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Research Article

INFLORESCENCE OF *COCOS NUCIFERA LINN* IMPROVES THE TONE OF UTERUS MUSCLES

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Abstract:

Women of reproductive age are most commonly encountered with disturbed menses and uterine disorders. Ayurveda, an ancient system of Indian medicine cited use of *Cocos nucifera* inflorescence to manage these problems. Hence in the present study the aqueous extract is studied for uterine tonic activity. The uterine tonic activity is studied by conducting comparative study of estrogenic activity of aqueous extract with diethylstilbestrol in bilaterally ovariectomized immature Albino Wistar rats. Estrogenic activity was assessed by taking vaginal cornification and uterine wet weight. Aqueous extract of *Cocos nucifera* inflorescence showed a significant increase ($P<0.001$) in uterine wet weight at higher dose (344mg /kg). Proliferative changes in uterine endometrium at both the doses (172 mg/kg and 344 mg/kg) were observed compared to the control, but it did not cause vaginal opening.

From the present study it was concluded that aqueous extract of *Cocos nucifera* inflorescence at doses of 172 mg/kg and 344 mg/kg possess uterine tonic activity and higher dose (344 mg/kg) was found to be significant than that of lower dose (172 mg/kg) when compared to control.

Key words: *Cocos nucifera* inflorescence; Uterus wet weight; vaginal cornification

INTRODUCTION

Women of reproductive age are most commonly encountered with disturbed menstruation, amenorrhea (absence of menses) and dysmenorrhea (painful menstruation). Approximately 20% of female patients visiting general gynecologist are women of these problems [1, 2] The prevalence of uterine problems in Indian women is very high and it has significant clinical associations [3-6]. It is estimated that amenorrhea is present in 50% of cases; dysfunctional uterine bleeding is present in 30%, Hirsutism occurs in 70% and 40% in obesity cases [2, 7]. Possible long term consequences include an increased risk of endometrial hyperplasia or cancer, metabolic syndrome, type-2 diabetes and cardiovascular abnormalities [2, 8]. Because of these potential significant consequences appropriate treatment of individuals is essential.

Although significant advances have been made in the treatment of reproductive disorders, there are serious limitations in existing therapies because of cost, utilization

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and toxicity. Medications from natural sources (medicinal plants) are attractive therapeutic alternatives and supplements to existing therapy, and have not really been explored in depth. There is reason to believe that novel chemical entities will emerge from plant kingdom in search of newer, safer, and more effective drugs as uterine tonic. Ayurveda, an ancient system of Indian medicine cited use of *Cocos nucifera* inflorescence to manage irregular menses, amenorrhea,menstrual and uterine disorders [9].

In traditional medicine around the world, the coconut is used to treat a wide variety of health problems. According to Hartwell, coconuts are used in folk remedies for tumors. It has been reported to be anthelmintic, antidotal, antiseptic, astringent, bactericidal, diuretic, purgative, vermifuge, stomachic and supportive. In other places, it is known as a remedy for abscesses, asthma, bronchitis, cold, constipation, cough, earache, fever, flu, gingivitis, jaundice, nausea, rash, scabies, scurvy, sore throat, toothache, tuberculosis, tumors, typhoid and veneral diseases. Indigenous people of tropical countries use young coconut juice in the treatment of stomach upsets, diarrhea and dysentery. The lauric acid content of coconut endows it with antimicrobial properties. As such, coconut is useful in the treatment of digestive tract infections [10,11].

In modern medicine, the coconut is used as an immune system booster in infants. It is used to improve digestion and absorption of other nutrients such as; vitamins, minerals, amino acids. It is used to prevent obesity, overweight problem. It boosts energy and fights fatigue. It is one of the few thyroid-activating substances that actually support the body's use of thyroid hormones, thus increasing metabolism. It is used in the treatment of mal-absorption of fat such as cystic fibrosis and enteritis. It improves insulin secretion and enhances the utilization of blood glucose. This forms the basis for its use in the management of diabetes. Coconut is effective in treating and preventing heart disease, chronic fatigue syndrome, osteoporosis, gall bladder disease, Cohn's disease, prostate enlargement and cancer because of its composition and high medium chain fatty acid content. It is beneficial in disease conditions as hepatitis, SARS and AIDS caused by viruses. It improves CD-4 and CD-8 counts in patients who are immuno-compromised. Research has shown that it reduces viral load in AIDS patients. It also reduces inflammation and allergic reaction due to its anti-histaminic effect. The coconut palm has a multitude of industrial uses. Its products includes: food, fermented and unfermented drink, alcohol, vinegar. It produces utensils for household use such as oils for food, illumination, soap and margarine production and ointment. The residue after extraction is used in feeding domestic animals and as fertilizer [10, 11].

Studies conducted on polyphenolic rich extract from husk fiber of *Cocos nucifera Linn.* found to have leshminicidal effect [12]. It has also been found that aqueous extract from husk fiber of *Cocos nucifera Linn.* has ability to induce central analgesia along with antinociceptive potential [13]. Studies conducted on Bahirdhum Padhati Mashi of unripe *Cocos nucifera* husk shown to have chronic diuretic effect [14]. Studies conducted on wound healing property shown the oil of *Cocos nucifera* is an effective wound healing agent [15]. The warm crude extract of coconut milk and Coconut water is found to have protective effect on ulcerated gastric mucosa of rat [16]. It has been found that the Coconut water solution can be used as holding medium for in vitro embryo production [17]. It has also been found to have antihypertensive effect on Norepinephrine stimulated guinea pig atria [18].

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Hence an attempt is made to study the aqueous extract of *Cocos nucifera* inflorescence for its uterine tonic activity.

MATERIALS AND METHODS

Chemicals, Drugs and Plant Extract

Diethylstilbestrol (DES) (Stilbestrol Tablet was prepared by using 0.6%w/v sodium CMC as an suspending agent) used as reference standard at a dose of 2 mg/kg (p.o.) [19]. Aqueous extract of *Cocos nucifera* inflorescence was obtained from Natsyn Catalysts, Tamil Nadu, Madras. (The extract was in the powder form having strength of 1: 25 i.e. 1mg aqueous powder extract is equivalent to 25 mg of crude drug). All other chemicals and reagents used in this study were of analytical grade.

Experimental Animals

The rats were procured from Drug Testing Laboratory, Bangalore. And they housed in polyacrylic cages and maintained at 27 ± 2°C, 45-60% RH and 12 h photo period. They were provided with a standard pellet diet (Hindustan Lever Ltd., Bangalore, India) and water ad libitum. All animal procedures have been approved by the Animal Ethical Committee (No: IAEC/ NCP/04/09) in accordance with animal experimentation and care guidelines provided by IAEC/CPCSEA.

Uterine tonic activity [19, 20, 21]

Immature female Wistar rats weighing about 50-60 g were ovariectomized. Ovariectomy was performed under ketamine anaesthesia. The dose of ketamine (Aneket®) used was 70 mg/kg and injected by intramuscular route [22]. Single longitudinal incision was made in the skin of the abdomen. Ovaries which were embedded in pad of fat were identified. The top of a pair of fine forceps was introduced and the fat around the ovary was grasped, care being taken not to rupture the capsule around the ovary. The tip of the uterine horn was then crushed with a pair of artery forceps and the ovary, was removed with a single cut by a pair of fine scissors. The ovary of the other side was removed in the same way. The inner abdominal muscle was closed by suturing with help of sterile absorbable cat gut and skin wound was closed by using sterile silk suture. Care was taken to avoid any infections to the wound by applying Neosporin antibiotic powder.

After complete healing of the wound the rats were randomized into four groups of 8 in each.

- Group I (control) received vehicle i.e. water by oral route at dose 10 ml/kg b.w.
- Group II (standard) received aqueous suspension of diethylstilbestrol in 0.6% (w/v) Sodium CMC at dose of 2 mg / kg b.w.
- Group III (Test I) received aqueous extract of Cocos nucifera inflorescence at dose 172 mg/ kg b.w.
- Group IV (Test II) received aqueous extract of Cocos nucifera inflorescence at dose 344 mg/kg b.w.

All animals were administered orally daily for seven days.

Vaginal opening and cornification were checked daily. After 24 hours of last treatment, the animals were sacrificed by cervical dislocation. Uteri were isolated and cleaned carefully from adhering connective tissue. The fluid from uteri was removed. Then uteri were weighed immediately on sensitive balance (Sartorius TE 214 S).

RESULTS

Uterine tonic activity

Assessment of uterine tonic activity of aqueous extract of Cocos nucifera inflorescence was done by uterine wet weight and vaginal cornification.

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Table1: Effect of aqueous extract of *Cocos nucifera* inflorescence on uterine wet weight in bilaterally ovariectomized female Albino Wistar rats.

Group	Treatment(route)	Dose (mg/kg b. w.)	Uterine wet weight (mg/100 g b.w.) Mean ± S.E.M.	% increase in Uterine wet weight
I	Control (p.o.)	-	44.62 ± 0.85	-
II	Standard DES (p.o.)	2	173.8 ± 1.24***	289.51%
III	*Cocos nucifera* (p.o.)	172	45.79 ± 0.61	2.62%
IV	*Cocos nucifera* (p.o.)	344	51.77 ±1.39***	16.02%

Data were analyzed by one-way ANOVA followed by Dunnett's *t*- test. All groups were compared with control. n = 8
*** *P*< 0.001 compared with control.

The lower dose (172 mg/ kg) of aqueous extract of *Cocos nucifera* inflorescence did not show significant increase in uterine wet weight compared to control. The higher dose (344 mg/kg) of aqueous extract of *Cocos nucifera* inflorescence showed significant increase (P<0.001) in uterine wet weight compared to control (Table 1). The standard drug DES produced highly significant increase (P<0.001) in uterine wet weight compared to control.

DISCUSSION

Uterus and the female reproductive tract undergo innumerable physiological and biochemical changes under the influence of ovarian hormones such as estrogen [23]. In ovariectomized immature female rats, the resultant lack of estrogen causes atrophy of the uterus. Administration of estrogenic substances to ovariectomized immature rats leads to uterotrophic changes, vaginal cornification and proliferative changes in uterine endometrium [19]. Estrogenic potency and efficacy have traditionally been expressed in terms of uterotrophic effects in immature and in ovariectomized female rats. The increase in uterine wet weight was dose dependent with increase in the dose of aqueous extract of *Cocos nucifera* inflorescence. Estrogenic compounds are known to cause the vaginal opening, keratinization and cornification of the vaginal epithelium, causing the superficial cells to be shed into lumen to form large squamous cells [19, 21, 24]. The aqueous extract did not show the vaginal opening and cornification.

CONCLUSION

From the present study it was concluded that aqueous extract of *Cocos nucifera* inflorescence at doses of 172 mg/kg and 344 mg/kg possess uterine tonic activity as evidenced by increase in uterine wet weight. Higher dose (344 mg/kg) has shown

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significant increase in uterine wet weight than that of lower dose (172 mg/kg) when compared to control.

CONFLICT OF INTEREST

There is no conflict of interest associated with the authors of this paper.

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