3. **Aims and Research questions**

The overall aim of the present research work is to contribute to the existing knowledge in the field of antidiabetic therapy. This work is comprised of three parts:

1. The first part focused on the extraction, fractionation and evaluation of antidiabetic potential of the extracts of two traditionally used antidiabetic plants – *Tinospora sinensis* and *Chonemorpha fragrans*.
2. The second part involved the isolation of active constituents present in the plants.
3. In the third part, isolated compounds were subjected to different *in vitro* antidiabetic screening methods.

3.1 **Research questions**

A number of research questions were raised after the literature search:

1. Can we prove the traditional claims with evidences?
2. Is it possible to isolate the active constituents so that the molecular mechanisms can be understood?
3. Will these single ingredients alone contribute towards the activity or is it the synergistic effect of other constituents responsible for the activity?

Based on the research questions, a number of specific aims were designed for the research work.

3.2 **Specific aims**

1. Collection of the stems of *T. sinensis* and roots of *C. fragrans*.
2. Extraction with ethanol (95%) followed by fractionation with solvents of increasing polarity.
3. To assess the antioxidant potential using models like DPPH, ABTS, nitric oxide scavenging, ferric reduction capacity and total antioxidant capacity.
4. To evaluate the antidiabetic activity by *in vitro* and *in vivo* models.
In vitro methods

- Alpha amylase inhibitory potential
- Glucose uptake studies using 3T3 cell lines

In vivo methods

- Acute toxicity studies
- Normoglycemic studies
- Oral glucose tolerance test
- Antidiabetic studies on streptozotocin - nicotinamide induced diabetic rats

5. Chemical profiling of the extracts using UPLC-QTOF MS/MS to identify the active constituents.

6. Isolate the active constituents by column chromatography.

7. Structural elucidation by UV, IR, NMR and mass spectroscopy.

8. Evaluation of the antidiabetic potential of isolated compounds using in vitro models
   - Alpha glucosidase inhibitory activity
   - In vitro gene expression (PPAR γ) in L 6 Myotubes