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COMPARISON OF BIOCHEMICAL AND CLINICAL PROFILE BETWEEN GERIATRIC AND NON- GERIATRIC PATIENTS WITH CHRONIC KIDNEY DISEASE

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Abstract:

Objective: *To compare biochemical and clinical profile between geriatric and non- geriatric patients with chronic kidney disease.*

Material and methods: *This cross sectional study was conducted at Department of Urology, Sahiwal Medical College, Sahiwal from January 2018 to December 2018 over the period of 1 years. Total 100 patients of chronic kidney disease (50 elderly patients and 50 non-elderly patients) were selected and biochemical and clinical profile between both groups was compared.*

Results: *Total 100 patients of chronic kidney disease (50 geriatric and 50 non- geriatric) were selected. Mean age of geriatric patients was 62.74 ± 3.43 years and mean age of non-geriatric patients was 48.56 ± 5.88 years. Most common clinical sign symptom was general weakness 50 (100%) and 50 (100%) in both groups followed by pedal edema in 42 (84%) patients in geriatric patients in 32 (64%) non- geriatric patients, oliguria in 38 (76%) geriatric patients in 32 (64%) non- geriatric patients. Statistically significant difference was observed for levels of blood urea (p=0.0054), serum sodium (p=0.0231), total protein (p=0.0078), SGOT (serum glutamic-oxaloacetic transaminase) (p=0.0002), SGPT (serum glutamic pyruvic transaminase) (p=0.0089), Triglyceride (p=0.084), haemoglobin (p=0.0014) and MCV (p=0.033)*

Conclusion: *Results of present study showed that elderly chronic kidney disease patients are more likely to be develop hyponatremia, hypertriglyceridemia and anaemia, amongst mentioned abnormalities. Understanding the biochemical abnormalities beforehand helps in appropriate risk assessment as well as modifications in patient management.*

Key words: *Chronic kidney disease, lipid profile, geriatric, end-stage renal disease*

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INTRODUCTION:

The kidneys play a central role in fluid, electrolyte and acid base homeostasis in humans. In chronic kidney disease (CKD), irreversible damage results in an inability of the kidneys to perform its vital homeostatic, excretory and synthetic functions. CKD is the presence of kidney damage, manifested by abnormal albumin excretion or decreased kidney function that lasts longer than three months as quantified by measured or estimated glomerular filtration rate (eGFR).[1]

The glomerular filtration rate (GFR) is considered to be a representative parameter for evaluating the functional state of the kidney. Inulin clearance is the gold standard for GFR estimation. However, this method is not performed in clinical practice, because of technical complexity and limited availability.[2] Chronic Kidney Disease(CKD) is defined as per The kidney disease outcomes quality initiative ,2003, [K/DOQI] of the National Kidney Foundation [NFK] as either kidney damage or a decreased kidney glomerular filtration rate of less than 60ml/min/1.73m^2 for 3 or more months (chronic renal failure corresponds to CKD stages 3-5).Chronic kidney disease is a major public health problem with increasing incidence and prevalence associated with poor out come and high cost.[3] Increase in the prevalence of chronic kidney disease (CKD), progression to end-stage renal disease (ESRD) and the consequent financial burden of renal replacement therapy (RRT) has highlighted the importance of CKD and its risk factors.[4-5] High prevalence of CKD, and subsequent ESRD, in the elderly is attributable mainly to increasing prevalence of traditional risk factors for CKD such as diabetes, hypertension and CVD.[6]

The present study was planned with the objective of clinico-biochemical profiling of chronic kidney disease patients in geriatric population as well as drawing relevant comparison with their non-elderly counterparts.

MATERIAL AND METHODS:

This cross sectional study was conducted at Department of Urology, Sahiwal Medical College, Sahiwal from January 2018 to December 2018 over the period of 1 years. Total 100 patients of chronic kidney disease (50 elderly patients and 50 non-elderly patients) having features of uremia for ≥ 3 months, patients having elevated blood urea, serum creatinine and decreased creatinine clearance, ultrasound evidence of chronic renal failure, supportive laboratory evidence of CRF like anaemia, low specific gravity, changes in serum electrolytes etc. or supportive radiological evidence of renal osteodystrophy were included in this study.

Patients with ischemic heart disease, patients with any malignancy, patients on antimetabolites drugs, patients with liver disorders and patients denying consent were excluded from the study.

Study was approved by ethical committee and written informed consent was taken from every patient.

All the study participants were assessed for clinical symptoms like generalised weakness, pedal edema, oliguria, breathlessness, vomiting, anorexia, facial edema, haematuria, altered sensorium, flank pain, convulsions etc.; as well as clinical signs like polyuria, dysuria, pallor, blood pressure measurements, ascites, flaps, pleural effusion, skin and nail changes, pulmonary edema were also studied. The biochemical parameters assessed were serum Sodium, serum Potassium, serum Calcium, serum Creatinine, blood urea, serum bilirubin, serum Albumin-Globulin, serum SGOT, serum SGPT, serum Cholesterol and serum Uric Acid. eGFR was calculated using Cockcroft–Gault formula. Multiplication factor of 0.85 was used for females, as recommended.[7]
All the data was entered on pre-designed proforma along with demographic profile of the patients.

Data was analyzed by using SPSS version 18. Mean and SD was calculated for numerical data. Frequencies and percentages were calculated for categorical data. Chi-saqure test and student t test used to detect difference between two groups. Statistical significance was defined at $p<0.05$.

RESULTS:

Total 100 patients of chronic kidney disease (50 geriatric and 50 non- geriatric) were selected.
Mean age of geriatric patients was 62.74 ± 3.43 years and mean age of non-geriatric patients was 48.56 ± 5.88 years.
Most common clinical sign symptom was general weakness 50 (100%) and 50 (100%) in both groups followed by pedal edema in 42 (84%) patients in geriatric patients in 32 (64%) non- geriatric patients, oliguria in 38 (76%) geriatric patients in 32 (64%) non- geriatric patients, vomiting 33 (66%) and 21 (42%) respectively in geriatric and non- geriatric patients, pallor in 50 (100%) in geriatric group and 50 (100%) non- geriatric group, hypertension in 47 (94%) patients in geriatric group in 42 (84%) in non- geriatric group. All the parameters showed higher prevalence in geriatric group, but only few were found to have statistically significant difference [pedal edema

(p=0.023), vomiting (p=0.016), anorexia (p=0.001)]. (Table 1)

Upon calculation of GFR by Cockcroft–Gault formula, wide fluctuations were observed for GFR values. Forty two out of 50(84%) participants from geriatric group and 37 out of 50(74%) participants from non- geriatric group were observed to have GFR value less than 4.0.

Various biochemical and haematological parameters were assessed as part of the study. Obvious differences were noted in almost all the parameters between the two groups. Statistically significant difference was observed for levels of blood urea (p=0.0054), serum sodium (p=0.0231), total protein (p=0.0078), SGOT (serum glutamic-oxaloacetic transaminase) (p=0.0002), SGPT (serum glutamic pyruvic transaminase) (p=0.0089), Triglyceride (p=0.084), haemoglobin (p=0.0014) and MCV (p=0.033) (Table 2).

In view of the variable GFR levels amongst study participants, important variables were categorized according to GFR levels (GFR<4.0 and GFR>4.0). Further sub-group analysis of important biochemical and hematological parameters of the two groups by GFR categorization is detailed in.

Serum Potassium was significantly higher in patients with GFR<4.0 in both groups. Statistical significance was also noted for sub-group comparison of lipid parameters like triglyceride, total cholesterol, LDL and HDL amongst elderlies. Haemoglobin was observed to be on the lower side in sub-group with GFR less than 4.0, but statistically significant could not be established for sub-group analysis, but the difference between groups was highly significant (p-0.0014). (Table 3)

Table 1: Clinical Symptoms and signs amongst study participants.

Parameter	Geriatric group	%	Non- geriatric group	%	p-value
General weakness	50	100	50	100	1
Pedal edema	42	84	32	64	0.023
Oliguria	38	76	32	64	0.19
Breathlessness	21	42	12	24	0.056
Vomiting	33	66	21	42	0.016
Anorexia	39	78	22	44	0.001
Facial edema	11	22	9	18	0.617
Haematuria	5	10	4	8	0.727
Abdominal distension	8	16	9	18	0.79
Altered sensorium	9	18	10	20	0.799
Flank pain	2	4	3	6	0.646
Convulsion	5	10	1	2	0.092
Polyuria	2	4	0	0	0.222
Dysuria	2	4	1	2	0.558
Pallor	50	100	50	100	1
Hypertension	47	94	42	84	0.11
Ascites	21	42	20	40	0.839
Flaps	17	34	11	22	0.297
Pleural effusion	6	12	5	10	0.749
Skin /nails	14	28	16	32	0.668
Pulmonary edema	4	8	7	14	0.338

Table 2: Biochemical and hematological parameters amongst study participants

Parameter	Geriatric group		Non-Geriatric group		p-value
	Mean	SD	Mean	SD	
GFR (ml/Min)	3.094	1.62	3.416	1.59	0.3188
Blood urea (mg/dL)	194.52	48.49	168.24	43.68	0.0054
Sr creatinine (mg/dL)	16.34	5.29	15.69	4.3	0.5048
Sr sodium (mEq/L)	132.34	17.67	139.1	10.78	0.0231
Sr potassium (mEq/L)	5.09	0.833	5.27	0.73	0.2459
Total Protein (g/dL)	5.93	0.65	5.58	0.62	0.0078
Sr albumin (g/dL)	2.79	0.39	2.71	0.31	0.2327
Sr globulin (g/dL)	2.92	0.63	2.74	0.57	0.1336
Total bilirubin (mg/dL)	0.78	0.91	0.71	0.13	0.5926
SGOT (U/L)	32.78	10.13	41.06	11.27	0.0002
SGPT (U/L)	27.18	9.41	33.02	12.26	0.0089
Sr calcium (mg/dL)	7.36	0.89	7.62	0.88	0.1342
Sr uric Acid (mg/dL)	7.99	1.32	8.33	0.77	0.1276
Sr phosphorous (mg/dL)	4.93	0.95	4.91	1.03	0.9115
Triglyceride (mg/dL)	140.84	32.96	124.86	26.07	0.0084
Total cholesterol (mg/dL)	206.26	39.37	193.46	44.44	0.1307
HDL (mg/dL)	48.24	5.69	46.52	4.48	0.0964
LDL (mg/dL)	103.88	17.86	102.16	18.98	0.6419
RBC ($x10^6$) (cells/cmm)	3.28	0.86	3.48	0.73	0.1979
Hemoglobin (gm%/dL)	7.42	0.95	8.04	0.94	0.0014
MCV (fL/cell)	76.76	6.66	79.75	7.16	0.033
MCH (pg/cell)	28.96	2.3	29.71	2.64	0.1359
MCHC (gm/dL)	32.06	4.52	31.79	4.2	0.7528
Platelet count (cells/cmm)	292.52	67.43	335.52	51.32	0.0005

Table 3: Sub-group analysis of biochemical and hematological parameters by GFR categories.

Variable	Geriatric group				P value	Non-Geriatric group				P value
	GFR<4.0 (n=42)		GFR>4.0 (n=8)			GFR<4.0 (n=37)		GFR>4.0 (n=13)		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Serum potassium	5.25	0.76	4.25	0.7	**0.001**	5.46	0.51	4.74	1	**0.001**
Serum Calcium	7.22	0.84	8.06	0.85	**0.304**	7.84	0.91	7.84	0.91	**0.014**
Serum Urea	7.9	1.3	8.5	1.38	**0.710**	8.3	0.68	8.4	1.02	**0.2445**
Serum Phosphorus	4.95	0.94	4.8	1.04	**0.516**	4.85	0.88	5.07	1.42	**0.7228**
Total Protein	5.85	0.65	6.36	0.47	**0.170**	5.51	0.61	5.79	0.63	**0.041**
Triglyceride	135.8	31.84	166.87	27.34	**0.157**	121.75	23.17	133.69	32.4	**0.013**
Total Cholesterol	211.4	39.82	179.12	23.67	**0.044**	200.89	47.07	172.3	27.64	**0.032**
LDL	104.9	17.39	98.5	20.56	**0.028**	105.62	17.34	92.3	20.67	**0.3581**
HDL	48.59	5.14	46.37	8.17	**0.002**	47.62	4.38	43.38	3.17	**0.3168**
Haemoglobin	7.35	0.92	7.775	1.09	**0.537**	7.99	0.88	8.18	1.11	**0.2576**
RBC (x106)	3.19	0.83	3.75	0.92	**0.886**	3.47	0.74	3.51	0.72	**0.0935**

DISCUSSION:

Over the last couple of decades or so, CKD has been recognized as a major global public health problem. Until recently, despite repeated advocacy world-over, public health system did not recognize CKD as being a significant problem.8 And this was despite the fact that CKD management consumes a disproportionately large fraction of the available healthcare resources.[8] With the present study, chronic kidney disease patients coming to a government tertiary care facility were profiled, with focus on geriatric population.

The study age group of >60 years was emphasized upon, as maximum incidence of chronic kidney disease occurs in 6th decade of life. The gender ratio (4.5:1) showed overwhelming male preponderance. This is in line with the male preponderance observed by Rajapurkar et al, (2.33:1) and Modi et al, (1.43:1).[9-10]

Distribution of various clinical parameters including symptoms and signs were evaluated and compared between the two groups. The incidences of all the clinical findings were relatively higher amongst the elderly group with CKD, which is in line with the findings of a similar study by Prasad R et al,[11] The commonest clinical signs in the Prasad R study were general weakness in 100%, high blood pressure in 92% and pallor in 90% of patients, similar to this observations. GFR estimation revealed group 1 having 84% patients and group 2 having 74% patients with GFR less than 4.0ml/min/1.73m2. This is corroborative of one elaborate hospital based study by Singh AK et al.[12]

Several important biochemical parameters were also evaluated as part of the study. Serum electrolytes assessment is an important part of work up in CKD patients. The electrolyte imbalance in CKD has been classically described as hyponatremia (less than 135.0 mEq/L), hyperkalaemia (more than 5.0 mEq/L) and hypocalcaemia (less than 8.0 mg/dL).[13] The findings amongst group 1 participants in the study were much in line with the above description, as is the case with most of the previous similar studies.[11-15] Further, hyperkalemia prevalence was observed to increase as GFR fraction went down, a finding consistent with renal physiology. Dyslipidemia is a common occurrence in CKD cases. The analysis of lipid profile showed a pattern of increased total cholesterol, LDL cholesterol and serum triglycerides with decreased HDL cholesterol levels. This correlates well with finding of other similar studies, which mostly reported hypertriglyceridemia, followed by hypercholesterolemia as the most common lipid abnormalities in the non-dialysed CKD patients.[12,16,17] Elevated serum cholesterol level due to impaired activity of lipoprotein lipase and direct inhibitory effect of various uremic toxins on the enzymes involved in lipid metabolism represents the most important pathophysiologic mechanism underlying the development of dyslipidemia in renal failure.

Haemoglobin levels have been postulated to be inversely associated with cardiovascular risk in patients with CKD.[18] Geriatric Group participants had a mean haemoglobin of 7.42 gm% and group 2 had a mean of 8.04 gm%, the difference being significant. Similar study done by Islam MN et al, in Bangladesh showed the mean haemoglobin to be as low as 4.96 gm%.[19] On the other hand, in a large multicentre CREATE trial, the mean haemoglobin level amongst participants was reported to be 11.6±0.6 gm%.[20] This may be indicative of the relatively higher risk of cardiovascular events in CKD patients from this part of world, a hypothesis which needs further validation. Chronic renal failure patients are prone for hyperuricemia and chronic hyperuricemia also plays role in the causation of renal failure. Very high prevalence of hyperuricemia (95%) was observed in the present study in both the groups. A similar study done by Abderraman et al, reported the overall prevalence of hyperuricemia in chronic kidney disease to be 15.20%, while also reporting significantly positive correlation between the serum uric acid levels and stages and severity of CKD.[21]

CONCLUSION:

Results of present study showed that elderly chronic kidney disease patients are more likely to be develop hyponatremia, hypertriglyceridemia and anaemia, amongst mentioned abnormalities. Understanding the biochemical abnormalities beforehand helps in appropriate risk assessment as well as modifications in patient management.

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