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Validation of Harmless Acute Pancreatitis Score for Non- Severe Acute Pancreatitis

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ABSTRACT

Background: In contrast to more complicated scoring systems requiring many parameters, Harmless Acute Pancreatitis Score (HAPS) which is very simple to calculate, has already been described in the literature as a predictor of non-severe acute pancreatitis. In this study, we aimed to validate this score in the form of sensitivity and specificity in predicting non severe course of acute pancreatitis.

Methods: This study was conducted over 1 year among patients admitted with acute pancreatitis in a tertiary care center of Nepal. The HAPS scores were calculated using the data obtained at admission and all patients were classified according to Revised Atlanta Classification 2012. Data were compared in terms of diagnostic parameters like (absence of abdominal guarding or rebound tenderness, creatinine < 2mg/dl or hematocrit of <43 for male and <39.6 for female) and sensitivity, specificity, positive and negative predictive value were determined.

Results: Out of 120 patients, 46 were female and 74 were male. HAPS were positive in 62 and negative in 58 patients. HAPS, a negative scoring system, correctly predicted the disease severity in 105 patients, with the specificity of 94.3% and sensitivity of 82.1%. Statistical analysis showed moderate agreement (Kappa = 0.751, $p < 0.001$), when compared with Revised Atlanta Classification.

Conclusions: HAPS score was effective in identification of patients who will run non-severe course of acute pancreatitis. Assessment can be completed within an hour from the presentation, making it an easy, rapid, cost effective and convenient screening tool. This helps in decision making for the management of non-severe pancreatitis (HAPS positive) at an optimal level of care and to refer/admit severe (HAPS negative) pancreatitis.

Keywords: Acute pancreatitis; HAPS score; Nepal; revised atlanta classification.

INTRODUCTION

Acute Pancreatitis (AP) is a common condition which often requires hospital admission. While most of them will recover well with minimal supportive treatment, only 10-20% may develop into severe threatening life condition, which will require treatment at higher level. [1]

There are various scoring systems for predicting severity of AP. [2] Most of these systems are complicated, carried out in higher levels with High Definition (HDU) and or Intensive Care Unit (ICU) facilities. These scores are based on multiple parameters and are expensive. [2]

The Harmless Acute Pancreatitis Score (HAPS) is a simple score to identify patients with non-severe acute pancreatitis. [3] HAPS can be assessed within an hour of the clinical examination. The parameters used are simple, in-expensive, and easily available which can be done at a majority of healthcare facilities with limited resources. This scoring system is accurate and correctly predicts the prognosis of patients with non-severe acute pancreatitis. [3, 4]

METHODS

This study was a prospective observational study done in Kathmandu Medical College Teaching Hospital (KMCTH), Kathmandu, Nepal from 1st Jan 2018 to 31st Dec 2018. This study was done after obtaining ethical approval from the institutional review committee of Kathmandu

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Aim of our study was to determine HAPS score in patients admitted with AP and to compare this with standard system and to predict its accuracy. Ultimately, we wanted to conclude that most of these patients can be diagnosed and managed in limit resource health care facilities, and they don't need referral to the higher centers.

Total of 120 patients above the age of 18 years, who were admitted with the diagnosis of acute pancreatitis were included in the study. Patients not giving consent and having underlying pancreatic or any other malignancy, with underlying chronic kidney disease and polycythemia or any other chronic illness were excluded from the study.

The diagnosis of AP was made by surgeon on duty after clinical, biochemical and radiological evaluation if two of the following three criteria were present as per the Revised Atlanta Classification 2012. [5]

Abdominal pain consistent with AP (acute onset of a persistent, severe, epigastric pain often radiating to the back).

Serum lipase activity (or amylase activity at least three times greater than the upper limit of normal.

Characteristic findings of AP on trans-abdominal ultrasonography, contrast-enhanced computed tomography (CECT) and less commonly magnetic resonance imaging (MRI).

Severity of pancreatitis, definitions of organ failure and complications all of them were made as per Atlanta classification and definitions by international consensus 2012, and Modified Marshall Scoring system. [5, 6] The moderately severe and severe acute pancreatitis group of Atlanta classification are collectively taken as severe group to compare with HAPS.

Harmless Acute Pancreatitis Score (HAPS) was determined at the time of admission. All the investigations required for scoring were routine investigations done in all the cases of AP so the study did not added any financial burden to the patients. The patients were classified as HAPS positive or negative as per the score. One point was given for each of absence of abdominal guarding or rebound tenderness, creatinine < 2mg/dl or hematocrit of < 43 for male and <39.6 for female. If all the criteria were met and the sum of score was 3, then it was considered as HAPS positive. If the score was less than 3 which means to fail in meeting at least one of the criteria then it was considered as HAPS negative. HAPS positive group were expected to have a non-severe course while the negative group was expected to have a severe course of pancreatitis.

The patients were prospectively followed till they got discharge from the hospital or till death. Data obtained were entered using the Microsoft Excel (Office Package 2011). The chi-square test was used to compare categorical variables. Diagnostic accuracy was assessed by calculating sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV). HAPS for predicting severity were evaluated in the prospective cohort using area under the receiver operating curve (ROC). All statistical calculations were carried out using IBM Statistical Package for the Social Sciences (SPSS) version 21.

RESULTS

Out of total 120 cases, 74(62%) were male and 46(38%) were female. Mean age of the patient was 46.21 years (S.D- 18.28). The demographic data are shown in **Table 1**.

Table 1. Demographic data

Characteristics	Values n (%)
Total	120
Male	74 (62%)
Female	46 (38%)
Mean Age (Years)	46.21
Etiology	
Biliary	58 (48.3%)
Alcohol	42 (35%)
Idiopathic	19 (15.8%)
Iatrogenic	1 (0.8%)
HAPS Score	
Positive	58 (48.33%)
Negative	62 (51.67%)
Severity	
Mild	67 (55.83%)
Severe	53 (44.17%)
Treatment	
Conservative only	86 (71.66%)
With interventions	34 (28.33%)
Mortality	1 (0.8%)

The most common cause of acute pancreatitis in our study was biliary in 58 (48%), followed by alcohol induced in 42 (35%), and then idiopathic in 19 (16%).

Fifty-eight (48.33%) patients were HAPS positive and sixty-two (51.67%) were HAPS negative. Sixty-seven (56%) patients had mild acute pancreatitis and fifty-three (44%) were severe acute pancreatitis. Most of the patients 86 (76.67%) were managed conservatively whereas 34 (28.33%) patients needed some form of intervention.

HAPS score in terms of age and sex had no statistical significance. Among 58 HAPS positive cases, 55 were mild and only 3 were severe, which means that most of the patient follow non severe course of disease. Out of 62 HAPS negative patient, 50 were severe and 12 were non-severe which means most of them follow the severe course of disease. 36 out of 53 patients with severe pancreatitis were male, but there was no statistical significance between sex and severity (P-0.210). Mean age of patients with severe pancreatitis was 48.50 (SD- 16.78) years and while the mean age of non-severe group was 44years (SD 19.32). **Table 2.**

Table 2. HAPS and Severity of Pancreatitis

Outcome Severity	HAPS Score		p Value	Total
	HAPS Positive (Score 3)	HAPS Negative (Score < 3)		
Median Age (Years)	44 (SD 19.32)	48.50 (SD 16.78)	0.80	
Male, n (%)	38 (69.0)	36 (67.9)	0.80	
Mild	55	12		**67**
Severe	3	50		**53**
Total	**58**	**62**		**120**

The sensitivity of Harmless Acute Pancreatitis Score in predicting non-severe course at admission was 82.1% and the specificity was 94.3%. The positive predictive values (PPV) and the negative predictive values (NPV) were 94.8% and 80.6% respectively.

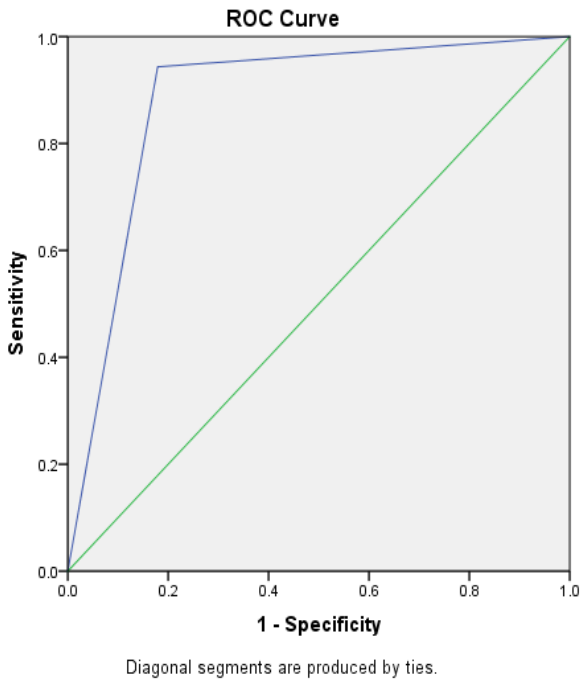

Figure 1. ROC curve by HAPS at admission for acute pancreatitis.

Receiver Operating Characteristic (ROC) curve yielded an area under the curve (AUC) of 0.882 (p value<0.001)}. There was moderate agreement between the non-severe course and mild course of pancreatitis as shown by high Kappa Value of 0.751(p value <.0001). **Figure 1.**

DISCUSSION

Acute pancreatitis a common medical condition with the incidence of 33.74 cases (95% CI 23.33-48.81) per 100 000 person-years according to global estimates.[7] Most of them are non-severe and only around 20% are severe which can lead to organ failure.[8] In a previous study in 2016 on the same institute, 12.9% of patients with AP had developed severe pancreatitis with organ failure.[9] These group of patients have mortality of 1.60 (95% CI 0.85-1.58) per 100 000 person-years globally.[7] Non severe patients are often referred to higher centers to monitor and manage as necessary in HDU and ICU. This is mainly due to clinical course of acute pancreatitis possibility to develop systemic complications which can be better monitored in ICU and HDU settings.

Study in 2009, introduced and later validated HAPS score for predicting non severe course of AP. [3] Even a recent systemic review and meta-analysis on HAPS score in 2021, conclude that the patient's with HAPS positive score doesn't require ICU and longer hospital admissions. These patients rather can be discharged shortly and can even be cared at home.[10]

Numerous articles[11,12] have reported over the past centuries on a wide variety of clinical parameters, scoring systems, and imaging procedures for predicting severity of AP. Most of these parameters have found no place in clinical routine because of either low reliability or high complexity. But few other clinical scoring systems have gained their values in predicting severity and HAPS is among the one with such promising evidence.[12]

Since the validation of HAPS with higher positive predictive value and specificity in the first study by Lankisch et al, [3] many studies are coming forward to support the accuracy of HAPS. [4] Revised Atlanta Classification 2012 (RAC) and Determinant Based Classification both are generally comparable in stratifying severity and offers significant improvement in comparison. [13] RAC being the standard known classification here in our study we compared HAPS with the Atlanta Classification. [3, 5] **Table 3** below shows comparison of different studies regarding HAPS score along with our study. [3,4,12,14]

Table 3. Comparison of results of different studies on HAPS Score.

Study	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Lankisch et al. in 2009, Germany (394 patients). [3]	29 (24-34)	97 (89-99)	98 (92-100)	22 (18-28)
Talukdar et al in 2014, India (103 patients). [4]	76.3 (66.9-86.4)	85.7 (78.0-96.8)	93.8 (88.5-98.6)	56.6 (45.4-73.6)
Oskarsson et al. in 2011, Sweden (511 patients).[12]	23.9 (19.4-28.9)	96.3 (81.0-99.9)	98.7 (93.1-100)	9.5 (6.3-13.6)
Sayraç V. A. et al in 2018, Turkey (144 patients).[14]		81	96	
Our study, Nepal (120 patients).	**82.1**	**94.3**	**94.8**	**80.6**

In a study by Mounzer et al. for predicting organ failure, modest accuracy was shown by HAPS with other scoring systems with the specificity of 94%. Hence, as a simple scoring system which is comparable with others scoring systems (**Table 4**)[15], HAPS is accurate, less time consuming and requires less cumbersome investigations.

Table 4. Comparison of different scoring system for Predicting Severity of AP[15]

Scoring Systems	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
APACHE II	88	53	17	98
GLASGOW	46	88	24	95
RANSON	27	95	32	94
HAPS	50	94	41	96
Our study (HAPS)	**82.1**	**94.3**	**94.8**	**80.6**

In resource limited countries like Nepal especially in primary health care centers and in remote areas where ABG machine and other biochemical tests are not available, classification systems like Revised Atlanta may be challenging. HAPS having the major advantage of being accurate, simple, cost effective and feasible can be a practically effective scoring system for guiding in management of acute pancreatitis. This will avoid unnecessary referrals to the tertiary centers. In higher centers, we can triage patient early with judicial use of available resources and thus stopping unnecessary tests, admissions and interventions.

This is a single center study in a small sample size. Even the interventions that might result in improving the outcome of the patient like fluid resuscitation, medication use and early enteral feeding has not been considered in this study. Obviously, it seemed that cost factor is effective in HAPS but the detail regarding the cost factor has not been mentioned.

CONCLUSIONS

HAPS score is effective in rapid identification of patients who will run non-severe course of acute pancreatitis. Assessment can be completed within an hour from the presentation, making it an easy, rapid, cost effective and convenient screening tool. Large multicentre study with longer follow-up will further strengthen this scoring system and provide evidence to commence its use in daily practice to make necessary decisions in the management of patients with acute pancreatitis.

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