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Effect of Ethanoic Extract of Treculia Africana Seeds on Total Cholesterol, Total Protein, and Nitric Oxide

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Abstract:

***Treculia africana* is well known and eaten by the people of South-South and South-East region of Nigeria. *T. africana* can be eaten alone or process and combine it with other fruits. It is nutritious and provide natural bioactive substance to the body. This study was aim to evaluate the Effect of Ethanoic Extract of *Treculia africana* Seeds on Total Cholesterol, Total Protein, and Nitric Oxide. It was an experimental research. 20 male rats were randomly selected into four groups (control, low dose, moderate dose and high dose groups) with five animals per group. Group A served as control and received only water and pellet feed, Group B (low dose) received 250mg/kg, group C (moderate dose) received 300mg/kgand group D (high dose) received 350mg/kg of aqueous extract of *Treculia africana* seed respectively. The extract was administered orally to the rats once a day for a period of 10days. On the 11th day, the animals were anaesthetized with chloroform soaked in cotton wool and blood tissues were collected. The results revealed that,there is significantly increase in the serum levels of total protein in all the treated groups when compared with control (Total protein control 51.40±0.51, low dose 61.60±0.51* medium dose 71.60±0.51*, and 71.80±1.07*). Total cholesterol significantly decreased when both medium and high dose were administered when compared with control (Total cholesterol control 2.34±0.05, medium dose 1.90±0.07*, high dose 1.96±0.19*). Also, nitric oxide significantly increases serum levels in the groups treated with *T. africana* when compared with control (Nitric oxide control 7.16±0.14, low dose 8.98±0.09*, medium dose 8.50±0.15* and high dose 8.02±0.11*).**

Keywords:

Effect, Ethanoic, *Treculia africana* Seeds, Total Cholesterol, Total Protein, Nitric Oxide.

Introduction

A lot of men in the south-eastern part of Nigeria consume bread fruit both for its nutritional benefits as well as other ethnomedicinal purposes (Gbaranor, *et al*., 2023a).Previous study revealed that majority of the people (96.20%) preferred herbal medicine as their treatment choice and this choice of treatment by the participants could be due to the fact that herbal medicine is accessible, available, affordable and also proximity of treatment centre. This researched revealed that majority of the people who live in the rural areas depend on herbal medicine for treatment of various ailment including STI (Gbaranor, *et al*., 2023b). Also, previous study by Gbaranor, *et al*., (2021) revealed that, most people in the rural areas and some in the urban areas depends on herbal medicine each time they have medical issues. WHO, whose report, revealed that 60% of the world's populations depend on herbal and traditional medicine, and 85% of the world's developing countries use traditional medicine in caring for diseases (Shuaib, M. *et al.,* 2023).Traditional African Medicine (TAM) is our socio-economic and socio-cultural heritage, surviving over 80% of the African population (Sunday *et al*., 2014; Elujoba *et al.*, 2005). In Ogoni, *T. africana* is called yagara (Gbaranor, *et al*., 2022). In other parts of Nigeria *T. africana* is commonly called Afou or "bere – foo-foo in Yoruba; Barafuta in Hausa; Ize in Bini; Eyo in Igala; Edikang in Efik; Ukwa in Ibo, (Olapade & Umeonuorah, 2014).

The phytochemical component of African Breadfruit consists of flavonoid, anthranoids, phlobotanin polyphenols, anthraquinones, saponins, alkaloids, and cardiac glycosides (Osabor,*et al.*, 2009).

Total protein (albumin and globulin) are produced by the liver and in the case of a liver damage, production of these proteins are reduced or completely ceased (Sunday, *et al*., 2021). The concentrations of the total protein, bilirubin and albumin may indicate the state of the liver and the type of damage (Yakubu *et al.*, 2005).

Cardiovascular disease induced by hyperglycemia is associated with alterations in serum lipid profiles (Laakso M, 1996; Steiner G, 1999; Massing *et al, 2001*). Alteration in serum lipid profiles are known in diabetics, which are likely to increase the risk of coronary heart disease (Laakso, 1996; Steiner, 1999; Massing *et al,* 2001).Study by Chattopadhyay and Bandyopadhyay, (2005) revealed that the levels of total serum cholesterol, triglycerides, total lipids, VLDL and LDL-cholesterol were reduced with *Azadirachta indica* leaf extract and its antihyperlipidemic effect could represent a protective mechanism against the development of atherosclerosis.

The role of nitric oxide (NO) in erectile physiology is well known and NO activates relaxation of corporal cavernosal smooth muscle tissue resulting in increased blood flow into the penis resulting in an erection (Kelvin P Davies, 2015).Erectile dysfunction is a common, multifactorial disorder that is associated with aging and a range of organic and psychogenic conditions, including hypertension, hypercholesterolemia, diabetes mellitus, cardiovascular disease, and depression. Penile erection is a complex process involving psychogenic and hormonal input, and a neurovascular nonadrenergic, noncholinergic mechanism (Burnett, 2007). Nitric oxide (NO) is believed to be the main vasoactive nonadrenergic, noncholinergic neurotransmitter and chemical mediator of penile erection (Burnett, 2007). Released by nerve and endothelial cells in the corpora cavernosa of the penis, NO activates soluble guanylyl cyclase, which increases 3′,5′-cyclic guanosine monophosphate (cGMP) levels (Burnett, 2007).Acting as a second messenger molecule, cGMP regulates the activity of calcium channels as well as intracellular contractile proteins that affect the relaxation of corpus cavernosum smooth muscle. Impaired NO bioactivity is a major pathogenic mechanism of erectile dysfunction (Burnett, 2007).

Materials and Methods

Collection, Identification and Preparation of the plant

Treculia africana was obtained from Baem Town, Khana Local Government Area of Rivers State, Nigeria. The plant was identified by the Department of Plant Science and Biotechnology, Rivers State University.

Method of Extraction

The *T. africana* seeds were dried in a hot air oven at 40-45 °C and seeds were grinded. 50g of grinded *T. africana* seed and 500 ml of ethanoic was measured and poured into a solvent extractor and extracted until the extract was formed. The extract was obtained using the rotary evaporator and the water bath to concentrate the extract before administration

Experimental Animals and Management

Twenty male wistar rats were obtained from Etche, Rivers State. The wistar rats, each weighing between 120-160 grams, were housed in special cages (5 rats/cage) under standard laboratory conditions in the animal house of Human Anatomy, Rivers State University. The animals were allowed to acclimatize for four weeks before treatment started. During this period, the animals were fed twice daily with standard laboratory diet and tap water.

Study Design

Twenty 20 male wistar rats were randomly selected and were grouped into 4 groups with 5 rats per group The administration of *T. africana* seeds extract was done for 14 days. The LD50 of *T. africana* was 450mg/kg of body weight as determined by Aderibigbe and Agboola, (2010).

Group 1(control); received 5ml of distilled water, Group 2 (low dose); received 250mg/kg of *T. africana* seed extract, Group 3 (medium dose); received 300mg/kg of *T. africana* seed extract, Group 4 (high dose); received 350mg/kg of *T. africana* seed extract.

Sample Collection

On the 15 days, the animals were anesthetized with chloroform soaked in cotton wool.

Blood collection

Blood was collected (5ml from each rat) via heart puncture using a 5ml syringe. The blood was put into heparin and ethylene diamine tetra acetic acid (EDTA) bottles.

Analysis of Sample

Blood collected was used for hormonal analysis as described by Bolon *et a*l (1997).

Statistical Analysis

Data are presented as mean ± SEM and were analysed using a one-way Analysis of Variance (ANOVA). $P < 0.05$ was declared as significant statistically.

Results

The results revealed that, there is significantly increase in the serum levels of total protein in all the treated groups when compared with control (Total protein control 51.40±0.51, low dose 61.60±0.51* medium dose 71.60±0.51*, and 71.80±1.07*). Total cholesterol significantly decreased when both medium and high dose were administered when compared with control (Total cholesterol control 2.34±0.05, medium dose 1.90±0.07*, high dose 1.96±0.19*). Also, nitric oxide significantly increases serum levels in the groups treated with *T. africana* when compared with control (Nitric oxide control 7.16±0.14, low dose 8.98±0.09*, medium dose 8.50±0.15* and high dose 8.02±0.11*), (Table 1).

Table 1 shows the effect of ethanoic extract of *T. africana* on some biomarkers in male wistar rats. Total protein, total cholesterol and nitric oxide were the parameters that were evaluated. From the table, the result showed that there was a significant increase in the mean values of total protein in male wistar rats that were administered ethanoic extract of *T. africana*. The increase was seen across all experimental groups (low, medium, and high dosages). The mean values of Total cholesterol levels were seen to decrease in experimental groups that received medium and high dosages of ethanoic extract of *T. africana*. This decrease was statistically significant. Furthermore, the mean values of total nitric oxide were observed to increase significantly. This increase was recorded to be statistically significant.

Table 1: Effect of Ethanoic Extract of *TreculiaAfricana* on Some Biomakers in Male Wistar Rats

	TOTAL PROTEIN g/l mean±SEM	**TOTAL CHOLESTEROL mmol/l** mean±SEM	**NITRIC OXIDE (umol/ml) mean**±SEM
CONTROL	**51.40±0.51**	**2.34±0.05**	**7.16±0.14**
LOWDOSE	**61.60±0.51***	**2.26±0.05**	**8.98±0.09***
MEDIUM DOSE	**71.60±0.51***	**1.90±0.07***	**8.50±0.15***
HIGH DOSE	**71.80±1.07***	**1.96±0.19***	**8.02±0.11***

Values are presented in mean±SEM, n=5, * p≤ 0.05 statistically significant compared to control

Discussion

African culture cherished traditional medicine and is an important component of African Traditional Religion (ATR). Traditional medicine has been used across the globe and it has been seen to be cheap, effective, available and affordable in our society. Tradition medicine has become major source of income to the traditionalists due to the fact that majority of the populace now depends on it for treatment of various illness.

Treculia africana is eaten regularly on daily basis by many people both male and female for survival and improvement of health, without taking cognizance of the aftermath effects.Hence, the need for this study. In the study, the findings shows that total protein significantly increased in its serum levels when *T. africana* seed extract was administered to all the treated groups when compared with the control group. This increased in serum levels of total proteins indicate that the liver is protected. The liver is one of the source of protein production and when liver is not in a good state, it affects protein production. Dietary source is another source of protein production. This shows that the increased in serum levels of total protein in all the treated groups could be due to the presence of essentials bioactive compounds in the *T. africana* seed extract and this may help to restore and protect the liver. This study agrees with previous studies by Akanbi, (2013); Uraku, *et al.*, (2016).Total protein is the total amount of two classes of proteins found in the fluid portion of your blood. These are albumin and globulin. Proteins are important parts of all cells and tissues. The liver produces total protein

(albumin and globulin) and in the case of a liver problem, proteins production decrease or ceased completely. From the table, ethanoic extract of *T.africana* caused an increase in the total protein, which is good for the growth of body cells and tissues and our health in general.

The study also revealed the significant decrease in the serum levels of total cholesterol in the groups treated with the medium dose and the high dose when compared with the control group.
This decreased in the serum levels of total cholesterol may be due the presence of phytocompounds which could be responsible for this reduction and thus could use as antihyperlidemia. Total cholesterol serum levels that are usually increase in diabetic people could be lowered with *T. africana* seed extract. Thus, *T. africana* seed extract may be useful in preventing the development of both hyperlipidemia and atherosclerosis in diabetic people.This study also agreed with previous study by Chattopadhyay and Bandyopadhyay, (2005). were *Azadirachta indica* leaf extract lowered the serum levels of total cholesterol.

The research revealed significant increase in serum levels of nitric oxide in all the treated groups when compared with the control group. This increase in serum nitric oxide could be beneficial to the male who is facing weak erection. This is because nitric oxide is involving in penile erection by allowing blood to flow into the penile tissues and thus could enhance reproductive activity in male. NO seems to play a major role in the regulation of sperm motility, hyperactivation, capacitation, and fertilization Banihani and Shatnawi, (2020

Conclusion

T.africana seed is eaten on daily basis by many people across South-South and South-East zones in Nigeria. The research revealed significant increase in the serum levels of total protein and this could protect the liver. Again, the findings revealed significant decrease in the serum levels of total cholesterol when *T. africana* was administered and this may be useful in preventing the development of both hyperlipidemia and atherosclerosis in diabetic people. The research revealed significant increase in serum levels of nitric oxide in all the treated groups with *T. africana*and this increase in serum nitric oxide could be beneficial to the male who is facing weak erection.

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