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Cystatin C: Significance in Cardiovascular Disease among Indian population

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Objectives: Cystatin C is a protease inhibitor proposed as a replacement for serum creatinine for the assessment of renal function, particularly to detect small reductions in glomerular filtration rate. Patients with kidney disease are far more likely to die from cardio vascular disease (CVD), than to develop kidney failure. In this study, we propose a novel model to predict serum cystatin C level to access cardiovascular risks in patients with chronic kidney disease (CKD) through other parameters of CKD.

Methods: Blood samples from patients with CKD, CVD and both CKD with CVD, along with the normal healthy controls were collected. Lipid profile, urea, creatinine, hs-CRP, physiological parameters and cystatin C were analysed.

Results: Diabetics proportion were significantly higher among diseased persons as compared to control subjects ($p=0.0001$). Mean values of total cholesterol, triglyceride, VLDL, urea, creatinine and cystatin C among CKD group as well as in CVD group of patients were significantly higher ($p<0.05$) as compared to healthy controls. In CKD patients with CVD, the mean values of potassium, glucose, urea, creatinine, cystatin C and total leucocyte count were also significantly higher ($p<0.05$) as compared to healthy controls. A new formula was generated for calculating serum cystatin C level by extrapolating other parameters of CKD for risk assessment of CVD.

Conclusions: The study demonstrated a novel predictive model for assessment of serum cystatin C level which is an endogenous risk marker in the patients of CVD with CKD.

The figure indicating the effect of independent variables like age, potassium, albumin urea, creatinine, hemoglobin, constant on dependent variable, i.e. cystatin C. There was significant effect of age (p=0.008), potassium (p=0.001), albumin (p=0.01), urea (p=0.001), creatinine (p=0.0001), hemoglobin (p=0.016), constant (p=0.022) on Cystatin level, after controlling for other independent variables

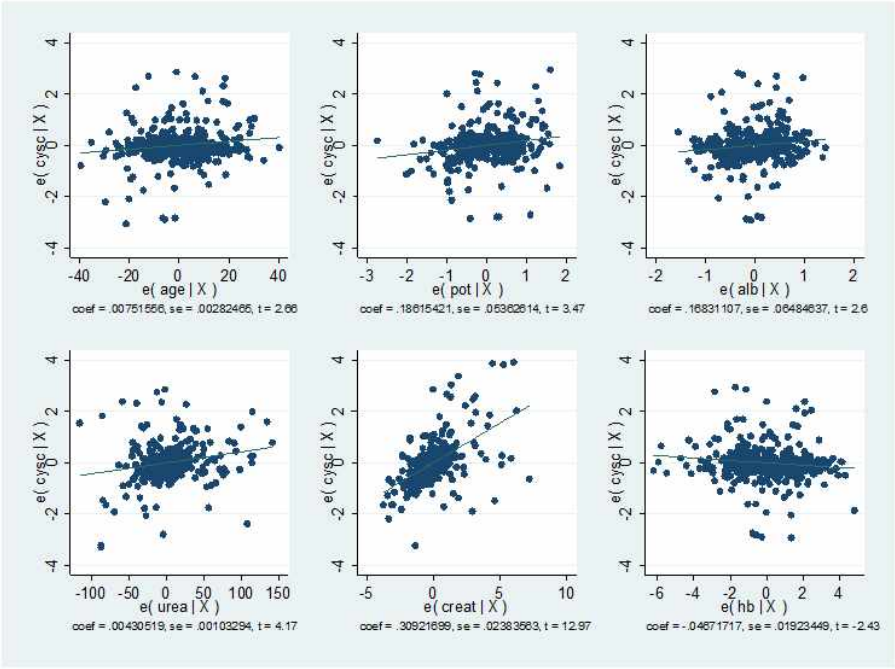

Figure: The figure indicating the effect of independent variables like age, potassium, albumin urea, creatinine, hemoglobin, constant on dependent variable, i.e. cystatin C. There was significant effect of age (p=0.008), potassium (p=0.001), albumin (p=0.01), urea (p=0.001), creatinine (p=0.0001), hemoglobin (p=0.016), constant (p=0.022) on Cystatin level, after controlling for other independent variables.

Mean Level (95% CI) of Biochemical Profile among four groups

Table: Mean Level (95% CI) of Biochemical Profile among four groups

Variable	CKD (n=71)	CVD (n=127)	Both (n=37)	Control (n=162)	F-statistic (p-value)
Total Cholesterol	189 (181 - 197)	196 (187 - 205)	190 (177 - 203)	174 (168 - 180)	7.38 (0.001)
Triglyceride	169 (158 - 179)	168 (160 - 177)	152 (134 - 171)	138(128 - 147)	10.35 (0.000)
HDL	40.4(39.2-41.6)	40.8 (39.5 - 42.0)	38.2 (35.7-40.7)	43.14(41.72 - 44.55)	5.48 (0.001)
LDL	114.9 (108 - 122)	128.8 (120.6 - 136.9)	121(109- 134)	106(101 - 111)	8.79 (0.001)
VLDL	33.74 (32 - 36)	33.68 (32.0 - 35.3)	30(27 - 34)	27.5 (25.68 - 29.32)	10.40 (0.001)
Sodium	138.6(137-140)	138.6(137.3-140.0)	139 (137-141)	140(139-140.47)	1.34 (0.26)
Potassium	4.97 (4.76 - 5.18)	4.38 (4.26 - 4.50)	5.02 (4.65 -5.41)	4.37 (4.31 - 4.44)	20.86 (0.000)
Glucose	103.7 (94.9 - 112.5)	109.5(102.1 - 116.8)	134 (114 - 152)	94.34 (91 - 97)	14.55 (0.000)
Total Protein	6.74 (6.55 - 6.92)	6.68 (6.55 - 6.82)	6.39 (6.08 - 6.69)	7.11 (7.04 - 7.20)	16.92 (0.000)
Albumin	3.39 (3.25 - 3.54)	3.48 (3.4 - 3.58)	3.27 (3.09 - 3.46)	4.16 (4.09 - 4.26)	72.52 (0.0001)
Urea	123 (109 - 137)	67 (61 - 73)	133 (114 - 152)	24.61 (23.52 - 25.71)	170.76 (0.000)
Creatinine	6.13 (5.32 - 6.95)	1.88 (1.77 - 2.00)	4.10 (3.23 - 4.98)	0.94 (0.86 - 1.00)	167.41 (0.0001)
Cystatin C	2.99 (2.61 - 3.37)	0.98 (0.90 - 1.05)	2.71 (2.20 - 3.22)	0.64 (0.61 - 0.67)	151.68 (0.000)
Haemoglobin	9.49 (8.93 - 10.05)	12.25 (11.85 -12.60)	11 (10 - 12)	13.10 (12.86 - 13.35)	59.66(0.000)
Total Count	8115(7415 - 8815)	10200(9452 - 10950)	10843(9313-12374)	7667(6963 -8371)	10.87 (0.001)