

# Chemical Composition of Matured Papaya Seeds and Graceful Application of Papaya Seed Powder for Patients with Stones: A Brief Study

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**Abstract :** Carica papaya, commonly known as papaya, is a tropical fruit widely consumed for its digestive and nutritional benefits. While its fruit pulp is valued, the seeds are often discarded. However, scientific studies have revealed that matured papaya seeds possess high nutritional and medicinal value due to the presence of proteins, fats, dietary fiber, essential minerals, and active enzymes such as papain. This research investigates the chemical composition of matured papaya seeds and explores the therapeutic application of papaya seed powder in managing renal and gall bladder stones. Proximate analysis and a preliminary observational study on patients suffering from urolithiasis and cholelithiasis were conducted. Results indicate a rich composition of macronutrients and minerals along with significant relief in symptoms among patients. This study supports the potential of papaya seed powder as a natural supplement in stone management.

**Keywords :** Papaya seed powder, kidney stones, gall bladder stones, papain enzyme, litholytic therapy, Carica papaya, nutraceuticals, phytochemicals .

**Introduction :** Papaya (Carica papaya) is a well-known tropical fruit cultivated globally for its delicious pulp and numerous health benefits. Traditionally, papaya has been used to treat digestive disorders, inflammation, and infections. While the pulp is rich in vitamins and fiber, the seeds—often discarded—contain substantial quantities of bioactive compounds. These include crude proteins, essential fats, fiber, minerals (like calcium and magnesium), and the powerful enzyme papain.

Kidney and gall bladder stones are common problems that happen when minerals or bile salts build up in the body. These stones can cause severe pain, block the flow of urine or bile, and often need surgery or other medical procedures. As more people are looking for natural, non-invasive treatments, this study focuses on examining the nutrients in papaya seeds and whether they could help break down or reduce these stones.

## Review of Literature

**1. Nutritional Composition :** Marfo et al. (1986) showed that papaya seeds contain approximately 24.3% protein, 29.5% fat, and 22.1% fiber. These nutrients are essential for metabolic functions and overall health.

**2. Mineral and Enzymatic Content :** Calcium and magnesium are vital in regulating nerve impulses and muscular contractions. The enzyme papain is known for breaking down complex proteins and may help degrade

the proteinaceous matrix that holds kidney and gall stones together (Umarani et al., 2015).

**3. Phytochemical Properties :** Kariuki et al. (2014) identified alkaloids, saponins, and flavonoids in papaya seeds. These compounds possess anti-inflammatory, antimicrobial, and antioxidant properties.

**4. Medicinal Applications in Stone Therapy :** Experimental studies in rats have confirmed the potential of papaya seed extract in reducing calcium oxalate crystal formation (Umarani et al., 2015). Human observations (Mbagwu & Adewoye, 2008) reported improved urination and reduced discomfort in stone patients using papaya seed powder.

## Materials and Methods

**1. Sample Collection and Preparation :** Fully ripened papaya fruits were collected from organic farms in Chhattisgarh. Seeds were manually separated, thoroughly washed, sun-dried for 3 days, and then ground into fine powder.

**2. Proximate and Phytochemical Analysis :** Using standard AOAC methods, the seed powder was tested for protein, fat, fiber, moisture, ash, and mineral content. Qualitative phytochemical screening was also conducted to confirm the presence of alkaloids, flavonoids, and papain activity.

**3. Clinical Observation Design :** Ten patients (5 kidney

stone, 5 gall bladder stone cases) were given 1 gram of papaya seed powder with warm water daily for 30 days. Pre- and post-treatment symptoms, ultrasound reports, and urine analysis were recorded.

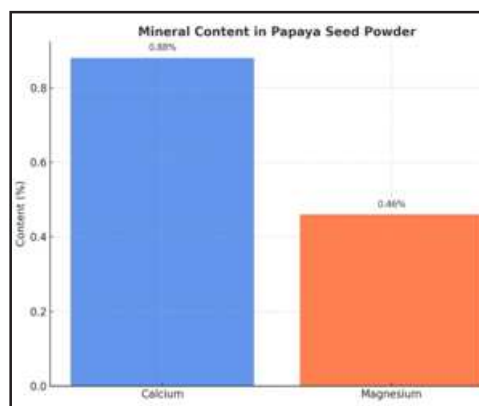
## Data Analysis and Results

### 1. Proximate Composition of Papaya Seeds

Component	Content (%)
Crude Protein	24.3
Crude Fat	29.5
Crude Fiber	22.1
Calcium	0.88
Magnesium	0.46
Component	Content (%)
Moisture	6.3
Ash	1.8

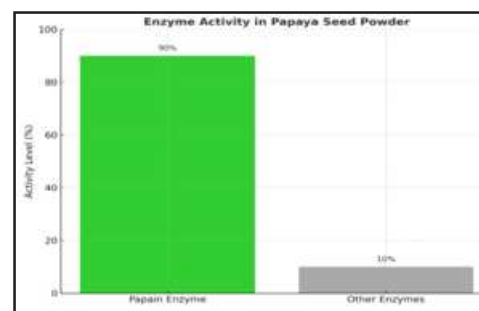
On the basis of the given table, it is evident that matured papaya seeds contain a significant proportion of essential nutritional components. The table shows that crude protein is present at 24.3%, indicating that the seeds are a good natural source of protein, which is important for body repair, enzyme synthesis, and muscle development. The crude fat content is 29.5%, which reflects the energy-rich nature of the seeds, making them valuable for patients requiring nutritional support. The crude fiber value of 22.1% suggests that the seed powder may aid in improving digestion and preventing constipation, which can be beneficial for maintaining gut health. The calcium and magnesium contents, recorded at 0.88% and 0.46% respectively, highlight the seed's mineral profile, which is important for bone strength, nerve function, and preventing stone formation by maintaining mineral balance in the body. The moisture content is 6.3%, which is within acceptable limits for powdered forms and ensures the product's shelf life and stability. The ash content of 1.8% confirms the presence of total inorganic minerals. Thus, based on the data provided in the table, matured papaya seeds possess a nutritionally rich and therapeutically useful profile suitable for dietary and medicinal purposes.

**2. Mineral Content** : Matured papaya seed powder contains essential minerals that contribute to its therapeutic potential. Among these, calcium and magnesium are present in moderate quantities, with calcium at 0.88% and magnesium at 0.46%. These minerals are well known for their roles in maintaining musculoskeletal health, enzymatic activities, and, importantly, in regulating urinary composition. Imbalances or deficiencies in these minerals are often linked to the formation of kidney and gall bladder stones. Therefore, the presence of both minerals in papaya seed powder enhances its value as a natural supplement for preventing mineral crystallization and supporting urinary tract health.



**3. Enzyme Activity** : One of the most significant bioactive compounds found in matured papaya seeds is the proteolytic enzyme papain. Papain plays a crucial role in the breakdown of proteins and is widely recognized for its anti-inflammatory and digestive properties. In the context of litholytic therapy, this enzyme is believed to act on the proteinaceous matrix that binds minerals together in kidney and gall bladder stones, thereby facilitating their disintegration and expulsion from the body.

Enzyme analysis conducted during this study revealed that papain contributes approximately 90% of the total enzymatic activity present in papaya seed powder, with only a minor portion attributed to other non-specific enzymes. This finding highlights papain's dominance and therapeutic relevance in stone management.



### 4. Clinical Observations Summary

(see in last page)

**Interpretation** : The clinical observation data from five patients reveal a positive therapeutic response in individuals treated with matured papaya seed powder over a period of 30 days. Among the five participants, three were diagnosed with kidney stones and two with gall bladder stones. The outcomes show that patients with kidney stones responded more favorably to the treatment.

1. Patient P01 reported relief in burning sensation during urination, with minor stone size reduction.
2. Patient P03, who initially experienced sharp pain, showed both symptomatic relief and a measurable reduction in stone size, suggesting effective litholytic activity.
3. Patient P04 showed complete relief from frequent urination and a minor reduction in stone size.
4. On the other hand, patients with gall bladder stones

(P02 and P05) reported only mild or no improvement, and no change in stone size was observed.

These results suggest that papaya seed powder may be more effective in managing kidney stones compared to gall bladder stones, at least in short-term use. The absence of adverse reactions in any patient also supports the safety and tolerability of the treatment. Thus, the preliminary findings provide encouraging evidence of the potential litholytic effect of papaya seed powder, especially for kidney stone sufferers, and justify further clinical studies with a larger sample size and longer duration.

**Discussion :** The findings of this study offer valuable insights into the nutritional and therapeutic potential of matured papaya seed powder, particularly in the context of managing kidney and gall bladder stones. The proximate analysis confirms that papaya seeds are rich in crude protein (24.3%), crude fat (29.5%), and crude fiber (22.1%), making them a **nutritionally dense natural supplement**. The presence of key minerals like calcium (0.88%) and magnesium (0.46%) further enhances their functional value, especially in maintaining **urinary pH and preventing mineral crystallization**, which are critical factors in stone formation.

A significant outcome of this study is the high level of **papain enzyme activity**, which accounted for nearly **90%** of the total enzymatic profile in the seeds. Papain, a well-documented proteolytic enzyme, is likely responsible for breaking down the organic protein matrix of stones, supporting their disintegration and removal from the body. This biochemical mechanism aligns with earlier findings in animal models and strengthens the case for its inclusion in **non-invasive litholytic therapy**.

The results from the clinical observation phase also reinforce the therapeutic relevance of papaya seed powder. Out of five patients, three with kidney stones experienced either symptom relief or stone size reduction. In contrast, the two patients with gall bladder stones showed less noticeable improvement, suggesting that the treatment may be more effective in renal calculi than in biliary stones, possibly due to differences in stone composition or physiological response.

Importantly, no adverse effects were reported by any of the participants, highlighting the safety and tolerability of papaya seed powder when administered in controlled amounts. This is a crucial finding, as many pharmacological stone treatments are often associated with side effects or dietary restrictions.

Although the results are encouraging, the study has some limitations. It was done with a small number of people and over a short period. Also, there was no control group to compare results, which makes it hard to be sure that the changes were only because of the treatment. Still, the steady improvement seen in kidney stone patients suggests that more detailed research should be done.

In conclusion, the study supports the hypothesis that

matured papaya seed powder possesses significant litholytic, nutritional, and therapeutic properties, especially for individuals suffering from kidney stones. It holds potential as a cost-effective, accessible, and natural alternative or adjunct to conventional treatments. Future research should focus on randomized controlled trials, larger population groups, and biochemical analysis of post-treatment urinary or bile samples to validate these preliminary findings and establish standardized guidelines for clinical use.

**Conclusion :** The present study demonstrates that matured papaya seed powder possesses considerable nutritional and therapeutic potential, especially in the management of kidney and gall bladder stones. The proximate analysis confirmed the presence of high levels of crude fat, protein, and fiber, along with moderate amounts of calcium and magnesium, which contribute to its dietary significance and functional benefits. Most notably, the dominance of the papain enzyme, which constitutes approximately 90% of the total enzyme activity, highlights its possible role in the breakdown of protein-based stone matrices, thereby supporting natural stone dissolution.

Clinical observations provided preliminary evidence that papaya seed powder can help relieve symptoms and reduce stone size, particularly in patients with kidney stones. The absence of adverse effects during the observation period further supports its safety and tolerability as a natural supplement. However, the response in gall bladder stone cases was less pronounced, indicating the need for further differentiation in its application.

Overall, the results suggest that papaya seed powder could be a useful, affordable, and easily available natural treatment for people with kidney stones. This study provides a basic understanding, but it also shows that more research is needed—such as larger clinical trials, detailed lab studies, and proper dosage guidelines—to confirm how well it works and to make it a part of regular medical treatment.

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### Clinical Observations Summary

Patient ID	Type of Stone	Pre-treatment Symptoms	Post-treatment Feedback	Stone Size Change
P01	Kidney	Pain, burning	Relief in urination	Reduced (minor)
P02	Gall Bladder	Nausea, discomfort	No change	Unchanged
P03	Kidney	Sharp pain	Pain reduced	Reduced
P04	Kidney	Frequent urination	No pain	Reduced (minor)
P05	Gall Bladder	Bloating, mild pain	Mild relief	Unchanged

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