

**Research Article****Frequency of Low Meld Score (11-20) and Hyponatremia in Patients  
with Decompensated Liver Cirrhosis****<sup>1</sup>Muhammad Ahmad, <sup>2</sup>Nomantariq Khan  
and <sup>3</sup>Mona Ali**<sup>1</sup>ahmadchoudary48@gmail.com<sup>2</sup>tariq.nouman@gmail.com<sup>3</sup>monaali91@outlook.com<sup>1,2,3</sup>THQ Hospital, Chunian District Kasur**ABSTRACT**

**Objectives:** frequency of low MELD score (11-20) and hyponatremia in patients with decompensated liver cirrhosis and to compare frequency of mortality in patients with chronic liver disease having MELD score 11-20 with and without hyponatremia

**Methodology:** After approval by ethical review committee and after taking informed consent from all the participants of study, patients of decompensated liver cirrhosis was enrolled from OPD and Emergency in the study who fulfilled the inclusion criteria, after applying the exclusion criteria. Patients having hyponatremia and MELD score was identified among them. Two groups will be made. Group A included the patients with serum Na less than 135 mEq/l and MELD score (11-20). Group B included the patients with serum Na level within normal range i.e. 135-145 mEq/l with MELD score 11-20. Mortality was compared between these two groups within next four months of follow up. Follow up done on monthly OPD visits. All the information was collected on proforma. Study had no effect on patient management.

**Results:** In this study, out of 250 cases, mean $\pm$ sd was calculated as 44.97 $\pm$ 9.06 years, 51.6%(n=129) were male and 48.4%(n=121) were females. Frequency of low meld score with and without hyponatremia was recorded as 23.2%(n=58) with hyponatremia, 26.4%(n=66) in cases without hyponatremia while 50.4%(n=126) had no findings of low MELD score. Comparison of low mortality in low MELD score with and without hyponatremia was recorded it shows that out of 58 cases of low MELD score with hyponatremia 39.65%(n=23) had mortality while out of 66 cases of low MELD score without hyponatremia had 19.70%(n=13) mortality, p value was calculated as 0.01.

**Conclusion:** We concluded that the rate of mortality in patients of decompensated liver cirrhosis MELD score 11-20 with hyponatremia is significantly higher when compared with cases without hyponatremia, however, these cases referred for ultimate treatment i-e liver transplant at an early stage.

**Keywords:** Decompensated liver cirrhosis, low MELD score, hyponatremia, mortality

**INTRODUCTION**

The high mortality of end-stage liver disease is a global public health problem. With the rapid progress of medical science, liver transplantation significantly improves the survival and quality of life of patients with end-stage liver disease. Many prognostic models and scores have been proposed in the last two decades to predict prognosis in patients with end-stage liver disease. Two most

commonly used scores are Child Pugh Score and MELD score.<sup>1</sup>

In 2002, the MELD score was adopted as a standard by which liver transplant candidates with end stage liver disease were prioritized for organ allocation in the United States. The MELD system had an immediate impact on the liver transplant landscape leading to a reduction in the number of

waiting list registrants for the first time ever, and a 15% reduction in mortality among those on the waiting list.<sup>2</sup>

Since the introduction of MELD as the primary allocation system, there has always been a goal of improving this mathematical prioritization model. In attempting to achieve this goal, one may alter the coefficients in the existing MELD formula or include new variables that evaluate additional aspects of the patient's health. Both approaches have been attempted, separately. We and others have shown that the addition of serum sodium improves survival prediction of the MELD score. Studies have shown that low serum sodium is associated with higher waiting-list mortality among liver transplant candidates. Effect of hyponatremia on waiting-list mortality gradually diminishes as the MELD score increases, and it is shown that adding serum sodium to the MELD score could reduce waiting-list mortality by as much as 7%.<sup>3,4</sup>

Cirrhotic patients often have dilutional hyponatraemia. Systemic arterial vasodilation leads to the release of antidiuretic hormone which, in turn, induces dilution hyponatremia. The activation of these mechanisms correlates with the degree of portal hypertension. In this view, hyponatremia can be considered an indirect marker of portal hypertension during cirrhosis. Notably, profound hyponatraemia is frequently associated with severe complications in liver cirrhosis, including ascites, hepatorenal syndrome and thus increased hospital admissions and prolonged stay in hospital.<sup>5</sup> Therefore, hyponatremia, with lower sodium values predicting worse outcomes, has been shown to be an independent predictor of survival at 3 and 12 months. Deitelzweig et al showed in his study in 2013 that cirrhotic patients with hyponatremia were more often readmitted within 30 days post discharge (25.1% vs. 11.0%;  $P < 0.001$ )<sup>6</sup> Hauman et al have shown in their study that hyponatremia is a strong predictor of early mortality, especially with lower MELD score  $< 20$  (33.5% mortality at 180 days with low serum sodium as compared to 5.8% with normal initial sodium level).<sup>2</sup> The

addition of Na to the MELD improves its predictive accuracy, especially for patients with lower range MELD scores. As reported in most studies, when the MELD score increases, serum Na contributes much less to increasing mortality prediction.<sup>7</sup>

In this study we intend to compare mortality in patients of decompensated liver cirrhosis MELD score 11-20 with and without hyponatremia so that high risk patients can be identified and referred for ultimate treatment i.e liver transplant at an early stage.

## METHODOLOGY

We enrolled a total of 250 cases of decompensated liver cirrhosis, age 20-60 yr, any gender either male or female whereas those with renal dysfunction attributed to diseases other than cirrhosis, intrinsic renal disease e.g. polycystic kidney disease, evidence of heart failure but not cirrhotic cardiomyopathy, hyponatremia due to other causes and Injection salt free albumin given within 24hr of enrollment in the study were excluded from the study.

After approval by ethical review committee and after taking informed consent from all the participants of study, patients of decompensated liver cirrhosis was enrolled from OPD and Emergency in the study who fulfilled the inclusion criteria, after applying the exclusion criteria. Patients having hyponatremia and MELD score was identified among them. Two groups will be made. Group A included the patients with serum Na less than 135 mEq/l and MELD score (11-20). Group B included the patients with serum Na level within normal range i.e. 135-145 mEq/l with MELD score 11-20. Mortality was compared between these two groups within next four months of follow up Follow up done on monthly OPD visits. All the information was collected on proforma by myself. Study had no effect on patient management.

## RESULTS

Age distribution shows that 29.2%(n=73) were between 20-40 years and 70.8%(n=177) were

between 41-60 years of age, mean±sd was calculated as 44.97±9.06 years. Gender distribution shows that 51.6%(n=129) were male and 48.4%(n=121) were females. Mean duration of disease was recorded as 2.064±0.84 years. Frequency of diabetes mellitus was recorded in 48%(n=120) while 52%(n=130) had no findings of diabetes mellitus. Frequency of hypertension was recorded in 51.6%(n=129) while 48.4%(n=121) had no findings of hypertension. Frequency of low meld score with and without hyponatremia was recorded as 23.2%(n=58) with

hyponatremia, 26.4%(n=66) in cases without hyponatremia while 50.4%(n=126) had no findings of low MELD score. (Table No. 1)

Comparison of low mortality in low MELD score with and without hyponatremia was recorded it shows that out of 58 cases of low MELD score with hyponatremia 39.65%(n=23) had mortality while out of 66 cases of low MELD score without hyponatremia had 19.70%(n=13) mortality, p value was calculated as 0.01 showing a significant difference. (Table No. 2)

**Table No. 6** Frequency Of Low Meld Score With And Without Hyponatremia (n=250)

Low MELD score		No. of patients	%
Yes	With hyponatremia	58	23.2
	Without hyponatremia	66	26.4
No	With & without hyponatremia	126	50.4
Total		250	100

**Table No. 2** Comparison of Mortality In Low Meld Score With And Without Hyponatremia

Mortality	Low MELD score With hyponatremia (n=58)		Low MELD score without hyponatremia (n=66)	
	No. of patients	%	No. of patients	%
Yes	23	39.65	13	19.70
No	35	60.35	53	80.30
Total	58	100	66	100

P value=0.01

**DISCUSSION**

This study was planned to compare mortality in patients of decompensated liver cirrhosis MELD score 11-20 with and without hyponatremia so that high risk patients can be identified and referred for ultimate treatment i-e liver transplant at an early stage. In this study, out of 250 cases, 29.2%(n=73) were between 20-40 years and 70.8%(n=177) were between 41-60 years of age, mean±sd was calculated as 44.97±9.06 years, 51.6%(n=129) were male and 48.4%(n=121) were females. Frequency of low meld score with and without hyponatremia was recorded as 23.2%(n=58) with hyponatremia, 26.4%(n=66) in cases without hyponatremia while 50.4%(n=126) had no findings of low MELD score. Comparison of low mortality in low MELD score with and without hyponatremia was recorded it shows that out of 58 cases of low MELD score with

hyponatremia 39.65%(n=23) had mortality while out of 66 cases of low MELD score without hyponatremia had 19.70%(n=13) mortality, p value was calculated as 0.01 showing a significant difference.

Deitelzweig et al showed in his study in 2013 that cirrhotic patients with hyponatremia were more often readmitted within 30 days post discharge (25.1% vs. 11.0%; P<0.001)<sup>6</sup> Hauman et al have shown in their study that hyponatremia is a strong predictor of early mortality, especially with lower MELD score<20 (33.5% mortality at 180 days with low serum sodium as compared to 5.8% with normal initial sodium level).<sup>2</sup> The addition of Na to the MELD improves its predictive accuracy, especially for patients with lower range MELD scores. As reported in most studies, when the MELD score increases, serum Na contributes much less to increasing mortality prediction.<sup>7</sup>The

findings of our study correspond to the above findings.

Hyponatremia is linked to impaired renal function induced by the hemodynamic abnormalities that develop in advanced cirrhosis. It is often associated with refractory ascites and hepatorenal syndrome<sup>8-9</sup> and implies an increased incidence of complications and a high mortality rate.<sup>10-11</sup> The prognostic importance of hyponatremia has been largely confirmed in the OLT setting. Indeed, three retrospective single-center studies<sup>12-14</sup> and a prospective multi-center study<sup>15</sup> agreed that hyponatremia is a strong independent mortality predictor. Interestingly, the risk of waitlist mortality appears to increase by 12% for each unit of decrease in serum sodium concentration for values between 120 and 135 mmol/L.<sup>16</sup> These findings have led to several attempts to integrate serum sodium into the MELD formula.

## CONCLUSION

We concluded that the rate of mortality in patients of decompensated liver cirrhosis MELD score 11-20 with hyponatremia is significantly higher when compared with cases without hyponatremia, however, these cases referred for ultimate treatment i.e liver transplant at an early stage.

## REFERENCES

1. Montano-Loza AJ. Clinical relevance of sarcopenia in patients with cirrhosis. *World J Gastroenterol.* 2014;20:8061-71.
2. Leise MD, Kim WR, Kremers WK, Larson JJ, Benson JT, Therneau TM. A revised model for end-stage liver disease optimizes prediction of mortality among patients awaiting liver transplantation. *Gastroenterology.* 2011;140:1952-60.
3. Sharma P, Schaubel DE, Goodrich NP, Merion RM. Serum sodium and survival benefit of liver transplantation. *Liver Transpl.* 2015;21:308-13.
4. Wedd J, Bambha KM, Stotts M, Laskey H, Colmenero J, Gralla J. Stage of cirrhosis predicts the risk of liver related death in patients with low model for End-Stage liver

disease scores and cirrhosis awaiting liver transplantation. *Liver Transpl.* 2014;20:1193-201.

5. Umemura T, Shibata S, Sekiguchi T, Kitabatake H, Nozawa Y, Okuhara S. Serum sodium concentration is associated with increased risk of mortality in patients with compensated liver cirrhosis. *Hepatol Res.* 2015;45:739-44.
6. Deitelzireig S, Amin A, Christian R, Friend K, Lin J, Lowe TJ. Hyponatremia-associated healthcare burden among us patients hospitalized for cirrhosis. *Advther.* 2013;30:71-80.
7. Heuman DM, Abou-Assi SG, Habib A, Williams LM, Stravitz RT, Sanyal AJ. Persistent Ascites and low serum sodium identify patient with cirrhosis and low MELD scores who are at high risk for early death. *Hepatology.* 2004;40:802-10.
8. Ginés P, Berl T, Bernardi T, Bichet DG, Hamon G, Jiménez W. Hyponatremia in cirrhosis: from pathogenesis to treatment *Hepatology,* 28 (1998), pp. 851-864
9. A. Ginès, A. Escorsell, P. Ginès, J. Saló, W. Jiménez, L. Inglada, et al. Incidence, predictive factors, and prognosis of the hepatorenal syndrome in cirrhosis with ascites *Gastroenterology,* 105 (1993), pp. 229-236
10. P. Ginès, M. Guevara Hyponatremia in cirrhosis: pathogenesis, clinical significance, and management *Hepatology,* 48 (2008), pp. 1002-1010
11. P. Angeli, F. Wong, H. Watson, P. Ginès CAPPS investigators. Hyponatremia in cirrhosis: results of a patient population survey *Hepatology,* 44 (2006), pp. 1535-1542
12. D.M. Heuman, S.G. Abou-Assi, A. Habib, L.M. Williams, R.T. Stravitz, A.J. Sanyal, et al. Persistent ascites and low serum sodium identify patients with cirrhosis and low MELD scores who are at high risk for early death *Hepatology,* 40 (2004), pp. 802-810
13. A.E. Ruf, W.K. Kremers, L.L. Chavez, V.I. Descalzi, L.G. Podesta, F.G. Villamil Addition of serum sodium into the MELD score predicts

- waiting list mortality better than MELD alone  
Liver Transpl, 11 (2005), pp. 336-343
- 14.S.W. Biggins, H.J. Rodriguez, P. Bacchetti, N.M. Bass, J.P. Roberts, N.A. Terrault Serum sodium predicts mortality in patients listed for liver transplantation Hepatology, 41 (2005), pp. 32-39
- 15.S.W. Biggins, W.R. Kim, N.A. Terrault, S. Saab, V. Balan, T. Schiano, et al. Evidence-based incorporation of serum sodium concentration into MELD Gastroenterology, 130 (2006), pp. 1652-1660
- 16.M.C. Londoño, A. Cárdenas, M. Guevara, et al. MELDscore and serum sodium in the prediction of survival of patients with cirrhosis awaiting liver transplantation Gut, 56 (2007), pp. 1283-1290