

The Effect of Aqueous Methanolic Stem Bark Extracts of *Acacia Polyacantha* on Sexual Behaviour, Serum Testosterone Levels in Male Wistar Rats

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Abstract: The aim of the research is to determine the possible application of *Acacia polyacantha* in the treatment of sexual behavior and serum testosterone. We determined the LD₅₀ from the dried bark of the plant to be 3808.88 kg/body weight, then treated the wistar rats with 150, 300 and 600 mg/kg body weight that was shown to have effects on mounting behavior which increased from 6.20±2.49 in control to up to 8.40±3.25 with concentration of 150 mg/kg and falls to 3.80±1.35 and 0.20±0.20 with 300 and 600 mg/kg body weight respectively. On the other hand the testosterone levels increased from 3.62±2.19 in control to 6.88±1.78 with 150 mg/kg and 7.18±2.38 and 7.78±2.38 with 300 and 600 mg/kg respectively while falling insignificantly below the control to 3.60±1.34 with Viagra 150 mg/kg. We concluded therefore based on the experiment conducted that *Acacia polyacantha* plant could be used to enhance sexual behavior after further screening of its active ingredients.

Key words: Fertility, infertility, sexual behavior, sperm counts

INTRODUCTION

Traditional medicine is the sum total of knowledge, skills and practices based on theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illness WHO (2008). Traditional medicine or folk medicine practice is based on the use of plants and extract *Acarya et al.*, (2008), in Asia and African 80% of the population depends on traditional medicine for primary health care. Herbal treatments are the most popular form of traditional medicine WHO (2008). WHO estimate 80% of the world's population presently uses herbal medicine for some aspect of primary health care.

Virtually every illness has a remedy made from concoctions of various parts of the useful flora used for gastro- intestine disorders, cardiovascular, respiratory or nervous diseases as well as fertility problems such as sexual dysfunctions, which is common in 31% of men WHO (2008). Male sexual dysfunction comprised of several problems associated with sexual performance including; erectile dysfunction, decrease libido, priapism, peyronie disease, and premature ejaculations, also diabetes mellitus, heart and vascular disease (Brock *et al.*, 2002), hormonal imbalance e.g., low

testosterone level which causes sexual dysfunction (Brock *et al.*, 2002), chronic disease such as kidney and liver failure, alcoholism, drug abuse, aging and cigarette smoking (Brock *et al.*, 2002). In addition side effect of certain medications including anti depressant drugs, these psychological problems include work related stress and anxiety, marital or relationship problems, depression, feeling of guilt and the side effect of past sexual trauma mostly associated with female (Brock *et al.*, 2002).

Aytal *et al.*, (1999) Projected global prevalence of erectile dysfunction in 2025 (World wide) to be 322 million and by regional estimate: North America-21, South America-26.1, Europe-42.9, Africa-30.8, Asia-199.9, Oceanic-1.9.

Over all age - specific prevalence of moderate or complete erectile dysfunction: Men age 40 to 44 years - 9%, men age 45 to 49 years - 12%, men age 50 to 54 years - 18%, men age 55 to 59 years - 29%, men age 60 to 64 years - 38 %, men age 65 to 70 years - 54%.

Berrada *et al.* (2003) indicate that the prevalence of erectile dysfunction ED and other disease associated with this condition in sub - Sahara Africa, Middle East, and South Asia is similar to the United States and Western Europe. Surveys of men between 35 and 75 years of age seeking primary health care indicate that the age-adjusting prevalence of ED were 57.4% in Nigeria, 63.3% in Egypt, and 80.8% in Pakistan.

Sexual behavior in rats as described by Berrada *et al.*, (2003) is mounting the animal by the male assuming the copulatory position on top of the female and grasping her flanks, but with out insertion, while intromission is mounting with insertion with brief (200-300 milliseconds). Semen is not released during intromissions or mounts. After 10 to 12 intromissions spaced 20-30 sec apart, the rat ejaculates semen.

It can be very difficult - even for a trained observer - to distinguish between these behaviors. There are subtle differences in the style of dismounts that help distinguish between mounts and intromissions. After an ejaculation, the male tends to pause longer before dismounting. Every ejaculation is preceded by a number of mounts and intromissions. Typically rats have multiple ejaculations before they reach exhaustion (satiation); after each ejaculation there is a refractory period lasting several minutes. Sexual encounters are divided into a number of 'series' depending upon the number of ejaculations. A series starts with a mount or intromission, and ends with an ejaculation. Numerous measures of the relationships between mounts, intromissions and ejaculations are recorded to measure sexual motivation and performance. For example: Mount Latency, the time that elapses between introducing the male and female to the test apparatus before the male mounts the female.

Acacia polyacantha belong to the family: *fabaceae*, sub-specie *campylacantha*. *Acacia* is Widespread all over Africa, Its presence may show ground water but the tree can grow in poor dry savannah soil (Mulofwa *et al.*, 1994). It is a deciduous tree up to 20 m tall, with feathery foliage giving an open light canopy. *Acacia polyacantha* is use in the treatment of snake bites, repellent, and treatment of premature ejaculation, rabies, typhoid and hemorrhoid (Mulofwa *et al.*, 1994). *Acacia* seeds are used in spices, curries and omelets'. Honey made by bees using *Acacia* flower as forage is considered a delicacy also *acacia* is used in making chewing gum and ornaments in gardens.

Northern Nigeria is endowed with abundant, medicinal flora. Although sexual dysfunction is a common problem, many patients are reluctant to discuss it because of the way the society may perceive a person as more as an "Incomplete man" this leads to the usage of traditional medicine to enhance sexual performance and the remedy of the sexual dysfunction.

Acacia polyacantha could be use as aphrodisiac and also to enhance sexual behavior. The effect of the plant extract was determined on sexual behavior; the effect of the plant extract on the levels of testosterone was investigated as well.

MATERIALS AND METHODS

The fresh stem bark of *Acacia polyacantha* was sourced from Samaru Zaria and was identified in the

Department of Biological Sciences Herbarium of Ahmadu Bello University, Zaria with a voucher number 1905. The specimen was then cleaned and air dried at room temperature for 2 weeks and then made into powder using pestle and mortar. The powdered samples was then collected and stored in a clean polythene bag until required for extraction.

The dried sample of the stem bark was extracted using 70% methanol and later macerated using separating funnel plugged with cotton wool, then the filtrate was concentrated over water bath at about 80°C. After which the extract is scrapped off and placed in a well-dried and clean airtight container.

Phytochemical screening was carried out on the obtained aqueous methanolic extract of the stem bark. The extract was dissolved in methanol to carry out the following test: Alkaloids, Anthraquinones, Cardiac glycosides, Carbohydrate, Flavonoids, Glycosides, Saponin, Tannins, Steroids and triterpenes The LD50 was determination using the method of Lorke (1983).

A total of 50 adult Wistar rats of both sexes were obtained from animal house of the Department of Pharmacology and Clinical pharmacy in A.B.U after random selection, two weeks prior to the experiment to acclimatize to the laboratory conditions, The rats were 8 -12 weeks old weighing between 120-200 g. They were housed in metallic cages, fed with standard rat feed with water *ad libitum*.

The animals were divided into five groups of five male rats each. Groups A (negative control) is given distilled water, C, D and E were administered graded doses of 150, 300 and 600 mg/kg respectively of the aqueous methanolic stem bark extract of *Acacia polyacantha* orally using cannular for 14 days, B were given standard drug sildenafil citrate (viagra) 5 mg/kg 1 h prior to the commencement of the experiment, The female wister rats were artificially brought into oestrus and paired with the male Wistar rats

The rats were anaesthetized by placing them in an anaesthetizing chamber already contain chloroform form for few seconds: after which they are laid supine on a dissecting board and the limbs fastened to the board with dissecting pins and dissected exposing the thoracic cavity and blood sample collected through the apex of heart stored in non- heparinized EDTA test- tube and centrifuged so that serum will be used for hormonal analysis.

The stored blood serum in the non- heparinized EDTA-test tubes were analyzed at the Department of chemical pathology Ahmadu Bello University Teaching Hospital Zaria, using testosterone kit [Syntron Bioresearch, Inc. Microwell Testosterone EIA, Reference number 4410 - 96 (96 test kit)] and sandwich method.

Result are presented as mean±SEM. Graphs were drawn using the excel package for the drawing graphs. Statistical analysis was done using one way analysis of

variance (ANOVA) followed by a post-hoc test of Duncan and Scheffe. Values of $p < 0.05$ was considered statistically significant.

The study was conducted at the department of human physiology Faculty of Medicine Ahmadu Bello University Zaria.

RESULTS AND DISCUSSION

In Table 1 the mounting frequency increased from 6.20±2.49 in control to up to 8.40±3.25 with concentration of 150 mg/kg and drops to 3.80±1.35 and 0.2±0.20 with 300 and 600 mg/kg body weights respectively. On the other hand the testosterone levels increased from 3.62±2.19 in control to 6.88±1.78 with 150 mg/kg and 7.18±2.38 and 7.78±2.38 with 300 and 600mg/kg respectively while falling insignificantly below the control to 3.60 ±1.34 with Viagra 150 mg/kg.

Male sexual dysfunction comprised of several problems associated with sexual performance including; erectile dysfunction, decrease libido, priapism, peyronie disease, and premature ejaculations, also diabetes mellitus, heart and vascular disease, hormonal imbalance e.g., low testosterone level which causes sexual dysfunction (Brock *et al.*, 2002), chronic disease such as kidney and liver failure, alcoholism, drug abuse, aging and cigarette smoking. In addition side effect of certain medications including anti depressant drugs, these psychological problems include work related stress and anxiety, marital or relationship problems, depression, feeling of guilt and the side effect of past sexual trauma mostly associated with female. The mounting behavior, the testosterone levels were shown to have increased significantly which signify that sexual dysfunction associated with performance including; erectile

dysfunction, decrease libido, priapism, peyronie disease, and premature ejaculation, hormonal imbalance e.g., low testosterone level which causes sexual dysfunction (Brock *et al.*, 2002) could possibly be treated using the *Acacia polyacantha* plant after further intensive experiment.

The chemical constituent of the plant extract that is/are specifically responsible for the anti- oxidant effect are not fully studied; but according to Harborne (1993) flavonoid posses an anti-oxidant effect. Therefore it would be reasonable to assume that the effect of the plant extract is due to the flavonoids present in the plant extract. The extract of *Acacia polyacantha* is seen to shows the potency of elevating serum testosterone level and could be used to enhance sexual behavior. Therefore when use for therapeutic purpose the plant extract should be used with caution.

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Table 1: Shows sexual behavior and testosterone level, though 150mg.kg⁻¹ is seen, as the most effective dose the result obtain is not significantly increased ($p < 0.05$)

| Groups | Sexual behavior | |
|-----------------|-------------------------|----------------------|
| | Number of mounts in 3 h | Testosterone (ng/ml) |
| Normal | 6.20±2.49 | 3.62±2.19 |
| Viagra (5mg/ml) | 6.60±2.78 | 3.60±1.34 |
| 150 mg/kg | 8.40±3.25 | 6.88±1.72 |
| 300 mg/kg | 3.80±1.35 | 7.18±2.38 |
| 600 mg/kg | 0.20±0.20 | 7.72±2.38 1 |