

# Chanca Piedra Stone Breaker

*Phyllanthus niruri*, is affectionately referred to as Chanca Piedra – Spanish for Stone breaker. Quite a name to live up to, but that is what *Phyllanthus niruri* has been used for traditionally: to break stones of the kidney and gallbladder. This stone breaking herb has been known in Indian ayurvedic tradition for the last 2000 years but being indigenous to many tropical and subtropical areas worldwide it is also known in Traditional Chinese Medicine and Brazilian, Indonesian and Malaysian traditional folk medicine systems. “Budhatri” as it is called in India is found in many Indian homes and is often used for tuberculosis, asthma, bronchitis, jaundice, and anemia.<sup>1</sup> In Brazil where it is referred to as “Quebra Pedra” it has been used successfully for urinary tract disorders.<sup>1</sup> In Indonesia it has been used for epilepsy, hypertension, toothache, malaria, fever, tetanus and urolithiasis (kidney stones).<sup>2</sup> More traditional uses for Chanca piedra include dysentery, influenza, diabetes, jaundice, dyspepsia, gonorrhea, and diarrhea.<sup>3</sup>



Figure 1. *Phyllanthus niruri* is affectionately referred to as Chanca Piedra – Spanish for Stone breaker.

The abundance of traditional and widespread use has led researchers to investigate these famed properties. Research has focused on its anti-viral, stone breaking and liver protecting properties, but *P. niruri* has also been shown to exhibit diuretic, hypotensive and hypoglycemic actions in humans<sup>4</sup>, suggesting it as a treatment for hypertension and diabetes. As well preliminary research in vitro and in vivo with mice has shown anti-malarial action<sup>5</sup>, supporting its potential as an anti-malarial agent.

## Anti-viral

Anti-viral activity in *Phyllanthus niruri* has gained a lot of attention particularly around hepatitis B. Hepatitis B is a virus that causes inflammation of the liver and often leads to jaundice. Many who get infected with Hepatitis B can become chronic carriers, putting them at risk for liver cirrhosis, cancer and even death. In fact more than one million people die each year from hepatitis B.<sup>6</sup> *P. niruri* has been commonly used worldwide as a treatment for jaundice and other liver disorders.<sup>7</sup> In 1987 it was demonstrated that an aqueous extract of *Phyllanthus niruri* was effective in vitro and in vivo on woodchuck livers (woodchucks have a similar hepatitis carrier state to that of humans) at decreasing the surface antigen of hepatitis B (HBsAg).<sup>8</sup> Hepatitis B is monitored by the presence of these surface antigens. This spurred much interest in anti-hepatitis B activity within the *Phyllanthus* genus. Another study, this time on humans, looked at a very closely related species<sup>9</sup>, *Phyllanthus amarus*, previously classified as *P. niruri* until they were shown to be two distinct species. They treated 37 chronic hepatitis B carriers with 600mg of *P. amarus* daily for one month and found that 59% of the subjects had completely lost their surface antigen compared to only 4% of the placebo-treated controls.<sup>10</sup>

Not only does the *Phyllanthus* species show effectiveness against hepatitis B but *P. niruri* also has action against the HIV virus. Extracts of *P. niruri* have shown inhibition of HIV-1 reverse transcriptase, which is an important enzyme in the HIV virus' replication process.<sup>11,12</sup> Niruriside, a phenylpropanoid from *P. niruri* also has been found to have anti-HIV activity.<sup>13</sup> It does this by preventing viral RNA from being transported to the cytoplasm, and thus halts the replication of HIV.

## Stone Breaker

Kidney stones affect many people, approximately 10-12% of the population in developed countries.<sup>14</sup> The estimated cost of healthcare for these numbers was \$2.1 billion in the US in 2000.<sup>15</sup> There are not many drug therapies that address kidney stones with success making this a substantial healthcare problem. However *Phyllanthus niruri* works to break these stones in their tracks. Chanca Piedra acts in more subtle ways than its name may suggest. Instead of crushing or pounding stones it works to dissolve, allowing passing or prevent these stones from forming in the first place.

Kidney stones, also known as urolithiasis or nephrolithiasis, occur when crystals in urine form from salts and accumulate along the inner surface of the kidney, ureter or bladder. Calcium oxalate stones make up the majority as they account for 70-80% of all kidney stones. But stones made of struvite and uric acid can also occur. Many stones are small enough to pass unnoticed through the urine, however they can become large enough to block the flow of urine or be extremely painful to pass. Many have likened the passing of kidney stones with the pain of childbirth – making it one of the most painful human experiences. There are inhibitors and promoters of stone formation that can be monitored in the urine: glycoaminoglycans (GAGs), citrate and magnesium are all considered endogenous inhibitors of calcium oxalate stone formation. Excessive calcium in the urine (hypercalcuria) is a marker of increased risk of calcium oxalate stone formation and so is considered a promotor. Factors such as genetics, low fluid intake, high protein and high salt diets are all factors in whether a person will develop stones.

Studies have shown *P. niruri* aqueous extract to inhibit calcium oxalate crystal growth and aggregation both in vitro and in animal studies.<sup>16</sup> In a Brazilian study on stone formation in rats, *P. niruri* prevented calcium oxalate growth, decreased the number of stones and lowered stone weight.<sup>17</sup> Glycoaminoglycans (GAGs), citrate and magnesium were monitored in this study. What they found was a decrease in urinary GAGs, suggesting the mechanism at work was from uptake of GAGs into the stones resulting in their dissolution.

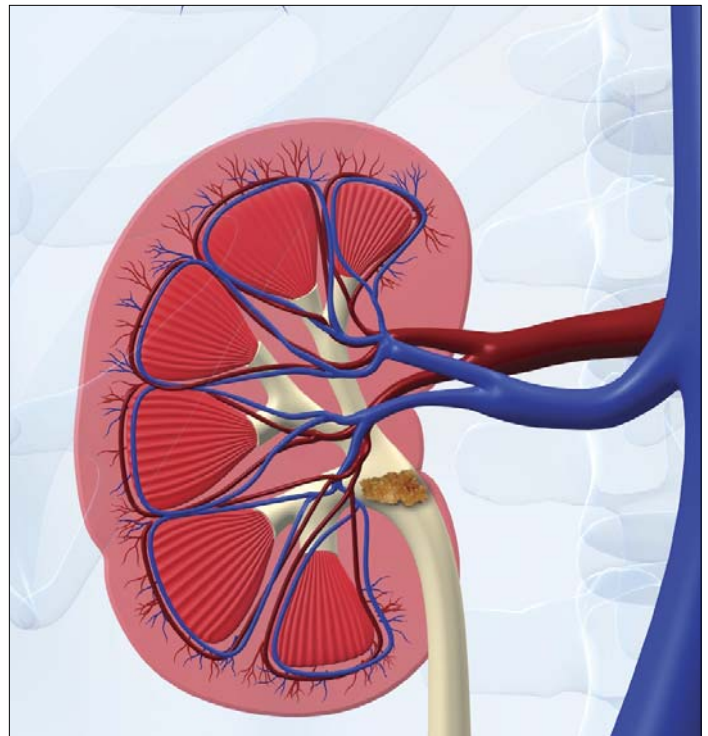


Figure 2. Cross Section of Kidney with stone

Human studies on *P. niruri*'s effectiveness to treat urolithiasis have also surfaced. *P. niruri* was found to normalize elevated calcium levels in individuals that were predisposed to forming calcium stones.<sup>18</sup> In this study they were investigating urinary excretion of promoters and inhibitors of calcium stones in humans. There was a significant reduction in urinary calcium excretion thought to be due to the reduction of calcium oxalate crystallization within the kidney tubules.<sup>1</sup> In another very interesting study, *P. niruri* was shown to reduce kidney stones in patients receiving extracorporeal shock wave lithotripsy (ESWL), a minimally invasive procedure for breaking up and removing stones.<sup>19</sup> Patients received either the ESWL alone or in combination with 2g of *P. niruri* daily, the results showed 93.5% stone free rate in the combination group compared with 83.3% stone free rate in those treated with just ESWL alone.

Other significant actions of *P. niruri* that contribute to stone reduction are its antispasmodic effect due to the presence of alkaloids.<sup>20</sup> These help smooth muscle to relax thus allowing stones to pass with greater ease. As well *P. niruri* has been shown to have analgesic action<sup>21</sup>, reducing the pain associated with passing stones. With these stone crushing, smooth muscle relaxing and pain relieving effects, Chanca Piedra is a well-rounded approach for treating stones of the urinary tract.

## Detoxification

So what does Chanca Piedra have to do with detoxification? The kidneys and the liver are two of our main detoxification organs, both of which are targeted by *P. niruri*. We have already discussed how *P. niruri* helps detoxify the kidneys through stone dissolution. *P. niruri* is also gaining recognition for its hepatoprotection (liver protection) qualities. We have seen how it works to protect the liver from the hepatitis B virus, but it has also shown effectiveness in protection from various liver toxins.

The liver, being responsible for detoxifying toxins and drugs, can become overloaded and be unable to detoxify appropriately leading to elevated liver enzymes (a marker of liver damage) and can in extreme cases lead to acute liver failure. One example is Acetaminophen, which causes more overdose hospitalizations than any other medication and its use is the leading cause of acute liver failure in the United States and the United Kingdom.<sup>22</sup> It has been demonstrated that the protein fraction of *P. niruri* was protective against liver damage induced in mice from acetaminophen.<sup>23</sup> The damage caused by drugs like acetaminophen is a result of a drastic increase in toxic metabolites as the liver attempts to detoxify the excess drug. These toxic metabolites are too great and result in depletion of the main liver antioxidant: glutathione, allowing the metabolites to cause damage to liver cells through oxidative stress. As Bhattacharjee et al. demonstrated in a rat model, *P. niruri* protein fraction worked to boost levels of antioxidant enzymes such as superoxide dismutase (SOD) and catalase (CAT) thereby neutralizing the excessive amounts of free radicals causing damage.<sup>23</sup> Similar studies using protein fractions were found to provide hepatoprotection against toxin induced liver damage from compounds such as carbon tetrachloride<sup>24</sup>, thioacetamide<sup>25</sup>, and nimesulide.<sup>26</sup> Markers of toxicity from these toxins are elevated liver enzymes and with administration of *P. niruri* the liver enzymes returned to normal levels.<sup>24</sup>

## Secret Ingredient?

A long list of health benefits such as that claimed by *P. niruri*, lends the question: what exactly does it contain that allows for such a diverse range of uses? It would be easy if there were one answer to this question, however, as could be expected, Chanca Piedra contains a variety of biologically active constituents that allow this plant to exhibit the many health benefits that it does. Among these are: lignans,

tannins, coumarins, terpenes, flavonoids, alkaloids, saponins, and phenylpropanoids.<sup>20</sup> Although whole plant extracts were used traditionally and in many scientific investigations, several constituents have been isolated from Chanca Piedra that help to elucidate its healing qualities.

Two biologically active lignans are main contributors to the hepatoprotective and anti-hepatotoxic qualities: phyllanthin and hypophyllanthin.<sup>7</sup> These same lignans, as well as two others, niranthin and nirtetralin, are thought responsible for the anti-hepatitis B activity.<sup>27</sup> The anti-HIV activity of *P. niruri* is attributed to a tannin known as repandusinic acid<sup>11</sup> as well as nirurisode, a phenylpropanoid.<sup>13</sup> *P. niruri*'s stone breaking actions are associated with a variety of lignans, alkaloids and flavonoids.<sup>1</sup> Some of the alkaloids present also show anti-malarial actions.<sup>3</sup> This is naming but a few in a long list of compounds while researchers are continually isolating others.

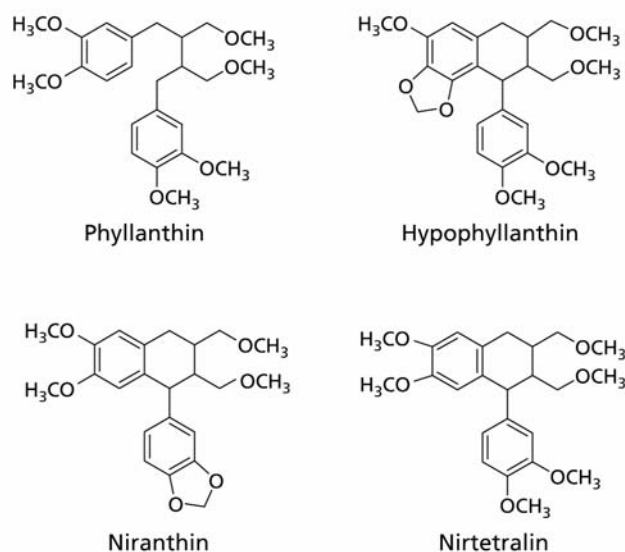


Figure 3. Biologically active lignans isolated from *P. niruri*. Phyllanthin and Hypophyllanthin have been identified as the main contributors to *P. niruri*'s liver protective and anti-hepatotoxic properties. Niranthin and Nirtetralin have been associated with anti-hepatitis B activity.

This plethora of compounds is working in concert to create a diversely acting herb used for millennia to treat a multitude of conditions. Through its action in protecting the liver against damage induced from liver toxins, oxidative stress, and viral stress, and its ability to clear the urinary tract through its stone breaking properties, Chanca piedra is an important addition to any detoxification effort for the liver and kidneys.

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# Supports the Health of the Kidneys, Liver and Gall bladder

