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ORIGINAL ARTICLE

Elevated Serum Procalcitonin Levels in Chronic Kidney Diseases Patients Undergoing Renal Therapy

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ABSTRACT

Introduction: Inflammation is an established mortality risk factor in chronic kidney disease patients and particularly in patients on dialysis.

Objectives: The main objective of the study is to find the role of procalcitonin in chronic kidney diseases patients undergoing renal therapy.

Material and methods: This cross sectional study was conducted Holy Family Hospital, Rawalpindi during November 2021 to June 2022. The data was collected with the permission of ethical committee of hospital. Baseline characteristics of patients were collected, including age, gender, BMI, history of diseases and time of dialysis.

Results: The data was collected from 200 patients. There were 88 (44.0%) male and 112 (57.0%) female patients. The mean age for male was 45.9 ± 11.7 years and for female 49.8 ± 14.1 years. The PCT level in CKD patients (0.45 ± 0.70 ng/mL) was significantly higher as compared to reference value of healthy control subjects. Significance increase in the value of BUN, Na, K, CRP and BUN is also observed in CKD patients.

Practical implication: PCT must be measured in CKD patients especially for dialysis patients.

Conclusion: It is concluded that PCT levels were significantly high in CKD patients, thus PCT is a valuable marker for early diagnosis of CKD or patients undergoing HD.

Keywords: CKD, PCT, CRP, Inflammation, Dialysis, Diagnosis

INTRODUCTION

Inflammation is a longtime mortality danger aspect in chronic kidney disease sufferers and mainly in sufferers on dialysis. people with a decreased glomerular filtration fee have multiplied ranges of inflammatory markers that growth with the quantity of renal damage and are due to oxidative pressure, endothelial disorder, and vascular calcification[1]. as a consequence, in view that infection is a cardiovascular danger marker in hemodialysis (HD), finding the pleasant predictor of inflammation is a priority difficulty for nephrologists. Many biomarkers have been evaluated inside the ultimate twenty years, even though no clean consensus has been reached[2]. continual kidney disease (CKD) is a kidney sickness wherein there may be gradual loss of renal function over a period of years or a long time. in the course of the early stages of CKD, due to the kidney's good sized repayment mechanism, patients with CKD can be asymptotic because the final renal nephrons are able to casting off pollutants and maintaining homeostasis. consequently, signs of CKD simplest seem whilst the kidneys are appreciably impaired[3]. the primary assignment confronted by the general public health machine is the accurate analysis of CKD; without everyday surveillance of renal function, maximum CKD sufferers have advanced to the superior stage whilst diagnosed. under such occasions, patients with CKD would possibly want to acquire everyday dialysis or a kidney transplant to continue to exist. according to records, in 2013, there have been 956 000 deaths attributed to CKD global; therefore, CKD has been considered to have a primary impact at the high-quality of lifestyles, especially in the elderly population[4]. among the general population, the superiority of CKD such as all 5 degrees is approximately thirteen.4%. in spite of this surprising high prevalence of CKD, the trend of this chronic disease is anticipated to grow in coming many years[5]. The excessive prevalence of diabetes, hypertension, and tobacco abuse is believed to be responsible for the increasing trend of CKD. With the records said above, we are able to conclude that CKD is a urgent public fitness issue affecting the fitness and fine of existence of the overall populace[6].

In 1975, procalcitonin became diagnosed as one of the precursors to calcitonin in animals prior to being located in human beings. A comparable precursor to calcitonin that changed into discovered in animals changed into in the end identified in human thyroid medullary carcinoma tissue and turned into termed “serum immunoreactive calcitonin” (iCT). levels of iCT boom in response to mobile injury, first mentioned in sufferers with inhalation damage secondary to burns[7]. An multiplied level of the huge molecular mass form of iCT turned into as sociated with early dying and irritating results in terms of different types of iCT. The excessive molecular shape of iCT become ultimately termed “procalcitonin” (PCT). the first have a look at to analyze the usefulness of PCT in sufferers with contamination was published in 1993 and showed that serum concentrations of PCT correlated with the severity of microbial contamination[8]. The PCT level in wholesome people without infection is underneath the restriction of detection (zero.01 ng/mL), and it's miles appreciably

expanded below the stimulation of pathogens. however, because of the pre-current endogenous infection that takes place in CKD sufferers and the impaired kidney clearance, the reference variety that applies to the overall populace won't be appropriate for diagnosing infections in CKD sufferers. more currently, debate has continued regarding whether or not the PCT stage is expanded in CKD sufferers without contamination, and the top-rated reference for CKD patients stays undetermined[9-11].

Objectives: The main objective of the study is to find the elevated serum procalcitonin levels in chronic kidney diseases patients undergoing renal therapy.

MATERIAL AND METHODS

This cross sectional study was conducted in Holy Family Hospital, Rawalpindi during November 2021 to June 2022. The data was collected with the permission of ethical committee of hospital.

Inclusion Criteria

- Age > 18 years
- Both male and female
- Confirmed diagnosis of CKD

Exclusion criteria

- Taking any anticoagulant drug
- Patients with renal failure
- Do not want to participate in the study.

Data collection: The information was gathered from 200 patients experiencing ongoing kidney illness. The information was gathered from both and female patients. Standard attributes of patients were gathered, including age, orientation, BMI, history of infections and season of dialysis. Every one of the phases of CKD were surveyed by utilizing the glomerular filtration rate (GFR) which was determined by utilizing discharge registered tomography. 5ml of blood test was drawn for biochemical examination of PCT. Blood was then centrifuged at 3000rpm for 10 mins for the detachment of plasma. Then, at that point, this plasma was put away for additional investigation of PCT, CRP, Urea, Creatinine, BUN, Ca, Na and Potassium levels. Every one of the tests was performed by manuals given by Randox Unit producer.

Statistical analysis: The data was collected and analyzed using SPSS version 20.0. All the quantitative variables were expressed in mean and standard deviation.

RESULTS

The data was collected from 200 patients. There were 88 (44.0%) male and 112 (57.0%) female patients. The mean age for male was 45.9 ± 11.7 years and for female 49.8 ± 14.1 years.

Table 01: Demographic Profile of the study Population

	Number	Mean Age ± SD (years)
Males	88 (44.0)	45.9 ± 11.7
Females	112 (57.0%)	49.8 ± 14.1
Total	200 (100%)	47.6 ± 12.8

Table 02 shows the baseline values of selected patients and history of diseases.

Table 02: Baseline values for CKD patients (n=200)

Variables	Frequency	COR (95% CI)	AOR (95% CI)	P-value
Age				
18-28	37	1.29 (0.95, 1.75)	1.46 (1.05, 2.03)	0.02
29-38	50	1.62 (1.08, 2.43)	1.50 (0.95, 2.36)	0.08
39-48	57	2.11 (1.44, 3.09)	2.40 (1.59, 3.65)	0.01
49-58	29	0.91 (0.62, 1.32)	0.77 (0.49, 1.23)	0.28
59-68	18	1.02 (0.67, 1.56)	1.40 (0.85, 2.32)	0.19
>68	8	2.89 (1.29, 6.45)	3.16 (1.36, 7.35)	0.07
Stage of CKD				0.08
Stage III	69	1.00		
Stage IV	131	0.78 (0.60, 1.02)	1.26 (0.97, 1.64)	
History of DM				0.03
No	34	1.00	1.00	
Yes	166	1.16 (0.94, 1.43)	0.70 (0.51, 0.96)	
History of non-steroid anti-inflammatory medicine				0.01
No	170	1.00	1.00	
Yes	30	0.65 (0.53, 0.81)	0.48 (0.37, 0.61)	
Habitual of prescribed medication				0.01
No	75	1.00	1.00	
Yes	125	1.73 (1.32, 2.27)	2.22 (1.65, 2.98)	
History of renal stone				0.79
No	124	1.00	1.00	
Yes	76	1.76 (1.34, 2.31)		

Table 3: Comparison of PCT levels and biochemistry parameters

Variables	CKD patients	Reference Value	P value
PCT (ng/mL)	0.45± 0.70	0.04 ± 0.06	<.001
BUN (mmol/L)	22.17 ± 9.10	5.32 ± 1.37	<.001
CREA (µmol/L)	669.45 ± 387.11	70.46 ± 15.96	<.001
K (mmol/L)	4.50 ± 0.81	4.21 ± 0.40	.011
Na (mmol/L)	137.48 ± 4.56	141 ± 1.96	<.001
Ca (mmol/L)	2.21 ± 0.23	2.34 ± 0.12	<.001
CRP (ng/mL)	13.78 ± 6.71	4.73 ± 7.89	<.001

Table 03 shows the PCT, BUN, CREA, Na, K and CRP levels in CKD patients. The PCT level in CKD patients (0.45 ± 0.70 ng/mL) was significantly higher as compared to reference value of healthy control subjects. Significance increase in the value of BUN, Na, K, CRP and BUN is also observed in CKD patients.

DISCUSSION

Procalcitonin (PCT), a 116-amino corrosive antecedent protein of calcitonin, has been accounted for to be an exact and explicit marker for the early determination of bacterial diseases in patients going through HD[12]. Be that as it may, renal end is apparently one of the significant pathways for PCT annihilation, and PCT discharge is by all accounts intervened by uremia or extracorporeal treatment. Besides, raised degrees of standard PCT have been found in an enormous number of constant HD patients with practically no indications of contaminations[13-15]. A review detailed that up to 44% of HD patients without bacterial contamination had expanded PCT levels (0.6-1.5 ng/ml)[16]. Besides, a new report recommended that PCT couldn't successfully recognize patients going through HD and having bacterial contaminations, since when the PCT cutoff esteem was ≥1 ng/ml, both symptomatic responsiveness and explicitness were poor[17].

The PCT level can be raised in patients with renal deficiency since PCT is a low sub-atomic weight protein that can be separated by the renal glomerulus and consumed by the renal tubules. Herget-Rosenthal et al. detailed that the PCT level step by step expanded by the level of weakening in renal capability and was affected by the kind of the renal substitution treatment. The standard degrees of PCT in CKD patients at stages I to IV didn't contrast from those in controls[18]. Then again, PCT levels in patients with stage V CKD and peritoneal dialysis (PD) were essentially higher than those in controls and patients with stages I to IV CKD. PCT levels in hemodialytic patients were fundamentally higher than those in CKD and PD patients in any stage[19]. As a rule, PD patients will generally have more remaining renal capability than hemodialytic patients, which might be the justification for the distinction of PCT levels between them.

PCT levels drop essentially once a patient with CKD is begun on RRT[20]. Patients with CKD began on RRT have shown the main reduction in PCT levels following a 4-hour meeting of high-transition hemodialysis (HFHD) contrasted and any remaining types of RRT. The extent of drop in PCT levels following HFHD has been ascribed to the high penetrability of PCT through the dialysis channel. Studies have neglected to show a huge drop in PCT following low-transition hemodialysis (LFHD), bringing about a pattern toward higher standard PCT levels in patients on LFHD contrasted and those getting HFHD[21]. Until now, studies have reliably shown a critical reduction in PCT levels following HFHD, peritoneal dialysis (PD), and nonstop venovenous hemodialysis (CVVHD). In any case, the greatness of drop in PCT level fluctuates relying upon the strategy for RRT examined.

CONCLUSION

It is concluded that PCT levels were significantly high in CKD patients, thus PCT is a valuable marker for early diagnosis of CKD or patients undergoing HD.

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