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A CASE STUDY ON THE EFFICACY OF HERBAL MEDICINE AND DIETARY INTERVENTIONS IN THE ALTERNATIVE MANAGEMENT OF GALLSTONE DISEASE

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ABSTRACT

Gallstone disease, or cholelithiasis, affects 10-15% of adults, often asymptomatic but with potential complications. Gallstones form due to factors like gallbladder dysmotility and hormonal changes. This case study describes a patient with acute abdominal pain, tenderness in the 11th intercostal region, and gallstones causing obstruction. Initial treatment included *Siriyalnangai* (*Andrographis paniculata*) tablets (300 mg, twice daily for two weeks) due to their potential to stimulate the Farnesoid X Receptor (FXR) and promote gallstone dissolution. In the third week, the patient consumed green apple juice (1 liter daily) to soften bile stones through its phenolic content, reducing bile acids and bilirubin. After six days, the patient was hospitalized, maintaining a diet of green apple juice, basmati rice, and steamed vegetables. On the last day, Epsom salt doses were given to stimulate bowel movements. Stool analysis showed light green, semisolid particles, and the patient's symptoms resolved, with ultrasound revealing only a small, non-obstructive gallstone. This regimen, combining *Siriyalnangai*, green apple juice, and Epsom salt, highlights a promising non-surgical approach to gallstone management, though further research is essential to validate its effectiveness and establish protocols.

INTRODUCTION

1.1 Background of Gallstone Disease

Gallstone disease, or cholelithiasis, affects 10-15% of the adult population worldwide and represents a major global health burden due to its prevalence and associated complications. Gallstones, solid deposits primarily composed of cholesterol, bilirubin, and calcium salts, form in the gallbladder and are commonly asymptomatic. However, up to 20% of patients with gallstones eventually develop symptoms, and around 1-2% face severe complications such as acute cholecystitis, pancreatitis, or even gallbladder cancer [1,2].

The formation of gallstones is multifactorial, involving both local and systemic factors. Locally, gallbladder dysmotility, bile composition, and inflammation play significant roles, especially when bile is oversaturated with cholesterol [3]. Systemic factors include hormonal influences, genetic predisposition, metabolic disorders, and lifestyle factors. High dietary cholesterol, obesity, diabetes, and sedentary lifestyles are known to increase gallstone risk. This complex etiology makes gallstone disease a challenging condition to manage clinically, especially since conventional treatments may not always address the underlying [4,5].

1.2 Challenges in Conventional Gallstone Treatment

The current standard treatments for symptomatic gallstone disease are primarily surgical, with cholecystectomy (surgical removal of the gallbladder) being the most common intervention. While effective in removing gallstones and relieving symptoms, cholecystectomy carries potential risks and limitations. Post cholecystectomy patients may experience complications such as chronic diarrhea, bile reflux, and, in rare cases, bile duct injury. Additionally, removing the gallbladder can have long-term metabolic impacts, as it alters bile flow and affects lipid metabolism [6,7,8].

Non-surgical options, though available, are limited and often come with drawbacks. Medications like Ursodeoxycholic acid (UDCA) can dissolve certain types of cholesterol gallstones, but they require prolonged use, are costly, and often lead to incomplete dissolution. Furthermore, UDCA is not effective for pigment stones, which form due to hemolysis or bile duct infections, making it a less versatile option for various gallstone types [9,10,11].

1.3 Rationale for Exploring Alternative Treatments

Given the limitations and potential adverse effects associated with conventional treatments, there is an interest in exploring natural, non-invasive therapeutic options for gallstone

management [12]. Alternative treatments are particularly relevant for patients who cannot undergo surgery or those seeking less invasive approaches. Herbal medicine and dietary interventions, which have been used in traditional medical systems such as Siddha, Ayurveda and Unani offer potential in managing gallstone disease through non-surgical means [13,14].

The combination of *Siriyalnangai* (*Andrographis paniculata*), Green apple juice, and Epsom salt represents a novel approach in the alternative management of gallstone disease. *Siriyalnangai*, a medicinal plant traditionally used in Siddha, Ayurveda and Unani medicine, has shown hepatoprotective and choleretic properties [15]. Compounds within *Siriyalnangai*, particularly Neoandrographolide, are believed to stimulate the Farnesoid X Receptor (FXR), a nuclear receptor involved in bile acid metabolism. Activation of FXR plays a crucial role in bile acid homeostasis, which may aid in dissolving gallstones by regulating bile acid synthesis, secretion, and transport [16,17].

Similarly, Green apple juice, known for its high phenolic content, has been linked to a reduction in bile acids and bilirubin, factors contributing to gallstone formation. Phenolic compounds and malic acid in green apple juice are thought to soften bile stones, potentially aiding in their breakdown and natural expulsion [18]. Additionally, Epsom salt (Magnesium Sulfate) has been used in various detoxification regimens and is known to increase intestinal motility. By promoting bowel movements, Epsom salt can facilitate the expulsion of softened gallstone fragments, making it a key component in the proposed regimen [19,20,21].

1.4 Hypothesis

The combined regimen of *Siriyalnangai* tablets, green apple juice, and Epsom salt will effectively reduce the symptoms of gallstone disease.

GENERAL OBJECTIVE

To evaluate the effectiveness of a combined regimen of *Siriyalnangai* tablets, green apple juice, and Epsom salt in managing gallstone disease.

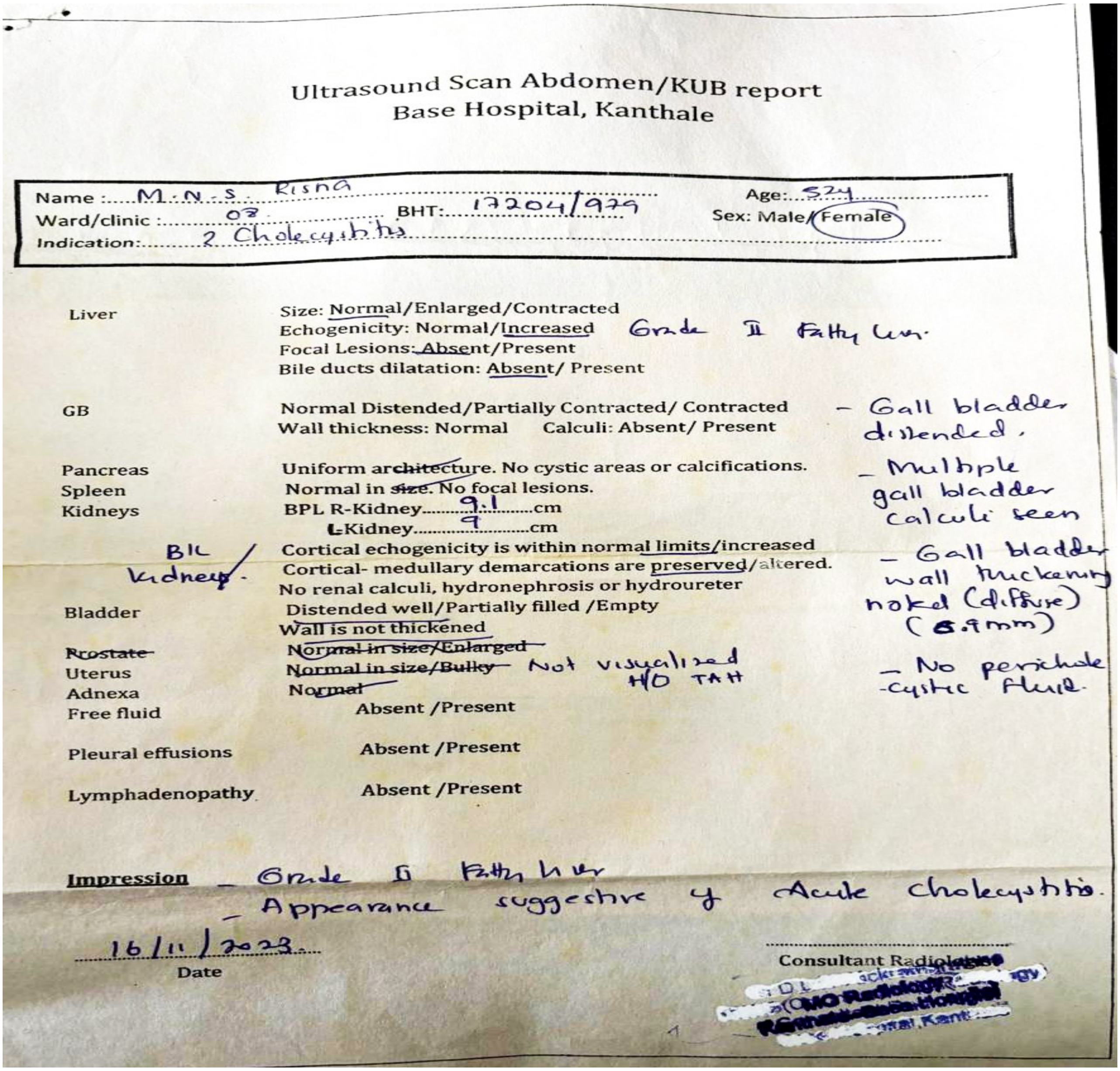
METHODOLOGY

This study was conducted as a case study over a duration of one month, involving a 53-year-old female patient diagnosed with gallstone disease via ultrasound who met the inclusion criteria and provided informed consent. The inclusion criteria comprised patients aged between 18 - 65 years, diagnosed with gallstone disease via ultrasound, experiencing symptoms such as severe abdominal pain, burning sensations, and constipation, and who had not undergone previous gallbladder surgery. The exclusion criteria ruled out patients with a history of gallbladder or biliary tract surgery, significant comorbidities such as diabetes or cardiovascular diseases, and pregnant or lactating women [22].

The treatment protocol incorporated a three-phase regimen involving *Siriyalnangai* (*Andrographis paniculata*) tablets, green apple juice, and Epsom salt. In Phase 1, the patient received 300 mg of *Siriyalnangai* tablets twice daily before meals for two weeks. Phase 2 consisted of a six day regimen during the third week, where the patient consumed 1 liter of concentrated green apple juice daily, prepared from approximately four large green apples, taken on an empty stomach in small sips throughout the day, while following a light diet, avoiding foods interfering with bile metabolism such as cold or fried foods, refined sugar, dairy products, and animal based foods, and encouraging fresh salads, cooked vegetables, nuts, and warm foods with hydration through 5 liters of water daily. In Phase 3, on the seventh day of the third week, the patient was administered four doses of Epsom salt (4 tablespoons mixed in 8 ounces of water) at 1.5-hour intervals starting at 6:30 PM, with instructions to lie in a right lateral position after each dose, alongside 1 liter of green apple juice in the morning, a light lunch of basmati rice and steamed vegetables, and a small portion of fruit if needed later. Stool was collected in the net cloth the following morning for analysis to confirm gallstone fragment expulsion [23,24,25].

Baseline data collection included a comprehensive physical and ultrasound examination to assess gallstone size, location, and number, alongside symptom severity such as pain, tenderness in the 11th intercostal space, burning sensations, and constipation. Throughout the treatment, the patient maintained a daily log of symptom changes, and a follow-up ultrasound was conducted post-treatment to evaluate changes in gallstone characteristics. Stool analysis was performed after Epsom salt administration. Descriptive statistics were used to report changes in symptoms, ultrasound findings, and gallstone expulsion, while qualitative assessments analyzed symptom relief and the therapeutic regimen's feasibility and effectiveness in clinical settings [26,27].

4. RESULTS



Ultrasound Scan Abdomen/KUB report
Base Hospital, Kanthale

Name : M.N.S. Risna Age: 52y
Ward/clinic : 03 BHT: 17204/979 Sex: Male/Female
Indication: ? Cholecystitis

Liver
Size: Normal/Enlarged/Contracted
Echogenicity: Normal/Increased Grade II Fatty Liver.
Focal Lesions: Absent/Present
Bile ducts dilatation: Absent/ Present

GB
Normal Distended/Partially Contracted/ Contracted
Wall thickness: Normal Calculi: Absent/ Present

- Gall bladder distended.
- Multiple gall bladder calculi seen
- Gall bladder wall thickening noted (diffuse) (5.9mm)
- No pericholecystic fluid.

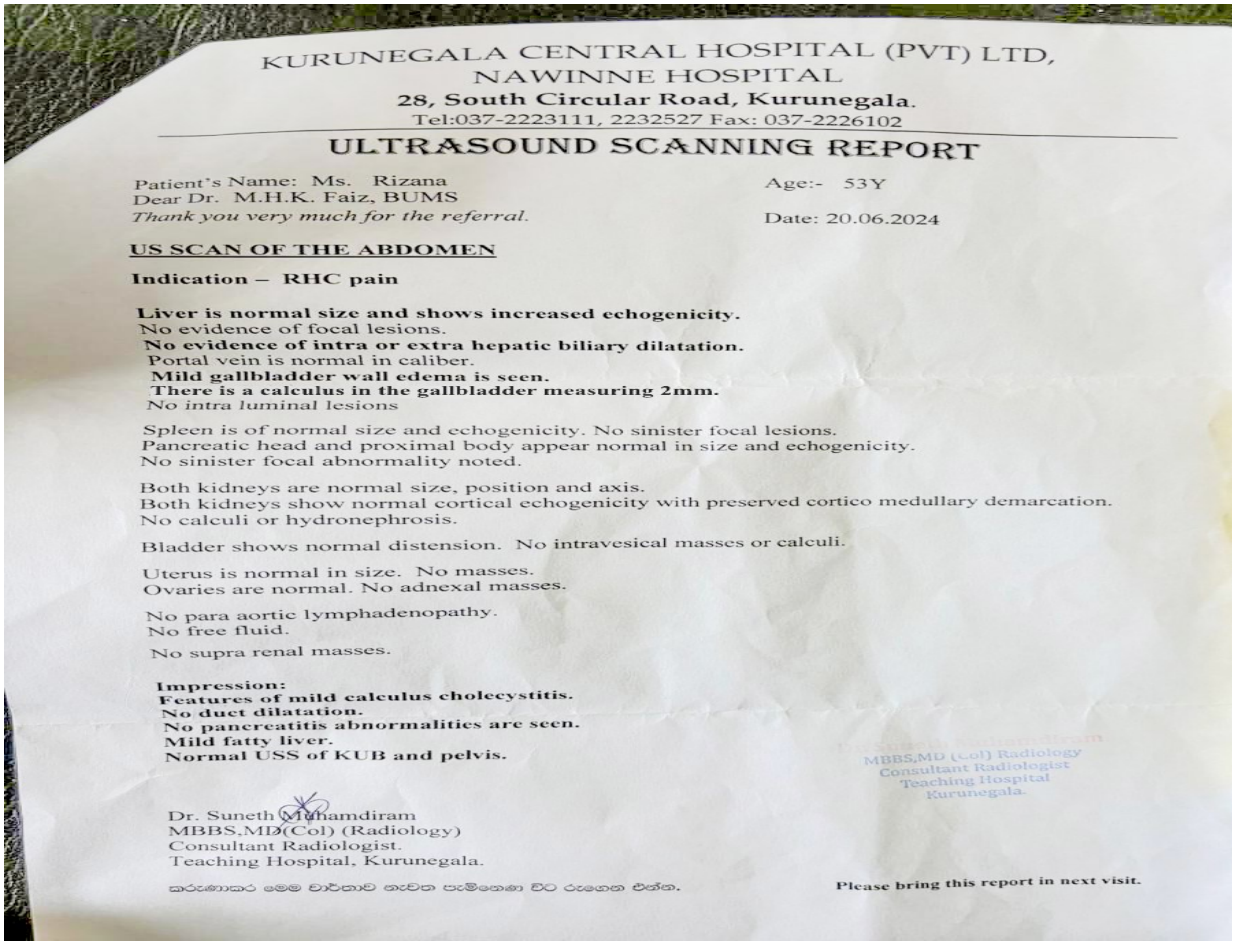
Pancreas Uniform architecture. No cystic areas or calcifications.
Spleen Normal in size. No focal lesions.
Kidneys BPL R-Kidney 9.1 cm
L-Kidney 9 cm
B/L kidney. Cortical echogenicity is within normal limits/increased
Cortical- medullary demarcations are preserved/altered.
No renal calculi, hydronephrosis or hydroureter
Bladder Distended well/Partially filled /Empty
Wall is not thickened
Prostate Normal in size/Enlarged
Uterus Normal in size/Bulky Not visualized H/O TAH
Adnexa Normal
Free fluid Absent /Present
Pleural effusions Absent /Present
Lymphadenopathy Absent /Present

Impression - Grade II Fatty liver
- Appearance suggestive of Acute Cholecystitis.

16/11/2023
Date

Consultant Radiologist

Figure 4.1 Ultra sound scan abdomen report before the treatment on 11/16/2023.



KURUNEGALA CENTRAL HOSPITAL (PVT) LTD,
NAWINNE HOSPITAL
28, South Circular Road, Kurunegala.
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ULTRASOUND SCANNING REPORT

Patient's Name: Ms. Rizana
Dear Dr. M.H.K. Faiz, BUMS
Thank you very much for the referral.

Age:- 53Y
Date: 20.06.2024

US SCAN OF THE ABDOMEN

Indication – RHC pain

Liver is normal size and shows increased echogenicity.
No evidence of focal lesions.
No evidence of intra or extra hepatic biliary dilatation.
Portal vein is normal in caliber.
Mild gallbladder wall edema is seen.
There is a calculus in the gallbladder measuring 2mm.
No intra luminal lesions

Spleen is of normal size and echogenicity. No sinister focal lesions.
Pancreatic head and proximal body appear normal in size and echogenicity.
No sinister focal abnormality noted.

Both kidneys are normal size, position and axis.
Both kidneys show normal cortical echogenicity with preserved cortico medullary demarcation.
No calculi or hydronephrosis.

Bladder shows normal distension. No intravesical masses or calculi.

Uterus is normal in size. No masses.
Ovaries are normal. No adnexal masses.

No para aortic lymphadenopathy.
No free fluid.

No supra renal masses.

Impression:
Features of mild calculus cholecystitis.
No duct dilatation.
No pancreatitis abnormalities are seen.
Mild fatty liver.
Normal USS of KUB and pelvis.

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කරුණාකර මෙම වාර්තාව ගැවිත පැමිණෙන විට රැගෙන එන්න.

Please bring this report in next visit.

Figure 4.2 Ultra sound scan abdomen report after the treatment on 20/06/2024

Figure 4.3 In stool examination, semisolid particles approximately 0.3 cm in size.

Table 4.1 Daily log Of Symptoms with a Pain Score.

of each

Day	Symptoms	Severity (1-10)	Comments
1	Severe abdominal pain, burning pain, Tenderness in the 11th intercostal region	9	Administered Siriyalnangai tablets
2	Severe abdominal pain, burning pain	8	Continued Siriyalnangai tablets
3	Severe abdominal pain, burning pain	8	Continued Siriyalnangai tablets
4	Severe abdominal pain, burning pain	7	Continued Siriyalnangai tablets
5	Severe abdominal pain, burning pain	7	Continued Siriyalnangai tablets
6	Severe abdominal pain, burning pain	6	Continued Siriyalnangai tablets
7	Severe abdominal pain, burning pain	6	Continued Siriyalnangai tablets
8	Severe abdominal pain, burning pain	5	Continued Siriyalnangai tablets
9	Moderate abdominal pain, burning pain	5	Continued Siriyalnangai tablets
10	Moderate abdominal pain, burning pain	4	Continued Siriyalnangai tablets
11	Moderate abdominal pain, burning pain	4	Continued Siriyalnangai tablets
12	Moderate abdominal pain, burning pain	3	Continued Siriyalnangai tablets
13	Mild abdominal pain, burning pain	3	Continued Siriyalnangai tablets
14	Mild abdominal pain, burning pain	2	Continued Siriyalnangai tablets
15	Mild abdominal pain, burning pain	2	Started green apple juice regimen
16	Mild abdominal pain, burning pain	2	Continued green apple juice regimen
17	Mild abdominal pain, burning pain	2	Continued green apple juice regimen
18	Mild abdominal pain, burning pain	1	Continued green apple juice regimen
19	Mild abdominal pain, burning pain	1	Continued green apple juice regimen
20	Mild abdominal pain, burning pain	1	Continued green apple juice regimen
21	Mild abdominal pain, burning pain	1	Administered Epsom salt
22	No pain and Tenderness in the 11th intercostal region	0	Sign and Symptoms completely relieved
Note: The severity scale ranges from 1 (mild) to 10 (severe).			

DISCUSSION

The findings from this case study suggest that a combined regimen of *Siriyalnangai* tablets, green apple juice, and Epsom salt may serve as a promising alternative in the management of gallstone disease. This multi phased approach provided significant symptom relief, reduction in gallstone size, and eventual expulsion of gallstone fragments without the need for surgical intervention. This section discusses the mechanisms and therapeutic potential component, compares the regimen to conventional treatments, and explores future research directions.

5.1 Initial Assessment and Baseline Findings

Upon initial examination, the patient presented with acute, severe abdominal pain primarily localized in the right hypochondrial and epigastric regions. There was tenderness noted in the 11th intercostal space, indicating localized inflammation and discomfort associated with gallstone disease. The patient also reported persistent constipation and burning pain, significantly

impacting daily activities. Baseline ultrasound imaging identified multiple gallstones with a complete obstruction in the gallbladder, confirming a severe case of cholelithiasis.

5.2 Symptom Changes and Observations by Treatment Phase

Phase 1: *Siriyalnangai* Tablet Administration (Two Weeks)

During the first week of *Siriyalnangai* tablet administration, the patient reported a reduction in pain severity. By the end of the two-week period, both abdominal pain and burning sensations had lessened. However, the patient continued to experience mild discomfort, indicating partial improvement. Although there was some relief from constipation, complete normalization of bowel movements was not achieved during this phase. The symptomatic relief observed can be attributed to the choleretic and hepatoprotective properties of *Siriyalnangai*, which likely aided in bile flow and reduced inflammation. However, gallstone dissolution was limited at this stage, with further treatment required for comprehensive results.

Siriyalnangai (*Andrographis paniculata*), an herb used widely in Siddha medicine, has long been recognized for its hepatoprotective, anti-inflammatory, and choleretic properties. The active compound neoandrographolide in *Siriyalnangai* is believed to stimulate the Farnesoid X Receptor (FXR), a key regulator of bile acid metabolism. FXR activation is known to maintain bile acid homeostasis, which may help prevent bile stasis, a significant factor in gallstone formation. By influencing bile acid synthesis, secretion, and transport, *Siriyalnangai* may contribute to the gradual dissolution of gallstones by improving bile flow and reducing bile supersaturation with cholesterol [28,29,30].

In this case, the two-week administration of *Siriyalnangai* tablets resulted in noticeable symptom relief, suggesting its potential role in reducing bile related discomfort and promoting gallstone breakdown. While further research is necessary to fully understand the mechanism, this finding supports the traditional use of *Andrographis paniculata* for gallbladder health and highlights its potential as an adjunct or alternative to conventional bile-acid modifying drugs like ursodeoxycholic acid (UDCA) [31].

Phase 2: Green Apple Juice Regimen (One Week)

The introduction of daily green apple juice in the third week led to a further reduction in pain and discomfort. The patient reported progressively decreasing pain intensity, with no episodes of burning pain by the end of this phase. Treatment involved daily intake of 1 liter of green apple juice over six days. Green apple juice is rich in phenolic compounds and malic acid, both of which have been suggested to play roles in reducing bile acid and bilirubin levels. High bile acid and bilirubin levels are associated with cholesterol crystallization, contributing to gallstone formation and growth. Malic acid, in particular, has a mild choleretic effect, promoting bile production and potentially aiding in the softening and disaggregation of bile stones. The phenolic compounds in apple juice also provide antioxidant effects that may further contribute to gallbladder health.

During this phase, the patient experienced additional relief from discomfort and observed improved bowel movements. This result suggests that green apple juice may serve as a practical dietary intervention for softening gallstones and enhancing bile flow. While the exact mechanism requires more study, this case supports the idea that apple juice, particularly varieties high in malic acid, could be integrated into gallstone management protocols [32,33].

Phase 3: Epsom Salt Administration (One Day)

On the final day of the third week, the patient received four doses of Epsom salt at 1.5-hour intervals, with instructions to lie on the right lateral side after each dose. By the third dose, the patient reported experiencing a sensation of bowel movement urgency and mild abdominal cramping. On the morning following the Epsom salt administration, the patient had multiple loose bowel movements, culminating in watery stool. The stool was collected and inspected for gallstone fragments, revealing light green, semisolid particles approximately 0.3 cm in size, suggesting the expulsion of softened gallstone material.

The final phase of treatment used Epsom salt (magnesium sulfate) to stimulate bowel movements and facilitate gallstone expulsion. Epsom salt works as an osmotic laxative, drawing water into the intestines and softening stool, which in turn promotes intestinal motility. The patient reported a sense of urgency and multiple bowel movements following Epsom salt administration, resulting in the expulsion of light green, semisolid particles confirmed to be gallstone fragments. This supports the hypothesis that Epsom salt can be instrumental in non-surgical gallstone removal by promoting bile drainage and intestinal cleansing [34,35].

The use of Epsom salt in this regimen aligns with traditional detoxification practices and suggests a non-invasive approach to supporting gallstone passage. Its laxative effects are advantageous in cases where patients seek alternatives to surgical removal, providing a safe and relatively gentle means of facilitating the natural expulsion of softened gallstone fragments [36,37].

5.3 Follow Up Examination and Diagnostic Findings

During the follow up examination after the completion of the three-phase regimen, the patient reported complete relief from major symptoms, including abdominal pain, burning sensations, and constipation. There was no tenderness detected in the 11th intercostal space, indicating resolution of the localized inflammation that had been present before treatment. A follow up ultrasound revealed a reduction in the number and size of gallstones. The previously observed multiple obstructive gallstones had been reduced to a single small gallstone measuring less than 2 mm, with no evidence of obstruction. This change suggests that the combined regimen effectively contributed to the breakdown and expulsion of gallstone fragments. The patient expressed satisfaction with the treatment results, reporting no adverse side effects aside from minor nausea associated with the green apple juice regimen. Overall, the patient found the treatment regimen tolerable and preferable to surgical options, given the gradual but noticeable symptom relief and non-invasive nature of the therapy [38,39].

Compared to standard medical treatments for gallstone disease, this alternative regimen offers several advantages. Cholecystectomy, the most common surgical treatment, is highly effective in symptom resolution but comes with inherent risks, including infection, injury to the bile ducts, and the long-term metabolic consequences associated with gallbladder removal. Patients undergoing cholecystectomy often experience changes in digestion, including chronic diarrhea and bile reflux, due to the altered flow of bile post-surgery [40,41,42].

5.4 Limitations and Considerations

While the results of this case study are encouraging, several limitations must be considered. The findings are based on a single case, which limits the generalizability of the results. Additionally, gallstone disease varies widely in terms of stone composition, size, and location, which may affect the success of this regimen in other patients. The study also did not involve long-term follow up, which would be necessary to assess the potential for recurrence or residual symptoms.

CONCLUSION

In conclusion, this case study demonstrates the potential of a combined regimen of *Siriyalnangai* tablets, green apple juice, and Epsom salt as a non-invasive treatment for gallstone disease. The regimen effectively reduced symptoms, decreased gallstone size, and facilitated gallstone expulsion in a manner that was well tolerated by the patient. These findings support the promise of herbal and dietary interventions as alternatives to conventional gallstone treatments, particularly for patients seeking non-surgical options. Further research and clinical trials are essential to validate the efficacy of this regimen and to develop standardized protocols for the use of these natural agents in gallstone management.

FIGURES AND TABLES

Figure 4.3	In stool examination, semisolid particles approximately 0.3 cm in size	6

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LIST OF ABBREVIATIONS

- FXR - Farnesoid X Receptor
- UDCA - Ursodeoxycholic acid

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