Original Article

Socio-Demographic Status of Chronic Kidney Disease in Adult Rural Population

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Abstract:

Background: Chronic kidney disease (CKD) is a common disorder requiring a public health surveillance strategy to identify those at a risk of progression to End Stage Renal Disease (ESRD). To find out the association of various demographic and socioeconomic factors with CKD in rural area this study was done on the background that CKD is a major public health problem worldwide and a significant cause of morbidity and mortality. **Methods:** This cross-sectional study was carried out in Nephrology department, Bangabandhu Seikh Mujib Medical University and Kidney Foundation. The samples were collected from rural areas of Savar, Dhaka. A multistage sampling following simple random sampling procedure was done to choose the study area and a total 1265 adult population ranging from 15-65 years of both sexes were studied. **Results:** The study revealed 60.1% participants were young and middle aged (15-40 years). The mean age was 35.57 $\pm$ 12.98 years. The majority of the participants were female (63%) and married (85%). Regarding occupation housewives were 57.7%, farmer 14.8%, small businessman 5.5%, serviceholders 6.9%, day-labor 4.9%, student 8.1%, and rest 2.1% were unemployed. Multisticks test for urine demonstrated a total 76(6.0%) participants were proteinuric and among this 2.5% had isolated proteinuria. Proteinuria and MDRD equation depicted 238 (18.8%) were having CKD, on the other hand C-G equation revealed 226 (17.9%) having CKD. Results from both equations are not significantly different. Increased age (>40 years), females and housewives were more prone to develop CKD. **Conclusion:** The survey data revealed that CKD is not less common (18%) in the rural population. A similar survey conducted recently in the urban disadvantageous population also demonstrated a significant percentage of CKD. So to prevent or slow the progression of CKD, early detection and therapeutic intervention is the best way. So, a nationwide screening programme is necessary to develop awareness of entire population, to find exact prevalence of CKD and its associated risk factors. As a result a cost effective preventive strategy could be adopted.

Indexing words: CKD, Rural population, Sociodemographic status

Introduction:

The prevalence of chronic kidney disease (CKD) has increased significantly over the past decade, emerging as an epidemic proportion specially in the disadvantageous group of population throughout the world resulting in the greater utilization of related health care services. By 2001, more than 1 million patients were reported worldwide to receive dialysis treatment alone, with the numbers growing at an annual global average rate of 7%[1,2]. CKD and the development of end stage renal disease (ESRD) are particularly common in the minority population in the USA, that is, African American, Hispanic, Asian American and native[3,4] who are socioeconomically disadvantageous and have limited access to health care[5]. Renal disease is also increasing, with an age-adjusted incidence of treated ESRD in Australian aboriginals approximately 20 times that of non aboriginal people and doubling every 3 to 4 years[6]. In Sweden, low socioeconomic status related to occupational and educational level is associated with increased risk of chronic renal failure[7]. The prevalence of CKD in Asia is equivalent to or higher than in Western countries causing the alarming socioeconomic burden. A survey in the community level has shown that about the majority of the CKD

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patients are younger in age which is the most productive age of life. Disadvantageous populations are socioeconomically unprivileged having limited access to health care and low socioeconomic status related to occupational and educational level. But this unexpected presentation with end stage kidney disease-very little can be offered except dialysis which also beyond the ability due to poverty. As a result these patients are becoming burden for themselves and for the whole family. In most of the cases the affected family bears the financial burden years after years even after the death of the patient. Numerous studies have suggested that socioeconomic disparities exist in the prevention and management of disease in general[8,9,10]. So, proper intervention in early stage of CKD would slow the progression and reduce the rate of ESRD.As there is no previous exact data among Bangladeshi rural population focusing on sociodemographic profile of patients with CKD, this study was aimed at to find out the socio-demographic status of Chronic Kidney Disease (CKD) in adult rural population.

Methods:

This was a cross sectional study carried out in Nephrology department, Bangabandhu Seikh Mujib Medical University and Kidney Foundation from July 2003 to June 2005. The study area was selected named Bongaon Union, a rural area of Savar thana 30 k.m. away from centre of Dhaka city. A total fifteen thousand population of both sex, age between 15 and 65 years were screened for this study. Persons having fever at the time of screening, recent history of fluid loss such as diarrhea, vomiting, trauma, and pregnant women were excluded from the study. A total of twelve hundred sixty five populations were included bya multistaged clustered sampling design by following simple random sampling procedure who met the inclusion criteria. Age, sex, occupation and marital status were noted. Kidney function was stratified according to current national kidney foundation (NKF) guidelines on the evaluation, classification and stratification of chronic kidney disease[11].

Staging of CKD as based on estimation of renal function by GFR. GFR was calculated from serum creatinine by Cockcroft-Gault and MDRD equation[12].

Data were analyzed through SPSS program. Continuous data were presented as mean and standard deviation from the mean. Chi-square, Fishers exact test, Students t- test and Spearman correlation test was used for statistical analysis. Results were presented in tabulated form, charts and diagrams along with statistical interpretation**.**

Results:

The findings derived from analysis of the collected data are furnished below:

Distribution of CKD:

Comparison was made of the distribution of CKD between Cockcroft-Gault and MDRD equations for detecting CKD. The proportion of CKD detected by Cockcroft and MDRD equations were 17.9% and 18.8% respectively and no significant difference was observed between two equations in terms of CKD detection ($p > 0.05$)[13].

Age distribution:

Out of 1265 participants, most was between 20 – 40 years of age (50%). The mean age was (35.57 ± 12.98) years and the lowest and highest ages were 15 and 65 years respectively.

Sex distribution:

Sex distribution shows that 63% of the participants were female and 37% male having a male female ratio of roughly 1:2.

Sociodemographic characteristics:

The cardinal sociodemographic features of the participants are depicted in Fig 1. More than 60% of the participants were below 40 years of age, 63% were female, 85% married and 57.7% housewives.

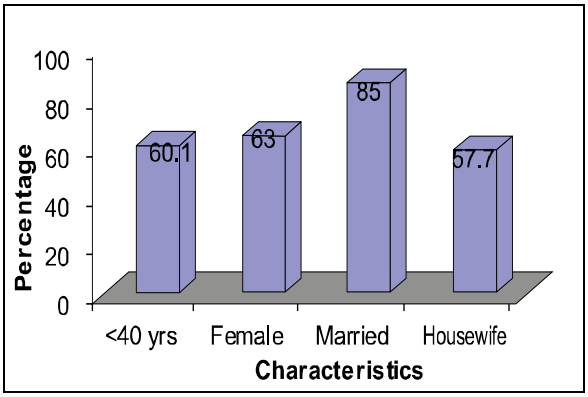


Fig. 1: Dominant sociodemographic characteristics (n=1265)

Occupation:
Housewives formed the main bulk (57.7%) of the participants followed by farmer 14.9% students 8.1%, service-holder 6.9%, business 5.5%, day labor 4.9% and unemployed 2.1% (Table I).

Table I: Distribution of participants by their occupation (n = 1265)

Occupation	No	%
Housewife	730	57.7
Farming	188	14.9
Service	87	6.9
Business	69	5.5
Day-labor	61	4.9
Student	103	8.1
Unemployed	27	2.1

Marital status:
Distribution of participants shows that 85% of the participants were married and the rest (15%) unmarried (Fig. 2).

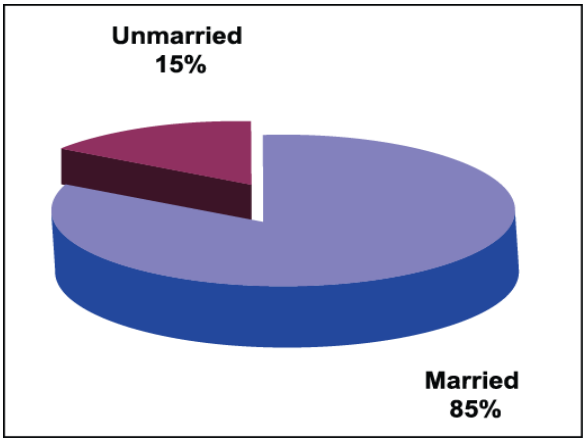


Fig. 2: Distribution of participants by marital status (n = 1265)

Correlation between age and corrected Ccr:
The result of the study shows that as age increases corrected Ccr gradually decreases although the decrease does not follow a steady pattern. Line graph depicts that at the age 15 years corrected Ccr was 86.7 mg/dl which ultimately dropped to 48.5 mg/dl at the age of 65 years suggesting that an inverse relationship exists between the two variables (r = -0.60, p < 0.001) (Fig. 3).

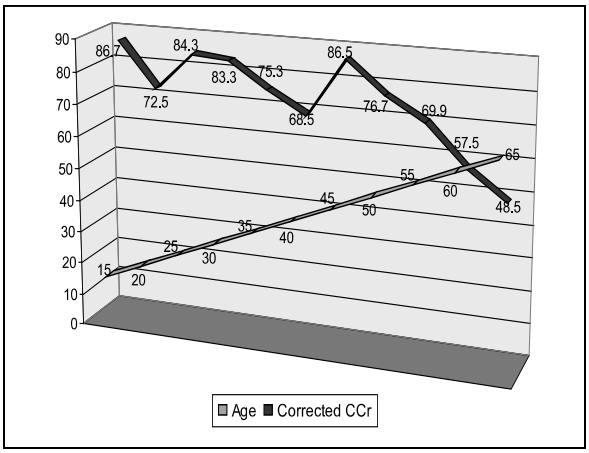
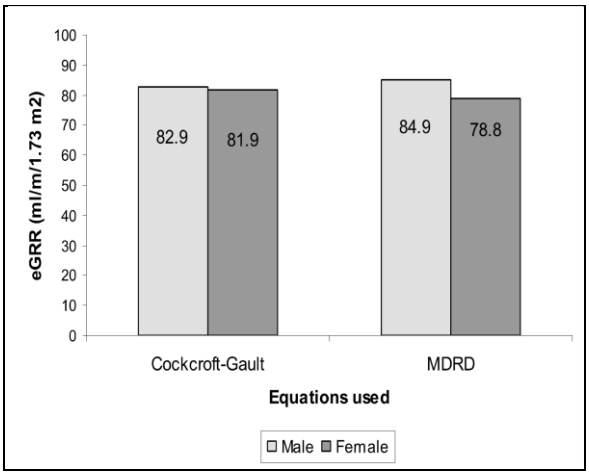


Fig. 3: Correlation between age and corrected Ccr Corrected Ccr (eGFR) between equations.

The mean corrected Ccr and mean eGFR by Cockcroft-Gault and MDRD equation respectively relative to sex. The corrected CCr does not vary widely between two equations (Fig. 4).

Fig. 4: Comparison of corrected Ccr between equations



Sex-wise level of serum creatinine:
Table II compares the level of serumcreatinine with respect to sex. The mean serum creatinine in male group was found to be siginificantly higher (1.13±0.58 mg/dl) compared to that of their female counterpart (0.94 ± 0.21 mg/dl) (p< 0.001).

Table II: Comparison of serum creatinine between male and female

Sex*	N	Serum creatinine (mg/dl) (Mean ± SD)	p-value
Male	467	1.13 ± 0.58	< 0.001
Female	798	0.94 ± 0.21	

***** Data were analysed using **Student's t-Test.**

Raised serum creatinine:
Fig. 5 demonstrates that 9.9% of the males had serum creatinine >1.4 mg/dl while 6.3% of females had serum creatinine >1.3 mg/dl.

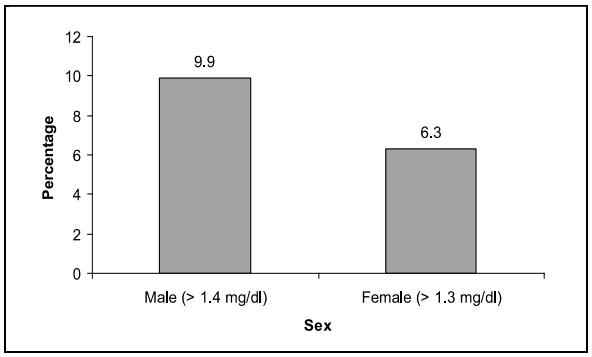


Fig. 5: Raised serum creatinine in male and female

CKD among participants with normal serum creatinine:
Out of 421 males and 748 females with normal serum creatinine, 51(12.1%) and 94(12.6%) respectively were detected as having CKD by prediction equation (Fig. 6 & 7).

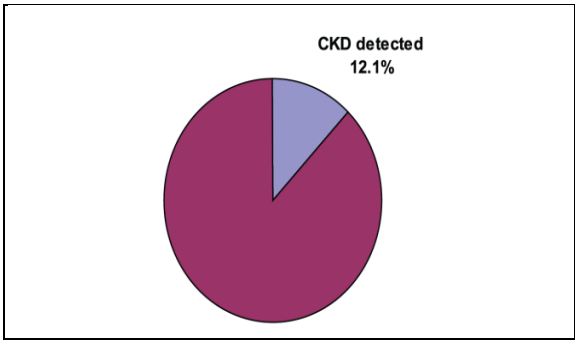


Fig. 6: Normal serum creatinine with CKD in male (n = 421)

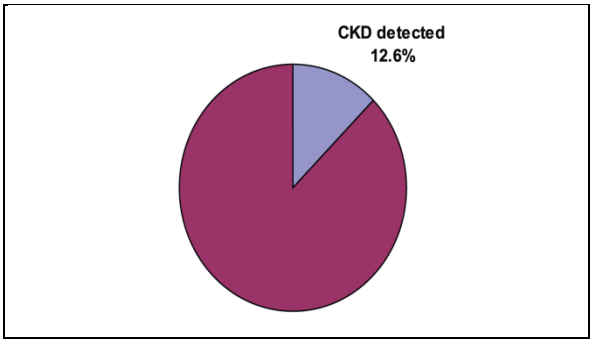


Fig. 7: Normal serum creatinine with CKD in female (n = 748)

Association of CKD (C-G) with sociodemographic characteristics:
Table III compares the sociodemogrphic features between CKD and normal population. The middle aged and elderly (age ≥ 40 yrs) were found to be significantly prone to develop CKD than the young and early middle aged group (< 40 yrs) (p < 0.001). However, The CKD population was not found to be associated with sex and occupation (p > 0.05).

Table III: Association of CKD (C-G) with sociodemographic characteristics

Sociodemographic characteristics	Group		χ^2	*p-values
	CKD (n = 226)	Normal (n = 1039)		
Age (yrs)				
≤40 (young & early middle aged)	75(33.2)*	806(77.6)	173	<0.001
>40 (middle aged & elderly)	151(66.8)	233(22.4)		
Sex				
Male	85(37.6)	382(36.8)		
Female	141(62.4)	657(63.2)	0.057	0.812
Occupation				
House-wives	134(59.3)	596(57.4)		
Farmers & others	92(40.7)	443(42.6)	0.283	0.595

* Data were analysed using **Chi-squared (χ^2) Test** and **df = 1** in each case**.**

Association of CKD (MDRD) with sociodemographic features:
Table IV presents association of CKD (MDRD) with sociodemographic variables. Middle aged and elderly, females and housewives were found to be more prone to be associated with CKD (p < 0.001, p < 0.05 and and p < 0.05 respectively).

Table IV: Association of CKD (MDRD) with sociodemographic features

Sociodemographic characteristics	Group		χ^2	*p-values
	CKD (n = 238)	Normal (n = 1027)		
Age (yrs)				
≤ 40 (young & early middle aged)	113(47.5)*	768(74.8)	68.12	<0.001
> 40 (middle aged & elderly)	125(52.5)	259(25.2)		
Sex				
Male	74(31.1)	393(38.3)	**4.27**	0.039
Female	164(68.9)	634(61.7)		
Occupation				
House-wives	155(65.1)	575(56.0)	6.61	0.010
Farmers & others	83(34.9)	452(44.0)		

* Data were analysed using **Chi-squared (χ^2) Test** and **df = 1** in each case**.**

Sociodemographic factors between CKD (C-G) and CKD (MDRD)

The prevalence of risk factors of CKD are almost identical whether CKD (C-G) or CKD (MDRD) equations are used for staging of CKD (p > 0.05) (Table V).

Table V: Sociodemographic factors between CKD (C-G) & CKD (MDRD)

Sociodemographic variables	Group		χ^2	*p-values
	CKD(C-G) (n = 226)	CKD(MDRD) (n = 238)		
Middle aged & elderly	66.8%	52.5%	3.49	0.061
Sex (female)	62.4%	68.9%	0.80	0.372
Occupation (house-wives)	59.3%	65.1%	0.53	0.466

*Data were analysed using **Chi-squared (χ^2) Test** and **df = 1** in each case**.**

Discussions:

The present study was conducted among adults in rural population of Bangladesh to find out the association of CKD with sociodemographic factors. The rural population differs from other common people of Bangladesh in terms of income, educational level and receiving health care facilities. Chronic illness in a family member invariably affects all the members within the family. Physical changes in the patients' financial strain of sustaining treatment and the fear of the future of the patient and the disruption of the family structure are the major causes of psychological stress[14].

In Iceland adults, the crude prevalence of stage 3 to 5 calculated by MDRD equation was 3.7% for males and 10.9% for females and prevalence of CKD was about 7% for males and 12.5% for females[15].

In AusDiab kidney study the prevalence of GFR < 60ml/min/1.73m^2 in case of male was 9.3% and in female 13.0% with the use of Cockcroft-Gault formula. Both the study revealed female preponderance of CKD when criteria 2 of NKF-K/DOQI definition are considered. But in the present study we did not find significant difference of CKD prevalence in male or female when C-G was used (p=0.812) but female prepondarence was found when MDRD formula used (p=0.039)[15].

Age is an important demographic factor. Both the equation use age as a factor which predict the GFR as well as CKD. Several population based study showed the correlation of age with CKD stage irrespective of sex. In AusDiab kidney study showed stages of CKD for 3 to 5 increases with age in both man and women (P<0.001)[16].

In Iceland study, prevalence of CKD significantly increased with increasing age in both sexes eg. in male age group 60-64 versus 65-69 was 5.2% versus 13.46% and in female was 11.7% versus 36%. In the present study the prevalence of CKD is significantly higher among the participants aged >40 years in either MDRD or Cockcroft-Gault formula was used (p< 0.001)[15].

The graphical presentation of corrected Ccr against the age showed in our study a gradual decrease of Ccr when corresponding age increases. Study showed at the age 15 years correct Ccr was 86.7 ml/min which ultimately dropped to 48.5 ml/min al the age of 65 years

suggesting that an inverse relationship exists between the two variables (r=-0.60, P<0.001). NHANES III US prevalence study revealed 11% of individual > 65 years without hypertension and diabetes had stage 3 or more CKD[17].

Previously only serum creatinine measurement was used largely for assessment of renal function. 9.9 % (46) of male in this study had serum creatinine >1.4 mg/dl and 6.3 %(50) female had serum creatinine >1.3 mg/dl. A total 7.6% of our study population had raised serum creatinine. Other study also showed similar type of result.

Conclusion:

Among individuals with CKD, being male or less educated corresponded to a lower likelihood of following the guidelines for preventing and managing CKD. Since a variety of demographic and socioeconomic factors are related to the prevention and management of CKD, individually tailored prevention activities must be developed and implemented.

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