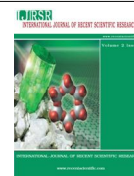




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EFFECT OF XYLOPIA AETHIOPICA PLANT EXTRACT ON SEMEN QUALITY OF THE SPRAGUE DAWLEY RATS

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ABSTRACT

Xylopiya aethiopyca commonly known as “African guinea pepper” or “Ethiopian pepper” is a popular pepper soup ingredient in Nigeria with several medicinal properties, but recently, its potential hazard to human health was observed. Sprague Dawley rats were fed with 25 mg Xylopiya aethiopyca for between 7 and 42 days, the animals were sacrificed and semen analysis was performed. When results were compared with the control rats, Xylopiya aethiopyca taken regularly progressively reduced sperm count and sperm motility. At the 42nd day of administration of Xylopiya aethiopyca, sperm count had reduced from $56 \times 10^6/\text{ml}$ to about $6 \times 10^6/\text{ml}$, while motility reduced from 82% to about 35%. We conclude that prolonged intake of Xylopiya aethiopyca can lead to reduction in sperm count and reduction in motility which may lead to secondary infertility.

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Key words: Xylopiya aethiopyca, semen, rats, medicinal plant.

1. INTRODUCTION

Xylopiya aethiopyca is an important medicinal plant in West Africa because it contains a variety of complex chemical compounds. The fresh and dried fruits, leaf, stem bark and root bark essential oils show various degrees of activity against several bacteria and certain fungi (Okigbo *et al.*, 2005; Schelz 2006). It has also been used for the treatment of dyspepsia, cough and fever and in the food industries as flavours and in the cosmetic industry as fragrances (Evans 2003). The oil has also been used as a mosquito repellent (Adewoyin *et al.*, 2006). It has antioxidant properties, and the principal constituents are mono- and sesqui-terpene hydrocarbons. The plant is widely distributed in the West African rainforest from Senegal to Sudan in Eastern Africa, and down to Angola in Southern Africa (Irvine 1961; Burkill 1985) where it is mostly used for local cooking, especially in the preparation of what is referred to as ‘the African pepper soup’ (Burkill 1985).

The tree contains annonacine (an alkaloid), volatile aromatic oils (Burkill 1985), diterpene and xylopic acids (Tairu *et al.*, 1999). Xylopiya aethiopyca also contains substances such as zinc (Smith 1999), lipids, proteins, carbohydrates, iodine, saturated and unsaturated fatty acids, mono- and sesqui-terpenoids, α and β pinenes, myriene, p.cymene, limonene, linalool and 1, 8, cineole (Faulkner *et al.*, 1985).

Xylopiya aethiopyca is an evergreen tree growing up to 20m tall and 60-70cm diameter. It has a straight stem with slightly stripped and smooth bark. The fruit is aromatic, quite pungent and slightly bitter, comparable to a mixture of cubed pepper and nutmeg. They look like small twisted bean-pods and are dark-brown cylindrical, 2.5-5cm long and 4-6cm thick. The contours of the seed are visible from the outside. Each pod contains 5-8 kidney shaped seeds of approximately 5mm in length (Ekong and Ogan 1968). The aim of the work was to determine the effect of the popular pepper soup ingredient Xylopiya aethiopyca on the prostrate.

MATERIALS AND METHODS

A total of sixty rats of the Sprague Dawley type were used for the experiment. Mating was achieved by exposure of the male rats to female rats for three days, after which they were separated. The animals were subdivided into 3 major groups of A, B, and C: Group A was the control and it was made up of 20 rats on normal diet. Group B was made up of 40 rats sub grouped into four, each consisting of 10 rats of 5 females and 5 males. They were fed for 7, 14, 21 and 42 days respectively with 25 mg of Xylopiya aethiopyca. Fresh fruits of Xylopiya aethiopyca were obtained from Koko town, Delta State, Nigeria, sundried for 7 days at $32 \pm 2^\circ\text{C}$. They were thereafter milled into a fine powder and stored under room temperature until used. Xylopiya aethiopyca was administered with the rats’ normal feeds. The amount of the feeds consumed was calculated by subtraction of the left over feeds from the weighed feeds for each day, while

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the amount of *Xylopi*a consumed was equal to the measured quantity (25mg) given with the first feeds for the rats, for each day. The animals were subsequently sacrificed. Semen analysis was done to observe the effects of *Xylopi*a *aethi*o*pica* on the male spermatozoa. This was possible by dissecting out the epididymis of the male rats and isolating the ductus epididymis from where semen was collected and analyzed by standard methods.



Fig 1 Fresh fruits of *Xylopi*a *aethi*o*pica*



Fig 2 Dry fruits of *Xylopi*a *aethi*o*pica*

RESULTS

There was duration dependent decrease in the quality of semen. The mean values for progressive motility, sluggishness and count of sperm for one week and six weeks feeding with *Xylopi*a *aethi*o*pica* were respectively significantly different from control values. However, with respect to sperm morphology, the values for the durations of feeding were not significantly different from the control value.

Table 1 Semen Analysis

	Without <i>Xylopi</i> a <i>aethi</i> o <i>pica</i> (Control)	One Week After <i>Xylopi</i> a <i>aethi</i> o <i>pica</i>	Six Weeks After <i>Xylopi</i> a <i>aethi</i> o <i>pica</i>
Sperm Count: x 10 ⁶ /ml	56.44 ± 3.97*	41.58 ± 2.23	6.24 ± 0.26
Morphology %	83.6 ± 1.14	82.0 ± 4.90	82.0 ± 5.70
Progressive Motility %	82.6 ± 2.07*	67.2 ± 1.92	35.6 ± 3.65
Sluggishness %	3.8 ± 0.84*	6.8 ± 1.30	17.2 ± 1.92

DISCUSSION

Dietary spices contain a wide variety of volatile and non-volatile chemicals obtained from parts of plants such as the seeds, berries, roots, pods, and the barks (Etoundi *et al.*, 2010), majority of which are used as medical plants for the treatment of diseases. Medicinal plants have been used for centuries for the treatment of several diseases and to promote good health (Lewis and Elvin-Lewis 2003). People that use spices in their diets are known to have low incidence of chronic diseases (Duthie *et al.*, 2003).

One benefit of spices and herbs is that they contain bioactive components such as polyphenols that can reduce oxidative stress and modulate harmful biological pathways. Several polyphenols have been shown to have scavenging activity (Sawa *et al.*, 1999) as well as inhibiting amylase and glucosidase activities (Kim *et al.*, 2000). *Xylopi*a *aethi*o*pica* commonly known as “African guinea pepper” or “Ethiopian pepper” has several medicinal properties; it is anti-tumour, anti-asthmatic, anti-inflammatory and antimicrobial. It has been used for

the treatment of hypotension and coronary vasodilatory conditions (Fleischer 2003). It has traditionally been used for the treatment of cough, dysentery, boils and sores (Burkhill 1985). The fruit of *Xylopi*a *aethi*o*pica* is used as a carminative, and as a post-partum tonic. Other medicinal uses are for stomach ache, treatment of bronchitis, biliousness and dysentery (Iwu 1993). The fruit has been shown to have antimicrobial action against gram positive and negative bacteria, *Candida albicans* [20], stomach-aches, dysenteric conditions, febrile pains and rheumatism (Abbiw 1990). It has also been used as an insecticide and mosquito repellent (Fleischer 2003), but recently its harmful effects were observed.

In this study, we administered 25 mg of *Xylopi*a *aethi*o*pica* to Sprague Dawley type of rats orally for up to 42 days and observed a progressive reduction in motility of sperm cells and a reduction in the number of sperm cells. Abnormality in sperm morphology which is a potent factor in assessing male fertility was not observed in this experiment as there was no significant difference between the percentage of morphologically abnormal spermatozoa in the control and the test sperm. Therefore, the adverse effect of *Xylopi*a *aethi*o*pica* on the fertility of the male rats used in this study was on sperm count and sperm motility.

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