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RESEARCH ARTICLE - MEDICAL TECHNIQUES

Assessment of Risk Factors of Chronic Kidney Disease among Patients Attending Medical City Complex

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Abstract

Chronic kidney disease is a worldwide health problem that is defined as structural abnormalities or progressive or permanent loss of renal function for 3 months or more, which is usually associated with a decrease in glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m^2 or persistent proteinuria, which can lead to end-stage renal disease (ESRD) or kidney failure. To assess the risk factors leading to chronic kidney disease among the patients between cases and controls in the Medical City Complex. The study was conducted in hospitals of the medical city complex (Baghdad Teaching Hospital, Nursing Home Private Hospital, Ghazy Al-Hariri Hospital for Surgical Specialist, and kidney diseases and Transplant Center) in Baghdad, Iraq, and was designed as a case-control. There were 300 participants (150 cases and 150 controls). Data was collected over five months. The findings show that the highest percentage (20%) was within the age group 50–59 years old in the case study group, with a mean age of patients and controls of 47.71 ± 17.42 and 48.54 ± 17.43 years, respectively, and there were significant sociodemographic risk factors for CKD with gender and residency (p. value < 0.05). There was a significant link between medical history and the outcome of this investigation (p. value < 0.05 and OR > 1) All of the risk factors for CKD were hypertension, acute kidney disease, HCV infection, hyperlipidemia, renal stones, anemia, and cardiovascular disease. alcohol consumption had a significant difference with CKD (p. value =0.004). Increased intake of antihypertensive medical drugs also increases the risk of CKD (p. value =0.000). There is a significant association between patients' gender and residence, the patients with hypertension, AKI, HCV infection, hyperlipidemia, renal stones, anemia, and CVD had a significant relationship with CKD. The risk of CKD is increased in people who have had alcoholism and also in patients who have taken antihypertensive medication, The study recommends educating people about the risk factors of CKD, encouraging them to adopt a healthy diet, and healthy lifestyle, and encouraging alcohol cessation through special programs. The GFR test and other routine clinical tests must be performed regularly to monitor the change in kidney functions.

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Keywords: Chronic Kidney Disease; Glomerular Filtration Rate; End-Stage Renal Disease; Kidney Failure; Risk Factors.

1. Introduction

Chronic kidney disease is a worldwide health problem, contributing to increased morbidity and mortality. Its prevalence varies between 8% and 16% all over the world [1, 2]. It is defined as structural abnormalities or progressive or permanent loss of renal function for 3 months or more, which is typically associated with a decrease in glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m^2 or persistent proteinuria, which can lead to end-stage renal disease (ESRD). Over 1.4 million patients worldwide are receiving renal replacement therapy [3-5]. CKD patients are put into one of five stages based on their GFR. According to the 2012 kidney disease: Improving Global Outcomes, GFR is the best overall indicator of the level of kidney function and is considered a marker of the early stages of CKD [6-8]. Kidney disease is a silent killer because the disease is asymptotic at the early stages (1-3a), so it is difficult to assess and detect. When the patient reaches a loss of more than 50% of kidney function (ESRD), the symptoms will appear and the patient will seek medical treatment [9, 10]. More than 1 of 7 representing 15% of US adults, or 37 million people, are estimated to have CKD. About 9 out of 10 adults with CKD do not know they have CKD, and 2 out of 5 adults with severe CKD do not know they have CKD [11]. The typical risk factors include hypertension, diabetes, cardiovascular disease, and obesity. Other risk factors such as aging, smoking, excessive alcohol intake, heavy metal exposure, lifestyle behavior, pesticides, environmental pollution, infectious and inherited disease, acute kidney injury, dyslipidemia, arthritis, and non-steroidal anti-inflammatory drugs (NSAIDs) are responsible for CKD in many developing countries [12-14]. Diabetes and hypertension are significant risk factors for CKD, accounting for roughly 70% of all CKD causes worldwide [15]. It is essential in community health to identify the risk factors that are susceptible to the individual developing chronic kidney disease because some risk factors can be adjusted to prevent or delay the progression to ESRD and are also considered a major risk factor for cardiovascular disease [5, 16]. The economic burden of CKD can be reduced by getting help early and finding people who are more likely to get kidney disease [5].

Nomenclature & Symbols			
CKD	Chronic kidney disease	HCV	Hepatitis C virus
GFR	Glomerular filtration rate	HBV	Hepatitis B virus
ESDR	End-stage renal disease	NSAIDs	Non-steroidal anti-inflammatory drugs
S.D	Standard deviation	LN	Lupus nephritis
OR	Odd ratio	CVA	Cardiovascular disease
C.C.	Contingency Coefficients	AKI	Acute kidney injury
DM	Diabetes mellitus	RA	Rheumatoid arthritis

Aim of the study: To assess the risk factors contributing to chronic kidney disease among the patients between cases and controls in the Medical City Complex and to predict variables that contribute to the risk factors of CKD among the studied samples.

2. Patients and Methods

2.1. Study design

The study was designed as a case-control and has been conducted in the following settings: (Baghdad Teaching Hospital, Nursing Home Private Hospital, Ghazy Al-Hariri Hospital for Surgical Specialists, and Kidney Diseases and Transplant Center) in the Medical City Complex in Baghdad City. Data was collected for five months during the period between the 7th of December 2021 to the 5th of May 2022. The sample for the study consisted of 300 people (150 cases and 150 controls), including all the patients who were diagnosed with CKD by a specialist. A convenient sampling (a nonrandom sampling approach) drawn at random from a larger population (a nonrandom sampling approach) was also used.

They used the following formula to determine the minimal size of a sample: $n=p*(1-p)*z^2/d^2$

n: minimal sample size
P: proportion of Prevalence of CKD in the population was 6.8%, according to a previous study done by [17].
Z: confidence level (z = 1.96 at 95%)
D: This is the acceptable margin of error (0.052)
n= *(1-6.8%) *1.962/0.052, n = 97 cases are the least sample size necessary to carry out this study, but the actual number of cases in this study was 150 to increase the accuracy.

Data was collected by direct interview with the patients themselves by the researcher and a specially designed questionnaire was developed and used consisting of personal (age, sex, marital status, residence, occupation, education, …..) and medical information (History, medication, ….) related to the chosen patients, the investigator asked the patients to bring all of the investigations that could be helpful like blood tests, urine tests, case sheets that ensure their diagnosis with CKD by the nephrologists. The questionnaire was reviewed by 8 scientific experts related to the field.

A pilot study using a convenient sample of ten (10) individuals was selected among patients with "Chronic Kidney Disease – CKD" at the "Medical City Complex" in Baghdad City to identify the best approach needed to find out the nature of the difficulties they might face. This preliminary study was conducted for the period from the 1st of December to the 7th of December 2021. The study population was chosen based on specific inclusion criteria of the patient group like; diagnosed with CKD (GFR tests of less than 60 mL/min/1.73 m^2 or having persistent proteinuria), adults, agreeing to follow-up, and compliant. Otherwise, exclusion criteria included the following; pregnant women, kidney transplantation, and those less than 18 years old. The control group consisted of adult persons with an age ≤ 18 years old who did not have CKD (GFR tests of more than 60 mL/min/1.73 m^2 and no proteinuria).

2.2. Statistical analysis

The data for each questionnaire was encoded and entered into an excel sheet before being transferred to the Statistical Packages for Social Sciences (SPSS)-22.0 Version. Extract data in the form of statistical tables consisting of frequencies, percentages, means, standard deviations, and ranges (minimum and maximum values). The significance of the difference between different percentages was determined using the Contingency Coefficients (C.C.) test and binomial test (qualitative data). Statistical significance was taken into account where the P-value was less than or equal to 0.05 and the odd ratio was more than 1. The risk variables related to CKD.

3. Results

The current study enrolled 150 patients with CKD diagnosed by specialist doctors and 150 healthy participants. The demographic characteristics of patients and control subjects are shown in Table 1. The mean age of patients and control participants was 47.71 ± 17.42 and 48.54 ± 17.43 years, respectively. The results show no significant difference (p. value = 0.445) between these two groups regarding mean age. The table shows that the age group 50–59 years old has the higher percentage of patients (20%). Regarding gender, males 78 (52%) versus females 72 (48%) at the level of significance (P. value = 0.028), and regarding residency distinct urban preponderance 118 (78.7) versus rural 32 (21.3%) at a level of significance (P. value = 0.03). Another variable of SDCv. had recorded no statistical differences at (p. value > 0.05) reflected the validity of the selected subjects due to their similar status in light of the variables, regarding the marital status the studied among single, married, divorced, and widow (16.7%, 67.7%, 0.7%, and 6%), respectively had no significant difference at (P. value = 0.253). Furthermore, education level at no significant difference (P. value = 0.087) among illiterate, read and write, primary school, intermediate or secondary school, and institute, college or higher Education (8.7%, 3.3%, 26.7%, 39.3%, and 22%), respectively. As well as occupational status had no significant differences at (P. value = 0.133) among high professional & managerial jobs, lower professionals, and unskilled workers (0.7%, 24.7%, 74.7%), respectively.

The distribution of patients with CKD and control subjects according to medical history items and associated factors that are shown in Table 2 explains that were recorded with significant relationships at least at P<0.05 and had risk OR >1 for each of the following factors: hypertension,

acute kidney injury, HCV infection, hyperlipidemia, renal stone, anemia, myocardial infarction, congestive heart failure, and atherosclerosis. These factors are candidates as risk factors since there were more positive cases in the study group compared to what there were in the control group, while other factors had nonsignificant differences at P>0.05 of the following: family history of renal diseases, diabetes, HBV infection, Rheumatoid arthritis, cirrhosis, lupus nephritis, and prostatic hyperplasia.

Concerning to subjects studied, "Social History" items that are shown in Table 3 were associated factors that were recorded as significant relationships at P<0.01 at the factor of "Alcohol Status". This factor could be a risk factor because the study group had more positive cases when it was present than the control group and other factors such as smoking, nephrotoxic exposure, and agrochemical exposure had a nonsignificant relationship at P>0.05.

The distribution of medications in the studied groups with comparison significance is shown in Table 4, which found that only the "Antihypertensive medication" item has an associated factor that was recorded as a highly significant relationship at P<0.01. This factor is a candidate as a risk factor since higher positive cases in the study group are registered with a decreasing period of use compared to what is in controlled group registration, while other medications such as NSAID, antibiotics, and antipsychotics had a nonsignificant relationship at P>0.05.

Table 1. The demographic characteristics of chronic kidney disease cases and control subjects

SDCv.	Classes	Case Study group		Control group		C.S. (*) P-value
		No.	%	No.	%	
Gender	Male	78	52	59	39.3	C.C.=0.126
	Female	72	48	91	60.7	P=0.028 (S)
Age Groups Yrs.	< 20 yrs.	7	4.7	4	2.7	C.C.=0.138 P=0.445 (NS)
	20 _ 29	23	15.3	22	14.7	
	30 _ 39	20	13.3	26	17.3	
	40 _ 49	26	17.3	18	12	
	50 _ 59	30	20	25	16.7	
	60 _ 69	26	17.3	38	25.3	
	70 >yrs.	18	12	17	11.3	
	Mean ± SD	47.71 ± 17.42		48.54 ± 17.43		
Marital Status	Single	25	16.7	21	14	C.C.=0.166 P=0.253 (NS)
	Married	115	76.7	109	72.7	
	Divorced	1	0.7	1	0.7	
	Widow	9	6	19	12.7	
Residency	Urban	118	78.7	132	88.2	C.C.=0.124
	Rural	32	21.3	18	12.0	P=0.030 (S)
Education Levels	Illiterate	13	8.7	23	15.3	C.C.=0.163 P=0.087 (NS)
	Read and write	5	3.3	8	5.3	
	Primary School	40	26.7	50	33.3	
	Intermediate, or Secondary School	59	39.3	47	31.3	
	Institute, College, or Higher Education	33	22	22	14.7	
Occupation	High professional & managerial jobs	1	0.7	0	0.00	C.C.=0.115 P=0.133 (NS)
	Lower professionals	37	24.7	25	16.7	
	Unskilled workers	112	74.7	125	83.3	

(*) S: Sig. at P<0.05; NS: Non-Sig. at P>0.05; Testing based on a contingency coefficient (C.C.) test

Table 2. Distribution of Medical History according to having a diagnosed disease with comparisons of significant

Medical History	Group	Study		Control		C.S. (*) P-value	OR	95% C.I.
	Resp.	No.	%	No.	%			
1. Family history of renal disease	No	106	70.7	118	78.7	C.C.=0.092 P=0.111 (NS)	1.531	0.905: 2.589
	Yes	44	29.3	32	21.3			
2. Diabetes	No	97	64.7	110	73.3	C.C.=0.093 P=0.105(NS)	1.503	0.918 : 2.460
	Yes	53	35.3	40	26.7			
3. Hypertension	No	29	19.3	94	62.7	C.C.=0.403 P=0.000(HS)	7.004	4.151 : 11.817
	Yes	121	80.7	56	37.3			
4. Acute kidney injury	No	41	27.3	150	100	C.C.=0.603 P=0.000(HS)	4.552	3.552: 6.110
	Yes	109	72.7	0	0.00			
5. HBV infection	No	148	98.7	148	98.7	C.C.=0.000 P=1.00 (NS)	1.000	0.139: 7.193
	Yes	2	1.3	2	1.3			
6. HCV infection	No	135	90.0	147	98.0	C.C.=0.166 P=0.004 (HS)	5.444	1.542: 19.221
	Yes	15	10.0	3	2.0			
7. Hyperlipidemia	No	94	62.7	116	77.3	C.C.=0.158 P=0.006 (HS)	2.033	1.226: 3.370
	Yes	56	37.3	34	22.7			
8. Rheumatoid arthritis	No	87	58.0	98	65.3	C.C.=0.075 P=0.191(NS)	1.365	0.855: 2.177
	Yes	63	42.0	52	34.7			
9. Cirrhosis	No	147	98.0	150	100	C.C.=0.100 P=0.082(NS)	Cohort Study=2.020	1.801: 2.266
	Yes	3	2.0	0	0.00			
10. Renal stone	No	88	58.7	109	72.7	C.C.=0.146 P=0.011 (S)	1.345	0.329 : 2.460
	Yes	62	41.3	41	27.3			
11. Anemia	No	30	20.0	93	62.0	C.C.=0.393 P=0.00(HS)	6.526	3.886 : 10.960
	Yes	120	80.0	57	38.0			
12. Myocardial infarction	No	117	78.0	130	86.7	C.C.=0.113 P=0.049 (S)	1.833	0.997: 3.371
	Yes	33	22.0	20	13.3			
13. Congestive heart failure	No	125	83.3	144	96.0	C.C.=0.204 P=0.000 (HS)	4.800	1.908: 12.077
	Yes	25	16.7	6	4.0			
14. Atherosclerosis	No	116	77.3	132	88.0	C.C.=0.140 P=0.015 (S)	2.149	1.152: 4.009
	Yes	34	22.7	18	12.0			
15. Lupus nephritis	No	139	92.7	145	96.7	C.C.=0.089 P=0.123(NS)	2.295	0.777: 6.774
	Yes	11	7.3	5	3.3			
16. Prostatic hyperplasia (Male)	No	139	92.7	140	93.3	C.C.=0.013 P=0.821(NS)	1.108	0.456: 2.692
	Yes	11	7.3	10	6.7			

(*) OR: Odds Ratio with 95% Confidence Interval; HS: Highly Sig. at P<0.01; Testing based on a contingency coefficient (C.C.) test. For Cohort Study = Total Number of negative outcomes divided by control number of negative control

Table 3. The distribution of Social History in the studied groups with a comparison of significant

Social History	Groups Response	Study No.	Study %	Control No.	Control %	C.S. (*) P-value
Smoking Status	Non	105	70	103	68.7	C.C.=0.062 P=0.563 (NS)
	Ex-Smoker	25	16.7	21	14	
	Current Smoker	20	13.3	26	17.3	
Alcoholic Status	Non-Drinker	129	86	145	96.7	C.C.=0.188 P=0.004 (HS)
	Drinker	21	14.0	5	3.3	
Nephrotoxic Exposure in working (lead, cadmium, or other heavy metals)	No	134	89.3	140	93.3	C.C.=0.071 P=0.218 (NS)
	Yes	16	10.7	10	6.7	
Agrochemicals Exposure (pesticides and fertilizers)	No	146	97.3	144	96	C.C.=0.037 P=0.520 (NS)
	Yes	4	2.7	6	4	

(*) HS: Highly Sig. at P<0.01; NS: Non-Sig. at P>0.05; Testing based on a contingency coefficient (C.C.) test

Table 4. The distribution of medications in the studied groups with comparison significant

Medications	Groups Response	Study		Control		C.S. (*) P-value
		No.	%	No.	%	
NSAID uses	No	63	42	57	38	C.C.=0.105 P=0.500 (NS)
	Yes	87	58	93	62	
Antibiotic uses	No	77	51.3	92	61.3	C.C.=0.173 P=0.222 (NS)
	Yes	73	48.7	58	38.7	
Antihypertensive medication	No	27	18	91	60.7	C.C.=0.419 P=0.000 (HS)
	Yes	123	82	59	39.3	
Antipsychotic uses	No	145	96.7	136	90.7	C.C.=0.133 P=0.247 (NS)
	Yes	5	3.3	14	9.3	

(*) HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; NS: Non-Sig. at P>0.05; Testing based on a contingency coefficient (C.C.) test

4. Discussion

In the current study, the highest percentage (20%) was within the age group 50–59 years old, the case study group, with a mean age of patients and controls of 47.71 ± 17.42 and 48.54 ± 17.43 years, respectively, like study which found that mean age of patients was 47.94±12.25 years and higher percentage within the age group 41-60 [17].

There are significant differences based on place of residence at (P< 0.05) where patients living in urban areas was (78.7%) this is similar to a study done in the United States which residency had highly significant differences at (P<0.0001) who (71.8%) living in urban area [18].

Regarding gender (52%) of the patient were males and the other percentage for females, which had significant differences at (P = 0.028) this agree with a study done in Ethiopia in which 54.7% of patients were male and had significant differences at (P = 0.01) [9], and regarding the educational level, the highest percentage (39.3%) of the case study group were intermediate or secondary school graduates, similar to the study done in the Kurdistan Region who (41.8%) of patients were intermediate or secondary school graduates [19].

Concerning to subjects of medical history items, family history of renal disease had no significant difference (P = 0.111) 44 (29%) of the case group and 32 (21%) of the control group had a family history of renal disease, and the risk was 1.5 times higher if the patients had a family history of renal disease (OR = 1.53). This disagrees with studies done in Mosul City where the family history had a high significance difference (P = 0.000) and the risk was 7.1 times higher, this difference in outcomes is because, while some types of kidney disease may be inherited, majority of the time, when the disease is discovered in multiple family members, it is not due to genetics. In contrast, environmental and social variables are the causes of renal disease [20].

Patients with a history of diabetes had no significant difference with CKD (P = 0.105), were 53 (35%) of the cases and 40 (27%) of the controls with diabetes (OR = 1.503), which is similar to a study done in El Salvador, which was not significant (P = 0.509) and (OR = 1.3) times if they had DM [21].

Hypertension had a highly significant difference (P=0.000) and the high percentage of the case group that had hypertension was 121 (81%) while the control group had 56 (37%) and the risk of having CKD was 7 times (OR = 7.004) if you had hypertension. This result agrees with studies done in Saudi Arabia where (87%) of cases had hypertension and it is very highly significant (P < 0.00001) and the risk is 6 times greater for hypertension patients to have CKD [3].

Patients with acute kidney injury had highly significant differences with a high percentage of study group 109 (73%) and with a risk of 4.6 times more likely to have CKD (OR = 4.552), it agrees with a study done in India, where acute kidney disease had highly significant differences with P < 0.001 and had a risk of 2.8 times [22].

HCV infection had highly significant differences (P = 0.004) in 15 (10%) of the case group, 3 (2%) of the control group had HCV and the risk was 5.4 times greater for exposure to CKD (OR = 5.444). This agrees with a study done in Taiwan that had high significance (P < 0.001) and the risk was 2 times [23].

Hyperlipidemia had highly significant differences (P = 0.006) 56 (37%) of the case group and 34 (23%) of the control group had hyperlipidemia, and the risk of having CKD is 2 times higher (OR = 2.03). However, this doesn't match up with most studies, such as the one done by the Koreans, which found no significant difference (P = 0.752) and no link between hyperlipidemia and CKD (OR = 1.1) because of the different ways of life and nutritional habits, is considered as an independent risk factor for CKD, indicating that lipid buildup in the renal parenchyma is harmful to renal function and the kidneys are particularly susceptible to damage from free fatty acids [24, 25].

Rheumatoid arthritis was 63 (42%) of the case group and 52 (35%) of the control group, there is no significant difference between RA and CKD (P=0.19) and (OR=1.3) which means there is no association between RA and CKD and this disagree with a study done in Algeria that found there is a significant difference (P=0.004) and risk is 14 times if patients had RA, there is combined between RA disease characteristics and CVD associated factors which appear to play a role in reduced kidney function, or as a consequence of inflammatory process related to RA can effect on kidney function so RA did not directly relate to the risk of CKD [26].

Patients with liver cirrhosis had no significant differences (P = 0.082) were 3 (2%) of the case group but no patient was exposed to cirrhosis in the control group it considered a cohort study in which the risk factors for exposure to CKD are 2 times higher if you are exposed to cirrhosis (OR = 2.02) it unlike the study done in the USA, it has highly significant differences (P<0.0001) and the risk is 5 times greater (OR = 5.41),

this is due to differences between the other population in the prevalence of cirrhosis because of differences in social habits like increasing of alcohol consumption and also differences in nutritional habits that increase the prevalence of cirrhosis in that population so cirrhosis considers as a risk factor for CKD [27].

In the case group 62 (41%) and 41 (27%) in the control group had a history of renal stones, and (OR = 1.36 CI 95% 0.329-2.461) meant that 50% of the odds of developing the disease as the unexposed group, like in the study done in Iran, was (P< 0.0001) and had 1.3 times the risk if patients had renal stones [28].

Anemia had highly significant differences (P = 0.000). Among 120 (80%) of the case group and 57 (38%) of the control group had anemia, and the risk of anemia is 6.5 times (OR =6.526) to having CKD, agreeing with the study done in China (P<0.001) and the risk is 1.4 times [29].

Myocardial infarction, congestive heart failure, and atherosclerosis are considered heart diseases that had significant differences (P = 0.04, 0.000, 0.015) and (OR = 1.833, 4.8, 2.149) respectively. This agrees with the study done in Saudi Arabia where heart disease had a high significance difference (P< 0.00001) and the risk was 7 times (OR = 7.2) [3].

Lupus nephritis had no significant difference at (P=0.123) where 11 (7%) of the case group and 5 (3%) of the control group had LN, it is similar to the study which had no significance at (P = 0.147) [30].

Prostatic hyperplasia in males had no significant difference (P = 0.821) and 11 (7%) of the case group and 10 (7%)of the control group had prostatic hyperplasia (OR = 1.108) meaning there is no association between prostatic hyperplasia and CKD, it agrees with the study which (P = 0.287) and (OR = 1.521) [31].

Concerning to subjects of social history items, there was no statistically significant difference in smoking (P = 0.563) 20 (13%) of the case group and 26 (17%) of the control group were current smokers, while 25 (17%) of the case group and 21 (14%) of the control group were ex-smokers, this agrees with the study done in Belize that had no significant difference (P = 0.520) were 30.9% of patients was ever smoked [32].

A significant difference (P = 0.004) with CKD was found in 21 (14%) of the case group 5 (3%) of the control group was a drinker of alcohol which is similar to a study done in Taiwan that had a significant difference (P = 0.018) [33].

Nephrotoxic Workplace exposure to lead, cadmium, or other heavy metals had no significant difference (P = 0.218), with 16 (11%) of the case group and 10 (7%) of the control group having been exposed to nephrotoxic materials at work. This contrasts with a study done in Korea, where there was a significant difference between lead and cadmium (P = 0.025 and 0.003), respectively, and no significant difference with other heavy metals (P = 0.29) because it depends on the time of exposure, and the protective equipment that is used [34].

Agrochemical exposure such as pesticides and fertilizers had no significant difference (P = 0.520) with CKD where 4 (3%) of the case group and 6 (4%) of the control group had been exposed to agrochemicals, it is similar to a study done in India that had a highly significant difference (P<0.001) with CKD, this is because of the difference in the components of pesticides and fertilizers, the way that they affect the body, the time of exposure, and the protective equipment that is used [35].

Concerning medication items, there was no statistically significant difference in NSAID use (P = 0.500), with 87 (58%) of the case group and 93 (62%) of the control group using NSAID, which is consistent with the results of an Indonesian study (P = 0.60) [36].

Antibiotic use had no significant difference (P = 0.222) with CKD 73 (49%) of the case group and 58 (39%) of the control group, it was similar to the study done in Saudi Arabia where there was also no significant difference (P = 0.397) [3].

Antihypertensive medication had a highly significant difference (P = 0.000) were 123 (82%) of the case group, and 59 (39%) of the control group using antihypertensive medication, this agrees with the study done in Kenya, which also had a highly significant difference (P = 0.009) [37].

In this study, antipsychotic medication was used by 5 (3%) of the case group and 14 (9%) of the control group, with no significant difference (P = 0.247), similar to a study done in Taiwan, where there was also no significant difference (P = 0.6920) [38].

5. Conclusion

In the highlighted the results obtained, the study concluded the following:

- Most of the case samples were males in the age group of 50–59 years old with intermediate or secondary school education.
- There was a significant association between the patient's gender and residency and the risk factors for CKD.
- Very high correlations were found between the risk of CKD and medical history (hypertension, AKI, HCV infection, hyperlipidemia, renal stones, anemia, cardiovascular disease).
- There was no significant association between CKD risk factors and social history, but there was a very strong association between drinking alcohol and the risk of CKD.
- The risk of CKD was increased in patients who used antihypertensive medication.

5.1. Recommendations

- Educating people about the risk factors for CKD through TV, social media, and health educators through face-to-face meetings with healthcare workers in primary healthcare centers in remote areas.
- Encouraging people to adopt a healthy diet rich in antioxidants such as fruits and vegetables, which are recommended for good health.
- Enhance a healthy lifestyle by participating in various types of physical activity.
- Encourage alcohol cessation through special programs.
- The GFR test and other routine clinical tests must be performed regularly to monitor the change in kidney function for persons with a risk for CKD this makes it possible to prevent CKD or start treatment early to stop the disease from getting worse.

Ethical Approval

Ethical approval for this study was granted by the ethical committee of the Iraqi Ministry of Health (no. 49013).

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References

[1] Collister, D., et al. The patterns, risk factors, and prediction of progression in chronic kidney disease: a narrative review. in Seminars in nephrology. 2016. Elsevier.
[2] Chen, T.K., D.H. Knicely, and M.E. Grams, Chronic kidney disease diagnosis and management: a review. Jama, 2019. 322(13): p. 1294-1304.
[3] Sultana, S., et al., Risk factors and knowledge assessment of general public for chronic kidney disease in Taif Region, Saudi Arabia. World Journal of Advanced Research and Reviews, 2020. 8(1): p. 123-143.
[4] Azab, A.E. and A.S.I. Elsayed, Correlation between chronic kidney diseases and hematolgical data in Sabratha hospital in Libya. Asian J Pharm Clin Res, 2017. 10(2): p. 291-296.
[5] Kazancioğlu, R., Risk factors for chronic kidney disease: an update. Kidney international supplements, 2013. 3(4): p. 368-371.
[6] Kellum, J.A., et al., Kidney disease: improving global outcomes (KDIGO) acute kidney injury work group. KDIGO clinical practice guideline for acute kidney injury. Kidney international supplements, 2012. 2(1): p. 1-138.
[7] Muiru, A.N., et al., The epidemiology of chronic kidney disease (CKD) in rural East Africa: a population-based study. PloS one, 2020. 15(3): p. e0229649.
[8] Waheeb, M.Q., Cystatin C, E-glomerular Filtration Rate and Creatinine are Considered as a Marker in Iraqi Patients with Chronic Kidney. 2009.
[9] Kore, C.a.Y., H.M., Prevalence of chronic kidney disease and associated factors among patients with kidney problems public hospitals in Addis Ababa, Ethiopia. J Kidney, 2018. 4(01): p. 1-5.
[10] Wachukwu, C.M., et al., Prevalence of risk factors for chronic kidney disease among adults in a university community in southern Nigeria. Pan African Medical Journal, 2015. 21(1).
[11] CDC, Chronic Kidney Disease in the United States. 2021.
[12] Duan, J.-Y., et al., Prevalence and risk factors of chronic kidney disease and diabetic kidney disease in a central Chinese urban population: a cross-sectional survey. BMC nephrology, 2020. 21(1): p. 1-13.
[13] Ginawi, I.A., H.G. Ahmed, and A.M. Al-Hazimi, Assessment of risk factors for chronic kidney disease in Saudi Arabia. Hypertension, 2014. 1(1.4).
[14] Luyckx, V.A., et al., Reducing major risk factors for chronic kidney disease. Kidney international supplements, 2017. 7(2): p. 71-87.
[15] Nalado, A.M., et al., Prevalence of risk factors for chronic kidney disease among civil servants in Kano. Nigerian Journal of Basic and Clinical Sciences, 2012. 9(2): p. 70.
[16] Bikbov, B., et al., Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The lancet, 2020. 395(10225): p. 709-733.
[17] Moparthi, S., M. Seepana, and D.M. Bhimarasetty, Risk factors for chronic kidney disease: a hospital based cross sectional study from Visakhapatnam. International Journal of Community Medicine and Public Health, 2018. 5(9): p. 3909.
[18] Lebov, J.F., et al., A population-based study of prevalence and risk factors of chronic kidney disease in León, Nicaragua. Canadian journal of kidney health and disease, 2015. 2: p. 41.
[19] Sharif, D.A., et al., Demographic and characteristic distribution of end-stage renal failure in Sulaimani Governate, Kurdistan region, Iraq. Int J Med Res Prof, 2017. 3(1): p. 207-13.
[20] Khaleel, F., S. Hussain, and A. Hmood, Risk factors of chronic kidney disease among patients attending Ibn Sina Teaching Hospital in Mosul City. Iraqi JMS. 2019; 17 (1): 24-31. doi: 10.22578. Editorial Board Members, 2019. 17(5): p. 24.
[21] Orantes, C.M., et al., Chronic kidney disease and associated risk factors in the Bajo Lempa region of El Salvador: Nefrolempa study, 2009. MEDICC review, 2011. 13: p. 14-22.
[22] Maiwall, R., et al., Incidence, risk factors, and outcomes of transition of acute kidney injury to chronic kidney disease in cirrhosis: a prospective cohort study. Hepatology, 2020. 71(3): p. 1009-1022.
[23] Wang, P.-C., et al., The Impact of Hepatitis C Virus, Metabolic Disturbance, and Unhealthy Behavior on Chronic Kidney Disease: A Secondary Cross-Sectional Analysis. International Journal of Environmental Research and Public Health, 2022. 19(6): p. 3558.
[24] Lee, S.J. and C.W. Chung, Health behaviors and risk factors associated with chronic kidney disease in Korean patients with diabetes: the Fourth Korean National Health and Nutritional Examination Survey. Asian nursing research, 2014. 8(1): p. 8-14.
[25] Gai, Z., et al., Lipid accumulation and chronic kidney disease. Nutrients, 2019. 11(4): p. 722.
[26] Derouiche, S., T. Cheradid, and M. Guessoum, Assessment of Risk Factors for Chronic Kidney Disease in Djamaa (El Oued, Algeria) Population. Frontiers in Biomedical Technologies, 2020. 7(1): p. 14-21.
[27] Wijarnpreecha, K., et al., Noninvasive fibrosis markers and chronic kidney disease among adults with nonalcoholic fatty liver in USA. European Journal of Gastroenterology & Hepatology, 2018. 30(4): p. 404-410.
[28] Dehghani, A., et al., Prevalence of chronic kidney diseases and its determinants among Iranian adults: results of the first phase of Shahedieh cohort study. BMC nephrology, 2022. 23(1): p. 1-11.
[29] Ji, A., et al., Prevalence and associated risk factors of chronic kidney disease in an elderly population from eastern China. International journal of environmental research and public health, 2019. 16(22): p. 4383.
[30] Hanly, J.G., et al., The frequency and outcome of lupus nephritis: results from an international inception cohort study. Rheumatology, 2015. 55(2): p. 252-262.

[31] Hong, S.K., et al., Chronic kidney disease among men with lower urinary tract symptoms due to benign prostatic hyperplasia. BJU international, 2010. 105(10): p. 1424-1428.
[32] Lin, J.-J., et al., Prevalence and Risk Factors for Chronic Kidney Disease in Belize: A Population-based Survey. The Lancet Regional Health-Americas, 2021. 1: p. 100013.
[33] Lai, Y.-J., et al., Alcohol consumption and risk of chronic kidney disease: a nationwide observational cohort study. Nutrients, 2019. 11(9): p. 2121.
[34] Kim, N.H., et al., Environmental heavy metal exposure and chronic kidney disease in the general population. Journal of Korean medical science, 2015. 30(3): p. 272-277.
[35] Farag, Y.M., et al., Occupational risk factors for chronic kidney disease in Andhra Pradesh:'Uddanam Nephropathy'. Renal Failure, 2020. 42(1): p. 1032-1041.
[36] Indrayanti, S., et al., Risk factors for chronic kidney disease: a case-control study in a district hospital in Indonesia. Journal of Pharmaceutical Sciences and Research, 2019. 11(7): p. 2549-2554.
[37] Muyodi, M.M., et al., Prevalence of and factors associated with chronic kidney disease in osteoarthritis patients at Kenyatta National Hospital. East African Orthopaedic Journal, 2020. 14(2): p. 72-80.
[38] Wang, H.-Y., et al., Second-generation antipsychotic medications and risk of chronic kidney disease in schizophrenia: population-based nested case–control study. BMJ open, 2018. 8(5): p. e019868.