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Risk factors of progressive chronic kidney disease: Asian study

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Abstract

Introduction: According to World Health Organization (WHO), associations between body mass index, percentage of body fat and health risks for Asians are different than do European population. Therefore, meaningful prospective study on body composition and risk factors in Asiansis needed.

Method: Present study focused Asian Chronic Kidney Disease (CKD) patients and contributing risk factors (uncontrolled diabetes, poor nutritional status, obesity and hypertriglyceridemia) for the progression of the disease. 120 non dialyzed CKD patients were enrolled in the study. Nutritional status was assessed by dietary protein and energy intake, serum albumin, lean tissue index, handgrip strength and body mass index. Post hoc Bonferroni Analysis, Independent t test, chi square and linear multiple regression were some of the statistical test done.

Result: Among all causative factors, diabetic nephropathy (n=52) was most common with more prevalence in males than females. Diabetes was highly prevalent (56.67 %) among CKD patients with mean HbA1c 7.7± 1.9%.80% of patients who had diabetes, had at least two family members (p= 0.004). 26.60% patients in the present study had hypoalbuminemia with mean albumin 3.8 gm/dl. Stage wise comparison showed significant difference (p= 0.039) in Lean tissue mass (LTM) between all stages.

Conclusion: Understanding risk factors may fill gap in the conservative disease management by integrating preventive and control strategies and thereby likely to prevent from major socio economic and public health consequences.

Keywords: Chronic kidney disease, risk factors, nutritional status, lean tissue mass, diabetes

Introduction

Chronic kidney disease (CKD) is a major public health problem worldwide. It affects the global burden of death causing premature morbidity and mortality which is due to the disease interaction with other non-communicable illness. The burden of chronic kidney disease is not restricted to its effect on demands for renal replacement therapy; the disease has other major effects on the overall population. High blood pressure, anemia, malnutrition, bone disease, neuropathy, dyslipidemia, left ventricular hypertrophy, metabolic acidosis and decreased overall functioning and wellbeing are few complications associated with CKD.As per Kidney Disease: Improving Global Outcomes (KDIGO), CKD is defined as abnormalities of kidney structure or function, present for >3 months,

with implications for health(Stevens and Levin, 2013).Worldwide projection showed that at the end of 2004, among 1,783,000 end stage renal disease (ESRD) patients, 77% were on dialysis, 23% had a functioning renal transplant (RT), and this number is increasing at a rate of 7% every year. In 1990, CKD ranked 27th in the causes of deaths, which increased to 18th in 2010.In Asian countries like India, with the projected figure of 57.2 million cases of diabetes in 2025 and with the expected increase in hypertension to double from 2000 to 2025(Kearney et al., 2005), CKD prevalence is likely to increase with serious socioeconomic and public health consequences. To reduce the prevalence of CKD and associated increased cardiovascular risk, careful monitoring of risk factors is critical. Family history, is an effective and promising way of identifying risk factors for early prevention of disease condition.

However, with established CKD, a factor associated with disease progression is of great concern. Risk factors such as poor nutritional status, uncontrolled diabetes, obesity and high triglycerides accelerate disease progression and reduce patient survival. Poor nutritional status significantly emerged as an important risk factor for the progression of CKD which is evident with low muscle mass, weak muscular strength, poor visceral protein stores and low body mass index (BMI). Obesity is another factor which is highly associated with CKD, due to its effect on increased intra-capillary perfusion pressure or an increase in the activity of rennin–angiotensin system (RAS).

Materials and methods

The present study was cross-sectional. 120 Chronic kidney disease (CKD) patients of stage 2, 3a, 3b and 4 from outpatient department of a private hospital, Delhi, India, were recruited after informed consent during the study period. Demographic profile, educational status, case and family history of diabetes were collected through interviews. Nutritional status was assessed by dietary protein and energy intake, serum albumin, lean tissue index, handgrip strength and body mass index. Weight status, waist hip ratio and triglycerides were also measured to associate with the risk of disease progression. Glomerular filtration rate was calculated by Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI), 2009 equation. Post hoc Bonferroni Analysis, Independent t test, chi square and linear multiple regression were some of the statistical test done.

Results

In the present study, the mean age of 120 patients was 54.61 ± 13.72 years with significant difference (p=0.003) in stage 2 and stage 4 (Post hoc Bonferroni Analysis). Majority of patients (65 %)in the study were either graduates or post graduates. Out of 120 patients, 98.34 % of patients had glomerular renal diseases and 1.66% had vascular renal disease. Among all causative factors, diabetic nephropathy (n=52) was most common with more prevalence in males than females. Diabetes was highly prevalent (56.67 %) among CKD patients with mean HbA1c 7.7± 1.9%.Chi square test was done to associate patient's disease with his/her family history. For diabetes, CVD and renal stones, significant association was observed between family history and presence of similar diseases in the patient. 80% of patients who had diabetes, had at least two family members (p= 0.004). 26.60% patients in the present study had hypoalbuminemia with mean albumin 3.8 gm/dl. Patients with albumin values less than4 gm/dl, were analyzed at all stages. It was observed as given in table1, that patients of stage 4 had more number of patients with albumin below 4gm/dl. The results were significant with p =0.029.

Table 1: Frequency of patients with low serum albumin, less protein and energy intake by stage of disease.

Variables	Total (n=120)		Stage								p value
			2		3a		3b		4		
	N	%	N	%	N	%	N	%	N	%	
Albumin <4 gm/day	67	61.5	13	68.4	7	33.3	22	64.7	25	71.4	**0.029***
Protein <0.6gm/day	29	24.2	5	23.8	5	19.2	9	25.7	10	26.3	0.921
Energy < 25kcal/day	78	65	10	47.6	13	50	27	77.1	28	73.7	0.031
*P value significant at <0.05											

When dietary data was analyzed, it emerged that more number of patients at higher stage of illness were having protein less than 0.6gm/kg/day with calories less than 25kcal/kg/day. This shows that there may be an association of protein and energy intake with the serum albumin in CKD patients.

Stage wise comparison showed significant difference (p= 0.039) in Lean tissue mass (LTM) between all stages. Similar results were obtained for Lean tissue index (LTI) (p=0.028). The prevalence of undernutrition in stage 4 patients as compared to initial stages was very high. In CKD, with low muscle mass, there was decline in muscular strength which was measured as handgrip strength (HGS). Patients at stage 4 had mean handgrip strength 19.45± 7.09 kg which was significantly (p <0.001) lower than patients of stage 2 with handgrip 25.7±8.53 kg. Independent t test was used to observe differences in BMI as per stages of the disease. Significant difference (p=0.029) in BMI was noted between stages. At later stage of disease, BMI of CKD patients was lower.

Mean usual body weight (73.34±14.89kg) and present body weight (72.62±15.2 kg) of the patients was significantly higher than mean ideal body weight (60.10±8.33kg) of the patients. On computing waist hip ratio (WHR), mean WHR for CKD patients was 0.99±0.09 cm. In the present study, highest WHR was noted in stage 2 patients and in patients with age more than 65 years. Triglycerides were also high in both male (159.67±75.73 mg/dl) and female (164.91±101.20 mg/dl) patients of the present study.

Discussion

Diabetes, is the leading causative factor of CKD globally. If uncontrolled, it may accelerate disease progression. Therefore, the recommendation of target hemoglobinA1c (HbA1c) for CKD is 7% (Foundation NK/KDOQI, 2012). There was an association of protein and energy intake with the serum albumin in CKD patients. Therefore, planning diet according to disease stage and as per dietary standard recommendations is important. Due to paucity of literature on body composition of non-dialyzed patients, comparison was done using dialysis patient's data. LTI values were similar to other studies, whereas FTI in present study group was higher. According to the WHO Expert Consultation, Asians generally have a higher percentage of body fat than Caucasians of the same age, sex, and BMI (Barba et al.,2004);Present and usual weight of CKD patients was on the higher side as compared to ideal body weight. Patients thus were overweight and obese and were at high risk of disease progression.WHR of patients in the present study was higher than the recommendation for healthy Asians (males: 0.89 and females:

0.81) (Snehalatha et al., 2003).WHR, according to literature is an independent risk factor for the development of decreased kidney function in a diverse community-based population (Elsayed et al., 2008).High triglycerides in CKD are not only risk factor for the progression of disease but also an outcome due to dysregulation of lipid metabolism in renal disease. Regular monitoring of CKD patients for risk factors should be planned for early management. Therapeutic lifestyle changes like increase in physical activity, dietary modifications and educational counseling are advised to maintain weight and serum albumin levels and to control diabetes and dyslipidemia (El Nahas et al., 2005).The utility of knowing risk factors associated with CKD is to strategize preventive and control measures early for impeding progression of chronic kidney disease.

Conflict of interest: None

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