ejpmr, 2017,4(7), 671-677

SJIF Impact Factor 4.161

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

STUDY OF IPOMOEA BATATAS EXTRACTS FOR ANTIDIABETIC ACTIVITY

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Article Received on 15/05/2017 **Article Revised on 05/06/2017** **Article Accepted on 26/06/2017**

ABSTRACT

The hypoglycemic effects of graded quantities (100mg/kg, 200 mg/kg and 300mg/kg/day) of Ipomea batatas leaf extracts at a dose of once daily for fourteen days on the blood glucose level of 20 rats whose glucose level exceeded 200mg/dl after alloxan induction were studied. Qualitative and quantitative analysis of phytochemical ingredients of Ipomea batatas leaf were also carried out. The results showed that oral treatment with 2ml of 200 mg/kg/day of Ipomoea batatas aqueous extract did not produce significant alterations in the blood glucose concentration level when compared with basal value. The highest percentage blood sugar reductions of 69.35% was recorded in rats treated with 200 mg/kg/day, followed by 60.16% (300mg/kg/day extract) while the least percentage sugar reduction of 52.10% was observed in 100mg/kg/day extract. The non-diabetic induced rats exhibited steady increase (8.51%) in their normal glucose level. It was revealed that alloxan induced rats treated with 100mg/kg/day, 200mg/kg/day and 300mg/kg/day sustained percentage weight loss of 49.15%, 27.95% and 31.37% respectively compared with non-diabetic induced rats. The qualitative phytochemical screening investigation of Ipomeabatata indicated the presence of alkaloids, flavonoids, tannins, saponins, steroids, phenol, anthraquinone, Phlobatannin, Glycosides and terpenoids**.** Also, quantitative phytochemical study revealed that saponin (6.18) was the highest phytochemical content followed by tannin (4.05) while Glycoside was the least (0.29). In conclusion, 200mg/kg/day of the extract produced the best hypoglycemic effect (69.35%) in diabetic induced rats.

KEYWORDS: Alloxan-induced rats, Anti-diabetes, Diabetes, Ipomoea batatas, phytochemical analysis.

1. INTRODUCTION

Diabetes mellitus (diabetes) is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced. High blood sugar or hyperglycemia is a condition in which an excessive amount of glucose circulates in the blood plasma. It was first identified as a disease associated with excessive muscle loss in the ancient world and sweet urine which resulted from slippage of glucose into the urine.[1-3]

It can be classified into four broad categories: namely type 1, type 2, gestational and "other specific type" diabetes. The other specific type are a collection of a few dozen individual causes. The term "type 1" diabetes has replaced several former terms, including childhood onset diabetes and the term "type 2" has replaced several formal types including adult onset, obesity related diabetes and NIDDM (Non-insulin dependent diabetes mellitus). Beyond these two types there is no agreed standard nomenclature.

Type 2 diabetes is also known as the non-insulin dependent diabetes and is the most commonly found type of diabetes in the world. Type 2 diabetes is a lifelong chronic disease in which there are high levels of sugar in the blood. Diabetes is caused by a problem in the way your body makes or uses insulin. Insulin is needed to move blood sugar into cells, where it is stored and later used for energy. Patients suffering from type 2 diabetes tend not to respond effectively to insulin and their fat, liver, and muscle cells do not respond correctly to insulin either, which is called insulin resistance. As a result, blood sugar is not able to get into these cells to be stored for energy. And when sugar cannot enter the cells, high levels of sugar build up in the blood. This is called hyperglycemia. Hyperglycemia is the technical term for high blood glucose (sugar). High blood glucose happens when the body has too little insulin or when the body can't use insulin properly.

Type 2 diabetes usually occurs slowly over time and most people with type 2 diabetes have no symptoms at first or it may even take years. Some early symptoms of diabetes may include; bladder, kidney, skin, or other infections those that are more frequent or heal slowly.

You may experience some fatigue, hunger, and increased of thirst. Other important symptoms like increased urination, blurred vision, erectile dysfunction, and pain or numbness in the feet or hands. A hormone produced by the pancreas called insulin helps sugar in our blood get into the cells of our bodies.

There are several tests that can be done in order to confirm the diagnosis of type 2 diabetes. The doctor can order a fasting plasma glucose test or casual plasma glucose. The fasting plasma glucose test (FPG) is the preferred method for diagnosing diabetes, because it is easy to do, convenient, and less expensive than other tests, according to the American Diabetes Association. Before taking the blood glucose test, you will not be allowed to eat anything for at least eight hours. They can also use the oral glucose tolerance test, for this test you have to fast overnight, and the fasting blood sugar level is measured. Then you have to drink a sugary liquid, and blood sugar levels are tested periodically for the next several hours.

Routine screening for type 2 diabetes is normally recommended at the age 45, especially if you are overweight. If the results are normal then you should repeat the test every three years. If the results are borderline, your physician will tell you when you should come back to retest. Screening is also recommended for people under 45 and overweight especially if you have heart disease or a family history of type 2 diabetes, or blood pressure above 135/80.[4-5]

There is no cure for diabetes but it can be controlled, but it does require a lifelong commitment to blood sugar monitoring, healthy eating, regular exercise, possibly, diabetes medication or insulin therapy. The main goal of treatment is to first lower high blood glucose levels and the long-term goal of treatment is to prevent problems from diabetes. The main treatment for type 2 diabetes is to exercise and diet. Type 2 diabetes can basically be controlled by following a few steps; As long as you test and record your blood glucose, know when to eat and when to eat, how to take your medications if any are needed, and how to recognize and treat low and high blood sugar. It can take several months to get the hang of these basic skills but as everything else it will become second nature.

There are several types of medication that can be prescribed by your doctor if diet and exercise does not keep your blood sugar at normal or near normal levels. Some of the drugs prescribed help lower your blood sugar levels in different ways, so therefore your doctor may have you take more than one drug. Some of the most common types of medication are as follows: Alpha-glucose inhibitors (such as acarbose), Biguanides (Metformin), Injectable medicines (including exenatide, mitiglinide, pramlintide, sitagliptin, and saxagliptin) Meglitinides (including repaglinide and nateglinide), sulfonylureas (like glimepiride, glyburide and tolazamide), and Thiazolidinediones (such as rosiglitazone and pioglitazone). Rosiglitazone may increase the risk of heart problems, so before you take this particular medication make sure to discuss any possibilities of heart problems with your physician. These drugs may be given with insulin, or may be used alone. You may need insulin if you continue to have poor blood glucose control. It must be injected under the skin using a syringe or insulin pen device. Insulin cannot be taken by mouth. Women who have type 2 diabetes and become pregnant may be switched to insulin during their pregnancy and while breast-feeding because it is not known whether hyperglycemia medications taken by mouth are safe for use of pregnancy.[6-7]

Although long-term complications of diabetes develop gradually, they can eventually be disabling or even life-threatening. Diabetes can lead to more serious problems after many years. You can develop eye problems, including trouble seeing especially at night, and light sensitivity, and you can even become blind. Your feet and skin can develop sores and infections. After a long time your foot or leg may need to be removed. Diabetes also makes it harder to control your blood pressure and cholesterol. This can lead to a heart attack, stroke, and other problems. It makes it harder for the blood to flow to your legs and feet. The nerves in your body can get damaged and cause pain, tingling, and loss of feeling. And because of nerve damage you could have problems digesting the food you eat. You could feel weakness or have trouble going to the bathroom. Nerve damage can also make it harder for men to have an erection. High blood sugar and other problems can lead to kidney damage. Your kidneys may not work as well and they may even stop working. In order to prevent problems from diabetes, you should visit your health care provider or diabetes educator at least four times a year and discuss any problems you are having.

Plants have always been a source of drugs for humans since time immemorial. *Ipomoea batatas* continues to be highly valued in the local management of diabetes because of its effectiveness in the control of blood glucose and its low cost. Therefore, the present study investigates the blood glucose lowering effect of aqueous extract of *Ipomoea batatas* in alloxan-induced diabetic rats as a way of managing diabetes mellitus and also to identify the phytochemicals present in the extract.[8-10]

MATERIALS AND METHODS

Collection of laboratory Animals (rats) and plant materials (*Ipomoea batatas*)

Young male 6-8 weeks old Wister rats and weighing between 100 - 180g were collected in a metal cage. The animals (rats) were acclimatized for 21 days before being subjected to experimental study. The rats were kept in plastic perforated cages and maintained under standard conditions. They were then allowed free access to rat pellets and portable water throughout the period of

experimentation while fresh whole plants of *Ipomoea batatas* was collected from a farm at Hyderabad.

Preparation of the plant extract
500g of air dried leaves of *Ipomoea batatas* were boiled with 5 litres of water for 40 minutes, after which it was rapidly filtered through a muslin cloth. The filtrate was them allowed to evaporate for another 60 minutes to give a brownish - black almost solid residue.

Preparation of the rats for induction
Four rats were housed in each cage. Four cages were used for the experiment, one cage for the non-diabetic group while the other three group were for the alloxan induced group. All cages were numbered for proper identification, while all animals were marked with water resistant makers on their body. After three weeks of acclimatization to the facility, induction began.

Induction of diabetes
Diabetes was induced by intraperitional administration of 150 mg/kg body weight of freshly prepared alloxan (SD Fine Chemicals Ltd, Mumbai, India). In this method, the rats were restrained to keep calm. The rats were turned over so that the abdomen was exposed, forceps was used to lift up the vein, after which the area was swabbed with 70% ethanol and induction was done with a 2ml syringe and needle, after which fasting blood glucose levels were obtained.

Six hours after alloxan injection, rats were orally infused with 5% analytical glucose at an oral dose of 10ml each so as to prevent the onset of fatal hypoglycemia, which often accompanies administration of alloxan as a result of acute massive pancreatic release of insulin. 24 hours later, the fasting blood glucose values of the alloxan - induced rats were determined using the glucometer. Rats with the fasting blood glucose levels above 200 mg/dl were selected and distributed into three groups of four rats in each group addition to a group containing normoglycemic rats which served as an untreated control group. Groups A, B and C which are the alloxan-induced hyperglycemic rats were orally treated with the single daily oral doses of 300 mg/kg, 100 mg/kg and 200 mg/kg of *Ipomoea batatas* respectively. All the rats were treated for 14 days.

Collection of blood sample for final blood glucose level analysis
The rat's blood samples were collected after acclimatization, 24 hours after induction with alloxan and after 14 days treatment with aqueous extract of *Ipomoea batatas* for the determination of the blood glucose level of the rats. The blood samples were collected from the tail using a lancet after which fasting blood glucose level was determined.

Determination of fasting blood glucose
After an overnight fast, blood samples for fasting blood glucose determination were obtained from the experimental rats by gently nipping the rat tail with lancet. The tails were gently squeezed to let out two or three drops of fresh venous whole blood which were placed in the sample well of the glucose strip which was then inserted into the glucometer. The blood glucose monitor was calibrated and validated at the beginning of midway and into the end of the experiment fasting blood glucose was determined using one touch fine test basic glucose monitoring meter.

Phytochemical screening of *Ipomoea batatas*
The leaves of *Ipomoea batatas* were air dried for four weeks and then ground into fine powdered form for qualitative and quantitative analysis. The powdered plant material was extracted in 100ml of distilled water on a mechanical shaker for 48 hours. The extract was filtered using a Buchner funnel and Whatman Filter paper and sterile cotton wool. The filtrate of the extract was frozen at -40°C and dried for 48 hours.

Qualitative test
Qualitative analyses and Chemical tests were carried out on the extract using standard procedure to identify the constituents.

Test for tannins
1ml of the plant extract was boiled in 20ml of distilled water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added to the filtrate. A blue-black coloration was observed, which confirms the presence of tannin.

Test for phlobatannis
2ml of the plant extract was boiled with 1% aqueous hydrochloric acid. A red precipitate was deposited which was taken as evidence for the presence of phlobatannins.

Test for saponins
5ml of the plant extract was boiled in 20ml of distilled water in a water bath and filtered. Then 10ml of the filtrate was mixed with 5ml of distilled water and shaken vigorously for a stable persistent froth. The frothing was mined with 3 drops of olive oil and shaken rigorously, the formation of emulsion was observed which confirms a positive test of saponin.

Test for flavonoids
3ml of 1% aluminium chloride solution was added to 5ml of the plant extract. A yellow coloration was observed indicating the presence of flavonoids. 5ml of dilute ammonia solution was added to the above mixture followed by the addition of concentrated H_2SO_4, which gave a yellow coloration that disappeared on standing. The yellow coloration which disappeared on standing indicates the presence of flavonoids.

Test for steroids
2ml of acetic anhydride was added to 2ml of the plant extract of each sample followed by careful addition of

2ml H_2SO_4. The color changed from violet to blue which indicates the presence of steroids.

Test for alkaloids
1ml of the plant extract was stirred with 5ml of 1% aqueous HCl on a steam bath and filtered while hot. Distilled water was added to the residue and 1ml of the filtrate was treated with a few drops of Mayer's reagent (Potassium mercuric iodide solution). A cream colour was formed with Mayer's reagent which gives a positive test for alkaloids.

Test for anthraquinones
5ml of the plant extract was mixed with 10ml Benzene. The solution was then filtered and 5ml of 10% ammonia solution added to the filtrate. The mixture was shaken and the presence of pink colour in the ammonia (lower) phase indicated the presence of anthraquinones.

Test for Phenols
5ml of the plant extract was pipetted into a 30ml test tube. Then 10ml of distilled water was added. 2ml of ammonium hydroxide solution and 5ml of concentrated amyl alcohol were also added and left to react for 30 minutes. The development of a bluish green colour was taken as evidence for the positive test for phenol.

Test for terpenoids (Salkowski test)
5ml of the plant extract was mixed with 2ml of chloroform and 3ml of concentrated sulphuric acid was carefully added to form a layer. The interface formed a reddish brown colour which confirms the presence of terpenoids.

Test for glycoside as cardenolides (Keller-killani test)
5ml of the plant extract was treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1ml of concentrated sulphuric acid. A brown ring at the interface indicates deoxy sugar characteristics of cardenolides which confirms a positive test forcardenolides. A violet-green ring appearing below the brown-ring in the acetic acid layer indicates the positive test for glycoside.

Quantitative test
Determination of alkaloids
2g of finely ground sample of the *Ipomoea batatas* plant was weighed and l00ml beaker and 20ml of 80% absolute alcohol added to give a smooth paste. The mixture was transferred to a 250ml flask and more alcohol added to make up to l00ml and 1g magnesium oxide was then added. The mixture was digested in a boiling water bath for l5hrs under reflux air condenser with occasional shaking. The mixture was filtered while hot through a small buchner funnel. The residue was returned to the flask and re-digested for 30mins with 50ml alcohol after which the alcohol was evaporated. Hot water was added to replace the alcohol lost. When all the alcohol had been removed, 3 drops of 10% HC1 were added. The whole solution was later transferred into a 250ml volumetric flask, 5ml of zinc acetate solution and 5ml of potassium ferrocyanide solution were added, and the solution was thoroughly mixed to give a homogenous solution. The flask was allowed to stand for a few minute and filtered through a dry filter paper and l0ml of the filterate was transferred into a separating funnel and the alkaloids present were extracted vigorously by shaking with five successive portions of chloroform. The residue obtained was dissolved in l0ml hot distilled water and transferred into a Kjeldahl tube with the addition of 0.02g sucrose and 10ml of concentrated H2S04 and 0.02g selenium was added and digested to a colorless solution to determine the percentage of nitrogen (%N) by Kjeldahl distillation method (21, 22).
% alkaloids = %N x 3.26

Determinationof flavonoids
0.50g of finely ground sample of *Ipomoeabatatas*was weighed into l00ml beaker and 80rn1 of 95% ethanol was added and stirred with a glass rod to prevent lumping. The mixture was filtered through a Whatman Filter paper into a l00ml volumetric flask and made up to the mark with ethanol. 11ml of the extract was pipetted into 50m1 volumetric flask. Four drops of Concentrated HCl were then added with a dropping pipette after which 0.5g of magnesium turnings were added to develop a magenta red coloration. Standard flavonoid solutions of range 0 - 5ppm was prepared from l00ppm stock solution and treated in a similar way with HCl and magnesium turnings. The absorbance of magenta red coloration of sample and standard solutions were read on a digital Shimadzu UV-1800, UV/Vis-Spectrophotometer at a wavelength of 520nm. The percentage flavonoid was calculated using the formula.
% flavonoid =

$$\frac{Absorbance\ of\ sample\ X\ average\ gradient\ factor\ X\ dilution\ factor}{Weight\ of\ Sample\ x\ 10{,}000}$$

Determination of tannins
0.20g of the plant (sample) extract was added into a 50m1 beaker. 20m1 of 50% methanol was then added. The beaker was then covered with paraffin and placed in water bath at 77 - 80°C for l hour. The mixture was shaken thoroughly to ensure uniform mixing. The extract was quantitatively filtered (using a double layered whatman No 4 Filter paper) into a l00ml volumetric flask. 20m1water, 2.5m1 folin- Denis reagent and l0ml of 17% Na_2CO_3 were added and mixed properly. The mixture was made up to mark with water, mixed well and allowed to stand for 20mins. The bluish - green colour which developed at the end of range of 0-10ppm, were treated similarly as lml standard samples. The absorbance of the tannic acid standard solution as well as sample was read after color development on a Shimadzu UV-1800, UV/Vis-Spectrophotometer at a wave length of 760nm.Percentage of tannin was calculated using the formula:
% Tannin =

$$\frac{Absorbance\ of\ the\ sample\ x\ dilution\ factor\ gradient}{Weight\ of\ Sample\ x\ 10{,}000}$$

Determination of saponins

1g of finely ground sample of *Ipomoea batatas*was weighed into a 250ml beaker and 100ml of isobutyl alcohol was added. The mixture was shaken on a UDY shaker for 5 hours to ensure uniform mixing. Thereafter, the mixture was filtered through a Whatman Filter paper into l00ml beaker and 20ml of 40% saturated solution of magnesium carbonate was added. The mixture obtained with saturated magnesium carbonate was again filtered through a Whatman Filter paper to obtained a clear colourless solution. 1ml of the colourless solution was pipetted into 50ml volumetric flask and 2ml of 5% of ferric chloride solution was added and made up to the mark with distilled water. The solution was allowed to stand for 30 mins for blood red colouration to develop. 0 - l0ppm standard saponin solutions were prepared from saponin stock solution. The standard solution was treated similarly with 2ml of 5% ferric chloride solution as done for 1ml sample above. The absorbance of the sample as well as standard saponin solutions were read (after color development) in a Shimadzu UV-1800, UV/Vis-Spectrophotometer at a wavelength of 380nm.

% Saponin =

$$\frac{Absorbance\ of\ sample\ x\ Gradient\ factor\ x\ Dilution\ factor}{Weight\ of\ Sample\ x\ 10{,}000}$$

Determination of glycosides

10ml of the plant extract was pipette into a 250ml conical flask. 50ml chloroform was added and shaken on a mixer for 1hr. The mixture was filtered into 100ml conical flask containing 10ml of pyridine. 2ml of 2% sodium nitroprusside was added, shaken thoroughly for 10 mins. 3ml of 20% sodium hydroxide was later added to develop a brownish yellow colour. Glycoside standards of concentration which ranges from 0 – 5mg/ml were prepared from 100mg/ml stock glycoside standard. The series of standards 0 – 5mg/ml were treated similarly like the sample above. The absorbance of the sample as well as the standards was read on a Shimadzu UV-1800, UV/Vis-Spectrophotometer at a wavelength of 510nm. Percentage of glycoside was calculated using the formula.

% glycoside =

$$\frac{Absorbance\ of\ sample\ x\ Gradient\ factor\ x\ Dilution\ factor}{Weight\ of\ Sample\ x\ 10{,}000}$$

Statistical analyses

Test of significance was conducted by analysis of Variance (ANOVA) and separation of means by Duncan's multiple ranges Test (DMRT) at 5% probability level.

RESULTS

Effects of different quantities of *Ipomoea batatas* leaf aqueous extracts on sugar level of alloxan- induced diabetic rats.

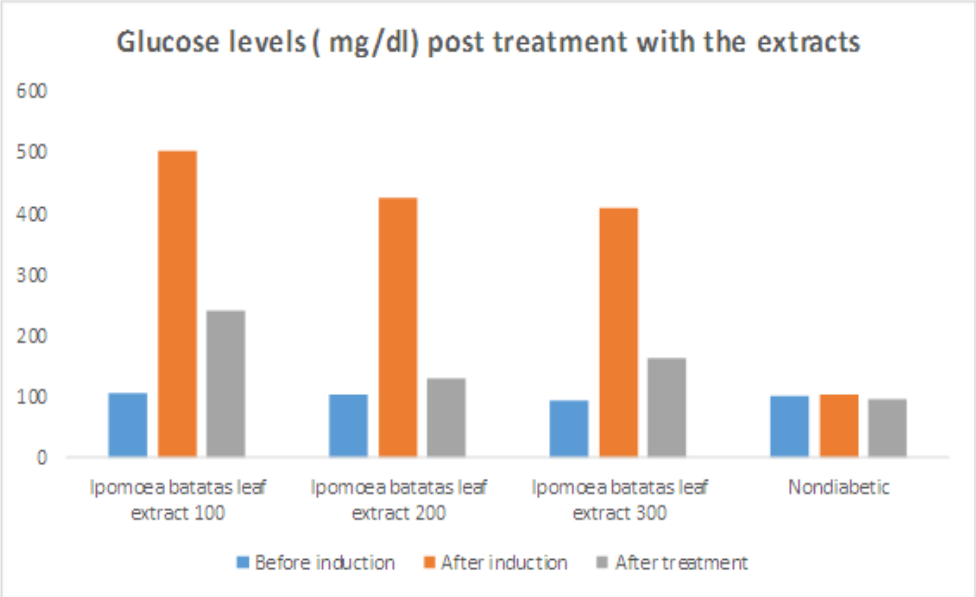
Table 1: Mean sugar level (mg/dl) of rats treated with Ipomoea batatas leaf aqueous extract.

Treatment groups	**Dosage (m)**	**Glucose levels (mg/dl) post treatment with the extracts**			
Groups		***Before induction***	***After induction***	***After treatment***	***% Sugar***
Ipomoea batatas leaf extract	100mg/kg/day	105.80±10.42	502.60±24.30	240.70±6.43	52.10
Ipomoea batatas leaf extract	200mg/kg/day	102.65±2.36	425.80±10.50	130.50±7.50	69.35
Ipomoea batatas leaf extract	300mg/kg/day	92.60±9.54	410.40±45.21	163.50±30.20	60.16
Nondiabetic (Normal)	Distilled water	100.50±3.50	104.50±4.25	95.60±2.23	8.51

The hypoglycemic effects of different quantities of *Ipomoea batatas* leaf extract. The results showed that there was no significant difference in the fasting glucose level of all the experimental rats before induction. The sugar level of rats increased after alloxan induction of the rats compared with non-diabetic group. It was observed also that oral treatment with 100 mg/kg/day of *Ipomoea batatas* aqueous extracts did not produce much significant alterations in the blood glucose concentration level when compared with basal value because high level of sugar was still observed in alloxan - induced rats treated with of 100 mg/kg/day of leaf extract (240.70±6.43mg/dl) of *Ipomoea batatas* even till the last day of the experiment, indicating diabetic condition of the rats (hyperglycemia). Also, there was no significant difference in the sugar level of rats treated with of 200mg/kg/day and 300 mg/kg/day of the extracts but this hypoglycemic effect significantly different from non-diabetic and rats treated with oral administration of 100 mg/kg/day *Ipomoea batatas* extracts.

At the end of 14 days, percentage maximum dose-dependent reductions of blood glucose concentrations of 52.10% was recorded in rats treated with 100 mg/kg/day, 69.35% was recorded in 200 mg/kg/day extract while 60.16% was recorded in sugar level of alloxan-induced

rats treated with 300 mg/kg/day of *Ipomoea batatas* leaf extracts and these values are statistically different from those of the control. The non-diabetic induced rats exhibited steady increase (8.51%) in their normal glucose level throughout the experimental period.



Effect of different quantities of *Ipomoea batatas*leaf aqueous extracts on body weights of alloxan - induced diabetic rats

Table 2: Mean weights of rats treated with Ipomoea batatasleaf aqueous extract

Treatment groups	**Dosage (m)**	**Weights (g) post treated with the extracts**			
Groups		***Before induction***	***After induction***	***After treatment***	***% Weight reduction***
Ipomoea batatas leaf extract	100mg/kg/day	96.20±4.52	97.25±5.20	49.45±0.56	49.15
Ipomoea batatas leaf extract	200mg/kg/day	90.50±6.15	90.50±6.15	65.20±6.54	27.95
Ipomoea batatas leaf extract	300mg/kg/day	75.42±0.15	76.56±0.50	52.54±2.23	31.37
Nondiabetic (Normal)	Distilled water	90.15±1.10	90.15±6.05	90.15±6.05	0.00

Table 2 showed the effects of 2ml/kg oral administration of different quantities of *Ipomoea batatas* aqueous extracts for 14 days on the body weights of alloxan - induced diabetic rats. The results revealed significant different in the weights of the rats before the rats were induced. After alloxan induction, no significant difference was observed in their weights. At the end of oral treatment, it was observed that there was no significant difference in the weights of the experimental rats treated with 100 mg/kg/day and 200 mg/kg/day of the extracts, an effect which was different significantly from the weights of rats treated with 300 mg/kg/day and non-diabetic rats.

It was revealed that at the end of 14 days of oral treatment, alloxan - induced rats treated with 100 mg/kg/day, 200 mg/kg/day and 300 mg/kg/day sustained percentage of 49.15, 27.95 and 31.37% respectively compared with non diabetic - induced rats which recorded percent loss of 0% which means they maintained their weights. Similar effect was observed except in alloxan-induced rats treated with 300 mg/kg/day of the extract of *Ipomoea batatas*, and non-diabetic rats.

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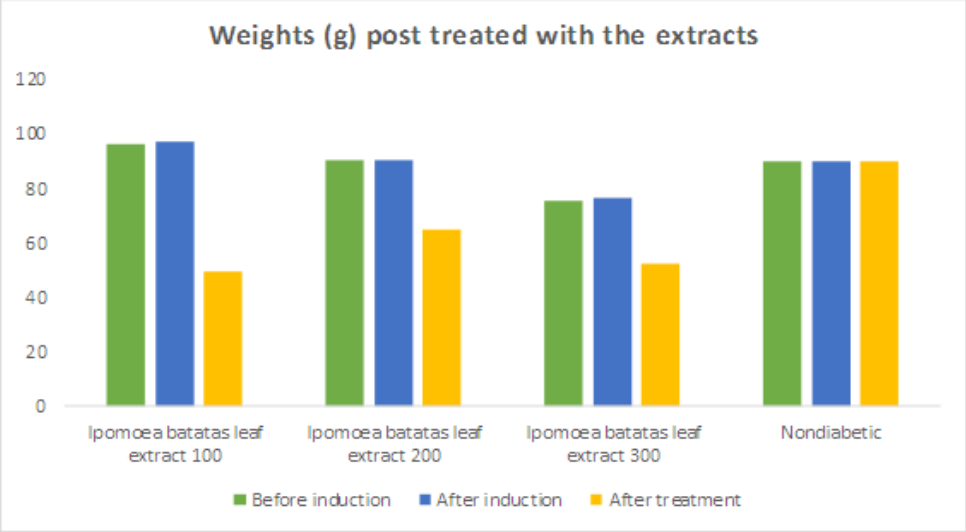

Results of qualitative and quantitative screening of *Ipomoea batatas* aqueous extract

The qualitative Phytochemical screening analyses of *Ipomoea batatas* revealed the presence of alkaloids, flavonoids, tannins, saponins, steroids, phenol, anthraquinone, phlobotannin, glycoside and terpenoid in the extract while the quantitative screening showed that saponins, tannins, anthraquinones and flavonoids contains the 6.18%, 4.05%, 2.54% and 2.10% respectively. The phytochemical with the highest quantity is saponin while the one with the lowest quantity is glycosides (Table 3).

Table 3: Qualitative and quantitative phytochemical screening of Ipomoea batatas leaf.

Phytochemicals	*Qualitative*	*Quantitative (%)*
Tannins	++	4.05
Saponin	++	6.18
Flavonoid	++	2.10
Alkaloids	+	1.67
Steroids	+	0.78
Phenol	+	0.72
Anthraquinone	++	2.54
Phlobatannin	+	0.36
Glycosides	+	0.29
Terpenoides	+	0.68

CONCLUSION

In conclusion, the results of this study clearly demonstrated that 200 mg/kg/day aqueous leaf extract of *Ipomoea batatas* produced a pronounced and remarkable blood-glucose lowering potential of 69.35% in alloxan-induced diabetic rats, therefore, represents an effective anti-hyperglycemic dosage for the treatment of diabetes and the plant remains potential source for discovery of new orally active agents for future diabetes therapy. The aqueous leave extract of *Ipomoea batatas* can be recommended to be used as an antidiabetic agent for patients due to the fact that it is cheap and also a natural agent. It can also be recommended as a potential source of diabetic drug for pharmaceutical industries.

REFERENCES

1. Shoback G. and Gardener D. 2011. Prevalence of diabetes, 15: 499–501.
2. Mellisa C. and William D. 2010. Diabetes mellitus, 13–16.
3. Rother K. 2007. Diabetes treatment – bridging the divide, 356(16): 501.
4. Riserus U. and Willet W. 2009. Dietary fats and prevention of type 1 diabetes, 10–15.
5. Seidell J. 2008. Obesity, insulin resistance and diabetes. A world of epidemics, 5–8.
6. Cefalu T. 2006. Animal models of type 2 diabetes in young people: a serious disease requiring impaired understanding and care, 47: 3.
7. Amos A., Macorty D. and Zimmet P. 2010. The rising global burden of diabetes and its complications, 14: 7–85.
8. International Diabetes Federation. 2009. Diabetes Overview, 7-14.
9. World Health Organisation. 2012. The prevalence of type 2 diabetes, 6–18.
10. Islam, S., 2006. Sweetpotato (*Ipomoea batatas* L.) Leaf: Its potential effect on human health and nutrition. J. Food Sci, 71: R13-R21.