Chapter 2

Review of literature

A thorough literature review was carried out on plants suitable as anti-diabetic herbal formulation, which could be a novel formulation. The literature review is as follows:

2.1 Review of Literature for Diabetes Mellitus

Ozougwu et al. (2013) has reported the informative literature review on diabetes (type 1 and 2) clearly on its aetiology, pathogenicity and physiology.

Deshpande et al. (2008) reviewed diabetes, its epidemiology and related complications. They illustrated it well with statistics of US people suffering from diabetes. They also discussed various diseases associated with diabetes namely neuropathy, kidney disease, cardiovascular disease, vision difficulties etc. they tested randomize people and revealed that changes in life style and controlled lipid and blood glucose level can help to overcome such difficulties.

Muoio and Newgard (2008) reviewed information regarding various biochemical, genetic and molecular factors in type 2 diabetes and such factors may stimulate to lose metabolic fuel homeostasis. This literature review has advanced our knowledge regarding various mechanisms like bio-chemical and molecular which are involved in the occurrence of Diabetes type 2.

Fernandez-mejia (2006) discussed the molecular basis of type 2 diabetes. Biochemical methods, Classical physiology studies, the use of gene targeting approaches in mice, tissue culture technology, and naturally occurring mutations in patients have analyzed the molecular triggers for type 2 diabetes and have contributed to a deeper knowledge of the molecular mechanisms involved in the type 2 diabetes.
2.2 Review of Literature for Drug (*Gymnema sylvestre*)

Saneja et al. (2010) has reviewed the various ethnobotanical and traditional uses as well as phytochemical and pharmacological reports on *Gymnema sylvestre*.

Editor et al. (2007) has reviewed that the active constituent of *Gymnema sylvestre* is gymnemic acids and thus it is regarded as one of the most vulnerable species having potent anti-diabetic properties. It has been noticed that diabetes, obesity and gymnemic acids could have been a possible linkage between all of them.

Krishna (2012) has reported that Gymnemic acid is the prime active constituent of *Gymnema sylvestre* and its extract is helpful in regulating blood sugar level for the treatment of diabetes mellitus type 2.

Persaud et al. (1999) has studied that an alcoholic extract of *Gymnema sylvestre* affects the insulin secretion very significantly from the islets of Langerhans and several pancreatic β-cell lines in rat. The results affirm that *Gymnema sylvestre* possess the stimulatory action on insulin release because of elevating cell permeability, rather than by stimulating exocytosis by regulated pathways.

Al-Romaiyan et al. (2010) has revealed the direct stimulative actions of *Gymnema sylvestre* extract on insulin secretion from pancreatic β-cells showed *In vitro* measurements using isolated human islets of Langerhans demonstrated direct stimulatory effects of *Gymnema sylvestre* extract on insulin secretion from human β-cells, consistent with an *in vivo* mode of action through enhancing insulin secretion. These *in vivo* and *in vitro* observations suggest that *Gymnema sylvestre* extract may provide a potential alternative therapy for the hyperglycemia associated with diabetes mellitus type 2.
Mall et al. (2009) has demonstrated the *Gymnema sylvestre* extract show remarkable decrease in the fasting blood glucose level, cholesterol and serum triglyceride level in treated rats. Same way, it also showed the potent elevation in serum HDL cholesterol level. Thus experimental study revealed that GS possesses antidiabetic and hypolipidemic properties in normal fasting and alloxan induced rats.

### 2.3 Review of Literature for Animal Model

Fröde and Medeiros (2008) has reported the informative literature review regarding the animal models available for diabetes and some in vitro models used for the investigation of the detailed mechanism of action of drugs having significant antidiabetic activity.

King and Bowe (2015) gave the information about experimental animal models which are currently used for both Type 1 and 2 diabetes with the evaluation of various advantages and disadvantages of these diabetic models for research purposes and the factors required to be considered during their use.

Karthic et al. (2012) has studied the anti-diabetic effects of *Gymnema sylvestre* in diabetic rats using alloxan and revealed that *Gymnema sylvestre* suspension cell extract exhibit remarkable anti-diabetic activity so it was considered as potent anti-diabetic drug.

### 2.4 Review of literature for Glibenclamide

Saxena and Argal (2015) has prepared herbal suspension containing alcoholic extract of *Annona squamosa* leaves, *Aegele marmelos* leaves and *Azadirachta indica* leaves was prepared and evaluated for its organoleptic characteristics, physicochemical parameters and antidiabetic activity using Glibenclamide as standard drug.
2.5 Review of Literature for System

Madhav et al. (2009) has reviewed that due to having some significant advantages, the oral transmucosal route is getting more popularity now-a-days for systemic delivery than the per oral route. It provides an alternative route for the administration of drug. It offers higher rapid absorption into the blood as compared to the oral administration to the GIT. It is non-invasive in nature. In this kind of dosage form any specialized care or equipments are not required thus it involves lower cost than intravenous drug administration. This route is more convenient and comfortable for the patient populations requiring rapid onset of action than i.v. administration.

Patel et al. (2011) has discussed that along with the solid and semisolid formulations, liquid formulation are one of the potential dosage forms for oral transmucosal drug delivery. An aerosol spray is readily available for the absorption because it can deliver the drug onto the mucosal surface or into the salivary fluid and thus it is used as alternative to the various solid formulations. Due to delivery of fine droplets by this formulations, reduction in lag time was observed.

Thosar (2011) has demonstrated that Oral sprays release the drug rapidly in oral cavity due to this unique characteristics it obviate requirement of water during administration. It focuses on the overview of the oral mucosa, formulation aspects of oral spray, advantages of oral sprays and their patents.

Xu et al. (2002) has studied the hypoglycemic effect of a novel insulin formulation, INSULIN BUCCAL SPRAY (IBS). They produced that formulation by combining propanediol with soybean lecithin to form an absorption enhancer for insulin on diabetic experimental animals like rats and rabbits. From this experimental data it was concluded that IBS can effectively reduce blood glucose in the diabetic rat and rabbit model.
Diaz-del Consuelo et al. (2005) has demonstrated that insulin buccal spray is effective for the patients with Type 1 diabetes because it controls postprandial glucose levels. Insulin administered via the buccal spray formulation is as effective in lowering blood glucose levels as the subcutaneous route.

2.6 Review of Literature for Adjuvants

Savita et al. (2004) has determined the consequence of consumption of *Stevia rebaudiana* on selected Hypertensive and NIDDM patients. This *Stevia rebaudiana* acts as sweetener and possesses slight after taste but it allows patients to keep their sugar intake low and yet they can enjoy the sweet taste of foods.

Madan et al. (2012) has reviewed the various information about various aspects of *Stevia rebaudiana* plant used for various purposes in traditional system of medicine.

Lemus-Mondaca et al. (2012) has concluded that *stevia* produces low calorie sweeteners like diterpene glycosides which are approx. 300 times more sweet than saccharose. Along with therapeutic activities the extract of *Stevia rebaudiana* contain a high amount of sweetening agents i.e. steviol glycosides.