Prevalence of chronic kidney disease in India - Where are we heading?

With increasing life expectancy and prevalence of life style diseases, US has seen a 30% increase in prevalence of chronic kidney disease (CKD) in the last decade.[1] Unfortunately, from India there is no longitudinal study and limited data on the prevalence of CKD.

In western countries, diabetes and hypertension account for over 2/3rd of the cases of CKD.[2] In India too, diabetes and hypertension today account for 40–60% cases of CKD.[3] As per recent Indian Council of Medical Research data, prevalence of diabetes in Indian adult population has risen to 7.1%, (varying from 5.8% in Jharkhand to 13.5% in Chandigarh) and in urban population (over the age of 40 years) the prevalence is as high as 28%.[4,5] Likewise the reported prevalence of hypertension in the adult population today is 17% (14.8% from rural and 21.4% from urban belt). A similar prevalence of 17.4% has been reported by Panesar *et al*. (in the age group of 20–59 years) even from slum-resettlement colony of Delhi.[6,7] With rising prevalence of these diseases in India, prevalence of CKD is expected to rise, and obviously this is the key target population to address.

A study published in this issue is from a rural belt of Karnataka. The population had a mean age of 39.88 ± 15.87 years with 3.82% prevalence of diabetes and 33.62% of hypertension. Authors found 6.3% prevalence of CKD stage 3; which is the highest reported till date by any Indian worker. It is disturbing to note, the high prevalence of hypertension in a rural setting where over 75% population had normal or low body mass index. In comparison to most other published studies from India [Table 1], the present study population is younger and even the prevalence of diabetes is low but surprisingly despite that prevalence of stage 3 CKD is reported to be higher (6.3%). It is disturbing to see the rising prevalence of hypertension and CKD in rural belts. Possibly with shifting population the difference between urban and rural areas is getting blurred. Undoubtedly, we need more Indian data to validate these findings.

Such data also raises a suspicion/possibility of an entity like 'CKD of unknown etiology-CKDu[8] in this area, like in certain areas of Sri Lanka and Andhra Pradesh. One is not sure of the underlying cause for CKDu, though suspected agents are cadmium, fluoride, arsenic, pesticides, etc. Renal histology in these cases shows chronic tubule-interstitial nephritis. One seriously needs to think about the existence of such entity in this belt.

Modi and Jha[9] reported an age-adjusted incidence of end-stage kidney disease (ESKD) as 229/million population. This is more than double of what has been believed (100/million) over a long time. Was the previous data not very exact or the prevalence has actually risen due to increased longevity and life style diseases, is the point for debate? This study however addressed only stage 5D.

As one can see from published Indian studies, population screened, and criteria used for CKD diagnosis are different

Table 1: Prevalence of CKD- Indian Data

Authors	*n*	Mean age (in years)	DM (%)	HTN (%)	Criteria of CKD	Stage and prevalence	Limitations
Agarwal *et al*.	4712 urban	42±13	10.7	22.13	Creatinine ≥1.8 mg/dl on two occasions 8-12 weeks apart	Stage 3 and above=0.785%	Creatinine cut off 1.8 mg/dl is high Proteinuria subset not included as CKD GFR not calculated
Varma *et al*.	3398 mixed	35.65±8.72	1.53	15	Almuminuria >30 mg/L or albumin/creatinine ratio >30 and/or GFR <60 ml/min by MDRD and CKD-EPI	Stage 1-3=13%	Albuminuria done only once
Singh *et al*.	5588 urban	45.2±15.2	18.8	43.1	Dip stick proteinuria GFR <60 ml/min	Stage 1-5=17.2%, 6% stage 3 and above	Voluntary approach Large number having DM and HTN (high-risk group), population not true representative
Singh *et al*.	5252 semi-urban	-	7.3	31.2	Dip stick proteinuria and GFR <60 ml/min	Stage 3 and above=4.2%	Proteinuria not repeated

DM: Diabetes mellitus, HTN: Hypertension, CKD: Chronic kidney disease, GFR: Glomerular filtration rate, MDRD: Modification of diet in renal disease, CKD-EPI: Chronic kidney disease epidemiology

by different workers. Agarwal *et al*.[10] studied south Delhi urban population and reported stage 3 prevalence of 0.785%. They used s creatinine cut off of over 1.8 mg/dl, done on two occasions (approximate 12 weeks apart) as the defining criteria. Study has limitations; (i) CKD diagnosis is not based on glomerular filtration rate (GFR) (ii) patients with proteinuria have not been included (iii) creatinine cut off is high; hence the reported figure is much lower than reported by other Indian studies.

Singh *et al*.[11] studied urban and semiurban population of Delhi. They had 31.2% hypertensives and 7.3% diabetics in the screened population. Based on dipstick proteinuria and GFR calculation by modification of diet in renal disease (MDRD) equation they found 4.2% population to be suffering from stage 3 CKD. However, they didn't repeat the proteinuria testing and study didn't address CKD stage 1 and 2.

We studied CKD prevalence in healthy government employees and their families. Inclusion criteria differed as we didn't include population with known diabetes, hypertension or renal disease. We tested for microalbumin uria to pick up early stages of CKD and calculated GFR by MDRD and CKD-EPI equations. Our population was relatively younger (35.64 ± 8.72 years) but diverse. 13–15% were diagnosed to have undiagnosed hypertension and 1.53% diabetes. We found prevalence of CKD as 13–15.04% with stage 1, 2 and 3 as 6.62%, 5.40% and 3.02% respectively.[12] The study findings are similar to National Health and Nutrition Examination Survey data suggesting that we are no different from the western world.

In a recently published Screening and Early Evaluation of Kidney Disease study[13] the mean age of the population was 45.22 ± 15.2 years, and any adult could participate in the study. They performed dipstick proteinuria, and GFR calculation was with CKD-EPI equation. They found the prevalence of CKD as 17.2% with stage 1, 2, 3, 4, 5 as 7%, 4.3%, 4.3%, 0.8% and 0.8% respectively. 43.1% of their cohort had hypertension, and 18.8% had diabetes; a figure that is not a true representation of Indian population.

What one gathers from published data from India is that we are no different from US population in the prevalence of CKD. Like the present study suggests that even the difference between the prevalence of CKD between rural and urban India is getting blurred. Today life expectancy of an Indian has increased from 41.38 years (in 1960) to 66 years (2013) [14] and prevalence of diabetes and hypertension is steadily rising. Therefore like in western world prevalence of CKD is expected to rise with the passage of time.

However when doing such epidemiological studies we need to formalise few issues (i) creatinine estimation should be standardized, which is not the case so far in India (ii) in absence of co-morbidities should an aging kidney be categorized as CKD and (iii) as suggested by KDIGO, till we have a correction factor for Indians, CKD-EPI equation should be used. A recent study from India compared GFR by Gate's method, plasma clearance method and eGFR by MDRD equation. They found Gate's method better than eGFR but there was poor correlation of radionucleide clearance method (akin to the gold standard) with Gate's method and MDRD equation.[15]

Though a minority of CKD patients reach ESKD (0.15–0.20%/year over next 10–25 years), this population is 10–100 times vulnerable for cardiovascular (CV) events. Therefore, it is important to identify them and have preventive strategy for CV events in place.[16] Should screening be universal or targeted to high-risk groups? (i.e. diabetics, hypertensives, CVD patients and those with family h/o renal disease etc.). It is a known fact that over 50% of diabetics and hypertensives are not aware that they are harboring the disease, therefore if we target the high risk population than only half the patients are likely to be missed; hence some researchers advocate universal screening.[17] But keeping the economics in mind even for developed countries universal screening is not cost-effective, therefore, it may be prudent to have targeted screening for CKD.[18] But whatever policy one follows, there is little doubt about that there is an urgent need to have appropriate social and political strategy for prevention of CKD.

P. P. Varma
Chief Consultant, Indian Armed Forces, New Delhi, India
Address for correspondence:
Dr. P. P. Varma,
Indian Armed Forces, New Delhi, India.
E-mail: varmapp123@rediffmail.com

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