

EFFECT OF DENNETTIA TRIPETELA (MMIMI) SEED INTAKE ON THE IOP OF NORMOTENSIVE EMMETROPIC NIGERIAN IGBOS

BY

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ABSTRACT

D*ennettia Tripetala (mmimi)* is a well known forest fruit from the family annonacea and spicy indigenous plant and has been found to contain lots of minerals, vitamins, alkaloids and trace elements which are of medicinal importance. The study was aimed at investigating the effect of *Dennettia Tripetala (D. Tripetala)* on the intraocular pressure of normotensive emmetropic Igbos of Eastern Nigeria. Forty volunteers (mean age 23.36 ± 3.60 yrs) were used for the study. The IOP of each subject was measured pre and post ingestion of 0.75g of *D. Tripetala* seed at 30mins interval for 120 minutes. The findings showed peak reduction of IOP after 60mins (11.20mmHg, representing 25.64% reduction) of consumption and increased towards baseline (15.6mmhg). Results also showed slight reduction of IOP at the 90mins (12.96mmHg induced value) and 120mins (14.40mmHg induced value) post ingestion. The peak effect of *D. Tripetala* was found to be statistically significant ($p > 0.05$). It is recommended that intake of *D. Tripetala* seed be encouraged especially among glaucomatous individuals.

KEYWORDS: *Dennettia Tripetala*, flavonoids, oleoresins, intraocular pressure, glaucomas

INTRODUCTION

Dennettia Tripetala is a well-known forest fruit and spicy indigenous medicinal plant. It is widely domesticated in the Southern, Eastern and Western part of Nigeria¹.

Dennettia Tripetala is commonly known as pepper fruit by the English, "mmimi" by the Igbos, "Nkaika" by the Ibibio and Efik, "Imako" by the Urhobo tribe of the Niger-Delta region, and "Igeri" by the Yorubas. It is a common ethnomedicinal plant in West Africa, which appears red when ripe and green in an unripe form with a pungent spicy taste. The parts used include the leaves, fruits, seeds, roots and stem². A survey of existing literatures shows that pepper fruits contain *Dennettia* essential oils and pheolic acids³, ethanol⁴, alkaloids⁵, ethylacetate, flavonoids, tannis and glycosides. Indications show that the rich presence of a type of essential oil called oleoresins determines the aromatic flavouring, colouring and pungent properties of pepper fruits. It also contains a hexanolic constituent (n-hexane) which is toxic to *Aedes aegypt* larvae³. Also it was found out that 80% of *Dennettia* oil contains a natural nitro compound called β -Phenylnitroethane which boosts the insecticidal activity of *Dennettia*

*Tripetala*⁶. Vanillin, dennettine (a new 2, 6-dimethoxy-chrome), argentinine were isolated along side with uvariopsine from *D. Tripetala*⁷.

Elemental analysis showed that *D. Tripetala* contains mainly calcium and iron. Others are magnesium, zinc, manganese and copper. Generally, the fruit contains minerals, vitamins, oils, iron flavours⁸, crude proteins, fibre, ash, carbohydrate, sulphur⁹.

Some of the fruit extracts have been shown to be active as antifungal agents against *Sacchomyces Cervisae*, *Candida Triopicalis*, *Candida Sp.*, *Cryptococcus Sp.*, *Geotrichum Sp.*, *Rhizopus Stolonifer*, *Aspergillus* and *Fusarium Sp.*². It can also serve as insecticide against 3rd instar larvae of *Aedes aegypt* mosquito, bioinsecticides for the control of rice weevil *Sitopulus*, *Zeamais*¹⁰. Medicinally, the leaves and fruits of *D. Tripetala* is used for cough treatment and enhancing appetite. In Igboland, the fruits and seed are sign of hospitality for visitors.

Selah *et al*¹¹ recorded an epidemiological association between those who have a diet rich in fresh fruits and vegetable and a decreased risk of cardiovascular disease and certain forms of cancer. Intraocular pressure is the pressure within the eyeball as a result of the constant

formation and drainage of the aqueous humour. It is the internal pressure of which allows the eye to hold on to its shape and function properly. Intraocular pressure is controlled primarily by the rate of secretion or rate of drainage of the aqueous humour. These will be building up pressure leading to increased risk of optic nerve damage, a pathological condition called glaucoma.

Quigley¹² rated glaucoma as the second leading cause of vision loss worldwide. He also estimated that 66.80 million people are affected by glaucoma worldwide and 6.70 million are bilaterally blind because of the disease. It was said to affect individuals of all age groups but is more prevalent after the fourth decade of life. Black subjects, in comparison with Caucasian subjects are known to have increased risk of optic nerve damage caused by glaucoma¹³. Intraocular pressure is essential in visual health because it sustains the metabolism of the cornea and lens¹⁴. Generally, the normal range of IOP value is between 13mmHg to 21mmHg. IOP above these values are considered to be pathological resulting in glaucoma¹⁵.

Considering the fact that *D. Tripetala* is used among others for therapeutic purposes, its systemic effect may be oblivious. Therefore this work is geared towards determining the effect of *Dennettia Tripetala* seed on the IOP of normotensive emmetropic Nigerian Igbos.

METHOD

Forty healthy young volunteers (mean age 23.36 ± 3.60 yrs) of Abia State University Uturu were used for the study. These subjects passed the inclusion and exclusion criteria used for the study. After informed consent was sought and obtained from each of them, the pre-test and post-test experimental design was used in this study.

The subjects were selected after a thorough case history, external examination and funduscopy were carried out to ensure good ocular and systemic health. Subjects with ocular and systemic pathologies were not included in the study. Only emmetropic subjects as determined by standard optometric objective and subjective refraction with normal IOP range of 12 - 21mmHg¹⁵ (measured using Schiotz tomometer) were used for study.

Fresh *Dennettia Tripetala* fruits used for the study were obtained from a local market in Uturu Abia State, after it was authenticated for

consumption by a renowned Botanist from Abia State University Uturu.

The fruits of *D. Tripetala* were washed with water and the fruits extracted were dried under the sun. The dried seeds were then weighed out in 0.75g (3-5 seeds) and then separated in drug envelopes.

The intraocular pressure pre-ingestion of *D. Tripetala* was measured and recorded as the baseline value. Then 0.75g weighed seeds of *D. Tripetala* was given to the subjects for ingestion⁴. The IOP was measured post-ingestion of the seeds after 30 minutes of ingestion to allow for digestion and assimilation. The IOP was again measured subsequently after 60 minutes, 90 minutes and one 120 minutes.

RESULTS

Results obtained showed that consumption of 0.75g of *D. Tripetala* seed gradually reduced the mean IOP from 15.6mmHg to 11.20mmHg, (25.64% reduction) after 60 minutes; and gradually reversed towards baseline value at 120mins-post ingestion. The mean induced change in IOP at 60 minutes was 4.00mmHg (table 1). The effect was found to be statistically significant ($p > 0.05$).

DISCUSSION

Result obtained from this study showed that ingestion of 0.75g of *D. Tripetala* reduced the IOP of normotensive emmetropes though not sustained (table 1). At 30 mins post consumption of pepper fruit, the IOP was reduced by 17.30% (12.90mmHg) from the mean baseline of 15.60mmHg. This decrease in IOP was consistent at 60 mins (a 25.64% reduction 11.20mmHg) and then started reverting towards baseline. This decrease was therefore not found to be sustained after 60minutes post consumption of the seeds. The IOP returned almost to baseline after 120 minutes (a mean of 15.40mmHg) post ingestion of 0.75g *D. Tripetala*.

There was a statistically significant ($P < 0.05$) reduction of IOP after 30minutes and 60 minutes. This reduction in IOP recorded was probably due to the ascorbic acid, magnesium, flavonoid, melatonin, thiamin, vitamin B₁₂, lipid acid content of *D. Tripetala*.

Ascorbic acid had been established to support the osmotic influx of water following osmolarity elevation of blood artificially leading to the fall in IOP¹⁶. According to Trygre¹⁷, 1.50%

of the anterior chamber contents are renewed each minute and the half life of anterior chamber aqueous is some 45 minutes corresponding to a daily production of about 2.80ml. Therefore when *D. Tripetala* is ingested and its constituents absorbed into the intravenous blood stream, the ascorbic acid constituents through the blood stream reaches the eye and lowers the inner eye pressure through increased blood osmolarity.

The presence of Ascorbic acid in the filtration angle via the anterior chamber and iris strengthened the collagen fibres of the meshwork tissues preventing its shrinkage, narrowing and blockage by pigment cells which normally circulate within the aqueous and drain out via the trabecular meshwork. The increase after 90 minutes and 120 minutes was probably due to the amount of ascorbic acid and magnesium in 0.75g *Dennettia Tripetala* was not enough to continue with the reduction of IOP. Furthermore Gasper¹⁸ noted that magnesium supplementation improve blood supply to the eye and assisted with vision in glaucomatous patients. Flavonoid, another constituent of *D. Tripetala* is attributed to reduce IOP. Head *et al*¹⁹

explained that flavonoids assist with collagen stabilization and synergizes the effect of vitamin C. The effect of flavonoid in IOP reduction is thought to be as a result of the reduction in excessive permeability of blood aqueous membrane within the eye.

The presence of lipoic acid (fatty acid) probably helped in the reduction of IOP by increasing glutathione in red blood cells and lacrimal fluid of glaucomatous patients thereby reducing the intraocular pressure¹⁹.

Finally, the presence of melatonin, thiamine (vitamin B₁) and vitamin B₁₂ perhaps also contributed to the reduction in IOP. This is due to the fact that melatonin levels have been found to decrease in glaucomatous patient and normal diurnal rhythms of IOP fluctuation reflect melatonin rhythms²⁰.

Since glaucoma has been found to be one of the leading causes of blindness worldwide the need for cheaper and acceptable adjuvant remedy becomes necessary. Therefore *D. Tripetala* ingestion should be encouraged as an adjuvant in the treatment of glaucoma.

TABLE 1: CHANGES IN INTRAOCULAR PRESSURE DUE TO INGESTION OF 0.75G OF *D. Tripetala* WITH TIME (MEAN BASELINE IOP = 15.6mmHg)

Time interval (mins)	Mean induced IOP	Mean induced Change in IOP	Percentage mean change %
30	12.90	2.70	17.31
60	11.20	4.00	25.64
90	12.96	2.64	16.92
120	14.40	0.20	1.28

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