Pharmaceutical Sciences & Analytical Research Journal
ISSN: 2640-6659

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Research Article *Volume 7 Issue 1*

Effect of *Afframomum Alboviolaceum* Fruit on the Testosterone Levels of Male Albino Rats – A Baseline Assessment

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Received Date: November 11, 2024; **Published Date:** January 08, 2025

Abstract

Male infertility is defined as the inability of a male to make a fertile female pregnant, also for a minimum of at least one year of unprotected intercourse. Infertility affects about 15% of all couples in the United States and at least 180 million worldwide. Infertility is most commonly caused by problems in the system such as poor ejection of semen, abnormal spermatozoa, and absence or low levels of spermatozoa produced due to low testosterone levels. Some studies on *Aframomum* species, including *Aframomum melegueta* (a closely related species known as grains of paradise), suggest possible benefits for male reproductive health, such as increased libido and improved sexual performance, possibly due to their influence on androgenic (testosterone-related) pathways. However, specific research on *Aframomum alboviolaceum's* effects on testosterone is limited. This study aimed to assess the effect of *Aframomum albovioceum* on testosterone levels in male albino rats. Thirty male white Wistar strain albino rats with a weight of not less than 320g were used in the study and were divided into three groups: control, positive test one, and positive test two groups. The rats in the 3 groups were stabilized at the Standard Medical Diagnostic Laboratory mile 3 Nkwen, for 1 week before the experiment started. The rats in the positive test 1 group were orally fed with 50% normal food and 50% food supplemented with dried powdered *Aframomum albovioceum plant*. The positive test 2 group received 80% dried powdered *Aframomum albovioceum* plant and 20% normal food. The control group received 100% normal food. After one month of treatment, blood samples were collected and analyzed for testosterone levels using the Suresign Professional Finecare Analyser which uses the fluorescence immunoassay (FIA) technology. The results showed that the rats in the positive test groups had significantly higher levels of testosterone compared to the control group ($p<0.05$). The findings suggest that *Aframomum albovioceum* fruit has the potential to boost testosterone levels in male albino rats, with the second positive test group showing even higher testosterone levels. It is therefore recommended that effective dosages and potential side effects of *Aframomum albovioceum* fruit should be well-established, and more work should be done on it before it can be considered good for stimulating an increase in testosterone production in man. It is also recommended that more work be done to compare if there will be a significant difference in testosterone production between the plant itself and its fruit.

Keywords: *Aframomum Alboviolaceum*; Testosterone; Male Infertility; Male Albino Rats

Abbreviations

FIA: Fluorescence Immunoassay; GnRH: Gonadotrophin Releasing Hormone; EDTA: Ethylenediamine Tetraacetic Acid; SD: Standard Deviation; PT: Positive Test; LH: Luteinizing Hormone; WHO: World Health Organization.

Background

According to WHO 2020, Infertility is a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 or more regular unprotected sexual intercourse [1]. Male infertility is defined as the inability of a male to make a fertile female pregnant, also for a minimum of at least one year of unprotected intercourse. Infertility affects about 15% of all couple in the United States and at least 180 million worldwide [2].

Infertility is most commonly caused by problems in the system, such as issues relating to the ejection of semen, abnormal spermatozoa or absence/low levels of sperm cells [1]. Infertility can be primary or secondary. Primary infertility is when pregnancy has never been achieved by a person, and secondary infertility is when at least one prior pregnancy had been achieved before [2]. Though infertility can come from any of the sexes, in the male reproductive system, it may be caused by: Hormonal disorders leading to abnormalities in hormone produced by the testicles. Hormones such as testosterone regulates sperm production [1]. Examples of disorders that results in imbalance include: pituitary or testicular cancer, testicular failure to produce spermatozoa, for example due to varicoceles or medical treatments that impair sperm production cells (chemotherapy). Abnormal sperm function and quality like morphology, and motility of the sperm also affects fertility [1]. According to matt Tsujimura, [3] having low testosterone, may lead to stalls in sex drive. It can also contribute to erectile disjunction, although there are other causes of erectile disjunction.

In Cameroon the prevalence of infertility remains poorly known. Scientific evidence shows that the male factor is involved in 50%-60% of overall infertility however, they are solely incriminated in the case of only 20% of couples. Infertility has been long considered as a female derived problem in Africa; hence very little efforts has been made to identify the male responsibility in infertile couples. In Cameroon, this domain remains unexplored due to cultural, ethical and other relative barriers. A study conducted in Yaoundé Central Hospital for example revealed that men are responsible in about 20% of couples attending limnology semis for infertility problems [4]. Majority of the causes of infertility in men is attributed to a reduction in testosterone levels.

There had been reported works on the correlation between plant use and increase in testosterone levels in mice [5]. A study done by Atabaki and others in 2023 showed that, *Cardamom ellatarri* of the family *Zingiberaceae* helps improve testosterone levels in albino rats. Cardamom extract enhance the activity of an antioxidant called glutathione [6]. Increase in the levels of glutathione increases the levels of gonadotrophin releasing hormone (GnRH), which then stimulates the pituitary gland to secrete luteinizing hormone then finally secrete leyding cells to secrete testosterone [7]. In a study carried out by Mbongue and colleagues they found out that after injecting male albino rats with the seed extract of *Aframomum melegueta,* it was found to increase sexual ability in male rats even in the sexually inactive male albino rats [5]. *Aframomum melegueta* is in the same family with *Aframomum alboviolaceum* which is actually more abundant in Cameroon. This study therefore aimed at investigating the effect of *Aframomum alboviolaceum* on the testosterone levels of male albino rats, so as to set a base on the natural remedy of low testosterone levels in man.

Methodology

This was an experimental design, performed in the Standard Medical Diagnostic Center, Mile 3, Bamenda. The *Aframomum albovioceum* plant fruits were collected from the Ndop valley in Cameroon. It was washed and air dried, then taken to the laboratory for drying using an incubator. The fruits were fried every day in a 52L digital bacterial incubator (Incubat TFT) at 600C for 7 days. After drying, the fruits were crushed into powder using a well cleaned and dried kitchen blender (Balashov 200W).

It was then kept in a dry sealed, leak proof container at room temperature, ready for administration. The study utilized 30 selected male Wistar strain albino rats that weighed not less than 300g and were in good physical health from husbandry reports. These rats were stabilized for 1 week and then divided into 3 groups. Test group were made up of 20 rats that is positive test one (PT_1 = 10rats) and positive test two (PT_2 = 10rats) while the control group (C) was also made up of 10 rats. The PT_1 rats each received a combination of 50% normal feed and 50% *Aframomum albovioceum* plant fruit (1:1 ratio of 3g to 3g respectively) every day. The PT_2 rats each received a combination of 20% normal feed and 80% *Aframomum albovioceum* plant fruit (1:4 ratio of 1.2g to 4.8g respectively) every day.

The control group rats each received 100% (6g) normal rat feed every day. The rats were fed for a month (28days). Rats were exsanguinated on the 29th day and 3mls of venous blood was collected into EDTA tubes and labelled. The tubes were well mixed, centrifuged at 2500rpm for 2minutes and taken for analysis. Testosterone was measured from the serum

of the collected samples using the Suresign Professional Finecare Analyser which uses the fluorescence immunoassay (FIA) technology, following the manufacturer's instructions. The statistical analysis was done using SPSS version 23. The independent sample t test was used to analyze for inferential statistics. Statistical significance was considered if p value was less than or equal to 0.05.

Results

Presentation of Research Rats

All research rats were males, 10 in each group labeled control (C), Positive test 1(PT_1) and Positive test 2 (PT_2), with a mean ± standard deviation (SD) weight of 321±10.1g, 316±11.20g and 320±11.01g as presented in Table 1 below. There was no statistically significant difference in the weights of the male rats in this study (p = 3.12).

Mean ± standard deviation (SD) weight (g)	
Control (C, n=10)	321±10.11
Positive test 1 (PT1, n=10)	316±11.20
Positive test 2 (PT2, n=10)	320±11.01
p – value	3.12

Table 1: Presentation of research rats.

Effect of *Aframomum Albovioceum* on the Testosterone Levels in Male Albino Rats

Differences in Testosterone Level between the Control and Positive Test 1 Rat

Table 2 below presents the differences in mean±SD testosterone level between the control (C) and positive test 1 (PT_1) rats. The PT_1 rats received a combination of 50% normal feed and 50% *Aframomum albovioceum* plant (1:1 ratio). There was a statistically significant difference in the testosterone levels in C rats and PT_1 rats in this study (p = 0.021). In fact, the testosterone level observed in the PT_1 group was 2.16 times higher than the testosterone level in the C group. This is also presented in Figure 1 below.

Mean±SD Testosterone levels (ng/ml)	
Control (C, n=10)	2.61±0.02
Positive test 1 (PT1, n=10)	4.77±0.14
t – value	12.05
p – value	0.021*

Source: *-Statistically significant at 0.05 significance level. Normal testosterone level in male albino rats - 0.66 to 5.4ng/ml.

Table 2: Differences in testosterone level between the control and positive test 1 rats.

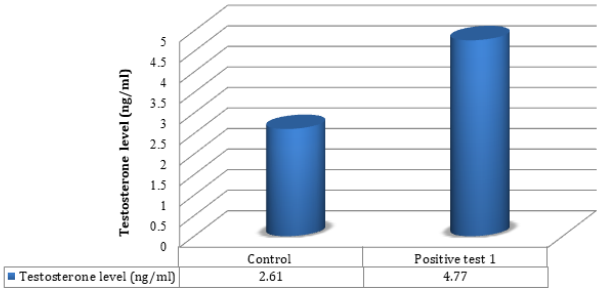

Figure 1: Differences in testosterone level between the control and positive test 1 rats.

Differences in Testosterone Level between the Control and Positive Test 2 Rats

Table 3 below presents the differences in mean±SD testosterone level between the control (C) and positive test 2 (PT_2) rats. The PT_2 rats received a combination of 20% normal feed and 80% *Aframomum albovioceum* plant (1:4 ratio). There was also an observed statistically significant difference in the testosterone levels in C rats and PT_2 rats (p = 0.001). The testosterone level observed in the PT_2 group was 3.02 times higher than the testosterone level in the C group. This is also presented in Figure 2 below.

Mean±SD Testosterone levels (ng/ml)	
Control (C, n=10)	2.61±0.02
Positive test 2 (PT2, n=10)	5.63±0.08
t – value	13.82
p – value	0.001*

Source: *-Statistically significant at 0.05 significance level. Normal testosterone level in male albino rats - 0.66 to 5.4ng/ml.

Table 3: Differences in testosterone level between the control and positive test 2 rats.

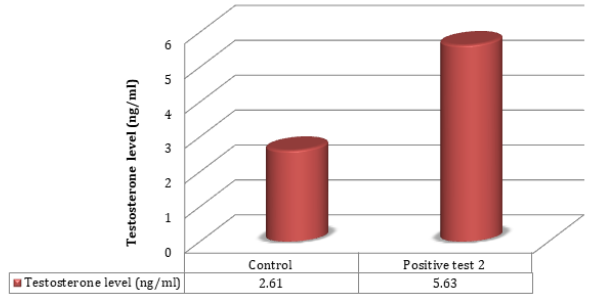

Figure 2: Differences in testosterone level between the control and positive test 2 rats.

Comparison between the Control, Positive Test 1 and Positive Test 2 Testosterone Level in Test Subjects

Though there was no observed statistically significant difference in the testosterone levels between the PT_1 and PT_2 rats, there was still an increase in the testosterone level in the PT_2 rats compared to that in the PT_1 rats (p = 0.98).

There was an observed statistically significant difference between the testosterone levels in the C and PT_1 rats (p = 0.021), C and PT_2 rats (p = 0.01) but not between the PT_1 and PT_2 rats (p = 0.98) as indicated above. This is presented in Figure 3 below.

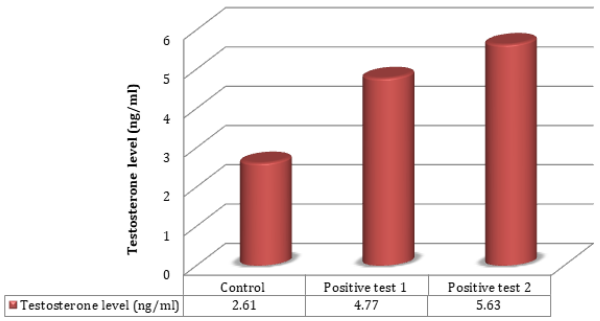

Figure 3: Comparison between the Control, Positive test 1 and positive test 2 testosterone level in test subjects.

Discussion

The aim of this study was to assess the effect of *Aframomum albovioceum* fruit on the testosterone levels of male albino rats. After weeks of *Affframomum* fruit administration, the rat's testosterone levels were then tested and it showed that, the mean testosterone levels in the positive test 1 rats were 2.16 times significantly higher than that of the control group. Furthermore, there was no significant difference between the mean testosterone levels of positive test 1 and positive test 2 groups. The findings of this study are consistent with previous studies that have investigated the effect of *Aframomum albovioceum* extract on testosterone levels. For example, a study by Adebiyi, et al. [8] reported that the fruit increased testosterone levels in male rats when compared to their control groups. Similarly, a study by Awodele, et al. [9] found that the extract had a significant effect on testosterone levels in male rats compared to their control groups as well.

The mechanism of action of *Aframomum albovioceum* on testosterone levels is not fully understood. Extracts from this plant and fruits are believed to contain bioactive compounds that may stimulate testosterone production or improve reproductive health. Animal studies have shown some positive effects of this plant on reproductive hormones, including testosterone, although more research is needed to fully understand the mechanisms and efficacy in humans. In fact, it has been suggested that the plant or plant seeds may act by increasing the production of luteinizing hormone (LH), which in turn stimulates the production of testosterone by the Leydig cells in the testes [10].

Conclusion

This study concludes that *Aframomum albovioceum* fruit has the potential to boost testosterone levels in male albino rats with increase concentration per kilogram body weight. Even though the toxicology and mode of action of the plan is yet to be known, its effect on testosterone boost is evident. More work is needed to assess if it's the plant stem, leaves, flowers or fruits that significantly stimulate testosterone production.

Acknowledgments

We wish to thank the Standard Medical Diagnostic Center authorities for granting us permission to carry out the research in their very good laboratory.

Conflict of Interests

The authors declare that they have no competing interests

References

1. World Health Organisation (2023) Infertility prevalence estimates 1990-2021. Books.
2. Gore AC, Chappell VA, Fenton SE, Flaws JA, Nadal A, et al. (2015) EDC-2: The Endocrine Society's Second Scientific Statement on Endocrine-Disrupting Chemicals. Endocrine Reviews 36(6): E1-E150.
3. Tsujimura A (2013) The Relationship between Testosterone Deficiency and Men's Health. World J Mens Health 31(2): 126-135.
4. Tetsatsi ACM, Munyali DA, Ngadjui E, Watcho P, Fozin GRB, et al. (2020) Semem qualities among men attending urology services in the Dschang health district west Cameroon: A retrospective study on 379 cases. International journal of reproductive biomedicine 18(2): 121-128.
5. Mbongue GYF, Kamtchouing P, Dimo T (2011) Effects of the acqueous extract of dry seed of *Aframomum melegueta* on some parameters of the reproductive function of mature male rats. First international journal of andrology 4(4): 53-58.
6. Atabaki B, Mirazi N, Hosseini A, Sarihi A, Izadi Z, et al. (2023) Effect of *Elettaria cardamomum* L. on hormonal changes and spermatogenesis in the propylthiouracil-induced hypothyroidism male BALB/c mice. Endocrinol Diabetes Metab 6(5): e438.

7. Marques P, Lages AS, Skorupskaite K, et al. (2022) Physiology of GnRH and Gonadotrophin Secretion. In: Feingold KR, Anawalt B, et al. (Eds.), Endotext [Internet]. South Dartmouth (MA): MDText.com.

8. Adebiyi OE., Adebiyi OO, Owolabi OJ (2015) Effect of Aframomum albovioceum extract on testosterone levels in male albino rats. Journal of Advances in Medical and Pharmaceutical Sciences 5(2).

9. Awodele O, Oreagba IA, Odoma S, Agbaje EO (2013) Phytochemical screening and anti-diabetic potentials of the leaves of Musa paradisiaca and seeds of Aframomum melegueta. Journal of Medicinal Plants Research 7(11): 610-615.

10. Nedresky D, Singh G (2020) Physiology, Luteinizing Hormone. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, India.