

---

**SHORT COMMUNICATION****Coconut Water Consumption and Its Effect on Sex Hormone Concentrations**

*Nnodim Johnkennedy<sup>1\*</sup>, Elendu Humphrey Ndubueze<sup>2</sup>, Ihim Augustine<sup>3</sup>, Dimeke Chioma<sup>1</sup>*

*Ezekwesiri Cletus Okey<sup>4</sup>*

<sup>1</sup>*Department of Medical Laboratory Science, Faculty of Health Science, Imo State University*

*Owerri, Imo State, Nigeria, <sup>2</sup>Education Registration And Regulation Department, Medical Laboratory Science Council of Nigeria Headquarters Asokoro, Abuja, Nigeria,*

<sup>3</sup>*Department of Medical Laboratory Science, Faculty of Health Sciences and Technology, College of Health Sciences, Nnamdi Azikiwe University Nnewi Campus Nigeria*

<sup>4</sup>*Department of Chemical Pathology Federal Medical Centre Owerri Nigeria*

---

**Abstract:**

*Background:* Coconut water has many beneficial effects on health since it contains electrolyte, vitamins, sugar, protein, antioxidants, minerals, cytokinins and dietary fiber. Actually it is fat free and has zero cholesterol. It has antiviral and antibacterial properties, helps to lose weight, very beneficial to a person with kidney stones due to its minerals, potassium, and magnesium content and it has different effects in the sex organ. *Aim and Objectives:* This present study was carried out to investigate the effect of consumption of coconut water on the concentration of some serum sex hormones (Testosterone, Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), and Prolactin) in rats. *Materials and Methods:* Twenty (20) female Albino Wistar rats (200-220 g final body weight) were randomly assigned into 2 groups of 10 rats each. Group I served as Control while Group II was administered 3 ml of coconut water for 28 days. *Results:* The levels of testosterone, FSH and LH were significantly increased, while prolactin was significantly decreased when compared with the control ( $P < 0.05$ ). *Conclusion:* This result implies probably that the consumption of coconut water could enhance reproductive functions in Albino Wistar rats and likely to increase the fertility.

**Keywords:** Coconut Water, Fertility, Rats, Reproduction, Sex Hormones.

**Introduction:**

Plants are extensively used to relieve sexual disorders. Herbal remedies have long been advocated, with some being advertised widely since the 1930s [1]. There are many herbal drugs those have been used by men with erectile malfunction with varying degrees of success. Most potent herbal aphrodisiacs are available and have little or very little side effects [2]. Coconut water is a refreshing drink that keeps the body cool and hydrated. It is a refreshing tropical beverage that is consumed all around the world. Coconut water is the liquid that one finds inside a young green coconut [3]. It contains electrolytes like chlorides, calcium, potassium, sodium and riboflavin. It is also rich in vitamin C. Research has shown that coconut water contains sugar, dietary fibre, proteins, antioxidants and minerals and provides an isotonic electrolyte balance [4]. It also contains cytokinins which promote plant cell division and growth. These cytokinins have significant anti aging, and anti carcinogenic effect and antithrombotic effects. [5]. Other biologically active ingredients in coconut water include L arginine and magnesium that produce definite physiological and biochemical actions in human body [6]. The water of fresh green coconuts is

actually fat free and has zero cholesterol. Some studies stated that coconut water increases High density lipoprotein levels in the body. Coconut water helps to lose weight as it is low in fats. It is a storehouse of important nutrients and B complex vitamins. It has antiviral and antibacterial properties. It is generally recommended during pregnancy as it helps in constipation, heart burn and slow digestion. The lauric acid present in coconut water has antifungal, antibacterial and antiviral properties which boost the body's immune system [7]. Tender coconut water is very beneficial to a person with kidney stones due to its minerals, potassium, and magnesium content. It also acts as a diuretic as it increases the flow and production of urine. In the same vein, when coconut water is applied to affected skin areas with acne, wrinkles, stretch marks, cellulite and eczema, it clears up the skin and gives it youthful smooth looking skin [8]. However, coconut water can have different effect in the sex organ. Fertility and reproductive health are regulated and maintained by the levels of serum sex hormones. Sex hormones are steroid hormones that are produced especially by the ovaries, testes or adrenal cortex and affect the growth or function of reproductive organs. It also stimulates the development of secondary sexual characteristics [9].

In the light of the above findings, this work was conducted to monitor the effect of coconut water on hormonal concentrations in rats.

#### **Material and Methods:**

**Coconut Water:** Coconuts of 7 to 8 months of age were harvested from the coconut trees grown at Ndibinama Duruewuru Amucha, Njaba LGA of Imo State Nigeria. The coconuts were dehusked, broken carefully and the liquid endosperm (coconut water) was collected and was used in the experiment.

**Experimental Animals:** Albino Wistar rats weighing between 200 to 220 g were used for the study. The Wistar rats were kept in a laboratory animal unit with a 12 hour light/dark cycle. Throughout the experiment, the room temperature was maintained. Also, the rats were maintained on a standard chow diet and water *ad libitum*. After acclimatization, the rats were randomly grouped into 2 groups of ten rats each. The first group of animals which served as normal control was given distilled water. Group II was given 3 ml of coconut water. The duration of experimental period was 28 days. In both groups, the administration of coconut water was through oral route. This treatment was by oral compulsion. All animals were allowed free access to food and water throughout the experiment.

**Ethics:** All experiments were conducted in accordance with the National Institute of Health Guide for the Care and Use of Laboratory Animals [10].

**Blood Collection:** Twenty four hours after the last dose of coconut water was administered, the animals were anaesthetized with chloroform vapour, quickly brought out of the jar and sacrificed. Whole blood was collected by cardiac puncture from each animal into clean dry test tubes. The blood was allowed to stand for about 15 minutes to clot and further spun in a wester fuge centrifuge (model 1384) at 10,000 g for 5 minutes. Serum was separated from the clot with Pasteur pipette into sterile sample tubes for the measurement of the hormonal concentrations.

**Biochemical Analysis:** Serum level of FSH, Testosterone, LH, and prolactin was estimated using enzyme immunoabsorbent assay through kits.

**Statistical Analysis:** The values were expressed as mean  $\pm$  standard deviation. The student t-test was used to calculate the significant differences at  $P < 0.05$ .

**Results:**

Table 1 shows the effect of coconut water on serum FSH, LH, testosterone, and prolactin in rats.

production of testosterone in Leydig cells [13], which in turn may act on the Sertoli cells and peritubular cells of the seminiferous tubules and also stimulates spermatogenesis in males. On the

**Table 1: Effect of Coconut Water on Serum Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), Testosterone, and Prolactin in Rat**

Groups	FSH (mg/dl)	LH (mg/dl)	Testosterone (mg/dl)	Prolactin (mg/dl)
Control (3 ml / kg body weight mineral water)	16.42 ± 0.86	83 ± 1.97	55.41 ± 5.24	21.94± 8.39
Study (3 ml/kg body weight coconut water)	19.72 ±2.42*	39.71±8.26*	61.11± 7.11*	18.27 ±3.99*

\*Significantly different from control at  $P < 0.05$

**Discussion:**

The application of some plants constituents in pharmaceutical industries has gone long way in the elevation of the status of the herbal medicine in Nigeria [11]. The need for fertility stimulation in men and women cannot be overemphasized especially when a marriage is childless in Igbo communities. While chemical methods for fertility stimulation may have some side effects and are not readily available.

In this study, the results obtained showed that the level of serum LH, FSH and testosterone were significantly increased in rats administered with coconut water when compared with the controls. This is in contrast to the work of Nnodim *et al* [12] in which *xylopia aethiopica* caused reproductive dysfunction. This probably implies that coconut water plays important role in regulation of hormonal level which in other words improves reproductive health. The increase in FSH, LH and testosterone levels could be as result of some potent agents in the coconut water that stimulate the synthesis and subsequent release of these hormones in the anterior pituitary gland / ovary. FSH is an important hormone that stimulates spermatogenesis while LH stimulates the

other hand, FSH and LH play an important role in the control of reproductive function in females. In females, FSH stimulates ovarian follicle growth and maturation, as well as E2 synthesis by granulosa cells, whereas LH stimulates androgen production by theca cells and ovulation of the dominant follicle. Females with loss-of function due to mutations in the Follicle Stimulating Hormone Receptor (FSHR) genes present clinically with primary or secondary amenorrhea and associated arrest in follicle development at the pre-antral stage [14]. Hence, consumption of coconut water may be of immense benefits, since it will help ameliorate thermal function.

In this study it was observed that the level of prolactin was significantly decreased. There is usually an inverse relationship between prolactin levels and the levels of testosterone. As prolactin levels decrease, the levels of testosterone, increases. This is in line with the work of Ofem *et al* [15].

**Conclusion:**

Increase in serum levels of testosterone, FHS and LH produced by coconut water may improve reproductive health in Albino Wistar rats.

---

**References:**

1. Mohan VR, Balamurugan K, Sakthidevi G. Fertility Enhancement of *Polycarpaea Corymbosa* (L.) Lam (Caryophyllaceae) Whole Plant on Male Albino Rats. *Asian J Pharm Clin Res* 2013; 6 (Suppl 5):151-155.
2. Oyedeji KO, Bolarinwana AF. Evaluation of antifertility and teratogenic effects of crude extracts of *Portulaca oleracea* in male and female albino rats. *Asian J Pharm Clin Res* 2013; 6: 217-220.
3. Nnodim JK, Dike-Ndudim J, Elendu HN, Nwagbaraocha M, Egbuobi R, Onyeze V. Antioxidant and Cardioprotective Effect of Coconut Water against Doxorubicin Induced Cardiomyopathy. *JKIMSU* 2013; 2(2): 38-41.
4. Bhagya D, Prema L, Rajamohan T. Beneficial effect of tender coconut water on blood pressure and lipid levels in experimental hypertension. *Journal of Cell and Tissue Research* 2010; 10(1): 2139-2144.
5. Yong JWH, GeL, Ng TF, Tan SN. The chemical composition and biological properties of Coconut water. *Molecules* 2009. 14(12) 5144-5164.
6. Campbell Fack D, Thomas T, Falck TM, Tutuo N, Clem K. The intravenous use of coconut water. *Am J Emerg Med* 2000; 18(1):108-111.
7. Moura CC, Soares PB, Depaulareis MV, Fernandes NAJ, Zanetta BD, Soares CJ. Potential of coconut water and soy milk for viability of periodontal ligament cells, an *in vivo* study. *Dent Traumatol* 2104; 30(1)22-26.
8. Sekar N, Veetil SK, Neerathilingam M. Tender coconut water an economical growth medium for the production of recombinant proteins in *Escherichia coli*. *BMC Biotechnol* 2013, 2(13):70.
9. Thakur MK, Paramanik V. The role of steroid hormone coregulators in health and disease. *Hormone Research* 2009; 71(4)194-200.
10. Ochei J and Kolhatkar A. Care and use of experimental animals. In: *Medical Laboratory Science Theory and practice*, Tata McGraw-Hill India; 2007: 1213-1232.
11. Edeoga, HO, Okwu DE, Mbaoble BO. Phytochemical constituents of some Nigerian Medicinal Plants. *African J Biotechnol* 2005; 4(7): 685-688.
12. Nnodim JK, Nwanjo HU, Okolie NJ, Opara AU, Nwosu DC, Okoroiwu I, Dike J, Okorie H, Nwadike CN and Uduji HI. Effects of *Xylopiya aethiopicum* fruits on reproductive hormonal level in rats. *Global Journal of Medicinal Plant Research* 2013; 1(1): 29-31.
13. Bernard DJ. Mechanisms of FSH synthesis. *Fertil Steril* 2010; 93:2465-2485.
14. Tietz NW. *Fundamental in Clinical Chemistry*, W. B Saunders Company, Philadelphia; 1st Edition, 1994:1354-1373.
15. Ofem OE, Antai AB, Essien NM, Oka VO. Enhancement of some sex hormones concentrations by consumption of leaves extract of *Viscum album* (mistletoe) in rats. *Asian Journal of Medical Sciences* 2014; 5 (3): 87-90.

---

**\*Author for Correspondence:** Dr. Nnodim Johnkennedy, Department of Medical Laboratory Science, Faculty of Health Science, Imo State University Owerri, Imo State, Nigeria.  
Tel No: +238034237000, E-mail: johnkennedy23@yahoo.com