Chapter 2

Aim and Objective
2. AIM AND OBJECTIVES

Diabetes mellitus (DM) is a major health problem all over the world. Globally, the number of people that has been diagnosed with diabetes has exploded in the past two decades. In 2000, 151 million people in the world were diabetic. With the current rate of increase (6% per annum), it has been projected that 221 million people will be diabetic in 2010 and 324 million by 2025 (Zimmet et al., 2001).

The underlying goal of all diabetes treatment and management is to maintain an adequate blood concentration. Several approaches were made presently to reduce the hyperglycemia such as treatment by newer oral hypoglycaemic agents (OHA) sulfonylureas (eg., Tolbutamide, Acetohexamide, Cholopropamide, Gilbenclamide, Glipizide and Glidozide) which stimulates pancreatic islet cells to secrete insulin; another class of OHA that is guanidine derivatives known as biguanides (eg., Phenformin, metaformin, and buiformin) which acts to reduce hepatic glucose production; thiazolidinediones, increase in insulin receptor sensitivity and delay of digestion α-glucosidase inhibitors, which interfere with glucose adsorption and insulin itself, which suppresses glucose production and augments glucose utilization (Moller, 2001). Unfortunately, these agents could produce severe hypoglycaemia, weight gain and gastrointestinal disturbances (Sirichai et al., 2005). Side effects of sulphonyl urea drugs include Nausea, vomiting and cardiovascular mortality; Biguanides may cause lactic acidosis. Limitations of OHA in NIDDM and problems of insulin antibodies in IDDM have been recorded. In terms of effectiveness of modern OHA in diabetes in an increasingly important medical problem (Kahn and Shechter, 1990). Epidaemiological data also warn that medical patients are still at risk of chronic morbidity and premature mortality even after the assiduous use of the available OHA. A normal physiological pattern of glucose homeostasis is rarely reinstated after treatment (Aberti and Zimmet, 1988).

In a large clinical trial covering 8 years conducted by the University group's diabetes programme of USA,(1970), it was reported that patients treated with

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sulphonylurea suffered a two-fold increase in mortality as compared to insulin treated patients.

Although insulin seems an ideal anti-diabetic agent, it cannot stimulate the pancreas of a healthy individual. Though insulin is able to lower blood sugar level, symptoms reoccur very soon. Furthermore, like cortisone hormone injection, it has many side effects. Insulin is unable to recover pancreas function and it speeds up the aging of the organ. Hence diabetes within 15 to 20 years of diagnosis begin to develop complications (Brownlee and Cerami, 1981). The range of different complications in diabetes is directly related to the hour to hour fluctuations in blood sugar that persist even when insulin is taken once or twice a day (Pirat 1978; Job et al., 1975).

All these therapies have limited efficiency and various side effects and thus searching for new classes of compounds is essential to overcome these problems. Several medicinal plants have been reported to be used in traditional medicine for the treatment of diabetic patients in different ethnic societies of Asia, Africa and South America. Even in developed countries of Europe, North America and Japan several plant products are used for the treatment of diabetes in the name of herbal plants (Banskota et al., 2006).

According to a report by Ryan et al., (2001), one-third of diabetic patients take alternative medicines that they consider efficacious. Actually, more than 1200 plants have been described to be experimentally or ethnopharmacologically used in the treatment of diabetes mellitus (Ivorra et al., 1989; Marles and Farnsworth, 1995; Wang and Ng, 1999; Li et al., 2004). To date, a few of these medicinal plants have received scientific or medical scrutiny, despite the fact that the World Health Organization has encouraged and recommended that traditional treatment for diabetes warrant further evaluation (WHO, 1980).

The growing public interest and awareness of natural medicines have led the pharmaceutical industry and academic researchers to pay more attention to medicinal plants (Day, 1998). Mushrooms have a notable place in the folklore through out the

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world and in the traditions of many cultures (Chang and Bushwell, 1999). The family of *anodermataceae* consists of a large group of tree fungi of the class *Polyporaceae*, specifically the genus *Ganoderma* and other related genera. *Ganoderma* fungi are mainly found in tropical and subtropical areas; the typical species is *Ganoderma lucidum* (Fr.) Karst. It is called Ling Zhi or Reishi (Chinese), Mannentake (Japanese) and Tuwonbiri (Hausa). It is seasonal and can be found growing alone or in groups on decaying hardwood logs and stumps.

*Ganoderma lucidum* is commonly known as a medicinally-potent mushroom. It has been widely used in China and other oriental countries for hundreds of years for the treatment of various diseases including hyperglycaemia and cancer. The Medical Research Institute of Kinki University found in yearly experiments that *Ganoderma lucidum* has the same effect as insulin.

The *Ganoderma lucidum* is extremely rare and difficult to find in the wild. Because the husks of the spore are very hard, the spores can't germinate as readily as the spores of other mushrooms. To germinate, the right combination of oxygen and moisture conditions is needed. Fortunately, we are now able to recreate favorable growth conditions. It can be cultured on logs that are buried in shady, moist areas. *Ganoderma lucidum* can also be inoculated onto hardwood stumps. Under commercial cultivation conditions, *Ganoderma lucidum* is normally grown on artificial sawdust logs. The mushroom that was once the provenance of the emperors of China can now be purchased in health food stores (George, 2007).

The cultivation of *Ganoderma lucidum* on solid substrate, stationary liquid medium or by submerged cultivation has become essential to meet the increasing demand in the international markets (Hsieh and Yang, 2004) and makes it more accessible and affordable. Increasing demand for *Ganoderma lucidum* has led to investigation into the suitability of sawdust and agricultural wastes as substrates for commercial bag cultivation of the mushroom.

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The aim of the present research work is to help in contributing towards the ethnobotanical uses of Ganoderma lucidum found in Kolli hills of India as an effective hypoglycaemic and antioxidant agent.

The present investigation has the following Aim and objectives

1. Artificial cultivation of Ganoderma lucidum collected from Kolli hills on various substrates, standardizing the culture conditions and finding out the yield of biomass.
3. Effect of Ganoderma lucidum aqueous extract on hepatic marker enzymes in hyperglycaemia induced rats.
4. Effect of Ganoderma lucidum aqueous extract on tissue antioxidant status in streptozotocin diabetic rats.
5. Effect of Ganoderma lucidum aqueous extract on plasma antioxidant status in streptozotocin induced diabetic rats.
9. Effect of Ganoderma lucidum aqueous extract on protein, glycoprotein and glycogen levels on streptozotocin induced diabetic rats.

Mushrooms, which grow so close to the earth, have a grounding effect. When considering a medicinal mushroom, we get back in touch with the essential forces of the earth. This study will harness mushrooms medicinal power for the good of humankind in the years to come.

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