



Original Research Article

## Evaluation of Reference Interval of Serum Creatinine in Rural Area of Konkan Region from Maharashtra State

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### ABSTRACT

**Aim:** To estimate the reference intervals of serum creatinine from rural area of Konkan region of Maharashtra state.

**Study Design:** Retrospective study.

**Methods:** Serum creatinine was measured by Jaffe's Method on Cobas C<sub>111</sub> (Roche) Fully automated chemistry analyzer using Erba Diagnostics Mannheim GmbH kit manufactured by Transasia Bio-medicals Ltd.

**Results:** Results of Total 1008 were included in the present study. The serum creatinine levels in males were  $0.81 \pm 0.23$  mgs /dl and in females were  $0.60 \pm 0.21$  mgs /dl. The statistical analysis was done by using Student's *t*-test.

**Conclusion:** In the present study the much lower level of serum creatinine in both males and females were observed. This may be due to low muscle mass or weight. To study exact biochemical mechanism of such lower levels of serum creatinine in rural area of Konkan region of Maharashtra state, further investigations are needed.

**Key words:** Reference interval, Serum creatinine, Konkan

### INTRODUCTION

Reference interval means the normal range of particular parameter obtained from reference population. The reference interval of particular parameter in any laboratory depends on the reagent used from the particular manufacture company, specific methodology and the instrument used. It also varies with age, gender, region, dietary habits and physical activities of an individual. The reference interval is used to compare with normal individuals and evaluate patient's results. The diagnosis,

monitoring the disease process and prognosis of disease is dependent on the patient's laboratory results.

Creatinine is anhydrous of creatine. It is formed from three amino acids such as arginine, glycine and methionine by spontaneous cyclisation of creatine or creatine phosphate. Creatinine is excreted in urine. Estimation of serum creatinine is used as a diagnostic parameter to assess kidney function. Serum creatinine concentration is not influenced by endogenous and exogenous factors. (1-3)

According to the International Federation of Clinical Chemistry (IFCC) it is necessary for every laboratory to establish their own reference interval. However, in India most of the laboratories follow reference intervals established in the western population. (4-6)

Many times the source of the reference intervals have been taken from text books, Western literature or population based study from different countries. It varies from country to country and also region to region within the same country. So far we came across very little studies on Indian reference interval hence it is necessary to establish the reference values in our population.

Therefore the present study is carried out to estimate the reference intervals of serum creatinine from rural area of Konkan region of Maharashtra state and to evaluate and compare these results with previously published studies.

## **MATERIALS & METHODS**

The present study was conducted in the Department of Biochemistry, B. K. L. Walawalkar Rural Medical College and Hospital, Sawarde.

We have reviewed retrospectively records of healthy individuals from rural area of Konkan region of Maharashtra state who had undergone health check at B. K. L. Walawalkar Rural Medical College and Hospital, Sawarde. All these subjects were considered healthy on the basis of physical and biochemical examinations.

The subjects attending OPD in B. K. L. Walawalkar Hospital for routine health check up were included in the study. It is retrospective observational study. The present study includes normal healthy controls having age group 20 to 60 years from both genders.

Total 1008 (450 males and 558 females) were included in the present study. The patients suffering from diabetes mellitus,

hypertension, Cardiovascular diseases, Liver diseases, Tuberculosis and pregnant women were excluded from the present study.

The random blood samples were collected in plain bulb without any anticoagulant. After clotting at room temperature, the serum was separated from the clot by centrifugation at 3000 rpm for 10 minutes. The clear supernatant (Serum) was immediately transferred in another test tube and used for serum creatinine estimation. Serum creatinine was measured by Jaffe's Method on Cobas C<sub>111</sub> (Roche) Fully automated chemistry analyzer using Erba Diagnostics Mannheim GmbH kit manufactured by Transasia Bio-medicals Ltd. The statistical analysis was done with the Excel 2007 software for the determination of the median and the results were compared between males and females using the Student's *t*-test.

## **RESULT & DISCUSSION**

Tester F. Ashavaid and coworkers conducted study of 4466 subjects to establish reference interval in the Hinduja National Hospital & Medical Research Centre, Mumbai. According to this study reference interval of serum creatinine in males was 0.7 to 1.30 mg/dl and in females was 0.6 to 1.0 mg/dl. (6)

Mascha Vermaand and coworkers conducted study of 1121 subjects to establish reference interval at SRL Ranbaxy Clinical Reference Laboratory, Mumbai. According to this study the reference ranges were 0.7-1.3 and 0.4-1.0 mg/dl for males and females respectively. (7)

Sundaram M. and others conducted a study of 213 subjects on healthy individuals attending a HIV referral center in Chennai. According to this study, reference interval for Serum creatinine in males was 0.9 to 1.3 mg/dl and in females was 0.7 to 1.0 mg/dl. (8)

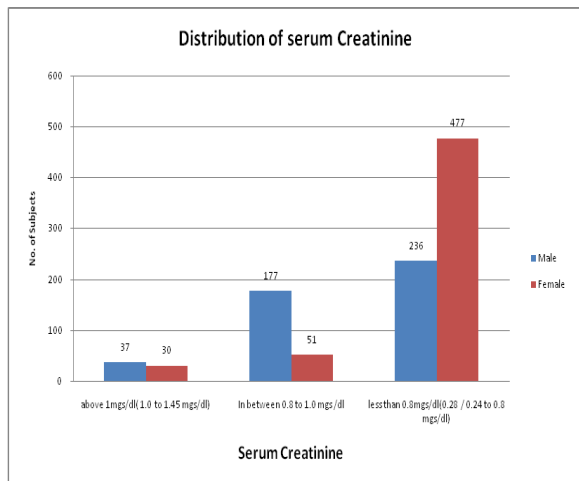
In the present study total 1008 (450 males and 558 females) samples were estimated for serum creatinine. The serum creatinine levels in males were  $0.81 \pm 0.23$  mgs /dl with maximum values was 1.45 mgs / dl and minimum of 0.28 mgs/dl observed. The serum creatinine levels in females was  $0.60 \pm 0.21$  mgs /dl with maximum values was 1.4 mgs / dl and minimum of 0.24 mgs/dl observed. The mean serum creatinine was significantly higher in males as compared to female (Table No. 1). Our results are comparable with previous workers.

Table No. 1: Serum creatinine levels in male and female.

Serum Creatinine in mg /dl		
Gender	Male (N = 450 )	Female (N = 558)
Mean $\pm$ SD	$0.81 \pm 0.23$	$0.60 \pm 0.21$
Maximum	1.45	1.4
Minimum	0.28	0.24
Statistically Significant Result ( P < 0.05 )		

Table No.2: Distribution of serum creatinine levels in male and female.

Serum Creatinine in Mgs/dl	Male (N= 450)	Female (N=558)
above 1mgs/dl ( 1.0 to 1.45 mgs/dl)	37 ( 8.22%)	30 (5.37%)
In between 0.8 to 1.0 mgs /dl	177 (39.33%)	51 (9.14%)
less than 0.8mgs/dl (0.28 / 0.24 to 0.8 mgs/dl)	236 (52.44%)	477 ( 85.48%)



Graph No. 1: Distribution of serum creatinine levels in male and female.

In the present study it was observed that out of 450 males, only 37 males ( 8.22%) have serum creatinine above 1mgs/dl, 236 males(52.44%) have less than 0.8mgs/dl which lies in between 0.28 to 0.8 mgs/dl and 177 (39.33%) are in between 0.8 to 1.0mgs /dl. In the present study it was observed that out of 558 females, Only 30 females (5.37%) have serum creatinine above 1.0 mgs/dl and 477 females ( 85.48%) have less than 0.8mgs/dl, which lies in the range of 0.24 to 0.8 mgs/dl and 51 females lies in between 0.8 to 1.0 mgs/dl (Table No.2 and Graph No.1).

As compared to western literature such as Harper <sup>(9)</sup> as 0.6 to 1.5 mgs /dl and also Indian literature from different regions such as U Satyanarayana <sup>(1)</sup> as 0.6 to 1.4 mg/dl, MN Chatterjea <sup>(2)</sup> as 1 to 2 mg/dl , DM Vasudevan <sup>(3)</sup> as 0.7 to 1.4 mgs/dl.

## CONCLUSION

In the present study the much lower level of serum creatinine in both males (from 0.28mgs /dl) and females (from 0.24mgs /dl) were observed. The clinical conditions associated with low serum creatinine level are not known. This may be due to low muscle mass or weight. In this region the average body weight of males lies in between 45 to 55 Kgs and of females lies in between 35 to 45 Kgs. As the values of creatinine depends on muscle mass of an individuals. To study exact biochemical mechanism of such lower levels of serum creatinine in rural area of Konkan region of Maharashtra state, further investigations are needed.

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