4. Scope and Objectives

Natural products of plant origin offer vast resources of newer medicinal agents with potential clinical use. The whole plant of *Actiniopteris dichotoma* that belongs to Polypodiaceae family, known as peacock’s tail, has been reported to have antioxidant activity. The fronds juice of this herb has been claimed to have antidiabetic potential. The leaves and stem have been reported to have rutin and other phenolic derivatives. The juice of the young spadix of *Cocos nucifera* Linn that belongs to Arecaceae family is reported to have antidiabetic potential. Coconut oil, fibre from coconut kernel and coconut flour have been used to control and manage diabetes mellitus. *Kyllinga nemoralis* that belongs to Cyperaceae family known as white flowered kyllinga has been reported to have antidiabetic potential. The roots and leaves of *Premna corymbosa* that belongs to Cyperaceae family have been used in the treatment of diabetes. The tribes and local herbal practitioners in Orissa use and prescribe the paste of roots of this plant along with rice washed water orally twice daily to reduce blood sugar in diabetic patients.

In the present study the above mentioned four antidiabetic plants were selected on the basis of their use in traditional medicines for diabetes. It is likely that the polyphenolic constituents present in these plants may possibly exert their antioxidant and hypoglycaemic effects through α-glucosidase enzyme inhibition. Extracts of these species were, therefore, proposed to be tested for their antidiabetic potential and inhibitory potential of α-glucosidase enzyme. Isolation and characterisation of phytochemicals responsible for antidiabetic activity was also proposed to be carried out and screened for their antidiabetic potential.

4.1. Aim

Isolation, characterisation and evaluation of bioactive leads/drugs from selected medicinal plants for the treatment of diabetes.

4.2. Objectives

- Pharmacognostical and phytochemical investigation on the selected plants.
- Assessment of antioxidant potential of the plant extracts by *in vitro* methods.
- Assessment of antidiabetic potential of plant extracts by *in vitro* and *in vivo* methods.
- Bioactivity guided fractionation and characterization of the bioactive compounds.
- Elucidation of possible antidiabetic mechanism through docking studies.
Scope and Objectives

4.3. Plan of work

4.3.1. Phase I: Pharmacognostical and phytochemical investigation
- Ethnobotanical survey, literature review and selection of plants
- Collection and authentification of plants
- Microscopical and morphological investigation
- Determination of physiochemical parameters
- Preparation of extracts using ultrasonication assisted method of extraction
- Qualitative and quantitative phytochemical analysis

4.3.2. Phase II: Pharmacological investigation:
- \textit{In vitro} antioxidant studies of the extracts
- \textit{In vitro} \( \alpha \)-glucosidase inhibition assay of the extracts
- \textit{In vivo} \( \alpha \)-glucosidase inhibition assay using Starch tolerance test
- \textit{In vivo} antidiabetic screening using Streptozotocin induced diabetic model

4.3.3. Phase III: Bioactivity guided fractionation
- Isolation of bioactive compounds using \( \alpha \)-glucosidase inhibitory assay and column chromatography
- Structural elucidation of the isolated compounds by IR, NMR and MS
- \textit{In vitro} \( \alpha \)-glucosidase enzyme inhibition assay of the isolated compounds
- \textit{In silico} molecular docking studies of the isolated compounds

4.3.4. Phase IV: Documentation of results and publication