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FUNCTIONAL EFFECTS OF *SESAMUM INDICUM* SEEDS ON SOME HORMONES IN FEMALE WHITE RATS

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ABSTRACT : This study was carried to investigate the effects of sesame seeds on the hormones levels in white rat females serum during the stages of virgins, pregnant and lactating by using 30% of sesame seeds for 20 days. Thirty-six (36) of albino rats were used and randomly divided into three groups (virgins, pregnant and lactating) (12 rats/group). Each group subdivided into two groups (control and treatment) (6 rats / group). Thereafter, control and treatment rats were sacrificed after 20 days to provide serum and mammary g land tissue for the hormonal and morphometercal analysis. The hormonall examination have shown a significant increase ($p < 0.05$) in estrogen, progesterone and prolactin levels in blood serum of all groups that treated when compared with the control.

The morphometrical results showed a significant increase in the diameters and number of mammary gland's vesicles in all animals that treated with sesame seeds fin comparison with controls. Our conclusion pointed out that sesame seeds have an effective effect on the tissue of the mammary glands and levels of some hormons.

Key words : *Sesamum indicum*, three physiological stage, sex hormones.

INTRODUCTION

The mammary glands are compound tubuloalveolar gland that produces and excretes the milk, which is the best source of nutrition for newborns. The secretion of milk from the mammary glands were regulated by prolactin hormons, which is directly responsible for promoting the secretion of milk. The low levels of prolactin leads to a decrease in breastfeeding in mothers (Bath *et al*, 1985). Where, the prolactin (PRL) hormone plays a key role in the growth of the mammary glands as well as for lactation that prepare the female for energetic and behavioral demands postpartum (Preston and Wilson, 2017). Ovarian steroids (estradiol and progesterone) appear to be key regulators of the different stages of mammogenesis and mammary function. Mammogenesis in early life is a determinant for the subsequent enhancement of lactation (John and Hall, 2016).

From earliest times of mankind a multitude of plant galactagogues had been used in the folk medicine of all human cultures. There is a continuing interest in identification and better understanding of lactogenic plants and their extracts (Lompo-Ouedraogo *et al*, 2004).

Sesame seeds are prescribed for treatment of menopause, induction of uterine bleeding and high menstrual rate in the next menstrual cycle without treatment (Yavari *et al*, 2014). In addition to increasing beta(β) estrogen receptors in the uterus (Anagnostis and Papadopoulos, 2009). As well as the effectiveness of sesame seeds in reducing the growth of breast tumors (Al, 2012). The presence of some elements in sesame such as iron, copper and cobalt increases the concentration of hemoglobin, and raise the number of blood cells by stimulating hematopoiesis in the bone marrow and due to presence of vitamin B12 (Diab, 2013). As shown the importance of sesame seed in testicular improvement (concentration, motility, viability of sperm in the epididymis and increase the epithelial germinal height) and enhance fertility and spermatogenesis in male rats (Amini *et al*, 2012). Therefore, this investigation was directed to cast a light on the effect of Sesame seeds in some hormonal level and morphometrical analysisof mammary gland tissue.

MATERIALS AND METHODS

Animals

Wistar rats animals were obtained from the pharm logical collage ofKarbala University of Iraq. All animal procedures were performed in accordance with the guidelines of Supervisory Committee of housing

department, Education Collage of Pure Sciences, Animal Council, Karbala University.

Animals and diets

Thirty adult (20 female and 10 males) of Norway rats (*Rattus norvigicus*) were used for this study. They were kept for 2 weeks for adaptation with experimental. After mating, males were isolated in separate cages. When the pregnant rats delivered and weaned newborn, the weaned females are isolated from male and allowed them to grow until sexual maturity to be used in future experiments. The process of mating and birthing are continued during the period of the study, therefore, the animals in convergent age can be provided.

A total of 36 adult female were used in the experiment. Their average body weight ranged between 140-200gm. They were kept at a temperature between 20 -24°C (room temperature). Animals were housed individually in wire - meshed stainless steel cages. The light/dark cycle was maintained as 12 hrs/12hr. The animals were randomly divided into three groups (virgins, pregnant and lactating) (12 rats\groups), then the each group sub divided into two groups (control and treatment) (6 rats/group).

Special care was taken in order to eliminate any unwantedeffects due to the provided diet. Commercial rat chow wasused (Sohool Al-Khaerat Company, Baghdad, Iraq) containing M.E poultry 3150, protein 20%, moisture 11%, Lysine 1.31%, methienine 0.46%, Meth +cyst 0.86%, Theronine 0.72%, Av.p 0.44%, calcium 0.85%, Na 0.16%, C.L 0.20%, K 0.74%, ca\p 2.03%, NA +K+CL 199-518%, Cp 162.066, Fat 5.2%, Fibre 3.2%, Ash 7.1%, Antioxdant add, Phytase add, NSP add, salinomycin add, Essential add. The pellets were grounded and one part (experimental diet) was mixed with the sesame seed (from Iraqi market) at a final concentration of 30% (w/w), while the rest (control diet) was kept as it was.

After that in both parts, the ground material was mixedwith a minimum amount of tap water and by the use of ameat mincing machine, new pellets were created that weredried overnight at 458C in oven , or in room tempreture in summer (Anagnostis and Papadopoulos, 2009). Blood samples were collected from puncture the heart. The blood was kept for no more than 4 hours in the Eppendorf tube without EDTA and the serum was separated by centrifugation 3000 cycles for 5 minutes and deep-frozen for later biochemical analyses (Al-Khalisi, 2000). For histological study of rat tissue, the rats were anaesthetized by chloroform and killed. Immediately after death the mammary gland for morphometrical study were excised and preserved in fixative solution depending on the study till the preparation of histological sections.

Statistical analysis

The data are expressed as mean ± standard deviation SD and analyzed by one-way ANOVA followed by Revised Least Significant Differences LSD. Statistically significant were considered as $p < 0.05$.

RESULTS

Table 1 also shows an increase in the level of hormones prolactin, estrogen and progesterone in female rats treated with 30% of sesame seeds.

Table 2 shows an increase in the diameter of the vesicles and it's number, as well as an increase in the size of the mammary glands and increase body weight of the treated groups for the three stages compared to the control (Table 3).

DISCUSSION

The treatment of sesame seeds leads to an increase in the size of the lobules and the abundance of vesicles and their branches for all animals in the physiological stages (virgins, pregnant, lactating), this is due to the effective components of sesame seeds and one of the most important of these compounds is Quercetin, which is a type of phytoestrogen effectively promote the secretion of prolactin and development of mammary glands (Tušimová *et al*, 2017). Where, Lin *et al* (2018) explained Quercetin stimulates and releases prolactin receptors from the pituitary gland, as well as stimulates the proliferation of epithelial cells.

Sesame seeds also contain sesame, which also contains phytoestrogen that potential role is stimulate estrogen E2 by binding to estrogen receptors (Agiang *et al*, 2015). The ERα is a critical regulator in mammary gland development, it is expressed both in the mammary epithelium and the mammary stroma (Li *et al*, 2010). Agiang *et al* (2016) showed a significant increase in prolactin and estradiol when 10% of sesame seed oil was used and they were concluded that it affected the endocrine system and fertility was enhanced (Agiang *et al*, 2016). Yavari *et al* (2016) also explained the possibility of using sesame seeds as a treatment for oligomenorrhea instead of progesterone hormone therapy. Progesterone is known to work prominently with prolactin in promoting the development of the parasitic-alveolar system in the mammary glands (John and Hall, 2016).

Besides ,the presence of many vitamins and minerals in the seeds of sesame (Souza *et al*, 2018), which proved to be effective in increasing milk production, where, Yang *et al* (2011) noted that vitamin A and B-Carotene have a role in maintaining epithelial tissue health in the mammary

Table 1 : The effect *Sesamum indicum* on main value to serum hormones level in adult female rats for 20 day in three physiological stages.

Hormones	Stage	Control	Sesame	Average transaction
Estrogen Pg\ml	Virgin	1.23±32.09	1.62±36.24	1.21±34.17a
	Pregnant	1.30±71.31	1.44±79.59	1.56±75.45b
	Lactating	2.15±51.88	1.49±63.97	2.30±57.93c
	Average transaction	3.99±51.76A	4.73±59.94B	
Progesterone ng\ml	Virgin	0.8±5.5	0.5±12.2	1.1±8.8a
	Pregnant	0.93±15.8	1.28±18.7	0.87±17.3b
	Lactating	0.70±18.1	1.30±27.7	4.17±22.9c
	Average transaction	1.39±13.14A	1.66±19.53B	
Prolactin ng\ml	Virgin	0.8±3.5	0.7±6.1	0.66±4.8a
	Pregnant	0.72±7.7	0.48±10.6	0.59±9.2b
	Lactating	0.33±11.5	0.52±17.1	0.64±14.4c
	Average transaction	0.88±7.59A	1.14±11.26B	

The different capitals in the horizontal direction indicate significant differences of P< 0.05. The small letters in the vertical direction indicate significant differences of P< 0.05.

Table 2 : Effect of *Sesamum indicum* on the number and diameter of alveoli and number of lobes in mammary glands of treated rats.

Parameter	Grubs	Diameter of the vesicles	Number of vesicles	Number of lobes
Virgin	Control	0.77±15.34A	0.02±1.66A	0.01±1.33A
	Sesame	0.72±39.13B	0.03±12.06B	0.03 ± 4B
Pregnant	Control	0.64±44.72A	0.43±62.73A	0.03±5.8A
	Sesame	2.8±72.06B	0.16±45.33B	0.05±7.6B
Lactation	Control	2.6±78.13A	0.14±27.86A	0.04±7.5A
	Sesame	3.59±163.27B	0.11±17.13B	0.02±8.6B

The different capitals in the direction indicate significant differences of P< 0.05.

Table 3 : The effect of *Sesamum indicum* on wight body in three physiological stages.

Grubs	Parameter	Body weight	Weight of the gland
Virgin	Control	2.58 ± 155 A	0.02 ± 0.37 A
	Sesame	2.78 ± 162 B	0.19 ± 1.01 B
Pregnant	Control	5.62 ± 215 A	0.21 ± 145 A
	Sesame	8.01 ± 229 B	0.22 ± 3.17 B
Lactation	Control	5.54 ± 176 A	0.24 ± 3.34 A
	Sesame	6.02 ± 183 B	0.29 ± 5.09 B

The different capitals in the direction indicate significant differences of P< 0.05.

glands. In another study pointed out that folic acid has a role in increasing milk production (Graulet *et al*, 2007). Griffiths *et al* (2007) suggested that a diet rich in zinc, magnesium, cobalt and selenium had improved milk production (Moeini *et al*, 2009).

Table 2 shows a significant increase in the diameter of vesicles and their number of virginal groups as compared to control, and this increase reflects the active state of the lactation glands and similar changes were observed in the stages of pregnancy and lactation. This result is in agreement with the other studies that used plants extracts containing flavonoids which also found in sesame (Al-Bazii, 2013; Kadhem, 2016).

The current study also indicated a significant increase in the weight proportion of mammary glands (Table 3). This increase may be attributed to the cellular divisional activity, in addition to the increase in the secretory contents of the cells and alveoli of mammary glands concurred with Aliawy *et al* (2014), where studied *Trigonella foenum – graecum* containing flavonoids. As for the weight of the body, we noticed significant differences because of high levels of mono- and poly-unsaturated fatty acids and this result matched with Sugano *et al* (1990).

CONCLUSION

The treatment of sesame seeds for female rats in the three physiological cases (virgins, pregnant and lactating) leads to increase in the growth and development of mammary glands in addition to a significant increase in female sex hormones. This study indicates that sesame seeds have beneficial effect on the endocrine system.

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