# Increased Myostatin/Skeletal Mass Index Ratio is a Predictor of Worse Survival in Hepatitis B Virus-related Liver Cirrhosis
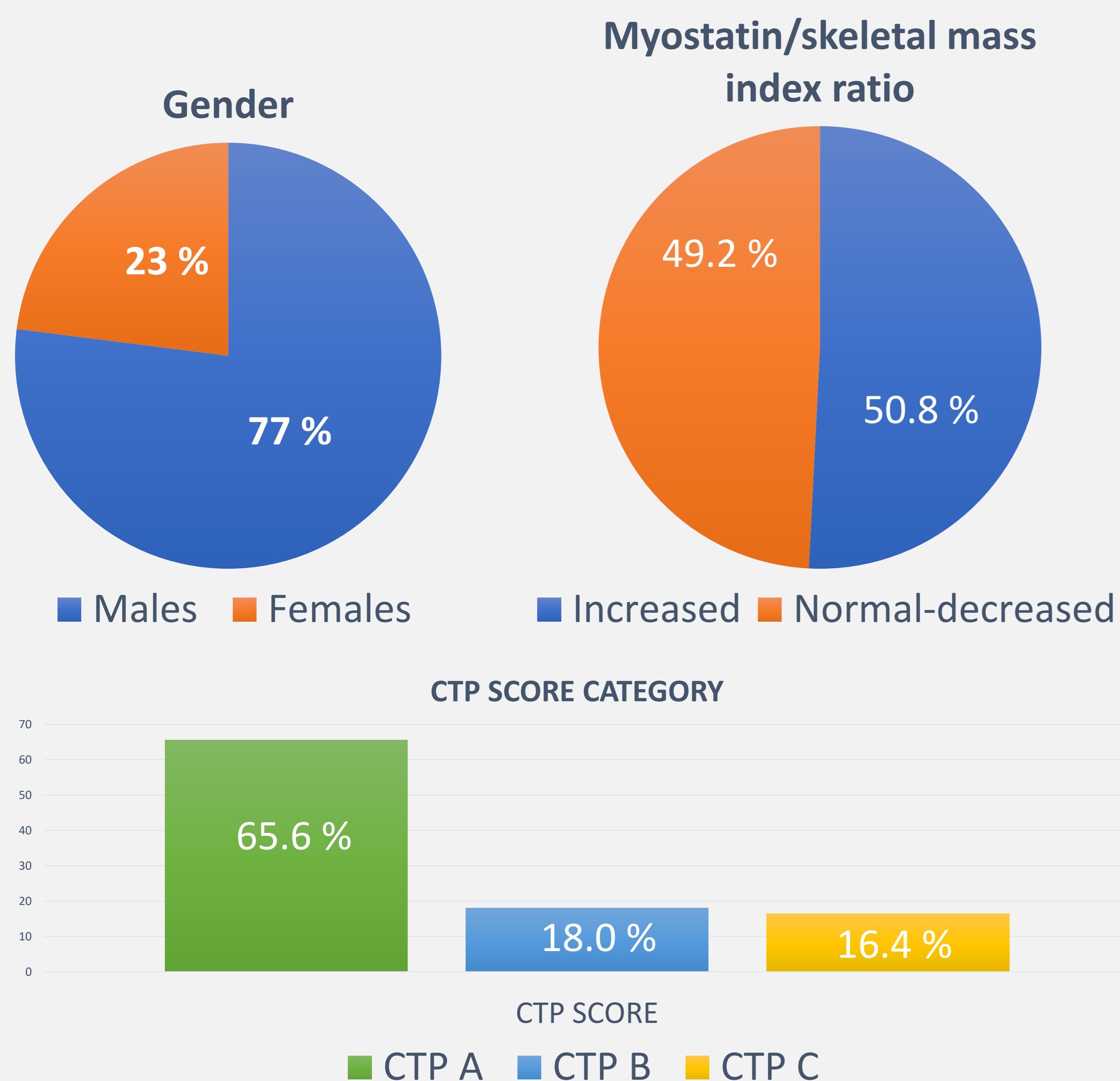
Nugraha, Komang Agus Wira ; Mariadi, I Ketut ; Somayana, Gde ; Kumbara, Cokorde Istri Yuliandari Krisnawardani; Dharmesti, Ni Wayan Wina

Gastroenterohepatology Division, Internal Medicine Department, Faculty of Medicine, Udayana University/Prof. dr. I.G.N.G. Ngoerah General Hospital, Denpasar, Bali

## OBJECTIVES

Sarcopenia, defined by skeletal muscle depletion and muscle weakness, has a deleterious influence on the outcomes of liver cirrhosis patients. Myostatin can be transcriptionally up-regulated by hyperammonemia, and elevated myostatin levels are involved in the pathogenesis of sarcopenia in liver cirrhosis. However, whether serum myostatin levels are associated with survival in patients with liver cirrhosis remains an unsolved issue and has been inconsistent in recent studies. We aimed to investigate the influence of real myostatin activities with skeletal muscle mass corrected (myostatin/skeletal mass index ratio) on the survival of patients with hepatitis B virus-related liver cirrhosis.

**Gender**



23 %
77 %

Males  Females

**Myostatin/skeletal mass index ratio**



49.2 %
50.8 %

Increased  Normal-decreased

**CTP SCORE CATEGORY**



65.6 %  18.0 %  16.4 %

CTP SCORE

CTP A  CTP B  CTP C

## MATERIALS AND METHODS

This prospective cohort study assessed 61 hepatitis B virus-related liver cirrhosis patients at Prof. dr. I.G.N.G. Ngoerah General Hospital, Denpasar, Bali. Patients already received antiviral therapy, and they were followed-up for at least 2.5 years, from September 2021 to March 2023. The primary endpoint of this study was mortality. The subjects were divided into two groups based on their myostatin/skeletal mass index ratio (31 subjects with an increased ratio and 30 subjects with a normal-decreased ratio), using the median value as a cut-off. Skeletal mass index (kg/m2) was measured using bioelectrical impedance analysis. Enzyme-linked immunosorbent assay was used to measure myostatin serum (ng/L). Other risk factors (age, gender, Child-Turcotte-Pugh/CTP score, malnutrition, and comorbidity) were involved in multivariate cox regression analyses.
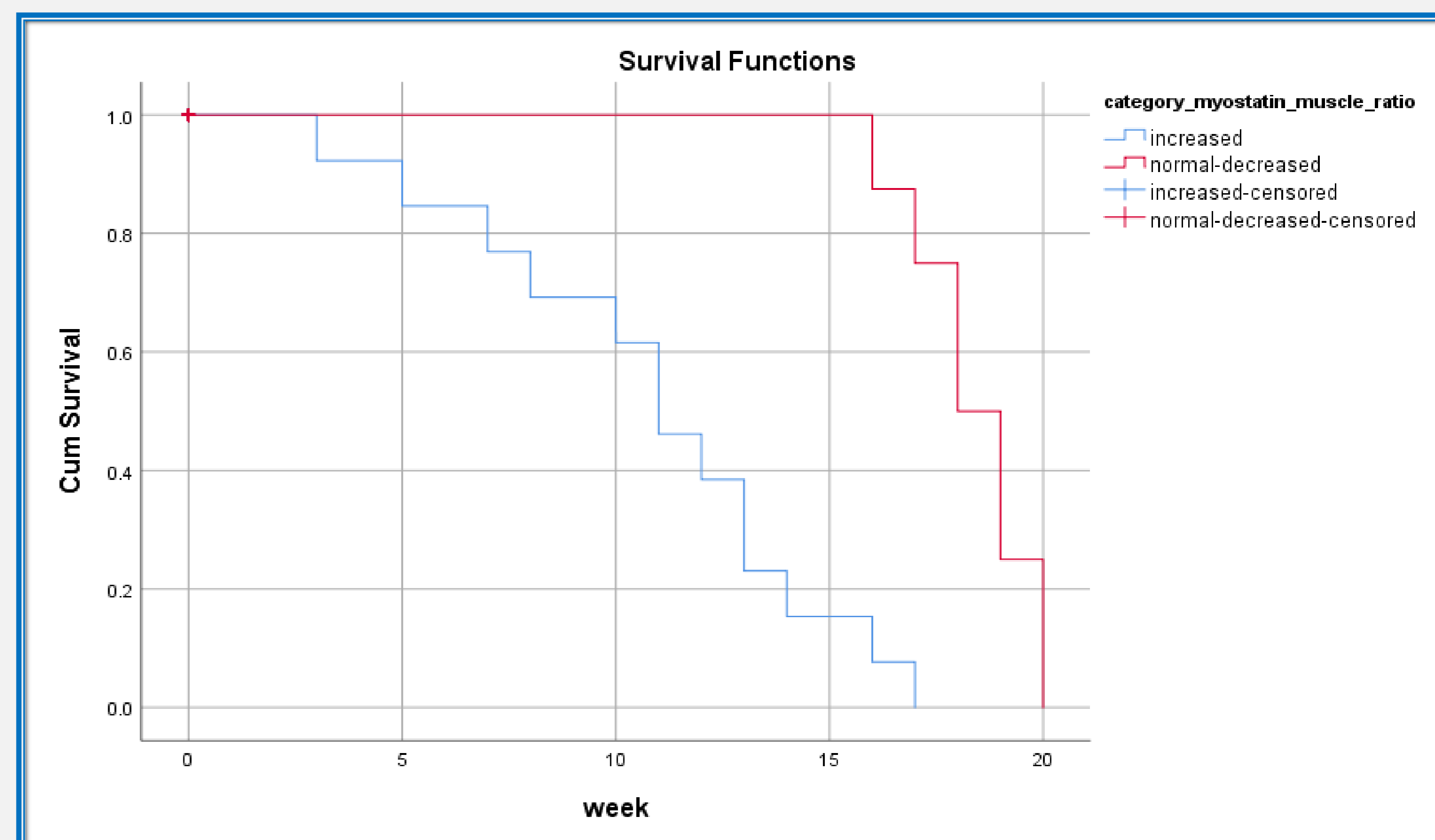


**The 2.5-year survival of hepatitis B-liver cirrhosis patients stratified by baseline myostatin/skeletal mass index ratio**

## RESULTS

The mean age of participants was 50.64±10.47 years. The median myostatin/sceletal mass index ratio was 3.96 (0.04-60.59). Cross-sectionally, there was a negative correlation between myostatin and the skeletal mass index (r= -0.53, p<0.001). The cumulative incidence of mortality was 34.4%. A Kaplan-Meier survival curve for mortality showed a significantly increased mortality in patients with an increased myostatin/sceletal mass index ratio (p<0.001). The median survival in patients with an increased myostatin/sceletal mass index ratio was 11 weeks, compared with 18 weeks in patients with a normal-decreased myostatin/sceletal mass index ratio. Increased myostatin/sceletal mass index ratio (HR=15.16, 95% CI:2.81-81.61, p=0.002) and CTP score (HR=3.70, 95% CI:1.01-13.60, p=0.049), showed significant association with mortality in multivariate cox regression analyses.

## CONCLUSION

An increased myostatin/skeletal mass index ratio was identified as a significant predictor of worse survival in hepatitis B virus-related liver cirrhosis patients. It could be a potential marker for survival and a target of therapy to improve the outcome of hepatitis B virus-related liver cirrhosis patients.

## ACKNOWLEDGEMENTS

Contact email: nugrahawira03@gmail.com