https://doi.org/10.36570/jduhs.2024.1.2047

JDUHS

ORIGINAL ARTICLE

Aetiology, Severity and Outcome of Patients admitted with Acute Pancreatitis: A Cross-Sectional Study

Abdul Samad,[1] Adeel Ahmed,[2] Batool Zehra,[3] Javeria Iftikhar[3]

1. Department of Gastroenterology, Naimat Begum Hamdard University Hospital, Karachi, Pakistan.
2. Department of Gastroenterology, Fatima Hospital, Baqai Medical University Karachi, Pakistan.
3. Department of Surgery, Naimat Begum Hamdard University Hospital, Karachi, Pakistan.

Correspondence to: Dr. Abdul Samad, Email: samaddhedhi@gmail.com, ORCiD: 0000-0001-9277-6452

ABSTRACT

Objective: To determine the aetiology, severity and outcome of patients admitted with acute pancreatitis at Hamdard University Hospital Karachi, Pakistan.

Methods: This retrospective cross-sectional study was conducted at Hamdard University Hospital Karachi from January 2021 to June 2023. Patients aged 18 years and above who were admitted to the hospital with confirmed acute pancreatitis, admitted through the emergency department or by direct admission were included. Patient's demographic data, aetiology, along with the severity of disease and outcome, such as alive or dead, were noted. Bedside Index of Severity in Acute Pancreatitis was used to assess the severity of the disease.

Results: Of the 188 patients, the mean age was 59.14 ±9.52 years. Mild acute pancreatitis was observed in 58 (30.9%), moderate in 95 (50.5%), and severe in 35 (18.6%) patients. Biliary pancreatitis was the most common etiology in 129 (68.6%) participants, whereas symptoms of abdominal pain and abdominal distension were observed in all 188 (100%) patients. A significant association of acute pancreatitis was observed with age (p-value <0.001), gender (p-value 0.047), length of hospital stays (p-value <0.001), and Computed Tomography Severity Index (CTSI) severity (p-value <0.001). Mortality was observed in 9 (4.8%) patients with severe acute pancreatitis.

Conclusion: In conclusion, biliary pancreatitis was the most common etiology of patients admitted with acute pancreatitis. Significant associations were found between the severity of acute pancreatitis and various factors including age, gender, hospital stay duration, and CTSI severity. The overall mortality appeared only in patients with severe acute pancreatitis.

Keywords: Acute Pancreatitis, Etiologies, Mortality, Severity.

INTRODUCTION

Acute pancreatitis is a clinically significant inflammatory disorder of the pancreas, characterized by the sudden onset of abdominal pain and elevated levels of pancreatic enzymes.[1] As a leading cause of hospital admissions worldwide, acute pancreatitis poses a considerable burden on healthcare systems and necessitates a comprehensive understanding of its etiology, severity, and outcomes for effective management.[1,2]

The global burden of acute pancreatitis is substantial, with a morbidity rate of 34 per 100,000 individuals.[3] However, regional variations in causative factors and clinical course necessitate context-specific investigations.

The severity of acute pancreatitis is a critical determinant of patient outcomes and resource utilization. Understanding the spectrum of disease severity is essential for risk stratification, early intervention, and allocation of healthcare resources.[1,4,5] Recent advancements in prognostic markers, imaging modalities, and scoring systems have enhanced our ability to categorize acute pancreatitis severity.[6-8] However, the applicability and effectiveness of these tools in the Pakistani population is scarce and warrant investigation. Accurate assessment of acute pancreatitis severity is paramount for guiding optimal management and prognostication.

This research aims to contribute to the existing body of knowledge by comprehensively examining the etiology, severity, and outcomes of patients admitted with acute pancreatitis at Hamdard University Hospital in Karachi. The findings of this study are expected to provide valuable insights into the unique clinical profile of acute pancreatitis in this population, enabling the

development of targeted interventions and enhancing the overall management of this challenging condition.

METHODS

This retrospective cross-sectional study was carried out at the Department of Gastroenterology, Hamdard University Hospital Karachi, Pakistan. The hospital record was retrieved from January 2021 to June 2023. Ethical approval was obtained from the Institutional Review Board of Hamdard University Hospital prior to the commencement of the study (Registration Number: ERC/MBBS/16/2023).

Patients aged 18 years and above with confirmed acute pancreatitis admitted either through the emergency department or by direct admission were included. Alternatively, patients with a known history of chronic pancreatitis, having severe comorbidities such as end-stage renal disease, advanced liver disease, severe cardiovascular disease, or pancreatitis secondary to other conditions such as trauma or pregnant women were excluded. Furthermore, patients with incomplete medical records were also excluded.

The confirmation of acute pancreatitis ensured based on the presence of clinical features such as abdominal pain, serum amylase greater than three times the upper limit of normal or radiographically demonstrated acute pancreatitis on a computed tomography (CT) scan. The presence of at least two of the clinical characteristics were labelled as positive for acute pancreatitis.[9]

Raosoft sample size calculator was used for the estimation of sample size, taking a margin of error of 6%, confidence interval of 95%, population size of 20000, and reported severe acute pancreatitis in a previous study 18.8%.[10] The estimated sample size came out to be 162. However, to overcome the issue of missing data, we enrolled 188 patients. A pre-designed proforma was used to retrieve the information from the medical records. Information was collected regarding demographic characteristics such as age, gender, weight, height, and body mass index (BMI) of the patients. BMI is classified into the following categories: Underweight (BMI < 18.50 kg/m^2), Normal (BMI 18.50 – 24.99 kg/m^2), and Overweight/obese (BMI ≥ 25.00 kg/m^2). The aetiology of acute pancreatitis, along with signs and symptoms, were also noted. Moreover, serum amylase level, the severity of acute pancreatitis, and outcome, such as alive or dead, were also noted.

Two scoring systems were employed to assess the severity of acute pancreatitis: the Bedside Index of Severity in Acute Pancreatitis (BISAP) and the Computed Tomography Severity Index (CTSI). BISAP Score was calculated within 24 hours of admission based on five clinical criteria. (1) blood urea nitrogen (BUN) > 25 mg/dL (1.8 mmol/L), (2) haematocrit decrease > 10%, (3) respiratory rate > 20 breaths/min, (4) white blood cells (WBC) count > 18,000/mm^3, and (5) serum calcium < 8 mg/dL (2.0 mmol/L). Each criterion met awarded one point. The minimum score in BISAP was "0" and the maximum score was "5". Those who scored 0 was labelled as mild, 1-2 as moderate, and ≥ 3 as severe.

CT scan was performed on those who were diagnosed with moderate or severe acute pancreatitis. Contrast-enhanced CT scans was performed within 24 hours of admission. The presence and extent of pancreatic necrosis, fluid collections, and peripancreatic inflammation was assessed. Each criterion met awarded one point. The minimum score in CTSI was "0" and the maximum score was "10". Those who scored in between 0-2 was labelled as mild, 3-6 as moderate, and ≥ 7 as severe.

Statistical Package for Social Sciences (SPSS) version 24 was used for the purpose of statistical analysis. Mean and standard deviation was calculated for quantitative variables such as age, height, weight, and BMI. Frequency and percentages were calculated for qualitative variables such as gender, duration of hospital stays, CTSI scores, etiology, sign and symptoms, and outcome of acute pancreatitis. Inferential statistics were explored using the Chi-square/Fisher Exact test to identify the factors associated with the severity of acute pancreatitis and the outcome of acute pancreatitis. The p-value of ≤0.05 was considered statistically significant.

RESULTS

Of the total 188 patients with acute pancreatitis, the mean age was 59.14 ±9.52 years. There were 76 (40.4%) males and 112 (59.6%) females. The mean height, weight, and BMI of the patients were 161.24 ±20.81 cm, 78.36 ±22.99 kg, and 27.14 ±4.98 kg/m2 ,respectively. The mean length of hospital stays was 4.84 ±3.40 days. CTSI severity showed that none of the patients had a mild CTSI score, while moderate acute pancreatitis was observed in 95 (73.1%) and servere acute pancreatitis in 35 (26.9%) patients.

Etiology of acute pancreatitis showed that biliary pancreatitis was the most common etiology i.e., 129 (68.6%), followed by alcohol 18 (9.6%), pancreatic divisum 15 (8%), drug induced pancreatitis 11 (5.9%), idiopathic 6 (3.2%) and post endoscopic retrograde cholangiopancreatography (ERCP) pancreatitis 6 (3.2%) (Figure 1). All patients had signs and symptoms of

abdominal pain and abdominal distension i.e., 188 (100%) while, fever was observed in 107 (56.9%), jaundice in 101 (53.7%), pleural effusion in 98 (52.1%), hypoxia in 71 (37.8%), vomiting in 66 (35.1%), and ascites in 53 (28.2%) patients (Figure 2).

Mild acute pancreatitis was observed in 58 (30.9%) patients, moderate in 95 (50.5%) patients, and severe in 35 (18.6%) patients. A significant association of severity of acute pancreatitis was found with age (p-value <0.001), gender (p-value 0.047), length of hospital stays (p-value <0.001), and CTSI severity (p-value <0.001) (Table 1). Mortality was observed in only 9 (4.8%) patients who suffered from severe acute pancreatitis. Mortality rates were found to be significantly higher among patients with a hospital stay more than five days as compared to those with a duration of hospital stay less than or equal to five days, i.e., 7 (11.9%) vs. 2 (1.6%) (p-value 0.005). Similarly, the mortality rate was also found to be significantly higher among patients with severe CTSI scores as compared to moderate CTSI scores i.e., 7 (20.0%)vs. 2 (2.1%) (p-value <0.001) (Table 2).

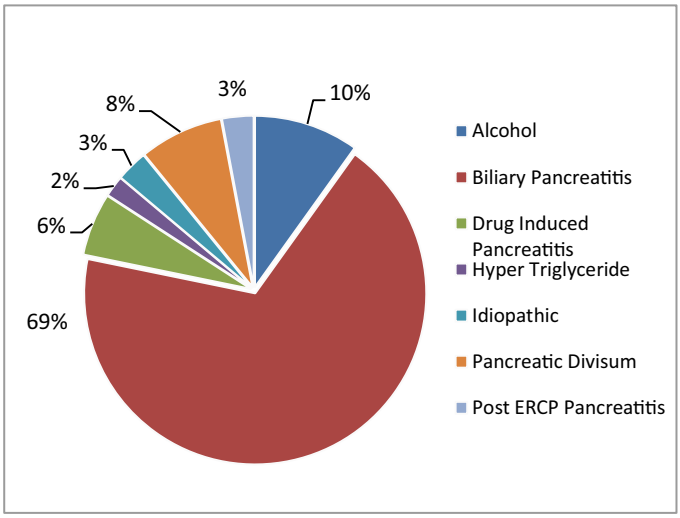

Figure 1: Etiology of Patients with Acute Pancreatitis (n= 188)

DISCUSSION

The findings of our study shed light on several crucial aspects of acute pancreatitis among patients admitted to Hamdard University Hospital in Karachi, Pakistan. The distribution of acute pancreatitis severity revealed that a substantial proportion of patients presented with moderate severity, while severe cases accounted for nineteen percent. The spectrum of acute pancreatitis severity observed in our study reflects the real-world presentation of the disease.[11,12] As per the practice of our hospital, only those individuals who had moderate or severe acute pancreatitis were recomm-ended for CT scans. The findings revealed that, most of the individuals who reported as moderate using BISAP were also reported as moderate using CTSI whereas only seventy seven percent of the patients who were reported as severe in BISAP were also reported as of severe acute pancreatitis. This finding emphasizes the importance of utilizing validated scoring systems like CTSI and Acute Physiology and Chronic Health Evaluation (APACHE) II alongside established classifications to capture the full spectrum of acute pancreatitis severity.[13-15] Various studies have also reported better accuracy of C-reactive protein to serum albumin ratio in predicting the severity and prognosis of acute pancreatitis.[16-19]

The etiological spectrum of acute pancreatitis in our study revealed biliary pancreatitis as the predominant cause. This finding aligns with previous reports from Pakistan and neighboring regions, suggesting a regional predominance of gallstones as a trigger for acute pancreatitis.[20,21] Alcohol-induced pancreatitis was the second most common etiology, consistent with its recognized role as a significant causative factor.[22] However, the presence of other etiologies like pancreatic divisum and drug-induced pancreatitis underscores the need for comprehensive diagnostic evaluation beyond the usual suspects.

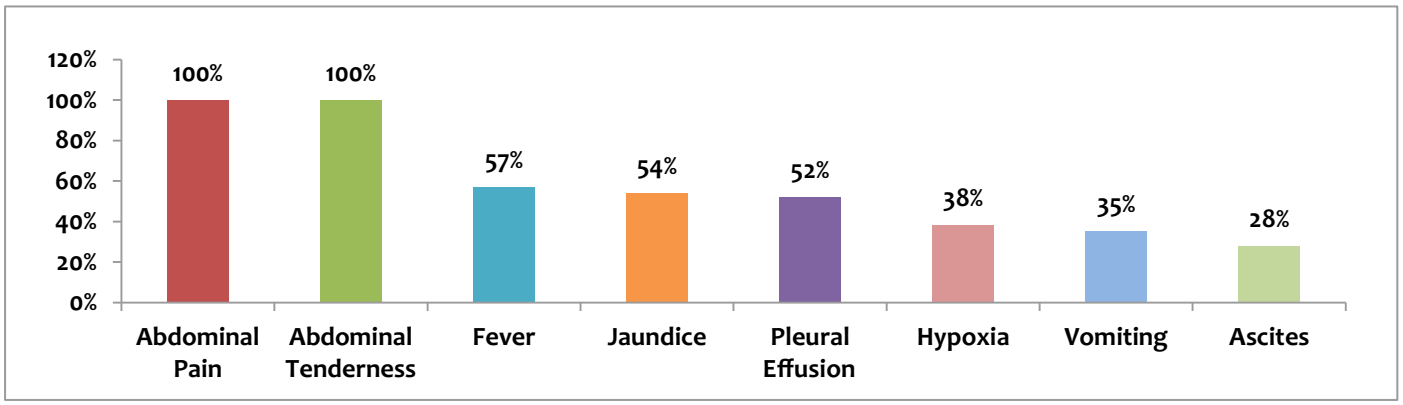

Figure 2: Sign and Symptoms of Patients with Acute Pancreatitis (n= 188)

Table 1: Factors associated with severity of acute pancreatitis (n=188)

	Total	Severity of Acute Pancreatitis			p-value
		Mild (n=58)	Moderate (n=95)	Severe (n=35)	
Age (years)					
≤60	97	35 (36.1)	55 (56.7)	7 (7.2)	<0.001*
>60	91	23 (25.3)	40 (44.0)	28 (30.8)	
Gender					
Male	76	21 (27.6)	46 (60.5)	9 (11.8)	0.047*
Female	112	37 (33.0)	49 (43.8)	26 (23.2)	
BMI categories (kg/m^2)					
Normal	47	12 (25.5)	24 (51.1)	11 (23.4)	0.519
Overweight/Obese	141	46 (32.6)	71 (50.4)	24 (17.0)	
Length of hospital stay (days)					
≤5	129	52 (40.3)	69 (53.5)	8 (6.2)	<0.001*
>5	59	6 (10.2)	26 (44.1)	27 (45.8)	
CTSI severity (n=130)$^{\$\wedge}$					
Moderate	95	--	87 (91.6)	8 (8.4)	<0.001*
Severe	35	--	8 (22.9)	27 (77.1)	

- CTSI: Computed tomography severity index, BMI: Body mass index

$CTSI was performed on 130 patients with moderate or severe acute pancreatitis, ^None of the patient had mild CTSI severity score

***** p-value ≤ 0.05 (Chi-Square test)

Clinical manifestations in our cohort exhibited the classic triad of abdominal pain, abdominal distension, and fever, with varying frequencies. Notably, jaundice, pleural effusion, hypoxia, vomiting, and ascites were prevalent, reflecting the systemic impact of acute pancreatitis. These findings underscore the multisystem involvement and diverse clinical presentations of acute pancreatitis, necessitating a holistic approach to patient management.[23] Our analysis identified several factors such as age, gender, hospital stay duration, and CTSI severity significantly associated with increased acute pancreatitis severity, providing valuable insights for prognostication and risk stratification. These findings align with existing literature but also contribute to our understanding of how these factors play out in the specific context of Karachi's population.

The observed mortality rate falls within the range reported in another study from Pakistan.[24] However, this remains a significant concern, highlighting the need for further investigation into potentially modifiable factors influencing outcomes.

The single-center design limits generalizability, and potential selection bias within the admitted patient population requires consideration. Future research with larger, multi-center cohorts employing standardized diagnostic and management protocols is crucial to validate our findings and establish generalizable conclusions for acute pancreatitis management in Karachi and beyond. This study unveils valuable insights into the etiology, severity, and outcomes of acute pancreatitis in Karachi, Pakistan. Biliary pancreatitis emerges as the dominant cause, while moderate severity dominates the clinical picture. A comprehensive understanding of prognostic factors like age, gender, and specific clinical features is crucial for risk stratification and individualized management. Further research employing validated scoring systems and larger cohorts is needed to refine our understanding and optimize acute pancreatitis management strategies in this unique setting. By unraveling the pancreatic puzzle in Karachi, we can pave the way for improved care for acute pancreatitis patients in this and similar regions.

CONCLUSION

The study revealed that biliary pancreatitis was the most common etiology of patients admitted with acute pancreatitis. Significant associations were found between the severity of acute pancreatitis and various factors including age, gender, hospital stay duration, and CTSI severity. Mortality rates were higher among patients with longer hospital stays and severe CTSI scores. The overall mortality appeared to be significa-

Table 2: Factors associated with outcome of acute pancreatitis patients (n=188)

	Total	Outcome		p-value
		Alive (n= 121)	Death (n= 9)	
Age (years)				
≤60	97	95 (97.9)	2 (2.1)	0.071
>60	91	84 (92.3)	7 (7.7)	
Gender				
Male	76	73 (96.1)	3 (3.9)	0.657
Female	112	106 (94.6)	6 (5.4)	
BMI categories (kg/m^2)				
Normal	47	45 (95.7)	2 (4.3)	0.844
Overweight/Obese	141	134 (95.0)	7 (5.0)	
Length of hospital stay (days)				
≤5	129	127 (98.4)	2 (1.6)	0.005*
>5	59	52 (88.1)	7 (11.9)	
CTSI severity (n=130)$^{\$}$				
Moderate	95	93 (97.9)	2 (2.1)	<0.001*
Severe	35	28 (80.0)	7 (20.0)	
Etiology				
Alcohol	18	18 (100.0)	0 (0.0)	N/A
Biliary Pancreatitis	129	125 (96.9)	4 (3.1)	
Drug Induced Pancreatitis	11	8 (72.7)	3 (27.3)	
Hyper Triglyceride	3	3 (100.0)	0 (0.0)	
Idiopathic	6	6 (100.0)	0 (0.0)	
Pancreatic Divisum	15	13 (86.7)	2 (13.3)	
Post ERCP Pancreatitis	6	6 (100.0)	0 (0.0)	

- CTSI: Computed tomography severity index, BMI: Body mass index, N/A: Not applicable, ERCP. endoscopic retrograde cholangiopancreatography, $ CTSI was performed on 130 patients with moderate or severe acute pancreatitis
^None of the patient had mild CTSI severity score
* p- value ≤ 0.05 (Fisher Exact test)

ntly low and was only seen in patients with acute severe pancreatitis. These findings underscore the importance of early diagnosis, prompt management, and tailored interventions in improving patient outcomes.

ETHICAL APPROVAL: This study was approved from the Institutional Review Board of Hamdard University Hospital prior to the commencement of the study (Registration Number: ERC/MBBS/16/2023, dated: 25th January, 2024).

AUTHORS' CONTRIBUTIONS: AS: Conception and designing of work, data acquisition and analysis, along with manuscript writing and revision. AA: Data analysis. BZ: Data collection. JI: Data entry. All authors critically reviewed the manuscript and gave final approval of the manuscript.

CONFLICT OF INTEREST: The authors declared no conflict of interest.

FUNDING: None

Received: January 7, 2024
Accepted: March 19, 2024

REFERENCES

1. Mederos MA, Reber HA, Girgis MD. Acute pancreatitis: A review. J Amer Med Assoc 2021; 325:382-90. doi:10.1001/jama.2020.20317
2. Barreto SG, Habtezon A, Gukovskaya A, Lugea A, Jeon C, Yadav D, et al. Critical thresholds: key to unlocking the door to the prevention and specific treatments for acute pancreatitis. Gut 2021; 70:194-203. doi:10.1136/gutjnl-2020-322163
3. Zhou Y, Ge YT, Shi XL, Wu KY, Chen WW, Ding YB, et al. Machine learning predictive models for acute pancreatitis: A systematic review. Int J Med Inform 2022; 157:104641. doi:10.1016/j.ijmedinf.2021.104641

4. Rahman A, O'Connor DB, Gather F, Koscic S, Gilgan J, Mockler D, et al. Clinical classification and severity scoring systems in chronic pancreatitis: a systematic review. Dig Surg 2020; 37:181-91. doi:10.1159/000501429
5. Colvin SD, Smith EN, Morgan DE, Porter KK. Acute pancreatitis: an update on the revised atlanta classification. Abdom Radiol 2020; 45:1222-31. doi:10.1007/s00261-019-02214-w
6. Silva-Vaz P, Abrantes AM, Castelo-Branco M, Gouveia A, Botelho MF, Tralhao JG. Multifactorial cores and iomarkers of prognosis of acute pancreatitis: applications to research and practice. Int J Mol Sci 2020; 21:338. doi:10.3390/ijms21010338
7. Van Den Berg FF, De Bruijn AC, Van Santvoort HC, Issa Y, Boermeester MA. Early laboratory biomarkers for severity in acute pancreatitis; A systematic review and meta-analysis. Pancreatology 2020; 20:1302-11. doi:10.1016/j.pan.2020.09.007
8. Lee DW, Cho CM. Predicting severity of acute pancreatitis. Medicina (Kaunas) 2022; 58:787. doi:10.3390/medicina58060787
9. Nesvaderani M, Eslick GD, Vagg D, Faraj S, Cox MR. Epidemiology, aetiology and outcomes of acute pancreatitis: A retrospective cohort study. Int J Surg 2015; 23:68-74. doi:10.1016/j.ijsu.2015.07.701.
10. Zhu Y, Pan X, Zeng H, He W, Xia L, Liu P, et al. A study on the etiology, severity, and mortality of 3260 patients with acute pancreatitis according to the revised atlanta classification in Jiangxi, China over an 8-Year period. Pancreas 2017; 46:504-09. doi:10.1097/MPA.0000000000000776
11. Chatterjee R, Parab N, Sajjan B, Nagar VS. Comparison of acute physiology and chronic health evaluation ii, modified computed tomography severity index, and bedside index for severity in acute pancreatitis score in predicting the severity of acute pancreatitis. Indian J Crit Care Med 2020; 24:99-103. doi:10.5005/jp-journals-10071-23343
12. Hagjer S, Kumar N. Evaluation of the bisap scoring system in prognostication of acute pancreatitis-a prospective observational study. Int J Surg 2018; 54:76-81.doi:10.1016/j.ijsu.2018.04.026
13. Janjua SS, Zaman F, Qamar T. Comparison of ranson's score, bisap, and ctsi in predicting the severity of acute pancreatitis. J Islamabad Med Dent College 2018; 7:255-9. doi:10.35787/jimdc.v7i4.256
14. Harshit Kumar A, Singh Griwan M. A comparison of APACHE II, BISAP, Ranson's score and modified CTSI in predicting the severity of acute pancreatitis based on the 2012 revised Atlanta Classification. Gastroenterol Rep 2018; 6:127-31. doi:10.1093/gastro/gox029
15. Chatterjee R, Parab N, Sajjan B, Nagar VS. Comparison of acute physiology and chronic health evaluation ii, modified computed tomography severity index, and bedside index for severity in acute pancreatitis score in predicting the severity of acute pancreatitis. Indian J Crit Care Med 2020; 24:99-103. doi:10.5005/jp-journals-10071-23343
16. Capurso G, Ponz de Leon Pisani R, Lauri G, Archibugi L, Hegyi P, Papachristou GI, et al. Clinical usefulness of scoring systems to predict severe acute pancreatitis: A systematic review and meta-analysis with pre and post-test probability assessment. United European Gastroenterol J 2023; 11:825-36. doi:10.1002/ueg2.12464
17. Zhao Y, Xia W, Lu Y, Chen W, Zhao Y, Zhuang Y. Predictive value of the c-reactive protein/albumin ratio in severity and prognosis of acute pancreatitis. Front Surg 2023; 9:1026604. doi:10.3389/fsurg.2022.1026604
18. Zhao Z, Yu Y, Xie R, Yang K, Xu D, Li L, et al. Prognostic value of the creatinine-albumin ratio in acute pancreatitis debridement. BMC Surg 2020; 20:322. doi:10.1186/s12893-020-00991-6
19. Tarar MY, Khalid A, Choo XY, Khurshid S, Tumeh H, Muhammad K. Use of the c-reactive protein (crp)/albumin ratio as a severity tool in acute pancrea-titis: Systematic review. Cureus 2022; 14:e29243. doi:10.7759/cureus.29243
20. Nawaz A, Khan AH, Farrukh R, Mahmood K, Hayat N, Nazir A. Frequency of silent gallstones in acute pancreatitis. InMed Forum 2021; 32:120.
21. Mumtaz N, Arif A, Shah SN, Samo A. The prevalence of gall stones in acute pancreatitis a prospective view from lady reading hospital mti peshawar kp. Pak J Med Health Sci 2022; 16:62-4. doi:10.53350/pjmhs2216962
22. Rasineni K, Srinivasan MP, Balamrugan AN, Kaphalia BS, Wang S, Ding WX, et al. Recent advances in understanding the complexity of alcohol-induced pancreatic dysfunction and pancreatitis development. Biomolecules 2020; 10:669. doi:10.3390/biom10050669
23. Matta B, Gougol A, Gao X, Reddy N, Talukdar R, Kochhar R, et al. Worldwide variations in demographics, management, and outcomes of acute pancreatitis. Clin Gastroenterol Hepatol 2020; 18:1567-75. doi:10.1016/j.cgh.2019.11.017
24. Hameed T, Khan AZ, Shah I, Khan AQ, Ahmad M. Factors leading to acute pancreatitis in tertiary care hospitals in Pakistan–a multicenter study. J Rawal Med Coll 2018; 22:50-3.