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Original Research Article

A Cross-Sectional Study to Evaluate Risk Factors of Chronic Kidney Disease among Diabetic Patients at Tertiary Care Hospitals in a District Of Gujarat

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Abstract:

Background: Non-communicable diseases such as DM and kidney disease are the foremost cause of mortality and morbidity worldwide.

Aims & Objectives: (1) To assess the different risk factors responsible for chronic kidney disease (CKD). (2) To assess the basic profile and stages of CKD among patients.

Methods and Material: The study was a cross-sectional study. The study participants were confirmed diabetic patients of the general medicine department of tertiary care hospitals in a district of Gujarat. Sample size was calculated by fleiss with CC method. Based on predefined inclusion and exclusion criteria, a total 320 patients were selected. Based on eGFR value, patients were classified into two groups. Group-1 was normal to mild kidney dysfunction and Group2 was moderate to severe kidney disease. Various CKD risk factors were compared between two groups.

Results: Among 320 patients, males were 61.6% and females were 38.4%. The mean age was 58.6±14.4. Around 19% of patients were illiterate. Half of the patients were tobacco users of ≥10 years (P<0.0007). The majority of patients (35%) belonged to CKD stage-1 followed by CKD stage-2 (30%). Significant difference was noted between the two groups for different risk factors e.g. Age (P<0.0001), prolong NSAIDs users (P: 0.01), history of UTI (P: 0.03), Labor occupation (P: 0.007) and chronic alcohol users (P: 0.0008).

Conclusions: Half of the participants were aged (≥60years). The majority of them were males. The proportion of risk factors was significantly higher in the moderate to severe CKD stage (Group-2). Among them the majority of risk factors were non-communicable and lifestyle habits-based categories.

Keywords: Risk factors, Chronic Kidney Disease (CKD), Tertiary care hospitals.

Introduction

Non-communicable diseases (NCDs), such as diabetes and kidney disease are the leading cause of death and morbidity worldwide [1]. DM is known as the fastest-rising chronic disease in the world. Worldwide, one in every eleven adults has diabetes. 90% of who have type 2 DM. These numbers have grown over the last three decades due to increasing rates of sedentary lifestyle habits, unhealthy dietary patterns, smoking, alcohol, and other addictions [2]. The prevalence of DM in India has risen from 7.1% in 2009 to 8.9% in 2019. Currently, 2.52 crore adults are estimated to have impaired glucose tolerance, which is estimated to increase to 3.57 crores in the year 2045 [3]. CKD is a progressive renal function loss over three months or more. Kidneys can be damaged from a physical injury or various diseases like DM, high blood pressure, and many more. This is linked with a reduction in GFR and proteinuria [4,5]. CKD was a cause of 4.09 lacs and 9.56 lacs deaths in 1990 and 2013 respectively. Among them DM was main risk factor in 46000 & 1.73 lacs deaths respectively [6]. Globally CKD prevalence in different regions ranges from <1% to 13%. According to the International Society of nephrology's kidney disease data center study, recent CKD reported prevalence is around 17% [7]. The risk factor of CKD varies significantly throughout India. GFR is the best indicator of kidney function, taking into account of age, race, and gender. The two most

popular methods for GFR estimation are creatinine clearance and the approximate GFR (eGFR) [8]. Formula-derived eGFR results have been commonly used in clinical practice and have been suggested by the UK National renal services framework for the assessment of all CKD patients [9]. CKD classification is based on both eGFR and albuminuria. CKD patients were classified into five stages according to the Kidney Disease Improving Global Outcomes (KDIGO) classification system [10]. Due to many challenges in access to care, >50% of CKD patients are first seen in stage5 which is end stage renal disease (ESRD) [11].

Such findings highlight the need for CKD risk factor evaluation screening programs. Once damage to the filtration function of the kidney, it's irreversible to make it normal as before. So the early identification of risk factors is essential. By doing this, we can prevent further damage by controlling the risk factors responsible for CKD. So the main objective of the current study is to assess such risk factors and their significance level.

Methods and Materials:

A cross-sectional study was conducted in diabetic patients of general medicine OPD or indoor wards at GMERS civil hospital-Junagadh and a few private hospitals in Junagadh district, Gujarat. The study was conducted during the period from December 2022 to May 2023. After the briefing of study, informed consent was taken from patients. Permission from the institutional ethical committee was also taken. All willing patients of ≥ 15 years of age and those who had at least two renal function tests (RFT) & urine proteins (albumin) lab reports of at least three months apart were included. Patients of <15 years of age, refused for informed consent, didn't have sufficient lab reports, and those with critical illness were excluded from the study. Different studies reveal the prevalence of CKD among DM patients was around 29 to 35% [12].

Sample size: As per the Fleiss with correction of continuity method, the calculated sample size was 268. Following parameters were considered for sample calculations. [P1=0.3, P2=0.15, Relative risk (RR)=2, using 0.05 level of significance (α=0.05), with power (1−β) =0.8, Ratio=1] [13]. The design effect not considered was limitation in sampling. Prolonged medications (like NSAIDs) history considered as risk factor for sample size calculation. Based on non-response and exclusion criteria, 33 out of 353 patients were dropped out during the study period. Finally, data of 320 patients was collected from personal interviews as well as patient's medical records. Pretested and specially designed performa was used for data collection. Which mainly focused on basic profile of patients and different etiological factors relevant to CKD? Risk factors were compared between normal / mild kidney dysfunction (group 1) (eGFR:≥60ml) and moderate / severe kidney disease (group 2) (eGFR<60ml). Microsoft MS excel was used for the data entry. Data analysis was done by using MS excel and other statistical software. Appropriate statistical tests were applied e.g. mean, standard deviation, proportion, relative risk, chi-square and P value.

Results:

Out of 320 patients, males were 197(61.6%) and females were 123(38.4%). Majority (162, 51%) of patients were ≥60 years of age followed by 101(32%) of 46 to 60 years (Table-1). Among ≥60 years of age, majority were males (126, 64%) (P<0.0001). The mean age was 58.6±14.4. The majority (95%) of patients were married. As per the table-1, around 58% of patients were hindu followed by muslim (37%). Among the 19% of illiterate patients, majority were females. Majority (38.2%) of females studied up to the primary level whereas majority (41%) of males studied up to the higher secondary standards (P<0.0001). The majority (57%) of patients belonged to the middle socio-economic class. Around 33% of patients had a family history of DM and 39% had a history of hypertension. As table-1 illustrates majority (54%) of males were overweight and the majority (41.5%) of females were obese (P<0.0001). Around 50% patients were tobacco users of ≥ 10 years, majority were males (P: 0.0007). Only 71(22%) of patients were alcohol users, majority was males (P: 0.0003). Mean RBS finding indicates significant gender difference (P<0.0001). Table-2 shows the CKD stage-wise classification of patients. The majority of patients (112, 35%) belonged to stage 1 followed by stage 2 (97, 30%). A total 111 (34.7%) patients were noted in CKD stage 3 to 5.

Table-3 illustrates two groups based on CKD stage; group1 (stage 1-2) and group2 (stage 3-5). Relevance of different CKD risk factors checked among the two groups. Geriatric patients were significantly noted higher in group 2 (P<0.0001). The majority of males (68.5%) belonged to group 2. The majority (43.2%) of DM patients of ≥ 8 years duration were noted in group 2 (P<0.0001). Higher obese patients were found in the group 2 (71.2%) (P:0.04).

The majority patients with prolonged NSAIDs / antibiotics medication history was noted in grou2 (46.8%) (P: 0.01). Significant difference observed for urinary tract infection history among both the groups (P: 0.03). Agriculture/silica dust-based workers more noticed in group 2 (P: 0.007). Majority (80%) of patients in both the groups had tobacco consumption habits. Significant difference was noted in alcohol consumption habits among the two groups (P: 0.0008)

Table 1: Gender wise profile assessment of the patients (N= 320).

Particulars (N= 320)	Total	%	Male (N=197)	%	Female (N=123)	%	P value	Chi-square
Age							<0.0001	45.1
≤ 45 yr	57	18	17	9	40	32.5		
46-60 yr	101	32	54	27	47	38.2		
≥ 60 yr	162	51	126	64	36	29.3		
Marital status							0.98	0.0003
Married	303	95	186	94	117	95.1		
Unmarried	17	5	11	6	6	4.9		
Religion							0.14	3.92
Hindu	186	58	123	62	63	51.2		
Muslim	118	37	65	33	53	43.1		
Others	16	5	9	5	7	5.7		
Education							0.001	18.45
Illiterate	62	19	28	14	34	27.6		
Primary	122	38	75	38	47	38.2		
Higher Secondary	108	34	81	41	27	22.0		
Graduate	21	7	9	5	12	9.8		
Post Graduate	7	2	4	2	3	2.4		
S-E Classification							0.34	2.17
Upper	17	5	8	4	9	7.3		
Middle	183	57	111	56	72	58.5		
Lower	120	38	78	40	42	34.1		
Family Hx of DM							0.11	2.5
No	216	68	126	64	90	73.2		
Yes	104	33	71	36	33	26.8		
Family Hx of HTN							0.66	0.19
No	196	61	123	62	73	59.3		
Yes	124	39	74	38	50	40.7		
Body mass index							<0.0001	77.8
Underweight	26	8	5	3	21	17.1		
Normal	92	29	53	27	39	31.7		
Over weight	118	37	106	54	12	9.8		
Obese	84	26	33	17	51	41.5		
Tobacco users (any form)							0.0007	14.62
None	45	14	18	9	27	22.0		
< 10 yr	125	39	73	37	52	42.3		
≥ 10 yr	150	47	106	54	44	35.8		
Alcohol users (any form)							0.0003	16.2
None	249	78	139	71	110	89.4		
< 10 yr	41	13	32	16	9	7.3		
≥ 10 yr	30	9	26	13	4	3.3		
Narcotic drugs users							0.09	4.67
None	287	90	171	87	116	94.3		
< 10 yr	27	8	21	11	6	4.9		
≥ 10 yr	6	2	5	3	1	0.8		
Systolic BP (Mean)							0.19	1.7
<140 mm/hg	117	37	78	40	39	31.7		
≥140 mm/hg	203	63	119	60	84	68.3		
Diastolic BP (Mean)							0.3	1.1
<90 mm/hg	138	43	80	41	58	47.2		
≥90 mm/hg	182	57	117	59	65	52.8		
RBS (Mean)							<0.0001	51.6
<200 mg/dl	104	33	80	41	24	19.5		
200-250 mg/dl	131	41	92	47	39	31.7		
≥ 250 mg/dl	85	27	25	13	60	48.8		
(HTN= Hypertension, S-E= Socio-Economic, RBS= Random blood sugar, P<0.05= Significant, Hx= History)								

Table 2: CKD Stage wise distribution of patients (N=320).

CKD Stage classification	eGFR Value (ml/min/1.73m2)	No.	%
Normal eGFR with Albuminuria (1)	≥90	112	35.0
Slightly decreased eGFR with Albuminuria (2)	60-89	97	30.3
Moderately decreased eGFR (3)	30-59	82	25.6
Severely decreased eGFR (4)	15-29	25	7.8
End stage Renal Dz (ESRD) (5)	<15	4	1.3

Table 3: Risk factors evaluation among patients according to CKD Stage (N=320).

Variables (Risk factors)	Stage (1,2) (N=209)	%	Stage(3,4,5) (N=111)	%	RR*	95% CI	P value	Chi-square
Age					5.03	3.19-7.94	<0.0001	72.7
≥ 60 yr	69	33.0	93	83.8				
< 60 yr	140	67.0	18	16.2				
Gender					1.35	0.97-1.88	0.08	2.99
Male	121	57.9	76	68.5				
Female	88	42.1	35	31.5				
DM duration					2.24	1.7-2.97	<0.0001	27.5
≥ 8 yr	33	15.8	48	43.2				
< 8 yr	176	84.2	63	56.8				
HTN duration					1.31	0.96-1.76	0.12	2.37
≥ 8 yr	60	28.7	42	37.8				
< 8 yr	149	71.3	69	62.2				
Obese					1.44	1.02-2.03	0.04	4.2
Yes	123	58.9	79	71.2				
No	86	41.1	32	28.8				
History-Cardio-Vascular dz.					1.2	0.89-1.63	0.28	1.15
Yes	67	32.1	43	38.7				
No	142	67.9	68	61.3				
History of Cancer					0.95	0.42-2.16	0.92	0.01
Yes	8	3.8	4	3.6				
No	201	96.2	107	96.4				
Family Hx of kidney dz (PCKD)					1.24	0.52-2.96	0.95	0.003
Yes	4	1.9	3	2.7				
No	205	98.1	108	97.3				
Prolong Medication Hx (NSAIDs)					1.51	1.12-2.03	0.01	6.62
Yes	66	31.6	52	46.8				
No	143	68.4	59	53.2				
Hx of UTI infection (Prolong/Recurrent)					1.7	1.16-2.50	0.03	4.46
Yes	11	5.3	14	12.6				
No	198	94.7	97	87.4				
Family Hx of Renal Stone					0.83	0.55-1.27	0.49	0.5
Yes	42	20.1	18	16.2				
No	167	79.9	93	83.8				
Occupation (work)					1.58	1.13-2.21	0.007	7.25
Laborer (Agri/silica Dust-base)	109	52.2	76	68.5				
Others	100	47.8	35	31.5				
Tobacco users (any form)					1.23	0.76-2.0	0.48	0.51

Yes	177	84.7	98	88.3				
No	32	15.3	13	11.7				
Alcohol users (any form)					1.75	1.31-2.35	0.0008	11.3
Yes	34	16.3	37	33.3				
No	175	83.7	74	66.7				
Narcotic Drugs users					1.36	0.90-2.04	0.23	1.39
Yes	18	8.6	15	13.5				
No	191	91.4	96	86.5				
(*Relative Risk= using the approximation of Katz, CI= Confidence interval, P<0.05= Significant, Hx= History), PCKD = poly cystic kidney disease								

Discussion

CKD is a worldwide public health concern and DM is one of the main risk factors for its occurrence and progression. Chronic DM hyperglycemia is recognized to be one of the main risk factors of CKD in addition to hypertension [14].

Hence known diabetic patients were taken for current study. The prevalence of diabetes and hypertension in India varied widely in many studies and ranged from 6-20% and 13-58% respectively [15]. The current study showed 25% of DM and 31.9% of hypertension patients had ≥ 8 years duration history. Higher the duration of DM history, more kidney damage was noted (P<0.0001) (Table-3).

A mean RBS value of <200mg/dl was noted in only 33% of patients (Table-1). It's recommended to control DM at an earlier stage of CKD for better outcomes. By using convenience cohort design, the prevalence of CKD in the SEEK-India cohort study was noted at 17.2% [16]. The prevalence of CKD stages 1, 2, 3, 4 and 5 was 7%, 4.3%, 4.3%, 0.8% and 0.8% respectively in SEEK-India. Table-2 of shows different stages of CKD according to eGFR value. The majority (35%) of patients were found in stage 1 followed by stage 2 (30%).

The various studies shows apart from DM, hypertension and many other factors might be responsible for CKD. These are old age, family history of kidney dz., obstructive (renal stone) or infective (pyelonephritis) history, history of prolonged medications (NSAIDs, Antibiotics), occupational exposure origin, lifestyle habits like smoking, alcohol etc. [17,18].

The current study also shows a statistically significant difference between risk factors and CKD stages (Table-3). Such risk factors of the current study were age (P<0.0001), prolonged medication (P:0.01), urinary tract infection history (P:0.03), occupation (agriculture/silica dust base) (P: 0.007) and chronic alcohol users (P: 0.0008). All such risk factors were significantly higher in the moderate to severe CKD stage (group 2).

Conclusion & Recommendation:

Among 320 patients, half of the patients were ≥ 60 years of age and the majority of them were males (P<0.0001). Female patients were less educated compare to males (P<0.0001). The majority of males were overweight and females were obese according to BMI criteria (P<0.0001).

The mean RBS value shows a significant gender-wise difference (P<0.0001). The majority patients belonged to normal & mild CKD stages (group 1) as compared to moderate to severe CKD stages (group 2). In comparison to other studies, the current study also shows statistically significant differences between many risk factors and CKD stages. The majority of risk factors were non-communicable and lifestyle habits-based categories. A few examples were prolonged DM history (P<0.0001), prolonged NSAIDs users (P: 0.01) and chronic alcohol users (P: 0.0008). The proportion of various risk factors was significantly higher in the moderate to severe CKD stages (group 2). Early identification of risk factors is essential to prevent further kidney damage. It also helps to reduce the economic burden of a country born by CKD treatment as well as by dialysis.

References

1. Couser WG, Remuzzi G, Mendis S, Tonelli M. The contribution of CKD to the global burden of major NCDs. Kidney Int. 2011;80 (12):1258–70.
2. Zheng Y. Global aetiology and epidemiology of type 2 DM and its complications. Nat Rev Endocrinol. 2018; 14(2):88–98.
3. International Diabetes Federation. Diabetes Atlas. 8th edn. Brussels, Belgium: 2017.
4. Eknoyan G, Lameire N, et al. KDIGO, 2013; 3(1):5-14.
5. Levin A, Rocco M. American Journal of Kidney Diseases. 2007; 49 (2): S10- S179.
6. Naghavi M, Wang H, Lozano R, Davis A, et al. Lancet. 2015; 385 (9963):117- 71.
7. Ene-Iordache B, Perico N, Bikbov B, et al.-A cross-sectional study. Lancet Glob Health 4: e307–e319, 2016
8. Dabla PK. Renal function in DM nephropathy. World J Diabetes. 2010; 1(2):48–56.

9. Department of Health. Available from: https:// scholar.google.com/scholar
10. Eknoyan G, Lameire N, et al. Kidney International Supplements. 2013; 3(1):5-14.
11. Varughese S, John GT, Alexander S, Indian J Med Res 126: 28–33, 2007
12. Naser AY, Alwafi H, Alotaibi B, et al. Int J Endocrinol.2021 Aug28;2021: 4572743.
13. Fleiss JL, Levin B, Paik MC. Journal of the Royal Statistical Society: Series D (The Statistician). 1992;41(2):185-196
14. Prasad DS, Kabir Z, Dash AK, et al: Diabetes Metab Syndr. 2012.
15. Devi P, Rao M, Sigamani A, et al: Prevalence, risk factors and awareness of hypertension in India: a systematic review. J Hum Hypertens. 2012.
16. Singh, A.K., Farag, Y.M., et al. SEEK study BMC Nephrol. 2013; 14: 114.
17. Xia J, Wang L, Ma Z, Zhong L, et al. Nephrol Dial Transplant. 2017; 32(3):475–87.
18. Bin ZS, Hossain N, Rahman M. Diabetes Metab J. 2018;42(4):330–7.