

PHYTOCHEMICAL SCREENING AND HYPOGLYCEMIC EFFECT OF SELECTED MEDICINAL PLANT

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ABSTRACT

Background and Objective: To investigate the anti diabetic activity of Glycyrrhizae Radix ethanolic extract in rats. **Methodology:** Rats were treated with Alloxan at a dose of 120 mg/kg I.P. for 09 days. So as to develop insulin resistance the Ethanolic extract of Glycyrrhizae Radix was administered concurrently from day 2nd P.O. twice daily. Values of fasting blood glucose and serum triglycerides were determined on 10th day. **Result:** There is a significant decrease $P < 0.001$ in blood glucose level at two dose of the extract tried in the Alloxan treated model (250mg/kg) and 500mg/kg. Higher dose showed a significant decrease $p < 0.005$ in serum triglyceride. **Interpretation and Conclusion:** The roots extract produces significant hypoglycemic activity in Alloxan model. Decrease in blood glucose level appears to be more due to its ability to modify the insulin action rather than to interfere with digestion and absorption of carbohydrates.

KEYWORDS: Acetyl-Co Carboxylase, World Health Organization, Glycyrrhizae Radix, Adenosine Diphosphate, Diabetes Mellitus.

INTRODUCTION

Diabetes mellitus, often referred to simply as diabetes, is a syndrome of disordered metabolism, usually due to a combination of hereditary and environmental causes, resulting in abnormally high blood sugar levels (hyperglycaemia). Blood glucose levels are controlled by a complex interaction of multiple chemicals and hormones in the body, including the hormone insulin made in the beta cells of the pancreas. Diabetes mellitus refers to the group of diseases that lead to high blood glucose levels due to defects in either insulin secretion or insulin action.^[1,2] Diabetes develops due to a diminished production of insulin (in type 1) or resistance to its effects (in type 2 and gestational). Both lead to hyperglycaemia, which largely causes acute signs of diabetes: excessive urine production, resulting compensatory thirst and increased fluid intake, blurred vision, unexplained weight loss, lethargy, and changes in energy metabolism. Monogenic forms. All forms of diabetes are treatable since insulin became medically

available in 1921, but there is no cure. The injections by a syringe, insulin pump, or insulin pen deliver insulin, which is a basic treatment of type 1 diabetes. Type 2 is managed with a combination of dietary treatment, exercise, medications and insulin supplementation. Diabetes and its treatments can cause many complications. Acute complications (hypoglycaemia, ketoacidosis, or nonketotic hyper-osmolar coma) may occur if the disease is not adequately controlled. Serious long-term complications include cardiovascular disease, chronic renal failure, retinal damage (which can lead to blindness), nerve damage, and microvascular damage, which may cause erectile dysfunction and poor wound healing. Poor healing of wounds, particularly of the feet, can lead to gangrene, and the danger of amputation. Adequate treatment of diabetes, as well as increased emphasis on blood pressure control and lifestyle factors (such as not smoking and maintaining a healthy body weight), may improve the risk profile of most of the chronic complications. In the developed world, diabetes

is the most significant cause of adult blindness in the non-elderly and the leading cause of non traumatic amputation in adults, and diabetes nephropathy is the main illness requiring renal dialysis in the United States.

Epidemiology

Diabetes mellitus is a serious condition with potentially devastating complications that affects all age groups worldwide.^[3,4] In 1985, an estimated 30 million people around the world were diagnosed with diabetes; in 2000, that figure rose to over 150 million; and, in 2012, the International Diabetes Federation (IDF) estimated that 371 million people had diabetes. That number is projected to rise to 552 million (or 1 in 10 adults) by 2030, which equates to 3 new cases per second (IDF, 2012).

Classification



Fig 1.1: Types of diabetes.

AIM AND OBJECTIVE

Aim

The Aim of this study was to determine in vivo hypoglycemic activity and safety, Phytoconstituents of liquorice root (*Glycyrrhizae Radix*) used traditionally in the management of diabetes mellitus.

Objectives

- 1) To prepare ethanolic extract of *Glycyrrhizae radix* leaves by using Soxhlet apparatus.
- 2) To determine the presence of phytoconstituents such as Alkaloids, Glycosides, tannins, flavanoids, saponins, steroids, terpenes in crude extract of GR.
- 3) To study the acute toxicity of the test extract of GR leaves by OECD 420 guidelines.
- 4) To determine the in-vivo hypoglycemic activity of the ethanolic extracts of *glycyrrhizae radix*.
- 5) To evaluate the safety of a high dose of the ethanolic extracts of *glycyrrhizae radix*. Changes in body weight, hematological and biochemical parameters.

MATERIALS AND METHODS

Plant Collection and Authentication

Plant root material of *Glycyrrhizae Radix* was collected from local areas of chittor district of Andhra Pradesh and was authenticated by Dr. madhava chetty botanist sri venkateshwara university Tirupati, Andhra Pradesh.

Preparation of Ethanolic Plant Extract

The coarse powder of roots of *G. radix* (1.5 kg) was extracted with ethanol (95%) in a Soxhlet extractor. The ethanolic extract was then concentrated on rotary flash evaporator to 1/10th volume. The concentrated ethanolic extract was then fractionated with n-butanol, ethyl acetate, solvent ether and petroleum ether (40-60°C) in succession. The ethanolic extract was concentrated to dryness under vacuum using rotary flash evaporator. An attempt was also made to observe the presence and absence of different phytochemical constituents, viz. alkaloids (Dragendorff's test), anthraquinones, saponins (foam formation), flavonoids (using magnesium and dil. HCl), sesquiterpenes and terpenes (Liebermann-Burchard's test) according to standard methods.

Pytochemical Screening of Ethanolic Extract of *Glycyrrhizae Radix*

Ethanolic extract of GR were subjected to preliminary phytochemical screening for the detection of various plants constituents.

1. Test for alkaloids

Treated with dilute Hydrochloric acid and filtered. The filtrate was treated with various alkaloidal agents.

- a) **Mayer's Test:** Treated with Mayer's reagent. Appearance of cream colour indicates the presence of alkaloid.
- b) **Dragendorff's-test:** When title amount of the sample was treated with Dragendorff's reagent, the appearance of reddish brown precipitate indicates the presence of alkaloid.
- c) **Hager's-test:** Treated with Hager's reagent, the appearance of yellow colour precipitate indicates the presence of alkaloid.
- d) **Quinoline alkaloids test:** Little amount of extract is added with glacial acetic acid gives reddish known fumes and with concentrated sulphuric acid gives blue fluorescence in U.V. light.

2. Test for carbohydrates

Dissolve small quantities (300 mg) of alcoholic extract separately in 4ml of distilled water and filter. The filtrate may be subjected to (a) Molish's test to detect the presence of carbohydrates. Dissolve a small portion of the extract in water and treat with (b) Fehling's solution A and B, (c) Benedict's reagents and (d) Barfoed's reagents to detect the presence of different sugars.

3. Test for steroids

- a) **Liebermann buchard test:** When the extracts were treated with concentrated sulphuric acid, few drops of glacial acetic acid, followed by the addition of acetic anhydride, appearance of green colour indicates the presence of steroid.

4. Test for proteins

- a) **Biuret's-test:** When the extracts were treated with copper sulphate solution, followed by the addition of

sodium hydroxide solution, appearance of violet colour indicates the presence of proteins.

- b) **Million's-test:** When the extract was treated with Millon's reagent, appearance of pink colour indicates the presence of proteins.

5. Test for tannins

- a. When the extract was treated with 10% lead acetate solution, appearance of white precipitate indicates the presence of tannins.
- b. When the extracts were treated with neutral ferric chloride solution, the appearance of violet colour indicates the presence of phenols.

6. Test for phenols

- a. When the extracts were treated with neutral ferric chloride solution, the appearance of violet colour indicates the presence of phenols.
- b. When the extracts were treated with 10% sodium chloride solution, the appearance of cream colour indicates the presence of phenols.

7. Test for flavanoids

- a. 5ml of the extract solution was hydrolyze with 10% v/v sulphuric acid and cooled. Then, it was extracted with diethylether and divided into three portions in three separate test tubes. 1 ml of diluted sodium carbonate, 1 ml of 0.1N sodium hydroxide, and 1ml of strong ammonia solution were added to the first, second and third test tubes respectively. In each test tube, development of yellow color demonstrated the presence of flavonoids.
- b. Shinoda's test: The extract was dissolved in alcohol, to that one piece of magnesium followed by cone. HCl were added drop wise and heated Appearance of magenta color shows the presence of flavonoids.

8. Test for glycosides

When a pinch of the extracts were dissolved in the Glacial acetic acid and few drops of ferric chloride solution was added, followed by the addition of concentrated sulphuric acid, formation of red ring at the junction of two liquids indicates the presence of glycosides.

9. Test for saponins

Foam test: 1ml of the extracts are diluted to 20 ml with distilled water and shaken well in a test tube. The formation of foam in the upper part of the test indicates the presence of saponins.

10. Test for terpenes

When the extracts were treated with Tin and thionyl Chloride, appearance of pink colour indicates the presence of terpenes.

Alloxan Induced Insulin Resistance in Rats

a. Materials

Dried roots of Glyzyrrhizae Radix were collected from chittor district of Andhra Pradesh and this was

authenticated by Assistant prof. k.madhava chetty dept of botany, Sri Venkateswara University, Tirupati, A.P, India. Glibenclamide: gift samples from hychem lab, Hyderabad. Glucose and triglycerides estimation assay kits; provided by Nizam Institute of Pharmacy and Research Centre, Hyderabad, Dept. of Pharmacology, Nizam Institute of Pharmacy, Deshmukhi.

b. Animals

Female wistar rats (150-200 grams) were provided by Nizam Institute of Pharmacy and Research Center. Institution animal's ethics committee has approved the experimental protocol (1330 ac /10/CPCSEA) Animals were housed in polypropylene cages. Paddy husk was provided a bedding material. Food and water was provided ad lithium. Rats were maintained on standard pelleted rodent diet.

c. Sample size selection

Thirty wistar rats were selected randomly and divided in to 5 groups. Each group consists of 6 animals.

d. Determination of Acute toxicity

The acute toxicity of the ethanolic extract of roots of Glycyrrhizae Radix was determined by using female wistar rats; those maintained under standard conditions. The animals were fasted for 3 hours prior to experiment. Animals will be administered with different doses of the extract by following up and down methods as per OECD guidelines number 425.^[28] From LD₅₀ dose two doses are to be selected and will be considered as low, high dose respectively.

e. Dose selection

- **Alloxan:** Alloxan monohydrate 120mg/kg, body weight (intra peritoneal). Alloxan was injected at various doses, increase in alloxan dose greater than 120 mg/kg body weight Intra peritoneal showed high mortality rates so 120 mg/kg, body weight was selected. Injection of alloxan intraperitoneal was considered the better than the sub cutaneous injection.
- **Glibenclamide (1mg/kg p.o in two divided doses i.e. 0.5mg twice a day morning and evening):** Dose of Glibenclamide in humans is 4mg/kg twice a day. This was extrapolated to rats at a dose of 1mg/kg P.O. twice a day. Glibenclamide was dosed twice a day to control hyperglycemia.
- **Glycyrrhizae radix:** (Low dose.250/kg P.O. twice a day, high dose. 500mg/kg, P.O. twice a day morning and evening): recommended dose of Glycyrrhizae Radix was dosed twice a day i.e. in morning and evening to control hyperglycemia.

f. Treatment protocol

All the rats were weighed and their blood glucose levels and triglycerides levels were estimated before treatment and following groups were made.

Group 1: (Normal control): received sterile water for injection 1ml/kg I.P, once a day and vehicle 1% gum acacia P.O. twice a day.

Group 2: (Alloxan control): received Alloxan 120mg/kg, I.P. once a day and vehicle 1% gum acacia w/v -3.5 ml/kg P.O. twice a day.

Group 3: (Alloxan plus Glibenclamide): received Alloxan 120mg/kg I.P. once a day and Glibenclamide 0.5mg/kg, P.O. twice a day.

Group 4: (Alloxan plus low dose of Glycyrrhizae Radix ethanolic extract): received Alloxan 120mg/kg, I.P. once a day and Glycyrrhizae Radix root extract of 250 mg/kg P.O. twice a day.

Group 5: (Alloxan plus high dose of Glycyrrhizae Radix ethanolic extract): received Alloxan 120mg/kg, I.P. once a day and Glycyrrhizae Radix root extract of 500 mg/kg P.O. twice a day.

Alloxan was injected once a day i.e. every day afternoon for the induction of insulin resistance and hyperglycemia. Glycyrrhizae Radix root extract and Glibenclamide was dosed twice a day i.e. in morning and evening to control hyperglycemia. Treatment was continued until day 10.

On day 10, after overnight fasting the animal were weighed and blood samples were collected by puncturing the retro orbital plexus under mild ether anesthesia. Later the animals were sacrificed by cervical dislocation and liver was isolated for histopathological observations.

Table 5.1: Treatment protocol for determination of hypoglycemic effect.

Groups	Descriptions
Groups I	Normal control (saline+1% gum acacia)
Groups II	Alloxan (120 mg/kg i.p) treated control
Groups III	Alloxan (120 /kg i.p) + Glibenclamide (0.36mg/kg body wt)
Groups IV	Alloxan (120 mg/kg i.p)+ Extract of glycyrrhizae radix 250mg/kg low dose (mg/kg body wt)
Groups V	Alloxan (120mg /kg i.p)+ Extract of glycyrrhizae radix 500mg/kg (mg/kg body wt)

g. Biochemical determinations

Blood samples are collected in centrifuged tubes and kept a side for clotting. After clotting the samples were centrifuged at 5000 rpm for 10 mins. Serum was separated and used for biochemical estimations. Blood glucose (GOP/POD) and triglycerides (gop/pod) was estimated by semi auto analyzer using the commercial assay kits.

h. Histology

Preparation of buffered neutral formalin solution

Buffered neutral formalin solution is the best overall fixative, therefore, strongly recommended for routine use, it contains are as follows:

37-40% formalin: 100.0ml

Distilled water: 900.0ml

Sodium phosphate monobasic: 4.0ml

Sodium phosphate dibasic: 6.5grams.

Histology of pancreas was observed and compared only between diabetic control and Glycyrrhizae Radix animals at the end of the study rats of these two groups were sacrificed pancreas was isolated and fixed in buffered neutral formalin solution dehydrated with ethyl alcohol and then included in paraffin. Sections of 5um were obtained by a microtome. Hematoxylin-eosin stain was applied to observe the histological pattern of the pancreatic langerhans. Medical pathologist gave comment on histological observations.

i. Statistical analysis

All results are expressed as mean. Statistical analysis was performed using the graph pad prism 5, graph pad software, U.S.A. one way annova was carried out to determine the effect of Glycyrrhizae Radix on blood glucose serum triglycerides level and change in body weight. Significant difference in the main effects among groups was identified by dunnet-test. Comparisons between just two sets of data were performed with the unpaired t-test. Differences were with $p < 0.05$ were considered statistically significant.

RESULTS

Table 6.1: Phytochemical Screening of Glycyrrhizae Radix.

S.no.	Phytoconstituents	Test performed	Result
1	Carbohydrates	Molisch's test	-
2	Proteins	Copper sulphate test	-
3	Flavanoids	Lead acetate test	+
4	Alkaloids	Dragendroff's test	+
5	Steroids	Liebermann's test	+
6	Terpenoids	Salkowski's test	+
7	Saponins	Froth test	+
8	tannins	Ferric chloride test	+
9	Phlobatannins	HCL test	-
10	Anthraquinones	Benzene test	-
11	Glycosides	Keller-killani test	+
12	Phenolic compounds	Ferric sulphate test	-

(+) Denotes Presence of Phytochemical

(-) Denotes Absence of Phytochemical

Table 6.2: Acute toxicity Study of Glycyrrhizae Radix.

Drug Treatment	Dose	Average weight of the animal in grams		Signs of Toxicity	Effects observed	Death
		Before Treatment (1 st day)	After Treatment (3 rd day)			
EEGR	5 mg/kg	159	165	No signs of toxicity	No effect	Nil
EEGR	50 mg/kg	150	159	No signs of toxicity	No effect	Nil
EEGR	500 mg/kg	157	164	No signs of toxicity	No effect	Nil
EEGR	1000 mg/kg	163	169	No signs of toxicity	No effect	Nil
EEGR	2000 mg/kg	145	154	No signs of toxicity	No effect	Nil
EEGR	5000 mg/kg	172	185	No signs of toxicity	No effect	Nil

EEGR – Ethanolic extract of Glycyrrhizae radix

Alloxan Induced Insulin Resistance Model in Rats

a. Blood Glucose levels (mg/dl)

Blood glucose levels in Alloxan control groups there was significant increase in serum glucose level (p<0.001) when compared to the normal control. All rats treated with Alloxan and glycyrrhiza radix roots at low dose and high dose respectively showed significant decrease (p<0.001) in the levels of serum glucose when compared

with Alloxan control. The rats treated with Alloxan and Glibenclamide showed significant decrease in serum glucose level (p <0.001) when compared with Alloxan control. Glycyrrhiza radix roots at the dose of 500 mg /kg body weight in normal rats showed significant (p<0.001) hypoglycemic effect when compared with the negative control (unpaired t test).

Table 6.3: Effect of Glycyrrhizae radix roots on blood glucose levels (mg/dl) in Alloxan induced insulin resistance model in rats.

Group	Group-1 Normal control	Group-2 Alloxan control	Group-3 Alloxan+ Glibenclamide	Group-4 Alloxan + low dose of g.r	Group-5 Alloxan + high dose of g.r
Serum glucose (mg/dl) MEAN ± SEM	72.88±3.234	348.9±61.60 ^{a**}	151.2±28.01 ^{b**}	189.9±4.508 ^{b**}	175.9±5.108 ^{b**}

Values are expressed as mean ± S.E.M, n=6,

Diabetic control= Alloxan 120 mg/kg I.P.

Diabetic+ Glibenclamide = Alloxan 140 mg/kg, I.P+ Glibenclamide 0.5mg/kg P.O. twice a day

Diabetic+Glycyrrhize Radix. low dose= Alloxan 120 mg/kg, I.P+ GR low dose 250 mg/kg P.O. twice a day

Diabetic+ Glycyrrhizae Radix high dose = Alloxan 120mg/kg, I.P+ GR high dose 500mg/kg P.O. twice a day

a- when compared with normal control,

b- When compared with Alloxan control.

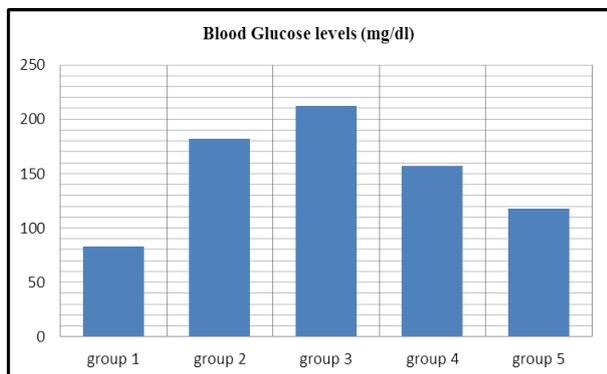


Fig 6.1: Effect of Glycyrrhizae Radix root on blood glucose levels (mg/dl) in Alloxan induced diabetes in rats.

Group-1 Normal control

Group-2 Alloxan control

Group-3 Alloxan + Glibenclamide 0.5 mg/kg P.O. twice a day

Group-4 Alloxan + Glycyrrhizae Radix 250mg/kg body weight

Group-5 Alloxan + Glycyrrhizae Radix 500mg/kg body weight.

b. Serum triglycerides levels

In Alloxan control group there was significant increase in serum triglycerides levels (p<0.01) when compared to the normal control. Rats treated with Alloxan and Glycyrrhizae Radix root at low dose (250mg/kg, body weight) showed decrease in triglycerides levels which was not statistically significant when compared with Alloxan control. Rats treated with Alloxan and Glycyrrhizae Radix root at high dose (500mg/kg body weight) showed significant decrease (p<0.05) in the levels of serum triglycerides when compared with Alloxan control.

Rats treated with Alloxan and Glibenclamide had showed increase in serum triglycerides level which was not statistically significant when compared with Alloxan control but highly significant when compared to normal control. Glycyrrhizae roots 250mg/kg body weight in normal rats showed significant (p<0.05) increase in serum triglycerides level when compared with normal control.

Table 6.4: Effect of g.r roots on serum triglycerides level mg/dl alloxan induced insulin resistance.

Groups	Group-1 Normal control	Group-2 Alloxan control	Group-3 Alloxan+ Glibenclamide	Group-4 Alloxan+ Glycyrrhizae Radix low dose	Group-5 Alloxan+ Glycyrrhizae Radix high dose
Serum triglyceride mg/dl Mean + sem	82.98±5.163	182.2±19.87 ^{a**}	212.2±33.43 ^{a**}	156.9±23.35	117.5±11.44 ^{b**}

Values are expressed as mean ± S.E.M, n=6,

Diabetic control= Alloxan 120 mg/kg I.P.

Diabetic+ Glibenclamide = Alloxan 140 mg/kg, I.P+ Glibenclamide 0.5mg/kg P.O. twice a day

Diabetic+Glycyrrhize Radix. low dose= Alloxan 120 mg/kg, I.P+ GR low dose 250 mg/kg P.O. twice a day

Diabetic+ Glycyrrhizae Radix high dose = Alloxan 120mg/kg, I.P+ GR high dose 500mg/kg P.O. twice a day

a. when compared with normal control,

b. When compared with Alloxan control.

***P<0.01; **p<0.01, * p<0.05

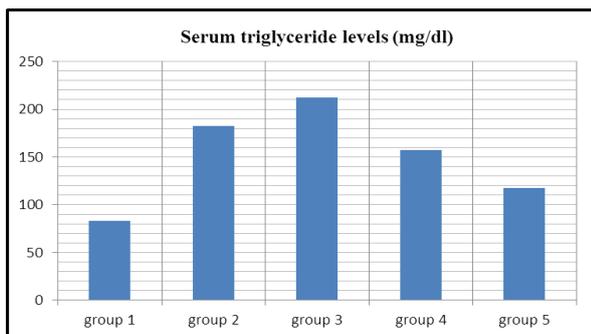


Fig 6.2: Effect of Glycyrrhizae Radix root on Serum Triglyceride levels (mg/dl) in Alloxan induced diabetes in rats.

Group-1 Normal control

Group-2 Alloxan control

Group-3 Alloxan + Glibenclamide 0.5 mg/kg P.O. twice a day

Group-4 Alloxan + Glycyrrhizae Radix 250mg/kg body weight

Group-5 Alloxan + Glycyrrhizae Radix 500mg/kg body weight

q. Histology of Pancreas

In diabetic control animal quantitative decrease in cells is observed (about 45% β cells are intact). Where as in Glycyrrhizae Radix root extract treated animals there was increase in β -cells when compared to Diabetic control (β cells are intact)

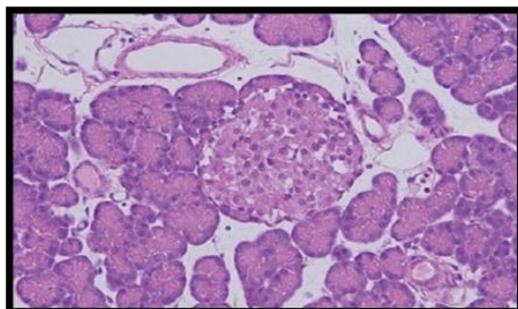


Fig no. a (H & E, 100x).
Group 2: Decreased cells (45% intact).

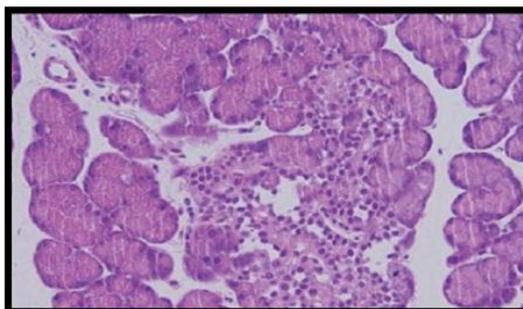


Fig no. b (H & E, 100x).
Group 3: Decreased cells (45% intact).

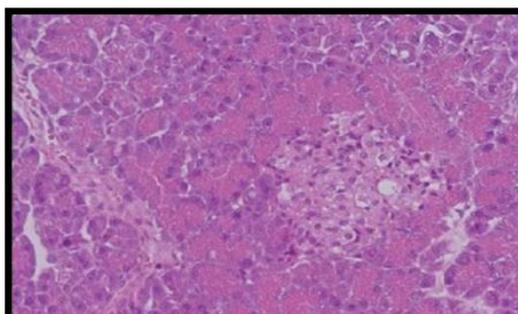


Fig no. a (H & E, 100x).
Group 4: Decreased cells (65% intact).

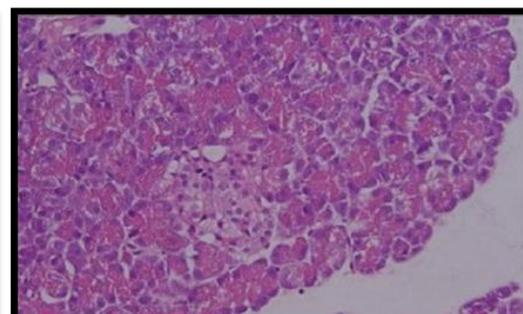


Fig no. b (H & E, 100x).
Group 5: Decreased cells (65% intact).

Fig 6.3: Histology of pancreas in Alloxan induced diabetes in rats.

DISCUSSION

In the present study Alloxan administration resulted in significant increase in blood glucose level ($p < 0.001$) and triglyceride level ($p < 0.01$). Glycyrrhizae Radix root showed dose dependent decrease in elevated blood glucose and triglyceride levels. High dose of the Glycyrrhizae radix root (500 mg/kg, body weight, p.o, twice a day) decreased blood glucose levels better than Glibenclamide. Glibenclamide treatment has shown marginal increase in triglycerides levels when compared to the Alloxan control and the increase was highly significant ($p < 0.001$) when compared to normal control. Findings indicated, treatment with Glibenclamide decreases the glucose levels but worsens triglyceride levels. Overall results show similarity with the results obtained by the clinical studies. Where as treatment with Glycyrrhizae Radix root decreases the glucose levels as well as triglycerides levels in hyperglycemia rats showing the superiority of Glycyrrhizae Radix root over Glibenclamide. Glycyrrhizae Radix root in normal rats has shown a significant decrease ($p < 0.001$) in blood glucose level indicating the Glycyrrhizae Radix root has hypoglycemic activity but not anti hyperglycemic activity.

A decrease in endogenous insulin secretion paves the way for the decreased utilization of glucose by the tissue. It results in elevation of blood glucose levels. Expression of elevated fasting blood glucose levels confirmed induction of diabetes in Alloxan induced experimental rats. So in this experiment the hyperglycemic-hyperlipidemia diabetic model in rats is similar to type II diabetes.

Thus we could say that Glycyrrhizae Radix has a beneficial effect on carbohydrate metabolism in diabetic rats.

The hypoglycemic effect of ethanolic extract of Glycyrrhizae Radix may be due to its potentiating the insulin activity either by increasing the pancreatic secretion of insulin from cells of islets of Langerhans or its release from bound insulin. Dyslipidemia is a frequent complication noted in chemical induced diabetes. And presents a serious risk of vascular disease.

In this study, we have observed an increase in the concentration of TC and TG in Alloxan induced diabetic rats. Hyperlipidemia is a recognized consequence of diabetes mellitus. Regarding the mechanism of action Glycyrrhizae Radix may enhance activity enzymes involved in bile acid synthesis and its excretion and this may have decreased in serum cholesterol and triglycerides. Most of the hypoglycemic drugs don't decrease serum TG level, but Glycyrrhizae Radix lowered it significantly since under normal condition insulin activates the enzyme lipoprotein lipase and hydrolysis the triglycerides.

The triglyceride profile in serum of the Alloxan induced diabetes rats treated with ethanolic root extract Glycyrrhizae Radix (250 & 500 mg/kg, p.o) showed significant reduction, as compared to diabetic control rats. This suggested that G. Radix can prevent or be helpful in reducing the complications of lipid profile observed in some diabetics in whom hyperglycemia and hypertriglyceremia co exist quite frequently.

CONCLUSION

This study was initiated to carry out the Phytochemical screening and test scientifically the claim of Glycyrrhizae Radix root as anti diabetic. We found that Glycyrrhizae radix root possess hypoglycemic activity and can be used in diabetes. Further the mechanism of action by which the Glycyrrhizae roots causes hypoglycemia should be established. Glycyrrhizae radix roots at high dose increases serum triglycerides level in normal rats, but same dose inhibits the elevation of triglycerides levels in hyperglycemic Alloxan treated rats. Further studies should be carried to establish the same.

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