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VARIATION OF SERUM CYSTATIN C VALUE WITH AGE

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ABSTRACT

Cystatin C is a cationic cysteine protease inhibitor. Older age, male gender, greater weight, greater height, current cigarette smoking, and higher serum C-reactive protein levels were independently related with increased serum cystatin C levels after adjusting for creatinine clearance. Renal function has been shown to decline with increasing age, with kidney size and volume decreasing after the fourth decade. Keeping these points in mind, the present study was conducted in the Department of Biochemistry, MMIMSR, Mullana, Ambala, with the aim to estimate and compare the levels of serum cystatin C in healthy individuals of either sex in the age range of 17 years and above. On comparing serum cystatin C levels in different age groups, it was observed that the serum cystatin C levels increases with age. This change in serum cystatin C value can be due to the age related decrease in the renal function. Hence, it is concluded that while estimating the serum cystatin C levels age should be taken into consideration.

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INTRODUCTION

Cystatin C is a cysteine protease inhibitor which is ubiquitously expressed at moderate levels and encoded by the CST3 gene. It is filtered at the glomerulus and totally reabsorbed and metabolized by tubular cells. The monomeric form of cystatin C is an important extra- and transcellular inhibitor and present in all human body fluids. The family of human cystatin comprises of 11 identified proteins. The cystatin A and B are mainly intracellular proteins which constitutes family 1 cystatins, whereas the family 2 Cystatins is formed by cystatin C, D, E, F, S, SA and SN are mainly extracellular or transcellular proteins. The family 3 Cystatins contains three cystatin domains. They are mainly intravascular proteins, involved in the coagulation process and in the production of vasoactive peptides[1]. Depending upon the analytical method used, the concentration of serum cystatin C in healthy adult individuals ranges between 0.8-1.2 mg/L [2]. Cystatin C, a reliable marker of renal function, is used for the estimation of glomerular filtration rate. Cystatin C is not only associated with renal disease [3], but also related to diseases like metabolic syndrome [4], diabetes mellitus [5] and thyroid disorders [6]. Renal function has been shown to decrease with increasing age, with kidney size and volume decreasing after the fourth decade [7]. Older age, male gender, greater weight, greater height, current cigarette smoking, and higher serum C-reactive protein levels were associated with higher serum cystatin C levels after adjusting for creatinine clearance [8]. Keeping these points in mind, the present study was conducted with the aim to estimate and compare the levels of serum cystatin C in apparently healthy subjects of different age groups of either sex.

MATERIALS AND METHODS

The present study was done in the Department of Biochemistry, M.M Institute of Medical Sciences and Research, Mullana, Ambala, in which the levels of serum cystatin C were estimated. 100 healthy individuals in the age range of 17 years and above of either sex were selected for the study. They were further divided equally into two age groups i.e. 17-49 years and 50 years and above. Serum obtained from 3 ml of blood drawn from ante-cubital vein under aseptic conditions was taken. Informed consent was taken from the participants included in the study. The estimation serum Cystatin C was done by Enzyme Linked Immunosorbent Assay (ELISA), described by Pergande M [9].

RESULT

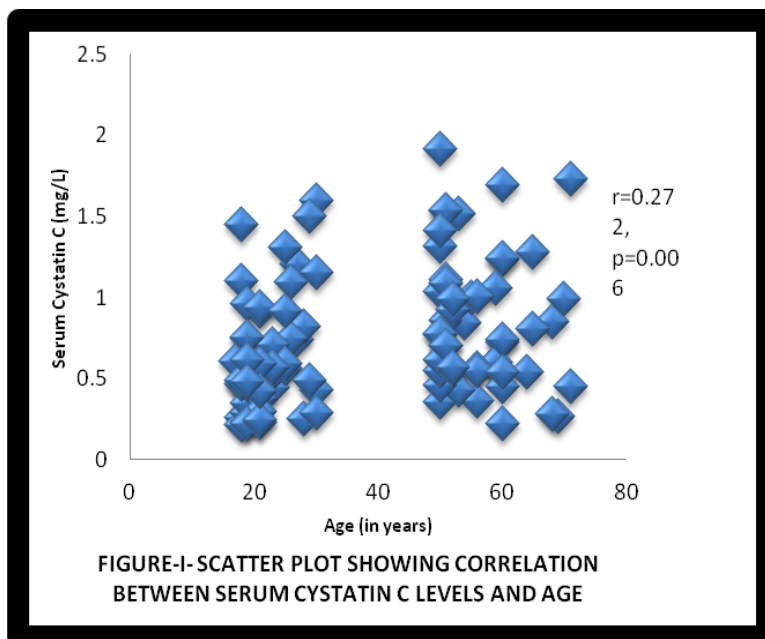
Table-1- Gender wise Comparison of Serum Cystatin C Levels in Subjects of Different Age Groups.

Age Group	Category According to gender	N	Mean Serum Cystatin C (mg/L)	Standard Deviation	Standard Error of Mean	p-value
17-49 years	Males	27	0.643	0.070	0.365	0.961
	Females	23	0.644	0.073	0.428	
50 years and above	Males	34	0.864	0.073	0.078	0.935
	Females	16	0.862	0.099	0.398	

*p-value < 0.05, significant, **p-value < 0.01, very significant, ***p-value < 0.001, highly significant.

Gender wise comparison of serum cystatin C levels in both the age groups was done. It was observed that serum cystatin C level does not differ in males and females in either age group. The serum cystatin C levels in males were 0.643 ± 0.070 mg/L and in females, the levels were 0.644 ± 0.073 mg/L in 17-49 years age group (p-value=0.961, statistically insignificant). Similar results were found on comparing the serum cystatin C levels in 50 years and above age group. The serum cystatin C level in males was 0.864 ± 0.073 mg/L while in females it was 0.862 ± 0.099 mg/L in 50 years and above age group (p=0.935, statistically insignificant).

On comparison of serum cystatin C level amongst males in both the age groups, it was found that the serum cystatin C level was 0.864 ± 0.073 mg/L in 50 years and above age group which is higher than the value seen in males (0.643 ± 0.070 mg/L) in 17-49 years age group, with p-value < 0.0001 (highly significant). Similarly, on comparing serum cystatin C level amongst females of both the age groups, the serum cystatin C level was 0.862 ± 0.099 mg/L in 50 years and above age group which is higher than the females in 17-49 years age group (0.644 ± 0.073 mg/L), with p-value (<0.0001) being highly significant. Serum cystatin C levels were also positively correlated with age ($r=0.272$, p-value < 0.05) (figure-1).



DISCUSSION

It has been observed that serum cystatin C does not differ in males and females in both the age groups. Similar findings were observed by other researchers in their studies [7,10,11]. In contrast, Pergande and Jung found that women had significantly lower cystatin C concentrations than age-matched men. However, their sample size was smaller (33 men and 33 women) [9]. The serum cystatin C levels were much higher ($p < 0.0001$) in both males and females in 50 years and above age group in comparison to the subjects of either sex in 17-49 years age group. Similar findings were reported by Norlund et al, which showed that there was no statistical difference in cystatin C values in 19 and 49 years of age but the levels rising significantly after 49 years of age [11]. Other researchers also reported the similar findings [7,12,13]. These results show that there is considerable worsening of kidney function with age, even among healthy persons. This change in renal function with age can be due to microvascular disease and collective exposure of risk factors at subclinical levels without crossing the threshold limit of clinical disease. In addition to risk factors, there are natural processes that include ageing. Another possibility is that age-related decline in renal function can be due to decrease in cellular function over time. The progressive loss of nephron units with age, further leads to increase stress on remaining nephrons, thus accelerates the decline. It has also been observed that lower energy impacts glomerular filtration rate, which may affect renal function in older adults. And lastly, decrement in biochemical investigation in ageing kidney cells, like fewer mitochondria, decrease concentration of enzymes, decrease ATPase activity, lower tubular transport, decreased sodium transport and oxygen consumption [12].

CONCLUSION

Cystatin C, a renal biomarker, increases with increase in age. This increase can be due to decline in the renal function with age. The bottom line of this research article is while estimating cystatin C levels, age should be taken into consideration.

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Competing Interests

This work was a part of the MD (Biochemistry Thesis) of Dr. Pallavi Mahajan at Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala. The authors declare no conflict of interest.

REFERENCES

1. Abrahamson M, Alvarez FM, Nathanson CM. Cystatins. *Biochem Soc Symp.* 2003; 70: 179-99.
2. Bashir R, Imtiaz S, Yasir M, Raza H, Shah SMA. Effect of body mass index on serum cystatin C level in healthy subjects. *Pak J Med Health Sci.* 2010; 4(4): 392-96.
3. Domingueti CP, Fóscolo RB, Simões e Silva AC, Dusse LMS, Reis JS, Carvalho MG. Evaluation of creatinine-based and cystatin C-based equations for estimation of glomerular filtration rate in type 1 diabetic patients. *Arch Endocrinol Metab.* 2016; 60(2):108-16.
4. Al Wakeel JS, Memon NA, Chaudhary AR, Mitwali AH, Isnani A, et al. Normal reference level of serum cystatin C in Saudi adults. *Saudi J Kidney Dis Transpl.* 2008; 19(3): 361-70.
5. Pucci L, Triscornia S, Lucchesi D, Fotino C, Pellegrini G, Pardini E, et al. Cystatin C and estimates of renal function: searching for a better measure of kidney function in diabetic patients. *Clin Chem.* 2007; 53: 480-88.
6. Krishna D, Rahul MH, Suma MN, Vishwanath P, Devaki RN, Sudhir. Role of cystatin C in assessing the cardiovascular risk among overweight and obese individuals. *Int J Health Allied Sci.* 2012; 1: 16-19.
7. Finney H, Newman DJ, Price CP. Adult reference ranges for serum cystatin C, creatinine and predicted creatinine clearance. *Ann Clin Biochem.* 2000; 37: 49-59.
8. Knight EL, Verhave JC, Spiegelman D, Hillege HL, Zeeuw DD, Curhan GC, et al. Factors influencing serum cystatin C levels other than renal function and impact on renal function measurement. *Kidney Int.* 2004; 65: 1416-21.
9. Pergande M, Jung K. Sandwich enzyme immunoassay of cystatin C in serum with commercially available antibodies. *Clin Chem.* 1993; 39: 1885-90.
10. Shlipak MG, Sarnak MJ, Katz R, Fried L. Cystatin C and the risk of death and cardiovascular events among the elderly. *N Engl J Med.* 2005; 352(20): 2049-60.
11. Norlund L, Fex G, Lanke J, Von SH, Nilsson JE, Leksell H, et al. Reference intervals for the glomerular filtration rate and cell-proliferation markers: serum cystatin C and serum β_2 -microglobulin/cystatin C ratio. *Scand J Clin Lab Invest.* 1997; 57: 463-70.
12. Odden MC, Tager IB, Gansevoort RT, Bakker SJL, Katz R, Fried LF, et al. Age and cystatin C in healthy adults: a Collaborative study. *Nephrol Dial Transplant.* 2010; 25: 463-69.
13. Galteau MM, Guyon M, Gueguen R, Siest G. Determination of Serum Cystatin C: biological variation and reference values. *Clin Chem Lab Med.* 2001; 39: 850-57.



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