

Assessment of Severity and Adverse Prognostic Factors in Adult Acute Pancreatitis: An Observational Study at Dhaka Medical College Hospital

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Abstract

Original Research Article

Background: Acute pancreatitis (AP) is a commonly encountered gastrointestinal disorder in acute hospital settings. It usually required hospital admission and without proper management, it can lead to death. In an attempt to predict the severity several approaches have been used and prognosis of attacks of acute pancreatitis. But there is a shortage of literature in our country's context regarding this issue. **Objective:** The objective of the study was to assess the severity and adverse prognostic factors in adult acute pancreatitis patients admitted to a tertiary care hospital. **Methods:** This research was a hospital-based descriptive cross-sectional study and was conducted at the inpatient department of Medicine in Dhaka Medical College from January 2014 to June 2014. A total of 50 patients admitted to the medicine department due to acute pancreatitis were approached. Before selection, screening of the patients was done according to inclusion and exclusion criteria. Following describing the aim and objectives of the study, informed written consent was taken individually. The researcher did a history and physical examination and data collection were done by interviewing each patient by using a structured questionnaire. Ethical measures were ensured properly throughout the study according to the declaration of Helsinki and the patient's health was the prime concern in the whole study period. Collected data were analyzed by computer with the help of SPSS 23. **Results:** Of 50 admitted patients, the mean age of the respondents was 35.18 ± 12.41 SD (years) with slightly male predominance (56% male vs 44% female). Idiopathic (66%) was the most frequent reason for acute pancreatitis. Subsequently, Gall stone disease (14%), alcohol (6%), post-surgery status (6%), petro-chemical exposure (6%), and hypertriglyceridemia (2%) was found as an aetiology. According to the Glasgow criteria, 18% of patients in this study had severe disease and 82% had mild disease. Short-term outcome assessment revealed, 72% of patients recovered, 14% of patients died and 14% did not improve. Patients with severe disease had significantly higher age, higher blood glucose level, higher serum urea level, and higher ALT level than patients with mild disease ($p < .05$). Moreover, Receiver operating characteristics (ROC) curve analysis of Glasgow prognostic score for acute pancreatitis shows that a cut-off value of 3 has a sensitivity of 50% and specificity of 94%. The area under the curve was 0.729. **Conclusion:** These findings indicated that severity of disease had a significant association with higher age, higher blood glucose level, higher serum urea level, and higher ALT level. As the outcome is worst without maximum care, early recognition and prompt management are essential to save the lives and cost of hospitalization.

Keywords: Patients, Higher, Acute pancreatitis, Study, Disease, Level.

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INTRODUCTION

Acute pancreatitis (AP) is a reversible inflammatory process of the pancreas it may be recurrent or occur as an isolated attack. From mild to severe and life-threatening, it has a variety of causes and can range in severity. Acute pancreatitis which is increasing in incidence is a potentially lethal disease. As a result of a better understanding of the natural history of the disease and improvement of critical care, its mortality has improved. In different countries, the

incidence varies from 4.5 to 79.8 per 100,000 per year. This variation is due to different diagnostic criteria, geographic factors, and changes over time [1]. A 10-fold increase in its incidence from 1960 to 1980, with a mortality rate from 1% to 9%, was noted [2]. Approximately 210,000 patients are admitted to hospitals each year with acute pancreatitis, with approximately 20% meeting the criteria for severe pancreatitis alone in the US [3]. In the first major attempts by Knaus et al in 1981 to quantify the severity

of the illness in ICU patients of acute physiology score and the chronic health evaluation (APACHE) were used and this was later modified by the same author in 1985 as APACHE II [4]. In monitoring the patient's response to therapy can be used the Ranson and the Glasgow scales are mainly meant for the assessment at presentation, while compared to the other systems of major advantage of the APACHE II scoring system. Several prognostic factors have been investigated and described the mortality rate is influenced by the severity of the disease, which has a mortality rate of 1% in contrast to the milder form of the disease. The mortality associated with severe acute pancreatitis is 25% with infected pancreatic necrosis and 10% with sterile [5]. The key for diagnosis is elevated levels of amylase or lipase; amylase levels more than 3 times the normal value is highly specific for acute pancreatitis. The degree of pancreatic inflammation is not directly correlated with the amylase or lipase absolute value. As a test for acute pancreatitis, lipase is more sensitive and specific than amylase and is therefore somewhat preferred. If amylase was done initially and was normal, lipase may be elevated [6, 7]. Furthermore, C-reactive protein (CRP) is performed subsequently and is an indicator of severity; useful after the first 36 to 48 hours [8]. Careful and repeated clinical evaluation is clearly of paramount importance in the management of individual patients. A cross-sectional descriptive study was carried out at the Department of Medicine and Department of Surgery, in Rajshahi Medical College Hospital that showed a higher leucocyte count was associated with high mortality. In addition, fever ($\text{temp} > 100.0\text{F}$) at admission, low serum calcium and albumin, and a high blood glucose level were also associated with higher mortality [9]. The lower age incidence of acute pancreatitis may be due to lower life expectancy and the occurrence of gallstone disease in the female at an early age due to early and multiple pregnancies in Bangladesh [9]. Study data showed that ascariasis, mumps, and trauma are common aetiological factors, that more commonly affect the younger age group. In industrialized countries, acute pancreatitis more commonly affects males than females and this is due to increased alcohol consumption by males [10]. Moreover, combinations of clinical and laboratory data that can indicate the severity of acute pancreatitis within the first 48 hours after admission can be evaluated by APACHE II grading system to predict severity.¹¹ Hence this study was planned to assess the adverse prognostic factors in adult acute pancreatitis patients admitted to DMCH.

OBJECTIVE

General Objective

To identify commonly encountered clinical features, risk factors and short term outcome of acute pancreatitis.

Specific Objective:

- To detect and record the clinical signs present in each patient during admission
- To calculate the frequency of presenting symptoms, signs, risk factors and outcome of the patient in terms of improved, not improved and death when discharged from hospital

MATERIALS AND METHODS

This was an observational study indoor Department of Medicine Dhaka Medical College & Hospital from January 2014 to June 2014 patients admitted in DMCH. Male or female age ± 18 years with clinical features consistent with acute pancreatitis and were confirmed by serum amylase, serum lipase, CT scan of the abdomen and by MRI of the abdomen were recruited as study population. Purposive convenient sampling was followed. A total of 50 patients was recruited as the study population. All patients were first screened and confirmed as a case of acute pancreatitis both clinically and radiologically. Then patients were observed regarding severity as well as poor prognostic factors in the first 48 hours of hospital admission. Before the selection of the participants, they were screened according to the inclusion and exclusion criteria. All selected patients were counseled about the aim and objectives of the study and they were clearly informed that they will not get any kind of benefits. Formal ethical clearance was taken from the ethical review committee of the Dhaka Medical College for conducting the study. Then data were entered in SPSS 23.0 for Windows 10 program version. An analysis plan was developed keeping the objectives of the study in mind. All continuous variables were calculated and expressed as Mean \pm SD for frequency and normal distribution. To assess the causes & complications of acute pancreatitis and outcome of pancreatitis was analyzed by frequency distribution and expressed as tables and pie charts. To establish the relationship between mean values of individual parameters and severity of acute pancreatitis was assessed by using chi-square analysis. And finally, the receiver operating characteristics (ROC) curve and area under the curve (AUC) of Glasgow acute pancreatitis prognostic score were done to reveal the sensitivity and specificity.

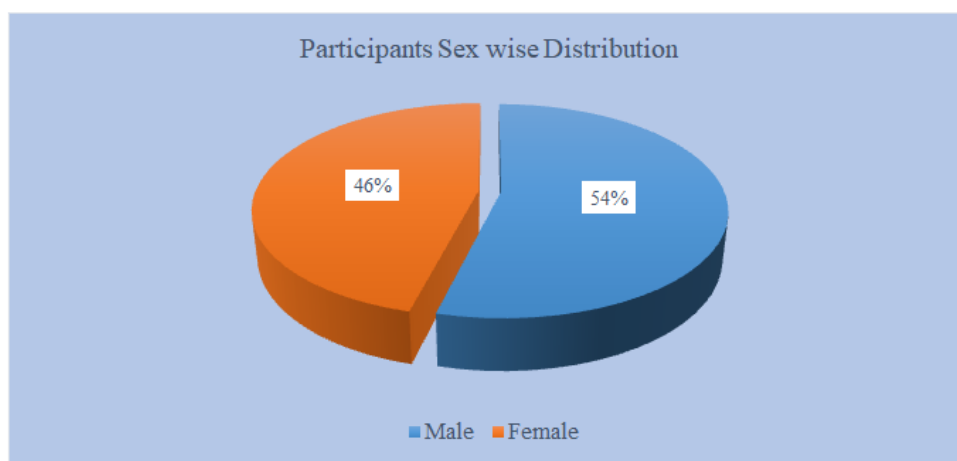
RESULTS

Total 50 cases were included in this study. Mean age of was 35.18 ± 12.41 years. Maximum age was 65 years and minimum age was 20 years. Majority of the patients (48%) was from age group 21-30 years. Table 1 showed the details.

Table 1: Age group distribution of the patients (N=50)

Variables	Frequency (n)	Percentage (%)
Age Group		
21-30 yrs.	24	48.0
31-40 yrs.	16	32.0
41-50 yrs.	2	4.0
51-60 yrs.	3	6.0
61-70 yrs.	3	6.0

Among the study participants, 54% patients were male and 46% were female. Figure I showed the details.

**Figure I: Sex distribution of the study participants (N=50)**

Assessment of other socio-demographic parameters, 94% patients were followers of Islam. Most of the patients were married (84%) and 60% patients

came from rural area. Majority patients were housewives (36%) followed by 28% patients doing private service. Table 2 showed the details.

Table 2: Different socio-demographic parameters of the participants

Variables	Frequency (n)	Percentage (%)
Religion		
Islam	47	94.0
Hinduism	3	6.0
Marital Status		
Married	42	84.0
Unmarried	8	16.0
Residence		
Rural	30	60.0
Urban	20	40.0
Occupation		
House wife	18	36.0
Government Service	6	12.0
Private Service	14	28.0
Farmer	2	4.0
Student	10	20.0

All of the patients complained abdominal pain. Among them 80% had upper abdominal pain and 20% had whole abdominal pain. 18% patients had complained of radiation of pain to the back. 42% patients had vomiting and/or nausea, 14% had fever, 6% respiratory distress and 4% patients had jaundice associated with abdominal pain. The most common

associated sign was dehydration (46%) followed by upper abdominal tenderness (18%) and distended abdomen (16%). 3 patient had hepatomegaly and 2 had splenomegaly. Ascites was found in 3 patients and epigastric mass in another 3 patients. Table 3 showed the details.

Table 3: Clinical features of patients (N=50)

Variables	Frequency (n)	Percentage (%)
Abdominal pain		
Site Upper abdomen	40	80.0
Whole abdomen	10	20.0
Radiation to back	9	18.0
Associated Symptoms		
Vomiting and/or Nausea	21	42.0
Fever	14	28.0
Respiratory distress	3	6.0
Jaundice	2	4.0
Associated Signs		
Upper abdominal tenderness	50	100.0
Dehydration	23	46.0
Anemia	3	6.0
Jaundice	2	4.0
Distended abdomen	8	16.0
Hepatomegaly	3	6.0
Splenomegaly	2	4.0
Ascites	3	6.0
Epigastric mass	3	6.0

Among 50 patients of pancreatitis most common cause was idiopathic (66%) followed in second by Gall stone disease (14%). This was followed by alcohol (6%), Post-surgery status (6%) and petro-

chemical exposure (6%). 2% patient had hypertriglyceridemia as a cause of pancreatitis. Figure II showed a pie chart of the distribution.

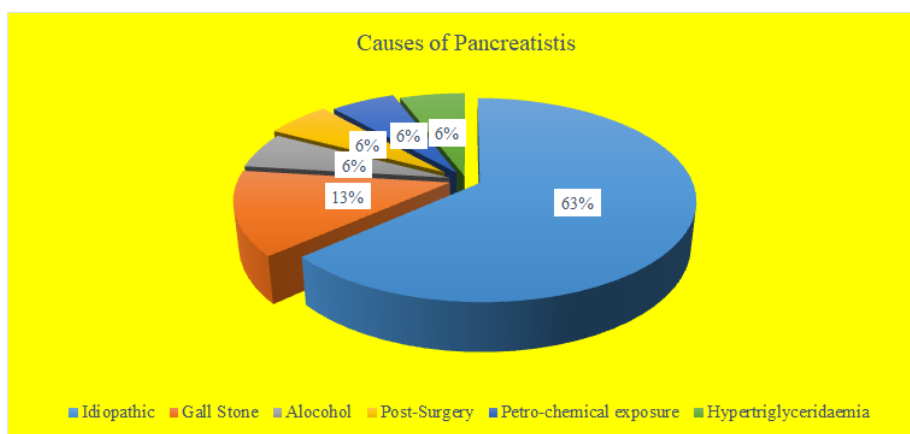


Figure II: Causes of Pancreatitis (N=50)

Among 50 patients 48% developed one or more complications. The most frequent systemic complication was low serum albumin level (28%) and

the most frequent pancreas related complication was pleural effusion (14%). Table 4 showed the details.

Table 4: Complication of Acute Pancreatitis (N=50)

Variables	Frequency (n)	Percentage (%)
Complications		
Hyperglycaemia	11	22.0
Hypocalcaemia	13	26.0
Hypoalbuminaemia	14	28.0
SIRS	3	6.0
Pancreatic complications		
Pancreatic pseudocyst	3	6.0
Pancreatic ascites	5	10.0
Pleural effusion	7	14.0
Pericardial effusion	2	4.0
Paralytic Ileus	1	2.0

Short term outcome of 50 patients was as follows: 72% patient recovered, 14% did not improve

and 14% patients died. Figure III showed a pie distribution of the outcome.

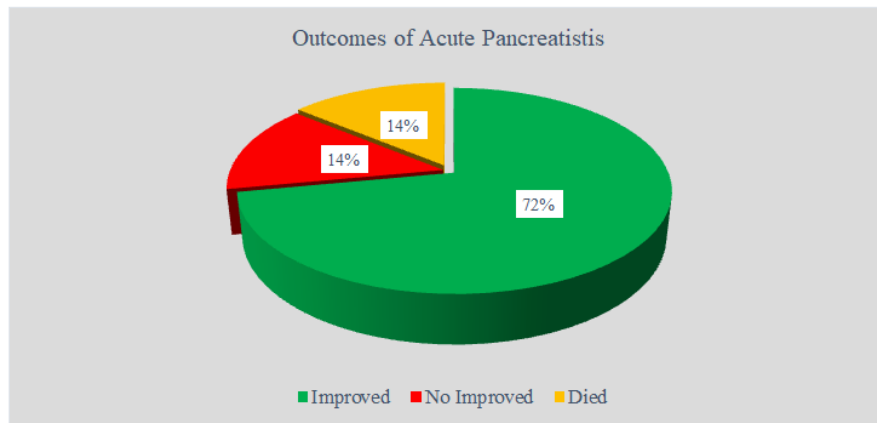


Figure III: Distribution of patients according to outcome of acute pancreatitis (N=50)

Patients who did not improve at short term follow-up and who died were considered to have severe acute pancreatitis (28% patients). On the other hand, patients who improved on short term follow-up were considered to have mild severity (72% patients). Patients with severe disease had significantly higher age, higher blood glucose level, higher serum urea

level and higher ALT level than that of patients with mild disease. Severe pancreatitis patients also had lower pO₂, higher WBC count, lower calcium level, higher LDH level, higher lipase and higher amylase than that of mild severity patients. But, these differences were not significant. Table 5 showed the details.

Table 5: Relationship between mean values of individual parameters and severity of acute pancreatitis

Factor	Severity	No.	Mean	SD	t test	p value
Age (years)	Mild	36	32.06	9.44	-2.49	0.023
	Severe	14	43.21	15.64		
pO ₂ (mmHg)	Mild	36	91.42	6.95	1.40	0.182
	Severe	14	85.36	15.61		
WBC (/mm ³)	Mild	36	12416.67	3289.51	-1.48	0.144
	Severe	14	14042.86	3932.06		
Albumin (g/l)	Mild	36	3.29	0.74	-0.88	0.383
	Severe	14	3.49	0.71		
Calcium (mg/dl)	Mild	36	8.57	0.90	0.48	0.632
	Severe	14	8.44	0.85		
Glucose (mmol/l)	Mild	36	7.07	2.93	-1.97	0.065
	Severe	14	9.91	5.06		
Urea (mg/dl)	Mild	36	24.75	12.72	-2.69	0.01
	Severe	14	36.21	15.39		
ALT (U/L)	Mild	36	55.64	25.95	-2.83	0.013
	Severe	14	124.00	88.75		
LDH (U/L)	Mild	36	267.69	62.74	-1.85	0.086
	Severe	14	419.14	303.27		
Lipase (IU/L)	Mild	25	1131.16	1763.08	-1.50	0.142
	Severe	13	2145.31	2337.53		
Amylase (IU/L)	Mild	33	975.30	878.87	-1.54	0.132
	Severe	11	1457.45	971.07		

Glasgow criteria for prognosis in acute pancreatitis consider 8 biochemical criteria along with age of the patient for determination of prognosis in acute pancreatitis. The biochemical criteria include: pO₂, WBC count, serum albumin, serum calcium, serum glucose, serum urea, ALT and LDH. Severity and prognosis of acute pancreatitis worsen as the number of

these factors increases. Factors more than or equal to 3 is considered severe disease. In this study 18% patients had ≥ 3 Glasgow factor and 82% had <3 factors. This implies that according to Glasgow criteria 18% patients in this study had severe disease and 82% had mild disease. Figure IV showed the distribution.

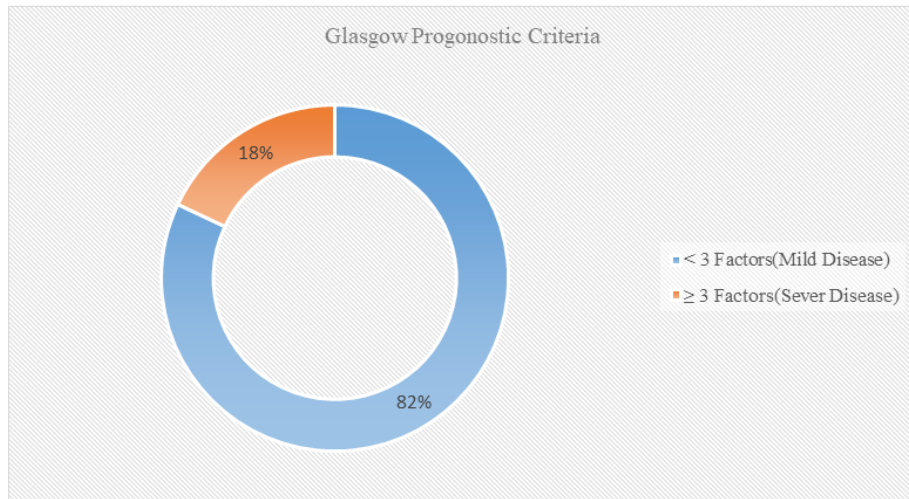


Figure IV. Distribution of subjects according to Glasgow criteria for prognosis inacute pancreatitis along with severity

Receivers operating characteristics (ROC) curve analysis of Glasgow prognostic score for acute pancreatitis showed that a cutoff value of 3 has a sensitivity of 50% and specificity of 94%. Area under the curve was 0.729. Figure V showed the details.

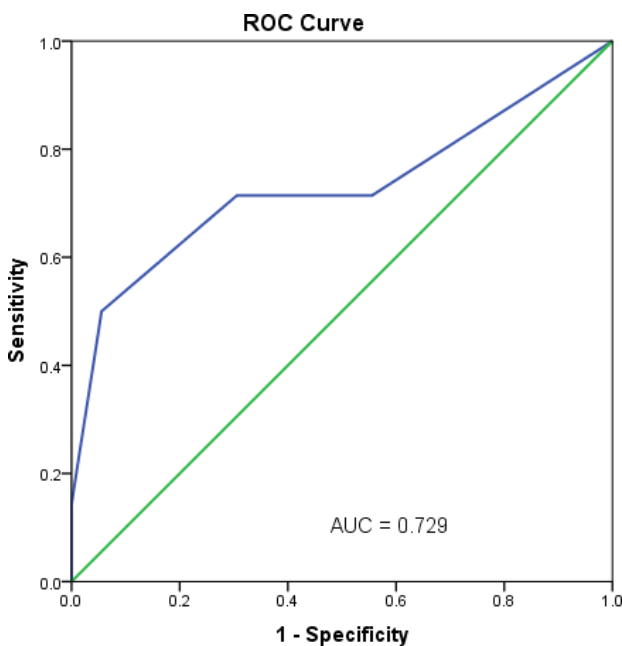


Figure V: Receiver operating characteristics (ROC) curve and Area under thecurve (AUC) of Glasgow acute pancreatitis prognostic score

DISCUSSION

Acute pancreatitis is one of the important causes of acute abdominal pain. It is responsible for 3% of hospital admission with acute abdominal pain [12]. It affects all age groups and the risk of developing acute pancreatitis progressively increases with age [13]. In contrast, this study had the majority of patients in the third decade. Whereas a study conducted in 3 combined military hospitals in Bangladesh had a maximum number of patients in the fourth and fifth decades [14].

The male-female ratio was found 1:17 (male 54% and female 46%). Variation in the male-female ratio in the case of acute pancreatitis is usually attributed to different etiologies [12]. Geographical variations are also likely to etiological [15]. For example, alcohol-related pancreatitis is found higher in male patients than in females because of the higher practice of alcohol drinking in males [16]. 60% of patients came from rural areas and 94% of patients were followers of Islam. This picture depicts the distribution of general habitat and religious affiliations in Bangladesh. According to an estimate by World Bank staff approximately 65% of the current population lives in rural areas in Bangladesh.¹⁷ On the other hand some 88 percent of the country’s inhabitant’s practices Islam [18]. Abdominal pain is the cardinal symptom of acute pancreatitis. It occurs in 95% of cases and usually, it is generalized to the upper abdomen [18]. All of the patients in this study complained of abdominal pain, especially upper abdominal pain (80%). Among them, 18% had radiation to back. Band-like radiation of pain to lower thoracic regions of the back is often found in acute pancreatitis [19]. Nausea and vomiting were the most common associated feature (42%) alongside pain. A study was done by Hasan MM *et al.*, also found nausea and vomiting to be a common presentation of acute pancreatitis [15]. All patients of this study had upper abdominal tenderness (100%). This finding is usual as a mild to severe tenderness is an invariable examination finding in acute pancreatitis.¹⁸ Dehydration was found in 46% of cases. Peri-pancreatic spread of inflammatory process may cause generalized ileus leading to distended abdomen [19] which was found in 16% cases. Ascites were a less common finding (6%) in this study in comparison to the study done in combined military hospitals where ascites was found in 20% of cases.¹⁸ Hepatomegaly was found in 6% of cases. Hepatomegaly in acute pancreatitis can be found when acute pancreatitis occurs in the setting of acute viral hepatitis. Jain P *et al.*, published a study in 2007 where they searched acute pancreatitis in acute viral hepatitis

patients and found 5.6% cases [18]. A careful design to find out viral hepatitis-associated pancreatitis could have found the same reasons for hepatomegaly in this study. Transient splenomegaly can occur in acute pancreatitis [19] and this was also an uncommon finding (4%) of this study. 6% of patients in this study had epigastric mass. This can be explained by the presence of pancreatic pseudocyst (6% of patients in this study). According to an article on Medscape pancreatic pseudocyst is a complication of pancreatitis and it should be considered when epigastric mass is found in patients with acute pancreatitis [20]. Most common causes of acute pancreatitis are Gall stone disease and chronic alcohol consumption [21]. 'Idiopathic' and 'Post-ERCP' were also included in the most common causes in the textbook [22]. In this study, the most common cause of acute pancreatitis was gall stone disease (14%) which was followed by alcohol, post-surgery complication, and petro-chemical exposure (6% each). Hypertriglyceridemia was found in 1 case (2%). No cause could be found in 66% of the cases (Idiopathic). This finding was nearly similar to the study conducted by Ahmed KU *et al.*, In their study entitled "Clinical profile of acute pancreatitis in a teaching hospital" they found 18% cases of gall stone disease and 10% cases of alcoholism as etiological factors for acute pancreatitis [21]. In many countries where alcohol is freely consumed it is the leading cause of acute pancreatitis. In this study, only 6% of cases were due to alcohol. This low incidence in contrast to Western countries reflects the socio-cultural and religious factors that discourage alcohol consumption in our country. 'Idopathic' cause was very high conforming to findings of western countries. A common systemic complication was hypoalbuminemia (28%), hypocalcaemia (26%), and hyperglycaemia (22%). These findings were different from other studies conducted in Bangladesh. Hasan MM *et al.*, reported 12% cases of hyperglycemia and 36% cases of hypocalcaemia in their study [14]. Whereas, Ahmed KU *et al.*, reported 8% cases of hypocalcaemia in their study [21]. Systemic Inflammatory Response Syndrome (SIRS) is a grave complication of acute pancreatitis and causes death in many of the affected patients. 6% of patients developed SIRS in this study. Other pancreas related complications found were pancreatic ascites (10%), pleural effusion (14%), pseudocyst formation (6%), pericardial effusion (4%), and one case of paralytic ileus. MM Hasan and colleagues found 28% cases of pleural effusion in their study which is twice the findings of this study [14]. Ascites, pseudocyst formation, and paralytic ileus were commonly found complications in different studies involving acute pancreatitis [14, 21, 23]. Acute pancreatitis has overall low mortality, of approximately 1% [25]. The risk of death increases with age, co-morbidities, and severe disease; in a recent meta-analysis, the risk of death was the highest among patients with both organ failure and infected necrosis [26]. In this study 14% of people died. This is approximately double the findings of Ahad A.

and colleagues [9]. This study was done with an aim to find out the short-term outcome of acute pancreatitis. Patients who improved at one-week follow-up were considered to have mild disease. Patients who did not improve and who died were considered to have severe pancreatitis. Different factors were analyzed to see which factors are important predictors of prognosis in acute pancreatitis. Higher age, high blood glucose, high blood urea, and high ALT levels were found to be significantly associated with adverse prognosis. Similarly, Blamey SL *et al.* found age, blood glucose, and blood urea to be significant factors. But, they also found calcium, LDH, PaO₂, WBC, and Albumin levels to be important parameters in predicting adverse prognosis in acute pancreatitis [27]. Many studies have compared different prognostic scales for the severity of acute pancreatitis. In the present study, a receiver operator characteristic curve analysis was done to see the sensitivity and specificity of Glasgow score for the severity of acute pancreatitis in detecting the severity of the disease. This scale is also known as the Glasgow-Imrie scale. A cut-off value of 3 was found to have the sensitivity of 50% and specificity of 94% with an AUC value of 0.729. Elmer P *et al.*, compared several prognostic scores. They found a sensitivity of 73.5% and specificity of 71.1% for cut-off value 3. Their AUC for Glasgow score was 0.805 [28]. The low AUC and sensitivity of the present study could be due to the small sample size.

LIMITATIONS OF THE STUDY

This study was conducted in a single center. The sample size was not large. Comparative analysis of different prognostic scores was beyond the scope. No scope to follow up with the patients for a longer duration.

CONCLUSION AND RECOMMENDATIONS

Acute pancreatitis is one of the important causes of hospital admission which may result in death if left untreated. Along with other factors, higher age, higher blood glucose level, higher serum urea level and higher ALT level at admission have prognostic implications. In low-resource settings, this could be used as an early prognostic marker and assess severity. However, these results could be used with caution due to the smaller sample size, and considering study design and further large cohort are recommended. Higher age, higher blood glucose level, higher serum urea level, and higher ALT level could be used as an early prognostic marker of acute pancreatitis. It can give an idea of early recognition of the severity of the patient. It can give an important clue for urgent referral of the patient to the Intensive care unit.

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