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Research Article

Effect of *Leptadenia hastata* (Pers) Decne on Metabolic Profile of Pregnant Albino Rats

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Abstract: Vegetables consumption has been associated with lower risk of pre eclempsia in pregnancy. The aim of this study is to determine the effect of *Leptadenia hastata* (Pers) Decne on some biochemical parameters in pregnant rats. *Leptadenia hastata* (Pers) Decne is a tropical herb widely used by pregnant women in northern Nigeria with so much nutritive and therapeutic claims attributed to it. The effect of different doses of the plant on metabolic profile of pregnant rats was determined. Results obtained showed significant decrease ($p \leq 0.05$) in Fasting Blood Sugar (FBS), Total Cholesterol (TC), Triglycerides (TG) and Low Density Lipoprotein (LDL) values. Urea, creatinine and alanine aminotransferase (ALT) levels increased significantly ($p \leq 0.05$) in a dose depended manner while aspartate aminotranferase (AST) activity showed little or no change in activity. The study proved the hypolipidemic effect of *L. hastata* and provided a scientific support for the ethno medical uses of *L. hastata* in the management of pre eclempsia in the study area.

Keywords: Fasting blood sugar, *Leptadenia hastata,* lipid profile, pre eclempsia, pregnant women

INTRODUCTION

Malnutrition during pregnancy is one of the leading causes of perinatal morbidity and mortality (UNICEF, 2009). Nutritional factors during pregnancy have been related to health in later stages of life such as infancy and adulthood (Ramon *et al*., 2009). During pregnancy, maternal tissues are involved in providing energy for reproduction process, which may affect blood serum chemistry. Improving maternal nutrition could improve fetal and subsequent health (Loy *et al*., 2011). Several micro nutrients are important for the health of the developing fetus especially where insufficient nutrient is prevalent (Centin *et al*., 2009).

Among the low income earners, leafy vegetables contribute much in alleviating the protein deficiency symptoms associated with starchy diets and so play a vital role in providing the health and well-being of the people (Badi *et al*., 2012). Vegetables not only provide important components such as ascorbic acids, β-carotene and folic acid that play important role in pregnancy, but are also sources of bioactive compounds that are directly associated with the prevention of disorders such as diabetes and cardiovascular disease (Flavia *et al*., 2012).

Leptadenia hastata (Pers) Decne is one of the vegetables commonly consumed during pregnancy in Adamawa state, north eastern Nigeria. The plant is used as food by many African populations. Human populations of the western Sahel depend on this wild plant to satisfy a substantial part of their nutritional requirement most especially where famine is prevalent (Aliero and Wara, 2009). The plant contained substantial amount of linoleic and α-linoleic acids. Leaves of the plant are rich sources of protein, calcium and zinc (Cook *et al*., 2000). *L. hastata* is widely used for theurapeutic purposes during pregnancy for the treatment of pre eclempsia. Several studies carried out revealed that the plant contains anti inflammatory constituents (Niekiema *et al*., 2011). The plant has also been revealed to have anti-androgenic effect that led to loss of fertility in animals that consumed its leaves (Bayala *et al*., 2012). However there is no information on the effect of *L. hastata* on metabolic profile in pregnancy to ascertain the safety of its consumption in pregnancy. This research was therefore undertaken to evaluate the effect of graded doses of *L. hastata* on metabolic profile of pregnant rats.

MATERIALS AND METHODS

Collection of plant materials: Fresh leaves of *L. hastata* were obtained from farms around the Modibbo Adama University of Technology Yola, Adamawa State, Nigeria. The plant was authenticated by a Botanist in the Department of plant science of the

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University. Leaves were dried under room temperature and ground into powder using mortar and pestle. Sample was stored in clean container and kept for further use.

Experimental design: Female albino rats (Wister strains) were obtained from animal holding at the Federal Housing Estate Jimeta, Yola. Rats were allowed to acclimatize for one week under laboratory condition. Standard laboratory diet and water were supplied *ad libitum*.

Grouping of animals: Female rats weighing 150-160 g were used for the study. The rats were grouped into five groups of 5 rats each. Male rats were introduced into each group for mating overnight (Dare *et al*., 2011).

Vaginal smearing: Vaginal smear was taken in the morning after mating and viewed under microscope. The presence of sperm cells in the vaginal fluid confirmed successful mating and rats were designated day 0 of the pregnancy (Madhyastha *et al*., 2007).

Administration of extract: Crude extract was administered orally to the rats via gastric intubation. Group 1 did not receive any extract and served as control. While groups 2, 3, 4, and 5 were administered 100, 200, 500, and 1000 mg/100 g body weight for 3 weeks. Animals were anaesthetized with diethyl-ether and blood samples collected by cardiac puncture in to EDTA lithium heparin bottles. Plasma was separated from blood and assayed.

Biochemical assays: Randox test kits were used for all biochemical parameters. ALT and AST were estimated using Reitman and Frankel (1957) method. Creatinine was determined using Jaffe's method as described by Tiez (2000). Urea was determined using Bethod's method of 1967 as described by Tiez (2000). Glucose was determined using enzymatic GOD-PAP method as described by Trinder (1969). TC, TG, HDL and LDL were determined using the methods described by Tiez (2000).

RESULTS

Result obtained from the studies is as presented in Table 1. Results obtained revealed that all the biochemical variables were affected by the administration of *L. hastata* in a dose depended manner. FBS, TC. TG and LDL significantly decreased ($p \leq 0.05$) at 1000 mg/100 g body weight of *L. hastata* when compared with control. Urea, createnine HDL and ALT however increased significantly ($p \leq 0.05$) at 1000 mg/100 g body weight of *L. hastata* when compared with control. AST showed no significant change in activity with increase in dose.

DISCUSSION

Pregnancy is associated with significant changes in biochemical parameters. Table 1 shows significant decrease ($p \leq 0.05$) in fasting blood sugar values in a dose depended manner. The fetus is known to have a considerably capacity to metabolically adapt to acute changes in glucose supply. Studies have shown that high level levels of antioxidant in vegetables could reduce the risk of fetal malformation as well as gestational diabetes (Idogun *et al*., 2008; Flavia *et al*., 2012). During pregnancy, glucose tolerance slightly improves and peripheral (muscle) sensitivity to insulin and hepatic basal glucose production is normal. The hypoglycemic effect of *L.hastata* seems to be in agreement with the findings of Bello *et al*. (2011).

Levels of TC, TG, and LDL in Table 1 decreased significantly ($p \leq 0.05$) in dose depended manner. Regular consumption of vegetables demonstrates dose response effect in reducing risk for coronary heart disease. Green leafy vegetables and fruits high in vitamin C content appears to have the strongest relationship to cardiac risk reduction. Phytonutrients in vegetables including flavonoids may have specific cardio protective effect partially mediated through favorable effects on endothelial function (Ali *et al*., 2011). Pregnant women in Adamawa state depend on vegetables to satisfy a substantial part of their nutritional requirement. *L. hastata* is particularly used during pregnancy for both nutritional and therapeutic purposes. It is particularly used by women with pre eclempsia. During pregnancy, there is an increase in hepatic lipase activity and decrease in lipoprotein lipase activity. Hepatic lipase is responsible for the increased synthesis of TGs at the hepatic level whereas the decreased activity of the lipoprotein lipase is responsible for the decreased catabolism at the adipose tissue level, leading to an increase in circulating TG (Ekhator and Ebomoyi, 2012). Studies by Brantsaeter *et al*. (2009) revealed that vegetables are positively associated with lower risk of pre eclempsia. Higher intake of vegetables during pregnancy was also revealed to be associated with lower risk for small for Gestational Age Babies (SGA). Other bioconstituents present in vegetables could be responsible for their potential benefit (Ramon e*t al*., 2009; Flores *et al*., 2010). Ingestion of fibre sources containing a greater proportion of soluble component such as pectin is effective in lowering plasma cholesterol concentration by directly affecting pathways. Increased TGs play a part in decreasing the HDL-cholesterol. HDL particles carry cholesterol from peripheral tissues to the liver. Impaired transport of cholesterol from peripheral

Table 1: Effect of *L. hastata* on metabolic profile of pregnant rats in mg/dL

Parameter	Normal	100 mg	200 mg	500 mg	1000 mg
FBS	71.60±13.24[a]	50.40±9.60	47.34±8.59	45.00±6.80	34.02±4.47[b]
TC	173.20±4.29[a]	39.79±6.85	37.01±5.23	36.66±3.78	25.78±5.40[b]
TG	220.02±12.34[a]	163.86±17.12	147.22±15.83	133.45±5.71	117.34±9.8[b]
HDL	14.85±0.94[b]	27.40±0.68	40.32±2.40	57.32±1.80	70.17±9.54[a]
LDL	118.24±8.68[a]	102±6.52	85.45±5.80	42.74±1.90	22.34±2.68[b]
Urea	20.30±0.30[b]	30.13±2.30	81.64±7.67	124.39±5.96	162.19±19.45[a]
Create nine	1.11±0.3.[b]	2.56±0.65	2.84±0.45	4.59±0.21	5.91±0.34[a]
ALT*	19.00±2.70[b]	19.00±2.00[b]	27.00±2.00	35.66±2.88[a]	40.33±2.30[a]
AST*	13.00±1.65	7.50±0.86	9.00±0.95	13.00±1.50	16.33±2.90

All values are mean±standard deviation (n = 5); a = significantly higher ($p \leq 0.05$) than other values in the same row; b = significantly lower ($p \leq 0.05$) than other values in the same row; * = Unit in IU

tissues to the target area of utilization may cause the decrease in HDL-cholesterol in the serum. The levels of HDL increased significantly ($p \leq 0.05$) with increase in dose. This seems to agree with the findings of Shenoy *et al*. (2010) that vegetables or their respective extracts can result in an improvement in the oxidant defense system with a consequential reduction in tissue oxidative damage. High urea levels indicate kidney dysfunction; increased nitrogen metabolism associated with diminished renal blood flow or impaired renal function which may be caused by liver function. High urea may also indicate dehydration, diuretic therapy or gastro intestinal blood lose. The increased in urea and creatinine may be relative to decrements in extracellular fluid volume and cardiac output. An overload of protein content of *L. hastata* may partially be responsible for this increment. ALT significantly increased ($p \leq 0.05$) in dose depended manner while AST showed little or no change in activity. ALT and AST activities in the serum are sensitive markers of liver damage (Milinkovic-Tur *et al*., 2005) Increased ALT indicates injury to organelles such as, mitochondria leading to the release of soluble enzyme ALT (Dahiru *et al*., 2003).

CONCLUSION

Administration of *L. hastata* to pregnant rats has been associated with lower risk of certain chronic health disorders including cardiovascular disease. This study has provided a scientific support for the consumption of *L. hastata* by pregnant women with pre eclempsia. Consumption of *L. hastata* at higher dose should be avoided as this could have a negative effect on the liver.

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