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ANALYSIS OF HEPATIC FUNCTION MARKERS IN CHRONIC LIVER DISEASE PATIENTS ACCORDING TO CHILD-PUGH CLASSIFICATIONS

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Abstract

Objective: The aim of this study was to evaluate the Child-Pugh score distribution among a group of patients with Chronic Liver Disease (CLD) and to measure their hepatic enzyme levels. **Materials and Methods:** This descriptive cross-sectional study was conducted at Jinnah Postgraduate Medical Center in Karachi, Pakistan. We included 200 participants based on specific inclusion and exclusion criteria. These subjects were categorized into four groups: a control group and groups A, B, and C based on their Child-Pugh scores. All participants provided written informed consent. Data were recorded and analyzed using SPSS Version 23. **Results:** There were notable differences among the groups in terms of Total Serum Bilirubin, Albumin, INR, Alkaline Phosphatase (ALP), Aspartate Aminotransferase (AST), and Alanine Aminotransferase (ALT). It was observed that Total Serum Bilirubin and INR values rose, whereas Albumin levels fell as liver disease progressed. The concentrations of ALP, AST, and ALT also escalated with increasing Child-Pugh scores. **Conclusion:** This investigation highlighted significant disparities in hepatic biochemical indices among the control and various Child-Pugh score groups, underscoring the influence of liver disease severity on these indicators. This knowledge enhances our understanding of the biochemical landscape in CLD patients and supports the improvement of clinical evaluation and management approaches for individuals at different stages of liver disease.

Keywords: Chronic Liver Disease, Child Pugh Score, Liver Enzymes.

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INTRODUCTION

Chronic Liver Disease (CLD) poses a significant global health issue, marked by persistent inflammation, fibrosis, and deterioration of liver functions. In Pakistan, similar to other regions worldwide, CLD presents a major public health dilemma.[1] The causes of CLD in the country are varied, encompassing viral infections such as hepatitis B and C, non-alcoholic fatty liver disease (NAFLD), and various metabolic syndromes.[2] Properly evaluating the severity of CLD is crucial for determining patient prognosis and making informed treatment choices. The Child-Pugh score, developed initially by Child and Turcotte and modified by Pugh, serves as an important instrument for this evaluation.[3]

The prevalence of CLD, driven notably by widespread hepatitis B and C infections, positions Pakistan under a considerable health burden. The nation's struggle against CLD is compounded by issues such as restricted healthcare access, diverse socioeconomic backgrounds, and insufficient epidemiological information. There is a specific interest in examining how the Child-Pugh score distribution among Pakistani CLD patients correlates with disease outcomes and management strategies.[4,5]

The Child-Pugh score remains a key clinical metric for gauging liver disease severity. It factors in variables like serum bilirubin, albumin levels, INR, presence of ascites, and hepatic encephalopathy to categorize patients into classes reflecting the seriousness of their condition. This classification is essential for predicting outcomes and shaping therapeutic approaches, particularly in resource-constrained settings like Pakistan.[6,7]

Furthermore, measuring liver enzymes, such as alanine and aspartate transaminase (ALT and AST), remains central to evaluating liver health and diagnosing liver conditions. These enzyme levels shed light on liver cell damage and help pinpoint the specific causes of CLD. Regular monitoring can track disease evolution and gauge the efficacy of treatments. Additionally, liver enzyme measurements are critical for deciding on medication dosages and other medical interventions in CLD patients, given their altered drug metabolism.[8,9,10]

However, despite the recognized importance of Child-Pugh scores and liver enzyme analysis, there's a marked lack of local data on their utility and impact within the Pakistani CLD patient population. The bulk of existing research and literature on these scores and enzyme levels comes from Western contexts, leaving a significant knowledge gap for Pakistan and other South Asian contexts. This study aims to close this gap by examining the distribution and impact of Child-Pugh scores and liver enzyme measurements in Pakistan's CLD patients, hoping to refine local management and treatment tactics for CLD, thereby enhancing patient health and quality of life.

MATERIAL AND METHODS

The research was conducted as a descriptive cross-sectional analysis at Jinnah Postgraduate Medical Center, Karachi, Pakistan. We systematically recruited 200 participants, adhering strictly to defined inclusion and exclusion criteria to ensure the

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study's validity. These participants were stratified into four distinct groups for analytical purposes: a control group, and groups A, B, and C, classified based on their Child-Pugh scores, which measure the severity of chronic liver disease.

The inclusion criteria targeted individuals between the ages of 18 and 60 years diagnosed with Chronic Liver Disease (CLD), specifically stemming from Hepatitis B Virus (HBV) or Hepatitis C Virus (HCV) infections. We purposefully excluded any individuals suffering from other chronic systemic illnesses or any form of malignancy to maintain focus on the study's primary objective and minimize confounding variables.

Before participating in the study, all individuals provided written informed consent, ensuring ethical standards were upheld and participants were fully aware of the study's nature and objectives. The collected data were meticulously stored and subjected to statistical analysis using SPSS Version 23. This comprehensive analysis involved calculating means and percentages to facilitate a clear understanding of the data. For this study, a p-value of less than 0.05 was predetermined as the threshold for statistical significance, indicating a meaningful difference or relationship between the observed variables.

RESULTS

Table 1: Gender and Child Pugh Classification of the Subjects

Variables		*Control*		*Class A Child Pugh*		*Class B Child Pugh*		*Class C Child Pugh*		*p-value*
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	
Gender	Female	26	52.0	23	46.0	28	56.0	24	48.0	0.99
	Male	24	48.0	27	54.0	22	48.0	26	52.0	

Table 2: Mean Comparison of Total Bilirubin, Albumin, INR and Sodium

Variables	*Control*		*Class A Child Pugh*		*Class B Child Pugh*		*Class C Child Pugh*		*p-value*
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Total s Bilirubin (mg/dL)	0.51	0.10	1.82	0.09	2.90	0.14	3.20	0.15	<0.01*
S.Albumin (g/dL)	4.82	0.21	3.19	.27	3.00	.12	2.50	0.22	<0.01*
INR Value	1.00	0.001	1.53	0.08	2.11	0.19	2.48	0.06	<0.01*
S. Sodium (mmol/L)	188.26	36.64	140.46	1.62	139.87	1.38	136.02	1.42	<0.01*
*p<0.05 was considered statistically significant using one way ANOVA									

Table 3: Mean Comparison of ALP, AST and ALT

Variables	*Control*		*Class A Child Pugh*		*Class B Child Pugh*		*Class C Child Pugh*		*p-value*
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	
ALP (IU/L)	52.70	9.81	110.40	46.19	112.90	12.29	163.18	19.52	<0.01*
AST (U/L)	19.60	2.66	71.64	14.38	112.03	8.71	134.22	4.48	<0.01*
ALT(U/L)	17.08	2.75	69.70	8.10	103.80	5.98	118.52	9.27	<0.01*
AST/ALT	1.16	0.13	1.04	0.22	1.08	0.11	1.14	0.11	<0.01*
*p<0.05 was considered statistically significant using one way ANOVA									

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DISCUSSION

The variations in biochemical markers observed between the control group and the various Child-Pugh score groups reflect the recognized influence of liver disease severity on these indicators. This aligns with current understanding and established knowledge regarding liver health and impairment.[11]The average values of Total Serum Bilirubin, Serum Albumin, International Normalized Ratio (INR), and Sodium for each category were documented. Notably, the control group exhibited a mean Total Serum Bilirubin of 0.51 mg/dL and Serum Albumin of 4.82 g/dL, with an INR of 1, indicating healthy liver function.

As anticipated, these figures differed significantly from those in the Child-Pugh classes A, B, and C, demonstrating the deterioration of liver function with increased severity of liver disease. Specifically, Total Serum Bilirubin levels were observed to escalate progressively with the advancing stages of liver disease, reaching the highest average in Class C (3.2 mg/dL). This rise in Total Serum Bilirubin with escalating Child-Pugh scores underscores the liver's diminishing ability to process and excrete bilirubin, a direct indicator of liver dysfunction, corroborating findings from prior research that noted an increase in bilirubin levels parallel to liver disease advancement.[12.13]

Similarly, a decline in Serum Albumin levels was seen with an increase in Child-Pugh scores, with the lowest average observed in Class C (2.5 g/dL). This trend is indicative of the liver's impaired synthetic capacity in advanced stages of liver disease since Serum Albumin is predominantly produced by the liver. This observation is consistent with prior studies that reported a decrease in Serum Albumin levels in individuals with significant liver disease.[14,15] Furthermore, INR values, which reflect coagulation status, ascended with the severity of the condition, peaking in Class C (2.48), indicative of impaired clotting function due to reduced production of coagulation factors by the diseased liver.

As liver disease severity increased from Class A through to Class C in the Child-Pugh scoring, levels of ALP, AST, and ALT were seen to rise, with the highest averages noted in Class C. This increase in hepatic enzyme levels with worsening Child-Pugh scores points to ongoing hepatocellular damage and cholestasis, as these enzymes enter the bloodstream following damage to liver cells and impaired bile flow. This is supported by previous studies that also recorded a rise in these liver enzymes correlating with the progression of liver disease.[16,17,18]

In summary, the findings from this study corroborate with the existing body of literature, reinforcing the established link between the severity of liver disease and changes in biochemical markers. These insights enhance our understanding of the biochemical changes occurring in patients with Chronic Liver Disease (CLD), facilitating more informed clinical assessments and therapeutic decisions. Furthermore, the study emphasizes the critical role of these biochemical markers in evaluating liver function and underscores the necessity for a thorough and multifaceted approach in the management of patients with advanced liver conditions.

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CONCLUSION

The research demonstrated significant differences in hepatic biochemical indicators between the control group and the various Child-Pugh score categories, showcasing the influence of the severity of liver disease on these measurements. This contributes to an improved comprehension of the biochemical characteristics of patients with Chronic Liver Disease (CLD) and can assist in enhancing the precision of clinical evaluations and the formulation of treatment approaches for individuals at different stages of liver disease.

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