Prevalence of Chronic Renal Diseases in the area of Urban part of Jaipur, Rajasthan

Authors
Kavita Arya¹, Dr Kush Manna², Dr Pankaj Kumar Meena³
¹ PG Student, Department of Biochemistry, SMS Medical College, Jaipur
² Demonstrator, Department of Biochemistry, MLN Medical College, Allahabad
³ Biochemist, Department of Biochemistry, NIMS Medical College, Jaipur

Abstract
Renal Diseases is common and horrible diseases now-a-days. Common in both in rural as well as in the urban part of India. In modern time also nobody bother and care about the primary symptoms unless and until it will be changed into chronic renal diseases. Many other conditions such as Diabetes Mellitus, Hypertension etc. may cause CKD if not treated properly. A total of 100 patients had investigated suffered from CDK along with same no. Of normal individuals. Both the genders were included in the study. The parameters of Chonic Renal diseases such as Uric Acid, Creatinine and Urea had perfomed through kit methods. All the parameters regarding to detected the CKD were significantly raised in the patients having complained of CKD than that of control group. Hence, this study has been a step forward to find relation of multiple metabolic factors with chronic renal failure and raises a fundamental issue of need of further research in this direction which can help in better understanding of this disease and in developing new therapeutic strategies in treatment of chronic renal failure patients

Keywords: CDK, Uric Acid, Creatinine, Urea.

Introduction
The kidneys are paired retroperitoneal organs normally situated one on each side of the vertebral column. The kidney excretes the waste products of metabolism, precisely regulates the body's concentration of water and salt, maintains the appropriate acid balance of plasma, and serves as an endocrine organ, secreting such hormones as erythropoietin, renin, and prostaglandins. The term “chronic renal failure” applies to the process of continuing significant irreversible reduction in nephron number and typically corresponds to CKD stages 3–5. The great majority of individuals classified as having CKD in the community over the age of 60 years is a reflection of physiologic age-related decrease in kidney function¹. Studies such as the National Health and Nutrition Examination Survey (NHANES), which provided data on an adult unselected population, estimated that 4.7% of US adults had CKD stage 3 or higher(defined as an estimated glomerular filtration rate (eGFR) of <60ml/min/1.73m²). Serum uric acid inversely correlates with decreasing renal function. Recent epidemiologic studies suggested that uric acid predicts the development of new-onset kidney disease and elevated levels of uric acid independently increase the risk for new-onset
kidney disease. CRF may be more likely a cause of hyperuricemia\(^{(2,3)}\). Serum creatinine concentration is widely used as an index of renal function so a higher serum creatinine and urea concentration is associated with a lower or reduced GFR\(^{(4)}\). Hence the study, investigated the prevalence of CKD patients.

### Aim & Objective
To investigate the prevalence of Chronic Kidney Disease by comparison study of serum creatinine, serum urea and serum uric acid level.

### Materials & Methods
A Hospital based cross-sectional study was planned, including 100 patients of chronic renal failure and 100 healthy persons having age between 30 to 70 years age coming to OPD/IPD Nephrology Department of SMS Hospital, Jaipur. The proposed study was conducted in the Department of Biochemistry of SMS Medical College and Hospital, Jaipur. A detailed history was taken with special emphasis on Age, Area, Socioeconomic status, Chief complaints, History of Present illness, Past History, Drug-History, Personal History, Family History from all study subjects.

### Laboratory Procedure
1. About 10 ml of blood samples were collected by venipuncture into labelled dry test tubes.
2. After collection blood samples were allowed to coagulate after which they were centrifuged at 2500 rpm for 15 minutes to obtain sera and analyzed on fully automated chemistry analyzer AU680 (Beckman Coulter).
3. For biochemical investigations, patients were required to come empty stomach after an overnight fast of at least 14 hrs. 10 ml of venous blood was drawn for the following tests

### Biochemical Parameters
1. **Estimation of Urea**\(^{(5)}\)

#### Method:
Enzymatic (UV) method

#### Reagent composition:
Reagent 1: Buffer Reagent
Reagent 2: Enzyme Reagent

Urea Standard: 40 mg/dl

#### Assay procedure

| Table 1: Assay Procedure of Urea |
|----------------------------------|
| **Sample** | **Standard** |
| Reagent | 1ml |
| Standard | 10µl |
| Sample | 10 µl |

Mix well and after 30 secs incubation read initial absorbance \(A_1\). Exactly after 60 seconds interval read absorbance \(A_2\) and measured at 320nm wavelength.

Determine the \(\Delta\) Absorbance.

\(\Delta\)Abs. = \(A_2 - A_1\)

#### Calculation

Urea Conc. (mg/dl) = \(\frac{\Delta\)Abs.of Sample}{\Delta\)Abs.of Standard} \times Conc. of Standard

2. **Estimation of Serum creatinine:**\(^{(6-9)}\)

#### Methodology
Modified Jaffe’s reaction

#### Reagent composition:
Reagent 1: Picric acid Reagent
Picric acid \(25.8\)mmol/L
Reagent 2: Sodium Hydroxide Reagent
Sodium Hydroxide \(95\)mmol/L
Creatinine Standard
Creatinine Standard \(2\)mg/dl(0.166mmol/L)

#### Assay procedure

| Table 2: Assay Procedure of Creatinine |
|--------------------------------------|
| **Pipette** | **Standard** | **Test** |
| Working Reagent | 1000µl | 1000µl |
| Standard | 100µl | - |
| Test | - | 100 µl |

Mix well and read initial absorbance \(A_1\)20 seconds after mixing and final absorbance \(A_2\)80 seconds after mixing and measured at 505nm.
Calculation:
\[ \Delta A = A_2 - A_1 \]
Creatinine (mg/dl)
\[ \Delta A = \frac{\Delta A_{\text{of Test}}}{\Delta A_{\text{of Standard}}} \times \text{Conc. of Standard} \]

3. Estimation of Uricacid:

Method:
Phosphotungstate methods

Reagent and Composition
Uric acid reagent (concentrations refer to reconstituted reagent). 4-aminoantipyrine 0.3Mm, HDCBS 2Mm, Uricase 150U/L, Peroxidases 5,000 U/L, buffer, PH 7.5±0.1. Non-reactive stabilizers and filters.
Measured at 510nm wavelength.

Calculations:-
\[ A = \text{Absorbance} \]
Uric acid (mg/dl)
\[ = \frac{A(\text{Unknown})}{A(\text{Std})} \times \text{Conc. of Standard} \]

Observations & Results
Table 3: Level of Serum Urea

|           | Control (Group 1) | Case (Group 2) | P-Value |
|-----------|-------------------|----------------|---------|
| Min       | 15                | 92             | 0.0000  |
| Max       | 38                | 195            |         |
| Mean      | 22.4              | 144.9          |         |
| SD        | 7.0               | 27.6           |         |

P<0.05 = Highly Significant

Figure 1: Level of Serum Urea

In the above table & Figure, it’s shown that the level of Serum Urea raised in the CKD patients i.e., 144.9mg/dl whereas the level of Serum Urea in control group is 22.4mg/dl.

Table-4 : Level of Serum Creatinine

|         | Control (Group 1) | Case (Group 2) | P-Value |
|---------|-------------------|----------------|---------|
| Min     | 0.4               | 2.49           | 0.0000  |
| Max     | 1.6               | 18.6           |         |
| Mean    | 1.1               | 9.9            |         |
| SD      | 0.4               | 3.3            |         |

P<0.001 = Highly Significant

Figure 2: Level of Serum Creatinine

In the above table & Figure, it’s shown that the level of Creatinine raised in the CKD patients i.e., 9.9mg/dl whereas the level of creatinine in control group is 1.1mg/dl.
Table 5: Level of Serum Uric Acid

|          | Control (Group 1) | Case (Group 2) | P-Value |
|----------|-------------------|----------------|---------|
| Min      | 2.27              | 8.1            | 0.0000  |
| Max      | 4.9               | 11.9           |         |
| Mean     | 3.4               | 9.9            |         |
| SD       | 0.8               | 1.2            |         |

P<0.001 = Highly Significant

Figure 3: Level of Serum Uric Acid

In the above table and figure, it’s cleared shown that the level of Serum Uric Acid is higher in CDK patients i.e., 9.9mg/dl than the control group i.e., 3.4mg/dl and p value is 0.

Table 6: Study of Age Distribution of Cases

|          | Control (Group 1) | Case (Group 2) | P-Value |
|----------|-------------------|----------------|---------|
| Min      | 36                | 30             |         |
| Max      | 68                | 65             |         |
| MEAN     | 51.3              | 44.5           | 0.0174  |
| SD       | 9.9               | 11.6           |         |

Figure 4: Study of Age Distribution of Cases

In the above table and figure, it’s detected that mean aged group for CKD patients and control group are 44.5 years and 51.3 years respectively and p value is 0.017.

Table 7: Study of Gender distribution

| Sex      | Control (Group 1) | Case (Group 2) | Control(%) | Case(%) |
|----------|-------------------|----------------|------------|---------|
| Female   | 8                 | 9              | 26.7       | 30.0    |
| Male     | 22                | 21             | 73.3       | 70.0    |
| Total    | 30                | 30             | 100.0      | 100.0   |
In the table as well in the figure it’s shown that males are more prominent as far as CDK is concerned. 70% males are suffered from CKD but the percentage of females are low i.e., 30%.

Discussion & Conclusion
The mean level and standard deviation of creatinine was found to be higher in group 2 (case group) (9.9±3.3) as compared to group 1 (control group) (1.1±0.4) and it is highly significant (P value-0.0000). The mean level and standard deviation of serum uric acid was found to be higher in group 2 (9.9 ±1.2) as compared to group 1 (3.4±0.4) and it is highly significant (P value-0.0000). The mean level and standard deviation of TG was found to be higher in case group (194.5±32.8) as compared to control group (101.6±39.6) And it is highly significant (P value-0.0000). 70% patients were males and 30% were females suffered from CKD. Hence, the present study suggested that the males patients are more than that of the females patients and Life style should be changed for all individuals so that percentage of CKD patients would decrease by taking healthy and balance food, avoid smoking, avoid alcohol intake, etc. Also, Government must take appropriate step to control the Chronic Kidney Diseases.

References
1. Muntner P. Longitudinal measurements of renal function. Semin Nephrol. 2009;29 (6):650-657.
2. Lamb, E.J., Tomson, C.R., Roderick, P.J. Clinical Sciences Reviews Committee of the Association for 18. Clinical Biochemistry. Estimating kidney function in adults using formulae. Ann Clin Biochem. 2005;42:321-45.
3. Rudolf, P.O. Christian T Georg, G. Maarten, K Rainer,B and Renate, Klauser-Braun. Elevated Uric Acid Increases the Risk for Kidney Disease. J.A.S.N2008;19:2251-2253.
4. Ul Amin N, Raja T. M, Javaid A, Mudassar Z. and Asad, M.R. A prospective study evaluating urea and creatinine levels in chronic renal failure pre and post dialysis; Journal of cardiovascular disease, Vol.2 No.2, 2014;2330-4596.
5. Teitz. N.W; Fundamentals of clinical chemistry, Philadelphia, W.B. Saunders & Co, Philadelphia, PA, P991(1976), Talke H, Schubert GE,Klin WCHERS, (1965);43:174.
6. Bowers, L.D.Clin Chem.1980;26:551.
7. Bartel,H.Clin.Chem.Acta1972;37:193.
8. Slot, C .Scand. J. Clin Lab.Invest1965; 17:381.
9. Young D,S.Clin.Chem.1975;21:266D.
10. Folin,D,Dennis,W,J.Biol.Chem.1913;13:469.
11. Caraway,W.T.Clin.Chem.1963;4:239.
12. Morin,L,G,J.Clin.PATH.1973;60:691.
13. Morin,L,G,Clin.Che.1974;20:51.
14. Brochner Mortensen, K, Medicine 1940;19:161.
15. Klackar,H.M,J.Biol.Chem.1947;167:429.
16. Praetorious,E,Poulson,H,Scand.J.Clin.invest1953;5:273.
17. Henry,R,J, Clinical Chemistry: Principles and Technics. 2nd Ed, Hagerstown (MD), Harper & Row. pp1974;531&541.
18. Young,D,S,et al.Clin.Chem.1975;21:1D.
About Authors

Kavita Arya, PG Student, Department of Biochemistry, SMS Medical College, Jaipur (Rajasthan), Email: aryakavita06@gmail.com
Mo. No.: 9529177391

Dr Kush Manna, Demonstrator, Department of Biochemistry, MLN Medical College, Allahabad (U.P.), Email: kmanna8@gmail.com
Mo. No.: 9340585988

Dr Pankaj Kumar Meena
Biochemist, Department of Biochemistry, NIMS Medical College & Hospital, Jaipur (Rajasthan)
Email: dr.pankajmeena1989@gmail.com
Mo. No.: 9772909898