MELD Score in Critical Cirrhotic and Non Cirrhotic Patients

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Abstract: Background: Patients admitted to the intensive care unit (ICU) who have multi-organ failure, showed a very poor outcome. The use of prognostic models for patients admitted to ICU is of great importance, since they provide an objective evaluation for a group of patients with potentially high mortality rates and cost. The advanced stage of liver failure and presence of cirrhotic complications contribute to poor prognosis of cirrhotic patients admitted to ICU. **Objective:** To comparing MELD score in critical cirrhotic and critical non cirrhotic patients for mortality and discharge from ICU. **Patients and Methods:** This a cross section prospective and retrospective thesis study was conducted on 120 patients (60 cirrhotic,60 non cirrhotic (heart failure, hepatorenal Syndrome et al.) who were admitted to ICU of Theodor Belhars Research Institute Hospital which is related to the Ministry of Higher Education and Scientific Research Hospitals. Signed consent was taken from the patients or the 1st degree relatives. **Results:** Model for End Stage Liver Disease (MELD) highly statistically significant with outcome of cirrhotic patients. MELD is non statistically significant with outcome of critical ill non cirrhotic patients. But SOFA and APACHE II significant in both cirrhotic and non cirrhotic according to outcome. **Conclusion:** MELD, SOFA, APACHE II score are good prognostic factors and have a high mortality prediction in liver cirrhosis patients who were admitted to ICU. Although SOFA, APACHE II score are good predictor for mortality in critical non cirrhotic patients MELD score does not act as a good predictor for them.

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1. Introduction

Cirrhotic patients are at an increased risk for developing decompensation related mainly to portal hypertension, including variceal bleeding, ascites, hepatic encephalopathy and hepato-renal syndrome. Patiens with cirrhosis admitted to the ICU have a substantially high mortality rate of 50% to 100% [(1)].

The Model for End Stage Liver Disease (MELD) is a numerical scale, ranging from 6 to 40, that was originally created to predict survival following transjugular intrahepatic portosystemic shunt (TIPS) for refractory ascites [(2)].

MELD score is a prognostic predictor for cirrhotic patients in ICU, calculated by the formula 3·8*logẽ (serum bilirubin [mg\d l])+11·2*loge (INR)+9·6*loge (serum creatinine [mg\dl])+6·4, it contains only objective values that eliminate intra-and inter-observer variability [(3)].

The prognostic accuracy of MELD scoring is improved by variables indicating organ support as (mechanical ventilation, vasopressors, and continuous renal replacement therapy) all included in the model [(4)].

Critically ill patients treated in the intensive care unit represent a heterogeneous collective. They differ decisively in their clinical presentation, age, disease etiology, hemodynamics, treatment response as well as in prognosis. Scoring systems (such as APACHE 2) have been developed to better stratify the risk profiles of ICU patients and to estimate their potential outcome [(5)].

Prior studies have compared the MELD score with ICU-specific prognosis scores in predicting in-ICU mortality and in- hospital mortality of cirrhotic patients after ICU admission.

Aim of the Work

Comparing MELD score in critical cirrhotic and critical non cirrhotic patients for mortality and discharge from ICU.

2. Patients and Methods

Study Design:

This a cross section prospective and retrospective thesis study was conducted on 120 patients (60 cirrhotic,60 non cirrhotic) who were admitted to ICU of Theodor Belhars Research

Institute Hospital which is related to the Ministry of Higher Education and Scientific Research Hospitals Signed consent was taken from the patients or the 1st degree relatives.

Study Period:

6 months prospective and retrospective.

Study Population:

Sample size:

Using PASS Program, selting alpha 5 and power 80%. After reviewing Literature no previous study compared MELD score prediction for mortality in cirrhotic and non cirrhotic ICU patient so, sensitivity of MELD in cirrhotic group was 96% and for non cirrhotic to be 75% with 50% mortality rate, need 60 per group, total (120).

Inclusion criteria:

All adult cirrhotic and non cirrhotic patients (aged 21 years or above), of both sexes, who will be admitted to ICU for more than 24 hours with varying indication. Diagnosis of liver cirrhosis will be done by abdominal ultrasound findings which reveal the presence of liver cirrhosis of any degree.

Exclusion criteria:

Patients aged less than 21 years old. All the patients included in the study will receive the standard of care according to our ICU protocols in the form of investigations and medications.

Data collection

All patients will be subjected to the following: Thorough history and clinical examination. Liver function tests: serum transaminases, serum bilirubin (total and direct) and serum albumin. Complete blood count, International normalized ratio. Serum urea and creatinine levels. Serum sodium and potassium levels. Abdominal ultrasonography.

All laboratory investigations will be done after 24 hours of admission to ICU.

All laboratory investigations will be done through a 5 ml blood sample taken from a peripheral vein after sterilization of the skin with povidone iodine except arterial blood gas sample which will be done through about 1ml of blood taken from radial artery after sterilization of the skin.

In addition, the 24 hours MELD, SOFA and APACHE 2 will be calculated for each patient.

MELD and SOFA and APACHE 2 will be compared between diseased and discharged patients.

MELD score equation:

The MELD score was adopted in 2002 by the United Network for Organ Sharing (UNOS) to prioritize allocation of deceased donor organs for liver transplantation. The MELD score for prioritization for liver transplant ranges from 4 to 60 points. The higher the MELD score, the lower the 3-month survival. MELD = 3·8*logĕ (serum bilirubin [mg\dl])+11·2*loge (inr)+9·6*loge (serum creatinine [mg\dl])+6·4**).** It will be calculated by computer -All patients will be under observation in ICU receiving the standard of care until improvement and discharge from ICU or death.

APACHE II score items:

The point score is calculated from a patient's age and 12 routine physiological measurements: Partial oxygen tension (depending on Fraction of inspired oxygen). Temperature. Mean arterial blood pressure. pH arterial. Heart rate. Respiratory rate. Serum Sodium. Serum Potassium. Serum Creatinine. Hematocrit value. White blood cell count. Glasgow coma scale.

Patient prognosis (specifically, predicted mortality) was computed based on the patient's APACHE II score in combination with the principal diagnosis at admission. The higher scores have the worst prognosis.

Sequential Organ Failure Assessment (SOFA) score:

Is a scoring system that assesses the performance of several organ systems in the body (neurologic, blood, liver, kidney, and blood pressure/hemodynamics) and assigns a score based on the data obtained in each category. The higher the SOFA score, the higher the likely mortality.

Abdominal Ultrasound:

Ultrasonographic examination will be performed to all participants after overnight fasting for at least 6 hours using a Toshiba Memo 30 scanner equipped with a 3.5 mHz linear transducer with full assessment of abdominal organs particularly the liver, spleen, portal vein, presence of ascites.

Ethical considerations:

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 and the ethical committee of hospital approved this study.

The end point of the study:

All patients will be under observation in ICU receiving the standard of care until improvement and discharge from ICU or death. The primary goal from this research is to determine whether MELD score effective in non cirrhotic critical ill patients and cirrhotic patients as apredictor of mortality or not. The secondary goal comparing between cirrhotic and non cirrhotic according to scoring systems.

Statistical Analysis

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 23. The quantitative data were presented as mean, standard deviations and ranges when parametric and median with inter-quartile range (IQR) when non parametric and percentiles was used to assess the distribution of some parameters. Also

qualitative variables were presented as number and percentages.

The comparison between groups regarding qualitative data was done by using ***Chi-square test*** and/or ***Fisher exact test*** when the expected count in any cell found less than 5. The comparison between two groups regarding quantitative data non parametric distribution was done by using ***Independent t-test.*** The comparison between two groups regarding quantitative data non parametric distribution was done by using ***Mann-Whitney test.*** The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following: P-value > 0.05: Non significant (NS). P-value < 0.05: Significant (S). P-value < 0.01: Highly significant (HS).

3. Results

This study showing that there is non significant relation between MELD score and non cirrhotic patients outcome table (7), but there is highly significant relation with cirrhotic patients according outcome table (8).

Table (1): Comparison between 2 groups regarding demographic data.

		Non cirrhotic group	**Cirrhotic group**	**Test value**	**P-value**	**Sig.**
		No. = 60	**No. = 60**			
Age (year)	Mean ± SD Range	59.77 ± 12.72 23 – 80	60.60 ± 10.62 32 – 92	-0.390•	0.698	NS
Sex	Female Male	33 (55.0%) 27 (45.0%)	29 (48.3%) 31 (51.7%)	0.534*	0.465	NS
DM (mg/dl)	Negative Positive	29 (48.3%) 31 (51.7%)	31 (51.7%) 29 (48.3%)	0.133*	0.715	NS
HTN (mmhg)	Negative Positive	30 (50.0%) 30 (50.0%)	49 (81.7%) 11 (18.3%)	13.374*	0.000	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test. DM=diabetes mellitus.

Table (2): Comparison between 2 groups regarding the clinical data.

		Non cirrhotic group	**Cirrhotic Group**	**Test value•**	**P-value**	**Sig.**
		No. = 60	**No. = 60**			
SBP (mmhg)	Mean ± SD Range	123.92 ± 31.54 60 – 200	90.83 ± 17.23 9 – 120	7.084	0.000	HS
DBP (mmhg)	Mean ± SD Range	76.33 ± 21.15 50 – 140	56.00 ± 11.96 40 – 80	6.482	0.000	HS
MAP (mmhg)	Mean ± SD Range	92 ± 23.79 40 – 160	67.08 ± 14.07 53 – 90	6.982	0.000	HS
HR (b/m)	Mean ± SD Range	98.63 ± 22.05 63 – 152	107.42 ± 15.78 80 – 146	-2.509	0.013	S
RR	Mean ± SD Range	22.5 ± 5.72 14 – 36	21.07 ± 7.19 12 – 40	1.208	0.230	NS
TEMP	Mean ± SD Range	37.26 ± 2.6 35.6 – 39	37.00 ± 1.65 36 – 39	0.430	0.668	NS
GCS	Mean ± SD Range	12.72 ± 2.47 9 – 15	10.98 ± 1.76 8 – 13	4.425•	0.000	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test

Table (3): Comparison between 2 groups regarding the liver functions.

		Non cirrhotic group	Cirrhotic Group	Test value	P-value	Sig.
		No. = 60	No. = 60			
AST (U/L)	Median (IQR) Range	34.8 (25.5 – 49) 10 – 183	69.5 (42.5 – 116.5) 40 – 3352	-5.061≠	0.000	HS
ALT (U/L)	Median (IQR) Range	20 (13.5 – 29.5) 7 – 125	37.5 (22 – 64) 56 – 559	-4.605≠	0.000	HS
BILI (T) (mg/dl)	Median (IQR) Range	1 (0.6 – 1.7) 0.2 – 18.1	3.4 (1.35 – 5.5) 1.5 – 26.5	-4.923≠	0.000	HS
BILI (D) (mg/dl)	Median (IQR) Range	0.25 (0.07 – 0.9) 0.01 – 10.7	1.44 (0.5 – 2.64) 0.1 – 14.7	-4.882≠	0.000	HS
ALB (g/dl)	Mean ± SD Range	2.97 ± 0.86 1.4 – 4.8	2.29 ± 0.56 1.2 – 3.7	5.149•	0.000	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test.

Table (4): Comparison between 2 groups regarding the blood tests.

	Non cirrhotic group	Cirrhotic group	Test value		P-value	Sig.
	No. = 60	No. = 60				
HB (g/dl)	Mean ± SD Range	10.3 ± 2.28 4.71 – 16.5	9.89 ± 2.45 5.2 – 16.7	0.950•	0.344	NS
HCT (%)	Mean ± SD Range	32.96 ± 6.75 17 – 46	29.03 ± 8.13 2.4 – 52.1	2.879•	0.005	HS
WBCs (10^9/l)	Mean ± SD Range	14.43 ± 8.66 3.4 – 44.6	12.58 ± 8.42 2.9 – 52	1.187•	0.238	NS
PLTs (10^9/l)	Mean ± SD Range	226.34 ± 108.47 14 – 507	124.98 ± 99.49 13 – 492	5.334•	0.000	HS
INR	Median (IQR) Range	1.25 (1.09 – 1.6) 0.9 – 5	1.46 (1.3 – 2.05) 1.01 – 5	-2.889≠	0.004	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test.
HB: hemoglobin.

Table (5): Comparison between 2 groups regarding the Kidney function tests.

		Non cirrhotic group	Cirrhotic Group	Test value	P-value	Sig.
		No. = 60	No. = 60			
UREA (mg/dl)	Median (IQR) Range	69.8 (28.15 – 135) 4.4 – 296	83.75 (43.5 – 109.45) 12 – 219	-0.008≠	0.994	NS
Creat. (mg/dl)	Median (IQR) Range	2.05 (0.94 – 5.56) 0.5 – 14	1.28 (0.86 – 1.93) 0.4 – 3.77	-3.270≠	0.001	HS
Na (mEq/l)	Mean ± SD Range	134.95 ± 6.09 121 – 151	134.00 ± 7.93 111 – 146	0.736•	0.463	NS
K (mEq/l)	Mean ± SD Range	4.33 ± 1.06 1.8 – 6.7	4.39 ± 0.85 2.8 – 6.3	-0.352•	0.725	NS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test.

Table (6): Comparison between 2 groups regarding Arterial Blood Gases and Mechanical ventilator.

		Non cirrhotic group	Cirrhotic Group	Test value•	P-value	Sig.
		No. = 60	No. = 60			
PH	Mean ± SD Range	7.36 ± 0.11 7.09 – 7.66	7.42 ± 0.10 7.12 – 7.56	-3.322•	0.001	HS
PCO2 (mmHg)	Mean ± SD Range	36.8 ± 10.59 14 – 70	32.12 ± 7.04 14 – 44	2.852	0.005	HS
PO2 (mmHg)	Mean ± SD Range	79.57 ± 21.55 11 – 145	88.58 ± 18.76 53 – 136	-2.444	0.016	S
HCO3(mmol/L)	Mean ± SD Range	21.09 ± 6.72 5.3 – 37.6	21.66 ± 6.11 6.9 – 34	-0.483	0.630	NS
SO2(%)	Mean ± SD Range	94.23 ± 3.02 84 – 100	96.72 ± 2.14 88 – 99	-5.195	0.000	HS
FIO2(%)	Mean ± SD Range	32.58 ± 14.94 21 – 90	30.08 ± 7.61 21 – 50	1.155	0.250	NS
Lactate (mmol)	Median (IQR) Range	2.35 (1.3 – 6.4) 0.2 – 15	3.70 (2.6 – 5.25) 0.7 – 15	-2.111≠	0.035	S
MV	No Yes	41 (68.3%) 19 (31.7%)	18 (30.0%) 42 (70.0%)	17.638*	0.000	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test.

Table (7): Relation between Scoring systems and outcome in Non cirrhotic patients.

		Outcome		Test value	P-value	Sig.
		Discharged	Died			
MELD	Mean ± SD Range	21.52 ± 9.07 7 – 40	19.00 ± 10.36 6 – 46	0.990	0.326	NS
Sofa	Mean ± SD Range	5.67 ± 2.48 1 –7	9.55 ± 3.53 8– 15	-2.568	0.010	S
Apache 2	Mean ± SD Range	14.48 ± 5.26 5 – 20	18.22 ± 7.45 5 – 38	-3.218≠	0.001	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test

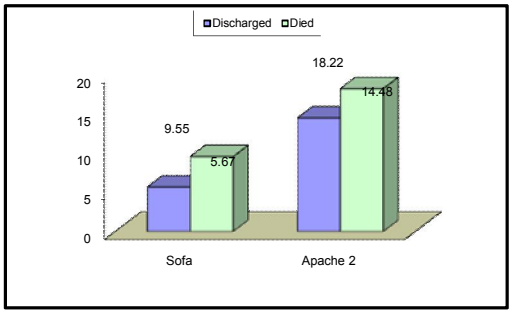

Figure (1): Relation between Scoring systems and outcome in Non cirrhotic patients.

Table (8): Relation between Scoring systems and outcome in Cirrhotic patients.

		Outcome		Test value	P-value	Sig.
		Discharged	Died			
MELD	Mean ± SD Range	16.69 ± 6.26 7 – 34	30.64 ± 8.47 17 – 50	-6.701	0.000	HS
Sofa	Mean ± SD Range	5.85 ± 2.43 2 – 5	11.86 ± 2.51 8 – 18	-6.703	0.000	HS
Apache 2	Mean ± SD Range	17.11 ± 5.05 9 – 33	27.64 ± 6.36 16 – 39	-6.428	0.000	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test.

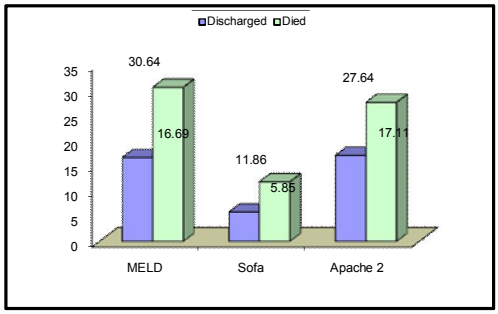

Figure (2): Relation between Scoring systems and outcome in Cirrhotic patients.

4. Discussion

This a cross section prospective and retrospective thesis study was conducted on 120 patients from Theodor Belharez Institute Hospital TBRI), divided into 2 groups: 60 cirrhotic group and 60 non cirrhotic group of both sexes admitted to The Critical Care unit, fulfilled the inclusion and exclusion criteria, Approval of the medical ethics committee of Theodor Belharez Institute Hospital (TBRI), and an informed consent was taken from the next of kin before conducting study.

The finding of this study suggest that MELD, SOFA, PACHE II scores are good prognostic factors and have a high mortality prediction in liver cirrhosis patients who were admitted to ICU.

Although SOFA, APACHE II score are good predictor for mortality in critical non cirrhotic patients, MELD score does not act as agood predictor for them.

As regard demographic data: the median age of the study population was 60.0 years (range, 23-92 years) patients enrolled in this study 62(50.5%) women and 58(49.5%) men.

In this study 31 (51.7%) non cirrhotic critical ill patients and 29 (48.3%) cirrhotic patients are diabetic which did not show significant differences in outcome.

Study agree with these results ***Ramachandran et al.*** [(6)] Showed that co-existent diabetes increases the incidence of complications in patients with cirrhosis. Although, did not show significant differences in outcome.

Study demonstrate these findings ***Siegelaar et al.*** [(7)], showed that in critical ill patient showed that (18.6%) had diabetes who are admitted to medical, mixed and trauma ICUs have chances of survival similar to those of patients without diabetes. Diabetes significantly increases mortality risk only in patients admitted after surgery, more specifically after cardiac surgery.

This study showed that 30 (50.0%) non cirrhotic critical ill patients and 11 (18.3%) few cirrhotic patients are hypertensive due to vasodilatation with low overall systemic vascular resistance, which is highly significant difference between them.

Study agree with this results ***Henriksen and Soren*** [(8)] arterial hypertension is rarely manifested in

patients with cirrhosis, even in cases with renovascular disease and high circulating renin activity.

This study showed that glassgo coma scale (GCS) (range 9 – 15) in non cirrhotic critical ill patients and (range 8 – 13) in cirrhotic patients which highly significant difference between 2 groups with P-value (0.000).

Study agree with these results ***Barsic et al.*** [9] a prospective study included 107 critically ill patients showed that the prognostic value of the GCS score is influenced by the cause of the consciousness impairment in critically ill ID patients. It was valid only in patients with CNS infections, particularly in patients with low GCS score values, but we were not able to confirm this in patients suffering from severe infections not affect CNS.

Against this study ***Dong and Cremer*** [10] 1,128 patients were included (62% males, mean age 58 ± 17 years, 40% surgical admissions) The GCS is difficult to obtain and interpret, and showed inconsistent predictive power. In patients with non-neurological primary disease.

This study showed that liver function tests in critical ill non cirrhotic patients minimal increase in comparison with its value in cirrhotic patients high increase which is highly significant difference between 2 groups with P-value (0.000) in all.

Agree with this study ***Thomson et al.*** [11] 263patients are admitted to intensive care unite (ICU) with critical illness showed that Low-grade abnormalities of liver function tests (LFTs) are a significant entity in critically ill patients and show an association with mortality outcomes and clinical events on ICU. They are likely to represent part of a spectrum of liver injury associated with critical illness and should not be disregarded.

Agree with this study ***Soultati*** [12] showed that Hepatic injury in ICU can emerge either as a rapid primary episode caused by an acute reduction in perfusion after shock, hemorrhage, resuscitation or low output septic shock, or as a late-onset form of hepatic injury emerging secondarily to multiple septic episodes and medical treatment strategies. The rapid primary liver dysfunction is accompanied by high levels of hepatic enzymes and is restored within a few days. In late-onset liver injury lower elevations of serum liver enzymes or of serum bilirubin levers are documented reflecting the hepatotoxic action of inflammatory mediators. Both the presence and degree of jaundice are associated with increased mortality and length of stay in ICU.

This study showed that Intrnational Normalized ratio (INR) highly significant between 2 groups: non cirrhotic (range (0.9- 5) and cirrhotic (range (1.01 – 5) with P-value (0.004).

Agree with this results ***Harrison*** [13] in patients with abnormal coagulation testing results in the setting of liver disease, INR and Prothrombin Time (PT) may be best used to provide the practitioner with information about the synthetic function of the liver but not to assess hemorrhagic risk. The evidence supports a "watchful waiting" approach to the transfusion of platelets and fresh-frozen plasma with a bedside assessment of the patient's actual hemorrhagic risk. The safest assumption that a practitioner in an acute and critical setting can make about any cirrhotic patient is that, even on their healthiest day, they were at an elevated risk of adverse outcomes that may be associated with an adverse thrombotic rather than the commonly feared catastrophic hemorrhagic event.

This study showed that significant difference between 2 groups in platelets count non cirrhotic (range 14 – 507 (10^9/l) and in cirrhotic (range 13 – 492 (10^9/l) with P-value (0.000) which showed that thrombocytopenia in some cases.

Agree with this study ***Drews and Weinberger (2000)*** an abnormally low platelet count arises from one or more of four general mechanisms: (*1*) decreased platelet production, (*2*) increased platelet destruction, (*3*) dilutional or distributional causes, and (*4*) spurious thrombocytopenia.

This study showing that acute kidney injury affect critical ill patients either cirrhotic creatinine (range (0.4 – 3.77 mg/dl) or non cirrhotic creatinine (range (0.5 – 14 mg/dl) showing significant difference between 2 groups which predict poor prognosis with P-value (0.001).

Study demonstrated this results ***Metnitz et al.*** [14] 17,126 patients admitted consecutively to 30 medical, surgical, and mixed intensive care units in Austria over a period of 2 yrs, The results of our study suggest that acute renal failure in patients undergoing renal replacement therapy presents an excess risk of in-hospital death. This increased risk cannot be explained solely by a more pronounced severity of illness. Our results provide strong evidence that acute renal failure presents a specific and independent risk factor for poor prognosis.

This study showing the following that outcome of (120) patients, 72 (60%) patients discharged while 48(40%) patients died.

Study agree with our results ***Frohlich et al.*** [1] cirrhotic patients are at an increased risk for developing decompensation related mainly to portal hypertension, including variceal bleeding, ascites, hepatic encephalopathy and hepato-renal syndrome. Patiens with cirrhosis admitted to the ICU have a substantially high mortality rate of 50% to 100%.

Several scores have been developed for cirrhotic patients admitted to ICU based on combination of

prognostic indicators. Of the models used like, child turcotte-pugh (CTP), model of end stage liver disease (MELD) for patients with liver disease, while acute physiology & chronic health evaluation (APACHE II) and sequential organ failure assessment (SOFA) are valid for use in different patient groups admitted to ICU [15].

Critically ill patients treated in the intensive care unit represent a heterogeneous collective. They differ decisively in their clinical presentation, age, disease etiology, hemodynamics, treatment response as well as in prognosis. Scoring systems (such as APACHE 2) have been developed to better stratify the risk profiles of ICU patients and to estimate their potential outcome [5].

It has been shown that the MELD score can serve as an indicator of multi-organ failure [16].

The MELD score captures derangements in two critical organ systems: kidney and liver. Liver dysfunction and elevations in the associated serum markers are known to be related to poor outcomes in many patient collectives [17].

In these study according to MELD score which including (serum bilirubin, creatinine levels and INR) its show that there is highly statistically significant negative relation with out come of cirrhotic patients discharged patients with score (7 – 34) and positive relation with died patients with score (17 – 50) but statistically non significant with non cirrhotic patients according to out come.

After reviewing Literature no previous study compared MELD score prediction for mortality in cirrhotic and non cirrhotic ICU patient so, sensitivity of MELD in cirrhotic group was 96% and for non cirrhotic to be 75% with 50% mortality rate, need 60 per group, total (120).

MELD scores with ICU specific prognosis scores in predicting in ICU mortality and in-hospital mortality for cirrhotic patients after ICU admission [18].

This study agree with a study on 276 patients admitted to the ICU done by ***Annamalai et al.*** [4] the MELD demonstrated as apredictor in critically ill patients with cirrhosis and might not be the best indicator for prognosis in the ICU population. It showed significantly progressive increase in mortality rate was associated with high MELD p value ($p < 0.001$) in cirrhotic and showed non significantly in the other ICU population ($p < 0.230$) which similar to our result highly significant ($p<0.000$) in cirrhotic and non significant ($p<0.326$) in non cirrhotic.

This study showed that MELD, SOFA and APACHE II, are a good indicator for mortality in cirrhotic patients.

Also in a study done by ***Juneja et al.*** [19] on 104 patients admitted to a specialty liver ICU in India, higher SOFA is good prognostic model in predicting 30-day mortality, observed mortality in ICU was 75.3% and 87.7%, respectively. P-value (0.003) highly significant for APACHE II, P-value (0.008) significant for SOFA, and P-value (0.001) highly significant for MELD. MELD, SOFA and APACHE II scores were the best prognostic model for cirrhotic in this study attributed to difference in study design as it described the observed mortality on admission and at 30 days mortality.

Also the study of ***Sumskiene et al.*** [20] demonstrated that MELD scale has higher capability to predict short-term mortality risk in patients with end-stage liver disease.

Also ***Papatheodoridis et al. in*** [21] demonstrated that the predictive accuracy of MELD score was always superior offering the greatest benefit in the prediction of 12- and 24-months survival. Both MELD and CTP scores can accurately predict short-term (3- and 6-months) survival in patients with decompensated cirrhosis, while MELD appears to have a slight advantage in predicting medium-term (12- and 24-months).

Against these study ***De Moraes et al.*** [22] showed that predictive power of the MELD score and derivatives, showing its applicability in cardiology. The use of this tool can contribute to the evaluation of the severity of the patients with heart failure.

This study showed that MELD parameters have been demonstrated to not be significant associated with patient outcomes in various populations such as patients with acute heart failure and septic patients.

Roth et al. [23] showed that MELD score as a predictor of mortality, length of hospital stay, and disease burden, by 39,323 inpatients were included in the final analysis. On admission, MELD scores of 15 to 19, 20 to 29, and ≥30 points showed increased hazard ratios (HRs) for hospital mortality the MELD score on hospital admission was significantly associated with mortality, long standing in hospital, and the number of comorbiditie which suggest that prospectively validation of the MELD score in inpatients as part of clinical decision support systems.

Also this study against our study by ***Kim et al.*** [24] on 343 patients shows that MELD and MELDNa scores were excellent predictors for 1-year and the statistical significance of MELD/MELDNa was higher in patients not receiving oral anticoagulation therapy.

Despite the encouraging results, this study has sever allimitations. First, the subjects were drawn from just one institution; consequently, the results may not be directly extrapolated to other patients populations. Second, the sample size was insufficient for reaching strong conclusions regarding the poor

short-term prognosis of mortality for ICU cirrhotic and non cirrhotic patients done by MELD score.

Finally, predicting of mortality scores was performed only on the first day of ICU admission, sequential measurement of mortality scores (e.g., daily or weekly) may reflect the dynamic aspects of clinical diseases and thus provide complete data for mortality risk.

Conclusion

Many factors may be useful as a predictor of mortality in ICU on patients with cirrhosis but may be not useful in non cirrhotic. MELD, SOFA, APACHE II score are good prognostic factors and have a high mortality prediction in liver cirrhosis patients who were admitted to ICU. Although SOFA, APACHE II score are good predictor for mortality in critical non cirrhotic patients MELD score does not act as a good predictor for them.

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