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ORIGINAL ARTICLE

Clinical Evaluation of Eugenia Jambolana Hypoglycemic Effects in Patients Diagnosed with Type II Non-Insulin Independent Diabetes

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ABSTRACT

Background: Type 2 diabetes mellitus is a progressive hyperglycemic ailment in which blood glucose level increases than the normal values. Eugenia jambolana has anti-hyperglycemic properties.

Objective: The study aimed to evaluate the hypoglycemic effects of Eugenia jambolana in patients, suffering from type II diabetes.

Study design: A control-experimental study was performed at the Department of Pharmacology, Liaquat University of Medical and Health Sciences Jamshoro for the duration of six months from February 2022 to July 2022.

Material and Methods: Patients with type 2 diabetes mellitus, having fasting glucose level greater than 140mg/dl and patients having uncontrolled diabetes, despite being on the anti-diabetic drugs, were included in the study as study subjects. The control group was comprised of individuals with blood glucose levels in normal ranges and had no previous family history of diabetes mellitus. The extracts of Eungenia jambolana were administered to the study subjects as per the approved plan and after which the blood glucose levels were determined.

Results: Blood glucose levels were reduced in the group of patients, who were not on any antidiabetic medication. Urinary glucose levels were also investigated and glycosuria was found to be reduced. Reduction in blood glucose was also observed in the group, which was on oral hypoglycemics and the glucose levels were dramatically reduced with high dose.

Conclusion: The extract of Eungenia jambolana exhibited lowering of blood glucose levels in diabetes patients and treated diabetes mellitus. It may be used alone or in combination with other hypoglycemic drugs for the effective blood glucose reduction and treatment of the disease.

Keywords: Eungenia jambolana, type 2 Diabetes Mellitus.

INTRODUCTION

Type 2 diabetes mellitus is one of the incessant hyperglycemic ailments in which blood glucose levels increase than the healthy normal levels. It is an incurable disease which progresses instantly in all ages. More than 100 million people died due to type 2 diabetes mellitus worldwide. The cause of this disease is a complete lack of insulin or reduction in insulin activity. Diabetes is considered as a vascular disease. The main micro vascular impediment of type 2 diabetes mellitus is nephropathy in which size of kidney and glomerular volume increases. Oxidative stress is a major complication associated with type 2 diabetes mellitus[1-2].

Several drugs are used to treat type 2 diabetes mellitus by increasing the blood glucose metabolism and insulin secretion[3-4]. The frequently stipulated drugs for type 2 diabetes mellitus are Biguanides, Sulphonylureas, Gliptins, etc. In addition, a multitude of herbs, spices, and other plant material are prescribed as effective alternates. Eugenia jambolana (EJ) has also observable effects on type 2 diabetes mellitus[5-6]. The other frequently used names of Eugenia jambolana are jamun, black plum and Indian blackberry. It has been broadly researched for its hypoglycemic or anti-hyperglycemic properties. Eugenia jambolana (EJ) or Jamun is an evergreen tree, found widely in Pakistan. It is a medicinal plant with anti-diabetic properties. The tree grows up to 30 meters. Its fruit is edible and luscious. The seed is composed of many bioactive compounds such as flavonoid and tannins. These bioactive compound play an important role in hypoglycemic activity[7-8]. The extract of EJ is enriched with the flavonoids. The flavonoids are considered to have the anti-inflammatory and antioxidant activity. These are phytochemicals that act as metal chelator[9-10]. The information on anti-hyperglycemic activity of EJ is limited in the scientific literature and these claims need extensive research. This study is aimed to evaluate the anti-diabetic activity of Eugenia jambolana in the patients suffering from type II diabetes mellitus.

MATERIAL AND METHODS

The study was conducted for six months, February 2022 - July 2022, at the Endocrinology department of institute hospital. The study with a controlled experimental design was approved by the hospital's Institutional Review Board. The study was carried out on patients, visiting the tertiary care unit. The study subjects were selected as per the approved inclusion criteria, as follows:

- Patients with type 2 diabetes mellitus, having fasting blood glucose level, greater than 140mg/dl.
- Patients with the history of the inadequate control of blood glucose level.
- Patients with type II diabetes, taking oral hypoglycemic agents.
- Both genders were included in the study, without any distinction.

The selected subjects were health screened and medically examined. Blood samples were collected through vein puncture with the condition of no fasting before 12 hour[11]. To prevent the coagulation and glycolysis the collection glass bottle were rinsed with potassium oxalate and sodium fluoride. The aqueous extract was prepared by adding water to the powder of ground shade dried seeds and leftover night, prior to filtration and further use. The alcoholic extract was prepared by adding alcohol to the ground powder of dried seeds and the pulp was prepared by the distillation. The two extracts were tested and administered to the patients. The blood samples were collected and tested every 15 to determine the changing pattern in the blood glucose levels. The statistical software SPSS was used for the statistical analysis of the data, presented in Table-1.

RESULTS

The patients who are taking hypoglycemic drugs and still they have no control of glucose levels were also included in the study. for control group normal individuals were selected who have no prior family history of diabetes mellitus.

The powdered extracts of Engenia jambolana were checked on control group, patients taking oral hypoglycemic drugs and patients who were not taking any drugs. The results showed that in the group where patients were not taking any drug the blood glucose level was reduced after using the extracts.

Urinary glucose levels were also checked and it was found that glycosuria was also cured by extracts of Engenia jambolana. Similar results were observed in the oral hypoglycemic group as well as shown in table no.1.

Table-1: Effect of extracts of Eungenia jambolana on type 2 diabetes mellitus patients

	Blood glucose level (mg/dl)		Urinary glucose (unit)	
	Before medication	After medication	Before medication	After medication
Patients taking no previous medication				
Low dose	189 ±8.21	133.1 ±6.4	Glycosuria	No glycosuria
High dose	201 ±20.11	104.1 ±9.9	Glycosuria	No glycosuria
Control				
Low dose	71	80	No glycosuria	No glycosuria
High dose	91	72	No glycosuria	No glycosuria
Patients taking Oral Hypoglycemic				
Low dose	155.2 ±11.2	131.1 ±7.49	No glycosuria	No glycosuria
High dose	164.1 ±9.8	104 ±14.1	No glycosuria	No glycosuria

The effect of Eugenia jambolana aqueous extract is presented in Table-2. In case of high doses, the glucose levels were dramatically reduced in patients. Glycosuria was also cured by using the aqueous extract.

Table-2: Effect of aqueous extract of Engenia jambolana on type 2 diabetes mellitus patients

	Blood glucose level (mg/dl)		Urinary glucose (unit)	
	Before medication	After medication	Before medication	After medication
Patients taking no previous medication				
Low dose	188.9±7.9	133.4±3.9	Glycosuria	No glycosuria
High dose	201.1±7.98	116.1±15.6	Glycosuria	No glycosuria
Control Group				
Low dose	84	91	No glycosuria	No glycosuria
High dose	71	66	No glycosuria	No glycosuria
Patients taking Oral Hypoglycemic				
Low dose	198±12.5	136.1±3.5	Glycosuria	No glycosuria
High dose	215±14.5	114±17.1	No glycosuria	No glycosuria

Table no.3 shows the effect of alcoholic extract of Engenia jambolana, here blood glucose level was reduced after using medication in both no medication and oral hypoglycemic group. The condition of glycosuria was treated after using medication.

Table-3: Effect of alcoholic extract of Engenia jambolana on type 2 diabetes mellitus patients

	Blood glucose level (mg/dl)		Urinary glucose (unit)	
	Before medication	After medication	Before medication	After medication
Patients taking no previous medication				
Low dose	201 ±27.2	121 ±10.2	Glycosuria	No glycosuria
High dose	227 ±15.1	99 ±12.1	No glycosuria	No glycosuria
Control Group				
Low dose	66	85	No glycosuria	No glycosuria
High dose	100	80	No glycosuria	No glycosuria
Oral hypoglycemic				
Low dose	167 ±11.2	123 ±11	No glycosuria	No glycosuria
High dose	152 ±10.1	88 ±12	No glycosuria	No glycosuria

DISCUSSION

Engenia jambolana is a plant having medicinal properties. It has been used to treat a number of diseases including antipyretic, anti-inflammatory and antihelmenthic diseases[12]. As per a study carried out to find its importance, it was reported that its juice is very effective to treat the inflammation of liver and spleen[13]. Its seeds have hypoglycemic effect. The different extracts of the seed can be used to treat diabetes mellitus. The roots of Engenia jambolana are also under study to find the medicinal effectiveness on type 2 diabetes patients[14]. Diabetes mellitus is a syndrome that causes abnormal management of blood glucose level either because of beta cell receptor not working properly or because the cells do not uptake glucose and use it ultimately accumulating the excess glucose in the blood[15]. It can lead to many other medical conditions as well so its timely control is very important to avoid any neurogenic or orthopedic issue. The powdered part of Engenia jambolana was given to patients suffering from diabetes mellitus in form of high dose and low dose. The extract was prepared and given to patients having no prior course of medication. Another group included those patients that were used to taking medication to lower blood glucose level. It was observed that the high dose of the drug was able to reduce the blood glucose level with or without the hypoglycemic drugs. As compared to the control the both diabetic groups experienced much reduction in blood glucose upon use of extracts of Engenia jambolana**.** The extracts were prepared in ethanol and water and one group was given the powdered form of the extract. The clinical outcomes were same in all groups. The glucose level of urine was also observed during the course of time. It was reported that the glycosuria if diagnosed on the patient was cured after taking extracts of Engenia jambolana**.** Within 2 weeks of using the drug, glycosuria was disappeared and urine glucose was normal. As per literature the leaves, roots and seeds of Engenia jambolana had positive effect on the high blood glucose of the diabetic patients. The 3g in water dose was given to patients in the past and it cured the glycosuria condition of the patients[16-17]. As per literature the burnt bark of the trees of Engenia jambolana are used by doctors in the past to cure the urinary glucose[18]. Twice a day dose was given to patient daily and it resulted in better results. As per a study carried out on diabetic rats, the decoction of Engenia jambolana was given to patients for 17 days and it has no effect on the glucose level of the patients. In another study the extracts of Engenia jambolana and Momordica charantia was used

to treat diabetes of the patients for 15 days and it resulted in lowering of hyperglycemic condition of blood and urine. As per literature the seeds of the Engenia jambolana has ability to check the conversion of starch into sugar that resulted in increased sugar, that's why it can control the hyperglycemic condition[19-20]. Alcoholic extracts and aqueous extracts were prepared just according to the protocols approved by previous studies. the alcoholic extracts were prepared by taking powered seeds of Engenia jambolana from electric grinder. The extract was added 1 kg per 500 ml of alcohol, the slurry was mixed. Mixture was filtered properly to avoid any contamination. Similar procedure was used by other studies as well[21]. Blood samples were extracted from each patient and labelled. All the patients that have conditions like GIT, cardiovascular issues, or any other endocrine disorder were excluded from the study. our study has one limitation. The effect of extracts of the seeds of Engenia jambolana should be checked for a longer period of time to follow-up the situation that either the drug is working or not for a longer period of time. This study reports that either taken alone or in combination with other hypoglycemic drugs the extracts of Engenia jambolana has positive effects. The effectiveness of alcoholic and aqueous extracts was observed to be equal. However, the dose of the extracts of Engenia jambolana and further parameters should be studied in detail to get a deep analysis.

CONCLUSION

The extracts of Engenia jambolana can be used to treat diabetes mellitus as they lower the blood glucose level in case of type 2 diabetes mellitus patients. The condition of glycosuria was also cured after using the same extracts. The extracts of this medicinal plant can be used either alone or in combination with other hypoglycemic drugs, for an effective outcome. However, the dose can be adjusted depending on the plasma glucose level of the patient.

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