3.0 RESEARCH ENVISAGED

Medicinal plants are still a valuable source of new pharmaceutical products and natural products still remain as one of the best reservoir of new structural-typed bioactive compounds. More than 25% of modern medicine comes from natural products and another 25% are structural modification of the lead compounds from natural source. It is estimated that only 15% of higher plants have been investigated for potentially useful biological activity. In spite of the presence of known antidiabetic medicine in the pharmaceutical market, remedies from medicinal plants are used with success to treat this disease. Many traditional plant treatments for diabetes are used throughout the world. Plant drugs and herbal formulations are frequently considered to be less toxic and free from side effects than synthetic one (Craker et al., 2006).

Based on the WHO recommendations, hypoglycemic agents of plant origin used in traditional medicine are important. The attributed antihyperglycemic effects of these plants are due to their ability to restore the function of pancreatic tissues by causing an increase in insulin output or decrease in the intestinal absorption of glucose. Hence treatment with herbal drugs has an effect on protecting β cells and smoothing out fluctuation in glucose levels. In general, there is very little biological knowledge on the specific modes of action in the treatment of diabetes, but most of the plants have been found to contain substances like phenolics, glycosides, alkaloids, terpenoids, flavonoids etc., that are frequently implicated as having antidiabetic effects.

Therefore, in recent years, considerable attention has been directed towards identification of plants with antidiabetic ability that may be used effectively for human consumption (Elder, 2004). There has been rapid expansion of different classes of antihyperglycemic drugs with unique pharmacological mechanism of action and, correspondingly, they have diverse toxicological profiles. A variety of medications are reported to maintain hyperglycemia i.e. elevated blood glucose level like insulin, sulphonylureas, biguanides, thiazolidinedione, glucagon-like peptide-1 analogues and dipeptidyl peptidase- IV inhibitors. Overdose of these drugs may include agitation, altered behaviour, excess
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sweating, slurred speech, tachycardia, seizures, and coma. Subcutaneous dose of insulin is associated with profound risk blurred vision and hypoglycemia. Sulfonylureas can cause hypoglycemia, which stimulates appetite and leads to weight gain. Biguanides causes anorexia and encourage weight loss. Thiazolidinediones like pioglitazone, rosiglitazone can cause hepatic dysfunctioning as an adverse effect on regular treatment. Management of diabetes without any side effects is still a challenge to the medical system. Nevertheless, natural supplements are widely used around the world to treat diabetes, but medical research does not support their effectiveness (Liu et al., 2004). Therefore, the search for natural supplement from medicinal plants is being intensified probably because of its fewer side effects, readily availability and low cost. Thus the scientific validation of medicinal plants traditionally used in the treatment and management of diabetes is necessitated.

*Acacia nilotica* (Mimosaceae) commonly known as babul, is one of the most widely used medicinal plant in Indian system of medicine and traditionally used as aphrodisiac, antipyretic, astringent, spasmodylic, hypoglycemic, demulcent, antifungal and in the treatment of bronchitis, diarrhoea, dysentery, biliousness, bleeding piles, hemorrhoid and in ophthalmic disorder (Kirtikar and Basu, 1975; Jawad et al., 2000). It has been reported to have antiinflammatory, antibacterial, antimutagenic and cytotoxic activity (Ambasta, 1994). The literature review revealed that comparative antidiabetic study on various parts of *A. nilotica* has not been experimentally studied, as well as no detailed study has been carried out on the modulation of oxidative stress, effect on lipid profile and hepatic enzymes of glucose metabolism associated with DM in experimental induced diabetic rats. Therefore the present study was investigate the antidiabetic and antioxidant activity of *A. nilotica* plant parts and its fractions.

### 3.1 Plan of research work:

- Selection, collection and authentication of plants parts
- Preparation of extracts
- Qualitative phytochemical screening
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- Quantitative estimation of total phenolic and flavonoids
- Thin layer chromatography
- In vitro antioxidant activity
  - Reduction of 1, 1- diphenyl- 2- picryl hydrazyl (DPPH)
  - Nitric oxide scavenging activity
  - ABTS scavenging activity
  - Superoxide dismutase scavenging activity
  - Iron chelation assay
- Preliminary Pharmacological screening of different extracts
  - Acute toxicity studies of different extracts
  - OGTT and hypoglycemic activity in normoglycaemic rats
- Alloxan induced antidiabetic activity of active extract
  - Estimation of Blood Glucose at 0th, 5th, 15th and 21st day
  - Determination of body weight
  - Determination of serum insulin
  - Determination of serum lipids
    - Total cholesterol (TC)
    - Total glycerides (TG)
    - Low density lipoprotein (LDL)
    - Very low density lipoprotein (VLDL) &
    - High density lipoprotein (HDL)
  - Preparation of pancreas, liver and kidney homogenates
    - Determination of Thiobarbituric acid reactive substances
    - Determination of Enzymatic antioxidants
      - Superoxide dismutase (SOD)
      - Catalase (CAT)
      - Glutathione peroxidase (GPx)
      - Glutathione-S-transferase (GST)
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- Determination of Non enzymatic antioxidants
  - Glutathione (GSH)
- Determination of glycogen
  - Histopathological studies of pancreas, liver and kidney
  - Solvent-solvent fractionation of active extract
  - Alloxan induced antidiabetic activity of active fraction
    - Estimation of Blood Glucose at 0\textsuperscript{th}, 5\textsuperscript{th}, 15\textsuperscript{th} and 21\textsuperscript{st} day
    - Determination of body weight
    - Determination of serum insulin
    - Determination of serum lipids
      - Total cholesterol (TC)
      - Total glycerides (TG)
      - Low density lipoprotein (LDL)
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    - Preparation of pancreas, liver and kidney homogenates
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        - Superoxide dismutase (SOD)
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        - Glutathione peroxidase (GPx)
        - Glutathione-S-transferase (GST)
      - Determination of Non enzymatic antioxidants
        - Glutathione (GSH)
      - Determination of Glycogen
        - Histopathological studies of pancreas, liver and kidney