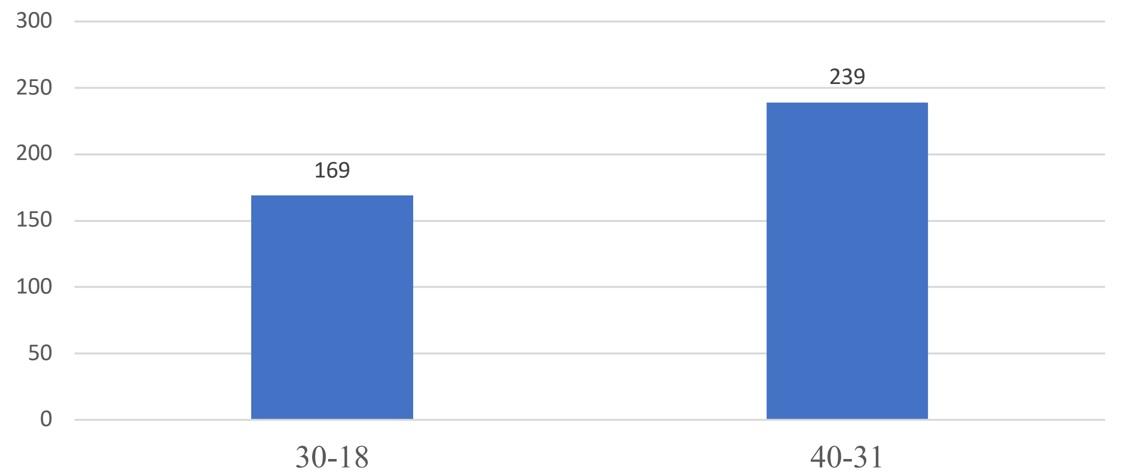

Figure 2. Number of patients in two age groups CKD in the study.

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

DOI: https://doi.org/10.54361/LJMR.20.1.06

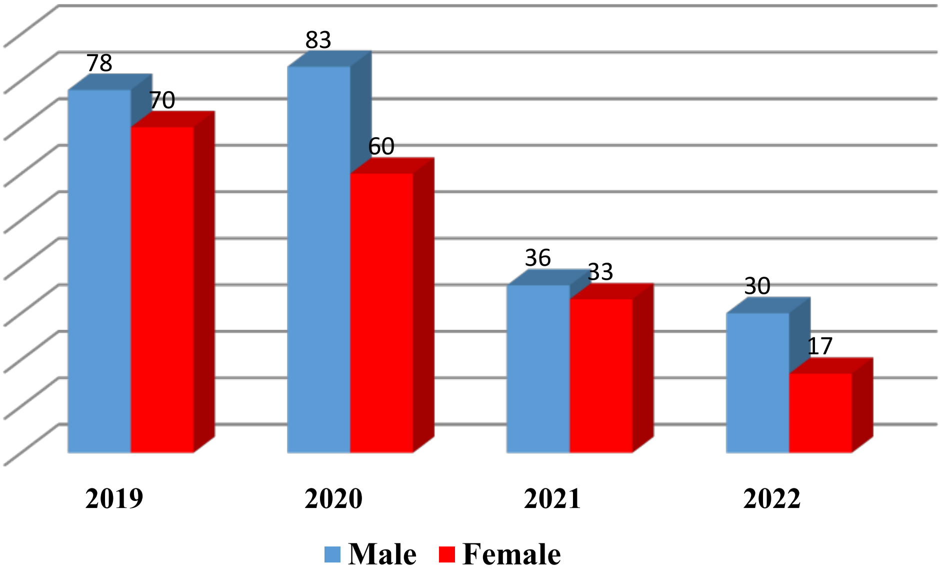

Figure 3A . Gender distribution per year CKD in the study group.

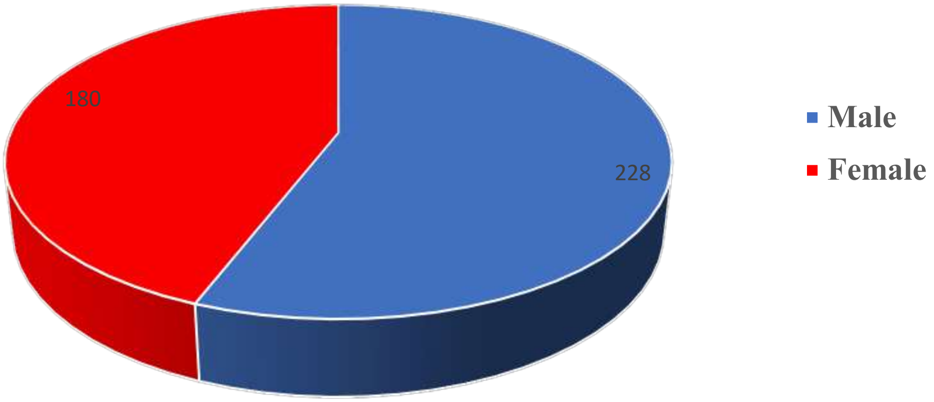

Figure 3B. Gender distribution CRD in the study group.

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

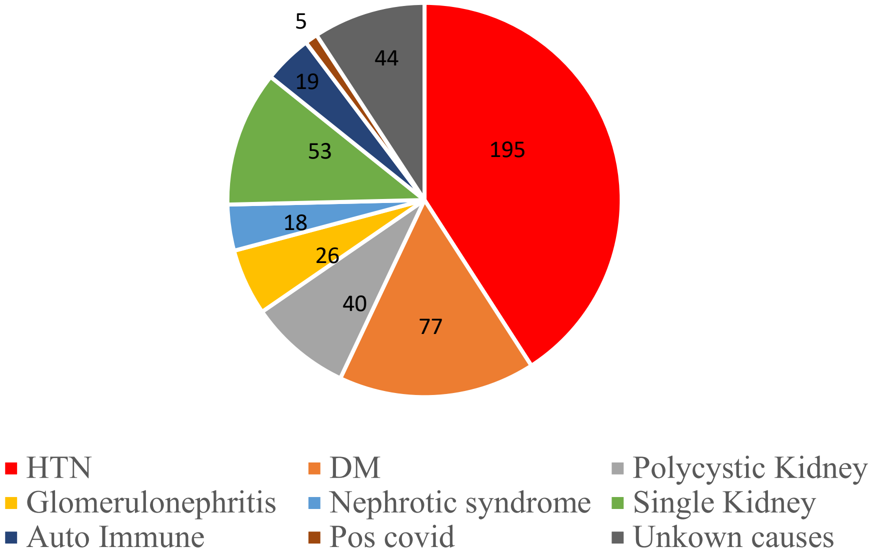

Figure 4. Causes of CKD in the study group.

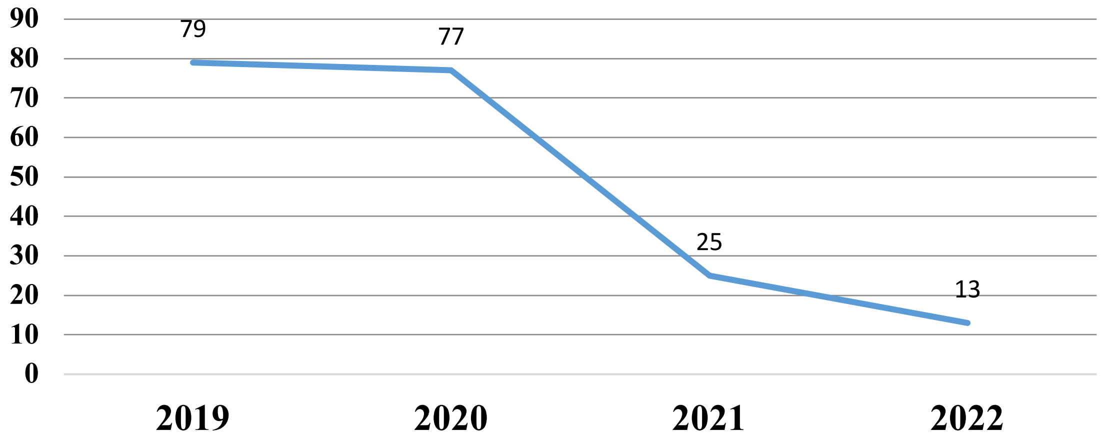

Figure 5.Trends of HTN cause CKD in the study group.

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

DOI: https://doi.org/10.54361/LJMR.20.1.06

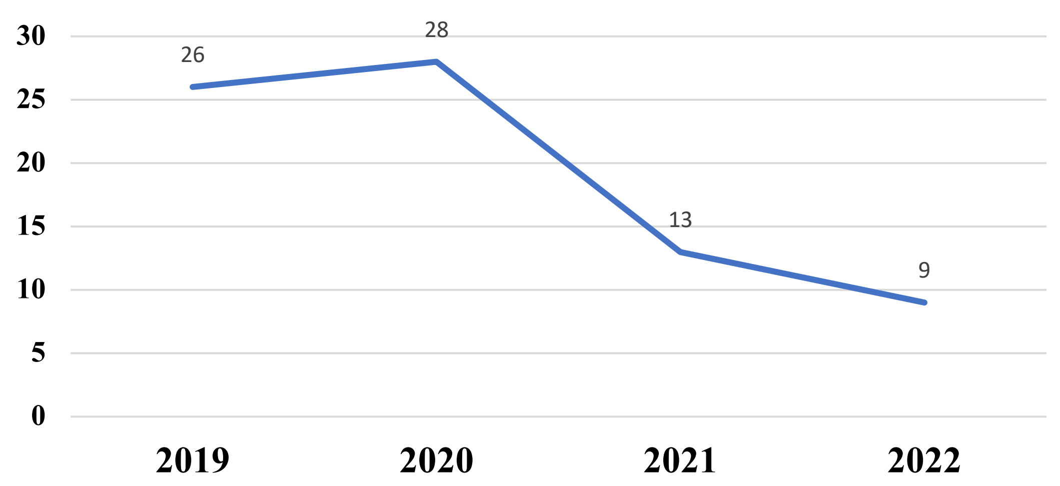

Figure 6.Trends of DM causes CKD in the study group .

Discussion:

CKD is very common and has appeared as one of the most non communicable causes of death in the world. It is found to affect an increasing number of populations over time and to further rise an alarm among the various global causes of death. CKD affects people in different area of the globe unequally, because of the differences in population demographic situations, their diseases, and access to health care resources. The devastating complications of CKD should prompt large efforts to develop and considered an effective management plan to decrease and prevent the progression CKD [18] .Our study aimed to assess the prevalence, the underlying causes and the outcome of CKD, in the AL-Hawari Nephrology Centre, in Benghazi, Libya, in young adults aged between (18-40) years, in the period from January (2019) until June (2022). In the study group, the total number of patients with CKD was (408).

The estimated prevalence of CKD in the studied population in (18 to 40) years' age, in Benghazi from January (2019) to June (2022) was 81.6 patients per 100,000. According to age distribution in the study group the number of patients from the age of (18 to 30) years were 169 of patients (41.4%), and from (31 to 40) years were (239) of patients (58.6%). Patients with CKD, from (18 to 40) years were (18%) of the total (408) patients across all age groups during the study period from January (2019) to June (2022). Regarding the age distribution, in our study, the highest number of patients were in the (31–40) years' age group, with a mean of age (30) years. The highest percentage of patients was in 2019 (36.5%) with a decline value during period of the study. The mean age was (30± 7) years, with a median of age (31) years. Regarding the gender distribution, in our study, the males number was 228 (55.9%), while the female number in the study group was 180 (44.1%), which was lower than the male number with the males to female's ratio (1.3:1). In the study group, the hypertensive patients were (195) and hypertension was the main primary cause (risk factor) (47.7 %) of patients CKD, the number of patients with diabetes mellitus was (77) and diabetes mellitus was the secondary most common cause (18.9%), polycystic kidney disease was (10%), glomerulonephritis was (6.4%), and autoimmune diseases was (4.7%). In the study group, we found that (57) of patients (27.4%) were had both hypertension and diabetes mellitus, which they were risk factors for the progression of CKD in young adult's patients. Regarding CKD progression and outcome, we found that OPD A (stage 1, 2,3 CKD according to eGFR) had the highest percentage of patients were (48%), followed by OPD ES (stage 4 and 5) was (12%), and hemodialysis was (10%). In 2016, a retrospective cross-sectional study conducted by Habas et al., in Tripoli, Libya on the causes, outcome of CKD in adult age over (18) years old, the study included (204) of patients, they found that (55.4%) were females and

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

(44.5%) were males, with female's predominance, and with mean of age was (51.9) years, However, these findings were not consistent with our study, where the percentage of the males was (55.9%) of the study group, which was higher than females percentage (44.1%), with a differ mean age which was (30.6 ± 6.35) years. This study revealed that DM was the most common primary risk factor for CKD, followed by glomerulonephritis as the second cause, and HTN as the third cause. However, these findings were not consistent with our study, where HTN was (47.8 %) as the primary cause of CKD, and DM was (18.9%) as the second most common cause of CKD [19].In addition, Habas et al, in their study, revealed that the most common primary cause of CKD in patients over (39) years, was the glomerulonephritis, followed by DM, and followed by autoimmune disease. However, these findings were not consistent with our study, where hypertension (48%) was as the primary cause of CKD, and DM was (19%) as the second most common cause of CRF. Finally, the results of Habas et al., study differ from our study, regarding the causes and gender distribution of CKD. While in their study they found a slight female's predominance, and our study we found a higher male's predominance [19] .A retrospective cross-sectional study conducted, in 2014 by Goleg FA et al., in Tripoli, Libya they found that DM causes (26%) of the CKD and is most common cause, followed by GN was (21%), as the second cause, and followed by HTN (14.6%) as the third cause. In contrast, in our study Goleg FA et al., found a different order of causes, with hypertension was (47.8 %) as the primary most common cause, followed by diabetes mellitus was (18.9%), as the secondary most common cause[20]. Goleg FA et al., in their study they found an increasing in the number of CRF patient, highlighting the importance of prevention and treatment of both DM and HTN to reduce CKD disease progression and need for hemodialysis (20) .Goleg FA et al., in their study demonstrated the importance to control HTN to prevent kidney damage and CRF progression and its complications [20]. A retrospective cross-sectional study conducted by Al-taworghei et al., in (2018-2019) in Tripoli, Libya, they demonstrated in their study the risk factors associated in patients with CRF of all age groups, the results showed that HTN was (32%), as the most common risk factor, followed by DM (20%), as the second most common cause. These findings of this study consistent with our study, as HTN (47.8%). as the primary most common risk factor and DM was the second most common cause was (18.9%) [21]. A retrospective cross-sectional study conducted, in 2015 in Khartoum, Sudan, done by Banaga et al., they demonstrated that HTN is the most common primary risk factor of ESRD, followed by glomerulonephritis as second cause, followed by DM as third causes. These results were consistent with our study, where HTN was (47.8%), as the primary most common causes, but differ arranged DM was (18.9%), as second cause. However, our study differs in that DM was as the second common cause (18.9%), rather than third [22] . Ghonemy et al., in 2016, in the El-Sharkia Governorate, Egypt, they found that HTN was (31.8%) the most common risk factor, followed by DM (15.5%), as the second most common cause of CKD. They demonstrated that both HTN and DM were the main causes of ESRD (23). These results were consistent with our study, where HTN was (47.8%) as the primary most common causes of CKD, and DM was (18.9%), as second cause of CKD. In their study they found that the highest proportion of patients with ESRD was in the age group between 50 and 60 years (31.9%), and most of them were from rural areas (61.3%). It is more common in males than in females, (62.2%) and (37.8%), respectively. The main risk factors of renal diseases are hypertension and diabetes, while unknown causes represent a high percentage of all causes by (17.7%). The relationship between HTN and CKD has long been the subject of controversy. The interplay between both of HTN and CKD has been the subject of numerous of studies, and the guidelines recommended for management of blood Pressure BP (130/80 mm Hg) in patients with CKD if proteinuria blood Pressure BP (125/75 mmHg) [23] .In 2013, Barsoum RS, published a study about the burden of chronic kidney disease, in North Africa the study covered 6 countries: Morocco, Algeria, Tunisia, Libya, and Egypt, the study demonstrated the causes of CKD in these countries, which showed that glomerulonephritis was (from 9 % to 20%), DM was (from11% to18%), hypertensive was (from 10% to 35%), chronic interstitial nephritis was (from7% to17%), and polycystic disease was (from 2% to 3%.). However, these findings were not consistent with our study, where HTN was the primary cause of CKD, with DM was second most common cause[24] . A retrospective cross-sectional study conducted, in 2023, in Wadi Ataba, City, southern Libya, by Alahrash et al., they investigated the risk factors associated among patients with CRF, found that DM was (36.1%), as the primary most common risk factor causes of CKD, followed by HTN (28.5%), as the second most common cause. These results were not consistent with our study, where HTN was (47.8%), as the primary most common causes of CKD, and DM was (18.9%), as second cause. They found that a combination of both DM and HTN was (16.1%), where as in our study, we found that both were 57 of patients (27.4%), and had both together HTN and DM with highest percentage. These results, confirming that both HTN and DM, both of them separately or combined together, are the most significant risk factors for CKD [25] .A retrospective cross-section study was conducted, in 2012, in Tripoli, Libya, by Alashek et al. investigated the risk factors for CKD among Libyan patients of all age groups, eighty-five percent of patients

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

were over 65 years' age and (58%) were males. In this study, they found the most common cause of ESKD was DM. Other important causes were glomerulonephritis, hypertensive nephropathy and hereditary diseases [26].The majority of patients with ESRD (over 60%) were either caused by hypertension was (25.36%) and DM was (23.75%), and combined of both HTN and DM were (12.93%). In this study, concluded that the early management of modified risk such as HTN and DM in early age of a patients will being reducing of progression of the CKD. These results were consistent with our study, where HTN (47.8%), was as the primary most common causes of CKD, and DM (18.9%) as second most common cause [26] .In 2017, a retrospective cross-sectional study done by Gusbi et al., who focused on the three main demographic regions of Libya: East, West, and South. The study analyzed data from 2,325 patients who attended 37 hemodialysis centers across the three regions. Gusbi et al., revealed that males were (55.8%) and females were (44.2%), with a mean age of (53.4) years. The most common causes of ESRD in these patients are hypertension (36.4%), DM (33. 3%). These results were consistent with our study, where males were (55.9%), and females were (44.1%). The HTN was (47.8%), as the primary most common cause of CKD, and DM was (18.9%), as the second cause [27]. A previous study, hypertension in Chronic Kidney Disease: Navigating the Evidence," done by F. M. Tedla et al. (2011), found that HTN and CKD are closely related; an increase in either systolic or diastolic blood pressure or both of two will lead to hypertensive renal changes and damage that precipitate CKD. Although it is not clear whether HTN is the precipitant for CKD or CKD is the cause of HTN, it is well recognized that both are closely related to each other [28]. In conclusion: summary of previous discussion and comparison of our study with the previous research studies, regarding the trend change in age, sex, and underlying causes in CRF.Regarding the trend change in the age distribution of CRF, previously, CRF mainly affected the elderly patients due to age-related nephron loss with comorbidities. However, in recent decades, in our study increasing incidence among young adults, which may be due to lifestyle changes such as diets, sedentary life, DM, obesity, HTN, and drugs overused for pain relief, e.g. NSAID. Our study highlights the importance of early detection and treatment of DM and Hypertension to reduce the progression of CKD and ESRF in younger patients. Regarding the trend change in the sex distribution of CRF, previously, is more common in females than in males. However, in recent decades, our study showed it has become more common in males than females with a ratio of 1.3:1. This shift may be due to hormonal differences, regional differences, environmental and genetic factors, lifestyle factors, e.g. smoking, socioeconomic, and stress. Regarding the trend change in the causes of CRF: previously, DM was the most common primary cause of CRF, with HTN as the second most common cause, followed by GN. However, recent data in our study showed that HTN is the leading cause, and diabetes mellitus is the second cause. This change because increasing of HTN in younger patients due to obesity, high salt intake, and sedentary lifestyles, smoking, war in our country from (2014) to (2019), and with good control of DM. Hypertension and diabetes both were the two most common causes of CKD; they affect the kidneys in different ways, and both can cause irreversible damage to the kidneys. Hypertension causes damage to the renal microvasculature leading to impaired filtration ability and scarring over time. Diabetes mellitus, with a high level of blood glucose, causes damage to the kidney filtering system, causing diabetic nephropathy, which causes scarring and a gradual loss of kidney function, resulting in CKD. The alarm sign is proteinuria, the presence of protein in the urine, without treatment, will be end to ESRF and the need for hemodialysis. The mainstay of prevention is the management of both high levels of blood pressure and high levels of blood glucose with medication, lifestyle changes, and regular follow-up for early detection of their complication. So controlling these factors is the most effective way to slow the progression of CKD.

Limitations:

A retrospective cross-sectional study design, which may result incomplete data and a lack of control over confounding variables. Sample sizes are frequently small, and studies may be conducted at single centers, limiting the generalizability of findings. Long-term follow-up data are often unavailable, restricting insights into the progression and treatment outcome of the disease. Variability in diagnostic criteria can affect the accuracy of results

To address the limitations of this study, future research should adopt prospective, multicenter study designs with larger population to improve generalizability. The standardized diagnostic criteria and follow-up will be increase the accuracy of result of disease progression. Additionally, comprehensive data collection on socioeconomic, lifestyle, and environmental factors is essential for understanding the influences on CKD progress

Recommendation:

From our study, we recommend that early diagnosis and management of hypertension and diabetes mellitus in young adults is very important to prevent chronic kidney disease and its progression.

Education of the patients about the sequelae of hypertension and diabetes mellitus and their management is very important to prevent CKD.

Electronic registration is needed and highly recommended in our hospitals.

Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

Acknowledgments:
The authors would like to express their gratitude to the Al-Hawari Nephrology Center in Benghazi and to all colleagues who contributed to the data collection, analysis, and review process of this study.

Conflict of insert inerst:
The authors declare that there is no conflict of interest regarding the publication of this paper.

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026

DOI: https://doi.org/10.54361/LJMR.20.1.06

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Received: 23-12-2025-Accepted: 18-01-2025 -Published: 21-01-2026