5. SUMMARY AND CONCLUSION

Diabetes currently is a major health problem for the people of the world. Diabetes is a chronic disorder of carbohydrate, fat and protein metabolism characterized by elevation of both fasting and post-prandial blood sugar levels. Approximately 215 million people worldwide suffer from Diabetes Mellitus and 90-95% of them from the Type 2 diabetes. In view of rapid increase in diabetic cases, WHO (World Health Organization) and American Diabetic Association have reduced the figure of Blood Glucose Level (BGL) from 140 mg/dl for the risk of Diabetes.

The synthetic oral hypoglycemic agents can produce serious side effects. Natural remedies from medicinal plants are considered to be the cost effective and safe alternative treatments for various diseases. Medicinal herbs have consistently been considered a leading source of pharmaceuticals, employed in the treatment of various human diseases due to their high chemical diversity and broad biological functionality. Recently many plants have been explored and claimed to be useful for the treatment of Diabetes Mellitus by our earlier and present Research Groups.

People are looking beyond conventional medical treatment towards Complementary or Alternative Medicine (CAM) for new ways to treat this disease, stay healthy, feel better and live longer without any side effects or toxicity. In the past, there have been many ethno-botanical medicinal plants, which have been used in traditional medicines for their antidiabetic properties without any scientific support and pharmacological evidences. Natural medicines can be integrated into conventional treatment by exploring and evaluating chemo preventive potential of identified medicinal plants with demonstrated biological activity.

Although modern medicine is well developed in most of the world, large sections of the population in developing countries still rely on the traditional practitioners, medicinal plants and herbal medicines for their primary care. Moreover during the past decades, public interest in natural therapies has increased greatly in industrialized countries, with expanding use of medicinal plants and herbal medicine.

Various herbs that are possess the strong antibiotic properties. These herbs can safely be relied upon to strengthen the immune system, protect from a wide array of disease-causing
organisms and assist in maintaining vibrant and robust health. Immune system is an incredibly complex interaction between organs, glands, body systems, surfaces, cells and chemicals. This symphonic concert of processes requires nourishment in order to function optimally. After studying the effect of HS capsules, along with physical activity, HS capsules with physical activity and Nutrition counseling the following observations were made.

**Socio-demographic data of obese NIDDM patients**

- Age, physical activity level, Income level, type of family, Educational qualifications, Food habits, Personal habits and duration of diabetes of Obese NIDDM patients.
- Of the 50 male patients, 10 per cent have low level income, 24.0 per cent have medium level of income and the remaining 66.0 per cent are of high income group. Of the 70 female, 12.06 per cent are of low income group, 21.43 per cent are in middle income group and 65.75 per cent are in high income group.
- Of the 50 male patients, 44.0 per cent have smoking habit, 24.0 per cent have Alcohol drinking habit and 32.0 per cent have both habits. Of the 70 female patients, 74.2 per cent have been suffering from diabetes for more than 5 years, while the remaining 25.7 per cent of or less than 5 years.
- Overall 95 percent of the patients had diabetic positive family history.

**Anti microbial activity of leaf products used in supplementation**

- Anti bacterial and anti fungal activity was observed in *Murraya Koenigii, Moringa Oleifera* and *Mentha Aervensis* leaves, which are used in bio medicinal capsules.
- Antimicrobial activity of Leaf powder: The bacteria included: *Shigella dysenteriae, Salmonella typhi, Salmonella paratyphi, Bacillus cerus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Vibrio cholerae, Bacillus megaterium* which are beneficial in keeping the pathogenic microbes below the threshold level and helpful in therapeutic uses.
- This study confirms that leaf powder posses in-vitro antimicrobial activity. This obviously justifies the use of above leaf powder in traditional medicine. The present
investigation on selected Obese NIDDM patients and impact of HS capsules, physical activity and nutrition counseling may be useful.

**Anthropometric measurements**

- Anthropometric measurements such as Height, weight, BMI and Waist hip ratios were reduced in the three experimental groups after the treatment.

- Anthropometric characteristics or body composition such as Triceps, biceps, sub scapular, suprailliac, SSFT, body density, body free fat, body fat and lean body mass were significantly decreased in the three experimental groups after the treatment.

**Clinical symptoms and health complications**

- Micro and macro vascular complications were observed in obese NIDDM patients.

- Poly urea, poly dipsia and polyphasia, perspiration, Excess weakness, nausea, odema and oral disorders were reduced in Obese NIDDM patients after the treatment.

- Health complications such as cardio vascular disorders, visual problems, amputations like foot ulcers, delayed wound healing, infections and kidney disorders were decreased in Obese NIDDM patients after the treatment.

**Dietary assessment**

- Major chunk of the patients use sunflower oil, while the patients using Groundnut oil or palm oil share more or less equal proportions. Equal proportions of patients use Sesame oil and Safflower oil.

- Food intakes were controlled after the treatment, nutrients such as energy, protein, fat, carbohydrates and dietary cholesterol levels were decreased. Vitamins and minerals such as vitamin A, C and B-complex vitamins, and folic acid were improved, iron calcium levels were also improved in the three experimental groups after the treatment.
**Physiological assessment**

- Blood parameters such as Systolic blood pressure and Diastolic blood pressure levels were decreased significantly in the three experimental groups after the treatment.

**Energy expenditure and Energy balance of the patients**

- The energy expenditure showed very low values when compared to energy intake after treatment. The energy expenditure values were significantly improved in the three experimental groups after the treatment.

**Biochemical analysis**

- FBG, PPBG, HbA\(^1\)C levels were decreased significantly in the three experimental groups after the treatment.

- Total cholesterol, LDL-cholesterol, VLDL-cholesterol levels were decreased significantly in the three experimental groups after the treatment. Whereas improved HDL-cholesterol levels were observed.

- Serum creatinine, Blood urea nitrogen levels were decreased among the three experimental groups after the treatment.

- Serum Antioxidant levels were increased after supplementation.

**SUGGESTIONS**

1. Research is to on herbal products should be encouraged extensively in herbal Biotechnology.

2. Government and policy makers are to take much interest by allocating required budget for this research.

3. As many people are interested to use herbal medicines, required care should be taken.

4. Separate research laboratories should be established to conduct and perform continuous research on herbal plants to extract their medicinal properties for the health of the people.