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Research Article

Antidiabetic Activity of Aqueous Methanolic Extracts of Leaf of *Tamarindus Indica*

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ABSTRACT
Aqueous methanolic extract of leaf of tamarindus indica ((Fabaceae)) were tested for anti-diabetic activity for alloxan induced diabetics in wistar rats. Aqueous methanolic extract shown significant protection and lowered induced blood glucose level to normal in glucose tolerance test. In alloxan in induced diabetic rats the maximum reduction in glucose was observed after 6 hours at a dose level of 200 mg/kg of body weight. Blood sugar level was determined using digital glucometer This laid the foundation to study the active compounds of such anti-diabetic plants that are responsible for the hypoglycemic activities. It also proves the traditional claim of nalgonda region regard tamarindus indica for its anti-diabetic activity.these results indicate that the leaf of tamarindus indica posses significant anti-diabetic activity.

Keywords:antidiabetic activity, leaf of tamarindus indica, Alloxan- induced diabetis.

INTRODUCTION

Traditionally tamarindus indica fruit used for the edible purpose and used in cooking Preparation. Medicinally it acts as a freezing agent and appetizing property. Tamarind bark is mostly sold for wound healing purposes[1], occasionally other Tamarind plant parts are found in wound healing medicine, such as the fruit[2], the pod husks[3], or the gum91. A decoction of *T. indica* leaves is one of the most important agents to clean wounds caused by Guinea worm infections94. Tamarind is valued mostly for its fruit, especially the pulp, which is used for a wide variety of domestic and industrial purposes[4]. The acidic pulp is used as a favorite ingredient in culinary preparations, such as curries, chutneys, sauces, ice cream, and sherbet in countries where the tree grows naturally383940. In India, the pulp is also eaten raw and sweetened with gar41.Tamarind pulp is also used to make sweet meats mixed with sugar called Tamarind balls[5] marind pulp is used as a raw material for the manufacture of several industrial products, such as Tamarind Juice Concentrate, Tamarind Pulp Powder, tartaric acid, pectin, tartarates, and alcohol[6,7]. Tamarind is valued mostly for its fruit, especially the pulp, which is used for a wide variety of domestic and industrial purposes[8], The acidic pulp is used as a favorite ingredient in culinary preparations, such as curries, chutneys, sauces, ice cream, and sherbet in countries where the tree grows naturally[9,10,11]. In India, the pulp is also eaten raw and sweetened with sugar[12]. Tamarind pulp is also used to make sweet meats mixed with sugar called Tamarind balls[13]. Tamarind pulp is used as a raw material for the manufacture of several industrial products, such as Tamarind Juice Concentrate, Tamarind Pulp Powder, tartaric acid, pectin, tartarates, and alcohol[14,15].The present work was evaluate the antidia betic activity of leaf of tamarindus indica.

MATERIALS AND METHODS

Alloxan monohydrate and Glibenclamide (Sigma-Aldrich Company, St. Louis, Missouri, USA), Ascorbic acid (Universal laboratories, Mumbai), Hydrogen peroxide (S.S.Pharm Hanamkonda), Glucometer kit (Taidoc Technology Corporation, San-Chung, Taipei country, Taiwan) were procured from local market. The solvents and other chemicals were procured from E. Merck, Mumbai and they were of analytical grade quality.

Collection of Plant material: Dried seeds of *Bambusa arundinaceae* were purchased from commercial supplier of rural Nalgonda, Andhra Pradesh, India. The seeds and plants were authenticated by Prof. Dr.K. Raju, Head of Department of Botany, Kakatiya University, Warangal, India.

Preparation of extract: The leaf of the plant were shade dried and made into coarse powder. It was extracted with aqueous methanol in a Soxhlet apparatus for 72 hours. The concentrated material was reduced to a thick mass at room temperature and water was removed by placing it on water bath. The weight of the dried material was recorded and used for experimental study[16].

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Table 1: Anti diabetic activity of aqueous methanolic *tamarindus indica* leaf extracts

Interval	Group-I	Group-II	Group-III	Group-IV	Group-V	Group-VI
	Normal control	Alloxan induced control	Glibenclamide (600µg/kg)	*tamarindus indica* leaf (50mg/kg)	*tamarindus indica* leaf (100mg/kg)	*tamarindus indica* leaf (200mg/kg)
0 hr	116±4.02	224±5.65	231±8.02	255±.24	239±6.12	237±0.01
1hr	109±0.09	217±3.6	224±0.21	233±5.56	229±4.62	222±2.4
2hr	114±7.05	209±6.11	193±9.56	219±4.71	193±2.97	189±8.34
3hr	112±5.73	201±6.66	132±1.07	18±7.09	172±4.98	153±5.86
4hr	104±3.85	198±7.45	125±9.01	168±5.23	140±2.84	139±4.90
5hr	110±6.90	186±6.87	109±3.83	148±2.71	126±4.06	118±6.03
6hr	107±5.71	176±7.75	90±2.06	124±1.08	115±6.93	107±4.09

n=6; values expressed as mean ± S.D
* $p<0.01$, ** $p<0.001$

Experimental animals: Albino Wistar rats (180-230 g) of either sex were fed with a standard diet and water ad libitum. The animals were housed in spacious polypropylene cages bedded with rice husk. The animal room was well ventilated and maintained under standard experimental conditions (Temperature 27^0C and 12 hours light / dark cycle) throughout the experimental period. Animal experiments were carried out following the guidelines of the animal ethical committee of the institute.

Acute toxicity test: Aqueous methanolic extracts of leaf of *tamarindus indica* were screened for acute toxicity, following the standard method (OECD/OCDE No: 425). Albino rats of either sex weighing 180-200gm were used in this study. Animals were maintained on normal diet and water prior to and during the course of experiment. The dose of aqueous methanolic extract was prepared with 5% acacia and was administered orally. The acute toxicity was tested at the doses of 300 and 2000mg/kg. Evaluation of antidiabetic activity of seed of *tamarindus indica leaf* fed alloxan induced diabetic Wistar rat.

Antidiabetic activity:Albino Wister rats (180-230g) of either sex were randomly divided in to 6 groups (6 rats/group) and were fasted overnight (18hrs). Animals in-group I were treated with acacia (5%) as control, remaining groups animals were treated with freshly prepared aqueous solution of alloxan monohydrate in a dose of 150mg/kg body weight through intraperitonial route[17,18] Then 5% dextrose was administrated to combat the immediate hypoglycemia. Group II kept as a diabetic control. After 18 hrs, Group III animals treated with standard glibenclamide (600µg/kg b.w) through oral route, even Group IV, V, VI and animals were treated with 50, 100 and 200 mg/kg of leaf of tamarindus indica of aqueous methanolic extract respectively through oral route. Blood samples were taken from the tail vein at 0, 1, 2, 3, 4, 5 and 6 hrs. The blood glucose concentration was measured by using glucometer and noted]19].

Statistical Analysis: The data was statistically analyzed by one-way ANOVA followed by Dunnett multiple comparison test with equal sample size. The difference was observed as significant when $p<0.01$. All the values were expressed as mean ± standard deviation (S.D.). Glucose level was observed at dose of 200 mg/kg of aqueous methanol extracts of leaf of tamarindus indica.

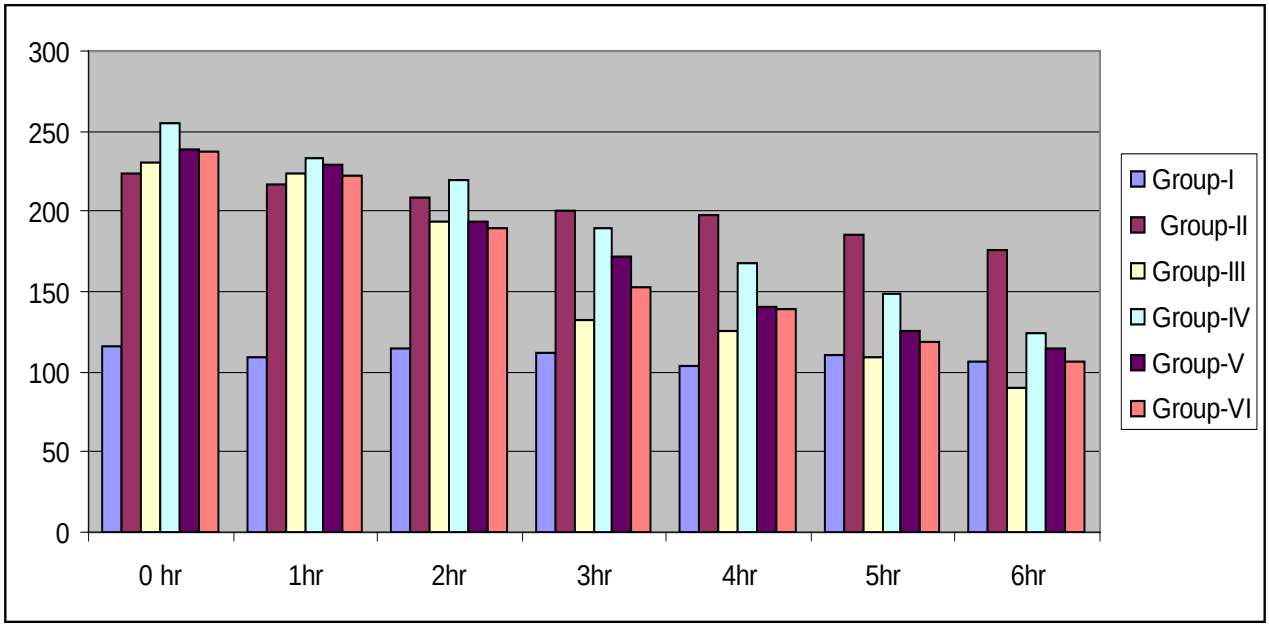
RESULTS AND DISCUSSION

Based on the acute toxicity studies, the dose of seed extracts was selected for further studies. Table 1 and figure 1 represents the evaluation of antidiabetic activity in leaf of tamarindus indica (50, 100 and 200mg/kg) aqueous methanolic extracts and Glibenclamide fed alloxan induced diabetic model (Wistar rats) shown the changes in the levels of blood glucose in groups. Aqueous methanolic *tamarindus indica* leaf extract has shown maximum reduction in blood glucose level which calculated by comparing the blood glucose level at 6^{th} hr with the blood glucose level at 0 hr of its respective groups based on the dose. The finally percentage reduction of blood glucose represented 200mg/kg concentrated aqueous ethanolic extract has shown maximum reduction in blood glucose as compared to control than other concentrations of *tamarindus indica* leaf extracts. Group II, III, IV, V and VII showed suppression of blood glucose level at 6 hrs significantly ($p<0.01$) compared to zero hour to its respective group. In this study, 200mg/kg of aqueous methanolic *tamarindus indica* leaf extract significantly ($p< 0.01$) suppressed blood glucose. Alloxan (beta cytotoxin) includes diabetes in a wide variety of animals by damaging the insulin secreting beta cell resulting in a decrease in endogenous insulin release, which paves the ways for the decreased utilization of glucose by the tissues. The significant anti diabetic activity of *tamarindus indica* leaf may be due to inhibition of free radical generation and subsequent tissue damage induced by alloxan or potentiation of plasma insulin effect by increasing either pancreatic secretion of insulin from existing beta cells or its release from as indicated by significant improvement in glucose and protein level because insulin inhibit gluconeogenesis from proteins.

CONCLUSION

In conclusion, our findings show that chloroform *leaf of of tamarindus indica* extract reduction on blood glucose may be due to several flavanoids, glycosides present

Figure 1 Antidiabetic activity of aqueous methanolic *tamarindus indica leaf* extracts



within the extract. More studies are required to ascertain the compounds and its mechanism of action, thereby providing a natural hyperglycemic control treatment, and thus decrease risk for diabetes, cardiovascular diseases. However, further studies are needed before *tamarindus indica* can be used safely as food additives.

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