



## Aphrodisiac Plant *Pausinystalia yohimbe* Induces Myocardiac Histological Normalcy in Wistar Rats

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**ABSTRACT:** The root of *Pausinystalia yohimbe* (k. Schum.) Pierre ex Beille, is commonly used by traditional herbal practitioners in Nigeria and around the globe without a safe dose regimen to treat erectile dysfunction and other related reproductive disorders. The present study examines some histological indices in male Wistar rats (*Rattus norvegicus*) treated orally with *P. yohimbe* methanol root using twenty five Wistar rats divided into five groups (n=5) of four treatment groups and one control group. The control group was administered 10 mL/kg distilled water only, while treatment groups received 25, 50, 100 and 200 mg/kg b.w of *P. yohimbe* root extract by oral cannula for 14 days. On day 15, animals in all group were anaesthetized, their heart were isolated and processed histologically. The results showed normal histological indices of the hearts examined, which were resemblance of, and significantly not different from the control. Therefore, the present study provides support for the safety profile of *P. yohimbe* herbal preparation in a concentration of doses administered to male Wistar rats. However, further studies may attempt to look at higher doses under similar circumstances.

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Medicinal plants have long been used to treat all types of reproductive disorders. Unspecified amounts of infusions and decoctions of the studied plant's *materia medica* are frequently consumed without regard for the lethal and other antagonistic effects. Meanwhile, herbal medicines are thought to be safer than synthetic drugs because phytochemicals in plant extracts target biochemical pathways. The latent destruction or impairment of internal organs caused by indiscriminate use of herbal supplements or drugs has necessitated caution in their use. There is also a need for extensive research into their effect on the visceral organs, as detoxification is a sole function of these vital organs (Sandigawad, 2015). *Pausinystalia yohimbe* is a sex-enhancer ethnobotanical plant that is distributed in almost all tropical countries and regions including America, India and Nigeria. *Pausinystalia yohimbe* (K. Schum.) Pierre ex Beille belongs to the

family Rubiaceae. It is a tree of tall seldom-exceeding 18 m in height and 1.2m in girth. It is abundant in the forest. The Bark is grey, smooth; slash creamy– white. It has fibrous leaves that are 7 – 20 cm long by 3.5 – 7.5 cm broad, the shape of the leaves varies from ellipsoid to oblong, sharply acuminate, narrowly cuneate, and rather thin; with 5-10 pairs of lateral veins. Its' stalk is short, about 2.5cm long or almost stalkless. Its Flowers (May to Sept.) are white, scented with axillaries and terminal panicles. The fruit (Jan to Mar) is spindle-shaped, measuring up to 2cm long with narrowly elongated winged seeds. It exhibits tap root system, and the root can be erect, bend, folded, and branching. It is found to extend from southwestern Nigeria to Gabon and Zaire. Yoruba call it 'Agbo idagbon' while Edo call it 'nikiba' (Kaey and Onochie, 1989). Literature reports on aphrodisiac/sex-enhancing activity of medicinal plants have

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demonstrated the presence of some compounds that aid the actions of *P. yohimbe* to include alkaloids, flavonoids, tannins, polyphenols, and sterol among others. Some of these compounds have their usefulness when used moderately but elicit toxic effects when abused whereas some are anti-nutrients that impart negatively on the internal organs and general wellbeing of individual animals, human being inclusive. Because metabolic enzymes that aid biotransformation and subsequent elimination of these compounds are not equally distributed among all species, the species of these animals could also be considered. Due to these factors, the safety of herbal drugs remains a global concern. (Calixto, 2000). The *materia medica* of the studied plant has been widely used by traditional medicine practitioners for the treatment of a wide variety of reproductive ailments (Adeniyi *et al.*, 2007; Ojatula, 2017); with various claims that it can be used as aphrodisiac agent in the treatment and management of low libido and infertility (Ojatula, 2017), to lower blood pressure (Ojatula, 2019) and as anti-oxidative agent (Authors' unpublished data). Due to the many applications of *P. yohimbe* plant in ethnomedicine, there is the need to investigate the effect on the cyto-architecture of visceral organ, the heart. Therefore, the objective of this paper is to evaluate some histological evaluation of methanol root extract of *Pausinystalia yohimbe* (k. Schum.) Pierre ex Beille on wistar rats (*Rattus norvegicus*).

## MATERIALS AND METHODS

The current study was experimental, with an animal model used to justify a human dose. The ethics and research committee of the Faculty of Basic Medical Sciences, University of Benin, Benin City, Nigeria, approved the study.

*Plant Collection and Authentication:* *Pausinystalia yohimbe* roots were obtained from Ugowan Village, near the boundary of Okomu National Park, Udo, Edo State, Nigeria. The tree was identified and authenticated at the Department of Plant Biology and Biotechnology, Faculty of Life Science, University of Benin, Nigeria. A sample plant was deposited at the Departmental herbarium, PhytoMedicine Unit with the voucher number UPBHx1066.

*Extract Preparation:* The fresh roots of *Pausinystalia yohimbe* collected were thoroughly washed and air dried inside the laboratory until constant weight was obtained. They were pulverized using an electric blender (RN4S, Mayer, China) and sieved to obtain the powdered form. One thousand two hundred grams (1,200 g) of the powdered form was extracted in 99% absolute methanol using Soxhlet apparatus. The

extraction was carried out in cycles at a temperature of 50 °C and each cycle lasted for 48 hours. Extract was evaporated to near dryness and as well, concentrated on a water bath under reduced pressure and low temperature. The slurry from methanol extract was later weighed and reconstituted in distilled water to give the required doses used in the study.

*Experimental Animals:* Twenty five inbred male Wistar rats with a mean weight of 202.25g were housed in a wire gauze cages. Already acclimatized rats in the fly proof Laboratory animal unit with ambient temperature (26-28 °C) and adequate ventilation at the Department of Anatomy, University of Benin, Benin City, Edo State, Nigeria were used for this study. They were fed with standard growers mash (Vita Feeds Nigeria limited), and clean tap water was provided *ad libitum*. The animal study was used in accordance with National Research Council (NRC) Guide for the care and use of Laboratory Animals (NRC, 1996). The rats were selectively assigned to group (A, B, C, D and E) n=5.

*Study Design:* The animals were subjected to empirical and physical measurements both before and after the experimental study (Odigie and Achukwu, 2015)). The rats were selected one at a time using a hand towel, while oral cannula was used to administer appropriate concentrations of the extract to the rats in group (B, C, D and E) ranging from (25, 50, 100, and 200 mg/kg) by oral administration for 14 days. Meanwhile, group A served as the untreated group (control), and received 10 mL/kg distilled water.

*Grossing and Tissue Processing:* At the end of the experimental study, all the animals (treated and untreated) were sacrificed by cervical dislocation. The visceral organ of interest, the hearts, were excised and observed grossly. They were cut at 3-5mm and were processed by the use of an automatic tissue processor (Hestion -ATP7000 tissue processor-Germany) for dehydration, clearing, and impregnation. After embedding, sections were obtained at 3-5 microns using digital rotary microtome (Hestion ERM 4000 Germany).

*Photomicrography:* Mayer's haematoxylin and eosin stained sections were examined using the Swift (R) binocular microscope (Olympus, England) with an in-built lighting system at x100 magnifications. Histological scoring was reviewed by two pathologist at the University of Benin, Teaching Hospital (UBTH), Benin City, Nigeria.

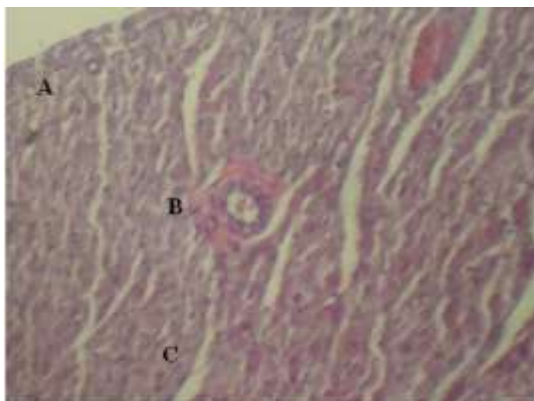
*Location and Duration of Study:* The experimental study was conducted in the animal house of the

Department of Anatomy, Faculty of Basic Medical Science, University of Benin, Benin City, Edo State, Nigeria. The histological investigation was carried out at the said Department. The study lasted for four months.

**Analyses:** Pathologists from the Department of Clinical Pathology at the University of Benin Teaching Hospital (UBTH) in Benin City, Nigeria, examined the histology plates for lesions and interpretations as described by Neel *et al.* (2007).

## RESULTS AND DISCUSSION

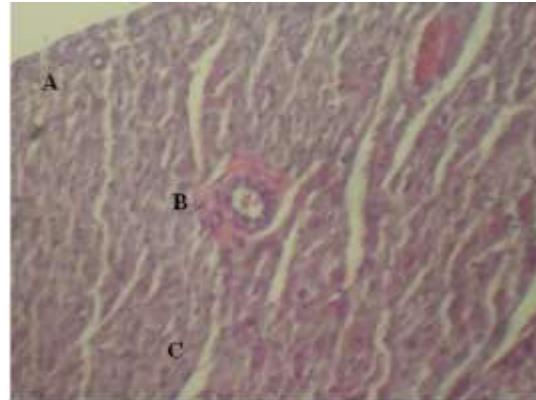
The findings of this study revealed that no physical signs of major behavioural changes were observed in the experimental rats during the course of the study. When compared to untreated groups, gross examination of the visceral organ, the heart, of both treated and untreated rats revealed normal colouration, size, and consistency. Furthermore, when matched with untreated rats for comparison, histological indices (cyto-architectures) were of normal histological representation of the visceral organ (heart) examined, as there were no observable lesion, myofibre degeneration, and necrosis with inflammatory cellular infiltrates. The sections of the heart body from the treatment (B, C, D, & E) groups of experimental animals that received the administration of graded doses of the methanol extract of *Pausinystalia yohimbe* root induced normal myocardiac cyto-architecture as shown in Figures 2, 3, 4 & 5 resemblance of the control group (Figure 1).



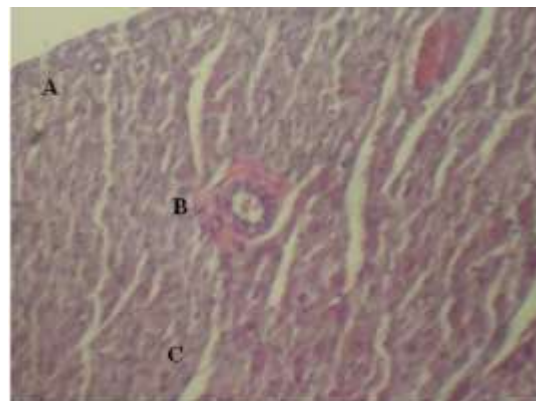
**Fig 1** (GROUP A): Photomicrograph representing the “Control” section of the heart body (Original magnification x 100). This shows bundles of myocardiac fibres (A), coronary vessel (B), and interstitial spaces (C).

Herbal preparations are used for therapeutic purposes in many countries around the world (Venukumar and Latha, 2002). Herbal drugs, despite being natural, can have serious side effects on the body, ranging from cancer to malfunctions of vital organs such as the

heart, liver, kidney, and lungs, as well as death (Aschwanden, 2001). They have the potential to cause a wide range of negative effects, particularly when used to treat chronic diseases such as hypertension and diabetes mellitus (Ezekwesili *et al.*, 2011).

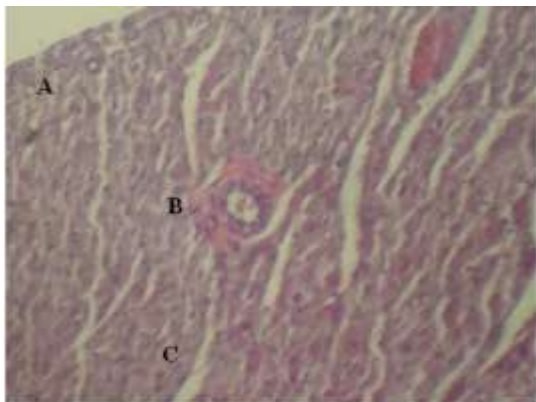


**Fig 2** (GROUP B): Photomicrograph representing the treatment section of the heart body (group B), that received 25 mg/kg of *P. yohimbe* for 14 days. (Original magnification x 100).



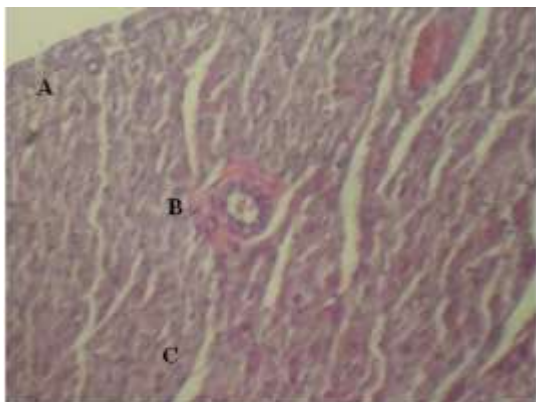
**Fig 3** (GROUP C): Photomicrograph representing the treatment section of the heart body (group C), that received 50 mg/kg of *P. yohimbe* for 14 days. (Original magnification x 100).

Given the multifunctional morphological makeup of the heart, liver, and kidney, it is critical to critically examine these distinct and vital visceral organs (Odigie and Odigie, 2014). The heart is especially important for pumping oxygenated blood to other body parts, hormones and other vital substances to various parts of the body, receiving deoxygenated blood and carrying metabolic waste products from the body and pumping it to the lungs for oxygenation, and maintaining blood pressure (Author’s unpublished data). As a result, it is critical to examine this organ (heart) in order to avoid a cellular breakdown as a result of indiscriminate consumption of herbal preparations. There appears to be little or no documentation on the histological adverse effects of *P. yohimbe* root extract in rats following oral administration, which could act similarly in humans.



**Fig 4** (GROUP D): Photomicrograph representing the treatment section of the heart body (group D), that received 100 mg/kg of *P. yohimbe* for 14 days. (Original magnification x 100).

The process of histo-cellular normalcy involves enhancement of the membranes structural and functional integrity. In the present study, *P. yohimbe* root extract has not acted as toxin and does not have deleterious effect on the studied visceral organ of rats at the dose levels of 25, 50, 100, and 200 mg/kg respectively, thereby, promoting their cellular integrity and causing cellular enhancement in membrane permeability and cell volume homeostasis. This result does not agree with the findings of Ezekwesili *et al.* (2011), whereby prominent histological changes were found in the visceral organs of rats treated intraperitoneally for 28 days. These observations, however, may be due in part to dose relativity, route of administration, or duration of administration (Odigie and Odigie, 2014). Remember that in the former study, higher doses of *A. torta* extract (2000 mg/kg) were administered intraperitoneally, whereas doses in the latter (present study) were lower oral doses of 25, 50, 100, and 200 mg/kg, respectively.



**Fig 5** (GROUP E): Photomicrograph representing the treatment section of the heart body (group E), that received 200 mg/kg of *P. yohimbe* for 14 days. (Original magnification x 100).

Given the ongoing research, it is clear that doses as high as 200 mg/kg in this study are insufficient to cause pathological changes in rats. Although the NRC (1996) reported that the acute toxicity (LD<sub>50</sub>) of medicinal plant extract in experimental animals (562.3 mg/kg body weight) may not be considered an ideal index of toxicity because this parameter is dependent on the species of animal used as well as inherent physiological variations, it may serve as baseline data for sub-lethal dose manipulations. The observed LD<sub>50</sub> (NRC, 1996) was performed on albino mice weighing (16-35g), which is unquestionably smaller in body weight than the Wistar rats (150-195g) used in the current study.

**Conclusions:** As a result of the preceding, our study suggests that oral administration of *P. yohimbe* root extract is safe at lower doses of 25, 50, 100, and 200 mg/kg body weight than intended for human use. It shows no histologically significant changes in the hearts of the test animals given orally. This finding lends credence to the safety profile of *P. yohimbe* herbal administration at lower concentrations. The standard scientific, safe dose regimen used by herbal practitioners, on the other hand, remains in doubt.

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