

THE EFFECT OF ETHANOLIC PULP EXTRACT OF ADANSONIA DIGITATA IN HYPERLIPIDEMIC EXPERIMENTAL ALBINO RATS

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ABSTRACT

Background: Hyperlipidemia represents several different disorders of lipid metabolism related to increased production, delayed degradation of atherogenic lipoproteins particles, or decreased synthesis. Such metabolic arrangements of lipoproteins are associated with serious health consequences including increase risk of atherosclerosis and its related disorders. Digitata extract has ability to reduce the hyperlipidemia this due to presence of pectin fiber, which is fermented in colon. Pectin may help lower plasma and liver cholesterol, triglycerides and LDL either by inhibition of cholesterol and bile acid absorption or due to increase excretion of this natural and acidic sterols. This study aimed to see the effect of Adansonia Digitata extract on lipid level in experimental Albino Rats. **Methodology:** It is

experimental study performed on 25 albino rats weigh 150 – 200 gm. 20 of them where induced for hyperlipidemia by cholesterol powder mixed with butter for two weeks. Adansonia Digitata extract in 70% ethanol, used as hypolipidemic herb in hyperlipidemic Albino rats. Different concentrations of it used including; high dose 3.75 g/ kg, medium dose 2.5 mg / kg and low dose 1.25 mg/ kg. A group of hyperlipidemic rats treated with the hypolipidemic drug (atorvastatin 10 mg), other group of rats used as negative control. Samples were collected after 12 hours of fasting from hyperlipidemic rats treated with extract of A. Digitata and the control groups. Lipid profile measurement after standardized meal, doses of Digitata extract, and hypolipidemic drug performed. **Result:** Adansonia Digitata reduce level of lipids with different doses. The high dose 3.75 g/kg shows highly significant decrease in total serum cholesterol, triglycerides, LDL (P. values = 0.001, 0.039, 0.000

respectively), also significant decrease observed in low dose also (1.5 g / kg) (P. values = 0.025, 0.010, 0.039 respectively). **Conclusion:** *Adansonia Digitata* suitable to be used as natural hypolipidemic agent.

KEYWORDS: *Adansonia Digitata*, Hyperlipidemia, Cholesterol powder, Butter, Atorvastatin.

INTRODUCTION

Hyperlipidemia involves abnormal elevation in the levels of any or all lipid fraction in the blood. Hyperlipidemia are regarded as Modifiable risk factors for cardiovascular diseases (CVD) due to their influence on atherosclerosis^[1]. Atherosclerosis is a syndrome affecting arterial blood vessels due to a chronic inflammably response of white blood cells in the wall of arteries. This promoted by low-density lipoproteins, cholesterol and triglycerides without adequate removal of fats and cholesterol from the macrophage by high-density lipoproteins. Herbal medicine is the use of medicinal plants for prevention and treatment of diseases range from tradition and popular medicines of every country to the use of standardized and titrated herbal extracts which is used in many condition such as hyperlipidemia and cardiovascular disease^[2].

Adansonia Digitata or (baobab), derived from the Arabic word baobab meaning fruit with multiple seeds, leaves, bark, roots and pulp. These seeds are used for multiple medicinal purposes in many parts of Africa. They showed interesting medicine properties including antioxidant, anti-inflammatory, antipyretic, has effect on influenza infections, and used for treating kidney and bladder disease^[3, 4].

Baobab dried fruit pulp contains variety of important nutrients including vitamins minerals and amino acids. vitamin C content ranging from 74 - 163 mg/ 100 gram and pectin 23.4 - 33.8 mg / 100 kg depending on varieties and geographical location^[5]. Pectin may help in lowering of plasma and liver cholesterol, triglycerides and LDL. This can be either by inhibition of cholesterol and bile acid absorption or due to increase excretion of this natural and acidic sterol. The dietary fiber is an important component of healthy nutrition because ensures a good gut health and normal nutrient absorption, the state of your blood sugar and cholesterol levels to the robustness of your immune system and whether good bacteria the probiotic microorganisms living in your gut can flourish^[6].

It is important to develop and standardize models for testing of anti-hyperlipidemic drugs^[7]. The dose of cholesterol required to induce Hyperlipidemia in rats available in literature varies from 20 days to 60 days.

Due to large variation in the dose of cholesterol required to induce Hyperlipidemia available in literature it was decided to standardize the cholesterol suspension induced Hyperlipidemia model. Two doses were low dose and high dose of cholesterol was for standardization of the model. The aim of this research it to determine the anti-hyperlipidemic effect of *A. Digitata* in hyperlipidemic Albino rats^[7].

MATERIALS AND METHODS

This is an experimental study, performed in Al – Ahfad University for women- School of pharmacy – Omdurman. Male and female albino rats weighing between 150 – 200 g purchased from Animal house of Al Ahfad center for science and technology; animals were housed in well-ventilated cages in Al Ahfad center for science and technology.

Twenty five rats used in this study five of them as normal control, five administered STD hypolipidemic drug (atorvastatin) and fifteen were induce hyperlipidemia by high, medium and low lipid diet for 2 weeks.

The fruits of baobab of *Adansonia Digitata* collected from Khartoum sate and Kordofan state. The collected fruit pulp was finally ground into powder by pestle and mortem. 100g of dried baobab powder was wet in 1 liter of 70% ethanol and left overnight. The mixture filtered to remove solid large particles using Buchner flask and vacuum pump Buchner apparatus. The suspension evaporated to liberate concentrated extract, which dried in hot oven at 80 C°

THE EXPERIMENTAL PROTOCOL

The high fat diet was formulated using pure cholesterol mixed with the butter and grown mesh feed. The experimental rats were divided into five groups Group I, normal control not administered with *Adansonia Digitata*.

Group II hyperlipidemic rats treated with high dose of baobab 3.75 g/Kg for one week, Group III hyperlipidemic rats treated with medium dose 2.5 g/ Kg, Group IV Hyperlipidemic rats treated with low dose 1.25 g /kg for one week, Group V hyperlipidemic rats treated with conventional anti-hyperlipidemic drug (Atorvastatin) 10 mg/ Kg daily for one week^[8].

LIPID PROFILE ESTIMATION

The rats were fasting for 12 hours, sample for base line and after induction of hyperlipidemia were drawn from the eyes of the rats after anesthesia by chloroform in heparin container, lipid profile analyzed by Biosystems™ reagents. Total Cholesterol estimated by cholesterol-oxidase peroxidase method, Triglyceride estimated by glycerol phosphate oxidase/peroxidase, HDL by cholesterol HDL precipitation reagent, and LDL-by-LDL precipitation reagent. Data analyzed using SPSS software.

RESULTS

Twenty five Albino rats used in this study five of them as normal control and twenty were induced for hyperlipidemia, five administered STD drug (atorvastatin) and fifteen treated by high, medium and low dose of *A. Digitata* to determine the effect of *A. Digitata* as an anti-hyperlipidemic agent. Lipid profile was done before diet, after diet and after administration of High, medium and low doses of *A. Digitata* and atorvastatin drug. Significant decrease of Total Cholesterol, triglyceride and LDL-C observed after administration of High dose, medium dose and low dose of *A. Digitata* and atorvastatin as shown in tables (1, 2 and 3) Fig.1.

Table 1: Comparison of lipid profile parameters before and after diet in study groups

P – values Parameter	Group 1	Group 2	Group 3	Group 4
Total Cholesterol	0.002	0.000	0.032	0.003
Triglyceride	0.045	0.009	0.001	0.013
HDL-C	0.102	0.026	0.045	0.089
LDL-C	0.001	0.005	0.017	0.009

Table 2: Comparison between lipid profile parameters after diet and after treatment with high dose (3.75 g/kg) and medium dose (2.5 g/kg)

Parameters	High dose (3.75 g/ kg)			Medium dose (2.5 g/kg)		
	After diet (Mean±SD)	Treated (Mean±SD)	P- value	After diet (Mean±SD)	Treated (Mean±SD)	P-value
Total Cholesterol	128.26±21.75	62.35±3.39	0.001	133.24±21.35	54.06±2.93	0.000
Triglyceride	88.66±20.72	65.07±3.55	0.039	92.12±23.50	39.02±3.07	0.001
HDL-C	40.88±11.15	38.72±6.09	0.329	52.02±17.84	41.00±5.83	0.226
LDL-C	71.64±12.50	18.67±3.72	0.000	62.40±19.42	21.20±6.30	0.002

Table 3: Comparison between lipid profile parameters after diet and after treatment with low dose (1.25 g/kg) and atorvastatin (10 mg)

Parameters	Low dose (1.25 g/ kg)			Standard drug atorvastatin 10mg		
	After diet (Mean±SD)	Treated (Mean±SD)	P-value	After diet (Mean±SD)	Treated (Mean±SD)	P-value
Total cholesterol	193.20±96.75	54.07±3.38	0.025	138.40±63.60	63.60±3.71	0.004
Triglyceride	180.44±50.57	82.52±31.96	0.010	95.26±19.37	65.80±11.45	0.019
HDL-C	82.66±27.09	45.20±5.46	0.031	60.28±21.57	45.00±8.30	0.178
LDL-C	93.42±61.59	14.10±7.02	0.039	61.80±31.29	26.80±5.21	0.039

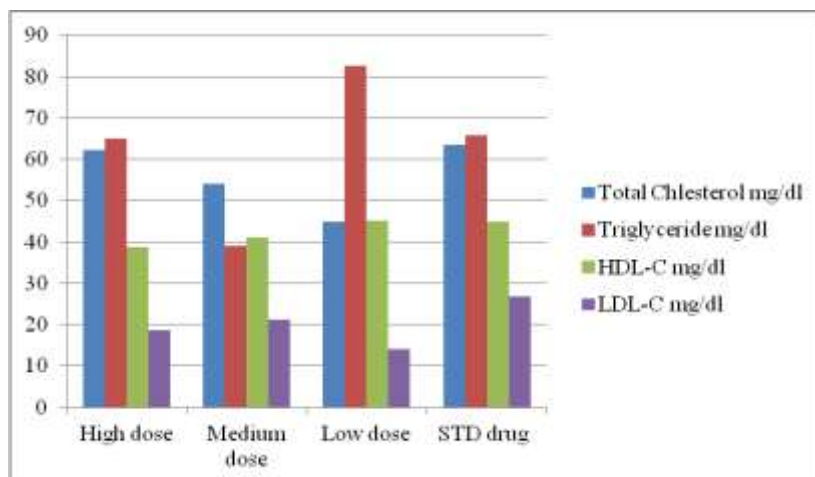


Figure 1: Lipid profile parameters after administration of high, medium, and low doses of Adansonia Digitata and Atorvastatin.

DISCUSSION

This study shows the effect of Adansonia Digitata on hyperlipidemic rats after administration of high, medium and low doses of Adansonia Digitata and atorvastatin.

Significant increase in total cholesterol was observed after administration of fat diet. Base line in high dose group 87.80 ± 5.65 , after diet 128.26 ± 9.72 ($P = 0.002$), base line in medium dose 81.00 ± 5.62 and after diet 133.24 ± 9.54 ($P = 0.000$), in low dose group base line 100.80 ± 9.14 and after diet 193.20 ± 13.27 ($P = 0.032$), and in group of atorvastatin before diet 79.80 ± 4.52 , after diet 138.40 ± 18.66 ($P = 0.032$). Significant decrease in total cholesterol observed after administration of High, medium, low dose and standard drug P. values: (0.001, 0.000, 0.025, 0.004) respectively. Significant increase in triglyceride observed after administration of fat diet. Significant decrease in triglycerides observed after administration of high, medium and low dose of Adansonia Digitata and atorvastatin P. values (0.039, 0.001, 0.010, 0.019) respectively. Significant increase in LDL observed after administration of fat diet. Significant decrease in LDL observed after administration of

Adansonia Digitata P. value (0.000, 0.002, 0.039, 0.039) respectively. No significant decrease observed in HDL after administration of Adansonia Digitata in all groups. There is agreement between Adansonia Digitata and atorvastatin in decreasing TSC triglycerides and LDL after induction of hyperlipidemia with high fat diet. These findings conclude that Adansonia Digitata is an effective anti-hyperlipidemic agent and these results agree with Alhassan A.J et.al, Bako, HY et. al^[9], Ryan ME, Sani I et. al and Matawali A et. al.

CONCLUSION

Adansonia Digitata or (baobab) can be used as natural hypolipidemic agent.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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