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Original Research Article

Evaluation of biochemical markers for detection of chronic kidney diseases (CKD) in covid positive patient among hospitalize individuals

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ABSTRACT

Introduction: In evaluating diagnosis of CKD can detect in covid-19 positive patient by estimation of few bio-chemical markers like erythropoietin level, cystatin-C (CysC), BTP (beta trace protein.), IL- 6, IL-8 and TNF alpha. Those chemical parameters usually may be potential diagnostic aspect. The study was undertaken to determine the prevalence of biochemical markers of CKD in covid positive patients those are taking dialysis twice in a week and also to evaluate the risk factors among 50 ICU and non-ICU individuals at salboni super speciality hospital, WB over a period of 6 months (June 2020 to Nov 2020). Blood samples were collected by using venipuncture technique from ICU and non-ICU individuals then serum is separated from the whole blood sample. Then the serum samples were performing CLIA immunoassay technique for detecting those biomarkers.

Result: Erythropoietin level was decreased significantly across CKD in age group (40-49) and also age group (50-59) for female and for the male age group (30-39) is significantly decreased in EPO level. Whereas the rest age groups are significantly increased in EPO level. Beta trace protein of all the groups are significantly increased remaining age group (40-49) for male. Cystatin C level, IL-6, IL-8, TNF alpha level is significantly increased of all the groups both male and female.

Conclusion: This is in contrast to the bio-chemical markers of CKD in covid patient, many of which are new and unfamiliar to clinicians, relatively costly, and lack the demonstrated clinical benefit over current methods to fully justify their wide implementation.

1. Introduction

Chronic kidney disease (CKD) is becoming a major public health problem worldwide. The current burden of disease might due to a change of the underlying pathogenicity of CKD. Glomerulonephritis was the one of the leading causes of kidney disease several decades ago. In India, given its population >1 billion, the rising incidence of CKD is likely to pose major problems for both healthcare and the economy in future years. Indeed, it has been recently estimated that the age-adjusted incidence rate of ESRD in India to be 229 per million population (pmp),[1] and >100,000 new patients enter renal replacement programs annually in India.[2]

Worldwide, the prevalence of CKD varies from eight to 16 per cent representing over 750 million cases,

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of which 78 per cent (387.5 million) are from low-middle-income countries (LMICs).[3,4] The development and outcomes of CKD are impacted by local factors like aetiological spectrum influenced by local risk factors, genetic differences, socio-demographic variables and access to healthcare resources. Cohort studies in patients with CKD have been established in the USA, Germany, Canada, France, Spain, Japan, Republic of South Korea and China.[5–11] The Screening and Early Evaluation of Kidney Disease by estimation of biochemical markers was designed and performed to generate data to determine the prevalence and risk factors for CKD in future diagnostic purpose.

2. Materials and Methods

The current study was carried out in the department of pathology, salboni super speciality hospital, WB, India from June2020 to Nov2020 among 50 hospitalized covid positive individuals previously suffering from CKD, also taking dialysis repeatedly. Through venipuncture blood sample were collected and serum is separated from blood sample. Detection of chemical markers like erythropoietin level, cystatin C (CysC), beta trace protein, IL- 6, IL- 8 and TNF alpha level was performed by CLIA(b technique. The study was approved by ethics committee.

3. Results

Total 50 samples were collected from ICU and Non-ICU individuals during six month study period of covid pandemic situation (June 2020 to Nov 2020). We studied different bio-chemical in three different age group of CKD patient. We observed very significant value of erythropoietin in age group between 30-39 in female patient and in age group of both 40-49 and 50-59 in male patient. Similarly cystatin-C level was significantly identified in all age group. In case of Beta trace protein we showed more significant result in male among all age group than female. Very significant result seen in immunological parameters in IL-6 and IL-8 value in all age for both male and female patient than TNF-alpha value.

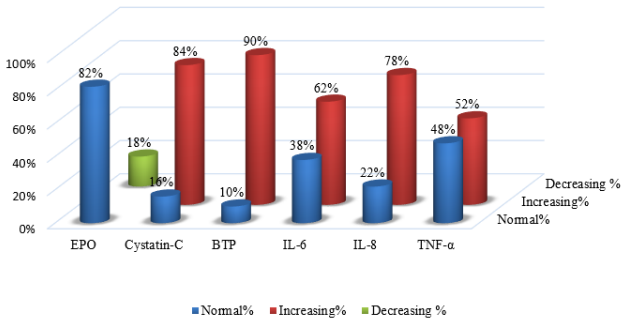

Fig. 1: Percentage of Biochemical parameters.

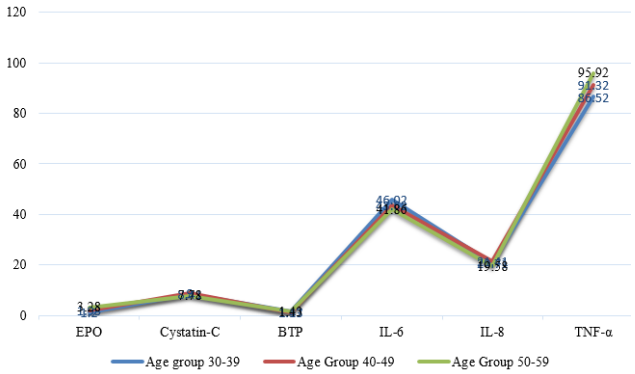

Fig. 2: Graphical presentation of significant biochemical markers in female patient.

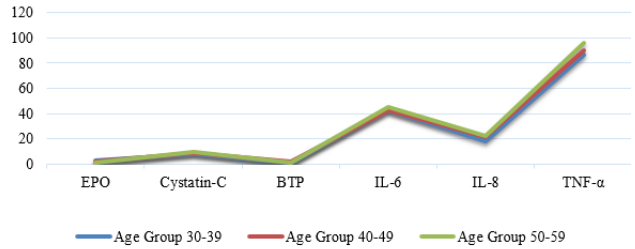

Fig. 3: Graphical presentation of significant biochemical markers in male patient.

4. Discussion

This systematic review the prevalence of CKD in various population-based studies, which used a standardized definition of CKD and considered age-, gender and ethnic-specific prevalence of CKD. Overall, the prevalence of CKD varied widely among the study populations and increased clearly with age. In general, females had a higher prevalence than males, especially in the middle aged groups. Our results confirmed that 18% decreasing rate of EPO level, 84% increasing level of Cystatin C, BTP level showed 90% increasing rate, IL-6 increasing 62% rate, IL-8 showed 78% increasing rate and finally TNF-alpha increasing 52% from total testing parameter.

4.1. Erythropoietic level

Erythropoietic level significantly increases for female in age group (30-39) in respect to normal range. For female in age group (40-49) and age group (50-59) is significantly decrease when compared to reference values (Table 1). For male age group (30-39) is significantly decrease but age group (40-49) and age group (50-59) is significantly increase in respect to reference values (Figure 1). Similarly the study was done by Beverborg et al.,[12] 2015 in University Medical Center Groningen, they were found EPO levels to

Table 1:

Age Group (yrs.)	Erythropoietin level (mu/ml)		Cystatin C (mg/L)		Beta trace protein (mg/L)		IL-6 (pg/ml)		IL-8 (pg/ml)		TNF-alpha (pg/ml)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
30-39	2.80 ± 0.830NS	1.20 ± 0.274 *	8.11 ± 1.118 *	8.41 ± 1.185 *	1.04 ± 0.176 *	1.43 ± 0.294*	42.59 ± 3.442 *	46.02 ± 1.758 *	17.92 ± 1.484 *	20.71 ± 2.045 *	87.06 ± 4.284 *	86.52 ± 5.094 *
40-49	1.84 ± 0.373 *	1.93 ± 0.687NS	8.60 ± 0.659 *	9.00 ± 0.596 *	1.65 ± 1.117NS	1.17 ± 0.131 *	42.95 ± 2.216 *	43.63 ± 3.084 *	21.05 ± 1.087 *	21.41 ± 1.489 *	90.24 ± 2.580 *	91.32 ± 3.564 *
50-59	1.41 ± 0.156 *	3.28 ± 1.115NS	9.51 ± 0.326 *	7.78 ± 0.545 *	1.09 ± 0.139 *	1.43 ± 0.187 *	45.15 ± 7.459 *	41.86 ± 2.430 *	22.44 ± 0.544 *	19.58 ± 2.054 *	96.28 ± 5.852 *	95.92 ± 5.974 *

increase over age and they also found that the association hemoglobin with EPO levels in healthy subjects, especially in anemic conditions, is strongly dependent on renal function.

4.2. Cystatin C

Level of Cystatin-C in all the groups was significantly similar. Cystatin C level significantly increased in age group (30-39), age group (40-49) and age group (50-59) for female in respect to reference range (Table 1). In case of male age group (30-39), age group (40-49) and age group (50-59) is significantly increase when compared to reference values (Figure 1). As compare the study was done by Peralta et al.,[13] 2011 in California, they isolate that the prevalence of decrease GFR on the basis of cystatin C only was relatively low in the diverse cohort of ambulatory subjects, particularly in the nonelderly. The number needed to screen to detect such individuals was high overall but decreased to about 10 among persons over the age of 75.

4.3. Beta trace protein

In my current study Beta trace protein level significantly increased in age group (30-39), age group (40-49) and age group (50-59) for female in respect of normal range (Table 1). For male age group (40-49) is significantly decrease but age group (30-39) and age group (50-59) is significantly increase in respect to reference values (Figure 1). Simillarly the study was done by Dajak et al.,[14] 2011 in Serbia, they find out that urinary BTP concentrations in patients with albuminuria below 30 mg/day were significantly lower than in patients with albuminuria above 30 mg/day ($p < 0.0001$).

4.4. IL-6

Interleukin-6 level in all the groups were significantly similar. IL 6 level significantly increased in age group (30-39), age group (40-49) and age group (50-59) for female in respect to reference range (Figure 2). In case of male age group (30-39), age group (40-49) and age group (50-59) is significantly increase when compared to reference values (Figure 3). Similarly the study was done by Lee et al.,[15] 2015 in USA, they isolate that IL-6 is independently and significantly associated with lower eGFR and higher albuminuria.

4.5. IL-8

Both male or female age groups IL-8 level were significantly closer. In female IL-8 level is significantly increased in respect of reference range in three age groups (Figure 2). In case of male age group (30-39), age group (40-49) and age group (50-59) is significantly increased in respect to reference values (Figure 3).Similarly the study was done by Tunçay et al.,[16] 2021 in Turkey, they find out that the serum IL-8 levels of CKD were significantly higher than of healthy subjects, respectively ($p<0.001$). There was no statistically significant difference between IL-8 in CKD patients with and without cardiovascular disease ($p>0.05$).

4.6. TNF alpha

TNF alpha level significantly increased in age group (30-39), age group (40-49) and age group (50-59) for female in respect to reference range (Figure 2). In case of male age group (30-39), age group (40-49) and age group (50-59) is significantly increase when compared to reference values (Figure 3). Similarly, the study was done by Sonkar et al.,[17] 2009 in Varanasi, they find out that the TNF alpha levels are significantly higher levels in CKD and renal transplant patients.

Current study significantly showed different parameters of chemical secretion of covid positive CKD patient. IL-6 and IL-8 and increasing parameters may be seen due to hypersensitivity reaction for viral transmission of

body. Other immunological parameters can be increase for exposure of viral element significantly.

5. Conclusion

Different hematological and immunological markers of kidney disease have an affinity to be classified by a few common limitations. In CKD patient already are immunocompromise patient and as well as due to changes of GFR, chemical regulation may hampered inside the body and changes of immunological parameters due to covid infection, causes secretion of interlukins and TNF for activation of hypersensitivity and complement system inside body. In present study, can be helpful for future diagnostic purpose in immune-haemato parameters in immunocompromise patient in different aspect.

6. Conflict of Interest

The authors declare no relevant conflicts of interest.

7. Source of Funding

None.

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