EFFECT OF ORAL INGESTION OF *NIGELLA SATIVA* SEEDS ON SOME BLOOD PARAMETERS

Abdullah O. Bamosa[1*], Basil A. Ali[1] and Saleh A. Sowayan[2]

تمت دراسة تأثير العلاج بجرامين من الحبة السوداء يومياً ولمدة أسبوعين على مستويات الجلوكوز ، وحمض البول ، والكوليستيرول ، والغلسيريدات الثلاثية ، ونيتروجين بولة الدم والكرياتينين ، على ١٦ طالباً من طلاب السنة الثانية بكلية الطب ، حيث تناول تسعة طلاب كبسولتين (٥٠٠ ملغ) من الحبة السوداء) مرتين يومياً وكانوا هم المجموعة الاختبارية ، وتناول سبعة طلاب آخرين كبسولتين (٥٠٠ ملغ) من السكر البني مرتين يومياً وكانوا هم المجموعة الضابطة . وفي المجموعة الاختبارية ، كانت المؤشرات التي أظهرت انخفاضاً يعتد به إحصائياً بنهاية الأسبوع الأول للعلاج هي الجلوكوز ($p<0.01$) والكوليستيرول ($p<0.05$) . ومع ذلك فإن مستواهما قد زاد بنهاية الأسبوع الثاني للعلاج ولكنهما بقيا تحت المستوى الطبيعي . أما الكرياتينين فقد زاد ($p<0.01$) بنهاية الأسبوع الأول ، وأظهر حمض البول انخفاضاً مضطرداً ولكن لا بصورة لا يعتد بها إحصائياً . ومن المثير أن مستوى حمض البول أظهر زيادة مضطردة في المجموعة الضابطة . ونستنتج من ذلك أن للحبة السوداء تأثير محتمل على مستويات الجلوكوز والكوليستيرول في الدم .

The effect of 2 weeks daily treatment with 2 g *Nigella sativa (N. sativa)* on the blood levels of glucose, uric acid, cholesterol, triglycerides, BUN and creatinine was studied on 16 second year male medical students. Nine students took 2 capsules of 500 mg *N. sativa* twice daily and served as the test group. Seven students served as controls and took 2 capsules of 500 mg brown sugar twice daily. In the test group, the parameters which showed a significant decrease by the end of the first week of treatment were glucose ($p < 0.01$) and cholesterol ($p = 0.05$). However, both levels went up by the end of the second week of the treatment but remained below baseline. Creatinine was significantly elevated ($p < 0.01$) by the end of the first week. Uric acid showed a progressive but a nonsignificant decrease. A finding of interest was that the control group showed a progressive and significant increase in uric acid. It is concluded that *N. sativa* has a potential reducing effect on the blood levels of both glucose and cholesterol..

Key words: *Nigella sativa*, glucose, cholesterol, uric acid, triglycerides, BUN, creatinine

Introduction

Nigella sativa (the black seed) is one of the famous herbal medicines that has been used for more than 2000 years. It exhibits special importance for Moslems because of the authentic saying of Prophet Mohammad (peace be upon him) "In the black seed there is healing for every illness except death" [1]. It is also used as a natural food additive and flavouring.

Department of Physiology[1] and Department of Pathology[2], College of Medicine and Medical Sciences, King Faisal University, P.O. Box 2114, Dammam - 31451, Saudi Arabia.
* To whom correspondence should be addressed.

N. sativa has been reported to possess many pharmacological effects. The carbonyl fraction of *N. sativa* was found to increase the urine excretion of uric acid in rats, protects guinea-pigs against histamine induced bronchospasm and increases bile excretion in dogs [2]. In rabbits [3] the fatty and petroleum ether extracts of *N. sativa* produced shortening in bleeding time and inhibition of fibrinolytic activity, while the petroleum ether extract induced shortening of clotting time. Observations also indicated a hypotensive effect of *N.sativa* [4]. In humans, *N. sativa* was found to enhance immunity by increasing T_4:T_8 ratio as well as natural Killer cell activity [5].

Antibacterial activity was also reported [6]. Antitumour activity of *N. sativa* has been observed against certain cancerous cells in humans [7]. *N.sativa* volatile oil produced dose-dependent increases in the respiratory rate and intratracheal pressure of urethane-anaesthetized guinea-pigs [8]. The multiple pharmacological properties of *N. sativa* have inspired us to conduct this study.

The aim of this study is to investigate the effect of *N. sativa* on the blood levels of glucose, uric acid, cholesterol, triglycerides, blood urea nitrogen (BUN) and creatinine in normal healthy human subjects.

Methodology

The study was conducted on 21 healthy second year male medical students. The subjects were divided into two groups:

Group 1: Nine subjects received 1 g twice daily of ground brown sugar dispensed in 500 mg capsules (control group).

Group 2: Twelve subjects received 1 g twice daily of ground *N. sativa,* dispensed in 500 mg capsules (test group).

Three fasting blood samples were withdrawn from every subject in each group in the following sequence: The first sample (Reading No. 0) was extracted on the first day of the treatment, before taking the dose for that day (baseline). The second sample (Reading No. wk 1) was taken one week after the initiation of the treatment. The third sample (Reading No. wk 2) was obtained 2 weeks after the treatment.

The blood samples were collected in heparinized tubes and the following parameters were measured in each: glucose, uric acid, cholesterol, triglycerides, BUN and creatinine. Measurement were made utilizing Automatic Clinical Analyzer (ACA) and Automatic Stat Routine Analyzer (ASTRA).

Analysis of the results

The first reading was used as a control for every subject and the significance of deviations of the second and third readings from this control was evaluated by paired Student's t-test, the level of significance was defined as $p < 0.05$.

Results

The results of three subjects in the group taking *N. sativa* and two subjects in the control group were excluded from our calculations because they were irregular in taking the capsules. Therefore, we were left with 9 subjects who took *N. sativa* capsules and 7 who served as controls taking brown sugar capsules. The results for triglycerides showed gross abnormality in one subject, of the *N. sativa* group, and therefore excluded from our calculationfor that parameter.

A highly significant reduction in the glucose level ($p < 0.01$) and marginally significant reduction ($p = 0.05$) in the cholesterol level were observed in the test group compared to their corresponding control after one week of daily treatment with 2 g *N. sativa* (Table 1). However, both glucose and cholesterol levels showed slight increment in the second week, yet remained insignificantly lower than their controls. Creatinine was significantly higher ($p < 0.01$) in the second reading, however, it showed a slight reduction in the third reading but still insignificantly higher than the controls. Uric acid and triglycerides showed progressive but insignificant decrease in both the second and third readings. BUN was almost unchanged in this group.

In the control group (Table 2) the blood level of glucose, cholesterol and triglycerides were insignificantly decreased in the second readings. However, both blood glucose and cholesterol became insignificantly higher than their corresponding controls in the third readings. Triglycerides level showed slight elevation in the third compared to the second reading yet remained insignificantly lower than the controls. Uric acid showed a progressive and significant increase in both the second ($p < 0.05$) and the third readings ($p < 0.05$). BUN increased slightly but insignificantly in both second and third readings. Creatinine showed a slight insignificant increase in the second reading and a slight insignificant reduction in the third reading compared to the controls.

In summary, significant changes were noted in the blood levels of glucose, cholesterol and creatinine in the *N. sativa* group and uric acid in the control group. Therefore, correlation coefficient measurements were carried out to find out any possible relationship between them. Correlation coefficients for the relative changes in the second readings of these parameters revealed no significant relation between them.

Discussion

An important feature of this study is being a double controlled study including self and matched controls. The results in this study showed that daily ingestion of 2 g *N. sativa* for one week produced a significant

Table 1. Different parameters in 9 tested subjects (N. sativa group).

Treatment	Reading No.	Mean (mg/dl)	Standard deviation	p Value
Glucose	0	85	7.28	
	wk 1	74.4	8.97	0.003
	wk2	82.2	7.21	0.065
BUN	0	12.7	1.94	
	wk 1	12.8	2.73	0.86
	wk2	12.8	2.54	0.824
Creatinine	0	0.8	0.07	
	wk 1	0.9	0.11	0.009
	wk2	0.822	0.12	0.35
Uric Acid	0	5.37	0.95	
	wk 1	5.43	0.5	0.55
	wk2	5.38	0.53	0.48
Cholesrerol	0	149	39.1	
	wk 1	141	40.7	0.05
	wk2	148	37.6	0.68
Triglycerides	0	83.9	56.2	
	wk 1	68.1	48.1	0.27
	wk2	65.6	27.1	0.09

Readings 0: pretreatment, wk 1: taken after one week and wk 2: taken after 2 weeks of twice daily 1 g ground *N. Sativa* dispensed in 500 mg capsules.

Table 2. Blood Parameters in 7 Control subjects.

Treatment	Reading No.	Mean (mg/dl)	Standard deviation	p-Value
Glucose	0	85.3	8.8	0.28
	wk 1	81.6	5.13	0.28
	wk2	94.1	14.7	0.3
BUN	0	15.1	1.95	
	wk 1	15.3	3.3	0.91
	wk2	15.7	2.2	0.48
Creatinine	0	0.83	0.14	
	wk 1	0.86	0.08	0.5
	wk2	0.814	0.07	0.8
Uric Acid	0	5.43	0.93	
	wk 1	5.73	0.85	0.053
	wk2	6.1	1.08	0.012
Cholesrerol	0	186	31.3	
	wk 1	175	35	0.12
	wk2	190	41.5	0.65
Triglycerides	0	96.6	51.1	
	wk 1	78.6	24.9	0.21
	wk2	84.1	32.6	0.45

Readings 0: pretreatment, wek1: taken after one week and wk2: taken after 2 weeks of twice daily 1 g ground brown sugar dispensed on 500 mg capsules.

decrease in the blood levels of glucose and cholesterol. To the best of our knowledge this is the first report of such an effect of *N. sativa* in humans. Certainly this can not be an incidental result as the double controls would exclude the psychological and social factors being the main contributing ones. The slight elevation of the above two parameters in the second week of the treatment with *N. sativa* compared to the first week suggests a decrease in *N. sativa* effect on both parameters. This might be due to a down regulation or a possible desensitization related to the relatively high dose of *N. sativa*. The mechanism of *N. sativa* induced reduction in glucose and cholesterol is not clear. The possibility that *N. sativa* might enhance peripheral utilization of glucose by the tissue may call for a further investigation. If this is true then the increase in intracellular glucose level would be expected to stimulate glycogenesis which is an active process utilizing energy through the breakdown of phosphocreatine to creatinine. The rise in blood creatinine level after one week of *N. sativa* ingestion supports this explanation. On the other hand, lack of correlation between glucose and creatinine readings fails to support this assumption.

The significant reduction in blood cholesterol following ingestion of *N. sativa* might be attributed to an enhancing effect of *N. sativa* on cholesterol excretion in bile. The enhanced effect of *N. sativa* on bile excretion had already been reported [2]. However, in this context it would be very interesting for future work to investigate the effect of *N. sativa* on LDL, HDL and HDL: total cholesterol ratio.

However, with regard to uric acid our results do not show a significant reducing effect of *N. sativa* on uric acid level in humans. The progressive and significant increase in the blood level of uric acid in the control group is hard to explain and rather unexpected.

In conclusion our results show a potential reducing effect of *N. sativa* on the blood levels of both glucose and cholesterol. Further studies are needed to establish such a promising and important effect of *N. sativa* and may throw light on the potential use of *N. sativa* in diabetes and hypercholestrolaemia.

Acknowledgements

The authors would like to thank the medical students who volunteered to the study and the

department of Physiology which supported this study. Thanks also to Mr. Zahid who typed the manuscript.

References

1. Al-Bukhari "Collection of authentic Prophetic saying, Division 71 (the book of Medicine), Chapter 7" published by Hilal Yayinlari, Ankara, Turkey, Second Edition 1976.
2. El-Dakhakhany M. Some pharmacological properties of some constituents of *Nigella sativa* L seeds: The carbonyl fraction of the essential oil. Proceeding of the 2nd International Conference on Islamic medicine; Studies in Islamic Medicine and Advantages of Herbal treatment, 12th April 1982; Kuwait. pp 426 - 431.
3. Ghoneim MT, El-Gindy AR, El-Alami E. Shoukry R. and Yaseen S. Possible effect of some extracts of *Nigella sativa* L. seeds on blood coagulation system and fibrinolytic activity. Proceeding of 2nd International Conference on Islamic Medicine. 12th April 1982; Kuwait. pp 528 - 535
4. El-Tahir KEH, Ashour, MMS and Al-Harbi, MM. The cardiovascular actions of the volatile oil of the black seed (*Nigella sativa*) in rats: Elucidation of the Mechanism of action. General Pharmacology 1993; 24: 1123-1131.
5. Elkadi A. and Kandil O. Effect of *Nigella sativa* (the black seed) on immunity. Proceeding of the fourth International conference on Islamic medicine. Bull of Islamic Medicine 1986; 4: pp. 344 - 348.
6. Topozada HH, Mazolum HA, El-Dakhakhny M. The antibacterial properties of *Nigella sativa* seeds, active principle with some clinical applications. J. Egypt Med. Assoc. 1965; 48: 187 - 202.
7. Salami NI, Nair SC, Jayawardhanan KK & Varghese CD. Antitumor Principles from *Nigella sativa* seeds. Cancer letters 1992; 63: 1.
8. El-Tahir KEH, Ashour MMS, & Al-Harbi MM. The respiratory effects of the volatile oil of the black seed (*Nigella sativa*) in Guinea pigs. Elucidation of the mechanism(s) of action. General Pharmacology 1993; 24: 1115-1122.