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# The Effect of Nigella Sativa Lin. Black Seeds/Kalonji (Family Ranunculaceae) On Hyperglycemia, Dislipidemia and Serum Uric Acid in Human Diabetics

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**Abstract:** Objective: The objective of this study was to investigate the effect of Nigella sativa Lin. (Nigella sativa L.) on Serum Glucose, Cholesterol, Triglycerides and Uric Acid concentration (mg/dl) in patients suffering from Diabetes mellitus type 2 compared to normal) human beings. Methods: *Nigella sativa* was selected to estimate its effect on Serum Glucose, Cholesterol, Triglycerides and Uric Acid in diabetics and normal (control) human beings. Previous workers, fed 2gm/day *Nigella sativa L.* as crushed seed with meals. The present study continued for 42 days and serum samples were collected on Day 01, Day 28 and day 42. The above parameters were estimated by using enzymatic kits through spectrophotometry. Results: The results revealed significant decrease($P<0.05$) in Serum Glucose, Cholesterol, Triglycerides and Uric Acid in diabetics on Day 28 and the decrease further increased on Day 42 as compared to Day 01, or with control individuals. The *Nigella sativa Lin.* did not show any significant effect on any of the above parameters in normal individuals. Conclusion: It can be concluded that *Nigella sativa L.* can be safely substituted allopathic treatment of diabetics to manage the disease with beneficial effect on its dislipidemic and uricemic complications.

**Keywords:** Nigella sativa linn; Diabetics; Serum glucose; Cholesterol; Triglycerides and uric acid.

## 1. Introduction

*Nigella sativa* (family ranunculaceae) is commonly called Kalonji seeds or black seeds [1].The black seed has been recommended as hypoglycemic drug at 2g crushed seed once daily with meal [2]. Due to its nutrient contents it also provides nourishment [3].

The active ingredient of *N. sative* L. is Thymoquinone, which is readily converted into dithymoquinone, a dimer which is referred to as nigellone having hypoglycemic properties [4]. The nigellamine another active molecules has hypolipidemic properties and 67% of total *Nigella sativa* lipid lowering is due to Nigellamines

*Nigella sativa* Lin. is recommended by the practitioners for treating diabetes and dislipidemia in Asia and Africa. [5, 6].

Nigellamines appear to have relatively potent lipid reducing properties in hyperlipidemics [2] and also in obesity with high baseline lipids [7].

Several studies showed that In Diabetes Mellitus type 2 (DM type 2), the oral feeding of 2g/day of the crushed Black seeds reduced total cholesterol (11.3% after four weeks,) LDL-C (16.3% within eight weeks) and triglycerides (20% within four weeks). The HDL: LDL ratio increased significantly without change in HDL- C [8].

In persons with high cholesterol but no diabetes, supplementation of 2g of the crushed seeds daily for less than four weeks failed to significantly modify fasting blood glucose [9].

Six weeks(42 days) of supplementation with *Nigella sativa* seed powder (2g/day) in DM type II showed significant improvements in HbA1c (1.52%) without change if taken with allopathic medication [8].

There is no apparent effect of *Nigella sativa* on lipids in persons with normal lipid profile [5].

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There is evidence that the function of the cardiovascular system may be altered in DM2. Since Diabetics included in the study complained of gout like symptoms and their initial uric acid level was also in critical upper limits, therefore the effect of *Nigella sativa* L. on serum uric acid was also estimated. Significantly higher ($P<0.05$) uric acid levels in diabetics were observed than controls [4]. The researchers have also reported positive correlation between diabetes and serum uric acid [4, 6]. It probably reflects biochemical interaction between serum glucose and purine metabolism. The beneficial effect of *Nigella sativa* L. on diabetes and several other metabolic disorders has been confirmed by Traditional practitioners in morocco, Canada, India and Pakistan [4, 10].

The aim of this study was to investigate the effect of *Nigella sativa* Lin. on serum glucose, Total cholesterol, triglycerides and uric acid level in Diabetics and normal humans.

Key Words: *Nigella sativa* Lin., Diabetics, Hyperglycemia, Hyperlipidemic, Thymoquinone, Nigellamines

## 2. Materials and Methods

The study was conducted on sixty diabetic humans whose blood samples were drawn on day 01 before herbal treatment started and on day 28 and after 42 days of the trial of *Nigella sativa* feeding. In control group only ten volunteers were included. Diabetes Mellitus Type 2 is one of the most common metabolic disorders with a worldwide prevalence from 1 to 5 % [10]. *Nigella sativa* Lin. Is one of the herbal medicines that have proved to be beneficial for lowering blood sugar and lipid profile. *Nigella sativa* L. has volatile oils which contains 18.4 to 24% thymoquinone which has hypoglycemic and hypolipidimic and hypouricemic properties [11].

**Patient selection criteria**; All patients were between the age of 40 to 60 years with no infectious or contagious disease or cancer. These volunteers belonged to educated families of Lahore, Pakistan who were reliable and could be contacted when needed for follow up. They did not complain any disease except Diabetes mellitus type 2 for duration of 10-15 years or gout like symptoms occasionally. All the diabetics were on some oral hypoglycemic medication and on NSAID tablets as needed. These individuals showed high serum cholesterol, triglycerides and uric acid and hyperglycemia tested at the time of selection, and no cardiac disease symptoms. . *Nigella sativa* was crushed in a grinder and given at a dose of 2g per day with meal for 28 and 42 days to all patients and controls. Ten healthy volunteers with same inclusion criteria were selected as control group.

5ml blood was drawn from the cubital vein at fasting in the morning from both the groups and serum Glucose, Total Cholesterol , Triglycerides and Uric Acid were estimated on Day 1 (when no Treatment given), Day 28 and Day 42 (after giving *Nigella sativa*). All blood parameters were estimated by using enzymatic kits from Merck®, through spectrophotometry at the Analytical Lab. of the Institute of Molecular Biology, University of Lahore, Pakistan and Ali Diagnostic Lab. Lahore. The data thus obtained was analyzed using SPSS (ANOVA) for statistical significance.

## 3. Results

**Table-1.** Analysis of serum selected components showing effect of *Nigella sativa* L.

| Parameter | Control (n = 10) | | | | Diabetic (n = 60) | | | |
|---|---|---|---|---|---|---|---|---|
| | Day 1 | Day 28 | Day 42 | p-value | Day 1 | Day 28 | Day 42 | p-value |
| | Mean ± SD | Mean ± SD | Mean ± SD | | Mean ± SD | Mean ± SD | Mean ± SD | |
| **Blood Glucose** *(mg/dl)* | 110.2 ± 8.1 | 104.3 ± 8.2 | 106.4 ± 8.1 | *> 0.05* | 270.3 ± 36.6* | 185 ± 20.1* (31.4% lower)[1] | 180.4 ± 29.4* (33.1% lower) | *< 0.05* |
| **Total Cholesterol** *(mg/dl)* | 175.2 ± 25.4 | 180.6 ± 40.4 | 182.4 ± 38.2 | *> 0.05* | 290.2 ± 29.8* | 240 ± 18.2* (17.1% lower) | 205.6 ± 38.4* ((29.3% lower) | *< 0.05* |
| **Triglycerides** *(mg/dl)* | 160.8 ± 20.3 | 160.4 ± 18.6 | 162.2 ± 18.5 | *> 0.05* | 313.6 ± 40.2** | 199.4 ± 31.6** (36.41% lower) | 180 ± 16.4** (42.5% lower) | *< 0.001* |
| **Uric Acid** *(mg/dl)* | 6.0 ± 2.1 | 6.64 ± 2.6 | 6.91 ± 2.41 | *> 0.05* | 9.4 ± 4.6* | 7.36 ± 4.4* (21.7% lower) | 6.84 ± 2.5* (27.2% lower) | *< 0.05* |

* P< 0.05 ** P< 0.001

[1].Percent decrease

*Nigella sativa L.* is a herbal medicinal plant, also known as Kalonji or Black Seed and used as a remedy for number of diseases [12]. But its active ingredient have not been categorically determined. During the last few decades the use of black seed proved beneficial in bronchial diseases and as antihistaminic, gastroprotective, hypotensive, hypolipidemic, hypourecemic and hypoglycemic herbal drug [13, 14], Therefore, *Nigella sativa L.* was selected to estimate its benefit on hypoglycemia and other metabolic complications in men with chronic DM2. The metabolic disorder of glucose needs to decrease lipids and uric acid concentration in the blood to avoid cardiac and renal diseases [14, 15].

The anti-diabetic properties of *Nigella sativa L.* seeds may be due to its insulinotropic action through active ingredients [12]. The results presented in table 1 indicated the effect of black seed on Blood Glucose, Total Cholesterol, Triglycerides and Uric Acid in normal and diabetic persons. The blood samples of Day 01 were compared with Day 28 and Day 42 samples. It was revealed that Blood Glucose (mg/dl) in patients with DM2 was significantly ($p<0.05$) reduced from 270.3±36.6 mg/dl on Day 01 to 185±20.1 on Day 28 showing 31.4% decrease

and to 180.4±29.4mg/dl amounting to 33.1% decrease on Day 42. In controls the black seed showed insignificant decrease (P>0.05) in all the parameters as compared to diabetics.

The Total Cholesterol significantly (p<0.05) decreased with increase in duration of feeding *Nigella sativa L.* On Day 01 the Total Cholesterol was 290.2±29.8 mg/dl which decreased to 240±18.2 mg/dl (17.1% decrease) on Day 28 and 205.6±38.4mg/dl (29.3% decrease) on Day 42.

The Triglycerides were 313.6±40.2 mg/dl on Day 01 which significantly reduced (P<0.001) to 199.4±31.6 mg/dl (36.41% decrease) on Day 28 and 180±16.4 (42.5% decrease) on Day 42. In control the *Nigella sativa* did not show any significant effect.

In diabetics on Day 01, the Serum Uric Acid was 9.4±4.6mg/dl which was reduced to 7.36±4.4 mg/dl (21.7% decrease) on Day 28 and 6.84±2.5mg/dl (27.2% decrease) on Day 42. A significant decrease (p<0.05) in Serum Uric Acid was noticed with the increase in time of feeding *Nigella sativa* L. The study confirmed the remedial effect for high sugar level and its complications on diabetic patients as reported by previous workers and revealed no effect on normal persons which also correlates with the past work [8].

## 4. Discussions

*Nigella sativa L.* was chosen to estimate its effect as a hypoglycemic, hypolipidimic and hypouricemic in light of previous studies [9]. The black seed was fed to human beings at a dose of 2 gm/day in crushed form with lunch. The 2 gm *Nigella sativa* dose was given because the previous workers reported that 2 gm/day was most effective [15]. The findings of the present study revealed hypoglycemic effect in diabetics, whereas the same dose of *Nigella sativa* did not show any significant effect in controls. The results are in confirmation of statement by Ganong [15]. The results are in agreement with the findings of Bamosa AO [8], The study was limited to 42 days because after that in follow up study the results remained in the similar range.

In diabetic individuals, significant glucose lowering effect of feeding *Nigella sativa L.* were noticed after 28 and 42 days trial as compared to the Day 1. The findings correlated with the results of Bamosa AO [8]. The Serum Cholesterol also decreased significantly (P<0.05) in diabetes as the feeding period increased. It indicated that hypoglycemic effect starts after 28 days but stabilizes and shows its potential up to 42 days. It showed that *Nigella sativa L.* crushed seed at a dose of 2 gm/day may be helpful to control type 2 Diabetes Mellitus [13]. The Triglycerides and cholesterol are related with cardiac diseases side effect of Diabetes Mellitus Type 2 [13]. In the present study, Triglycerides decreased significantly (P<0.001) by feeding *Nigella sativa* in diabetics. The lowering lipids in diabetics is a unique effect of *Nigella sativa* Lin [10, 14]. The Serum Uric Acid generally rises in diabetics showing painful knee and ankle1 [14, 15]. The Uric Acid estimation revealed significant (P<0.05), 21.7% decrease on day 28 and 27.2% decrease after day 42 in diabetics whereas did not show significant effect in controls. The reasons for non-significant effect of *Nigella sativa* L. in normal people needs further investigation. The study confirmed the findings of Bamosa and Saleh [16] and Qidwai, *et al.* [2] who reported correlating findings.

## 5. Conclusion

It may be concluded that the herbal treatment of diabetes with 2 gm/day *Nigella sativa* Lin. Seed in crushed form given to human diabetics potentially lowers the serum glucose, Cholesterol, Triglycerides and Uric acid.

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