Galactagogue action of Nigella sativa seeds

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ABSTRACT: This experimental study was designed to determine the galactagogue action of Nigella sativa seeds. Lactating mice were switched onto Nigella sativa containing diet from the day of labor and for 15 days. Nigella sativa significantly (P<0.01) increased serum prolactin in level and the weight of the litter compared with control group. Breast tissues of lactating mice after Nigella sativa contain ing diet showed larger acini, thicken epithelia and hyperactivity. No haematological, histological and biochemical side effects were caused by Nigella sativa.

Key words: Nigella sativa, galactagogue, milk letdown

I. INTRODUCTION

Nigella sativa Linn (Black Cumin) is widely cultivated throughout South Europe, Syria, Egypt, Saudi Arabia, Turkey, Iran, Pakistan and India (1). Al-Jassir has reported in detail the chemical composition of Nigella sativa seeds, the analysis showed a composition of 20.85% protein, 38.20% fat, 4.64% moisture, 4.37% ash, 7.94% crude fiber and 31.94% total carbohydrates (2). Sodium iron, zinc, calcium, magnesium, manganese and copper were detected in Nigella sativa seeds at low levels, while lead, cadmium and arsenic were not present (2). Chemical analysis of Nigella sativa fats revealed a composition of myristic, palmitic, oleic, linoleic and arachidonic acids (2,3). However 67 compounds were identified by capillary gas chromatography of Nigella sativa oil. They contained p-cymene 31.7%, a-pinene 9.3%, thymoquinone 24.5% and many other compounds (1). Nigella sativa carbohydrates consisted mainly of sucrose 32.56%, fructose 21.72%, α-glucose 20.81% and β-glucose 11.68% (3). Analysis of Nigella proteins showed that they consisted of 15 amino acids including 9 essential amino acids (4). Nigella sativa seeds exerted many pharmacological effects, these include antibacterial (5-7), antifungal (8), bronchodilator (9), inhibition of histamine release from mast cells (10,11), anticholinergic and smooth musculerelaxant effects (9), cardiac depressant, hypotensive effects (9,10,11), hypoglycemic effects (12), immunostimulant (13,14) and anticancer effects (15). This study was designed to determine the galactagogue action of Nigella sativa seed and its safety.

Materials and Methods:
Sixty mature female albino mice, of approximately similar bodyweight and age were used in this study. The regularity of estrus cycle of the females was determined by vaginal smears stained by methylene blue. Then the females were mated with healthy males of the same strain, during the proestrus period and for 24 hours. The day of fertilization was determined by the presence of the sperm in the vaginal smears, was considered as day 1 of pregnancy. After labor, 12 females were excluded because they gave less than 3 fetuses. The rest 48 females were divided into 2 groups of 24 each. The litter size was reduced to 3 fetuses for each female. Fetuses were weighed and then the mothers were in each group were switched to a control diet or Nigella sativa diet. The diet was prepared according to Agrawala et al (16,17).
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Control diet (1kg.) Nigella sativa containing diet (1kg.)

Wholewheat flour 800gr. Wholewheat flour 700gr.
Whole milk powder 170gr. Whole milk powder 170gr.
Yeast 22gr. Nigella sativa powder 100gr.
Calcium carbonate 5gr. Yeast 22gr.
Table salt 3gr. Calcium carbonate 5gr.
Multivitamins (SDI) 1 capsule. Table salt 3gr.
Multivitamins (SDI) 1 capsule.

As a litter lives on mother’s milk only for 20 days and cannot nibble at the food laid out for them mothers (17), the experiment lasted for 15 days. At day 15, fetuses were weighed again. Blood samples were taken from onethird of the mothers. In each group, serum prolactin level (R1A-CL51biointernational-France). Blood samples of the second third of the mothers in each group were used to estimate serum glucose, urea, GOT, GPT, bilirubin, uric acid, creatinine, triglycerides, alkaline and acid phosphatases by enzymatic methods (Raudox). Blood samples of the last third of the mothers were used to estimate WBC count, RBC count, differential WBC count, and Hb. The breast tissues of the mothers were biopsied and processed for histological examination. Specimens were taken from the liver, kidney, intestine, and stomach for the pathological study. Student’s test was used to determine the significance between groups.

Results:

This study showed that serum prolactin level of lactating female mice kept on Nigella sativa containing diet, was significantly higher (P<0.01) than that of mothers switched to control diet (Table 1). The weight of the litter of females kept on Nigella sativa containing diet was significantly (P<0.01) higher than those offemale given control diet (Table 2). In comparison with control group, the sections of the breast tissue of mothers kept on Nigella sativa containing diet showed large acini with an increase in the proliferation and thickness of the epithelium. The majority of the acini in the breast tissue showed more secretory activity (Fig 1). No pathological changes were observed in the liver, kidney, stomach, and intestine of females given Nigella sativa containing diet. All hematological and biochemical values were not significantly changed. However, a slight reduction (P<0.05) in the serum glucose and uric acid was found in females kept on Nigella sativa containing diet.

Table 1: Serum prolactin level in females given control diet in comparison of female kept on Nigella sativa containing diet.

<table>
<thead>
<tr>
<th>Groups</th>
<th>No. of mice</th>
<th>Serum prolactin ng/ml 8 p.m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactating mice on control diet</td>
<td>8</td>
<td>175.50 + 7.82</td>
</tr>
<tr>
<td>Lactating mice on Nigella sativa containing diet</td>
<td>8</td>
<td>185.0 + 3.16 (p&lt;0.01)</td>
</tr>
</tbody>
</table>

Table 2: The increase in the weight of the litter of the female mice kept on Nigella sativa containing diet compared with control.

<table>
<thead>
<tr>
<th>Groups</th>
<th>The difference between the weight of the litter at 1st and 15th day of age (mg)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>The litter weight of lactating mice on control diet</td>
<td>4730.25 + 290.85</td>
</tr>
<tr>
<td>The litter weight of lactating mice on Nigella sativa containing diet</td>
<td>6168.66 + 341.49 (p&lt;0.01)</td>
</tr>
</tbody>
</table>

*Mean of the means of litter weight of all mothers in the group
Fig.1: (A) Section on the breast tissue of the lactating mice kept on Nigella sativa containing diet showing larger acini (→), thicker epithelia (→), and more secretory activity (→), compared to the breast tissue of the lactating mice kept on control diet (B). (40X).

Discussion:

The prolactin stimulatory effect of Nigella sativa could be attributed to its anticholinergic effect (9). Snyder et al found that lactotrophs contained muscarinic receptors, and the administration of a cholinergic muscarinic agonist decreased the prolactin secretion either in basal condition or after different stimuli (18), in addition to this direct muscarinic effect at the level of lactotrophs, acetylcholine also seems to inhibit prolactin release at the level of hypothalamus (19). On the other hand, nigellone, the carbonyl polymer of thymoquinone isolated from Nigella sativa, is a very effective histamine release inhibitor. This inhibition is mediated by decreasing intracellular calcium, inhibition of protein kinase C and inhibition of oxidative metabolism (8). Histamine is an inhibitory mediator on the secretion of prolactin at the level of hypothalamus. This inhibition is mediated by H2 receptors (20). Therefore the prolactin stimulatory effect of Nigella sativa could be attributed to its anticholinergic and antihistaminic actions. Furthermore, Nigella sativa contained high amounts of carbohydrate, oils, proteins and trace elements (2, 3). These contents represent a high energy source which could participate in the galactagogue effect of Nigella sativa. The hyperactivity of the breast tissue of the lactating mice on Nigella sativa containing diet, occur due to an increase in the prolactin secretion. These effects were clearly reflected on the litter weight. According to these results, it appears that Nigella sativa is free from histological, haematological and biochemical side effects. The safety of Nigella sativa was recorded by many previous studies (1, 12, 14). However, the decline in the serum glucose and uric acid was attributed to hypoglycemic (12) and hypouricemic effects of Nigella sativa (1).
REFERENCES:


[10]. El-Dakhakhny , M. studies on Egyptian Nigella sativa L.II some pharmacological properties of the seeds active principle in comparison to its dihydro compound and its polymer Arzneimittel - Forsch 1965 , 15 (10) 1227-1229.


