

## Research Article

# Association of Modified Shock Index with Mortality in Patients with Non-Variceal Upper Gastrointestinal Bleed

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### Abstract

**Background:** In an emergency setting, non-variceal gastrointestinal bleeding in upper region of gastrointestinal tract is the common presentation. Multiple factors interact constantly to maintain the hemodynamic of patients. The modified shock index can help to predict hemodynamic instability and associated outcomes.

**Objective:** To assess the association of modified shock index with mortality within 72 hours in patients of upper gastrointestinal bleed.

**Methods:** This Prospective Cohort study was conducted at Department of Gastroenterology, Services Hospital, Lahore for 6months. Two hundred and eighty patients (140 in each group) were assessed for modified shock index. Two groups were formed i.e. exposed with modified shock index was  $>1.3$  and unexposed with modified shock index was  $\leq 1.3$ . Patients were followed-up in high dependency unit. If patients died within hospital stay, then mortality was labeled. Data was analyzed in SPSS v.20. Relative risk was calculated to measure association between modified shock index with mortality.

**Results:** The mean age of the patients in our study was  $52.31 \pm 14.22$  years in exposed group and  $50.69 \pm 11.23$  years in unexposed group. There were 80 males and 60 females in exposed group while 75 males and 65 females in unexposed group. Among exposed group, mortality occurred in 32 (22.9%) cases while in unexposed group, mortality occurred in 8 (5.7%). Relative Risk was calculated as 1.778 (95% CI; 1.443-2.19).

**Conclusion:** There is significant association of high modified shock index score with mortality. In future, we can now rely on modified shock index for prediction of prognosis of patients with upper gastrointestinal bleed.

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**Key Words:** Modified shock index, mortality, upper gastrointestinal bleed.

### Introduction

Normally, patients diagnosed with upper gastrointestinal bleed need hospital admission and have the mortality rate that can occur in 6% - 14% cases.<sup>1</sup> The examination of patients at initial presentation is important for the effective treatment and to achieve good prognosis and outcomes. In routine,

physicians have to take challenging decisions while managing the unconscious patients.<sup>2,3</sup> So it is important to find a helpful and reliable tool or scoring system that can help to determine the diagnostic and prognostic condition of the triage patients related to their hemodynamic instability.<sup>4</sup> Several predictors constantly interrelate with each other to maintain the hemodynamic stability of the unstable patients.<sup>5</sup> The

shock -- index, modified-shock index, and age-shock -- index have been explored before in several clinical conditions to predict their reliability in diagnosing and prognosis of hemodynamic instability.<sup>6</sup> These indices are estimated by using simple haemodynamic parameters, are non-invasive in nature, and do not add any additional cost for diagnosis or treatment.<sup>4,7</sup>

An increase in shock index from home to emergency department may estimate the higher mortality rate. The shock index can be valuable for the emergency department triage criteria, which is now used to activate the response of trauma teams. So rationale of this research was to determine the association of high modified shock index with mortality within 72 hours in patients of upper gastrointestinal bleed. In routine, patients usually undergo routine interventions without screening for prognosis. Modified shock index can helpful in predicting the prognosis of patients and special care and treatment can be given to the patients with high index value. But very little work has been done in this regard and local evidence is also missing. So we want to conduct this research to determine the association of modified shock index with mortality within 72 hours in patients with upper gastrointestinal bleed.

### Methods:

This prospective Cohort study was conducted at the Department of Gastroenterology, Services Hospital, Lahore for 6 months period i.e. from July to December 2019. Sample size of 280 cases was estimated with 95% confidence level, 3.5% margin of error level and mortality rate i.e. around 10%<sup>1</sup> in patients with upper gastrointestinal bleeding. Patients were then divided in two groups (140 in each group) based on modified shock index level. Patients of age 20-70 years, either gender presenting with upper gastrointestinal bleeding i.e. hematemesis, melena (dark black, tarry faeces), haematochezia (fresh blood in stool), were included. Modified shock index was measured by formula i.e. ratio of heart beat (bpm) and mean arterial pressure (mmHg). It was labelled as high if index score  $> 1.3$  (exposed group) and was labelled as low if index score  $\leq 1.3$  (unexposed group). Patients with already known gastrointestinal malignancy and taking treatment, cirrhosis (coarse

liver on ultrasound), hepatitis B or C (on medical record), ascites or variceal bleeding (on endoscopy) were excluded from the study.

After approval from ethical board, 280 patients fulfilled selection criteria were recruited for study through emergency Department. Informed consent was obtained. Demographic information was also obtained. Then patients underwent assessment for modified shock index. Two groups were formed i.e. exposed with modified shock index  $> 1.3$  and unexposed with modified shock index  $\leq 1.3$ . Meanwhile patients were admitted in high dependency unit. Then patients were followed-up in intensive care unit. If patients died during admission in the hospital, then mortality was noted. The patient who remained alive were followed-up till discharge and discharged patients were further followed-up in OPD and treated as per standard protocols. All this information was recorded on Proforma and analyzed via SPSS version 20. Relative risk was calculated to measure association between modified shock index and mortality in patients with upper gastrointestinal bleeding.  $RR > 1$  was considered as significant risk of association.

### Results:

The mean age of the patients was  $52.31 \pm 14.22$  years in exposed group and  $50.69 \pm 11.23$  years in unexposed group. There were 80 males and 60 females in exposed group while 75 males and 65 females in unexposed group. The mean duration of symptoms was  $3.41 \pm 1.93$  in exposed group and  $2.94 \pm 1.02$  in unexposed group. Mean duration of hospitalization was  $6.21 \pm 2.36$  days in exposed patients while  $4.31 \pm 1.79$  days in unexposed patients. Ulcer was more common in exposed patients while erosions were more common in unexposed patients ( $p < 0.05$ ). Table 1

The mean modified shock index was  $1.49 \pm 0.87$  in exposed group and  $0.6 \pm 0.3$  in unexposed group. The difference was significant ( $p < 0.05$ ). Among exposed group, mortality occurred in 32 (22.9%) cases while in unexposed group, mortality occurred in 8 (5.7%). Relative Risk was calculated as 1.778 (95% CI; 1.443, 2.19, \* =  $P < 0.001$ , significant difference in both groups). Table 2

**Table 1:** Demographics of patients

	Study groups		p-value
	Exposed	Unexposed	
n	140	140	
Age (years)	52.31 ± 14.22	50.69 ± 11.23	0.2910 *
Gender: Male / Female	80 / 60	75 / 65	0.5478 !
Duration of symptoms	3.41 ± 1.93	2.94 ± 1.02	0.012 *
Diagnosis on endoscopy			
Ulcer	98 (70%)	34 (24.3%)	
Mallory-Weiss syndrome	24 (17.1%)	59 (42.1%)	< 0.0001 !
Erosions	18 (12.9%)	47 (33.6%)	
Need for transfusion	17 (12.1%)	2 (1.4%)	0.0004 !
Duration of admission	6.21 ± 2.36	4.31 ± 1.79	< 0.0001 *
AST	40.18 ± 12.63	30.21 ± 15.32	< 0.0001 *
ALT	45.44 ± 15.75	42.17 ± 14.47	0.0715 *
Serum Creatinine	1.1 ± 0.61	1.0 ± 0.84	0.2554 *
Baseline hemodynamic			
Haemoglobin	8.44 ± 3.12	10.33 ± 8.92	0.0187 *
White blood cell	10.36 ± 4.57	5.66 ± 4.53	< 0.0001 *
Platelet count	147.89 ± 60.32	196.37 ± 40.25	< 0.0001 *

\* = independent samples t-test

! = Chi-square test

**Table 2:** Association of raised modified shock index with mortality

	Study groups	
	Exposed	Unexposed
n	140	140
Modified shock index	1.49±0.87	0.6±0.3*
Mortality (within 72 hours)	32 (22.9%)	8 (5.7%)*

**Relative Risk:** 1.778 (95% CI; 1.443, 2.19), \* = P < 0.001 (significant difference in both groups)**Discussion:**

The non-variceal upper gastrointestinal bleed is a common medical emergency, which is the significant clinical and economical burden. Despite the fact that the rate of mortality in patients of upper gastrointestinal bleeding has decreased significantly in recent years as a result of the advancement of proton-pump

inhibitor and endoscopy, it nevertheless stands at 5% - 10%.<sup>8</sup> The prominence of risk stratification in earlier phase for re-bleeding and mortality was stressed in a recent international agreement on upper gastrointestinal bleeding.<sup>9</sup> Re-bleeding was shown to be a major indicator of mortality among many risk factors for this disease.<sup>10</sup> Increasing age, cirrhosis, chronic kidney disorder, progressive neoplasia, reduced haemoglobin levels, heart dysfunction, and hemodynamic instability are both risk factors.<sup>11</sup>

The risk score proposed by Rockall in 1996, which distinguishes patients at risk of poor outcome after upper gastrointestinal bleed, is one of the most frequently used.<sup>12</sup> Vital signs are used by physicians to make diagnosis, recognise irregular pathophysiologic states, and monitor treatment responses. Respiratory speeds, heart rates, and blood pressures are reported numerically, which provides immediate knowledge about the seriousness of different acute

presentations and also guides response to clinical treatments.<sup>13</sup> In patients confined to medical intensive care units with gastrointestinal bleeding, a more formal review of the shock index is required. The immediate reaction to resuscitate, continuous bleeding after primary therapy, and re-bleeding after a period of recovery are also essential aspects to remember. It also has to be correlated with other risk scoring instruments.<sup>14</sup> When patients present with upper gastrointestinal bleed, the shock index is a helpful instrument for determining those who may have a high risk of short-term complications. It works and also other risk scoring instruments for gastrointestinal bleed, and it has the ability to be used in a serial manner during hospital admission to track the changes in clinical course.<sup>15</sup>

Nathan et al., investigated the impact of a high shock index in postpartum hemorrhage and observed that the high shock index ( $> 0.9$ ) had good sensitivity for predicting high dependency unit admission and the shock index  $\geq 1.7$  recognized the patients who need the urgent interventions.<sup>16</sup> Tseng & Nugent conducted a review on shock index level in patients of sepsis and observed that the raised shock index was helpful in the assessment of fluid resuscitation and in detection of patients having organ failure, lactic acidosis and higher rates of mortality.<sup>17</sup> Different researchers have done studies and compared the accuracy of shock -- index, modified shock -- index and age shock -- index to determine the more appropriate and suitable tool for prediction of hemodynamic instability in diseased patients. Yu et al., conducted an observational study and observed that the age shock -- index was more appropriate to detect the patients who were at higher risk of mortality after acute myocardial infarction, as compared to the shock -- index and modified shock -- index.<sup>18</sup> Zarzaur et al., conducted another study in trauma patients and observed that the shock -- index and age shock -- index have almost equal prognostic value for mortality within first 48 hours of presentation after trauma due to blunt injuries, but the age shock -- index was better for prognosis of patients aged  $> 55$  years.<sup>19</sup>

Liu et al., conducted a study in 2012 and found that the modified shock -- index has better predictive accuracy as compared to the shock -- index in predicting death after trauma in emergency.<sup>20</sup> Torabi et

al., conducted another study and compared the shock -- index, with modified shock -- index, and age shock -- index to determine the risk of mortality in patients presenting in emergency and observed that the age shock -- index had better performance as compared to the shock -- index & modified shock -- index.<sup>21</sup> Terceros-Almanza et al., conducted a study in 2017, and presented that the shock -- index and modified shock -- index showed equal accuracy of prediction of massive hemorrhage after trauma.<sup>23</sup>

### Conclusion:

Thus there is significant association of high modified shock index score with high mortality rate. In future, we can now rely on modified shock index score for prediction of prognosis of patient and can help to plan the treatment protocols according to the level of modified shock index, in order to decrease the mortality rate in such cases.

**Ethical Approval:** Given

**Conflict of Interest:** The authors declare no conflict of interest

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