

Non-surgical management of cholelithiasis using functional medicine approach: A case series

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Abstract

Background: Gallstone disease (cholelithiasis) is a common gastrointestinal disorder in Bangladesh, often linked to obesity, diabetes, and metabolic dysfunction. While laparoscopic cholecystectomy remains the gold standard, many patients seek non-surgical options. Functional medicine offers a systems-based approach targeting root causes such as diet, gut health, and metabolic imbalance.

Objective: To describe the outcomes of patients with gallstone disease managed using a functional medicine-based personalized protocol in a real-world clinical setting.

Methods: Three adult patients with ultrasonography-confirmed gallstones who declined surgery were managed between April and October 2025. Interventions included dietary modification, lifestyle changes, and targeted nutraceutical support. Clinical symptoms, patient-reported outcomes, and laboratory markers were monitored at baseline and follow-up.

Results: Patients ranged from 13 to 50 years, predominantly female. Common symptoms included right upper abdominal pain, dyspepsia, and bloating. All patients reported marked improvement within 4–8 weeks, with complete resolution of biliary pain and sustained symptom freedom at one month. Follow-up laboratory findings showed improved insulin sensitivity, normalized liver enzymes, and favorable stool microbiome changes. No adverse events occurred, and surgical intervention was avoided during follow-up.

Conclusion: This case series suggests that functional medicine-based interventions may support conservative management of uncomplicated gallstone disease in selected patients. While findings are preliminary, they highlight the potential of lifestyle-based strategies as adjuncts to standard care. Larger studies are warranted to evaluate long-term outcomes.

Keywords: Gallstones; Cholelithiasis; Functional medicine; Non-surgical management; Case series; Bangladesh

1. Introduction

Gallstone disease (GD), or cholelithiasis, is a common gastrointestinal disorder with a global prevalence of about 6% (1). Many patients remain asymptomatic initially, but progression can lead to biliary colic, cholecystitis, or pancreatitis, making GD a significant cause of hospital admissions. Established risk factors include female gender, advanced age, obesity, diabetes, and family history (2).

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The conventional treatment for symptomatic GD is laparoscopic cholecystectomy (3). While effective for symptom relief, surgery does not address the underlying metabolic dysfunctions that drive stone formation. Moreover, some patients are unsuitable for surgery or develop persistent digestive complaints after cholecystectomy, creating a gap in care.

Functional medicine (FM) offers a systems-based approach that emphasizes root-cause identification, including dietary imbalance, insulin resistance, and gut microbiome disruption (4). By focusing on nutrition, lifestyle, and metabolic optimization, FM may improve bile composition and gallbladder motility, providing a conservative option for selected patients.

This case series aims to describe the clinical outcomes of three patients with gallstones or biliary sludge managed using a structured functional medicine protocol. The objective is to illustrate its practical application and explore its potential role as an adjunct to conventional care.

2. Functional Medicine and Integrative Approaches for Gallstones

Functional medicine focuses on identifying and correcting underlying physiological imbalances through personalized interventions such as dietary modification, lifestyle changes, and targeted nutritional support. In gallstone disease, this approach aims to improve bile composition, enhance gallbladder motility, and address metabolic dysfunction rather than targeting gallstones alone [5].

Emerging evidence suggests that dietary interventions, weight management, and metabolic optimization may alleviate biliary symptoms and reduce gallstone-related complications, although high-quality randomized controlled trials remain limited [6]. Integrative approaches may therefore be beneficial for patients with uncomplicated gallstones who prefer non-surgical management or are not immediate surgical candidates [7].

While functional medicine has been explored in other metabolic and gastrointestinal disorders, literature specifically addressing its application in gallstone disease remains scarce, particularly in LMICs such as Bangladesh. This gap underscores the importance of descriptive studies, including case series, to generate preliminary evidence and inform future research.

3. Materials and Methods

3.1. Study Design and Setting

This descriptive case series was conducted at the American Wellness Centre, Dhaka, Bangladesh. Patients were managed using a structured functional medicine protocol focusing on dietary modification, lifestyle changes, and targeted nutraceutical support.

3.2. Patient Selection

Three patients were included based on the following criteria:

- Adults (≥ 18 years) with ultrasonography-confirmed gallstones or biliary sludge.
- Symptomatic or asymptomatic but declined surgical intervention.
- Completion of at least 4 weeks of functional medicine protocol.
- Availability of baseline and follow-up clinical data.

Exclusion criteria: prior cholecystectomy, acute surgical abdomen, significant comorbid liver disease, or need for immediate hospitalization.

3.3. Functional Medicine Assessment

Each patient underwent a comprehensive baseline evaluation including:

- Detailed clinical history and symptom review.
- Dietary and lifestyle assessment (fiber intake, fat quality, stress, sleep, physical activity).
- Family and medical history.
- Environmental and toxin exposure review.

- Diagnostic Investigations
- Abdominal ultrasonography (baseline and follow-up).

Laboratory tests: Complete blood count (CBC) , fasting insulin, HOMA-IR, advanced lipid profile, liver enzymes (ALT, AST, ALP, GGT).

3.4. Intervention Protocol

Patients followed a three-phase functional medicine protocol:

- Elimination and stabilization: removal of refined sugars, processed foods, and inflammatory triggers; introduction of high-fiber, gallbladder-friendly diet; stress management and sleep optimization.
- Personalization and restoration: structured food reintroduction, gut microbiome support (probiotics, digestive enzymes), targeted supplements (e.g., magnesium, omega-3, L-glutamine).
- Optimization and sustainability: long-term anti-inflammatory diet, metabolic optimization, maintenance supplements, and lifestyle consolidation.
- Adjunctive therapies included coffee enemas and gallbladder flushes, performed under supervision [8,9].

Table 1 Nutraceuticals Used, Mechanisms of Action, and Clinical Rationale

Nutraceutical	Key Ingredients	Mechanism of Action	Clinical Rationale / Protocol
Chanca Piedra	Chanca Piedra, lemon	Lithotripsy – helps break stones	Supports gallbladder care by promoting stone breakdown
Gallbladder Care	Taurine, Vitamin C, Pancrelipase, Superoxide Dismutase, Catalase, Cellulose, Magnesium stearate	Conjugation and detoxification – forms bile aiding digestion and cholesterol excretion	Enhances bile flow, supports fat digestion, reduces cholesterol saturation
Apple Cider Vinegar	Folate, Vitamin B12, Sodium, Apple Cider Vinegar powder, Pomegranate juice, Beet juice	Enzyme inhibition, AMPK activation, appetite modulation, acidification	Improves metabolism, enhances bile solubility, supports weight management
Digestive Enzymes & Probiotics	Fungal protease, Lactobacillus acidophilus, L. casei, L. plantarum, Bromelain, Papain, Fungal lipase, Fungal lactase, Alpha-galactosidase	Restores gut flora; antimicrobial support	Corrects dysbiosis, improves digestion, reduces bloating and dyspepsia
Losina	Aloe ferox, Foeniculi fructus	Immunomodulator, anti-inflammatory	Promotes cleansing, improves digestion, reduces inflammation
Complete Omega	EPA, DHA, Vitamin E, Gelatin, Glycerin, Ethylcellulose, MCTs, Oleic acid, Sodium alginate, Stearic acid	Anti-inflammatory, modulates cell membrane fluidity	Reduces systemic inflammation, maintains bile fluidity
Servola	Withania somnifera, Zingiber officinale, Asparagus racemosus, Chlorophytum arundinaceum, Saccharum officinarum	Analgesic	Reduces pain, supports overall gastrointestinal comfort

3.5. Outcome Measures

- Primary outcome: change in biliary symptom frequency and severity (patient diaries, VAS pain scores).
- Secondary outcomes: normalization of liver enzymes, improvement in insulin sensitivity, and ultrasonographic changes in gallbladder structure and stone size/sludge.

3.6. Safety Monitoring

Patients were instructed to seek immediate conventional medical care for signs of acute cholecystitis (fever, severe RUQ pain, vomiting). All interventions were adjunctive to ongoing care with their primary physician.

4. Case Presentations

4.1. Case 1

A young adult female presented with severe right hypochondriac pain, nausea, and abdominal distention. She had a prior diagnosis of cholelithiasis and had received conventional therapies.

4.1.1. Clinical Timeline:

- Baseline: Severe biliary pain (VAS 9/10), indigestion, constipation. USG revealed multiple echogenic calculi, largest ~1.8 cm, with gallbladder distension.
- After ~4 weeks of intervention: Pain reduced by ~50% (VAS 5/10). USG showed normal gallbladder size and wall thickness; stones measured up to ~8 mm.
- After ~6 weeks: Pain reduced by ~80% (VAS 2/10). USG showed contracted gallbladder with stones measuring ~5 mm.
- After ~10 weeks: Patient asymptomatic (VAS 0/10). USG showed normal gallbladder morphology with slight sludge, no ductal dilatation.

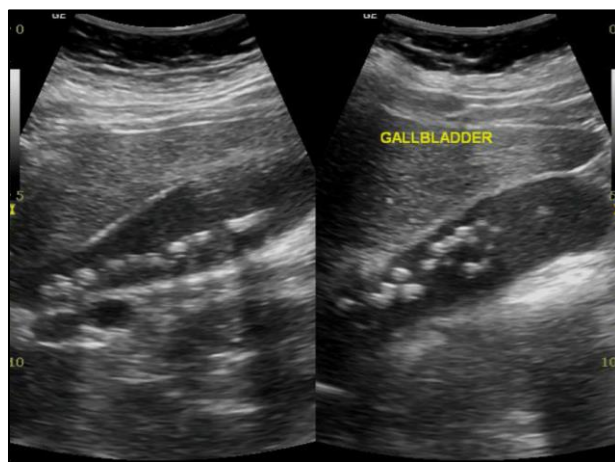


Figure 1 Ultrasound images of the gallbladder in Case 1 showing multiple echogenic calculi with posterior acoustic shadowing

4.2. Case 2

An adolescent female was diagnosed incidentally with asymptomatic gallstones during routine ultrasonography.

4.2.1. Clinical Timeline:

- Baseline: Asymptomatic. USG showed multiple tiny echogenic calculi, largest ~2 mm.
- After ~6 weeks: USG showed stones measuring ~2–3 mm.
- After ~12 weeks: USG showed gallbladder distension with stones, largest <1 mm.
- After ~5 months: USG showed normal gallbladder size and wall thickness, with slight sludge and contraction.



Figure 2 Transverse view showing multiple tiny echogenic calculi (<2 mm), detected incidentally. Gallbladder otherwise normal in size and wall thickness

4.3. Case 3

A middle-aged male with diabetes and fatty liver grade 2 presented with right shoulder pain, sleep disturbance, and constipation.

4.3.1. Clinical Timeline:

Baseline: Pain (VAS 8/10), sleep disturbance, constipation. USG showed multiple echogenic calculi, largest ~2 mm.

After ~6 weeks: Patient asymptomatic (VAS 0/10). Sleep improved, constipation persisted. USG showed normal gallbladder morphology, no ductal dilatation.



Figure 3 Longitudinal view showing multiple echogenic calculi (~2 mm) within the gallbladder lumen. Gallbladder wall thickness is increased, with fatty liver grade 2 background visible in surrounding parenchyma. Posterior acoustic shadowing is present

5. Literature Review

Gallstone disease (GD) is one of the most common gastrointestinal disorders worldwide. Its prevalence is rising in low- and middle-income countries (LMICs) due to epidemiological and nutritional transitions [10]. The formation of gallstones is multifactorial, involving genetic predisposition, metabolic abnormalities, dietary factors, and impaired gallbladder motility [11].

In South Asia, including Bangladesh, the burden of GD is increasing. Although population-based data remain limited, hospital-based studies suggest a rising number of gallstone cases, particularly among middle-aged women and

individuals with metabolic risk factors [12]. This trend parallels the increasing prevalence of non-communicable diseases (NCDs) in Bangladesh, including obesity and type 2 diabetes [13,14].

Cholesterol gallstone formation is intricately linked to insulin resistance (IR), metabolic syndrome, obesity, and dyslipidemia [15]. Excess hepatic cholesterol secretion and impaired gallbladder contraction promote bile supersaturation and stasis, creating favorable conditions for stone formation. Dietary patterns play a central role: high intake of refined carbohydrates and glycemic load is associated with increased gallstone risk [16], while dietary fiber has been shown to reduce biliary cholesterol saturation and improve gallbladder motility [10].

In Bangladesh, traditional diets rich in whole grains and vegetables are increasingly being replaced by refined rice, fried foods, and sugar-sweetened beverages, especially in urban areas [17]. This dietary transition contributes not only to diabetes and obesity but may also increase susceptibility to gallstone disease.

Physical inactivity is an established risk factor for GD, while regular physical activity improves insulin sensitivity and gallbladder emptying [18]. Rapid weight loss, particularly through very low-calorie diets or bariatric surgery, significantly increases the risk of gallstone formation due to cholesterol mobilization and reduced motility [19]. In Bangladesh, urbanization and occupational shifts have led to reduced physical activity levels, particularly among women [20].

Functional medicine (FM) approaches emphasizing gradual, sustainable lifestyle modification may therefore be particularly relevant in this population. FM targets root causes such as insulin resistance, dysbiosis, and bile composition abnormalities.

Cholecystectomy remains the definitive treatment for symptomatic gallstones and is widely practiced globally. However, many patients remain asymptomatic or experience mild, intermittent symptoms, for whom expectant management is recommended [10]. Pharmacological dissolution therapy, such as ursodeoxycholic acid, has limited applicability and is mainly reserved for small cholesterol stones in selected patients. In Bangladesh, access to surgical care may be constrained by cost, infrastructure, and patient preference. Consequently, patients often seek conservative, dietary, or alternative treatments before surgery, highlighting the need for evidence-based non-surgical strategies.

Given the rising burden of metabolic disorders and the increasing demand for conservative options, there is a need to explore structured, lifestyle-based approaches for GD. Existing literature supports the role of diet, lifestyle, and metabolic health in gallstone pathogenesis; however, evidence from real-world clinical settings in Bangladesh remains scarce. This case series aims to contribute to the evidence base by describing outcomes of patients with gallstones managed using a personalized functional medicine protocol.

6. Discussion

This case series demonstrates the outcomes of a structured, root-cause-oriented functional medicine protocol in patients with gallstone disease. Complete resolution of biliary symptoms was achieved through personalized interventions including dietary modification, metabolic optimization, gut microbiome restoration, and targeted nutritional support. These findings suggest that a functional medicine approach may serve as a viable adjunctive management strategy for patients with mild-to-moderate gallstone disease and identifiable metabolic or digestive imbalances.

6.1. Synthesis of Findings and Mechanistic Insights

The consistent symptomatic improvement across cases, despite differing presentations, aligns with the functional medicine principle of addressing shared underlying pathways. Mechanistic interpretation highlights several key physiological domains:

- **Normalization of bile chemistry:** Taurine supplementation likely increased the hydrophilicity of the bile acid pool, reducing the lithogenic index [21]. Concurrent phosphatidylcholine support replenished the primary phospholipid required for mixed micelle formation, enhancing bile's capacity to solubilize cholesterol [22]. Together, these strategies may have created a biliary environment less conducive to stone formation and more capable of dissolving sludge.
- **Restoration of gut-liver axis function:** In patients with dysbiosis or small intestinal bacterial overgrowth (SIBO), targeted antimicrobials and probiotics were employed. Dysbiosis alters bile acid metabolism via bacterial deconjugation, reducing functional bile acids and promoting intestinal inflammation [23]. Addressing

this likely improved enterohepatic circulation, reduced inflammation, and alleviated associated symptoms such as bloating and dyspepsia. This underscores the importance of gut health assessment in comprehensive gallstone management.

6.2. Comparison with Existing Literature

Our findings are consistent with, and expand upon, discrete elements of existing literature. The protective role of a high-fiber diet in gallstone prevention is well-documented [24], and this was foundational in our protocol. The use of *Chanca piedra* for dissolving cholesterol stones and sludge is established but underutilized; our application of lower-dose *Chanca piedra* within a nutritional protocol represents a novel adaptation in a functional medicine setting [25]. Importantly, most prior studies have examined single interventions in isolation. This case series contributes by demonstrating that a synergistic combination of dietary, metabolic, and microbiome-targeted strategies can yield significant clinical results in real-world practice.

6.3. Strengths and Limitations

Strengths of this study include the use of a structured, reproducible protocol, comprehensive baseline and follow-up laboratory data, and detailed clinical phenotyping. Personalized application based on advanced testing moves beyond one-size-fits-all recommendations.

Limitations must be acknowledged:

- The absence of a control group prevents definitive attribution of outcomes solely to the intervention; regression to the mean and placebo effects are possible confounders.
- The small sample size (three cases) limits generalizability.
- Patients were self-selected and highly motivated, which may reduce external validity.

7. Implications for Practice

This case series suggests that personalized functional medicine protocols may provide enduring benefit for gallstone disease and complement conventional management in patients with uncomplicated or asymptomatic gallstones. Integrative FM approaches may reframe gallstone management by emphasizing sustainable, cost-effective, lifestyle-based strategies. Further controlled studies are warranted to validate these preliminary findings and define the role of functional medicine in the broader therapeutic landscape.

8. Conclusion

This case series highlights the potential utility of a systematic functional medicine approach as an adjunctive management strategy for selected patients with gallstone disease. By addressing underlying root causes—including insulin resistance, dysbiosis, and altered bile composition—this model may alleviate symptoms, improve metabolic health, and potentially influence disease trajectory. While not a substitute for surgical intervention when clinically indicated, functional medicine represents a promising, patient-empowering option within an integrative care framework. Further research, particularly controlled clinical trials, is warranted to validate these preliminary findings and to define the role of functional medicine in the broader therapeutic landscape of cholelithiasis.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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