



## EVALUATE THE HYPOGLYCEMIC EFFECT OF VINCA ROSEA LEAF EXTRACTS IN ALLOXAN INDUCED DIABETIC RATS

\*Joyamma John

St Thomas College, Ruabandha Sector, Bhilai, Chhattisgarh, India 490006

\*Corresponding author- Dr.Joyamma John, Qt. No. 101/C Ruabandha, Bhilai, Chhattisgarh, India.

\*Corresponding authors email: drjoyammajohn5@gmail.com

### ABSTRACT

The present study was carried out to evaluate the antidiabetic activity of aqueous leaf extract of *Vinca rosea*. The aqueous extract at high dose (300mg/100g) body weight showed a significant hypoglycemic activity. Improvement in the body weight and water and food consumption is also observed after the treatment with herbal extract.

**KEYWORDS:** Alloxan, Hypoglycemic effect, Phyto chemicals, Diabetes mellitus, Alkaloids, *Vinca rosea*.

### INTRODUCTION

*Diabetes mellitus* is one of the common metabolic disorders that result in significant morbidity and mortality. It is considered as one of the five leading cause of death in the world (Kameshwara 91, 97, Vats *et al.*, 2004). Modern medicines do not provide satisfactory cure to diabetes mellitus many of modern medicines are having side effects also. Because of these reasons, there is an increasing demand of herbal products with antihyperglycemic activity. Large number of traditional plants reported to have anti diabetic properties (Joseph and Jini, 2011). Products obtained from traditional plants such as *Azardirachta indica* (neem) *Triogonella foenum* (Fenugreek), *Momrdica charantia* (Bitter gourd), *Syzygumcumini* (Black berries), *Ocimum sanctum* have anti hyper glycemic properties. Many of these are less effective in lowering blood glucose levels in severe diabetes. (Baily and Day 1989, Chopra *et al.*, 1956, Holman and Turner, 1991). *Vinca rosea* (Apocynaceae) is an herbaceous plant, belonging to the Apocynaceae family, commonly known as periwinkle. This plant is cultivated mainly for its alkaloids which are having anti cancer properties (Ranganathan and Sridharan 2001, Shrotri *et al.*, 1963, Sumona and Suryawanshi, 2001). The leaves are used traditionally in various regions of the world including India, West Indies *etc* (Cowely and Bennet, 1928). Significant hypoglycemic activities of leaf extract (both aqueous and alcoholic) have been reported in laboratory animals. Fresh methanolic leaf extract of *Vinca rosea* has been reported to have hypoglycemic effect in normal and alloxan induced diabetic rats. Leaves and twigs of *Vinca rosea* have been reported to have hypoglycemic activity in streptozotocin induced diabetic rats (Singh *et al.*, 2001, Vats *et al.*, 2004)

The present study is an attempt to evaluate the prolonged effect (30 days) of aqueous leaf extract of *Vinca rosea* in alloxan induced diabetic and non diabetic rats.

### MATERIALS & METHODS

**Plant material:** The leaves of *Vinca rosea* used for present study were obtained from herbal garden of St. Thomas college Bhilai Chhattisgarh India.

**Preparation of aqueous extract:** Fresh leaves were collected from the garden, homogenized, and filtrate was obtained by using a whatsman filter paper. The extract containing 300mg /100g body weight is given to both diabetic and non diabetic rats as drinking water.

**Animals:** Albino rats (8-10 weeks) of both sexes were obtained from a commercial supplier.

Before and during the experiment rats were provided with free access to food and water. Efforts were made to minimize animal suffering and to reduce the number of animals. All experiments complied with guidelines on ethical standards, for the investigations in animals. The study was approved by Institutional animal ethical committee for the care and use of animals. After randomization in to various groups and before initiation of experiments rats were acclimatized for a period of 7 days under normal laboratory conditions of temperature, humidity, dark and light cycles. The experiments were started at the same hour (10 AM)

**Experimental design:** Groups of animals five in each received following treatment schedule

Group I Normal control (non diabetic)

Group II Allaxon treated (Diabetic) control

Group III Allaxon treated rats with aqueous leaf extract of *Vinca rosea*

Group IV Normal rats with leaf extracts

Control group of both diabetic and non diabetic received only distilled water during the period of experiments.

#### Induction of Diabetes in Experimental Animals

Rats were made diabetic by a single intraperitoneal injection of alloxan (60mg/kg bodyweight) (Allaxon hydrate, CDH, India). Allaxon was weighed, and then dissolved in saline just prior to the injection.

Hyperglycemia was observed in rats after two days. Rats with plasma glucose level  $\geq$  to 180 mg/dl were selected

for the present study. Treatment with aqueous leaf extracts was started 48 hour after alloxan injection.

**Collection of Blood Samples and Blood Glucose determination**

For monitoring the blood glucose the blood samples were collected from tail tip of rat at the interval of seven days till the end of the experiment. The blood glucose was monitored by using one touch glucometer (One Touch select simple Life Scan India) using glucose test strips. The animals were sacrificed after 7, 15 and 30 days under mild ether anesthesia. Blood samples were collected and proceeded for glucose estimation (Nelson and Somogy, 1952) muscle and liver tissue were collected and proceeded for glycogen estimation (Mukherjee, 2005).

**Statistical Analysis**

All values of body weight, blood sugar ,muscle and liver glycogen were expressed as mean ±Standard error of mean(SEM) and analyzed for ANOVA Differences between groups were considered significant at P<0.0 5 levels.

**RESULTS**

Administration of single dose of alloxan (60mg/kg) caused decrease in body weight. This condition is reversed by continuous treatment of leaf extract for a prolonged period of 30 days

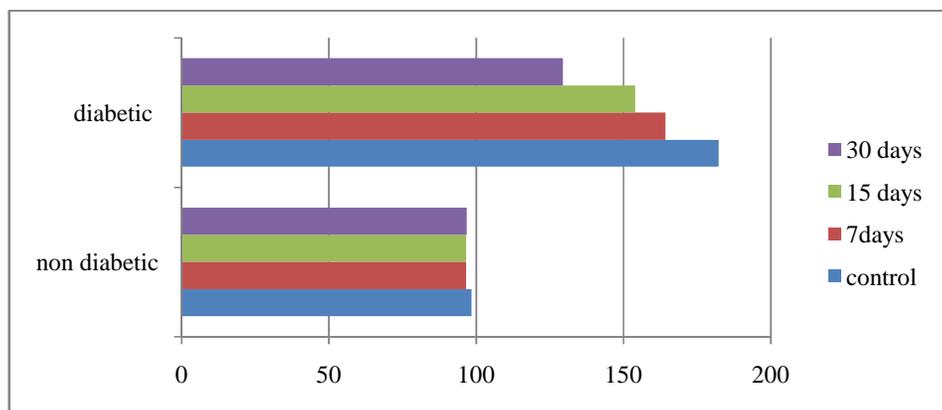
Body weight of non diabetic rats does not change, but the body weight of diabetic control showed significant reduction, and the body weight of alloxan induced diabetic rats treated with aqueous extract showed improvement in the body weight (Table I).

Administration of alloxan (60mg /kg) led to an increase in blood sugar level. This condition prevailed for one week. Daily treatment of leaf extract of *Vinca rosea* led to dose dependent fall in blood sugar level. Maximum effect was observed on prolonged treatment with a dose of 300mg/100g for 30 days (Table1, Figure 1)

There is an increase in the muscle and liver glycogen content of alloxan induced diabetic rats treated with aqueous leaf extract of *Vinca rosea* for thirty days (Table 2, Figure 2 and 3) This effect more significant in prolonged treatment with 300mg /100g body weight Food and water consumption of diabetic rats were high during the initial period of experiment. The rate of consumption of water and food gradually decreased by the end of the experimental period.

**DISCUSSION**

The results show that the intraperitoneal administration of alloxan to rats increased blood sugar level after two days, as well as decreased body weight. In addition diabetes related signs were observed. These results agree with previous observations that have employed this model that also report loss of body weight (Khatak *et al.*, 1979). Administration of aqueous leaf extract of *Vinca rosea* maintained the body weight of diabetic rats. In addition administration of the aqueous extract of *Vinca rosea* decreased water and food consumption. In light of the results, this study indicates that aqueous leaf extracts of *Vinca rosea* have good anti diabetic effects in alloxan-induced hyperglycemic rats.This treatment resulted in significant change in body weight, improved the conditions of Diabetic mellitus as indicated by reduced food and water consumption. In the present study increased blood sugar level following the administration of alloxan may be due to damage of pancreas. Similar effect is observed in alloxan induced control group of animal without the aqueous leaf extract of *Vinca rosea*. Prolonged treatment of aqueous leaf extract (30 days) resulted in gradual decrease in blood sugar level of alloxan induced diabetic rats. There is an increase in the liver glycogen content of the diabetic rats treated with aqueous leaf extract of *Vinca rosea*. These findings are similar to the earlier authors with different animal models (Nammi *et al.*, 2003).



**FIGURE 1:** Blood sugar level in diabetic and non diabetic rats treated with *Vinca rosea* extract

The regeneration of islet β cells following destruction by alloxan may be the primary cause of the recovery of alloxan-injected guinea pigs from the effects of the drug. The whole plant alcoholic extracts has been shown to act by β cell regeneration (Gorray *et al.*, 1986). Similar effects in streptozotocin-treated diabetic animals were reported by pancreas tonic (Rao *et al.*, 1998), Ephedrine (Xiu *et al.*,

2001), and *Gymnema sylvestre* leaf extracts [Shanmuga sundram *et al.*, 1990]. This study showed that aqueous extract of *Vinca rosea* significantly reduced the blood glucose level. This hypoglycemic effect is similar to the one reported for other plants (Savboda and Marry, 1965, Vats *et al.*, 2004) such effect may be explained in part by either a decrease in the rate of glucose absorption (Sumona

and Suryawanshi, 2001), or an increase in peripheral glucose utilization (Shanmuga sundaram *et al.*, 1990 Shewta *et al.*, 2009). This could be due to possibility that some cells are still surviving to act upon by *Vinca rosea*

leaf extract to stimulate the secretion of insulin or *Vinca rosea* extract to exert its insulin releasing effect (Chakravarty *et al.*, 1982, Shewta *et al.*, 2009).

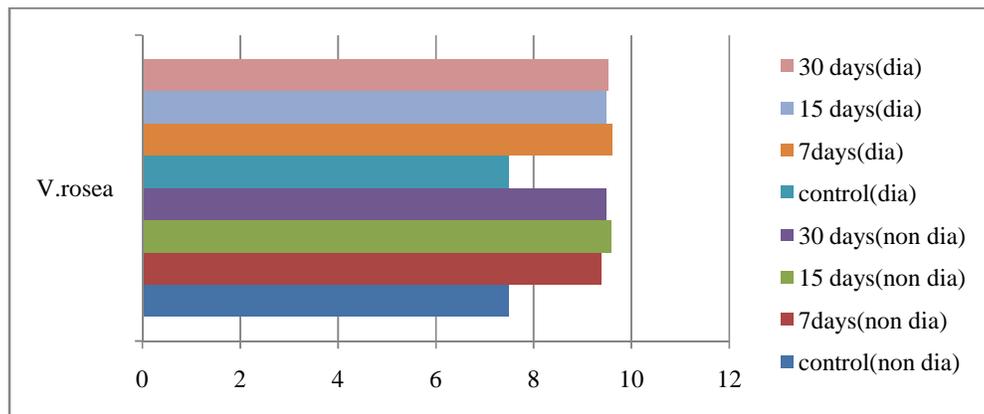


FIGURE 2: Muscle glycogen in non diabetic and diabetic rats treated with *Vinca rosea* extract

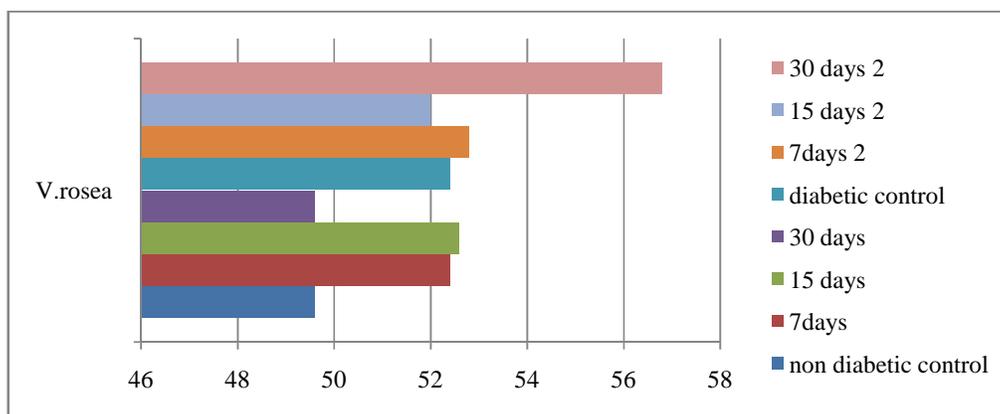


FIGURE 3: Liver glycogen in non diabetic and diabetic rats treated with *Vinca rosea* extract

TABLE 1: Body Weight and Blood sugar in non diabetic and diabetic rats treated with *Vinca rosea* extract

|             | Non diabetic rats |           |            |           | Diabetic rats |            |             |             |
|-------------|-------------------|-----------|------------|-----------|---------------|------------|-------------|-------------|
|             | Control           | 7days     | 15days     | 30days    | Control       | 7days      | 15days      | 30 days     |
| Body Weight | 330.4±1.63        | 331±6     | 322±1.87   | 322±7.18  | 236.20±4.20   | 248.6±1.50 | 273.40±2.07 | *279±7.33   |
| Blood sugar | 98.4±0.40         | 96.6±0.50 | 96.80±0.49 | 96.8±0.55 | 182.2±0.66    | 164.2±0.77 | 154.0±0.63* | 129.4±0.75* |

n=5, Values are ±SEM, \*significant at p <0.05

TABLE 2: Muscle and liver glycogen in diabetic and non diabetic rats treated with *Vinca rosea* extract

|                 | Non diabetic rats |            |            |            | Diabetic Rats |            |           |            |
|-----------------|-------------------|------------|------------|------------|---------------|------------|-----------|------------|
|                 | Control           | 7days      | 15 days    | 30 days    | control       | 7days      | 15 days   | 30 days    |
| Muscle glycogen | 7.5±0.01          | 9.4±0.07   | 9.6±0.11   | 9.56±0.15  | 7.50±0.01     | 9.62±0.17  | 9.54±0.15 | *9.54±0.89 |
| Liver glycogen  | 49.60±0.51        | 52.40±0.95 | 52.60±0.75 | 49.60±0.51 | 52.40±0.86    | 52.80±0.86 | 52±0.32   | *68.1±0.7  |

n=5, Values are ±SEM, \*significant at p <0.05

**CONCLUSION**

The treatment of rats with aqueous leaf extract of *Vinca rosea* did not show a consistent effect on normal blood sugar. But in allaxon induced hyper glycemic rats with aqueous leaf extract effectively changed the blood glucose level and glycogen content of liver and muscle, from the above discussion it concludes that aqueous leaf extracts of *Vinca rosea* at a high dose (300mg/100g) exhibited significant anti diabetic activity. More over continuous treatment with leaf extract for a long period (30 days) reversed the conditions of hyper glycemia. The treatment

with aqueous extract also showed improvement in body weight. Further investigation is essential to determine the exact phyto constituents responsible for anti diabetic activity.

**ACKNOWLEDGEMENT**

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**RECOMMENDATIONS**

Since allopathic medicines used in the treatment of diabetes are having side effects, so herbal preparations can be used for the treatment of type II diabetes.

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