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STUDIES ON THE EFFECTS OF CHRONIC LIVER DISEASE ON RENAL FUNCTIONS AT KHAIRPUR, SINDH

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Abstract

Aims and objectives: *In CLD patients Derangements in various homeostatic mechanisms leading to direct renal injury have been observed. Therefore present study was designed to observe the renal impairment in chronic liver patients.*

Materials and methods*: A comparative cross-sectional study was conducted at PAQSJIMS and Civil Hospital Khairpur during June 2024 to February 2025. A total of 167 CLD patients with 120 (71.9%) male and 47 (28.1%) female patients and 50 healthy subjects were assessed for renal functions. Serum creatinine, Blood urea nitrogen and electrolytes (Sodium, potassium, chlorides) were assessed for renal function. Automatic Analyzer machine Advia 1800 Siemens (Germany) was used to measure the renal markers. Demographic details, history of CLD, and relevant clinical findings were the part of data collection proforma.*

Results: *A total of 167 subjects out of which 43(35.8%) were HBsAg +ve males and 10(21.3%) were HBsAg +ve females and in HBsAg –ve cases 77 (64.2%) were males and 37(78.7%) were females. Among HCV +ve cases 57(47.5%) were males and 25 (53.1%) were females and among HCV -ve subjects 63(52.5%) were males and 22(46.9%) were females. Hepatitis B and Hepatitis C infected CLD groups show elevated creatinine approximately 1.8 mg/dl and co-morbid shows 1.6 mg/dL compared to normal. When BUN was observed in different CLD conditions, the Co-Morbid group demonstrated* ***a significant elevation*** *($p < 0.05$) while there was no significant change in all other groups. In each CLD condition lower sodium and chloride level was observed likely indicating hyponatremia and hypochloremia respectively.*

Conclusion*: In CLD patients renal markers were significantly altered.*

INTRODUCTION

Renal dysfunction is a common, life-threatening complication occurring in patients with liver disease. Renal dysfunctioning causes complications in chronic liver disease and cirrhosis and this association leads to significant morbidity and mortality [1]. The main causes of

cirrhosis were discovered to include Hepatitis B, and Hepatitis C. Blood urea nitrogen and Creatinine are the indicators of renal dysfunctioning, while the indicators of liver dysfunction are liver enzymes used to determine the prognosis of chronic liver disease [2]. Serum creatinine level is used to assess the kidney functioning which is significantly affected by liver abnormal conditions like cirrhosis [3]. Liver cirrhosis significantly affects kidney functions through various mechanisms, leading to renal dysfunction that worsens patient outcomes. Renal function tests are useful for identifying the presence of renal disease, monitoring the response of kidneys to treatment, and determining the progression of renal disease. The markers of renal function test assess the normal functioning of kidneys. They indicate the glomerular filtration rate, concentrating and diluting capacity of kidneys. If there is derangement in the values of these markers it indicates dysfunctioning of kidney [4].

MATERIAL AND METHOD

The study was conducted at Gambat Institue of Health and Medical Science District Khairpur Mir's Sindh/ Peer Syed Abdul Qadir Shah Jillani Institute of Medical Sciences (PSAQSJIMS) and Civil Hospital Khairpur. This study includes individuals with liver cirrhosis from the outpatient department of medicine to discover the relationship between renal profile and liver disease. The subjects were informed about the aim of study research and consent was taken before data collection. This study comprised 167 CLD patients and 50 healthy subjects as controls. From 167 subjects 120 were male patients and 47 were female patients. Diagnosis of CLD patients was carried out by examining the history, physical examination and blood tests including hepatic and renal investigations. The History data of chronic liver disease patients was collected by filling proforma from medicine ward and gastro ward After taking patients history their ultrasound reports were observed. The cirrhosis appearance was conformed on the basis of signs and symptoms of the disease, physical and clinical examination. Biochemical liver panel known as liver function tests (LFT) and liver biopsy was used to diagnose the chronic liver disease. About 4mL blood sample was collected with the help of sterilized syringe in gel tubes from clinically diagnosed patients. The samples were centrifuged at 4000 rpm in Allegra 2IR Centrifuge machine. Serum was separated in clean labeled tubes. The samples were labeled with bar codes and bar codes were computerized. Liver function test was performed on **ADVIA 1800 Siemens (Germany)** for testing liver enzymes such as Alanine transaminase (ALT), Alkaline phosphatase (ALP), Aspartate transaminase (AST), Gamma-glutamyl transferase (GGT) [5]. Sample for viral markers were allowed to run on Advia Seimens Centaur XP (Germany). Renal function test was performed on **ADVIA 1800 Siemens** (Germany) for testing serum Creatinine BUN, and Electrolytes (sodium, potassium and chlorides) with working Principle photoelectric method. Test results were collected for further analysis.

Inclusion criteria

Patients of all age groups, both male and female, Hepatitis A and Hepatitis B patients co-occurring with renal failure were included in this study.

Exclusion Criteria

Nephrotoxic drugs, intrinsic renal disease

Statistical analysis

Microsoft Excel and GraphPad Prism 8.4.0 was used for data analysis through one-way ANOVA along with Tukey's post hoc test). The p-value < 0.05 was considered statistically significant.

RESULTS

Among 167 CLD patients 47 (28.1%) includes female subject and 120 (71.8%) includes male subjects**.** Etiological profile was studied for viral markers as shown in table No.1

Table No.1 Etiological profile of chronic liver patients [6].

Etiology	No. of Patients
Hepatitis B	53(31.70%)
Hepatitis C	82(49.1%)
Co morbid	12(7.1%)
Non-viral	20(1.9%)

Gender-wise

studies according to viral markers shows that 43(35.8%) were HBsAg +VE males and 10(21.3%) females and among HBsAg –ve 77 (64.2%) were males and 37(78.7%) were females as shown in fig No.1. Among HCV + ve cases 57(47.5%) were males and 25 (53.1%) were female and among HCV -ve subjects 63(52.5%) were males and 22(46.9%) were females as shown in Fig No.2. This indicates that males have a higher prevalence of Hepatitis B infection compared to females. Females are more frequently HBsAg –ve suggesting lower infection rate. The higher proportion of HBsAg-positive (+ve) in males may be linked to behavioral, occupational and biological factors. Females show higher HBsAg negativity indicating relatively lower exposure risk.

Previously [7] it is found that Hepatitis B prevalence was higher in males than females possibly due to higher exposure risks through unsafe injections, barbar shaves. According to WHO (2021) HBV infection is more common in males with prevalence differences attributed to health care practices risk behaviors and biological susceptibility [8].

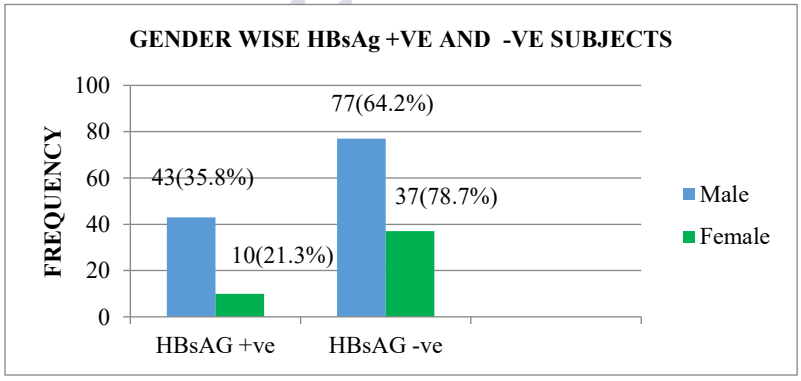


Fig No.1Gender-wise study of HBsAg (+ve and –ve) subjects

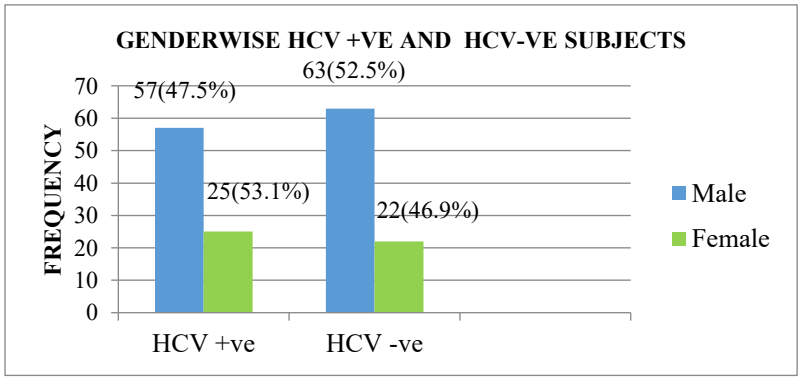


Fig No. 2 Gender-wise comparison of HCV + ve and HCV -ve subjects

When Creatinine level was observed in different CLD conditions, Hepatitis B and Hepatitis C Infected groups show elevated creatinine approximately 1.8 mg/dl and co-morbid shows 1.6 mg/dL compared to normal as shown in Fig No.3.It reflects higher serum creatinine as observed by Hartleb and Gutkowski [9].

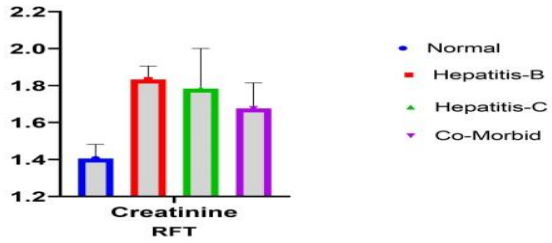


Fig No.3 Showing serum creatinine in different CLD conditions

Gender difference in serum creatinine was observed. Females mean approximately 1.0 mg/dl with in established normal range 0.5-1.0 mg d/l. Males mean approximately 2.0 mg/dl significantly higher than females as shown in Fig No. 4. When BUN was observed in different CLD conditions, the Co-Morbid group demonstrated a significant elevation in BUN ($p < 0.05$) while there was no significant change in all other groups as shown below in fig No.5

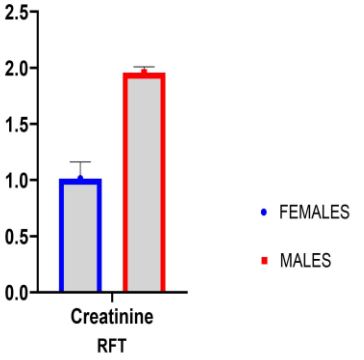


Fig No.4 Gender-wise creatinine

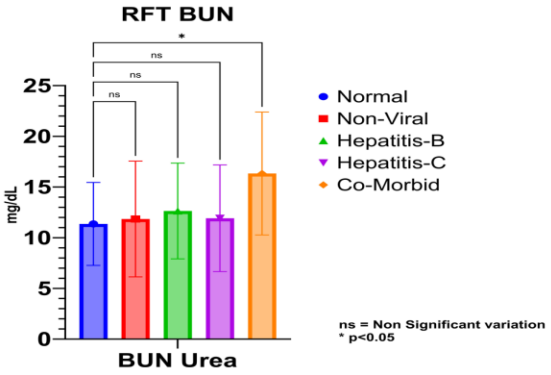


Fig No.5 (BUN) in different CLD Conditions

The groups with liver disease hepatitis B, Hepatitis C and co-morbid have lower sodium around 128 mEq/L likely indicating hyponatremia ($p < 0.05$) shown in Fig No. 6. These reductions are linked to worse complications including ascites, hepatic encephalopathy and hepatorenal syndrome. Study in the Kumaon region of India reported 47% of CLD Patients had hyponatremia and notably mortality among patients with sodium > 130 mEq/L was 19.1% [10].

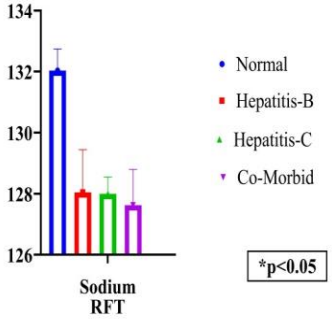


Fig No.6 Comparative levels of sodium in different CLD conditions

Serum chloride level was significantly decreased in CLD subjects (($p < 0.05$). The reduction was seen in Hepatitis C and Hepatitis B and co-morbid groups. Hepatitis B shows lowest chloride levels i-e 90 mEq/L. This trend suggests CLD is associated with hypochloremia with higher impact in viral etiologies as shown below in Fig No.7

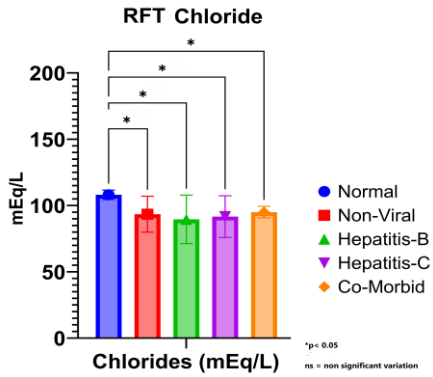


Fig No.7 Showing serum chloride in different etiologies of CLD

Renal function parameters were compared among different age groups (young adults, middle-aged adults, older adults, and elderly). The most significant finding was the progressive rise in serum creatinine with advancing age, being lowest in young adults (18–39 years) and highest in elderly patients (≥75 years). This reflects the combined effect of physiological renal aging and the renal dysfunction frequently associated with advanced liver disease [11].

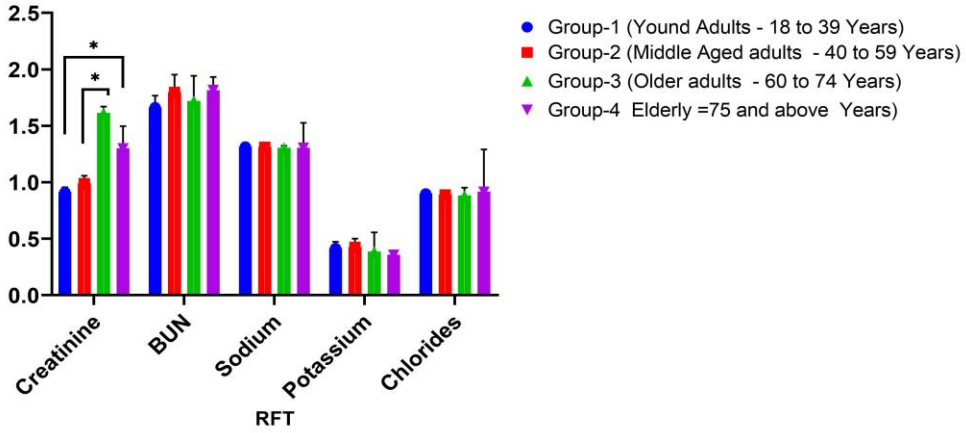


Fig No.8 Age wise distribution of CLD subjects for RFT parameters.

DISCUSSION

Chronic Liver disease is considered as most common disease that affects human health. We have assessed 167 patients including 47 (28%) female patients and 120 males (71.8%). This research work has found highest number of patients in the 40s with the mean age 42.11years. This result is consistent with previous studies[12,13] whose results also showed that chronic liver disease incidence increases with increasing age. The prevelance of disease was over 40% higher in males as compared to females [13]. The present study showed that serum creatinine levels were significantly elevated in CLD patients compared to healthy controls, with the highest values in co-morbid and hepatitis C groups. Previous studies also reported that even mild rises in serum creatinine predict poor prognosis in cirrhosis [11,14]. Similar trends were observed by researchers [15] who found altered renal function tests in viral CLD patients. While BUN levels did not significantly differ between Normal subjects and patients with isolated chronic liver diseases. Similar findings have been reported in studies where stable cirrhotic patients did not exhibit major alterations in baseline BUN values [11,16]. In contrast, the Co-Morbid group showed significantly higher BUN levels. In the present study, serum sodium levels were found to be significantly lower in patients with chronic liver disease (CLD), particularly those with Hepatitis B, Hepatitis C, and co-morbid conditions, as compared to the normal control group. The mean sodium level in the normal group was around 132 mEq/L, whereas CLD groups showed reduced values near 128 mEq/L ($p<0.05$). This finding highlights the occurrence of hyponatremia as a common electrolyte disturbance in CLD. Similarly, a tertiary care hospital study reported the mean sodium of 132.4 ± 11.4 mEq/L, with 36.1% of patients having sodium ≤130 mEq/L [17]. On the other hand, serum sodium, potassium, and chlorides showed relatively less fluctuation across age groups, although mild reductions in sodium were noted. Previous studies also confirm that electrolyte imbalances, including hypokalemia are frequent in CLD. The present study demonstrated that serum chloride levels were significantly reduced in CLD patients compared to healthy controls, with the lowest values observed in hepatitis C and co-morbid groups. Our findings therefore suggest that age-related increases in creatinine and BUN, combined with hyponatremia, provide important prognostic information in CLD patients. Elevated creatinine reflects hepatorenal dysfunction, while low sodium indicates circulatory dysregulation [18].

CONCLUSION

The present study demonstrated that few renal parameters (BUN, serum creatinine, sodium, potassium, and chloride) are significantly altered

in patients with chronic liver disease (CLD), reflecting the close interrelationship between hepatic dysfunction and renal homeostasis. Comparative analysis revealed a consistent trend toward elevated BUN and serum creatinine levels**.** In contrast, serum sodium levels were frequently reduced (hyponatremia), while chloride levels also showed variable disturbances. Age-wise stratification indicated that older patients exhibited more profound derangements, particularly in creatinine and sodium levels, suggesting that advancing age is associated with reduced renal reserve and increased susceptibility to electrolyte imbalance in the setting of CLD.

RECOMMENDATIONS

Overall, the findings emphasize that monitoring renal parameters is essential in the routine assessment of CLD patients**,** not only for early detection of renal impairment but also for guiding therapeutic interventions such as diuretic use, fluid management, and timely consideration of liver transplantation.

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Bioethical permission: The permission to conduct this research work was obtained from local Ethical Review Committee of faculty of Natural Sciences, Shah Abdul Latif University, Khairpur.

Conflict of interest: Authors declare no conflict of interest.

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