

## Effect of Aqueous Extract of *Nigella sativa* Seeds on Body Weight, Blood Glucose And Average Transit In Albino Rat Small Intestine

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### الخلاصة

درس تأثير اعطاء المستخلص المائي لبذور الحبة السوداء *Nigella sativa* بجرعة 8 غم/كغم من وزن الجسم يوميا ولمدة (15) يوما في اناث الجرذان غير البالغة على اوزان الجسم وتركيز كلوكوز الدم ومعدل المرور في الامعاء الدقيقة وقد أظهرت النتائج انخفاضاً معنوياً في اوزان الجسم في الحيوانات المعاملة بالحبة السوداء مقارنة مع اوزان الحيوانات قبل المعاملة وكذلك مقارنة مع اوزان حيوانات مجموعة السيطرة , وترافق مع ذلك انخفاض في تركيز كلوكوز الدم عند المقارنة مع حيوانات السيطرة ومن ناحية اخرى أظهرت الحيوانات المعاملة بمستخلص الحبة السوداء انخفاضاً معنوياً في معدل المرور في الامعاء الدقيقة مقارنة مع حيوانات السيطرة , مما قد يشير الى امكانية استعمال حبة السوداء كعلاج لحالات الاسهال لماله من خصائص ضد المغص والاسهال .

### ABSTRACT

The study was conducted to shed some light on the effect of the aqueous extract of *Nigella sativa* seeds at dose 8g/kg bw daily for 15 days on body weight, blood glucose and the average intestinal transit in female immature rats. The results revealed a significant decrease in body weights of *Nigella sativa* treated rats compared with control. In addition , A significant decrease in blood glucose level, small intestinal transit was observed in rats treated with *Nigella sativa* seeds compared with the control group. The inhibitory effect of *Nigella sativa* aqueous extract on the small intestinal

motility could be of a beneficial remedy ( as diarrheal treatment ), Since *Nigella sativa* seeds exhibit some antidiarrheal, antispasmodic properties.

## INTRODUCTION

The use of naturally occurring botanicals with substantial hypoglycemic activity to afford protection to humans against diabetes mellitus is receiving increasing attention . The black seed *Nigella sativa* (*N.sativa*) is a spicy plant that belongs to the Ranunculaceae family (1). The name black seed is one of many colloquial names of this plant like Black cumin seeds (2), Black seeds (3), habbatus sauda (4), habb sawda (5). The Greek physician Dioskorides used Black seed to treat headaches, nasal congestion , toothache and intestinal parasites . Hippocrates ,the grand father of today scientific medicine regarded *Nigella sativa* as a valuable remedy in hepatic and digestive disorders. *Nigella sativa* also known as extraordinary herb used in the middle east for thousands of years to treat ailments from asthma to psoriasis and recently been found to fight cancer and is loaded with protein (6). *Nigella sativa* was known to be used in folk-medicine of different culture for more than 2000 years, in addition, to Arab folk medicine for their hypoglycemic properties, is used as a herbal medicine for the treatment of diabetes mellitus (7,8) beside that *N. sativa* was shown to contain over 100 valuable components. It is a significant source of protein, essential fatty acids (the type our body cannot produce) and many vitamins and minerals (6). Aqel (9) found that volatile oil of this plant inhibits the contraction of smooth muscle induced by acetylcholine or by histamine and the contraction of vascular smooth muscle induced by norepinephrine . The present study was conducted to shed some light on the effect of the aqueous extract of *N.sativa* on body weight , blood glucose level and the average transit in rat small intestine .

## MATERIALS AND METHODS

**Preparation of plant extract :-** The plant seeds were purchased from the local market. These were washed to remove sand and other debris. 250 gram were weighed ,boiled with 1000ml distilled water for 90 minutes and filtered through muslin and the final volume of the filtrate obtained was 300 ml (10). The concentration of the seeds extract was approximately 0.8gm/ml (The dose used was 8g/kg. BW).

**Experimental design :** Immature female rats (body weight 60 –72 g), one month old, were housed under controlled conditions. Pelleted food and water were available . The animals were randomly divided into two groups (6 animals / group ). Group 1 received 10ml/kg body weight aqueous

extract of *N. sativa* orally by gavage needle, group II received orally equal amount of distilled water for 15 days experimental period. Food was withheld 20-24 hours in group I at day 14 and the animals were allowed access to water. Water was withheld at the day 15 to determine small intestinal movements and the gastrointestinal transit (GIT). Animals weights were recorded, 0.1 ml black ink was administered orally to all animals immediately before their daily administration of *N. sativa* and distilled water. After 30 minutes the animals were killed by cervical dislocation and intestinal tract was excised and the total length was measured from the pyloric sphincter to the ileocecal junction. The 1st distance traveled by the ink was measured. Blood samples were obtained from the heart for the determination of blood glucose level by Nelson method (11). To Yield the small intestine transit the following equation was used for each animal. (12).

$$\text{Percentage of small intestine transit} = \frac{\text{The farthest distance traveled by the ink} \times 100}{\text{Total small intestine Length}}$$

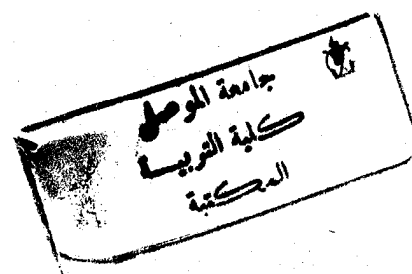
The percentage inhibitory effect of *N. Sativa* was calculated by the following equation

$$\% \text{ inhibition} = \frac{\text{Percentage of small intestine transit (control group)} - \text{percentage of small intestine transit (N. sativa treated group)}}{\text{Percentage of small intestine transit (control group)}} \times 100$$

The farthest distance traveled by the ink in control group. The data were statistically analyzed using t-test. (13)

## RESULTS

The results in (Tabel 1) revealed a significant ( $P < 0.05$ ) differences in animals body weights between control (Group I) and *N. sativa* treated group (Group II). A significant ( $P < 0.05$ ) decrease was shown in pre and post treatment body weights in the group treated with *N. sativa*. On the other hand, A significant ( $P < 0.05$ ) decrease in blood glucose level (Tabel 2) was shown in group treated with *N. sativa* compared with control group. In addition, A significant ( $P < 0.05$ ) decrease in the percentage of small intestine transit in *N. Sativa* treated group in comparison with control group. The percentage inhibitory effect of *N. sativa* was calculated and it was 57.19 ± 1.62%.



### Effect of Aqueous Extract of *Nigella sativa* .....

Table (1) Effect of *Nigella sativa* treatment on body weights.

Treatment	First weight (g)	Final weight (g)
Control (normal saline )	65.16 $\pm$ 1.62	70.16 $\pm$ 1.9
N. sativa ( 8 g/kg b.w )	66.66 $\pm$ 1.62	57.5 $\pm$ 1.75 * a

Values are mean  $\pm$  SE, number of animals 6rats / group.

\* The values significantly different from control group at (P< 0.05 )

a The values significantly different from N. sativa treated group at (P< 0.05 )

Table (2) The effect of *Nigella Sativa* treatment on small intestine transit and blood glucose concentration .

Treatment	Percentage small Intestinal transit	Percentage inhibition of small intestine transit	Glucose concentration (mg/100 ml blood)
Control (normal saline)	96 .48 $\pm$ 1.27	0	136 $\pm$ 2. 62
<i>Nigella sativa</i> ( 8 g/kg b.w)	41.29 $\pm$ 1.65*	57.19 $\pm$ 1.62	115 $\pm$ 1.59

Values are mean  $\pm$  SE . number of animals 6 rat/ group

\* Values differ significantly compared with control group at P< 0.05

## DISCUSSION

The results of the present study demonstrates that administration of aqueous extract of *N. sativa* for 15 days to immature rats produced a decrease in body weight, hypoglycemia and a decrease in the percentage of small intestinal transit . The decrease in body weight seems to agree with that reported by Ayob (14) who postulated that the decrease in body weights of animals treated with the aqueous extract of *N. sativa* may be brought about by the changes in the processes of digestion , absorption and metabolism of nutrients .Growth is a complex phenomenon and is influenced by hormones , genetic factors and adequate nutrition (15), Lack of sufficient amounts of any of the essential amino acids, essential fatty acids , vitamins and minerals interfere with growth (16) and this result also coincides with the results of previous studies showed that ethanol extract and the volatile oil

of *N. sativa* inhibit the spontaneous movements of rabbit jejunum (9). In addition, key hepatic enzymes activities may be changed due to hepatocellular damage caused by *N. sativa* extract at the molecular level (10). Studies on the effect of *N. sativa* on blood glucose levels in normal and diabetic animals were conflicting. The hypoglycemic effect of *N. sativa* in the present study is in agreement with that obtained in the previous reports in normal and alloxan-diabetic rabbits (17), alloxan-diabetic rats (8) and in human subject (18). In addition, Hawsawi (1) reported that *N. Sativa* seeds and their active ingredients, thymoquinone have a promising reducing effect on the blood glucose levels in normal rats. On the other hand, Our results seem to be incompatible with that of other studies. Al-Awadi et al. (19) reported no significant change in fasting blood glucose level when *N. sativa* (40 mg/day) was administered to normal and STZ-induced diabetic rats, El-Naggar and El-Deib (20) also found no significant reducing effect of *N. sativa* (36 mg/day) on blood glucose level in normal rats. Al-Hader (17) explained the hypoglycemic effect of *N. Sativa* on the basis of the increase in glycolysis in the peripheral tissues, decreased gluconeogenesis and inhibition of counter-regulating hormone release (i.e glucagon, cortisol, growth hormone). Moreover, Al-Hader (17) suggested that the hypoglycemic effect of *N. sativa* is mediated by an insulin-independent mechanism, since the significant decrease in fasting blood glucose levels was not accompanied by concomitant alteration in basal insulin levels. In addition, El-Dakhakhny (21) noticed a blood glucose lowering effect of *N. sativa* oil in STZ-diabetic rats and this hypoglycemic effect may be mediated by extra pancreatic action rather than by stimulation of insulin release. The inhibitory effect of aqueous extract of *N. sativa* on the percentage of small intestine transit coincides with the results obtained by Aqel (9), the ethanolic extract of *N. sativa* seeds inhibited the spontaneous movement of rabbit jejunum in organ bath and the volatile Oil of *N. Sativa* inhibited the contractions of rabbit jejunum by acetylcholine depolarization with high  $K^+$  solution. This effect of *N. Sativa* may interfere with the depolarization process or with  $Ca^{+2}$  influx. Hosseinzadeh (22) reported that the thymoquinone, the major constituent of *N. sativa* seeds have anticonvulsant effect in mice, Moreover Abdel-fattah (23) suggested that *N. sativa* oil and thymoquinone produced anti nociceptive effects through indirect activation of the supraspinal and kappa-opioid receptor subtypes. Reiter and Brandt (24) found that volatile oil from *Nigella sativa* had a relaxant effect on isolated tracheal and ileal smooth muscle of guinea pigs, In addition, % -pinene Present in the essential oil of *Nigella sativa* have been demonstrated to possess cholinergic activity (25) and the calcium antagonistic effect of the volatile oil of *Nigella sativa* on the tracheal

smooth muscle of the rabbit have been previously demonstrated ( 26 ). Boskabady and Shahabi (27) found a relatively potent relaxant ( bronchodilatory) effect of equous extract of *Nigella sativa* on the tracheal chain of the guinea pig due to comparative effect at cholinergic muscarinic receptors . Other Possible mechanisms operative in the bronchodilatory effect of *Nigella sativa* could include stimulation of inhibitor non-adrenergic non – cholinergic nervous system (NANC ) or inhibition of stimulatory NANC (28), methyl – xanthine activity (29) , opening of Potassium channels , an inhibition of phosphodiesterase .

In the present study, the inhibitory effect of *N. sativa* aqueous extract on the small intestinal motility could be a beneficial remedy (as diarrheal treatment ) with the *N. sativa* seeds which possess some antispasmodic properties.

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