NEED FOR STUDY

Theories of Stone formation\textsuperscript{34-35}

1. Super saturation theory
   - Based on binding of salts
   - Less salt concentration – compound in solution
   - High salt concentration – Precipitation of compound

2. Crystallization / Nucleation theory
   - Binding of ions or Molecules formation of crystals nucleation
     followed by aggregation

3. Inhibitor deficiency theory
   - Citrates, Magnesium & Pyrophosphates – Modify crystal growth &
     prevent stone formation (stone inhibitor)

4. Functional abnormalities theory
   - Abnormalities cause – obstruction of flow of urine & retention of
     urinary crystals
Currently available treatments^{33-34}

Among various plants which are used as Pashanabheda (Antiurolithiatic plants) in India, a survey was made by an eminent Ayurveda Physician, Prof. P. V. Sharma on the identity of real Pashanabheda. He reported that Berginia species is the real Pashanabheda and Aerva lanata is a reliable substitute for Berginia species due to its non-availability^{35}.

Aerva lanata is used as both Antiurolithiatic, Diuretic and also used for other activities traditionally^{36-42}. Reports reveal that Aerva lanata contains different active constituents, but none of them are reportedly screened for Antiurolithiatic activity till date^{43-48}.
Biodiversity plays a major role in the variation of active constituents in the same plant from place to place\textsuperscript{48-49}.

The Chemical constituents commonly responsible for Antiurolithiatic activity \textsuperscript{50-56}

Polar constituents $\rightarrow$ extracted with Polar solvents $\rightarrow$ shows promising Antiurolithiatic activity

Polar constituents $\rightarrow$ -OH, -COOH, -OCH\textsubscript{3} substitutions

- **Occurrence** - Usually in glycosidic form
- **Triterpenoids** - Pentacyclic (alpha- amyrin, beta- amyrin, Lupeol)
- **Flavonoids** - Isoflavone
- **Glycosides** - Anthraquinone (Anthracene + Quinone)

\begin{align*}
\text{Alpha-amyrin} & & \text{Beta-amyrin} & & \text{Lupeol} \\
\text{H}_3\text{C} & & \text{H}_3\text{C} & & \text{H}_3\text{C} \\
\text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\
\text{D} & & \text{D} & & \text{D} \\
\text{E} & & \text{E} & & \text{E} \\
\text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\
\end{align*}

*Aerva lanata* (L) available in Western Ghats region has not been studied scientifically for Antiurolithiatic activity till date. Hence, there is a need to isolate, characterize and evaluate the active constituents of the whole plant *Aerva lanata* for Antiurolithiatic activity for the development of new lead molecules.
OBJECTIVES

➢ To extract, fractionate, isolate and characterize the active constituents from *Aerva lanata* (L) using Modern Analytical Techniques.

➢ To evaluate characterized chemical constituent/s for their Antiurolithiatic potentials.

➢ To validate the Analytical study of the active constituent/s using HPLC.
Proposed study design

Collection of plant and authentication → Extraction → Hydro alcohol Pet ether (40-60°C) → Hydro alcoholic extract → Fractionation → DCM Ethyl acetate n-butanol → Fraction → Fraction I II III → Phytochemical tests and spectral analysis → Screening for antibacterial potency → Screening for Antiurolithiatic potentials → Isolation by column chromatography → AEF 1 AEF 2.3 → Betulin Quercetin → Analytical method development In silico molecular docking → Screening for antiurolithiatic potentials → Characterization by spectral techniques