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Research Article

Management and Outcomes of Symptomatic Gall Stone Disease during Pregnancy

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ABSTRACT

Background: Symptomatic gallstone disease during pregnancy is an important cause of maternal morbidity and hospitalization. Its management remains challenging because treatment decisions must consider both maternal and fetal safety. This study aimed to evaluate the management strategies and maternal and fetal outcomes of symptomatic gallstone disease during pregnancy.

Materials and Methods: This prospective observational study included 110 pregnant women diagnosed with symptomatic gallstone disease. Demographic characteristics, obstetric history, clinical presentation, management modalities, and maternal and fetal outcomes were evaluated. Patients were categorized according to conservative management (n = 64) or interventional management (n = 46), including laparoscopic cholecystectomy, open cholecystectomy, and therapeutic ERCP.

Results: Most patients belonged to the 26–30-year age group (39.09%), were multigravida (64.55%), and presented during the second trimester (43.64%). Conservative management was performed in 58.18% of patients, while 29.09% underwent laparoscopic cholecystectomy, 5.45% underwent open cholecystectomy, and 7.27% received ERCP. Symptomatic improvement was higher in the intervention group (95.65%) than in the conservative group (79.69%). Recurrent biliary symptoms (8.70% vs. 34.38%) and hospital readmissions (6.52% vs. 26.56%) were lower following intervention. Pregnancy loss occurred in 2.17% and 3.13% of patients, respectively. Preterm labor was also less frequent following intervention (10.87% vs. 14.06%).

Conclusion: Interventional management was associated with better symptomatic improvement and fewer recurrent biliary events compared with conservative treatment. Individualized treatment and multidisciplinary care are essential for optimizing maternal and fetal outcomes during pregnancy.

Keywords: Symptomatic Gallstone Disease, Pregnancy, Cholelithiasis, Conservative Management, Laparoscopic Cholecystectomy, Maternal Outcomes, Fetal Outcomes.

INTRODUCTION

Gallstone disease is one of the most common non-obstetric gastrointestinal disorders encountered during pregnancy and represents an important cause of abdominal pain, hospitalization, and surgical intervention. Pregnancy is associated with hormonal and physiological changes that predispose women to biliary sludge and gallstone formation. The prevalence of gallstones during pregnancy has been reported to range from 5% to 12%, while symptomatic gallstone disease occurs in approximately 0.05% to 3% of pregnancies [1,2]. Elevated estrogen levels increase hepatic cholesterol secretion, resulting in cholesterol-supersaturated bile, whereas progesterone reduces gallbladder contractility and delays emptying, promoting biliary stasis and gallstone formation [3]. Additional risk factors include obesity, multiparity, increased body mass index, and underlying metabolic abnormalities [4,5].Symptomatic gallstone disease during pregnancy may present as biliary colic, acute cholecystitis, choledocholithiasis, cholangitis, or gallstone-induced pancreatitis. Common manifestations include right upper quadrant abdominal pain, nausea, vomiting, and intolerance to fatty meals. Diagnosis may be challenging because these symptoms frequently overlap with pregnancy-related gastrointestinal complaints [6]. Ultrasonography remains the preferred initial diagnostic modality because of its safety, accessibility, and absence of ionizing radiation. Magnetic resonance cholangiopancreatography may be considered when common bile duct stones or biliary obstruction are suspected. Management of symptomatic gallstone disease during pregnancy requires careful consideration of maternal and fetal safety. Traditionally,

conservative treatment involving dietary modification, intravenous hydration, analgesics, and antibiotics when indicated has been preferred, particularly in uncomplicated cases [6]. However, non-operative management is associated with recurrent symptoms, repeated hospital admissions, and progression to complications such as acute cholecystitis and biliary pancreatitis [7,8]. Consequently, definitive surgical intervention may be necessary in patients with recurrent or complicated disease. Advances in minimally invasive surgery have established laparoscopic cholecystectomy as an effective treatment option during pregnancy. Compared with open surgery, laparoscopy offers reduced postoperative pain, shorter hospitalization, faster recovery, and fewer wound-related complications [9,10]. Although the second trimester was traditionally considered the safest period for surgical intervention, contemporary recommendations support laparoscopic cholecystectomy during any trimester when clinically indicated, with appropriate multidisciplinary care [11]. Therapeutic endoscopic retrograde cholangiopancreatography may also be required for complicated common bile duct stones. Maternal and fetal outcomes depend on disease severity, gestational age, treatment modality, and timing of intervention. Potential complications include recurrent biliary events, preterm labor, fetal distress, and pregnancy loss [12]. Therefore, the present study aims to evaluate the clinical presentation, management strategies, and maternal and fetal outcomes of symptomatic gallstone disease during pregnancy, with particular emphasis on the safety and effectiveness of conservative and surgical management.

MATERIALS AND METHODS

The present study was conducted as a hospital-based prospective observational study to evaluate the clinical presentation, management strategies, and maternal and fetal outcomes of symptomatic gallstone disease during pregnancy. The study assessed the effectiveness and safety of conservative and surgical management in pregnant women diagnosed with symptomatic gallstone disease. The study was conducted in the Department of General Surgery in collaboration with the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital. Pregnant women presenting to the outpatient department or emergency department with symptoms suggestive of gallstone disease were evaluated for eligibility. A total of 110 pregnant women diagnosed with symptomatic gallstone disease were included in the study. Patients fulfilling the eligibility criteria were enrolled using a consecutive sampling technique until the required sample size was achieved.

Study Population

The study population comprised pregnant women of different gestational ages who presented with symptomatic gallstone disease, including biliary colic, acute calculous cholecystitis, choledocholithiasis, and gallstone-induced pancreatitis. The diagnosis was established through clinical evaluation, laboratory investigations, and ultrasonographic findings.

Inclusion Criteria

1. Pregnant women aged 18 years and above.
2. Pregnant women in any trimester of pregnancy.
3. Patients diagnosed with symptomatic gallstone disease based on clinical and ultrasonographic findings.
4. Patients presenting with biliary colic, acute cholecystitis, choledocholithiasis, or gallstone-induced pancreatitis.
5. Patients who provided written informed consent to participate in the study.

Exclusion Criteria

1. Pregnant women with asymptomatic gallstones.
2. Patients with a previous history of cholecystectomy.
3. Patients with abdominal pain attributable to causes other than gallstone disease.
4. Patients with known malignant hepatobiliary disorders.
5. Patients who declined participation or did not provide informed consent.

Data Collection Procedure

Following enrollment, detailed demographic, obstetric, and clinical information was recorded using a structured case record form. Demographic characteristics included age, body mass index, and relevant medical history. Obstetric details included gravidity, parity, gestational age at presentation, and trimester of pregnancy. A detailed clinical history was obtained regarding the onset, duration, frequency, and severity of abdominal pain, associated nausea, vomiting, fever, jaundice, and previous episodes of biliary symptoms. All patients underwent general physical

examination, abdominal examination, and obstetric assessment.

Diagnostic Evaluation
All enrolled patients underwent appropriate laboratory and radiological investigations to confirm the diagnosis and assess disease severity. Laboratory investigations included complete blood count, liver function tests, serum bilirubin, and serum amylase and lipase when pancreatitis was suspected. Abdominal ultrasonography was performed to identify gallstones, gallbladder wall thickening, pericholecystic fluid, and biliary duct dilatation. Magnetic resonance cholangiopancreatography was performed in selected patients when choledocholithiasis or biliary obstruction was suspected and further imaging was clinically indicated.

Management Protocol
Patients were managed according to their clinical presentation, severity of symptoms, gestational age, and overall maternal and fetal condition. The treatment approach was determined by the treating surgical team in consultation with the obstetric and anesthesiology teams.

Conservative Management
Patients with uncomplicated symptomatic gallstone disease who were considered suitable for non-operative treatment received conservative management. Treatment included intravenous fluids, dietary modification, appropriate analgesics, antiemetics, and antibiotics when infection was suspected or confirmed. Patients were monitored for symptomatic improvement, recurrence of abdominal pain, and development of complications.

Surgical Management
Patients with recurrent biliary symptoms, acute cholecystitis, failure of conservative treatment, or other indications for definitive intervention underwent surgical management after multidisciplinary evaluation. Laparoscopic cholecystectomy was the preferred surgical approach when feasible, while open cholecystectomy was considered when clinically necessary. The timing of surgery was determined according to the urgency of the clinical condition, gestational age, and maternal and fetal status. Perioperative maternal monitoring and appropriate obstetric assessment were performed.

Endoscopic Management
Patients with suspected or confirmed common bile duct stones, obstructive jaundice, or cholangitis were evaluated for therapeutic endoscopic retrograde cholangiopancreatography. Endoscopic intervention was performed when clinically indicated, with precautions to minimize fetal radiation exposure.

Assessment of Maternal Outcomes
Maternal outcomes were evaluated according to the management strategy received. The following parameters were recorded:
1. Resolution or persistence of abdominal pain.
2. Recurrence of biliary symptoms.
3. Requirement for repeated hospital admission.
4. Development of complications, including acute cholecystitis, cholangitis, and pancreatitis.
5. Requirement for surgical or endoscopic intervention.
6. Postoperative complications, where applicable.
7. Duration of hospital stay.
8. Maternal morbidity and mortality.

Assessment of Fetal and Obstetric Outcomes
Fetal and obstetric outcomes were assessed in collaboration with the Department of Obstetrics and Gynaecology. The following parameters were evaluated:
1. Pregnancy continuation and outcome.
2. Occurrence of miscarriage or pregnancy loss.
3. Incidence of preterm labor and preterm delivery.
4. Occurrence of fetal distress.
5. Gestational age at delivery.
6. Mode of delivery.
7. Neonatal birth weight.
8. Neonatal intensive care unit admission.
9. Perinatal mortality.

Follow-up
Patients were followed during hospitalization and subsequently through scheduled antenatal visits or hospital records until delivery, wherever follow-up information was available. Maternal symptoms, recurrence of gallstone-related complications, requirement for additional interventions, and pregnancy outcomes were recorded. Postoperative patients were assessed for recovery and procedure-related complications.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using SPSS.26statistical software. Categorical variables were expressed as frequencies and percentages, whereas continuous variables were presented as mean ± standard deviation or median with interquartile range, depending on data distribution.

The chi-square test or Fisher's exact test was used to compare categorical variables between management groups. The independent Student's t-test or Mann–Whitney U test was used for continuous variables, as appropriate. Maternal and fetal outcomes were compared between patients receiving conservative and surgical management. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 presents the distribution of study participants according to demographic and obstetric characteristics. Among the 110 pregnant women, the majority belonged to the 26–30 years age group (39.09%), followed by 18–25 years (29.09%) and 31–35 years (22.73%). Multigravida women constituted 64.55% of the study population, whereas 35.45% were primigravida. Regarding gestational age at presentation, the highest proportion of patients presented during the second trimester (43.64%), followed by the third trimester (35.45%) and first trimester (20.91%). The demographic and obstetric distribution of participants is in Figure 1.Table 2 shows the distribution of study participants according to management modality. Conservative management alone was the most commonly adopted approach, accounting for 58.18% of cases. Laparoscopic cholecystectomy was performed in 29.09% of patients, while 5.45% underwent open cholecystectomy. Therapeutic ERCP without cholecystectomy during pregnancy was performed in 7.27% of cases. The distribution of different management modalities is depicted in Figure 2.Table 3 compares maternal clinical outcomes between conservative and interventional management groups. Symptomatic improvement was observed in 95.65% of patients undergoing intervention compared with 79.69% receiving conservative management. Recurrent biliary symptoms were more frequent in the conservative group (34.38%) than in the intervention group (8.70%). Similarly, hospital readmission was higher among conservatively managed patients (26.56% versus 6.52%). Acute biliary complications during follow-up occurred in 15.63% and 6.52% of patients in the conservative and intervention groups, respectively. The mean hospital stay was longer in the intervention group (5.36 ± 2.14 days) compared with the conservative group (4.12 ± 1.68 days). No maternal mortality was reported in either group.Table 4 presents the comparison of maternal and fetal outcomes according to management approach. Pregnancy loss occurred in 3.13% of patients receiving conservative management compared with 2.17% undergoing intervention. Preterm labor was reported in 14.06% of conservatively managed patients and 10.87% of patients in the intervention group. Similarly, preterm delivery occurred in 12.50% and 8.70% of patients, respectively. Fetal distress was observed in 10.94% of patients receiving conservative management compared with 8.70% undergoing intervention. These outcomes are in Figure 3.Table 5 demonstrates the distribution of maternal complications and clinical outcomes according to trimester of presentation. Recurrent biliary symptoms were most frequent during the first trimester (34.78%), followed by the second (22.92%) and third trimesters (17.95%). Acute cholecystitis was observed in 30.43%, 29.17%, and 25.64% of patients presenting during the first, second, and third trimesters, respectively. Biliary pancreatitis occurred in 8.70%, 8.33%, and 5.13% of patients, respectively. The requirement for surgical intervention was highest during the second trimester (41.67%), followed by the third (30.77%) and first trimesters (26.09%). Preterm labor was most frequently reported during the third trimester (17.95%), whereas pregnancy loss was highest among patients presenting during the first trimester (8.70%).

Table 1. Distribution of Study Participants According to Demographic and Obstetric Characteristics (N = 110)

Characteristics	Number (n)	Percentage (%)
Age group (years)		
18–25	32	29.09
26–30	43	39.09

31–35	25	22.73
>35	10	9.09
Gravidity		
Primigravida	39	35.45
Multigravida	71	64.55
Gestational age at presentation		
First trimester	23	20.91
Second trimester	48	43.64
Third trimester	39	35.45
BMI (kg/m²)		

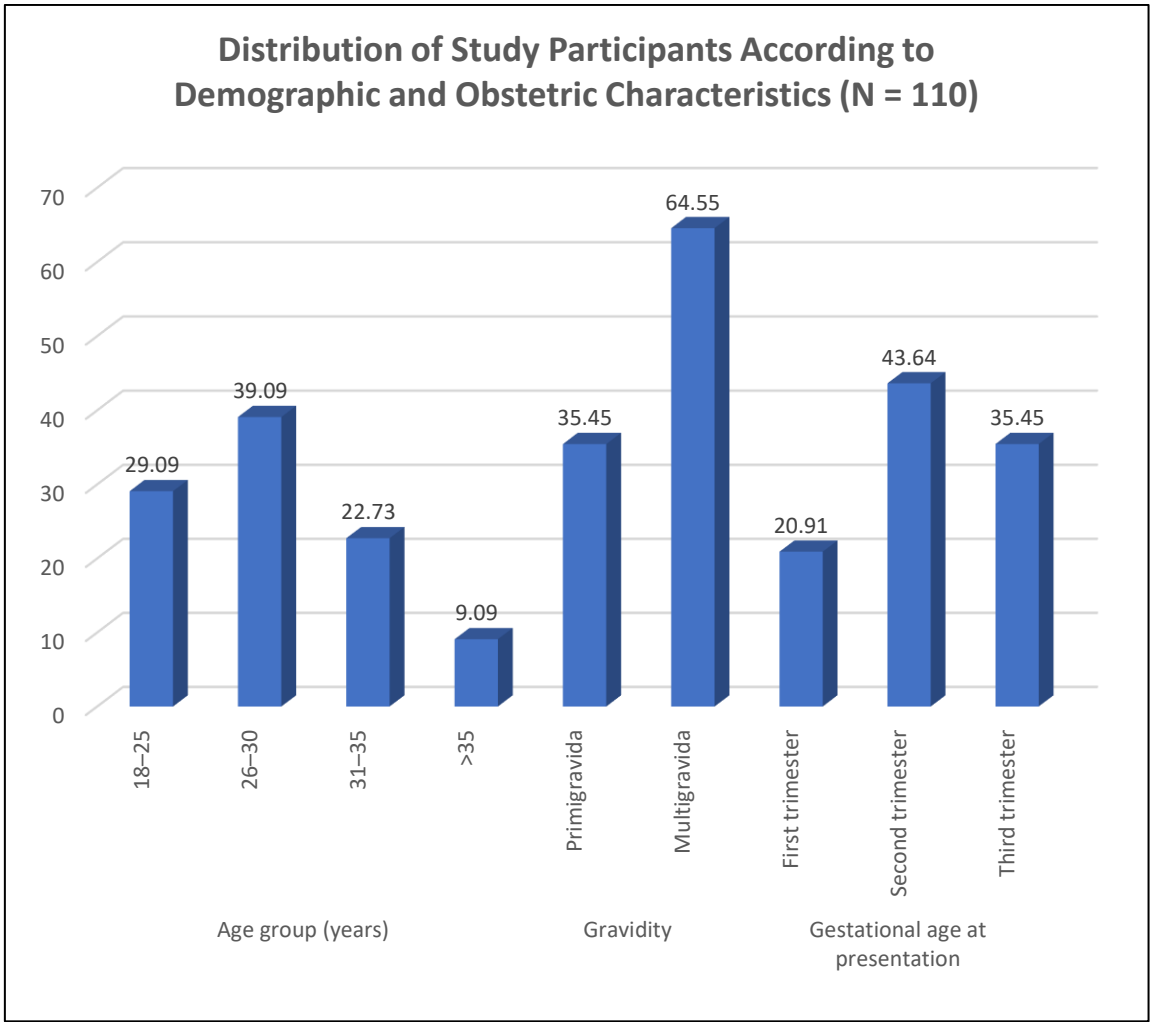


Figure 1 Distribution of Study Participants According to Demographic and Obstetric Characteristics (N = 110)

Table 2. Distribution of Study Participants According to Management Modality (N = 110)

Management modality	**Number (n)**	**Percentage (%)**
Conservative management alone	64	58.18
Laparoscopic cholecystectomy	32	29.09
Open cholecystectomy	6	5.45
Therapeutic ERCP without cholecystectomy during pregnancy	8	7.27
Total	110	100.00

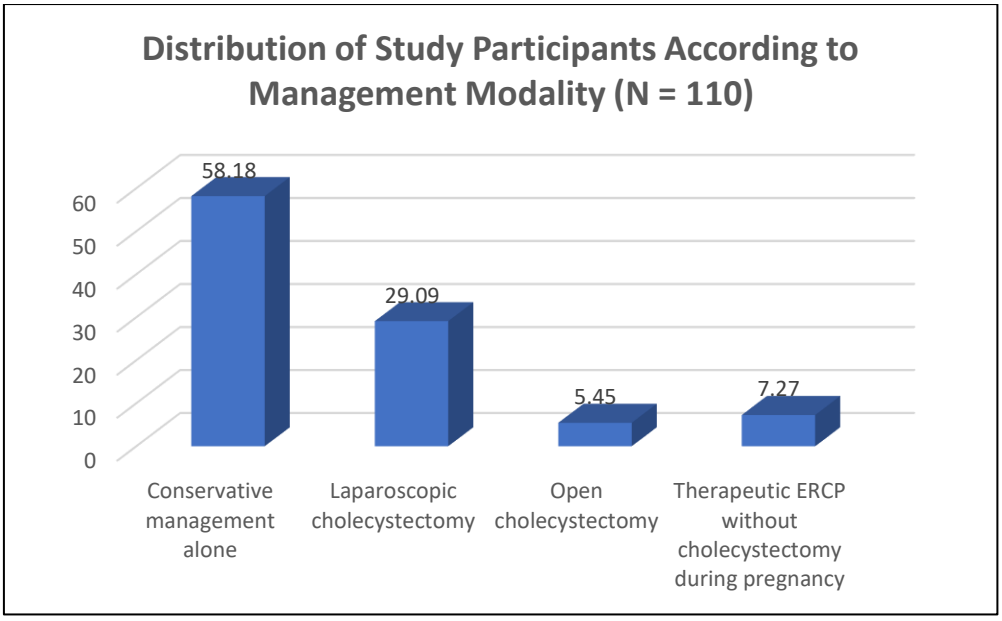


Figure 2 Distribution of Study Participants According to Management Modality (N = 110)

Table 3. Comparison of Maternal Clinical Outcomes According to Management Approach (N = 110)

Maternal outcomes	**Conservative (n = 64)**	**Intervention (n = 46)**
Symptomatic improvement	51 (79.69%)	44 (95.65%)
Recurrent biliary symptoms	22 (34.38%)	4 (8.70%)
Hospital readmission	17 (26.56%)	3 (6.52%)
Acute biliary complications during follow-up	10 (15.63%)	3 (6.52%)
Hospital stay (days), mean ± SD	4.12 ± 1.68	5.36 ± 2.14
Maternal mortality	0 (0.00%)	0 (0.00%)

Table 4. Comparison of Maternal and Fetal Outcomes According to Management Approach (N = 110)

Maternal and fetal outcomes	**Conservative (n = 64)**	**Intervention (n = 46)**
Pregnancy loss	2 (3.13%)	1 (2.17%)
Preterm labor	9 (14.06%)	5 (10.87%)
Preterm delivery	8 (12.50%)	4 (8.70%)
Fetal distress	7 (10.94%)	4 (8.70%)

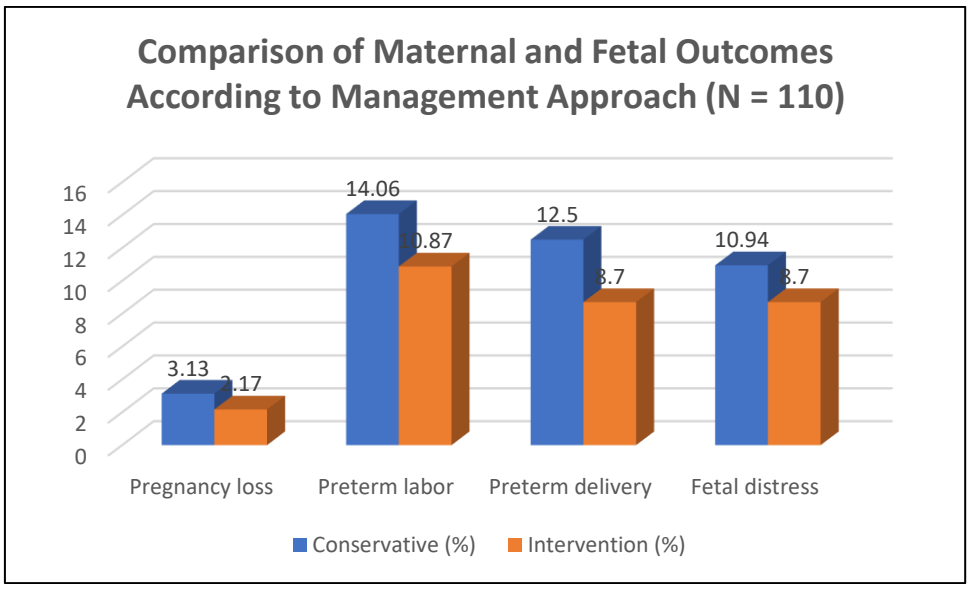


Figure 3 Comparison of Maternal and Fetal Outcomes According to Management Approach (N = 110)

Table 5. Distribution of Maternal Complications and Clinical Outcomes According to Trimester of Presentation (N = 110)

Clinical outcomes	First trimester (n = 23)	Second trimester (n = 48)	Third trimester (n = 39)
Recurrent biliary symptoms	8 (34.78%)	11 (22.92%)	7 (17.95%)
Acute cholecystitis	7 (30.43%)	14 (29.17%)	10 (25.64%)
Biliary pancreatitis	2 (8.70%)	4 (8.33%)	2 (5.13%)
Required surgical intervention	6 (26.09%)	20 (41.67%)	12 (30.77%)
Preterm labor	2 (8.70%)	5 (10.42%)	7 (17.95%)
Pregnancy loss	2 (8.70%)	1 (2.08%)	0 (0.00%)

DISCUSSION

The present study evaluated management strategies and maternal and fetal outcomes of symptomatic gallstone disease among 110 pregnant women. The majority of patients belonged to the 26–30-year age group (39.09%), followed by 18–25 years (29.09%). Multigravida women constituted 64.55% of participants, and most patients presented during the second trimester (43.64%), followed by the third trimester (35.45%). These findings highlighted the occurrence of symptomatic gallstone disease among women of reproductive age, particularly those with previous pregnancies.

Conservative management was employed in 58.18% of patients, while 29.09% underwent laparoscopic cholecystectomy, 5.45% underwent open cholecystectomy, and 7.27% received therapeutic ERCP. Symptomatic improvement was higher in the intervention group (95.65%) than in the conservative group (79.69%). Recurrent biliary symptoms (8.70% vs. 34.38%), hospital readmissions (6.52% vs. 26.56%), and acute biliary complications (6.52% vs. 15.63%) were lower following intervention. However, mean hospital stay was longer in the intervention group (5.36 ± 2.14 days) compared with the conservative group (4.12 ± 1.68 days).These findings were consistent with Rios-Diaz et al. (2020) [13], who evaluated 7,965 pregnant women with acute cholecystitis and reported that non-operative management was associated with increased obstetric complications (OR 2.69) and 30-day readmissions (OR 1.61). Similarly, Hassanesfahani et al. (2025) [14] reported symptom recurrence in 77% of conservatively managed patients, substantially higher than the 34.38% observed in our study. This difference may reflect variations in disease severity, patient characteristics, and follow-up duration.Regarding obstetric outcomes, pregnancy loss occurred in 3.13% of conservatively managed patients compared with 2.17% following intervention. Preterm labor (14.06% vs. 10.87%), preterm delivery (12.50% vs. 8.70%), and fetal distress (10.94% vs. 8.70%) were also numerically higher in the conservative group. An Australian population-based study involving 1,882 pregnancies similarly reported increased preterm birth associated with gallstone disease and reduced maternal readmissions following surgical management.

Trimester-specific analysis revealed that recurrent biliary symptoms were highest during the first trimester (34.78%), surgical intervention was most frequent during the second trimester (41.67%), and preterm labor was highest during the third trimester (17.95%). Swisher et al. (1994) [15] emphasized individualized management based on gestational age and disease severity.

CONCLUSION

The present study suggested that symptomatic gallstone disease during pregnancy could be managed through conservative or interventional approaches depending on disease severity and maternal and fetal conditions. Surgical and endoscopic interventions were associated with greater symptomatic improvement, fewer recurrent biliary episodes, and reduced hospital readmissions compared with conservative management. Maternal and fetal outcomes were generally favorable in both groups, with numerically fewer adverse outcomes among patients receiving intervention. Early diagnosis, appropriate patient selection, and multidisciplinary management are essential for optimizing maternal and fetal outcomes. However, larger prospective studies are required to establish the comparative safety and effectiveness of different management strategies.

Limitations

The present study was limited by its relatively small sample size of 110 patients and single-center design, which may restrict the generalizability of the findings. The observational nature of the study and lack of randomization may have introduced selection bias between conservative and interventional management groups. Differences in disease severity, gestational age, and clinical characteristics may have influenced maternal and fetal outcomes. Additionally, the limited follow-up period may not have captured long-term maternal complications and neonatal outcomes.

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