

Frequency of Gall Stones in Patients with Acute Pancreatitis on Ultrasound

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ABSTRACT

Purpose: The aim of the study was to identify the preponderance of the incidence of gallstones in a tertiary care hospital on ultrasonography regarding gallstones in patients with acute pancreatitis.

Methods: The study period was from 16 October, 2020 to 16 April, 2021, and the Department of Radiology at Hayatabad Medical Complex was selected as the study setting. One hundred and sixty-five patients between 18 and 60 years old who had presented within 48 hours after the onset of symptoms and met the operational definition of acute pancreatitis were recruited via non-probability consecutive sampling. Ultrasound was used to evaluate visualisation of gallstones on the basis of standard grey-scale criteria with posterior acoustic shadowing and positional mobility, and Doppler where possible. SPSS version 23 was used to analyse data. Quantitative variables were reported as mean \pm SD, and categorical variables as frequencies/percentages. Age group, gender, and BMI were stratified by gallstone status, and the chi-square test was used ($p < 0.05$).

Findings: The average age was 42.000 \pm 12.88; 57 per cent of the participants were men. Mean BMI was 26 \pm 3.39 kg/m². The prevalence of gallstones was 68 (41) patients. There was no significant correlation with age ($p = 0.9790$), gender ($p = 0.9336$) and BMI ($p = 0.9394$).

Conclusion: 41% of patients with acute pancreatitis had gallstones on ultrasound and this evidence aligned with the need to conduct early biliary imaging as a routine procedure in this environment.

Keywords: Acute pancreatitis; Gallstones; Ultrasonography; Biliary pancreatitis; Frequency; Hayatabad Medical Complex; Pakistan

INTRODUCTION

Acute pancreatitis is an acute inflammatory disease of the pancreas which often leads to emergency admissions and hospitalisation, and which has a broad clinical spectrum, including mild, self-limiting disease and severe, life-threatening systemic disease^{1,3}. Within the thesis framework, acute pancreatitis is positioned as an explanation of a hospital admission in a high frequency, and the reports have indicated a high burden of hospitalisations and different incidences among populations.

Clinically, diagnosis is mainly based on typical abdominal pain and biochemical findings (high serum amylase and/or lipase), and imaging is used to aid diagnosis and explain the aetiology or complications^{1,4}. Aetiology is important since early detection of the cause informs firm management and decreases the likelihood of recurrence; biliary disease (gallstones and related ductal stones) is one of the causes of acute pancreatitis in the entire world, alongside alcohol and other less frequently occurring triggers^{3,5}. Modern epidemiologic studies also indicate that rates of acute pancreatitis have risen over time in most areas, underscoring the importance of proper etiologic determination at initial presentation^{6,7}.

The transient nature of ampullary obstruction or passing of stones/sludge in acute pancreatitis makes gallstones clinically relevant, as identifying the aetiology of the biliary disease will potentially leave the patients at risk of re-attacks and avoidable complications^{5,8}. Gallstone disease is characterised in the thesis background as being widespread in the general population, and choledocholithiasis (common bile duct stones) is found in a significant fraction of symptomatic cases of gallstones, both of which explain the emphasis of biliary evaluation in the acute pancreatitis work-up.

Ultrasound is a sensible first-line modality because it is non-invasive, inexpensive, radiation-free, and widely available. It examines the gallbladder and biliary tree, providing supportive data in pancreatitis^{1,9,10}. The thesis states ultrasound is performed within 24 hours to identify gallstones and evaluate pancreatic or peripancreatic changes. For suspected biliary obstruction (e.g.,

ductal stones), guidelines recommend risk assessment and confirmatory tests to prevent missed stones and recurrent events^{11,12}. Imaging's role in assessing severity and complications is evolving, but early bedside imaging to identify biliary disease remains central to care¹³.

Although the clinical significance of biliary etiology lies in its ability to provide relevant data on the frequency and causes of biliary acute pancreatitis, the thesis identifies an evidence gap at the local level regarding how often gallstones are detected among patients presenting with acute pancreatitis in Pakistan. Ultrasound is especially relevant here, as it aligns with real-world limitations and is often the first imaging test performed for etiologic assessment and decision-making. Local frequency estimates can also be clinically useful: this can help prioritize biliary evaluation pathways early, guide referral decisions (including to ERCP where applicable), and establish timely definitive management strategies that can reduce recurrence and resource use^{5,8,14}. At the same time, there remains a tendency toward standardized early assessment and etiology-based care as the most common guiding principles internationally, which work best when based on context-specific information and available diagnostic strategies^{1,4}.

The research addressed the lack of local data on ultrasound-detected gallstones in acute pancreatitis patients, aiming to provide relevant frequency estimates to improve early etiologic triage. It focused on determining the rate of pancreatic cases examined at Hayatabad Medical Complex, Peshawar, and the frequency of gallstones detected by ultrasound. The key question was: What is the gallstone frequency in these patients? This work aids early diagnosis, guides biliary decisions, and reduces recurrence through timely, ultrasound-based detection.

MATERIALS AND METHODS

Study design: A descriptive cross-sectional study was conducted to determine the frequency of gallstones in patients presenting with acute pancreatitis using ultrasound.

Setting and duration: The study was conducted in the Department of Radiology at Hayatabad Medical Complex (HMC), Peshawar, over 6 months, from 16 October, 2020 to 16 April, 2021.

Study population: The target population comprised adult male and female patients aged 18–60 years who presented with clinical

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features consistent with acute pancreatitis (as per the operational definition) within 48 hours of symptom onset and were referred to Radiology from Emergency, Surgery, Medicine, and Gastroenterology departments (including OPD) at HMC.

Sampling technique: A consecutive (non-probability) sampling technique was used. All eligible patients presenting during the study period and fulfilling the selection criteria were enrolled until the required sample size was achieved.

Sample size: The sample size was 165, calculated using the WHO sample size formula by taking an expected prevalence of gallstones in acute pancreatitis of 30%, a 95% confidence level, and a 7% margin of error.

(For reproducibility: the commonly used WHO/standard proportion formula is $n = Z^2 \times p(1-p) / d^2$, where $p=0.30$, $d=0.07$, and $Z=1.96$ at 95% CI—this yields approximately 165.)

Inclusion criteria: Patients were included if they were adult male or female patients aged 18–60 years, presented with clinical features fulfilling the operational definition of acute pancreatitis, and reported within 48 hours of onset of symptoms after referral from the Emergency, Surgery, Medicine, Gastroenterology departments and OPD at Hayatabad Medical Complex (HMC), Peshawar.

Exclusion criteria: To minimise bias and avoid effect modification, patients were excluded if they had already diagnosed severe acute pancreatitis, a known history of chronic pancreatitis, previously diagnosed gallstones, or any history of surgical intervention on the biliary tract; these exclusion criteria were applied strictly as documented in the thesis methods.

Operational definitions Acute pancreatitis:

Acute pancreatitis was labelled positive with the presence of the following documented features:

1. Sudden onset epigastric pain (VAS pain score >5) radiating to the back, associated with nausea (≥ 3 episodes in 24 hours) and vomiting (≥ 4 episodes in 24 hours).
2. Serum amylase and lipase at least 3 times the upper limit of normal (and serum ALT >150 IU/L 12–24 hours after admission, as recorded in the thesis).

Gallstones on ultrasound (positive criteria):

Gallstones were marked present when ultrasound showed:

- **Greyscale ultrasound:** a highly reflective echogenic focus within the gallbladder lumen with prominent posterior acoustic shadowing; and gravity-dependent movement with change of patient position ("rolling stone sign").
- **Colour Doppler:** demonstration of a twinkling artefact, noted as useful especially for small stones.

Ultrasound protocol/equipment: Every registered patient was undergone ultrasound assessment of the gallstones, with the application of greyscale analysis and colour Doppler measurements, and change of the position of the patient was applied to determine the mobility of the stones, as the diagnostic criteria.

The model and the manufacturer of the ultrasound machine were not mentioned in the text of the thesis that can be found here; thus, the protocol was reported as is (greyscale + Doppler criteria and positional assessment).

Procedure of data collection: Patients with acute pancreatitis who met the criteria within 48 hours and passed an eligibility screening were selected from the listed departments at HMC. Data use, the study's purpose, and publication were clarified to participants.

The researcher performed ultrasound examinations of gallstones under the guidance of a consultant radiologist with at least 5 years' experience. The process of labelling gallstones as positive was based on the operational definition's criteria.

All the information from the study was recorded on a pre-designed proforma (included in the thesis), and the researcher followed up on the recorded results.

Data collection was done after the hospital's ethics committee approved it. Informed consent from all participants was

obtained in writing after the purpose of the procedure was explained and how the data would be used/publication.

Statistics: The data was typed, saved and analysed through SPSS 23. Mean \pm SD was used to summarise the quantitative variables (age, weight, height, BMI) and the frequency and percentage were used to summarise the categorical variables (gender, gallstone status).

The gallstone status was stratified according to the age, gender, and BMI, and it was measured with the chi-square test; $p < 0.05$ was taken as statistically significant.

RESULTS

A total of 165 patients with acute pancreatitis were included. Overall, 68 (41%) patients had gallstones on ultrasound, while 97 (59%) did not.

Most patients belonged to the 31–60 years age group (109/165; 66%), while 56/165 (34%) were aged 18–30 years, showing that acute pancreatitis cases presenting in this setting were predominantly middle-aged adults.

The mean age of 42 ± 12.88 years indicates a broad adult distribution, supporting that the study population reflects a typical adult acute pancreatitis cohort in hospital practice, rather than an elderly-only or young-only cluster.

The study included more males (57%) than females (43%), with 94 male and 71 female participants, showing a male predominance among patients presenting with acute pancreatitis during the study period.

This distribution is important for interpreting biliary findings because gallstone-related pancreatitis is often considered relatively more common in females; therefore, the gender mix provides context for the overall gallstone frequency observed in this cohort.

Most patients had BMI $> 25 \text{ kg/m}^2$ (117/165; 71%), whereas 48/165 (29%) were at BMI $\leq 25 \text{ kg/m}^2$, indicating that a large proportion of the study population fell into the higher BMI category.

The mean BMI of $26 \pm 3.39 \text{ kg/m}^2$ further supports that, on average, patients were slightly above the normal BMI threshold; this provides relevant context when interpreting whether gallstone presence differed across BMI categories in stratified analysis.

Gallstones were detected in 68 out of 165 patients, giving a frequency of 41%, while 97 (59%) patients had no gallstones on ultrasound.

This shows that biliary disease is a substantial contributor among acute pancreatitis cases evaluated in this setting, and reinforces the clinical role of early ultrasound in identifying a major etiologic factor at presentation.

Table 1. Age distribution (n = 165)

Age group	Frequency	Percentage
18–30 years	56	34%
31–60 years	109	66%
Total	165	100%

Mean age: 42 ± 12.88 years.

Table 2. Gender distribution (n = 165)

Gender	Frequency	Percentage
Male	94	57%
Female	71	43%
Total	165	100%

Table 3. BMI categories (n = 165)

BMI category	Frequency	Percentage
$\leq 25 \text{ kg/m}^2$	48	29%
$> 25 \text{ kg/m}^2$	117	71%
Total	165	100%

Mean BMI: $26 \pm 3.39 \text{ kg/m}^2$.

Table 4. Frequency of gallstones on ultrasound (n = 165)

Gallstones on ultrasound	Frequency	Percentage
Yes	68	41%
No	97	59%
Total	165	100%

Table 5. Stratification of gallstones with respect to age (n = 165)

Gallstones	18–30 years	31–60 years	Total	P value
Yes	23	45	68	0.9790
No	33	64	97	
Total	56	109	165	

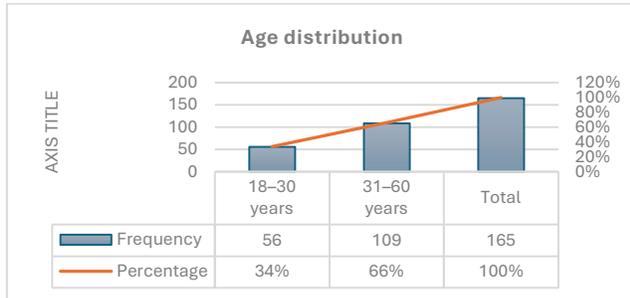


Fig. 1. Age distribution of patients with acute pancreatitis (n = 165). Most patients (66%) were aged 31–60 years, while 34% were aged 18–30 years (mean age: 42 ± 12.88 years).

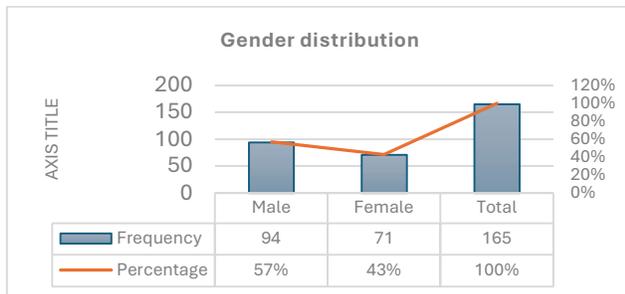


Fig. 2. Gender distribution of the study population (n = 165). Males constituted 57% (n = 94) and females 43% (n = 71), demonstrating male predominance.

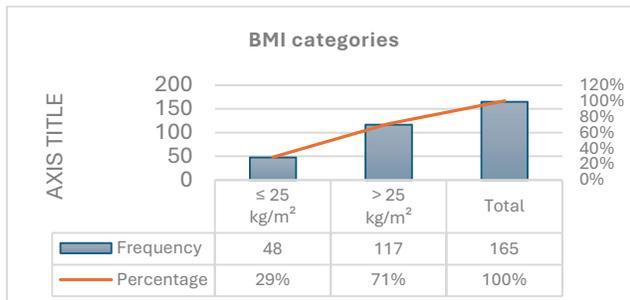


Fig. 3. Body mass index (BMI) categories among patients with acute pancreatitis (n = 165). The majority (71%) had BMI > 25 kg/m², while 29% had BMI ≤ 25 kg/m² (mean BMI: 26 ± 3.39 kg/m²).

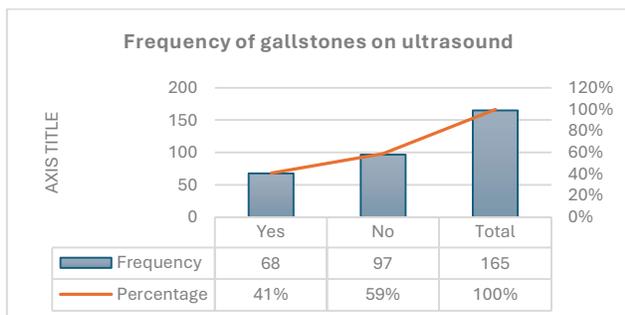


Fig. 4. Frequency of gallstones detected on ultrasound in patients with acute pancreatitis (n = 165). Gallstones were present in 41% (n = 68) and absent in 59% (n = 97).

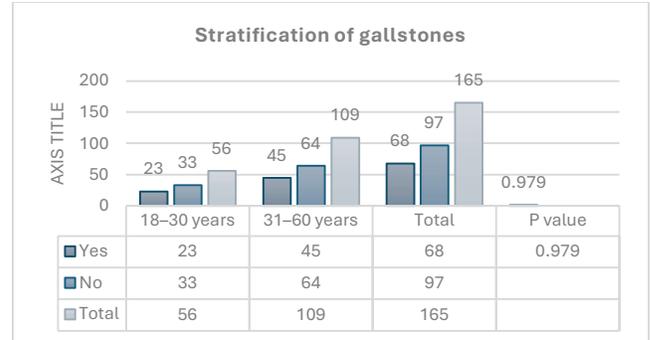


Fig. 5. Stratification of gallstones with respect to age group (n = 165). Gallstones were similarly distributed between 18–30 years and 31–60 years age groups, with no statistically significant association (Chi-square p = 0.9790).

Among patients with gallstones (n=68), 23 were aged 18–30 years and 45 were aged 31–60 years. Among those without gallstones (n=97), 33 were aged 18–30 years and 64 were aged 31–60 years.

The association between age group and gallstone status was not statistically significant (Chi-square p = 0.9790), indicating that gallstones were distributed similarly across the two age categories within this cohort.

DISCUSSION

This research at Hayatabad Medical Complex found that 41% of patients with acute pancreatitis had gallstones on ultrasound, supporting biliary disease as a key cause. Early etiological determination is crucial, as biliary pancreatitis can recur without proper management^{1,5}. Transabdominal ultrasound, widely available and non-invasive, detects gallstones and guides immediate care^{1,3}. Our rate aligns with global data showing gallstones significantly contribute to acute pancreatitis, though percentages vary by population, referral, and diagnosis timing^{2,6,7}.

Most participants were men (57%), with an average age of 42 ± 12.88 years and BMI of 26 ± 3.39 kg/m². While classical management suggests gallstones are more common in females and increase with age, our analysis found no significant link between gallstones and age, gender, or BMI (p>0.05). This may be because, in acute pancreatitis, biliary causes can't be reliably identified from demographics alone, making ultrasound and possibly additional imaging crucial for detecting biliary aetiology^{1,3}. Variability in ultrasound results can be due to bowel gas, body habitus, timing, and limitations in visualisation of the distal common bile duct. Guidelines recommend escalation (e.g., MRCP/EUS) if initial scans are negative.

Management-wise, when obstruction/cholangitis is suspected and definitive cholecystectomy is needed to prevent attacks, early detection of gallstones enables timely biliary clearance^{5,15}. The single-centre cross-sectional study provides valuable local baseline data, but future research should combine ultrasound-identified gallstones, biochemicals, severity stratification, and outcomes to develop tailored protocols and reduce recurrent biliary events^{2,3}.

CONCLUSION

This study determined the prevalence of gallstones on ultrasonography among patients presenting with acute pancreatitis at the Hayatabad Medical Complex, Peshawar. Among 165 cases, 68 (41%) and 97 (59%) patients had gallstones on ultrasound. These results suggest that the extent of acute pancreatitis presentation is significant in the current hospital environment and is attributed to gallstones, thereby confirming the clinical utility of early ultrasound for aetiological diagnosis.

Gallstone status was not statistically significantly related to age group (p = 0.9790), gender (p = 0.9336), or BMI category (p =

0.9394). This implies that, in this group, gallstones were widely distributed across demographic groups and could not be accurately determined by age, sex, or BMI. Thus, ultrasound-based biliary evaluation must be introduced as a systemic measure in the treatment of patients with acute pancreatitis, rather than a selective application based on demographic profile.

In general, the research offers local background data on the prevalence of gallstones in acute pancreatitis and justifies the inclusion of timely ultrasonography in the standard assessment protocols. More research using multicenter sampling and correlational analyses is advisable to enhance generalizability and to evaluate the association between ultrasound-measured gallstones and severity, recurrence, and management outcomes in the local population.

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