2. NEED FOR STUDY

Urolithiasis is a consequence of complex physical processes. The major factors are supersaturation of urine with the offending salt and crystallization. Crystals retained in kidney can become nucleus for stone formation. This process is synonymously known as Urolithiasis, Nephrolithiasis, Kidney stones or Renal calculi. The Ayurvedic literature describe four types of Ashmari (Urinary stones or Calculus) as,

```
A³øµΜ χα³µρΙκω³ΧΩΜ χτυΞαε χα³
µρΙ µτα #
ωατα↔π=ακτισμαξικη ταμε τα με
ηααχεντοσΓιτ: #59##
```

i.e. (1) Vatashmari, (2) Pittashmari, (3) Kaphashmari and (4) Shukrashmari. These are formed due to the imbalance in Vata, Pitta and Kapha.

The problem of urinary stones or calculi is very ancient one. These stones are found in all parts of the urinary tract, the kidneys, the ureters and the urinary bladder and may vary considerably in size.

Majority of urinary calculi are made up of CaPh, CaOx, uric acid (urates) or magnesium ammonium phosphate. In India, the common component of urinary calculi is CaOx. A number of vegetable drugs have been used in India and elsewhere which claim efficient cure of urinary stones.

2.1. Need for study

There are several options available in the management of ureteral stones. Treatment selection depends on stone size, location and composition, efficacy of each modality and associated morbidity, equipment available, physician skill, patient health and preference and finally costs.

In many cases, the management of urolithiasis is combined surgical and medical approach using percutaneous nephrolithotomy (PCNL), extracorporeal shock wave lithotripsy (ESWL) and antibiotics. These treatments are relatively costly, painful and require expert hands and availability of appropriate equipments. This has given rise to
stimulation in the search for investigating natural resources showing antiurolithiatic activity.

In spite of tremendous advances in the field of medicine, there is no truly satisfactory drug for the treatment of renal calculi. Most patients still have to undergo surgery to be rid of this painful disorder. Ayurveda, an indigenous system of Indian medicine, offers vast scope for the successful treatment of urolithiasis.

Plants and other natural substances have been used as the rich source of medicine. All ancient civilizations have documented medicinal uses of plant in their own ethnobotanical texts. The list of drugs obtained from plant source is fairly extensive.

Many remedies have been employed during ages to treat urolithiasis. Most of the remedies were taken from plants and proved to be useful, though the rationale behind their use is not scientifically established except for a few plants and some proprietary composite herbal drugs.

In the indigenous system of medicine, several plants are reported to be useful in the treatment of urinary stones. Many of these plants have been screened by various researchers till date; and many more are yet to be diagnosed.

For the present research work, following three plants were selected.

1) *Hemidesmus indicus* R. Br. (Family – Asclepiadaceae) - Roots
2) *Vitis vinifera* Linn. (Family – Vitaceae) - Fruits
3) *Bombax ceiba* (Family – Bombacaceae) - Fruits

There are citations in the classical literature for traditional uses of above plants for uses in urinary disorders. Example, the classical text describes uses of *V. vinifera* in urinary disorders as follows.

\[
\text{पञ्चपूर्वलीपृत क्षीर द्राक्षारसायि वा} \\
\text{द्राक्षारेसः वा अस्तुसकुकुम्पोविलिबीजवृष्टककुकुमकलकं सर्वमृत्राग्नातानम्} \\
\text{Astanga Sangraha, Chikitsa, 13-14.}
\]

\[
\text{द्राक्षातिमुधुरास्मला च शीता पितार्तिवाहिजित} \\
\text{Guntdevastra रूच्या वृथा सन्तप्ती परा} \\
\text{Raja Nighantu, Amradi Varga, 96-97.}
\]
Chapter 2

Need for Study

In this context, thorough literature survey was carried out to ascertain that none of the selected plant part has been studied so far for diuretic and antiurolithiatic activity. Accordingly, the research protocol was prepared using available standard methodology and put forth to registration committee of KLE University, Belgaum for peer review and approval. The suggestions and recommendations of registration committee were incorporated and amendments were submitted for final approval. All experimental work in the present study was conducted in accordance with the research protocol approved by KLE University, Belgaum.

2.2. Objectives of the study

The overall aim of the proposed study was to explore the biological activities of selected medicinal plant parts used in India as traditional medicine. The specific objectives were as follows:

A) The primary objective of the study was to evaluate selected medicinal plants for diuretic and antiurolithiatic activity using *in vivo* models and investigate the probable mode of action.

B) Second part of the study would focus on the phytochemical investigation of the plant extracts showing promising diuretic and/or antiurolithiatic activity using modern scientific techniques.
Chapter 2

Need for Study

2.3 Scheme of the research work

The overall scheme of the present research work has been illustrated schematically in fig. 2.1. In brief, the present study was designed and carried out in different steps as follows, using appropriate materials and methods to collect, interpret, analyze and correlate research findings.

- **Collection and authenticication**
- **Pharmacognostic investigations**
  - Organoleptic evaluation
  - Macro and micromorphological evaluation
- **Preliminary phytochemical investigations**
  - Physico-chemical evaluation
  - Extraction and fractionation
  - Preliminary qualitative chemical analysis
- **Pharmacological screening**
  - Acute oral toxicity study
  - Evaluation for diuretic activity in rats
  - Evaluation for antiurolithiatic activity in experimentally induced hyperoxaluric rats
- **Phytochemical investigations**
  - Separation, isolation and purification of phytoconstituent(s) from bioactive extract(s)
  - Spectral characterization of isolated phytoconstituent(s)
Fig. 2.1: Schematic layout of the proposed study for Diuretic and Antiurolithiatic activity and Phytochemical investigations