Original Article

OPEN ACCESS

Comparative Study of Clinical Profile of Patients with Solitary versus Multiple Gall Stone

Inzmam Riaz[1], Farzana Sabir[2], Tariq Abdullah[3], Adnan Ahmed Khan[4], Saleema Bibi[5], Qurat-ul-Ain Haider[6]

[1,5,6]Postgraduate Resident of Surgery at AIMS Hospital Muzaffarabad AJK
[2]Professor of Surgery, at AIMS Hospital Muzaffarabad AJK
[3]Postgraduate Resident of Medicine, AIMS Hospital Muzaffarabad AJK
[4]Consultant General and Laparoscopic Surgeon, at PIMA Hospital Muzaffarabad AJK

Author`s Contribution

[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [3]Active participation in active methodology, [5,6]analysis, or interpretation of data for the work, [4]Drafting the work or revising it critically for important intellectual content

Funding Source: None
Conflict of Interest: None

Received: May 12, 2024
Accepted: Nov 20, 2024

Address of Correspondent
Dr Inzmam Riaz
Postgraduate resident of surgery at AIMS Hospital Muzaffarabad AJK
inzimughal47@gmail.com

ABSTRACT

Objective: To compare the clinical profiles of patients with solitary versus multiple gallstones, focusing on symptom distribution and diagnostic findings.

Methodology: This prospective comparative study was conducted in the Department of General Surgery at AIMS Hospital, Muzaffarabad, from July to December 2023. Patients aged ≥18 years with newly diagnosed solitary or multiple gallstones confirmed by ultrasound were included. Exclusion criteria were common bile duct stones, previous cholecystectomy, gallbladder malignancy, pregnancy, and incomplete records. Patients were grouped as solitary or multiple gallstones based on imaging. Demographic data, clinical presentation, and associated features were documented using a structured proforma. Statistical analysis was performed using chi-square tests, with $p < 0.05$ considered significant.

Results: Among 58 patients, 34 (58.6%) had solitary gallstones and 24 (41.4%) had multiple. The mean age was 46.2 ±13.3 years; females predominated (82.8%). Most patients were symptomatic (93.1%). Common symptoms included upper abdominal pain (86.2%), nausea/vomiting (89.7%), right shoulder pain (65.5%), and back pain (60.3%). Jaundice was rare (8.6%). Comparative analysis revealed no statistically significant differences in individual symptoms between groups ($p > 0.05$). However, severe pain was significantly more frequent in solitary stone patients (37.9%) compared to multiple stones (12.1%) ($p = 0.035$).

Conclusion: Both solitary and multiple gallstones commonly present with similar symptoms such as abdominal pain and nausea. However, solitary gallstones were associated with a higher prevalence of severe pain. These findings emphasize the need for individualized assessment in gallstone management.

Keywords: Gallstones, solitary, multiple, pain severity, clinical profile.

Cite this article as: Riaz I, Sabir F, Abdullah T, Khan AA, Bibi S, Haider Q. Comparative Study of Clinical Profile of Patients with Solitary versus Multiple Gall Stone. Ann Pak Inst Med Sci. 2024; 20(4):922-926. doi. 10.48036/apims.v20i4.1116

Introduction

Gallstone disease (cholelithiasis) exists as a prevalent condition of gastrointestinal system with significant implications for global population by disrupts biliary system through calculi (gallstones) formation in biliary tract and/or gallbladder. Although, gallstones may clinically manifest as asymptomatic conditions, in several cases it can lead to life-threatening complications such as acute cholecystitis, biliary pancreatitis, gallbladder perforation, and cholangitis. [1] Epidemiological data reveals uneven distribution of gallstones prevalence around the world, wherein age, sex, genomic variations, comorbidities, and ethnicity play their roles in this inconsistency. [2] In the context of developed nations, around 10 to more than 20% of adults are affected by this disease.[3,4] However, rising trends have also been observed in low- and middle-income regions, with observed prevalence rates of 4.4% to as high as 76.4% in

African regions.[5] Pakistan, similar to other developing nations, has an estimated occurrence rate of gallstone disease around 15-20%, with inclination of female gender and urban areas surpassing the rural regions in prevalence.[6] The observed rise in gallstone disease prevalence has consistently been linked to dietary habits, sedentary style of living, higher BMI/obesity, and metabolic syndromes.[7]

Gallstones can be distinguished into either solitary or multiple as per frequency and these types have distinct clinical presentation patterns, progression rates, and correlated complications. Solitary types often reflect asymptomatic nature or fewer symptoms at first, but are more commonly linked to gallbladder carcinoma formation, which is evident in Asian regions. On the other hand, multiple types have been associated more commonly with acute complications such as acute cholecystitis and biliary colic.[6] Clinical presentation of solitary and multiple gallstones, under the influence of demographic patterns, presenting symptoms, and associated comorbidities, may be complicated by the presence of common symptoms including right upper quadrant pain, nausea, vomiting, and dyspepsia, which calls for the clinical profiling of gallstones to achieve proper diagnosis and better clinical management of gallstone disease.[8]

Literature extensively communicates regarding etiology, epidemiology, clinical presentation, and management of gallstones, however, frequency, severity, and associated complications in remain under-explored, with limited research focusing the comparative analysis of the frequency-based clinical profiling of the gallstones.[9-12] The age-specific clinical profiling data would allow the development of evidence-based clinical protocols to optimize patient outcomes through more individualized treatment plans. In the regional context of Azad Jammu and Kashmir (AJK), to the best of our knowledge, no study has yet focused on the distribution and implications of solitary versus multiple gallstones, which is vital for health planning, surgical decision-making, and resource allocation in this underserved area. Therefore, this study aims to compare the clinical profiles of patients diagnosed with either solitary or multiple gallstones by analyzing differences in symptom patterns, demographic characteristics, and diagnostic findings.

Methodology

This prospective comparative study was done at department of general surgery at AIMS Hospital Muzaffarabad AJK. Study was conducted during a period of six months from July 2023 to December 2023. Before the study ethical approval was obtained from the Institutional Review Board (IRB) Ref no. SGR-2020-107-12140. All the patients aged 18 years old or and above, both gender and newly diagnosed solitary or multiple gallstones confirmed through ultrasound or other imaging techniques, were included. All the patients with common bile duct stones (choledocholithiasis) or gallbladder polyps, patients with history of cholecystectomy or biliary surgery, gallbladder malignancy, pregnant women and patients with incomplete records or unwilling to participate were excluded. Written informed consent was obtained from each patient after counseling them about the confidentiality of their information, which would be securely maintained, and informing them that they had the right to withdraw from the study at any stage without affecting their treatment. All patients were divided into two groups: Group 1 for those with solitary gallstones and Group 2 for those with multiple gallstones. Each patient underwent a thorough clinical evaluation, including a detailed history and physical examination, to assess their clinical profile. The findings, such as presenting symptoms, associated comorbidities, and relevant laboratory and imaging results, were documented and analyzed based on their respective groups to compare the clinical characteristics of patients with solitary versus multiple gallstones. All the information was entered and analyzed using SPSS version 24. Comparative analysis was performed using chi-square statistical tests and p-value <0.05 was taken as significant.

Results

Overall 58 patients were included in the study with an overall men age of 46.24+13.28 years, the majority were female (82.8%) and most were married (89.7%). Regarding the type of kidney stones, 58.6% had solitary stones, while 41.4% had multiple stones. (Table I)

Overall both of the solitary and multiple stone groups had symptomatic stones (93.1%, p = 0.157). Common symptoms included pain in the upper right abdomen (86.2%, p = 0.311), central abdominal pain (50.0%, p = 0.976), back pain between shoulder blades (60.3%, p = 0.170), and pain in the right shoulder (65.5%, p = 0.202). Nausea or vomiting was reported in 89.7% of patients (p = 0.673), while jaundice was less common (8.6%, p = 0.948). Other symptoms like anorexia (8.6%, p = 0.202),

indigestion (5.2%), fatty food intolerance (5.2%), abdominal bloating (6.9%), and fever (5.2%) were infrequent, while no clinical features showed statistically significant differences between the two groups (p = >0.05). (Table II)

Table I: Baseline and clinical characteristics of the patients. (n=58)

Variables	Frequency	Percent
Gender		
Male	10	17.2
Female	48	82.8
Total	58	100.0
Marital status		
Married	52	89.7
Unmarried	6	10.3
Total	58	100.0
Types of stone		
Solitary	34	58.6
Multiple	24	41.4
Total	58	100.0

Table II: Clinical profile comparison according study groups. (n=58)

VARIABLES	STUDY GROUPS		Total	p-value
	Solitary	Multiple		
Nature stone				
Symptomatic	33(56.9%)	21(36.2%)	54(93.1%)	0.157
Asymptomatic	1(1.7%)	3(5.2%)	4(6.9%)	
Pain in the upper right portion of abdomen				
Yes	28(48.3%)	22(37.9%)	50(86.2%)	0.311
No	6(10.3%)	2(3.4%)	8(13.8%)	
Pain in the center of abdomen				
Yes	17(29.3%)	12(20.7%)	29(50.0%)	0.976
No	17(29.3%)	12(20.7%)	29(50.0%)	
Back pain between shoulder blades				
Yes	18(31.0%)	17(29.3%)	35(60.3%)	0.170
No	16(27.6%)	7(12.1%)	23(39.7%)	
Pain in right shoulder				
Yes	20(34.5%)	18(31.0%)	38(65.5%)	0.202
No	14(24.1%)	6(10.3%)	20(34.5%)	
Nausea or vomiting				
Yes	30(51.7%)	22(37.9%)	52(89.7%)	0.673
No	4(6.9%)	2(3.4%)	6(10.3%)	
Jaundice				
Yes	3(5.2%)	2(3.4%)	5(8.6%)	0.948
No	31(53.4%)	22(37.9%)	53(91.4%)	
Other clinical features				
Anorexia	5(8.6%)	0(0.0%)	5(8.6%)	0.202
Sense of indigestion	1(1.7%)	2(3.4%)	3(5.2%)	
Intolerance to fatty foods	2(3.4%)	1(1.7%)	3(5.2%)	
Abdominal bloating	2(3.4%)	2(3.4%)	4(6.9%)	
Fever	3(5.2%)	0(0.0%)	3(5.2%)	

According to the comparison of overall pain severity, the severe pain was more common in the solitary stone group (37.9%) compared to the multiple stone group (12.1%). Moderate pain was reported by 43.1% of patients, while mild or no pain was rare (6.9%). The difference in pain severity between the two groups was statistically significant (p = 0.035), as shown in table III.

Table III: Overall severity of pain comparison among study groups. (n=58)

Overall pain score	STUDY GROUPS		Total	p-value
	Solitary	Multiple		
No pain	1(1.7%)	0(0.0%)	1(1.7%)	0.035
Mild pain	1(1.7%)	2(3.4%)	3(5.2%)	
Moderate	10(17.2%)	15(25.9%)	25(43.1%)	
Sever pain	22(37.9%)	7(12.1%)	29(50.0%)	
Total	34(58.6%)	24(41.4%)	58(100.0%)	

Discussion

Gallstone disease, medically termed as cholelithiasis, is often an asymptomatic gastrointestinal condition, but if symptoms develop, it can lead to life-threatening complications such as biliary pancreatitis, acute calculus cholecystitis, or even a risk for gallbladder cancer, which makes it a significant concern for the global health.[13-15] This study compared the clinical profiles of patients diagnosed with either solitary or multiple gallstones by analyzing differences in symptom patterns, demographic characteristics, and diagnostic findings. In this study, Overall 58 patients were included, with an overall men age of 46.24+13.28 years, the majority were female (82.8%) and most were married (89.7%). These findings are in line with global trend of gallstone disease, with female predominance and more common among married as evident from the studies conducted by Huang et al.,[16] and Zhoa et al.[17] Higher incidence among females may due to hormonal factors such as estrogen and progesterone, which increase cholesterol saturation in bile, as well as pregnancy and multiparity, which promote biliary stasis, while predominance among married women may reflect greater cumulative exposure to these risk factors, in addition to possible lifestyle influences such as dietary habits and reduced physical activity, both of which contribute to gallstone formations

In present study, 58.6% of the patients had solitary stones, while 41.4% had multiple stones. Consistent with our findings, in a recent study of Thenral,[18] solitary gallstones were more common in 60% patients as compared to those with multiple gallstones (40%). Similar findings were reported in another study conducted by Jarrar and Al-Rowaili,[19] where solitary stone was most common presentation in 61% of patient, while multiple stones were found in 39% of cases. Correspondingly, studies conducted by Pahari et al. [20] and Alshoabi et al.[21] also suggest that solitary gallstones

present more frequently, with a greater risk of complications such as gallbladder perforation, empyema, mucocele, and surgery associated complications. However, a recent study conducted by Dev et al[6] found no difference in the clinical presentation of patients with multiple (n=71) or solitary (n=70) Gallstones, which may imply that other factors such as stone size may have more influenced the severity of symptom rather than number alone. Contrasting to our findings, in the study by Bansal et al[22] multiple stones were more common in 63.5% of patients compared to solitary stones in 36.5%. This disparity in finding may be explained by the difference in population-specific variables and methodology, which may have influenced the gallstone epidemiology.

In current study, both of the solitary and multiple stone groups had symptomatic stones (93.1%). Common symptoms included pain in the upper right abdomen (86.2%), followed by pain in the right shoulder (65.5%), back pain between shoulder blades (60.3%), and central abdominal pain (50.0%). Nausea or vomiting was reported in 89.7% of patients, while jaundice was less common (8.6%). Other symptoms like anorexia (8.6%), indigestion (5.2%), fatty food intolerance (5.2%), abdominal bloating (6.9%), and fever (5.2%) were infrequent. No clinical features showed statistically significant differences between the two groups (p-values > 0.05). Consistent with our findings, in the study by Vahed and Khedmat,[8] pain in upper right abdomen was the most common symptoms in 95.7% of patients, followed by vomiting in 52.9% of cases, shoulder/back pain in 37.1%, and fever in 25.7%, while diarrhea and itching each in 8.6% of patients were the least common symptoms. Moreover, in the study by Rathod et al[23] most common sites of pain were right hypochondrium (40%), both the epigastrium and right hypochondrium (40%), epigastrium (13.3%), and upper abdomen (6.7%). Other symptoms were dyspepsia in most cases (70 %), followed by nausea and vomating (66.7 %), fever (25%) and jaundice (11.66%).

In this study, according to the comparison of overall pain severity, the severe pain was more common in the solitary stone group (37.9%) compared to the multiple stone group (12.1%). The difference in pain severity between the two groups was statistically significant (p = 0.035). Comparable to our findings, Misrani et al[24] documented that solitary stones were more associated with colicky pain, while multiple stones were more inclined to dull pain. Contrasting to our findings, in the study conducted by Singh et al[25] pain was more common in multiple stone patients in both the males and females, however, the authors did not distinguished the severity of pain. Overall this study possess several limitations, being a single-center study with a relatively small sample size, the findings may not be generalizable to wider populations due to potential demographic and geographic variations. The selection bias may also be present, as only patients presenting to the hospital were included, possibly excluding asymptomatic or undiagnosed cases. Moreover, the important risk factors such as dietary habits, metabolic disorders, and genetic predispositions were not fully explored, and stone size and composition were not analyzed, which may also influence clinical outcomes. However further studies should aim to address these limitations by including larger, multi-center populations and adopting prospective or longitudinal designs to better evaluate disease progression and its consequences. Evaluation of the detailed risk factors, including lifestyle, comorbidities, and metabolic factors, along with evaluation of stone size and composition, would help clarify their role in symptom severity and its complications.

Conclusion

Study revealed that the majority of patients in both groups presented with symptomatic gallstones, with common symptoms including upper abdominal pain, shoulder pain, and nausea, while the patients with solitary gallstones were more likely to report severe pain compared to those with multiple stones. Other clinical features such as jaundice, indigestion, and bloating were statistically insignificant across the groups.

References

1. Sunnatova M. The role of X-ray surgery in complicated forms of gallstone disease. Mod Sci Res. 2025 Jun 18;4(6):388-90.
2. Wang X, Yu W, Jiang G, Li H, Li S, Xie L, et al. Global epidemiology of gallstones in the 21st century: a systematic review and meta-analysis. Clin Gastroenterol Hepatol. 2024 Aug 1;22(8):1586-95. doi:10.1016/j.cgh.2024.01.051.
3. Pęczuła A, Czaplicki A, Przybyłkowski A. Genetics of gallstones. Genes. 2025 Feb 22;16(3):256. doi:10.3390/genes16030256.
4. Hasan R, Allahbakhshi F, Shlyk AD, Allahbakhshi K. Gallstones as a predictor of elevated cardiovascular disease risk: a meta-analysis and meta-regression of over 7.4 million participants. PLoS One. 2025 Mar 19;20(3):e0314661.
5. Abdu SM, Assefa EM. Prevalence of gallstone disease in Africa: a systematic review and meta-analysis. BMJ Open

Gastroenterology. 2025 Jan 1;12(1).
6. Dev K, Sarfraz K, Shah SA, Yuvraj SN, Sindhu S, Mehak. Comparative study of clinical profile in patients with solitary vs multiple gallstones. Biol Clin Sci Res J. 2025 Jun 30;6(6):11-5. doi:10.54112/bcsrj.v6i6.1797.
7. Dai F, Cai Y, Yang S, Zhang J, Dai Y. Global burden of gallbladder and biliary diseases (1990–2021) with healthcare workforce analysis and projections to 2035. BMC Gastroenterol. 2025 Apr 12;25(1):249. doi:10.1186/s12876-025-03842-x.
8. Vahed LK, Khedmat L. Frequency of symptoms associated with gallstone disease: a hospital-based cross sectional study. European journal of translational myology. 2018 Apr 24;28(2):7412.
9. Kahler-Quesada A, Campwala I, Scholz S. Management of gallstone pancreatitis in children. Semin Pediatr Surg. 2025 Jun 29;151502. doi:10.1016/j.sempedsurg.2025.151502.
10. Маматова И, Мадаминова. The beneficial effects of corn silk (Zea mays) in gallstone disease. Int Multidiscip J Res Dev. 2025 Mar 22;1(2):56-61.
11. Baghel AS, Anand K, Gupta S. Clinical presentation and surgical outcome among patients having single and multiple gallstones: a prospective study. International Surgery Journal. 2022 Sep 28;9(10):1720-5
12. Morozov AM, Buinova MD, Titova AV. Role of risk factors in the development of cholelithiasis. Med Sestra. 2025 Jun 19;27(4):42-4. doi:10.29296/25879979-2025-04-10.
13. Thanushiyan V, Uthayanan B, Faiz MH, Uthayanan S. A case study on the efficacy of herbal medicine and dietary interventions in the alternative management of gallstone. Metabolism. 2025;6(7):8.
14. Agbektas T, Guclu G, Tas A, Ozmen E, Topcu O, Aydin S, et al. Leptin/Melanocortin pathway in cholelithiasis patients: a diagnostic perspective. Protein Pept Lett. 2025 Jan;32(1):75-83. doi:10.2174/0109298665343979241025114114.
15. Jumaa AM, Hussein AL, Khalaf MA. Gallstones in Tikrit, Iraq: a population-based study on the roles of obesity, gender, and age. An Overview of Disease and Health Research. 2025 May 22;1:1-10. doi:10.9734/bpi/aodhr/v1/5254.
16. Huang X, Hao X, Wang T, Zhang X, Wu P, Shen L, et al. Sex-related association between smoke exposure and gallstones in a US population: a cross-sectional study. BMC Public Health. 2025 Jan 28;25(1):344. doi:10.1186/s12889-024-21173-6.
17. Zhao Y, Liu X, Han J, Feng B, Yan C, Zhao J. The association between life's essential 8 and gallstones: a cross-sectional study. Sci Rep. 2025 Feb 8;15(1):4713. doi:10.1038/s41598-025-89024-x.
18. Thenral A. Association between gallstone disease and hypothyroidism. Cuest Fisioter. 2025 Feb 20;54(4):1651-60.
19. Jarrar BM, Al-Rowaili MA. Chemical composition of gallstones from Al-Jouf Province of Saudi Arabia. Malays J Med Sci. 2011 Apr;18(2):47-54.
20. Pahari S, Basukala S, Piya U, Khand Y, Thapa B, Thapa O, et al. Gallstone among patients presenting to the department of surgery in a tertiary care center: a descriptive cross-sectional study. JNMA J Nepal Med Assoc. 2023 Apr 30;61(260):315-20. doi:10.31729/jnma.8123.
21. Alshoabi S. Gallstones: site, size, number, prevalence and complications by ultrasonography. Int J Med Ima. 2016;4:52-6.
22. Bansal A, Akhtar M, Bansal AK. A clinical study: prevalence and management of cholelithiasis. Int Surg J. 2014 Nov 10;1(3):134-9. doi:10.5455/2349-2902.isj20141105.
23. Rathod V, Chavhan N, Dahake T. Effective diagnosis for the management of gallstone: a clinical study. Int Surg J. 2017 Jul 24;4(8):2612-4. doi:10.18203/2349-2902.isj20173397.
24. Misrani JK, Iqbal S, Sasoli NA, Memon ZA, Ahmedani SA. Comparative study of clinical profile in patients with solitary versus multiple gallstones. J Liaquat Uni Med Health Sci. 2016;15(1):12-5. doi:10.22442/jlumhs.161510457.
25. Singh RK, Prakash S, Vishal V, Alok S. Study of clinical profile in patients with solitary versus multiple gallstones. Int J Acad Med Pharm. 2023;5(2):1594-8.