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Phyllanthus Niruri IN THE TREATMENT OF UROLITHIASIS: A REVIEW

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ABSTRACT:
Phyllanthus niruri is a widely distributed herb used globally for treating Urolithiasis. It has demonstrated effects on various stages of stone formation, such as reducing crystal aggregation, modifying their structure and composition, and altering their interaction with tubular cells, which leads to decreased subsequent endocytosis. Clinical benefits include ureteral relaxation, elimination of calculi, and reduced excretion of calcium and other substances that contribute to urine crystallization. Studies in vivo, in vitro, and clinically have not revealed toxic effects on kidneys, heart, brain, or nervous system. While Phyllanthus niruri shows promise in preventing stone formation or aiding in elimination, validation through longer-term randomized clinical trials is necessary to substantiate its medical benefits. Phyllanthus niruri also reduces hyperoxaluria and hyperuricosuria, and inhibits the crystallization of calcium oxalate. Theobromine, found in the herb, has been observed to reduce uric acid crystallization in patients, thereby enhancing the efficacy of shock wave lithotripsy without causing any side effects.

KEYWORDS: *Phyllanthus niruri*, Stone breaker, Urolithiasis, Ureteroscopy, Prevalence.

INTRODUCTION

Phyllanthus niruri, commonly known as "Stone Breaker," belongs to the Euphorbiaceae family and has been traditionally used in Brazilian folk medicine for treating urolithiasis [1]. This herb is rich in approximately 50 different chemicals, including triterpenes, alkaloids, flavonoids, and lignans. Triterpenes from *Phyllanthus niruri* have demonstrated inhibition of calcium oxalate-induced cytotoxicity and reduction in the excretion of kidney stone-forming constituents. The plant typically thrives during the rainy season and is colloquially known as "Bhui Amla" due to its growth on land ("bhumi"). In South India, it is referred to as "Bhumyamalaki" and is utilized for treating conditions like constipation, gonorrhea, and syphilis. *Phyllanthus niruri* exhibits diverse pharmacological activities, including antiviral, antibacterial, anti-inflammatory, antiplasmodial, anti-malarial, anti-diabetic, diuretic, hypolipidemic, antioxidant, hepatoprotective, nephroprotective, and anticancer properties. Notably, *Phyllanthus niruri* L. has also shown immunomodulatory effects against Covid-19. This herb is known by various names in different languages: Bahupatra (Sanskrit), Bhui amla, Jangli amla (Hindi), Bhanya amla (Gujarati), Chanca piedra (Spanish), Quebra-pedra

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(Portuguese), Keezha nelli (Tamil), Keezhar nelli (Malayalam), Turi hutan, and Meniran hijau (Indonesian). In Ayurveda and the Unani system of medicine, *Phyllanthus niruri* holds significant therapeutic value.

Urolithiasis, commonly known as kidney stones, is a prevalent global ailment characterized by symptoms such as back pain, abdominal pain, hematuria, nausea, and vomiting. It can lead to severe complications including urinary tract infections, acute renal function deterioration, urinary tract obstruction, and other adverse health outcomes [2].

HISTORICAL BACKGROUND

During the sixteenth to eighteenth centuries, the prevalence of urolithiasis increased across all age groups and social strata due to changes in dietary habits and increased alcohol consumption. In El Amrah, Egypt, in 1901, an English archaeologist E. Smith discovered a 4500-5000-year-old mummy with bladder stones. Over the past few decades, urolithiasis has become more common in children due to rapid changes in lifestyle habits and increased affluence. The pain associated with urolithiasis is known to significantly impact both the physical and mental well-being of individuals [3].

TYPES OF STONES [4]

Calcium Stones (70-80%): Calcium stones, including calcium oxalate and calcium phosphate stones, are the most prevalent types of kidney stones. Calcium oxalate stones can exist as either Calcium Oxalate Monohydrate (COM) or Calcium Oxalate Dihydrate (COD).

Uric Acid Stones (5-10%): Uric acid stones are typically round, smooth, and red-orange in color, and they are radiolucent, detectable by ultrasonography or CT scans. These stones form due to low urinary uric acid levels, low urine pH, and reduced urinary volume[4].

Struvite Stones: Struvite stones are composed of magnesium ammonium phosphate. They develop when bacteria such as Proteus or Klebsiella convert urea into ammonia, leading to an increase in urine pH[5].

Cystine Stones (1%): Cystine stones are extremely hard and form in acidic urine. Cystinuria, a genetic disorder, causes cystine to leak from the blood into the urine, leading to stone formation in the kidneys. Cystine stones are rare and hereditary.

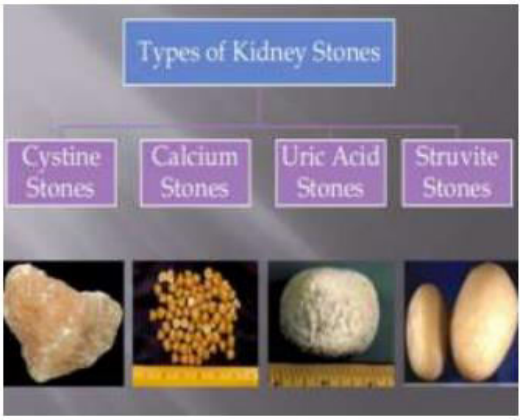

Figure 1: Types of Kidney Stones

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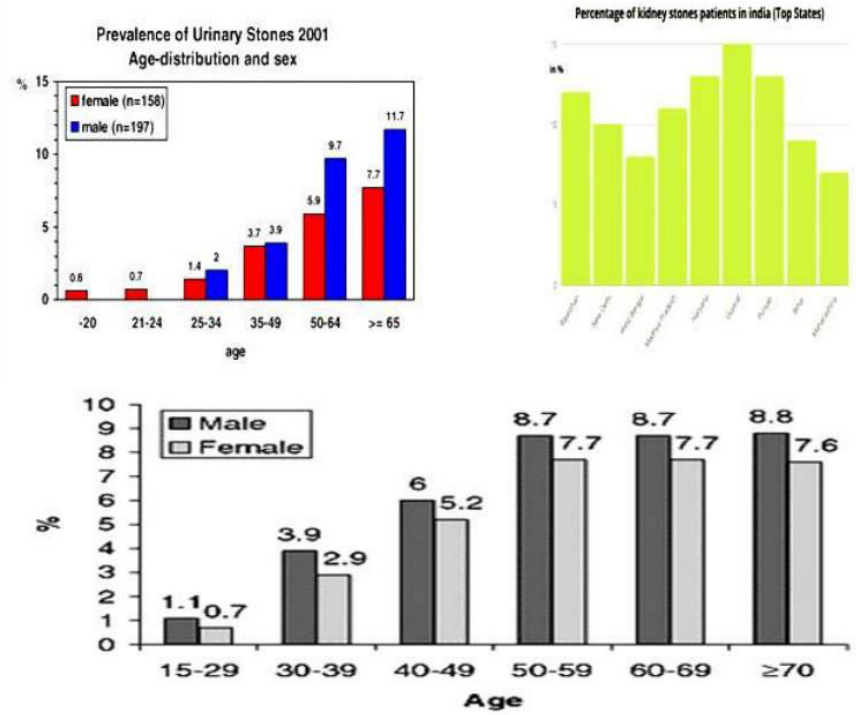
The typical size of a kidney stone averages around 5 mm. Stones smaller than 4 mm can usually pass through the urine naturally without requiring medication.

SIZE OF KIDNEY STONES	CHANCES OF PASSING NATURALLY	TIME REQUIRED TO PASS NATURALLY
Less than 2mm	About 80%	8 days (average)
2-4 mm	About 80%	12 days (average)
4mm	About 80%	31 days (average)
4-7mm	About 60%	45 days (average)
Larger than 7mm	About 20%	12 months (average)
1-2cm	Cannot pass	———
Larger than 2cm	Cannot pass	———

Table 1: sizes of kidney stones

EPIDEMIOLOGY

Approximately 12% of the global population is affected by Urolithiasis. Men between the ages of 20 and 49 are more likely to develop kidney stones compared to women. Recent studies attribute the rising incidence of Urolithiasis to dietary deficiencies and lifestyle changes [6]. The prevalence was recorded at 5.7% in Iran in 2005, 8.8% in North America between 2007-2010, 5%-10% in Europe, and 7.54% in Mainland China from 1990-2016. Calcium oxalate is the primary component causing Urolithiasis, with obesity and metabolic syndrome identified as significant risk factors. The occurrence of Urolithiasis increases with age, peaking at 19.7% in males around 80 years old, 18.8% in males aged 60-79, 11.5% in males aged 40-59, and 5.1% in males aged 20-39.



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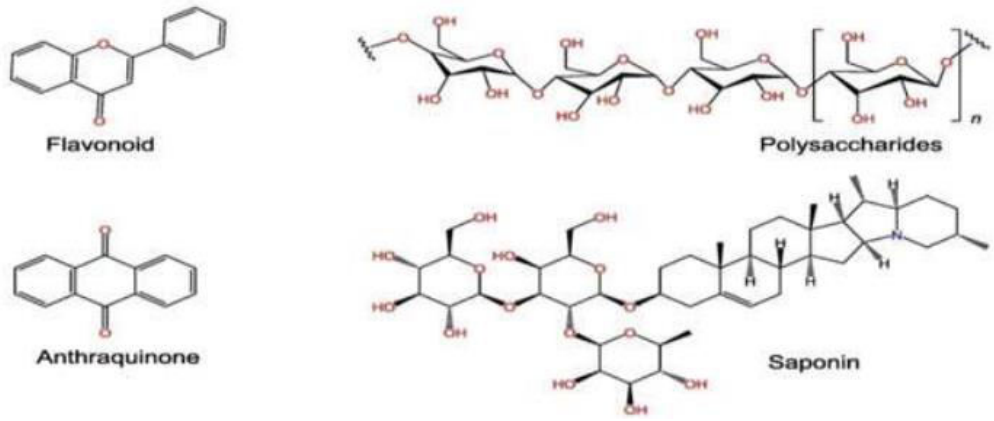

Fig: Active ingredient of CHMs in the treatment of Kidney stones

CONCLUSION

Urolithiasis, or kidney stones, is a prevalent global condition. *Phyllanthus niruri* has demonstrated efficacy in stone elimination, making it a valuable therapeutic option. Effective prevention and management of kidney stones require a combination of nutritional strategies and clinical interventions. Dehydration is a significant risk factor for kidney stones. Herbal remedies such as *Phyllanthus niruri* offer accessible, eco-friendly, affordable, and generally safe alternatives with a high margin of safety. Thus, *Phyllanthus niruri* plays a crucial role in herbal medicine, particularly in the treatment of urinary stones.

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