INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIOMEDICAL ANALYSIS | ISSN : 2278 – 2664
| APRIL-JUNE 2012| VOLUME 1 | ISSUE 1 | 14-19
Available Online Through: www.ijprba.com

Research Article

THE EVALUATION OF ANTI DIABETIC MELLITUS ACTIVITY OF *Ceiba pentandra* ON ALLOXON INDUCED TYPE-II DIABETIES IN RATS.

PRADEEP P*[1], SRINIVAS S[1], BHARATH P[2], SOUMYA G[1]

[1]St. John College of Pharmacy, Warangal, Andhra Pradesh, India

[2]Jyothismathi Institute of Pharmaceutical Sciences, Hyderabad, Andhra Pradesh, India

*Corresponding author E-mail: pradeeppeddi6767@gmail.com; Tel.: +9490676707

ABSTRACT

Medicinal plants played an important role in Indian culture since Rig Veda (5600 BC) where about 67 medicinal plants were recorded. [It is estimated that 80 % of about 4 billion population have to rely on traditional medicines due to high cost of modern medicines, lack of availability of required medicines and personal preferences. At least, 30 million people throughout the world suffer from diabetes mellitus. In Indian, the situation is expected to become much worse in the year to come because of food habit and sedentary life style. Life expectancy may be halved by this disease, especially in developing countries where its prevalence is increasing and adequate treatment is often unavailable. Diabetes not only kills, but it is a major cause of adult blindness, kidney failure, neuropathy, heart attack and strokes. *Ceiba pentandra* is one of the ancient plants used in the traditional system for diabetes, liver components, etc. The plant contains flavonoids, terpenes, phenol contents· The purpose of the present work was to investigate and validate the ethanobotanical uses of *Ceiba pentandra* Hypoglycemic and Hepatoprotective activities. Our results clearly demonstrate the hypoglycemic and hepatoprotective activities of Alcoholic extracts of *Ceiba pentandra* in different *in- vivo* models of hyperglycemia and hepatotoxicity. We first investigated the hypoglycemic activity of *Ceiba pentandra*. This was clearly evidenced by the increased levels of insulin in diabetic rats treated with *C.pentandra* plant extracts.

KEY WORDS

Extract, *Ceiba pentandra*, Alloxan, antidiabetic.

INTRODUCTION

Diabetes mellitus (DM) is a group of disorder of carbohydrate metabolism in which the action of insulin is diminished or absent through altered secretion [1], decreased insulin activity, or a combination of both factors. It is characterized by hyperglycemia [2]. As the disease progresses tissue or vascular damage ensues leading to severe complications such as retinopathy, nephropathy [9], neuropathy, cardiovascular disease and foot ulceration [3]. Diabetes mellitus may be categorized into several types but the two major types are type I (Insulin – dependent diabetes mellitus; IDDM) and type II (non – insulin dependent diabetes mellitus; NIDDM).The term juvenile – onset diabetes have sometimes [4] been used

for types I and maturity onset diabetes for types 2. Malnutrition – related diabetes is no longer considered a separate entity [5].

The purpose of the present work was to investigate and validate the ethanobotanical uses of *Ceiba pentandra* Hypoglycemic and Hepatoprotective activities. Our results clearly demonstrate the hypoglycemic and hepatoprotective activities of Alcoholic extracts of *Ceiba pentandra* in different in vivo models of hyperglycemia and hepatotoxicity. We first investigated the hypoglycemic activity of *Ceiba pentandra*. The evaluation of anti diabetic mellitus activity of *ceiba pentandra* on alloxon induced type-II diabeties in rats [6]. The present study investigation in the serum glucose and insulin parameters. The Alcoholic Extracts of *Ceiba pentandra* plant on Serum glucose levels were significantly lowered in diabetic rats after 15 days [7]. And Animals treated with 300 mg/kg; body weight of alcoholic extract of Group IV showed significant increase in insulin levels compared to Alloxan treated animals of group I [8]

MATERIALS AND METHODS

Plant material

Ceiba pentandra plant leaves collected from Satavahana University campus during Nov-Dec'2010 and authenticated by Dr. R. Odaiah, Professor in Dept. of Botany, S.R.R Govt. Degree and P.G. College. The specimen samples are stored in the University Library and the authentication number is (SRR/2011/04). The plant materials are shade dried [9].

EXPERIMENTAL METHODS

Preparation of plant extract: [10]

The whole plant of *Ceiba pentandra* were cleaned and chopped into small pieces and dried under shade. The coarse powder by mechanical grinding. The powdered material 100 g was subjected to continue hot extraction in soxhlet apparatus at a temperature of (60- 70^0 c) by using ethanol (95% v/v).

Pharmacological studies:

Selection of the dose:

The procedure was followed by using OECD guide lines (Organization of Economic Cooperation and Development) 420 (Acute Toxic Class Method). It was found that the ethanolic extract up to the dose of 2000mg/kg body weight, did not show any toxic symptoms or mortality [11].

Animals:

Wistar strain rats weighed (200-250gms) are selected. Rats were purchased from NIN (National Institute of Nutrition), Tarnaka, Hyderabad. The selected rats were acclimatized to the environment in the lab and provided feed and water *ad libitum*. These all guidelines followed from CPCSEA (Institutional Animal Ethical Committee) [12].

Drugs and chemicals:

Alloxan, Metformin, Glibenclamide, Diabetic kits are purchased from Merck Pharmaceuticals, Mumbai and other chemicals, reagents are supplied from local distributers.

Pharmacological screening for anti diabetic activity:

In this experiment, a total of 30 rats were divided into 4 groups of six animals in watch group. Group – I rats Animals are receive daily (control group) Saline. Group – II rats Animals are treated with alloxan.(Diabetic control group)(Does 60mg/kg; body weight) and Group – III rats Animals are treated with metformin (Reference group)(standard drug, dose 500mg/kg, body Weight, p.o) Group – IV rats. Animals are treated with Alcoholic (Test group – treatment extract of *Ceiba pentandra*.

(Herbal preparation, dose 300mg/kg, Body weight, p.o) [13].

Antidiaetic activity:

Estimation of the Biochemical parameters:

At the end of the 30th day before the animals were fasted over night and Blood (1.0ml) will be withdrawn from the retro – orbital vein puncture using micro capillary technique, the blood was collected in separate test tubes containing potassium oxalate and Sodium fluoride. The plasma is obtained after centrifugation at 3000 rpm. The serums will be estimated for following biochemical parameters [14].

Estimation of glucose concentration:

Blood will be withdrawn from the retro-orbital sinus at 30,60 and 120 minutes of extract administration and the plasma obtained after centrifugation at 3000 rpm will be estimated for fasting plasma glucose levels using glucose-oxidase/peroxides (Glucose estimation) kit[15].

Statistical Analysis:

All values were expressed as the mean obtained from a number of experiments (n). Data from table III of one control group and three test group animals were compared by student-t test [16].

RESULTS

Preliminary phytochemical screening

The Crude dried plant powder showed the presence of alkaloids, carbohydrates, phenols, gums and mucilage, saponins, steroids, protein, tannins, glycosides and reduced sugar, flavonoids and Terpins were present [17].

The Alcoholic extract showed the presence of alkaloids, carbohydrates, phenols, saponins, steroids, protein, tannins, glycosides and reduced sugar, flavonoids and Terpins were present.

Oral glucose tolerance test for *Ceiba pentandra*

There was significant decrease in blood glucose levels in animals treated with Alcoholic extract+ Glucose 300, 200, 100 mg/kg; 2g/kg Body weight of groups II to IV ,compared to control Group I(Glucose 2g/kg Body weight), yet **p <0.001of 120 min. Compared to Group III & Group IV, Group II animals were showing significant decrease in glucose levels. Glucose load animals were showing the reduced glucose level at 120 min. compared at 30 min. interval, this values were statistically significant at P* indicates <0.05.[**Figures no 1**]

Serum glucose levels in Alloxan treated diabetic rats:

The fasting blood glucose levels were significantly increased following the injection of Alloxan in comparison to normal rats (*p< 0.001*). The diabetic animals treated with Alcoholic Extracts of *Ceiba pentandra* plant on Serum glucose levels were significantly (*p< 0.001*) lowered in diabetic rats after 15 days.[**Figures no 2**]

Serum Insulin levels in Alloxan treated diabetic rats:

Animals treated with 300 mg/kg; body weight of alcoholic extract of Group IV showed significant increase in insulin levels compared to Alloxan treated animals of group II. The remaining groups (III & V) were also significant increase levels compared to above Alloxan treated animals of group I at (*p< 0.001*).But Alloxan treated animals showing significant decrease insulin levels at P < 0.001 as compared with normal.

[**Figures no 3**]

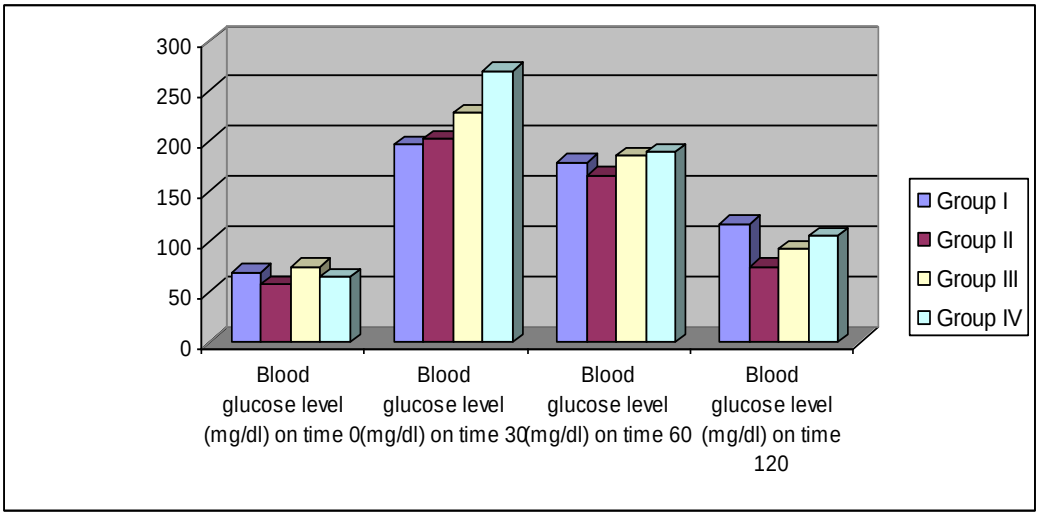

Fig: 1. Oral Glucose Tolerance Test for *Ceiba pentandra* on Wistar strain rats.

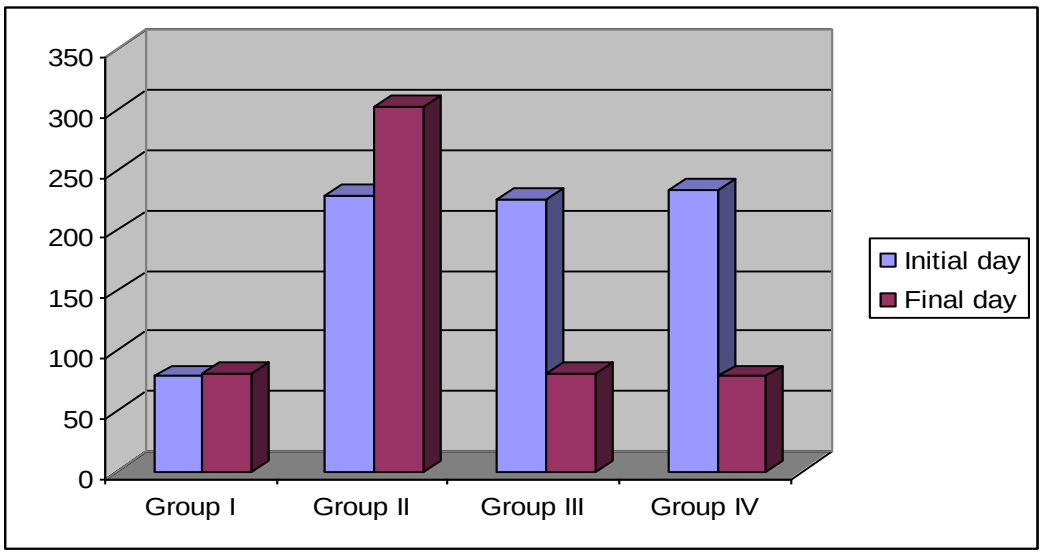

Fig: 2. Effects of Alcoholic Extracts of *Ceiba pentandra* plant on Serum glucose levels in Alloxan treated diabetic rats.

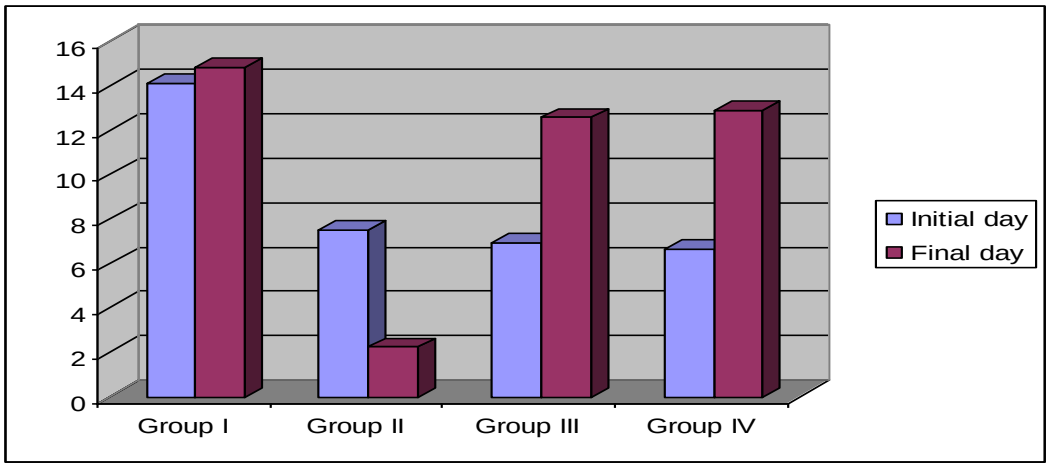

Fig: 3. Effects of Alcoholic Extracts of *Ceiba pentandra* plant on Serum Insulin levels in Alloxan treated diabetic rats

DISCUSSION

Diabetes mellitus is a principal cause of morbidity and mortality in human populations. It is a syndrome characterized by hyperglycemia, polydipsia and polyuria and causes complications to the eyes, kidney, and nerves. Diabetes mellitus is affecting approximately 5% of the world's population. It is also characterized by dysregulation in carbohydrate, protein and fat metabolisms caused by the complete or relative insufficiency of insulin secretion and\or insulin action. Much of the increased mortality and morbidity seen in diabetic patients is the result of various complications which develop with increasing durations of disease, particular when glycaemic control is poor, Such complications may originate from increased glycation of proteins and other biological macromolecules in the hyperglycemic environment, or from increased accumulation of sorbitol and other ployols via the aldose reductase path way, but other factors play an important role in determining susceptibility.

The present data indicate that, treatment with the ethanolic extracts of the plant of *Ceiba pentandra* significantly reduced the incidence and prevented the formation of urinary calculi in rats. The ethanolic extract was more effective of the plant of *Ceiba pentandra* in both curative and preventive regimens.

CONCLUSION

The Alloxan is well known for its selective pancreatic islet α-cell cytotoxicity and has used to induce diabetes mellitus in animals. It interferes with cellular metabolic oxidative mechanisms. Intraperitoneal administration of Alloxan (60mg/kg) effectively induced diabetes in Normal rats as reflected by glycosuria, hyperglycemia, polyphagia, polydipsia and body weight loss compared with Normal rats.

REFERENCES

1 Pabba Parameshwar, Y.N Reddy, E Ramesh. Hypoglycemic and anti-lipidemic effects of the hydro-ethanolic extract of *Helicteres isora* Linn.J. Ethnopharmacology .

2 Bhandarkar MR, Khan A., Anti hepatotoxic effect of *Nymphaea stellata* against carbon tetra chloride-induced hepatic damage in albino rats, J. Ethnopharmacol, 2004 ; 91 : 61-64.

3 Babu V, Gangadevi T, Subramoniam A., Antidiabetic activity of ethanolic extract of C*assia Kleinii* leaf in Alloxan-induced diabetic rats and isolation of an active fraction and toxicity evaluation of the extract. Indian J. Pharmacol, 2003; 35: 290-296.

4 Bartosikova L, Necas J, Suchy V, Kubinova R, Vesela D, Benes L, et al. Monitoring of antioxidant effect of Morine in alloxan-induced diabetes mellitus in the laboratory rat. Acta Veter. Brno. 2003; 72: 191- 200.

5 Grover JK, Vats V, Rathi SS. Anti-hyperglycemic effect of *Eugenia jambolana* and *Tinospora cordifolia* in experimental diabetes and their effect on key metabolic enzymes involved in carbohydrate metabolism. J. Ethnopharmacol. 2000; 73: 461-470.

6 Baquer NZ. Glucose over utilization and under utilization in diabetes and effects of antidiabetic compounds. Anal. Real. Acad. Farma. 1998; 64: 147-180.

7 Prince PSM, Menon VP, Pari L. Hypoglycemic activity of *Syzigium cumini* seeds: effect on lipid peroxidation in alloxan diabetic rats. J. Ethnopharmacol. 1998; 61:1-7

8 Bopanna KN, Kannan J, Sushma G, Balaraman R, Rathod SP. Antidiabetic and anti hyperlipaemic effects of neem seed

kernel powder on alloxan diabetic rabbits. Indian J. Pharmacol. 1997; 29: 162- 167.

9 Koenig R, Peterson CM, Jones RL, Sandek C, Lehrman M, Cerami A. Correlation of glucose regulation and hemoglobin A1c in diabetes mellitus. N. Engl. J. Med. 1976; 295: 417-420.

10 Koida H, Oda T. Pathological occurrence of glucose-6- phosphatase in liver disease. Clin. Chem. Acta 1959; 4: 554-561.

11 Brandstrup N, Kirk JE, Bruni C. Determination of hexokinase in tissues. J. Gerontol. 1957; 12: 166-171.

12 Olch J, Less M, Solane SGH. A simple method for isolation and purification of total lipids from animal tissues. J. Biol. Chem. 1957; 26: 497- 509.

13 Arroll VV, Longly RW, Joseph HR. Determination of glycogen in liver and muscle by use of anthrone reagent. J. Biol. Chem. 1956; 220: 583- 593.

14 Kameswara Rao B, Renuka Sudarshan P, Raja Sekar MD, et al.. Antidiabetic activity of *Terminalia pallid* fruit in alloxan induced diabetic rats. J Ethnopharmacol 2003; 85: 169 - 172.

15 Andallu B. Control of hyperglycemic and retardation of cataract by mulberry (*Morus indica. L*) Leaves in Alloxan diabetic rats. Ind J Exp Biol 2002; 40: 791 – 795.

16 Sumana G, Suryawanshi SA. Effect of *Vinca rosea* extracts in treatment of alloxan diabetes in male albino rats. Ind J Exp Biol 2001; 39, 748 – 758.

17 Valiathan, MS. Healing plants. Curr Sci 1998; 75: 1122 – 1126.