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IMPACT OF ETHANOLIC LEAF EXTRACT OF MUCUNA PRURIENS ON DIABETES REVERSAL

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Abstract: The impact of ethanolic leaf extract of *M. pruriens* on diabetes reversal in sildenafil citrate-induced Wistar rats. Albino rats of 150 – 200 kg/body weight (b.w) were used for the study. Four rats out of the twelve rats used for this study were kept as Normal control i.e., Group 1. The remaining 9 rats were made diabetic by intraperitoneal injection of sildenafil citrate (5 mg/kg b.w). They were further divided equally into 3 groups i.e., Group 2– diabetes induced or diabetes control, Group 3–diabetic rats administered with 200 mg/kg b.w ethanolic leaf extract of Mucuna pruriens, Group 4–diabetic rats administered with 400mg/kg b.w. The ethanolic leaf extracts of *Mucuna pruriens* were administered orally for 3 days in groups 3 and 4. After 7 days, the animals were sacrificed for the collection of blood and further analyses were carried out on the blood glucose level. There was a significant increase in the blood sugar level in Group 2 rats when compared to Group 1 rats. The effects were significantly reduced in Groups 3 - 4 which received variable doses of ethanolic leaf extracts of M.pruriens. This review that the traditional use of M.pruriens for the treatment of diabetes is supported and it also shows that the plant may be a good source of anti-diabetic agents.

Keywords: Diabetes, sildenafil citrate, *Mucuna pruriens*

INTRODUCTION

Diabetes mellitus is a disease of global significance and increasing prevalence in civilized society. Diabetes mellitus poses an increasing hazard to public health (1). Diabetes is a significant metabolic condition defined by chronic hyperglycemia brought on by abnormalities in insulin production, insulin action, or both (2). The Greek term "diabetes," which means "to siphon," or "to pass through," and the Latin word "mellitus," which means sweet or honeyed, combine to form the word "diabetes" (3). This is a result of elevated blood and urine sugar levels. In the sixth century

BC, Sushrutha recognized diabetes and gave it the name "Madhumeha," which means "honey in the urine" (4).

The International Diabetes Federation (IDF) estimated that 425 million people globally, including 16 million in Africa, had diabetes in 2017 (5). According to data from the World Health Organization's 2016 diabetes country profiles, the prevalence of diabetes was projected to be 5% in Mali, 4.1% in Niger, 4.2% in Burkina Faso, and 5.1% in Senegal (6, 7). The most often prescribed medications in contemporary medicine for the treatment of diabetes are metformin, Biguinides, Sulphonylurea, Insulin, etc. The negative effects of these medications, however, limit their long-term usefulness. *Momordica Charantia*, also known as the bitter gourd (8), *Helicterus isora*, *Curcurmin*, and *Trigonella foenum graecum*, often known as fenugreek, are all used in Ayurvedic medicine to treat diabetes (9

,10). Studies on these natural medications showed few side effects and avoided subsequent issues (11, 12).

Mucuna pruriens (L.) is the most promising medicinal plant employed in traditional medical practices worldwide, including the Ayurveda system (13, 14). It is frequently referred to as the velvet bean and is a member of the Fabaceae family (15). It can be used as a sedative, to alleviate chest pain, to cure infections of the urinary tract, to treat snake bite intoxication, and as a flavoring for cakes, sweet bread, and candies (16). Furthermore, it contains a wealth of nutrients (17). It was used as a herbal medicine to treat mental problems and male infertility (18). Parkinson's disease (PD) is also treated using this herb (19). Therefore, the present study investigated the impact of ethanolic leaf extract of *Mucuna pruriens* on diabetes reversal.

MATERIALS AND METHODS

Plant extraction preparation: Using a lab mortar and pestle, fine powder was made from the fresh leaves after they had been shade-dried. Three hundred grams (300 g) of powder was macerated at room temperature for 72 hours in a mixture of 70% ethanol and 30% distilled water. After that, this was filtered using a filter paper (Whatmann size no.1)

Source of materials: Fresh leaves of *Mucuna pruriens* were collected from the Medicinal Garden of the National Centre for Genetic Resources and Biotechnology, Ibadan, Nigeria. Botanical identification and authentication were performed.

Adult Wistar rats of 16 - 20 weeks and an average weight of 150 to 200 kg were obtained from the Faculty of Veterinary Medicine, University of Ibadan, Nigeria. The animals were acclimatized for a duration of seven days under standard environmental conditions with a 12hrs light/dark cycle maintained on regular feed (vital feed) and Water. All procedures were carried out in strict accordance with the Institutional guidelines on the care and use of experimental animals.

Induction of diabetes: The diabetic control and experimental groups of rats were separated. Prior to the experimental group's production of diabetes, the baseline blood glucose level was measured. Prior to the injection of sildenafil citrate, the rats were permitted to fast for the entire night. Then, 5 mg of sildenafil citrate per kg of body weight was administered intraperitoneally to the rats to cause diabetes. After induction, the rats were given unrestricted access to the same food and water. After 72 hours, blood samples from the rats' tail tips were used to test for diabetes.

Experimental protocol: Albino rats with body weight 150 – 200 kg were divided into four (4) groups; Group 1: Control, Group 2: Diabetes induced (sildenafil citrate 5 mg/kg body weight), Group 3: Diabetic rats administered with 200 mg/kg b/w of ethanolic extract of *Mucuna pruriens* leaf (sildenafil citrate + *Mucuna prurien*), and Group 4: Diabetic rats administered with 400 mg/kg b/w of ethanolic extract of *Mucuna pruriens* leaf (sildenafil citrate + *Mucuna pruriens*). The *Mucuna pruriens* were administered in a single oral dose per day for a period of three (3) days, and the animals were sacrificed and subjected to further analysis.

Statistical analysis. Statistical analysis using one-way ANOVA and standard error. Separated all means at the $P < 0.05$ level using Duncan's multiple range test.

RESULTS

Table 1: Analysis of variance showing the effect of ethanolic leaf extract of *Mucuna pruriens* on diabetes reversal

CHARACTER	SOURCE	SUM OF SQUARE	DF	MEAN SQUARE	F-VALUE	SIG
GLUCOSE	Model	28491.775	3	9497.258	18.682	0.008
	Error	2033.44	4	508.361		
	Sum	30525.219	7			

Table 2: Mean and Standard Error with mean separation using Duncan's multiple range test for the effect of ethanolic leaf extract of *Mucuna pruriens* on diabetes reversal.

LAB NO	GLUCOSE
GROUP 1	74.94 ± 5.87^{c}
GROUP 2	199.60 ± 11.80^{a}
GROUP 3	82.55 ± 11.05^{b}
GROUP 4	41.75 ± 26.85^{d}

When compared to the control rats (group 1), the blood glucose level in the diabetic group (group 2) increased significantly. When compared to the diabetic control (group 1) and diabetic group, the *Mucuna pruriens* leaf extract treatment led to a statistically significant (<0.008) drop in blood glucose levels in groups 3 and 4, respectively. Simultaneous administration of ethanolic leaf extract of *Mucuna pruriens* showed more pronounced antidiabetic activity, while *Mucuna pruriens* extract demonstrated enhanced antidiabetic effects.

DISCUSSION

Diabetes mellitus is a chronic metabolic disease that affects nearly all of the body's systems, and it can be managed using a variety of therapeutic approaches (20). A wide range of medicines isolated from plant species was studied for their possession of anti-diabetic activities in addition to the currently existing pharmacological treatments for the management of diabetics (21), (22). In light of these circumstances, the current study's objective was to assess how ethanolic leaf extract of *Mucuna pruriens* affected diabetic rats' ability to reverse sildenafil citrate-induced diabetes in rat models.

In this study, we found out that the blood sugar level of Wistar rats in group 1(control group) showed a normal blood sugar level for the Wistar rats used for this experiment, while that of group 2 (diabetes-induced rats) showed a severe increase in the blood sugar level when compared to group 1(control group).

In group 3 and 4 treated with 200mg/kg and 400mg/kg of M.pruriens showed a well-reduced blood sugar level when compared to group 2 (diabetes-induced group). These could be due to the antidiabetic and ameliorating effects of the leaf extracts of M.pruriens on the blood sugar level (23). The effects of the ethanolic leaf extract of M.pruriens is better and well-pronounced at a higher dose of 400mg/kg. Contract with Ifegwu *et al*; 2021 and Rajesh *et al*; 2016. Despite the fact that alloxan and Streptozocin (STZ) were used in inducing diabetes in their experimental rats respectively. This research work illustrated that sildenafil citrate can also be used to induce diabetes in rats, and this study showed that M. pruriens leaf has an anti-hyperglycemic effect, similar to that of its seed, and may be a source of hypoglycemic compounds.

CONCLUSION

Therefore, this current research work showed the anti-diabetic effect of ethanolic leaf extract of M. *pruriens* on sildenafil citrate-induced Wistar rats and the use of M. *pruriens* leaf for the treatment of diabetes mellitus.

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