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RESEARCH PAPER

PHYTOCHEMICAL CONSTITUENTS AND HYPERGLYCEMIC EFFECT OF AQUEOUS AND ETHANOLIC EXTRACTS OF *murraya koenigii* IN ALLOXAN INDUCED DIABETIC RATS

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ABSTRACT

Murraya koenigii is one out of many plants used locally for the treatment of diabetes. This work was carried out to determine the phytochemical constituents in aqueous and ethanolic leaf extracts of *Murraya koenigii* and its hypoglycemic effects. The experimental animals after acclimatization were randomly selected into 5groups of rats each and were induced with 150mg/kg of alloxan per body weight. The rats were treated with aqueous and ethanolic leaf extracts of *Murraya koenigii* at 500mg/kg daily for 5 weeks. Qualitative phytochemical analysis of *Murraya koenigii* confirms the presence of alkaloids, flavonoid, tannin, phenol and cardiac glycoside compound in both aqueous and ethanolic extracts. The study showed a significant decrease ($p<0.05$) in the blood glucose levels of rats treats with both extracts when compared with alloxan not treated, although ethanolic extract was more effective when compared with non-induced untreated group. This suggests that the aqueous and ethanolic life extract of *Murraya koenigii* has some hypoglycemic properties and may be safe for use.

Keywords: phytochemical, *Murraya koenigii*, hypoglycemic and diabetes

INTRODUCTION

Diabetes is a metabolic disorder characterized by the body's inability to regulate blood glucose due to relative or absolute deficiency in insulin (peptide hormone) producing beta cells in pancreas, or when the insulin receptors are resistant to the functions of circulating insulin (Ada, 2010). There are two main types of diabetes mellitus and are as follows; the type 1 or insulin dependent diabetes mellitus, which can only be controlled by insulin therapy, and the type 2 or non-insulin dependent diabetes mellitus which is the most common and starts in later life (over age 40) or obese individuals, and can be improved with medication and exercise (David *et al.*, 2011).

To keep the normal level of glucose in the body, the kidney removes the extra sugar from the blood and excretes it through urine. When glucose level exceeds the renal threshold (160-180mg/L) glucosuria occurs with wastage of energy and increased excretion of water and sodium. Different techniques like drug therapy, dietary therapy, spices and natural product therapy has been employed to reduce the incidence rate of the disease, to cure the disease, abolish the symptoms, minimize risk of hypoglycaemia ,minimize the long macro-vascular and micro-vascular complication which can result to death. Common Symptoms include weight loss, polyuria, polydipsia and polyphagia (Cooke *et al.*, 2008)

Natural products like spices have been recognized to have medicinal properties and possess many beneficial effects on health such as anti-inflammatory, anti-diabetic, anti-microbial, anti-oxidant activity, hypolipidemic e.t.c. (Keasri *et al.*,

2007). A number of natural products such as Alkaloids, flavonoid, terpenoids, saponin, phenols and cardiac glycosides have been isolated from medicinal plants including *murraya koenigii* and reported to possess anti-hyperglycemic properties.

Murraya koenigii is widely used as a spice in food and condiment in many countries. Various parts (leaves, stems, flowers) have been used in traditional medicine in the treatment of rheumatism, diabetics, vomiting, dysentery, bruises, traumatic injury and snake bite. However little scientific information exist regarding the effect of this plant in lowering blood glucose level. Therefore, the present study was undertaken to evaluate the phytochemical and antidiabetic effects of *Murraya koenigii* in alloxan induced diabetic rats.

MATERIALS AND METHOD

Subjects and Grouping: 30 female albino rats of 7-10 weeks old weighing between 100-150g were used for the study. The rats were maintained in a well-ventilated cage at a controlled room temperature. They were allowed free access to food, water and allowed to acclimatize for 4weeks.

Extraction of Plant Sample: Exactly 100g each of powdered curry leaf was dissolved in 400ml of ethanol and 600ml of distilled water was refluxed for 4 hours at 78°c and 100°c respectively. The extract was filtered using muslin cloth. The filtrate was evaporated using a rotary evaporator and concentrated further using water bath. The extract was collected, weighed and stored in a sterile air tight container and kept in the refrigerator until required for use.

Preparation of Stock Solution: 1g each of ethanol, aqueous concentrated extract and metformin was dissolved in 10ml of distilled water and the prepared solution was stored in the refrigerator.

Experimental Design: Albino rats of 10-15 weeks old weighing between 180-250g were randomly grouped and used in the study after the LD_{50} was determined.

- Group A: Alloxan induced diabetes rats treated with 400mg/kg body weight of ethanol extract.
- Group B: Alloxan induced diabetes rats treated with 400mg/kg body weight of aqueous extract.
- Group c: Alloxan induced diabetes rats treated with 400mg/kg body weight of metformin.
- Group D: Alloxan induced diabetes rats with no treatment.
- Group E: Non induced rats.

Phytochemical analysis; the curry leaves was screened for phytochemical properties by Trease and Evans (1989); Sofowora (1993)

Diabetic Induction: Prior to diabetic induction, the blood glucose level of the animals were taken. The rats were fasted for 12-18 hours and a single dose of 400mg/kg body weight of alloxan was administered. After 3 days of induction, the animals with blood glucose level above 150mg/kg body weight were selected for the experiments.

Determination of blood glucose levels: All blood samples were collected from the tail artery of the rats after every seven day. Blood glucose levels were determined by the glucose-oxidase principle (Beach and Turner, 1958) using a digital glucometer (Accu-chek Advantage) and the value expressed in the unit of mg/dl.

Determination of change on body weight: This was determined after every seventh (7) day of treatment with *murraya koenigii* extract. The changes on body weight observed were recorded respectively.

Data Analysis: The data were statistically analyzed using ANOVA with multiply comparisons versus control group.

RESULT

Phytochemical Analysis

The table represents the phytochemical composition of aqueous and ethanolic extracts of *Murraya koenigii*. Alkaloid, cardiac glycoside, phlobatannins, terpens, tannins, flavonoids, phenols and emodols were present in both extracts. Saponin was present in ethanolic extract but absent in aqueous extract while anthranoids, anthraquinone and steroids were completely absent in both extracts.

Table 1: phytochemical composition of ethanolic and aqueous extract of *Murraya koenigii*

Compounds	Ethanol	Aqueous
Alkaloids	++	++
Anthranoids	-	-
Cardiac glycosides	++	++
Phlobatannins	+	+
Saponin	+	+
Anthraquinone	-	-
Steroids	-	-
Terpenes	+	+
Tannins	+	+
Flavonoid	+	+
Phenols	+	+
Emodols	+	+

Keys: - (absent), + (moderately present), ++ (highly present)

Anti-diabetic effect

The changes in blood glucose level in diabetic not treated rat, non-diabetic rat, diabetic extract treated rats and the diabetic rats treated with metformin are shown below. The administration of *Murraya koenigii* extract improved the blood glucose level of diabetic animals. Aqueous showed a significant reduction when compared with ethanolic extract.

Table 2: blood glucose concentration of diabetic rats treated with aqueous and ethanolic extract.

	Blood glucose(mg/dl)				
Treatment periods	**DNT**	**NNT**	**DTE**	**DTS**	**DTA**
Day 0	100	98	99	100	98
Day 7	290	99	400	370	360
Day 14	340	100	300	210	290
Day 21	390	99	150	150	130
Day 28	410	99	100	98	100

Key: DNT (diabetes not treated), NNT (not induced not treated), DTE (diabetes treated with ethanolic extract), DTS (diabetes treated with standard), and DTA (diabetes treated with aqueous extract)

Weight changes

The changes in the body weight gain in control rat, diabetic extract treated rats. The body weight was decrease in diabetic rats while administration of *Murraya koenigii* extract improved the body weight gain in alloxan induced diabetes.

Table 3: weight variation in experimental animals

Treatment periods	Weight change (g)				
	DNT	NNT	DTE	DTS	DTA
Day 0	100	98	95	95	95
Day 7	97	99	97	97	95
Day 14	97	110	97	102	96
Day 21	95	110	102	110	105
Day 28	80	120	112	130	110

Key: DNT (diabetes not treated), NNT (not induced not treated), DTE (diabetes treated with ethanolic extract), DTS (diabetes treated with standard), and DTA (diabetes treated with aqueous extract)

DISCUSSION

Phytochemical components are responsible for pharmacological and toxic activities of plants (Lawal *et al.,* 2005). This study revealed the presence of various medicinal important phytochemical in both aqueous and ethanolic extract of *Murraya koenigii*. Alkaloid, cardiac glycoside, Phlobatannins, terpenes, tannins, flavonoids, phenols and Emodols are present in both extracts and are known for their anti-hyperglycemic properties for reducing elevated blood glucose levels, antioxidant, antimicrobial, antiviral, antibacterial and so on. The presence of all this phytochemical in *Murraya koenigii* is an indication that the plant can yield a drug of pharmaceutical significance in diabetes treatment and this correspond with the theory of Tijjani that not all phytochemical are present in all parts of the plant (Tijjani *et al.,* 2009).

There was a significant weight gain in all the treated groups**.** However, the diabetic untreated group suffers weight loss, which may be due to excessive breakdown of tissue protein and lipid caused by insulin insufficiency. But the extract was able to reverse this effect of diabetes a dose-dependent manner in the diabetic group, the improvement of body weight in diabetic treated rats may be due to improvement in the metabolic activities of the system to maintain glucose homeostasis.
In the diabetic test groups, there was a significant dose–dependent reduction ($p<0.05$) in fasting blood glucose in all the groups when compared with the control, but all are still within the normal range. In the extract treated diabetic groups, there was a statistically significant reduction in a dose - dependent manner compared to the diabetic controls.

The aqueous extract showed a more significant reduction in the blood glucose level when compared with the ethanolic extract. The reduction in blood glucose level observed in rat treated with both *Murraya koenigii* extracts is an indication of its antidiabetic potential, also the insignificant difference observed in the extract treated group when compared the group treated with metformin (control) is an indication that *Murraya koenigii* are very much promising as metformin to treat diabetes and similar reduction of blood glucose following administration of *Murraya koenigii* has been reported by (Yadav *et al* 2002) and (Dineshkumar *et al* 2010).

CONCLUSION

The observations of this study suggest that aqueous and ethanolic leaf extract of *Murraya koenigii* serve as a potent hypoglycemic agent for the management of diabetes and can also reverse the adverse effect of diabetes.

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REFERENCE

Ada (2010) America Diabetes Association. Diabetes Care; 33: S1 S62-69.

Cooke, D.W., and Plotnick. L. (2008). "Type 1 Diabetes Mellitus in Pediatrics". *Pediatrics in Review*; 29 (11): 374-384.

David, G., and Gardner, D. (2011). Greenspan's basic and clinical endocrinology (9th edition). New York: McGraw-Hill Medical. Pp. chapter 17.

Dinesshkumar, B., Analava, M., and Manjunatha, M. (2010). Antidiabetic and hypolipidemic effect of Mahanimbine from *Murraya koenigii* leave. *International journal of phytomedicine*; 2:22-30.

Keasri, A.N., Keasri, S., Singh, S.K., Gupta, R.K., and Watal, G., (2007) studies on the glycemic and lipidemic effect of *murraya koenigii* in experimental animal. *Journal of ethno-pharmacology*; 112: 305-311.

Lawal, M., Wasagu, R.S.U. and Ladan M.J. (2005): hepatotoxicity risk assessment of neem (*Azadirachta indica*) seed extract using albino rats. *Biological and Environmental Science Journal for the tropics*; 2(2):36-38.

Tijjani, I.M., Bello, I., Aliyu, A., Olunnshe, T. and Logun, Z. (2007) phytochemical and antibactenanl study of root extract coch lospermum tinctoricm. *American Research Journal of Medicinal Plant*; 3:16-22.

Yadav, S.V., Vats, V., Dhunnoo, Y and Grover, J.K (2002). Hypoglycemic and hyperglycemic activities of *Murraya koenigii* leaves in diabetic rats. *Journal of ethno pharmacology*; 82: 1111-1119.