Short communication

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Phytochemical Screening and Biochemical Effects of Aqueous Seed Extract of *Xylopiaaethiopica* (Uda) on SelectedHaematological Indices in Male Wistar Albino Rats

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ABSTRACT

The biochemical effects of aqueous seed extract of *Xylopia aethiopica* (uda) were determined on selected haematological indices of male Wistar albino rats using standard methods. Twenty five adult male rats were selected according to their weights and were divided into five groups designated A,B,C,D and E of five animals per group. Group A (control) received distilled water (1.0mL/kg body weight) whereas Groups B,C,D and E organisms were treated with 1.0mg/kg body weight, 2.0mg/kg body weight, 3.0mg/kg body weight and 4.0mg/kg body weight of extract respectively. The administration of the extract was carried out twice daily for 14 days after which the animals were anaesthesized and blood samples were collected 24 hours after the last administration through cardiac puncture and haematological studies carried out. The result revealed highest values of packed cell volume and invariably highest haemoglobin concentration (Hb) in Group E animals compared to the other groups. Phytochemical screening revealed the presence of volatile oils, tannins, flavonoids and saponins while phytosterols, glycosides while alkaloids were absent. From the findings in this prospective study, *Xylopia aethiopica* seed extract has useful pharmacological bioactive compounds and as such could be used as tonic in traditional medicine and as immune booster.

Key words : haematological, indices, experimental, organisms, Wistar, rats.

INTRODUCTION

The exclusive use of herbal remedies to treat and manage ailments had served from the onset as the most important therapeutic approach available to man. However, the decline from its use due to the introduction of modern synthetic medicine, started at about the beginning of the 20th century up to the 1970's (Wills *et al.*, 2000). Traditional medicine accounts for about 30% of the health needs of the rural populace in most regions of African. It has been reported that traditional medicines are used by about 60% of the world population both in the developing and developed countries where modern medicines are predominantly used (Mythilypriya *et al.*, 2007).

Xylopia aethiopica is a tall evergreen, aromatic tree, growing up to 20m high. It is found in the lowland rainforest and moist fringe forest in the savanna zone of Africa and made up of several body parts; the leaves, seeds(fruits), stem barks and root barks. It is commonly known as Ethiopian pepper or African guinea pepper or Negro pepper. Its seeds have both medicinal and nutritional values (Burkhill, 1985) and is

used as spices, postpartum tonics and remedy or treatment for many ailments like bronchitis, asthma, rheumatism, neuralgia and amenorrhea in women (Burkhill, 1985). Other parts of the plant have been employed for different therapeutic preparations. It has been reported that prolonged use of *Xylopia aethiopica* without proper monitoring of the usage can cause adverse effects on the reproductive system of man by affecting the sperm count, motility and viability (Burkhills, 1985)

Xylopia aethiopica have been used in many herbal preparations to produce xylopic acid, a substance which has been found to have antimicrobial effects (Karioti *et al.,* 2004). The seed extract of Xylopia aethiopica has also been reported to have antibacterial (Asekun and Adeniyi, 2004;Konning *et al.,* 2004 Kuete, 2010), antifungal (Tatsadjieu *et al.,* 2003), anti-plasmodial (Boyom *et al.,* 2003), anti-hypertensive and diuretic (Somova *et al.,* 2001) effects. It also has antioxidant activity (Karioti *et al.,* 2004) and cytotoxic effects on a wide range of cancer cell lines (Ju *et al.,* 2004). It has also been reported that the seed extracts of *Xylopia aethiopica* contain plant lipids that enhance healing from diverse ailments due to their antioxidant and anti-inflammatory properties (Azeb *et al.,* 2004). *Xylopia aethiopica* seeds are beneficial to man's health owing to the fact that they are immunostimulants and immune boosters (Bendich, 1993: Al-Mamary, 2002).

Xylopia aethiopica seeds have been mainly used traditionally as spices and condiments or as pepper substitute in Europe, Asia and Africa. In Southern Nigeria *Xylopia aethiopica* seeds have been administered medicinally as postpartum tonic to women that gave birth to arrest bleeding and induce placental discharge by traditional birth attendants. The seeds have also been used to stimulate fertility in women and restore the uterus to normal condition after birth. The sauce is usually given to women after delivery to relieve pains, promote healing and to facilitate lactation.

The essential oils, resin, annonacein, reberoside and avocein which can be isolated from the seed of thisplant have been reported to have antimicrobial effects against Gram positive bacteria such as *Bacillus subtilis* and *Staphylococcus aureus*; Gram negative bacteria such as *Pseudomonas aeruginosa* and the yeast-like fungus *Candida albicans* (Boakye-Yiadom *et al.,* 1977; Tatsadjieu *et al.,* 2003; Asekun and Adeniyi 2004; Okigbo *et al.,* 2005)

MATERIALS AND METHODS.

Plant material procurement

Dried seeds of *Xylopia aethiopica* (Uda) were purchased from the Eke market, Afikpo, Ebonyi State, Nigeria and was identified / authenticated by Dr. M. C. Okafor, the herbarium curator, Department of Science Laboratory Technology, Akanu Ibiam Federal Polytechnic Unwana (AIFPU), Afikpo, Ebonyi State, Nigeria and voucher samples were kept in the herbarium of Science Laboratory Technology Department for reference purposes.

Preparation of Seed Samples:

The dried seeds of *Xylopia aethiopica*were ground to fine powder using manual grinder and then sieved with 10 micrometer sieve. The powder was used in the extraction process while the remaining powder aliquots were used for phytochemical screening.

Preparation of Aqueous Extract of *Xylopia aethiopica* :

Xylopia aethiopica extract wasprepared by adding 75g of the dried and grinded powdered sample into 1L of distilled water and boiled for one hour with intermittent shaken to mix very well. The mixture was filtered using a sterile white double-folded cloth and then allowed to cool. The filtrate was concentrated by heating in a water bath to allow for the loss of the solvent by evaporation leaving behind the extract of appropriate concentration that was used for the oral administration of the test organisms

and was stored in a refrigerator until analysis..

Experimental Animals :

This prospective study was carried using twenty-five adult male Wistar (albino) rats (100g-200g) that were purchased from the animal house of Nnamdi Azikwe University, Awka, Anambra State, Nigeria. These animals were kept in cages in their respective groups in the Biology Laboratory of Akanu Ibiam Federal Polytechnic, Unwana for 2 weeks to acclimatize with the laboratory condition (ambient temperature 24-28^{0}C and 12 hour light – dark cycle). The animals had free access to solid pellet diet and clean water *ad libitum* throughout the study.

Experimental design

Twenty-fiverats were weighed and divided into five groups of five rats per group according to their weights and labeled A, B, C, D and E. Animals in all groups received, by oral administration the following:

Group A (control) : Distilled water (1.0ml/kg body weight)
Group B (test group 1) : *Xylopia aethiopica* extract (1.0mg/kg body weight)
Group C (test group 2) : *Xylopia aethiopica* extract (2.0mg/kg body weight)
Group D (test group 3) : *Xylopia aethiopica* extract (3.0mg/kg body weight)
Group E (test group 4) :*Xylopia aethiopica* extract (4.0mg/kg body weight)

The administration of the extract was carried out twice daily; morning and evening for another two weeks after acclimatization. The animals were anaesthesized with chloroform and blood samples were collected from the heart through Cardiac puncture in labeled EDTA anticoagulant bottles, 24 hours after the last administration of the extract.

And the effects of the extract was detected by determining the rat's Packed Cell Volume(PCV) and Haemoglobin concentration(Hb).

Determination of Haematological Parameters. Whole blood samples were collected into heparinized capillary tubes, filled up to about 2/3 the length, sealed with plasticine and centrifuged at 3 000 r/min for 10 min. The packed cell volume (PCV) was determined using haematocrit reader, and the haemoglobin concentration (Hb) was calculated from the PCV values according to the methods outlined by Tondon *et al.*(2009).

Phytochemical Screening :

A portion of the*Xylopia aethiopica* seed powder was subjected to phytochemical screening for the presence ofvolatile oils, phytosterols, tannins, glycosides, flavonoids, saponins and alkaloids, using the methods as outlined in Harborne(1984).

Statistical analysis of data :

Analysis of variance (ANOVA) for the data collected was carried out using Statistical Package for Social Science (SPSS) software for window version 15.1 Chicago, USA and post hoc testing was performed for inter-group comparison using the least significant difference (LSD). All data were expressed as means ± standard error of mean (SEM). The p-values of <0.05, were considered statistically significant.

RESULTS

Phytochemical screening of *Xylopia aethiopica* :

The result of the phytochemical screening of the aqueous seed extract of *Xylopia aethiopica* is shown in Table 1. The result revealed the presence of volatile oils, tannins, flavonoids and saponins while phytosterols, glycosides and alkaloids were found to be absent.

Determination of Haematological Parameters

The result of the PCV determination (Table 2) shows that there were progressive

increase in PCV values, from groups B, C,D and E with group E having the highest values when compared with group A which is the control. It could also be observed from the results that Haemoglobin concentration (Hb) being a factor of the PCV, that the Hb values for groups B,C,D and E increase in the same trend as the PCV when compared with the control (group A).

Table 1: Phytochemical screening of aqueous seed extract of *Xylopia aethiopica*

Constituents	Aqueous seed extract
Volatile oils	+
Phytosterols	-
Tannins	++
Glycosides	-
Flavonoids	++
Saponins	++
Alkaloids	-

Key: absent –; present +; copiously present ++

Table 2: Effects of Seed Extracts of *Xylopia aethiopica* on Packed Cell Volume (PVC) and Haemoglobin concentration (Hb)

Group	Treatment	PVC (%)	Hb (g/dl)
A(control)	Distilled water(1.0ml/kg b.wt)	36.2 ± 0.20	12.1±0.18
B	Extract(1.0mg/kg b. wt)	40.2 ± 0.15	13.4±0.20
C	Extract(2.0mg/kg b.wt)	41.0 ± 0.08	13.7±0.16
D	Extract (3.0mg/kg b.wt)	43.3 ± 0.16	14.4±0.18
E	Extract (4.0mg/kg b. wt)	44.1 ± 0.18	14.6±0.21

Values were expressed as average means of 5 determinations ± standard error of mean (SEM).

DISCUSSION

Phytochemical analysis is very useful in the evaluation of some bioactive and biological components of seeds, fruits and other parts of plants. This present study assessed the phytochemical screening, and the effects of aqueous seed extract of *Xylopia aethiopica* on PCV and Haemoglobin concentration of adult male rats.

The result of the phytochemical screening revealed the presence of volatile oils, tannins, flavonoids and saponins while phytosterols, glycosides and alkaloids were absent.

The invaluable pharmaceutical properties reported for *Xylopia aethiopica*may be attributed to the presence of these bioactive compounds such assaponins, flavonoids etc(Aguwu *et al*., 2010; Adimoelja, 2000; Ezeamuzieji *et al*., 1994). Epidemiological studies have shown that flavonoids intake is inversely related to mortality from coronary heart diseases and other incidences of heart attacks (Shills and Young, 1992). Odukoya *et al.* (2007) reported that*Xylopia aethiopica*by virtue of its flavonoids

contents exhibited antioxidant properties by inhibiting lipid per-oxidation and glutathione oxidation, and this could slow down aging process and improved immune response.Saponins also have been found to have anti-inflammatory, anti-haemolytic and immune-stimulating activities which validates the traditional use of the extract as immune booster (Bendich, 1993, Al-Mamary, 2002).

The results in Table 2 revealed that there was progressive effects of the extract on the PCV and Hb of the test organisms in the various groups (B,C,D and E) when compared with the control group A. These increased PCV and Hbis indicative that the seed extractof *Xylopia aethiopica* contains bioactive agent(s) that stimulated the production of red blood cells which brought about these increase in PCV and invariably the Hb. These findings agreed with an earlier work of Marieb (2009) and Taiwo *et al,*who reported that aqueous extract of *Xylopia aethiopica* was able to increase the levels of PCV and Hb.

CONCLUSION

From the findings in this prospective study, it is evident that *Xylopia aethiopica* seed extract has useful bioactive compounds that could enhance the production of red blood cells and hence increase in PCV and Hb which supports the claims of the efficacy of the plant as a potential tonic in traditional medicine and as immune booster. Phytochemical screening shows that the sample contains useful bioactive components (flavonoids, saponins, tannins) which are responsible for its antioxidant and antimicrobial effects that validates its usefulness in ethno-medicinal practices.

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