

## Meld Score as a Predictor for Hepato Adrenal Syndrome

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**Abstract:** MELD is a prospectively developed and validated chronic liver disease severity scoring system that uses a patient's laboratory values for serum bilirubin, serum creatinine, and the INR to predict survival. The term hepatoadrenal syndrome has been used to describe such an association between liver disease and adrenal failure and the definition of this term extends beyond the occurrence of sepsis, which is a frequent complication of liver failure. We planned this study to detect MELD Score as a predictor for hepatoadrenal syndrome. Our study was conducted on three groups of patients ( total 45 patients) 21 patients were males 24 patients were females with mean age  $57.44 \pm 9.95$  years (Cross sectional study) in whom adrenal function was assessed by synacthen test which was performed within the first 24 hours of admission. They were divided into 3 groups All included patients were subjected to full clinical evaluation, MELD scoring and child classification, routine laboratory investigations, synacthen test was performed within the first 24 hours of admission we found that Cirrhotic patients with high MELD score have higher incidence of adrenocortical insufficiency ( $P=0.008$ ). MELD score may be a good predictor for adrenocortical insufficiency With MELD cut off score 25.5 sensitivity was 0.727 and specificity was 0.750 Cirrhotic. **So In conclusion**, adrenal dysfunction is common in patients with cirrhosis and It occurs more frequently in patients with more severe liver disease and Correlates with disease severity scores. According to our study MELD score.

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**Key words:** liver cirrhosis, hepatoadrenal syndrome, adrenocortical insufficiency, MELD score.

### 1. Introduction

The term hepatoadrenal syndrome has been used to describe the association between liver disease and adrenal failure and the definition of this term extends beyond the occurrence of sepsis, which is a frequent complication of liver failure.<sup>1</sup>

#### Model for End Stage Liver Disease:

MELD is a prospectively developed and validated chronic liver disease severity scoring system that uses a patient's laboratory values for serum bilirubin, serum creatinine, and the INR to predict survival The MELD score, as currently used by UNOS (United Network for Organ Sharing) in prioritizing allocation of organs for liver transplantation, is calculated according to the following formula:

$$\text{MELD} = 3.8 (\log_e \text{ serum bilirubin (mg/dL)}) + 11.2 (\log_e \text{ INR}) + 9.6 (\log_e \text{ serum creatinine (mg/dL)}) + 6.4$$

The MELD score may also be useful in several other clinical settings such as predicting mortality in patients with alcoholic hepatitis and a variety of chronic liver diseases, and those undergoing a Transjugular Intrahepatic Portosystemic Shunt (TIPS).<sup>2</sup>

This study was done to detect if MELD score is a good predictor for hepatoadrenal syndrome or not<sup>?</sup>

### Patients:

Three groups of patients (total 45 patients) with cirrhosis 35 admitted to a liver intensive care unit and 10 patients admitted to hepatology ward in (TBRI) 21 patients are males 24 patients are females in whom adrenal function was assessed.

#### Three groups are:

- Group A include 15 patients with liver cirrhosis without sepsis and without hepatorenal syndrome.
- Group B include 15 patients with liver cirrhosis with septic shock without hepatorenal syndrome.
- Group C include 15 patients with hepatorenal syndrome without septic shock.
- Informed consent for participation in the study was obtained according to the guidelines of the institutional review boards for human subjects at the participating study centers.

#### Inclusion criteria:

##### 1- Liver cirrhosis patients by

I. Full clinical assessment.

II. Child classification.

III. Abdominal ultrasonography

##### 2-Cirrhotic patient with septic shock. Septic shock is

I.: When two or more of the following criteria are met (SIRS) :

1. Body temperature  $> 38^{\circ}\text{C}$  or  $< 36^{\circ}\text{C}$

2. Tachycardia >90/minute
3. Hyperventilation: respiratory rate >20/minute or arterial hypocapnia < 32 mmHg
4. White blood cell count > 12,000/dL or <4,000/dL or immature forms > 10%

## II: SOURCE OF INFECTION (Sepsis)

**III:**Sepsis associated with circulatory failure characterized by persistent arterial hypotension (decrease of systolic blood pressure below 90 mmHg or > 40 mmHg from baseline, or mean arterial pressure < 60 mmHg, despite adequate fluid resuscitation) unexplained by other causes.<sup>3</sup>

Refractory circulatory failure was defined as a persistent or growing metabolic acidosis despite adequate vasoactive support over an observation period of 6–12hours, and was judged to be present if there was a base excess below 5 mmol/l at the end of this period<sup>4</sup>. (Group B)

## 3-In Hepatorenal syndrome:

New Diagnostic Criteria of Hepatorenal Syndrome in Cirrhosis<sup>5</sup>

– Cirrhosis with ascites

– Serum creatinine >133 mmol/L (1.5 mg/dL)

– No improvement of serum creatinine (decrease to a level of 133 mmol/L)

(Serum creatinine $\mu$ mol/l=serum creatinine mg/dl $\times$ 88.4)after at least 2 dayswith diuretic withdrawal and volume expansion with albumin; the recommended dose of albumin is 1 g/kg of body weight per day up to maximum of 100 g/day.

– Absence of shock

– No current or recent treatment with nephrotoxic drugs

– Absence of parenchymal kidney disease as indicated by proteinuria >500 mg/day, microhematuria (>50 red blood cells per high-power field), and/or abnormal renal ultrasonography..

–Urine volume <500 mL/day<sup>6</sup>

– Urine sodium <10 mEq/L<sup>6</sup>(Group C)

## Exclusion criteria:

- Criteria of septic shock (for Groups A&C).
- Criteria of hepatorenal syndrome (for Group A&B)
- History of long term steroid therapy.

## All patients were subjected to the following:

- 1-Child–Turcotte–Pugh classification using full detailed history and clinical evaluation.
- 2-MELD (Model of End stage Liver Disease) score using full detailed history and clinical evaluation.
- 3- Full chemistry including HDL, liver function tests, renal functional tests full CBC, and PT,PC and INR.
- 4- Urinary Na .

## 5-Abdominal ultrasonography

6-Synacthen test was performed within the first 24 hours of admission. Synthetic adrenocorticotrophic hormone (250  $\mu$ g, Synacthen, Novartis Pharma AG, Basle, Switzerland) was given intravenously. Blood samples to measure plasma cortisol levels (competitive enzyme immunoassay, TOSOH CORPORATION, Tokyo, Japan) were obtained before and 30 minutes after synacthen administration.

Relative adrenal insufficiency was diagnosed when one of the following two criteria was met: (a) Baseline cortisol concentration less than 15  $\mu$ g/dL; (b) Increase in plasma cortisol after synacthen administration lower than 9  $\mu$ g/dL in patients with baseline Serum cortisol concentration below 35  $\mu$ g/dL.<sup>7</sup>

## 3.Results &Discussion

### MELD Score –DISTRIBUTION

Table 7: Showing MELD score distribution

GROUP	NO. OF PATIENTS	MEAN $\pm$ SD	P-VALUE
A	15	15.87 $\pm$ 8.25	A,B<0.001 A,C<0.001 B,C=0.003
B	15	28.67 $\pm$ 5.23	
C	15	33.93 $\pm$ 3.08	
<b>Total</b>	45	26.16 $\pm$ 9.6	

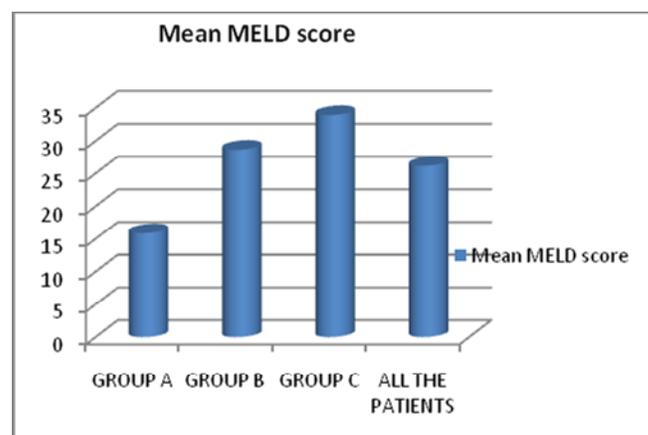


Fig 4: Showing MELD score distribution

As shown in table 7 & fig 4.MELD score mean was highest in the hepatorenal group (33.93  $\pm$ 3.08) followed by the patients with septic shock (28.67  $\pm$ 5.23) and was least in cirrhotic patients without hepatorenal syndrome and without septic shock (15.87 $\pm$  8.25). there was significant statistical difference in MELD score between each two groups of the three groups the three groups.

## MELD and adrenocortical insufficiency

Table 15 :Mean±SD of MELD score in patients with and without adrenocortical insufficiency

Adrenocortical insufficiency	No. Of Patients	MEAN ± SD	P-Value
NO	12	19.25± 10.45	0.008
YES	33	28.66± 8.05	

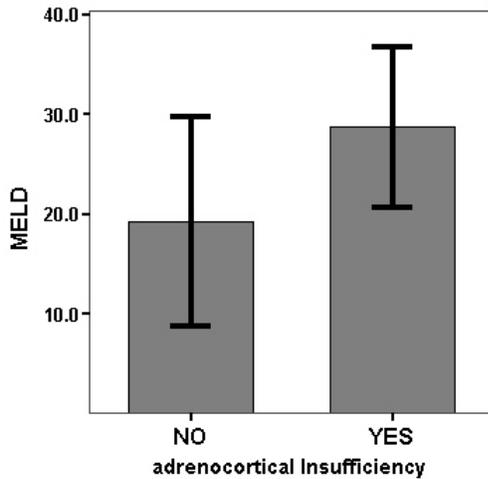


Fig. 10 :Mean±SD of MELDscore in patients with and without adrenocortical insufficiency

There was statistical significance between MELD and adrenocortical insufficiency ( $p$  value =0.008).

As regarding adrenocortical insufficiency and MELD score our study showed that the patients with adrenal insufficiency had mean MELD score 28±8 and in the patients with no adrenal insufficiency the mean was 19.2±10 which showed statistical significance  $p=0.008$  which shows agreement with Tsai *et al.*, 2006<sup>8</sup> the patients with adrenal insufficiency had mean MELD score 15.2±5.2 and in the patients with no adrenal insufficiency the mean was 10.4±6 which showed statistical significance  $p<0.001$  and also Fernandez *et al.*, 2006<sup>9</sup> the patients with adrenal insufficiency had mean MELD score 26.1±7.1 and in the patients with no adrenal insufficiency the mean was 28.1±10.

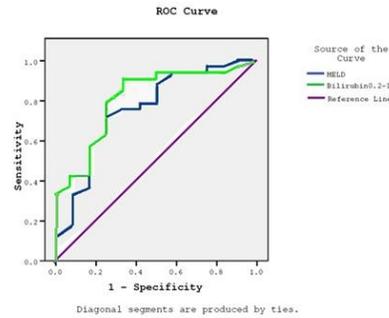
Table 27: Showing comparison between the our study and previous studies of adrenocortical insufficiency in patients with liver cirrhosis regarding mean± SD of MELD score.

Study	Adreal insufficiency	MEAN ± SD MELD score	P-VALUE
Fernandez <i>et al.</i> , 2006	yes	26.1±7.1	
	no	28.1±10	
Tsai <i>et al.</i> , 2006	yes	15.2±5.2	<0.001
	no	10.4±6	
Our study	yes	28±8	p=0.008
	no	19.2±10	

**Logistic regression analysis**

was done to search for the significant predictors of adrenocortical insufficiency from child classification, SGOT, Bilirubin, ascites, creatinine, albumin and MELD score .were entered in the logistic regression analysis and only MELD was found to be significant predictor for adrenocortical insufficiency  $p$ -value was 0.007.

**ROC curve for adrenocortical insufficiency**



**ROC curve for adrenocortical insufficiency 16**

ROC curve was done and showed that the MELD score is a good predictor for insufficiency in liver cirrhosis patients the area under curve to MELD was 0.761and showed that with MELD cutoff score 25.5 sensitivity was 0.727 and specificity was 0.750 while with MELD cut off score 18.5 sensitivity was 0.879 and specificity was 0.500.

While Tsai *et al.*, 2006 Found that with MELD cutoff level 12 Sensitivity was 72.22% specificity was 65.95%.

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