

# Study the effect of *Nigella Sativa* on thyroid function and reproductive hormone of female rat

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**Objectives** The present study was conducted to investigate the effect of *Nigella sativa* on hormone reproduction and thyroid function in female rats.

**Methods** Twelve female rats were used and divided randomly into two groups (6 animals for each) first group served as treatment and gave *Nigella sativa* oil (1ml/kg BW/day) orally according to body weight for a period of 30 consecutive days. While other group drenched with normal saline at same dose that above mentioned and served as control.

**Results** The result revealed significant increase in levels of LH, Estrogen T3 and T4 and significant decrease in level of TSH. Histological sections of thyroid gland revealed presence vaculation in colloid of thyroid follicle.

**Conclusion** In conclusion, the *Nigella sativa* oil caused the elevation of thyroid hormones as well as LH and estrogen but still within normal value.

**Keywords** *Nigella sativa*, rat, LH, T3, T4, TSH

## Introduction

A herbaceous plant, called *Nigella sativa* (Ns) has different names throughout the world such as black seed, black caraway and black cumin. The black seed oil is reported to be beneficial due to its composition of many components such as aromatic oils trace elements and vitamins.<sup>1</sup> Since *Nigella sativa* oil possesses high ratio of unsaturated fatty acids such as linoleic acid which in turn play an important positive role in function of reproductive system.<sup>2</sup>

A high percentage of medicine plants have pharmacological principles, so they are useful as curatives for many ailments. According to the reports of World Health Organization (WHO), Traditional medicine won the trust of 70–80% of people in primary health care.<sup>3</sup> The plants and their derivatives have a key role in world health. They have long been known to possess biological activity. And from which it draws about 30% of all modern medicines.<sup>4</sup> In addition, the plants used for a long time in the folklore medicine to improve fertility by enhancing fertility recipes and aphrodisiacal qualities.<sup>5,6</sup>

*Nigella sativa* L. plant belonging to the family called Ranunculaceae,<sup>7</sup> which is also called black seed and often their seeds used in folk medicine in some Asian countries and in the Middle East to promote the health and well used in the treatment of various diseases.<sup>8,9</sup>

Several reports confirmed the usefulness of black seed oil because of having more than one hundred of components as volatile oil, vitamins and trace elements.<sup>1</sup> Recently, clinical and animal studies revealed that the black seed extract has many therapeutic effects. *N. sativa* seeds have also been used as a natural remedy to promote female menstruation, galactagogue, carminative, laxative and gastroprotective in traditional medicine.<sup>12</sup>

Anti-tumor,<sup>13,14</sup> anti-anxiety,<sup>15</sup> anti-microbial,<sup>16,17</sup> anti-parasitic properties,<sup>10,11</sup> anti-inflammatory<sup>18</sup> and anti-oxidant,<sup>19</sup> diuretic and hypotensive, genoprotective, hepato-protective and antidiabetic<sup>11</sup> as well as bronchodilator activity and estrogenic activity.<sup>20</sup>

Despite the progress in *N. sativa* seeds research in the last decade, the biological and physiological effects of *N. sativa* seeds still controversial and needs more investigation. So the present study aimed to evaluate *N. sativa* seeds oil as a supportive

traditional medicine on hormones involved in female reproduction and on thyroid function.

## Material and Methods

**Animal and experimental design:** The present study was conducted on the female rats (*Rattus norvegicus*) to evaluate the effect of *Nigella sativa* oil on some hormonal indices of healthy female rats. Twelve female rats were divided randomly into two groups (6 animals for each) first group served as treatment and gavaged *Nigella sativa* oil (1ml/kg BW/day) orally according to body weight for a period of 30 consecutive days. While other group drenched with normal saline at same dose that above mentioned and served as control group. At the end of the experiment, blood samples were collected under chloroform anaesthesia via cardiac puncture using sterile disposable syringes at baseline (pre-treatment), day 30 after treatment. The blood samples were then centrifuged at 3000 rpm for 10 minutes to separate the serum. The serum was stored at –80°C until assays were carried out. All tests were performed according to the manufacturer's instructions.<sup>21</sup>

Hormonal assay was performed. Estrogen and LH, T3, T4 and TSH levels were measured by using ELISA kit (Bio Merieux). All rats were sacrificed by cervical dislocation under anaesthetised and then midline laparotomy was performed. Resected thyroid gland specimens of each rat in all groups were fixed in 10% buffered formaldehyde for 24 hours and histological procedure was performed according to Ref. (22).

**Statistical analysis:** Two sample Independent *t* test was used, and the data were expressed as means ± standard deviation. The data were analyzed using SPSS windows program version 15.<sup>23</sup>

## Results and Discussion

The hormonal activities of LH and estrogen showed significant increase in the treated groups (Table 1) while stayed the same in the control group.

Table 1. Shows effect of *Nigella sativa* oil on some hormones in female rats (Mean  $\pm$  SE)

Parameter	LH ( $\mu$ IU/ml)	Estrogen (pg/ml)	Total T3 (ng/dl)	Total T4 ( $\mu$ g/dl)	TSH ( $\mu$ IU/ml)
Control	0.42 $\pm$ 0.01	29.08 $\pm$ 0.75	0.13 $\pm$ 0.02	72.04 $\pm$ 1.29	0.05 $\pm$ 0.006
Treatment	0.31 $\pm$ 0.12*	41.27 $\pm$ 1.42*	1.17 $\pm$ 0.07*	93.64 $\pm$ 1.27*	0.02 $\pm$ 0.01*

\*represent significant difference at ( $p \leq 0.05$ ).

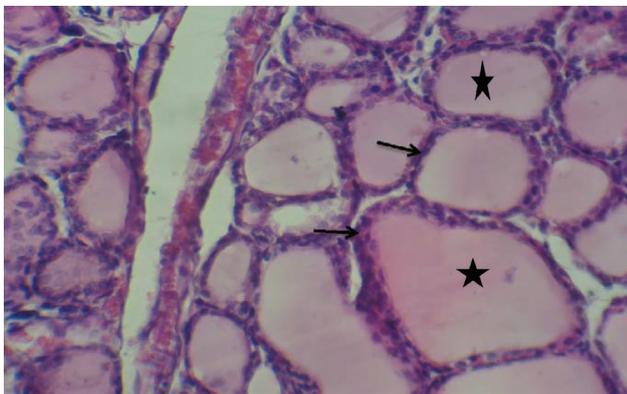


Fig. 1 Light micrograph for thyroid gland of control rat, shows normal architecture, thyroid follicles, filled with colloid (star) and lined by cuboidal thyrocytes (thin arrow) (H&E) 100X.

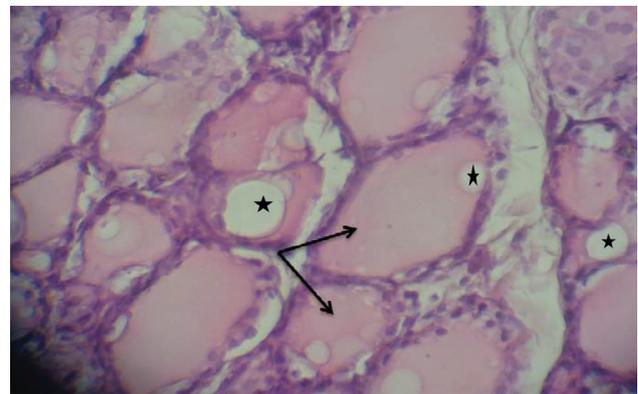


Fig. 2 Light micrograph of histological changes in thyroid gland of female rat treated with nigella sativa shows thyroid follicles vary in size (arrow), some of follicles with vacuolated colloid (stars). H&E, 100x.

In present experiments, the Ns oil treatment led to significant increase in LH levels which may be due to the direct effect of oil on hypothalamus which in turn increases Gonadotrophic Releasing Hormone (GnRH), furthermore fatty acids can stimulate GnRH-dependent pathways that initiate changes in gonads function.<sup>24</sup>

The positive increased effect of estrogen concentration in treated groups is may be attributed to the contents of the Ns oil especially thymoquinone that enter in building of cholesterol which is important source of cholesterol esters that may have a role in estrogen synthesis.<sup>25</sup>

Regarding thyroid function, the results of T3, T4 and TSH serum level of control and treatment groups are shown in Table 1, The plasma concentration of T3 and T4 are significantly ( $P \leq 0.005$ ) increased and TSH serum level significantly ( $P < 0.005$ ) decreased in treatment groups compared with control groups. The treatment with oral administration of NS increased T4 levels in rabbits.<sup>26</sup> These results indicated that oral administration of NS lead to hyperthyroidism in mice; likewise, other study reports that the oral administration of NS not only increased serum T3 and decreased TSH but also has an anti-oxidant effect.<sup>27</sup>

The oral administration with NS could raise T3 level without changing T4 and TSH serum concentration levels.<sup>28</sup> Further work is suggested for evaluating the effect of NS on the serum concentration of thyroid hormones to clarify the possible mechanism of action. Histological result of thyroid gland revealed normal appearance of thyroid tissue and intact follicular structure in control rats, thyroid follicles lined with cuboidal epithelial lining filled with colloid (Fig. 1). Thyroid gland of female rats treated with Ns showed no histological changes when compare with the control except that some of the follicles were enlarged and containing vacuolated colloid as appear from Figure 2. This might be attributed to increased endocytotic activity of many follicular cells reflecting a compensatory mechanism to the augmented release of the stored hormones in the follicular lumen.<sup>29</sup>

## Conclusion

In conclusion, the *Nigella sativa* oil caused elevation of thyroid hormones as well as LH and estrogen but still within normal value and histological sections of thyroid gland revealed presence vaculation in colloid of thyroid follicle. ■

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