# Estimation of Liver Enzymes in Chronic Liver Disease Patients with Reference to Child Pugh Scores

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## ABSTRACT:

### Objective:

The objective of this study was to assess the distribution of Child-Pugh scores among a cohort of CLD patients and to estimate liver enzymes in these patients.

### Materials and Methods:

This was a descriptive cross sectional study carried out in Jinnah post graduate medical center Karachi, Pakistan. A total of 200 subjects were recruited in the study after applying inclusion and exclusion criteria. The subjects were divided into four groups: control group, group A, group B and group C according to Child Pugh Score. Written informed consent was obtained from all participants. The data obtained was stored and analyzed using SPSS Version 23.

### Results:

Significant differences were observed in Total Serum Bilirubin, Albumin, INR, Alkaline Phosphatase (ALP), Aspartate Transaminase (AST), Alanine Transaminase (ALT), across these groups. Total Serum Bilirubin, INR increased, while Albumin decreased with worsening liver disease. ALP, AST, and ALT levels showed an increase with advancing Child-Pugh scores.

### Conclusion:

The study revealed substantial variations in liver-related biochemical parameters across the control group and different Child-Pugh score groups, indicating the impact of liver disease severity on these markers. These findings contribute to a better understanding of the biochemical profile in CLD patients and can aid in refining clinical assessments and treatment strategies for patients with varying degrees of liver disease.

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

## INTRODUCTION:

Chronic Liver Disease (CLD) is a global health concern characterized by ongoing inflammation, fibrosis, and impaired liver function. In Pakistan, as in many other parts of the world, CLD represents a substantial public health challenge. The etiology of CLD in Pakistan is multifactorial and includes factors such as viral hepatitis (particularly hepatitis B and C), non-alcoholic fatty liver disease (NAFLD), and metabolic disorders. The management of CLD relies heavily on accurate assessment of disease severity, which is crucial for prognosis estimation and treatment decisions.[1] The Child-Pugh score, initially developed by Child and Turcotte in 1964 and later modified by Pugh in 1973, has emerged as a valuable tool in this regard.[2] Pakistan bears a significant burden of CLD, with high rates of hepatitis B and C infections. The country faces unique challenges in combating CLD due to limited access to healthcare resources, varying socioeconomic factors, and a lack of comprehensive epidemiological data.[1] The prevalence of CLD in Pakistan, particularly in the context of Child-Pugh score distribution, remains an area of interest and concern. Understanding the distribution and implications of Child-Pugh scores in CLD patients in Pakistan is essential for optimizing healthcare strategies in this region.[1]

The Child-Pugh score is a widely recognized clinical tool used to assess the severity of liver disease. It incorporates parameters such as serum bilirubin, serum albumin, international normalized ratio (INR), ascites, and hepatic encephalopathy to classify patients into three distinct classes (A, B, or C) based on disease severity.[2,3] This stratification helps in predicting patient outcomes and guiding treatment decisions. In Pakistan, where resources are often limited, the Child-Pugh score can play a pivotal role in resource allocation and optimizing patient care.[1]

In addition to the Child-Pugh score, estimating liver enzymes, such as alanine transaminase (ALT) and aspartate transaminase (AST), is a fundamental aspect of evaluating liver function and

diagnosing liver diseases.[3,4] Liver enzymes provide valuable insights into hepatocellular injury and can help identify the underlying causes of CLD. Monitoring changes in these enzymes over time can aid in tracking disease progression and treatment response.[4,5] Moreover, liver enzyme levels can guide clinicians in making informed decisions regarding medication dosages and interventions, especially in patients with CLD who may have altered drug metabolism.[6,7] Despite the potential utility of the Child-Pugh score and liver enzyme estimation in Pakistan's context, there is a notable gap in knowledge regarding their application and implications within the local population. Limited research has been conducted to explore the distribution of Child-Pugh scores and liver enzyme levels among CLD patients in Pakistan and the relationship between these parameters and clinical outcomes. The existing literature on Child-Pugh scores and liver enzyme estimation predominantly originates from Western countries; with limited representation from Pakistan and other South Asian nations.[8] This gap in knowledge necessitates a more comprehensive investigation into the relevance and predictive value of both Child-Pugh scores and liver enzymes in the Pakistani population. Additionally, as healthcare resources and etiological factors in Pakistan may differ significantly from Western countries, a localized understanding of these parameters is essential for improving patient care and outcomes. In this study, we aim to bridge this gap in knowledge by conducting a comprehensive study on the distribution and significance of Child-Pugh scores and liver enzyme levels among CLD patients in Pakistan. By addressing this research gap, we aspire to contribute to the development of more effective strategies for the management and treatment of CLD in Pakistan, ultimately improving the health and well-being of the affected population.

**Materials and methods:**

This was a descriptive cross sectional study carried out in Jinnah post graduate medical center Karachi, Pakistan. A total of 200 subjects were recruited in the study after applying inclusion and exclusion criteria. The subjects were divided into four groups: control group, group A, group B and group C according to Child Pugh Score. Inclusion criteria were patients with ages 18- 60 years having CLD due to HBV and HCV. Exclusion criteria were any other chronic systemic illness or malignancy. Written informed consent was obtained from all participants. The data obtained was

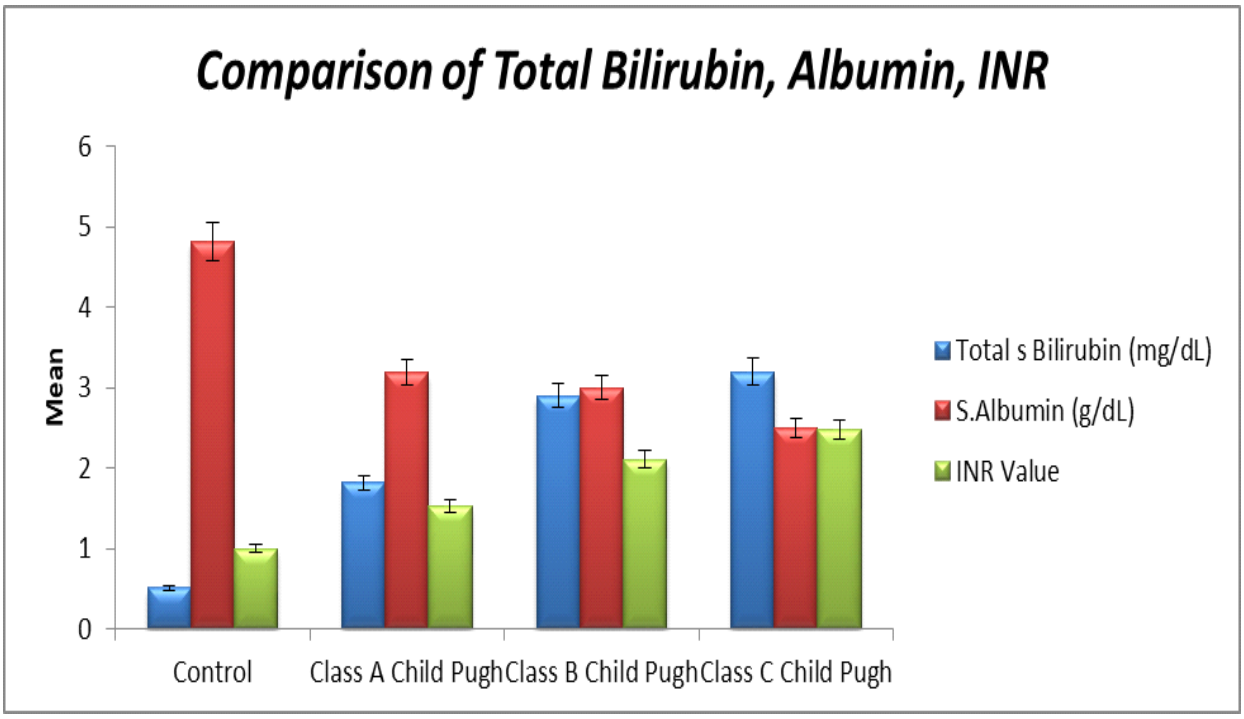
stored and analyzed using SPSS Version 23. Mean and percentages were recorded and p value < 0.05 was considered significant.

**RESULTS:**

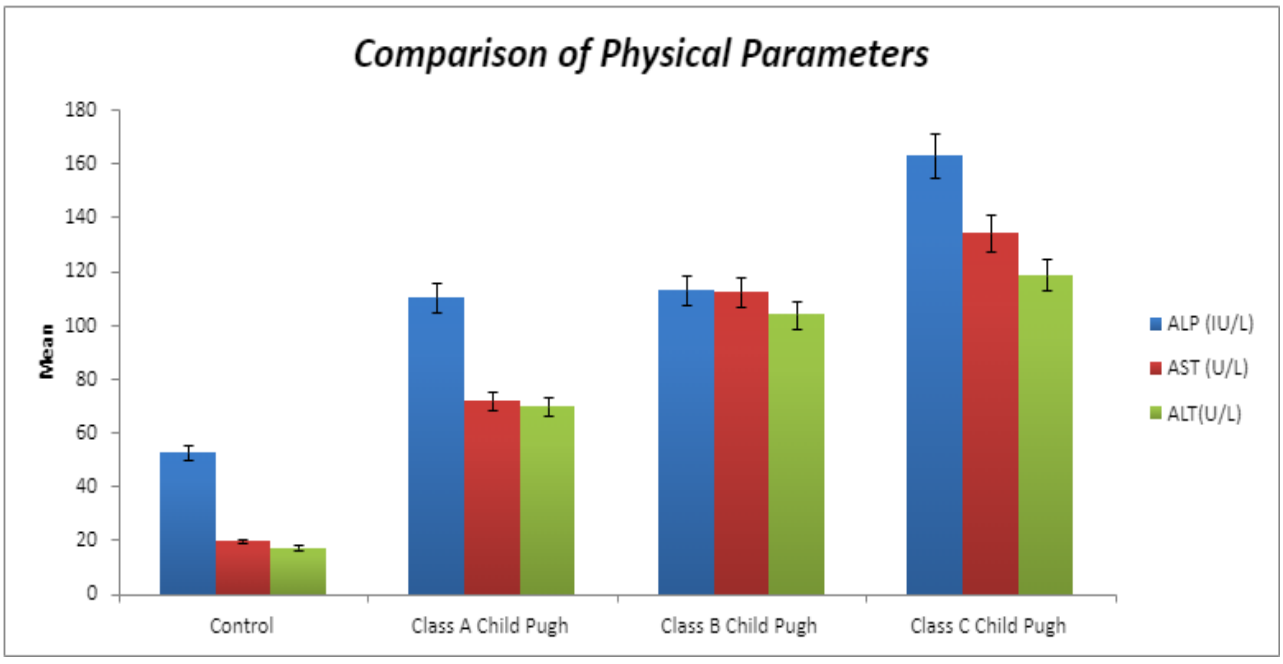
**Table 1: Gender and Child Pugh classification of the subjects**

| *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** | |

**Bar Chart 1: Comparison of Liver enzymes among the study groups**




**Bar Chart 2: Comparison of Liver enzymes among the study groups**



## DISCUSSION:

The observed variations in biochemical parameters across the control group and different Child-Pugh score groups can be attributed to the well-established impact of liver disease severity on these markers. These results align with the expectations and existing knowledge about liver function and dysfunction. The mean values for Total Serum Bilirubin, Albumin, International Normalized Ratio (INR), and Sodium were reported for each group. In the control group, the mean Total Serum Bilirubin was 0.51 mg/dL, Serum Albumin was 4.82 g/dL, and INR was 1. As expected, these values showed a significant difference when compared to the Class A, B, and C Child-Pugh groups, which indicated the impact of liver disease severity on these parameters.

The mean Total Serum Bilirubin increased progressively with worsening liver disease, with Class C having the highest mean value (3.2 mg/dL). The progressive increase in Total Serum Bilirubin as the Child-Pugh score worsens reflects impaired liver function. Elevated bilirubin levels are a hallmark of liver dysfunction due to its role in the metabolism and excretion of bilirubin. Similar findings have been reported in studies where Total Serum Bilirubin levels increased with advancing liver disease.[9, 10]

Serum Albumin levels decreased as the Child-Pugh score increased, with Class C showing the lowest mean value (2.5 g/dL). Similarly, INR values, which indicate coagulation status, increased with disease severity, reaching the highest value in Class C (2.48). The decreasing trend in Serum Albumin levels with worsening Child-Pugh scores can be explained by the compromised synthetic function of the liver in advanced liver disease. Serum Albumin is primarily synthesized in the liver, and its reduction is indicative of impaired hepatic protein production. Similar results have been documented in previous studies which reported declining Serum Albumin levels in patients with severe liver disease.[11,12] The elevation of INR values with increasing Child-Pugh scores reflects impaired coagulation function in advanced liver disease. Liver dysfunction results in decreased production of clotting factors, leading to a prolonged INR. These findings are consistent with previous research, which also observed increased INR values in patients with more severe liver disease.[13, 14]

As liver disease progressed from Class A to Class C Child-Pugh groups, ALP, AST, and ALT levels showed an increasing trend, with Class C having the highest mean values. The increasing levels of ALP, AST, and ALT as Child-Pugh scores advance are indicative of ongoing hepatocellular injury and cholestasis. These enzymes leak into the bloodstream due to hepatocyte damage and impaired bile flow. Similar findings have been documented in research which reported elevated liver enzymes in patients with advanced liver disease.[15, 16, 17, 18]

The results of this study are consistent with existing literature, reinforcing the well-established relationship between liver disease severity and biochemical markers. These findings provide valuable insights into the biochemical profile of CLD patients, aiding in clinical assessments and treatment decisions. While the study underscores the importance of these markers in assessing liver function, it also highlights the need for a comprehensive evaluation that considers multiple factors when managing patients with advanced liver disease.

## CONCLUSION:

The study revealed substantial variations in liver-related biochemical parameters across the control group and different Child-Pugh score groups, indicating the impact of liver disease severity on these markers. These findings contribute to a better understanding of the biochemical profile in CLD patients and can aid in refining clinical assessments and treatment strategies for patients with varying degrees of liver disease.

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