Effect of the Methanolic Extract of Trichosanthes Cucumerina Seed (SnakeGourd/Tomatoe) on Hormone Influenced Seminal Vesicle Weight in Adult Wistar Rats

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Abstract

**Background:** To determine the effect caused by the methanolic extract of Trichosanthes cucumerina on hormone influenced seminal vesicle weight in adult Wistar Rats. Place and Duration of Study: Department of Anatomy, Faculty of Basic Medical Science, Olabisi Onabanjo University, Ikenne, Ogun State Nigeria, for 6 weeks. Methodology: We included 20 adult male Wistar rats, of 4 groups (Normal control NCTRL, Hormone treated control HTC, High dose of extract HDT/C, Low dose of extract LDT/C) with each group comprising of 5 animals each, with individual rats weighing between 150g-320g. The seminal vesicle weight increase was achieved by the simultaneous induction of 400ng/ml of Estradiol and 1250ng/ml of Testosterone (with respect to the subject's body weight), which were administered via the inguinal region for a period of 3 weeks (in alternate days). After the period of hormonal administration, two of the subjects from groups NC and HTC were sacrificed in other to appreciate the weight increase in the HTC group as compared with the NC. Furthermore, with the methanolic extract of the plant's seed, the animals grouped in HD/TC and LDT/C was treated with respect to their body weight, for a period of 3 weeks. After which, the animals were sacrificed and the seminal vesicles were further processed. All results were expressed as Mean ± Standard Deviation (S.D) for each group. All grouped data were statistically evaluated using SPSS 15.0 software. Hypothesis testing methods included the independent – samples t–test. Statistical significance was set at p<0.05.

**Result:** The combined administration of Testosterone and Estradiol caused an increase in the seminal vesicle size, which was observed to be reversed by the extract. Conclusion The combined administration of Testosterone and Estradiol caused an increase in the seminal vesicle size, which might suggest some change in its histological morphology. However, the hormonal effects were observed to have been suppressed by the extract.

Introduction

The seminal vesicles (glandulae vesiculosae) or vesicular glands [1] are a pair of simple tubular glands postero-inferior to the urinary bladder of male mammals, it is located within the pelvis. Each seminal gland spreads approximately 5 cm, though the full length of seminal vesicle is approximately 10 cm, but it is curled up inside of the gland's structure. Each gland forms as an outpocketing of the wall of ampulla of each vas deferens. The excretory duct of seminal gland opens into the vas deferens as it enters the prostate gland. Seminal vesicles secrete a significant proportion of the fluid that ultimately becomes semen. Lipofuscin granules from dead epithelial cells give the secretion its yellowish color. About 50-70%[2] of the seminal fluid in humans originates from the seminal vesicles, but is not expelled in the first ejaculate fractions which are dominated by spermatozoa and zinc-rich prostatic fluid. The excretory duct of each seminal gland opens into the corresponding vas deferens as it enters the prostate gland. Seminal vesicle fluid is alkaline, resulting in human semen having a mildly alkaline pH.[3] The alkalinity of semen helps neutralize the acidity of the vaginal tract, prolonging the lifespan of sperm. Acidic ejaculate (pH <7.2) may be associated with Ejaculatory duct obstruction. The vesicle produces a substance that causes the semen to become sticky/jelly-like after ejaculation, which is thought to be useful in keeping the semen near the womb. Testosterone is a steroid hormone from the androgen group and is found in mammals, reptiles,[4] birds,[5] and other vertebrates. In mammals, testosterone is primarily secreted in the testicles of males and the ovaries of females, although small amounts are also secreted by the adrenal glands. It is the principal male sex hormone and an anabolic steroid. In men, testosterone plays a key role in the development of male reproductive tissues such as the testis and prostate as well as promoting secondary sexual characteristics such as increased muscle, bone mass, and the growth of body hair.[6] In addition, testosterone is essential for health and well-being [7]
as well as the prevention of osteoporosis.[8] On average, an adult human male body produces about 7-8 times more testosterone than an adult human female body, [9] but females are more sensitive to the hormone.[10] Testosterone is observed in most vertebrates. Fish make a slightly different form called 11-ketotestosterone.[11] Its counterpart in insects is ecdysone.[12] During menopause, estrone is the predominant circulating estrogen and during pregnancy estradiol is the predominant circulating estrogen in terms of serum levels. Estradiol is also present in males, being produced as an active metabolic product of testosterone. The serum levels of estradiol in males (14 - 55 pg/mL) are roughly comparable to those of postmenopausal women (< 35 pg/mL). Estradiol, like other steroids, is derived from cholesterol. In plasma, estradiol is largely bound to sex hormone-binding globulin, also to albumin. Only a fraction of 2.21% (± 0.04%) is free and biologically active, the percentage remaining constant throughout the menstrual cycle.[13] In the normal menstrual cycle, estradiol levels measure typically <50 pg/ml at menstruation, rise with follicular development (peak: 200 pg/ml), drop briefly at ovulation, and rise again during the luteal phase for a second peak. At the end of the luteal phase, estradiol levels drop to their menstrual levels unless there is a pregnancy. During pregnancy, estrogen levels, including estradiol, rise steadily toward term. The source of these estrogens is the placenta, which aromatizes prohormones produced in the fetal adrenal gland. Snake gourd (Trichosanthes cucumerina) belongs to the family Cucurbitaceae mostly consumed as vegetable, but it may grow throughout the year except extreme winter. It is a popular vegetable with moderately high nutritive value. The total production of snake gourd during 2003-2004 was 136000 tons on the area of 1, 59,000 acres of land. [14] This figure indicates the low yield potentiality of our cultivars. It is commonly called as snake gourd, viper gourd, snake tomato or long tomato. The fruit is usually consumed as a vegetable due to its good nutritional value. The plant is richly constituted with a series of chemical constituents like flavonoids, carotenoids, phenolic acids which makes the plant pharmacologically and therapeutically active. Its Fruit is regarded as anthelmintic, vomitive [15] antidia-betic [16] for boil [17]. Seeds are anthelmintic, and anti fibrile [18]. Root is used as purgative and tonic. The pharmacological activities of cucurbitacin containing plants have been known since ancient times. Cucurbitacins are particularly known in folk medicine for their strong purgative, anti-inflammatory, and hepatoprotective activities [19].

Methods

Management Adult male rats, weighing between 150g-320g were obtained from the animal house of the Department of Zoology, University of Ibadan, Nigeria. They were housed in the animal house provided by the Department of Anatomy, Olabisi Onabanjo University, where they had access to food, water, and air. Their environment was well cleaned to avoid infection of any kind upon the animals. After a week of acclimatization, we induced them with specific dosage of Estradiol and Testosterone (both diluted in corn oil respectively). The hormones were given based on the animal’s body weight, and the route of administration being the inguinal region. After 3 weeks of induction, some of the subjects were sacrificed to appreciate the weight increase haven brought about by the hormones. Others were then treated with the methanolic extracts of Trichosanthes cucumerina (in proportion to their body weight), diluted in corn oil. The treatment lasted for 3 weeks after which the animals were sacrificed. Drug Administration The hormones were diluted in corn oil into 400ng/ml and 1250ng/ml of estradiol and testosterone respectively. Hormones were administered exogenously via the inguinal region for three weeks, for thrice a week in alternate days [20]. The extracts were given at 0.2mg/ml and 0.1mg/ml of high and low dosages [20]. The testosterone was manufactured by Green Field Pharm. (JIANG SU) Co., Ltd, China while the Estradiol was manufactured by Medipharm (Pvt.) Ltd., 108-Kotlakhpat Industrial Estate, Lahore. Method of Extraction Six ripe fruits of Trichosanthes cucumerina were gotten from Ayepe, a local town in Ijebu-remo side of Ogun State, Nigeria. The seeds were obtained from the fruit, washed in clean water; sun dried for three days, the coat peeled off, 40g of the seeds were weighed, ground into fine powder and finally soaked in 100ml of methanol. The solution was filtered after 48 hours while the filtrate was concentrated using the rotary evaporator; volume of filtrate obtained = 30.6ml, weight of residue left = 32g; weight of the seeds dissolved in the filtrate = 8g; volume of filtrate (oil obtained from the seeds) after evaporating = 2.5ml. Therefore; extracts concentration = mass/volume = 8/2.5 = 3.2g/ml Processing Animals were anaesthetized with chloroform in closed chamber. The animals were then sacrificed and the scrotum of each rat opened, the seminiferous tubules were ligated with the whole seminiferous tubules taken out for the weight to be taken.
Results

1. For the Normal control group; 5 rats where used, and the mean ± SD was 0.09 ± 0.02.
2. For the Hormone treated control group; 5 rats where used, and the mean ± SD was 0.21 ± 0.05.
3. For the High dose of extract group; 5 rats where used, and the mean ± SD was 0.10 ± 0.05 c, d.
4. For the low dose of extract group; 5 rats where used, and the mean ± SD was 0.19 ± 0.05 b, a. The means of the groups were compared using T-test at P < 0.05. a- Means No significant difference between H CTRL when compared with LD T/C. c- Means No significant difference between N CTRL when compared with HD T/C. d- Means there is significant difference between H CTRL when compared with HD T/C. b- Means there is significant difference between N CTRL when compared with LD T/C.

Discussion

Using t-test at 5% level of significance, significant difference (P < 0.05) was observed statistically between the groups (N ctrl and LD T/C). In addition, difference between the groups (H Ctrl and HD T/C) was statistically significant (P < 0.05). However, no significance difference (P < 0.05) was observed statistically between the groups (N Ctrl and HD T/C). The difference between the groups (H ctrl and LD T/C) was not statistically significant (P < 0.05). Considering the table, one will observe a massive weight increment in the seminal vesicles which was caused by the hormone. This effect was reversed by the extract administration. This is evidence supporting the plant’s anti-inflammatory effect. [19]

Conclusion(s)

The combined administration of Testosterone and Estradiol caused an increase in the seminal vesicle size, which might suggest some change in its histological morphology. However, the hormonal effects were observed to have been suppressed by the extract.

Abbreviation(s)

T/C- Trichosanthis cucumerina
METC- Methanolic extract of trichosanthis cucumurina seed MEAN ± SD- Mean plus OR minus Standard

Deviation p<0.05- Statistical significance was set at p<0.05. t-test- samples t-test

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References

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