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**IN-VITRO ANTI-UROLITHIATIC ACTIVITY OF EXTRACT OF
CURCUMA LONGA L RHIZOMES ON DISSOLUTION OF KIDNEY
STONES**

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ABSTRACT

Background: Herbal formulations are known to be the most potent for their stone dissolving properties. The products that are utilized for kidney stone dissolving activity inhibit the calculogenesis by decreasing the size of stone forming agents such as calcium oxalate crystals, uric acid crystals, calcium phosphate and cystine crystals.

Materials and Methods: Herbal stone dissolving formulations were prepared by using several herbal extract. The *Curcuma longa* extract was prepared using ethanol by simple extraction method. Experimental solution was prepared by dissolving the extract in distilled water in iodine flask and stirred using magnetic stirrer for seven days.

Results: The solution of rhizomes of *Curcuma longa* showed potent kidney stone dissolving property with that of the marketed formulation.

Conclusion: Dried rhizomes of *Curcuma longa* is contains a number of phytoconstituents like alkaloids, glycosides, carbohydrates, tannins, diterpenes, saponins, etc. which can be considered as a potent kidney stone dissolving agent.

Keywords: *Curcuma longa*, kidney stone, herbal extract, calcium oxalate crystals

INTRODUCTION

Curcuma longa or turmeric (English), Haldi (Hindi), Halud (Bengali) belonging to the family Zingiberaceae, a perennial herb of about 1m high with short stem that is naturally found in South Asia, Indonesia and India (mainly south India) and distributed throughout all regions of the world [1, 2, 3]. Powdered form of roots and rhizomes of *Curcuma longa* are commonly utilized as a main ingredient in curry, also as preservative and colouring agent in various food preparations throughout the world [4]. However, the yellowish colour and most of the pharmacological activities of *Curcuma longa* are due the presence of curcumin in it [2, 5]. *Curcuma longa* is reported to have an array of pharmacological activities such as antiviral [6], anti-HIV [7], antibacterial [8],

antioxidant [9], antimutagenicity [10], anticarcinogenic [11, 12], anti-proliferative and anti-inflammatory [13], and hypolipidemic activities [14]. Turmeric is also having many other therapeutic uses like antiseptic properties [15], in the treatment of Alzheimer's disease [16], diabetes, arthritis, hepatic and renal dysfunctions, cardiac diseases [17], etc. Hence, a number of chemical compound from turmeric have isolated such as curcuminoids like curcumin (1), demethoxycurcumin (2), bisdemethoxycurcumin (3), polysaccharides like starch (4), cellulose (5), terpenoids like turmerone (6), turmeronol-A (7), as well as other compounds like trans-p-coumaric acid (8), trans-ferulic acid (9) etc. (Figure 1)[18-21].

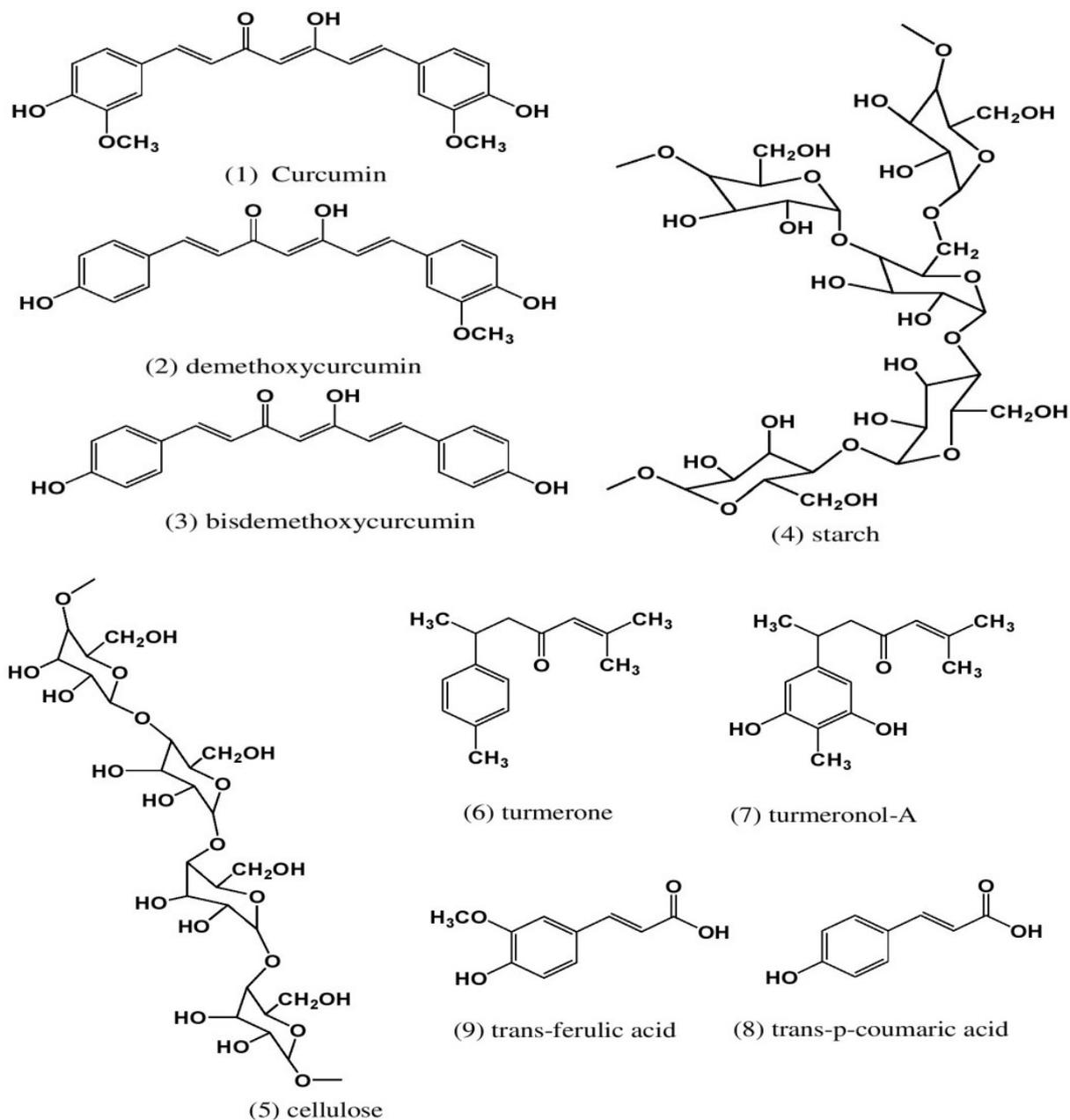


Figure 1: Structures of various isolated compounds

Kidney stones are the aggregation of crystals that formed in the kidney, also known as renal calculi [22]. It is due to renal tubular acidosis, modularly sponge kidney, Dent's disorder and hyperparathyroidism. Kidney stones are of several types like calcium oxalate crystals (80%), uric acid crystals (5-

10%), calcium phosphate and cystine crystals. This is the most common urine disease that of about 10% of the population having it at some point in their life. It is reported that men get kidney stones more frequently than women. It can be diagnosed by several symptoms like extreme pain in the

back or side, bloody urine, bad smells of urine, burning sensation during urination, etc. [22].

MATERIALS AND METHODS

Extraction of plant materials - The extraction of *Curcuma longa* L. was carried out by simple extraction method. 0.50 g of the powdered drug was extracted using 50 ml of ethanol as a solvent [23].

Phytochemical screening - The solution of *Curcuma longa* L. extract was prepared by dissolving it in distilled water and qualitative phytochemical screening for alkaloids, saponins, steroids, tannins, proteins, amino acids, flavonoids, diterpenes, phenols, anthraquinones, glycosides and carbohydrates was carried out [24-27].

Kidney stone dissolving activity - Various kidney stones were collected from Srimanta Sankardeva Hospital and Research Institute, Mancotta road, Dibrugarh, Assam. *In-vitro* studies were carried out in these stones,

weighing and placing them in iodine flask containing 10 ml solution of the extract. The solution was stirred using magnetic stirrer for seven days and weighed [28, 29]. Similarly, the test was carried out for control (distilled water) and standard (Cystone) also [30, 31].

RESULTS

After the extraction of the powdered drug, the yield value of the extract was found to be 60% (w/w). The ethanol extract of *Curcuma longa* L. contains various phytoconstituents (Table 1).

The *in-vitro* analysis for kidney dissolving property was carried out using cystone tablets (Himalaya Drug Company) as standard and distilled water as control. The ethanol extract of *Curcuma longa* L. found to be much potent kidney stone dissolving properties as that of standard (Table 2).

Table 1: Phytochemical screening for ethanol extract of *Curcuma longa* L

| Phytochemicals | Test | Observation | Inference |
|----------------|---------------------------|-------------------------------|-----------|
| Alkaloids | Hager's test | Yellow ppt. | + |
| | Dragendroff's test | Creamy ppt. | + |
| | Wagner's test | Brown-reddish ppt. | + |
| Proteins | Xanthoproteic test | Yellow colour not formed | - |
| Amino acids | Ninhydrin test | Blue colour not formed | - |
| Carbohydrates | Molisch's test | Violet ring at junction | + |
| | Fehling's test | Red ppt. | + |
| | Benedict's test | Orange-red ppt. not formed | - |
| | Barfoed's test | Brick red ppt. | + |
| Glycosides | Iodine test | Blue colour | + |
| | Legal's test | Pink colour | + |
| | Kellar-Killiani test | Brown coloured ring | + |
| | Anthraquinone test | Rose pink colour | + |
| Tannins | Ferric chloride test | Green colour | + |
| Steroids | Libermann-Burchard's test | Red/ yellow colour not formed | - |

| | | | |
|------------|---------------------|--------------------------------|---|
| Phenol | Test for phenol | Bluish-black colour not formed | - |
| Diterpenes | Test for diterpenes | Green colour | + |
| Flavonoids | Zinc test | Red colour not formed | - |
| Saponin | Saponin test | Foam was formed | + |

(+) indicates the presence of phytoconstituents; (-) indicates the absence of phytoconstituents.

Table 2: Kidney stone dissolving activity of ethanol extract of *Curcuma longa* L

| Kidney stones | Weight before analysis (g) | Weight after analysis (g) | Differences (g) |
|---------------|----------------------------|---------------------------|-----------------|
| Stone 1 | 0.38 | 0.11 | 0.27 |
| Stone 2 | 0.49 | 0.21 | 0.28 |
| Stone 3 | 0.34 | 0.10 | 0.24 |
| Stone 4 | 0.44 | 0.20 | 0.24 |
| Stone 5 | 0.21 | 0.09 | 0.12 |
| Stone 6 | 0.20 | 0.09 | 0.11 |
| Stone 7 | 0.32 | 0.12 | 0.20 |
| Stone 8 | 0.27 | 0.10 | 0.17 |
| Stone 9 | 0.46 | 0.22 | 0.24 |
| Stone 10 | 0.19 | 0.08 | 0.11 |
| Stone 11 | 0.36 | 0.14 | 0.22 |
| Stone 12 | 0.35 | 0.13 | 0.22 |
| Stone 13 | 0.39 | 0.16 | 0.23 |
| Stone 14 | 0.29 | 0.11 | 0.18 |
| Stone 15 | 0.41 | 0.17 | 0.24 |
| Stone 16 | 0.37 | 0.15 | 0.22 |
| Stone 17 | 0.11 | 0.07 | 0.04 |
| Stone 18 | 0.24 | 0.11 | 0.13 |
| Stone 19 | 0.31 | 0.15 | 0.16 |
| Stone 20 | 0.42 | 0.14 | 0.28 |
| Control | 0.59 | 0.55 | 0.04 |
| Standard | 0.55 | 0.21 | 0.34 |

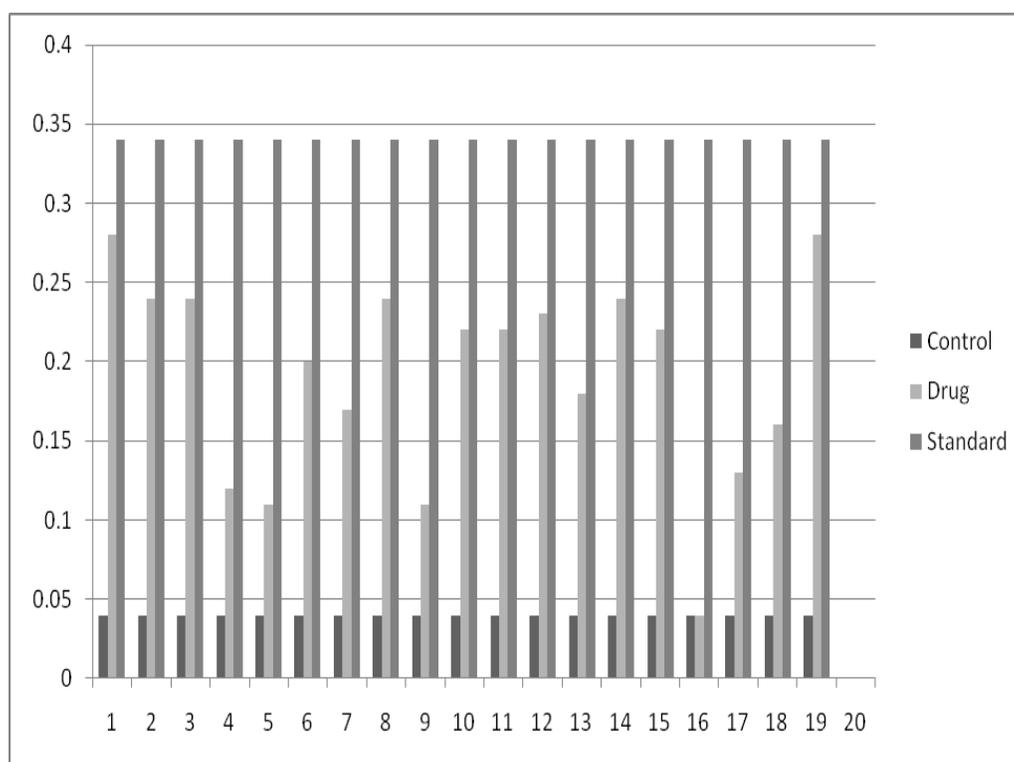


Figure 2: Weight of kidney stones dissolved by control, drug and standard

DISCUSSION

Dried rhizomes of *Curcuma longa* was powdered and extracted using ethanol as a solvent and the yield value of the extract was found to be 60% (w/w). The phytochemical investigations of the extract shows the presence of various phytoconstituents such as alkaloids, glycosides, carbohydrates, tannins, diterpenes and saponins. *Curcuma longa* has a number of isolated compounds such as curcuminoids like curcumin, demethoxycurcumin, bisdemethoxycurcumin, polysaccharides like starch, cellulose, terpenoids like turmerone, turmeronol-A, as well as other compounds like trans-p-coumaric acid, trans-ferulic acid etc., for which it known for an array of pharmacological activities such as antiviral, anti-HIV, antibacterial, antioxidant, antimutagenicity, anticarcinogenic, anti-proliferative and anti-inflammatory, hypolipidemic activity, etc. Here, the ethanol extract of *Curcuma longa* was tested for *in-vitro* kidney stone dissolving activity using cystine as the standard drug and same was tested using distilled water as a control for the analysis. The control reduces kidney stones to least amount (4 g) as compared to drug and standard (**Figure 2**). Cystine is known to be act by inhibiting the stone formation of kidney by the process

disintegration in the mucin, so reduces the stone forming agents such as calcium oxalate crystals, uric acid crystals, calcium phosphate and cystine crystals. The rhizomes of *Curcuma longa* also found have potent kidney stone dissolving properties as like as the standard (**Figure 2**).

CONCLUSION

Dried rhizomes of *Curcuma longa* is found to have a number of phytoconstituents like alkaloids, glycosides, carbohydrates, tannins, diterpenes and saponins, which are responsible for an array of pharmacological activities. Thus from the present study it can be concluded that the rhizomes of *Curcuma longa* can be considered as a potent kidney stone dissolving agent. Thus, the study can be a strong evidence for further *in-vivo* studies.

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