

## Therapeutic use of nigella sativa on metabolic disorders: A review

Vaishali Mathur<sup>1</sup>, Mahak Sharma<sup>2\*</sup>

<sup>1</sup> Ph. D Scholar, Department of Nutrition and Dietetics, Faculty of Applied Health Sciences, Manav Rachna International Institute of Research and Studies, Delhi Suraj Kund Raod, Faridabad, Haryana, India

<sup>2</sup> Associate Professor, Department of Nutrition and Dietetics, Faculty of Applied Health Sciences, Manav Rachna International Institute of Research and Studies, Delhi Suraj Kund Raod, Faridabad, Haryana, India

### Abstract

Nigella Sativa, generally known as Kalonji, Black Cumin, Black Seed, Onion Seed, is a therapeutic spice. It not only gives additional flavor to the food but also has been observed to be effective in the therapy of many diseases. The study was conducted to find out therapeutic uses of Nigella Sativa. About 24 research papers were studied from various databases like Pubmed, Google Scholar, web of Science, Scopus, Science Direct etc. both national and global research papers were included. Most of the database included for consist of original research papers and systematic review papers. The results revealed that Nigella Sativa has a therapeutic effect on hyperlipidemia, have anti-inflammatory effect, is effective on lowering blood glucose levels, has anti-cancer properties, controls thyroid dysfunction, helps in weight management, and many more therapeutic benefits. It is thus concluded that Nigella Sativa can be used as a herbal remedy in many diseases thus not only being cost effective but also having no side effects. It can also be proposed as preventive strategy for many metabolic disorders. It is considered to be a very important spice in Unani medicine and is also named as “The Prophetic Spice” by some. Further, more exclusive and intensive randomized control trials need to be conducted on the effect of Nigella Sativa on hyperlipidemia, cancer, obesity, thyroid and even oral health

**Keywords:** kalonji, black cumin, onion seed, hyperlipidemia, anti-inflammatory

### 1. Introduction

Nigella Sativa is the botanical name for a commonly used spice, also known as also known as Kalonji, Black caraway, Black seed, roman coriander, black cumin, fennel flower, nutmeg flower. It is the form of a seed which are used in Indian and Middle eastern cuisines. They have a unique smell and taste. These seeds contain palmitic acid, linoleic acid, oleic acid etc. the major enzyme present in Nigella Sativa is thymoquinone. (Gilani AH, 2004) [24].

For more than 20 decades Kalonji seeds (Nigella Sativa) have been used for therapeutic purposes as it was discovered that there are many positive benefits of using these seeds on the overall health of humans. A few of the many benefits are listed as below:

Helps in controlling hair fall, Controls Diabetes, Helps fight acne, Lowers cholesterol levels thus giving a healthy heart, Effective in joint pain, Cures headaches, Gives relief from asthma, Relieves cough and allergies, Improves vision, Cures hypertension, Good for weight loss, Prevents cancer, Boosting memory, Helps in healthy renal function, Healthy teeth, Cures tumor, Treats piles, Oil treats cracked heels, Boosts energy, Prevents hair loss, Improves skin, Cure liver disorders, Cures back pains and rheumatism. They are also found to be helpful in curing internal worms, nasal congestion, toothaches, conjunctivitis, bronchitis, flu constipation etc.

One of the studies conducted by Gilani AH *et al* 2004 [24], defined the chemical composition of Nigella Sativa as below:

Moisture is 7.43%

Ash is 4.14%,

Fixed oil is 37%,

Volatile oil is 1.64%

Albumin is 8.2%

Mucilage is 1.9%

Organic acid precipitated by copper is 0.38%

Metarabin is 1.36%

Melanthin is 1.4%

Cellulose is 8.32%

Sugar is 2.75%

Arabic acid is 3.41% and other substances dissolved by soda are 9.38%. (Gilani AH, 2004) [24].

Nigella Sativa seeds are rich in component called thymoquinone. Thymoquinone is a molecule which is monoterpene. Its chemical name is 2-methyl-5-isopropyl-1, 4-benzoquinone. It has a lot of pharmacological properties. It is also found that thymoquinone has strong lipophilicity property which makes it able to dissolve fats, oils and lipids faster.

In liposomes, thymoquinone inhibits the non-enzymatic lipid peroxidation. It has been found that it works as a free radical scavenger. It is also strong inhibitor of the production of eicosanoid, which is called thromboxane B2 and leucotrienes B4, it inhibits both cyclooxygenase and lipoxygenase. These are the reasons why it is assumed that the intake of kalonji powder shall reduce the lipid levels positively.

### The Nigella Sativa Seed

The Nigella Sativa plant has flowers which come once a year and are pale blue or white in color with 5 – 7 petals. The plant's height is around 25-30 cms. and has fine thin

leaves which are linear in shape. The Seed is black in colour with pointed edges.



Fig 1: Wikipedia



Fig 2: Spicejungle.com

The fruit has inflated capsules which contain the Nigella Sativa seeds. These seeds have a very unique bitterly pungent aroma and flavor. In the Palestine cuisine, their paste is even used to make a bitter sauce.



Fig 3: Wikipedia

### Material and Methods

Various research papers were studied. About 24 research papers were studied from various databases like Pubmed, Google Scholar, web of Science, Scopus, Science Direct etc. both national and global research papers were included. Most of the database included for consist of original research papers and systematic review papers. The selection of papers was based on various randomized clinical trials done to fin the effect of Nigella Sativa on Metabolic disorders and also the reviews based on previous studies.

The inclusion criteria for selection of the papers was a minimum of 30 subjects in both human or animal trials. The research papers were included, stated that informed consent of the study subjects were taken, ethical clearance was taken from the institute for both human and animal studies. Most of the research papers were included which defined the dosage of Nigella Sativa and its effects.

### Nigella Sativa and its therapeutic Potential: Nigella Sativa and Hyperlipidemia

When the lipid levels in the blood is high, beyond the normal recommendations, the condition is called hyperlipidemia. It has its effect on all the classes of the society irrespective of higher or lower class. Approximately 25-30% deaths in developing countries are caused by CHD. High levels of LDL and lower levels of HDL are a matter of concern and are quite common in Indian people these days. Although there are many treatments for hyperlipidemia, but a herbal treatment is always considered safe and sound, which tends to give away results without side effects.

The study conducted by Kim-e-Muneera *et al*, on “Comparative evaluation of Nigella sativa (Kalonji) and simvastatin for the treatment of hyperlipidemia and in the induction of hepatotoxicity”, had comparative evaluation of Nigella sativa (Kalonji) and simvastatin for the treatment of hyperlipidemia and in the induction of hepatotoxicity. The study was conducted on 30 rats. The rats were taken as case and control. These 30 rats were then divided into 3 groups. The first group was given simvastatin; However, the second group was given Nigella Sativa seeds. The third group was kept as a control group and was not given any treatment. The serum lipid profile test was done after 6 weeks of administration of the drug. Cholesterol, Triglycerides, HDL, LDL & ALT were checked. The result revealed that the group on Nigella sativa showed 48.4% decrease in cholesterol levels. Their LDL reduced by 70% and triglycerides by 25.3%. The HDL showed 53.5 % increase. It also was seen that Nigella Sativa helps in weight loss. It was concluded that both simvastatin and Nigella Sativa have cholesterol lowering effect, but Nigella sativa also has a protective role in liver function.

In another study, titled, “The petroleum ether extract of Nigella sativa exerts lipid-lowering and insulin-sensitizing actions in the rat”, conducted a study to see the lipid lowering and insulin-sensitizing actions of Nigella Sativa in rats. Rats were fed on normal diet and tap water for 3 weeks. Their weight and serum profiles were noted. After that they were divided into two groups. The aqueous petroleum ether extract was fed to one group daily (which was equal to 2gms/kg) with regular meals However, the other group was fed on the same diet with tap water. This was done for 4 weeks. The food and water intake were noted every day and the weight was checked weekly. The result revealed that there was a loss of appetite and weight in the group being fed on Nigella Sativa extract. It was also noted that the blood glucose levels of the rats on Nigella sativa extract dropped down. The lipid levels also lowered significantly. The study showed that the petroleum ether extract of Nigella Sativa lowers the lipid and blood sugar levels. It also induces anorexia leading to weight loss. However, further study needs to be done. The study was done by Phuong Mai Lea, *et al*.

Similarly, Zahida Tasawar *et.al*, in their study titled, “The effects of Nigella Sativa (Kalonji) on lipid profile in patients

with stable coronary artery disease in Multan, Pakistan”, conducted a study on the effects of Kalonji seeds on lipid profile of cardiac adults at Pervaiz Elahi Institute of Cardiology, Multan. Eighty cardiac adults between the age group of 26-69 years were selected. These were divided into two groups of 40 adults each. Details like age, sex, tobacco use, Marital Status, history of diseases etc were noted. One group was given Nigella Sativa (500 mg/daily) along with Statin (10-20mg/day) was given for 8 months. However, the other group was given only statin (10-20mg/day). The fasting blood sample was taken for a complete lipid profile at the start, then at 2 months and then at 6 months. The average cholesterol levels decreased by 14.8%, LDL 23%, VLDL 15.16% and triglycerides – 15.16% while HDL increased by 3.18% in the intervention group, However, it was not this drastic in the non-intervention group. It was found that Kalonji seeds have a positive effect in lowering the serum lipid levels of cardiac adults.

Similarly, Amirhossein Sahebkar *et al*, in their study titled, “Nigella Sativa (Black Seed) Effects on Plasma Lipid Concentrations in Humans: a Systematic Review and Meta-Analysis of Randomized Placebo-Controlled Trials”, studied the effect of Nigella Sativa on lipid concentration in the plasma through meta analysis of various studies done earlier. Various registered clinical trial studies done upto 2015 were studied. The data was taken from Pubmed, Google Scholar, Scopus, web of Science etc. The data of the results was analysed quantitatively. The analysis was conducted of 17 studies and it was found that the consumption of Nigella Sativa had lowered the serum lipid levels. There is a negative effect of Nigella Sativa on serum Lipid levels thus lowering LDL and increasing HDL Levels. However, more studies on such clinical trials needs to be done.

### **Nigella Sativa and Anti-inflammation**

The property of any substance which helps in reducing swelling or inflammation is known as anti-inflammatory. There are multiple drugs available in the market for this purpose, but they have their own side effects. An herbal anti-inflammatory substitute is always beneficial.

The study conducted by Mukhtar Ikhsan, *et al*, on, “Nigella sativa as an anti-inflammatory agent in asthma”, studied the anti-inflammatory effect of ethanol extracts of Nigella Sativa on mast cells of Wistar rats. The mast cells were divided into six groups and were stimulated for release of histamine by C 48/80. 1<sup>st</sup> group was not given anything while other five groups were given 0.1mg/ml, 0.2mg/ml, 0.3 mg/ml, 0.4mg/ml and 0.5mg/ml of Nigella sativa Ethanol extract. Their histamine concentrations were measured. Histamine release was inhibition increased in the mast cells as the concentrations went up. It However, was not inhibited in the control group. The study shows that extract of Nigella Sativa has inhibiting effect on the release of histamine in mast cells, thus giving positive effect on asthma. Nigella sativa this can be used for preventive and therapeutic purposes in cases of asthma. However, the study is limited to only histamine release. Effect of Nigella Sativa on other factors like leukotriene shall also be studied. In another study titled, “Immunomodulatory and anti-inflammatory action of Nigella sativa and thymoquinone: A comprehensive review”, review of studies stating the anti-inflammatory and immunomodulatory effects of Thymoquinone present in Nigella sativa was done. Various

studies which were done on the effect of thymoquinone as a anti-inflammatory and immunomodulatory agent were studied. Thymoquinone present in Nigella Sativa has been found to have positive effects on inflammation, cellular immunity, humoral immunity, paradigm and cytotoxic activity. It has been found that Nigella sativa has an effect on the alteration of humoral and cellular immune response. However, further detailed studies are needed to be done. The study was conducted by Amin F. Majdalawieh, *et. al*.

Similarly, Bahareh Amin *et.al*, in their study titled, “Black Cumin (Nigella sativa) and Its Active Constituent, Thymoquinone: An Overview on the Analgesic and Anti-inflammatory Effects”, reviewed earlier *in vitro* and *in vivo* studies which suggest the positive effects of Nigella sativa specially its analgesic and anti-inflammatory effects. Numerous research papers were studied. The chemical composition of the seed was studied and was found that oil, moisture, carbohydrates, protein, minerals, and vitamins etc present in the seed vary as per the method, time and location of harvest. There are many traditional uses of the Spice like toothache, fever, and colds along with wounds, skin disorders, etc. Other than these, Nigella sativa has antinociceptive activity, anti-inflammatory activity, and positive antioxidant activity and anti-inflammatory activity in both *in vivo* and *in vitro* studies. It was also seen that Nigella sativa and thymoquinone have a very low toxicity in the therapeutic doses of even upto 50 mg/kg. There are more than 100 compounds in Nigella sativa which are yet to be studied. The essential oils and fixed oils present in the seed are highly beneficial. From the researches published till date, it is evident that thymoquinone has an antinociceptive and anti-inflammatory effect. Further comprehensive studies should be done on specific molecular and cellular mechanism of action along with controlled trials on humans.

### **Nigella Sativa and Diabetes**

Diabetes is a metabolic disorder where the level of blood glucose in blood is increased due to lack of absorption. It leads to various disorders.

In a study conducted by Mahmoud Balbaa, *et al*, titled, “Oxidative stress and expression of insulin signaling proteins in the brain of diabetic rats: Role of Nigella sativa oil and antidiabetic drugs”, the possibilities of effect of Nigella Sativa Oil when given in combination of anti-diabetic drugs on the neuro protector process of diabetic rats were studied. For 21 days a combination of 2 ml of Nigella Sativa Oil and. 8 mg glimepiride, 100 mg metformin, and various combinations were given to 90 Type 2 Diabetes Induced rats. The rats were divided i 3 groups, where one was nondiabetic control group, second was diabetic control group and third was diabetic experimental group. All these groups were further divided in 8 groups depending on the dosage and combination of drugs induced. Their anthropometric and biochemical measurements were noted. later their brains were studied. It was found that in diabetic rats there was a decrease in antioxidation and increase in lipid peroxidation of brain. Brain glucose levels also decreased. It was observed that there was a positive impact of Nigella Sativa Oil on diabetic rats whether given alone or i combination with other drugs thus preventing amyloid plaque formation, and neurotoxicity. These results conclude that Nigella Sativa Oil and its combinations with various other drugs are beneficial as a anti-diabetic medicine. The study conducted by Reza Daryabeygi-Khotbehsara, *et al*,

titled, “Nigella Sativa Improves Glucose Homeostasis and Serum Lipids in Type 2 Diabetes: A Systematic Review and Meta-analysis”, showed the effect of herbal remedy for Type 2 diabetes by the use of Nigella Sativa. Various publications on clinical trials of Nigella Sativa which were published till Feb 2017 were studied. The papers were searched on Medline, Scopus, Pubmed and other registered clinical trials. Two independent researchers studied the papers. It was found through various studies that use of Nigella Sativa improved fasting blood sugar significantly. Even the Lipid profiles improved with the use of Nigella Sativa. Both serum lipids and Glucose homeostasis had a positive effect by consumption of Nigella Sativa, hence it can be used as an alternative medicine. However, the study was done on a few cases and further studies need to be done. The study conducted by Mahmoud Balbaa, *et al*, titled, “Nigella sativa Relieves the Altered Insulin Receptor Signaling in Streptozotocin-Induced Diabetic Rats Fed with a High-Fat Diet”, showed the effect of Nigella Sativa Oil on lipid profile, blood glucose, gene expression of insulin receptor signaling molecules and oxidative stress. Rats were divided into 3 main groups. 1st group was nondiabetic, Group 2 was fed with HFS and Streptozotocin and then NS oil, and group 3 was fed on High Fat diet and Streptozotocin but not on NS oil. The feeding was continued for 21 days and then biochemical analysis were done. Body weight increased in Nondiabetic rats after 21 days of intake of Nigella Sativa oil, However, it decreased 1.5 times more in the diabetic group fed on Nigella sativa Oil as compared to the control group. There was a significant increase in the Total Cholesterol and Triglycerides levels of the groups fed with NSO as compared to the control. Similarly, a significant decrease in Low Density Lipoprotein and increase in High Density Lipoprotein was observed in NSO treated rats. Insulin concentrations were also increased in the Groups on Nigella Sativa Oil as compared to the control groups Serum and Hepatic TBARs were also increased in the induced groups a compared to control groups. Nigella Sativa oil has positive effect on the weight loss of diabetic rats and also improves their lipid profile by improving Total Cholesterol, Triglycerides, Low Density Lipoprotein and High Density Lipoprotein levels. It also improves the insulin concentrations.

In another study titled, “Antidiabetic Properties of a Spice Plant Nigella sativa”, the different properties of the nigella sativa seeds were reviewed. This paper describes the results of different experiments done to check effects of the seed. Effect of Nigella Sativa was studied on nondiabetic rats, STZ induced diabetic rats, STZ Induced diabetic hamsters and diabetic humans through various previous studies. In various experiments when extracts of N Sativa were fed to normal nondiabetic rats, it increased their serum insulin and lowered serum glucose levels. It did not have any adverse effect on the liver. Antidiabetic activity in STZ induced diabetic rats - In various experiments, streptozotocin was induced in rats and thus diabetes was developed. These rats when fed on nigella sativa, had a lowered blood glucose level. Antidiabetic activity in STZ induced diabetic hamsters - The results on feeding n sativa were positive in lowering the serum glucose levels. Antidiabetic effect on humans - The results of different experiments on humans were also positive which means that n sativa helped in lowering blood glucose levels. The study concluded that N.Sativa has a positive effect on lowering the blood glucose

levels in both humans and animals. The study was conducted by Murli L. Mathur *et al*.

### **Nigella Sativa and cancer**

Cancer is a life-threatening disease where abnormal growth of cells occurs and keeps spreading thus leading to multiple complications

The study conducted by Amin F. Majdalawieh *et.al*, titled, “Recent advances on the anti-cancer properties of Nigella sativa, a widely used food additive” had a review of studies which prove that Nigella sativa helps in curing cancer tumors. It not only cures, but also inhibits growth of the tumor. It has been found that Nigella Sativa has anti-proliferative and pro apoptotic effects, antioxidant and cytotoxic effects, antimutagenic effects, antimetastatic effect and Natural Killer toxic effect. It is evident from all the studies and reports that Nigella sativa has anti-proliferative, anti-metastatic, pro-apoptotic, antimutagenic, and antioxidant roles. It is also evident that due to these properties, it also has immuno boosters and suppresses inflammation. It has been found to enhance anti-cancer activity. It also suggests that therapeutic use of Nigella sativa can be done in cancer. The experimental and preclinical studies prove the anti-cancer effect of nigella sativa. Although clinical trials have not been done yet and therefore research on the biochemical parameters and causes shall be done.

In another study titled, “Anti-cancer properties and mechanisms of action of thymoquinone, the major active ingredient of Nigella sativa”, a review of *in vivo* and *in vitro* studies was conducted to review the effect of Thymoquinone in anti-cancer effect. They found that Thymoquinone has antiproliferative, antioxidant, pro-apoptotic, anti-metastatic, NK-dependent cytotoxic, and cytotoxic effects. It also tells about the molecular mechanisms behind these effects. It is concluded that p53, PPARG, NF-kB, MAPK, STAT3, and PI3K/AKT are the significant signaling pathways through which the anti-cancer activity of thymoquinone is activated. It is also found that thymoquinone has a role in suppression of many types of tumors in their growth, their development and even their metastasis. It was concluded that A lot of study has been done on the seed and oil of Nigella Sativa as it has a lot of therapeutic value in many diseases which also include cancer. More work on such researches may open therapeutic uses of the seed in curing cancer. The study was conducted by Amin F. Majdalawieh *et.al*.

### **Nigella sativa and throid**

The thyroid gland is situated in the neck and has a very important role in the metabolism and growth of the body.

The study conducted by Farimah Beheshti, *et al* titled, “The effects of Nigella sativa extract on hypothyroidism-associated learning and memory impairment during neonatal and juvenile growth in rats” revealed that Hypothyroidism causes oxidative damage to the brain cells which results in memory loss and also has negative effect on the learning ability. Since research suggests that Nigella Sativa is high in antioxidants and has neuroprotective effects, this study is done to see its effects on learning ability and memory loss caused by hypothyroidism caused by hypothyroidism in the growth of juvenile and neonatal rats. 30 female pregnant rats were selected. When they delivered, the mother rats

along with the babies were divided in 6 groups and were given water as follows:

1. Control - plain water
2. propylthiouracil mixed water (PTU)
3. PTU with 100 mg/kg Nigella sativa
4. PTU with 200 mg/kg Nigella sativa
5. PTU with 400 mg/kg Nigella sativa
6. PTU with 100 mg/kg vit C

The mothers had this water during lactation and pups continued to have this water after lactation for 8 weeks. After which 10 pups from each group were selected and their learning and memory were tested. After that their brain tissues were removed and analysed. It was found that there was a positive effect of the hydroalcoholic extract of Nigella Sativa on lowering the thyroxine levels of juvenile and neonatal rats and increased their memory and learning capacity. It was concluded that consumption of nigella sativa and even Vit C lowers the thyroxin levels thus lowering hypothyroidism and increasing memory.

In another study titled, “The effects of Nigella sativa on thyroid function, serum Vascular Endothelial Growth Factor (VEGF) – 1, Nesfatin-1 and anthropometric features in patients with Hashimoto’s thyroiditis: a randomized controlled trial”, to see the effect of Nigella Sativa on thyroid Function, Nesfatin -1, VEGF and Anthropometric Changes in patients with Hypothyroidism. A total sample of 40 adults aged 22 to 50 years were selected. Their thyroxin levels and anthropometric measurements were taken. They were then divided into 2 groups. The first group was given 2 gms. of Nigella sativa powder and the second group was on placebo for 8 weeks. After 8 weeks the serum thyroxine levels,

and the anthropometric measurements were taken again. The double-blind trials were done by giving 2 gms of nigella sativa powder to 20 patients for 8 weeks, while 20 patients were given starch for 8 weeks. It is evident from the results that the nigella sativa powder had positive effect in lowering the anthropometric measurements. Thyroid levels and VEGF levels lowered in patients with Nigella Sativa Intervention while no changes occurred in patients who were on placebo. There was not a very significant effect on Nesfatin - 1 levels. Nigella Sativa has a positive effect in lowering the hypothyroidism, anthropometric measurements and VEGF levels However, it does not affect in lowering Nesfatin - 1 levels significantly. However, the study was conducted on a small sample size. This study was done by Mahdiah Abbasalizad Farhangi, *et al.*

**Nigella Sativa and Obesity**

Obesity is a situation where the body fat and weight increases thus leading to further complications and health hazards.

In a study conducted by Nazli Namazi, *et al.*, titled, “The effects of Nigella sativa L. on obesity: A systematic review and meta-analysis”, the effects of Nigella Sativa on obesity through meta-analysis in adults were seen. Database upto June 2017 from various portals like Cochrane Library, Scopus, PubMed/Medline and ISI Web of Science was searched and clinical trials with placebo were studies. The mean Weight Circumference, weight, BMI etc. were analysed. The results showed that as compared to placebo, there were drastic reduction in the BMI and Weights by consumption of Nigella Sativa. There is a moderately positive effect of Nigella Sativa on weight loss. However, further extensive studies need to be done.

**Table 1:** Positive Effect of Nigella Sativa on various metabolic disorders

DISEASE	STUDY	Reference Number
Anti - Hyperlipidemic Effect	Nigella Sativa has a positive effect on lowering cholesterol. Studies also showed that the petroleum ether extract of Nigella Sativa lowers the lipid and blood sugar levels. Nigella Sativa also effect serum Lipid levels – Decrease LDL level and increasing of HDL Levels.	(2,3,4,5)
Anti- Inflammatory Effect	Nigella sativa can be used for preventive and therapeutic purposes in cases of asthma. Thymoquinone present in Nigella Sativa has been found to have positive effects on inflammation, cellular immunity, humoral immunity, paradigm and cytotoxic activity. From the researches published till date, it is evident that thymoquinone has a antinociceptive and anti-inflammatory effect.	(6,7,8)
Anti – Diabetic Effect	The studies conclude that Nigella Sativa Oil and its combinations with various other drugs are beneficial as a anti-diabetic medicine. It was revealed that both serum lipids and Glucose homeostasis had a positive effect by consumption of Nigella Sativa, hence it can be used as a alternative medicine. Nigella Sativa oil has positive effect on the weight loss and improves insulin concentration in diabetic rats. The Researches also concluded that Nigella Sativa has a positive effect on lowering the blood glucose levels in both humans and animals.	(9,10,11,12)
Anri – Cancer Effect	The experimental and preclinical studies prove the anticancer effect of nigella sativa. It was also found that thymoquinone has a role in suppression of many types of tumours in their growth, their development and even their metastasis.	(13, 14)
Thyroid	It was found that consumption of nigella sativa lowers the thyroxine levels thus lowering hypothyroidism and increasing memory. Nigella Sativa powder has a positive effect in lowering the hypothyroidism, anthropometric measurements	(15, 16)
Obesity	The study showed that as compared to placebo, there were drastic reduction in the BMI and weights by consumption of Nigella Sativa. There is a moderately positive effect of Nigella Sativa on weight loss.	(17)

**Nigella Sativa and Other Herbal Medicinal Benefits**

In a study conducted by Aftab Ahmad, et.al, titled, “A review on therapeutic potential of Nigella sativa: A miracle herb”, various properties of the Nigella Sativa Plant and its seeds were described. It also describes its beneficial uses and its medicinal benefits. The descriptions are based on

various other researches which have been used as references. Various papers were reviewed. It was found that Nigella Sativa has positive effects on Antioxytotic activity, Contraceptive and anti-fertility activity, Anticonvulsant activity, Neuro-pharmacological activities, Testicular-protective activity, Pulmonary-protective activity and anti-

asthmatic effects, Nephroprotective activity, Hepato-protective activity, Gastro-protective activity, Cardiovascular activity, Immunomodulatory activity, Anti-inflammatory and analgesic activity, Anti-cancer activity, Antidiabetic activity, Antioxidant activity, Anti-schistosomiasis activity, Antifungal activity, Antibacterial activity. It was concluded that *Nigella Sativa* is a herbal remedy to many diseases without any side effects and pocket friendly. However, the biochemical causes leading to the therapeutic effect of the seed and the plant are yet to be studied.

Similarly, Wesam Kooty, et.al, in their study titled, "Phytochemistry, pharmacology, and therapeutic uses of black seed". The purpose was to review the studies done on *nigella sativa* as a therapeutic option for herbal remedies as the WHO data says that 80% people prefer to have herbal medicines. The data was gathered from papers published in journals like Science Direct, IranMedex, Medline, PubMed, EMBASE, Scopus, SID and EBSCO. The keywords searched were mainly *nigella sativa*, Black seeds, medicinal plant, therapeutic effect etc. *N. sativa* contains 60 mg zinc, 216 g protein, 406 g fat, 527 mg phosphorus, 45 g ash, 84 g fiber, 1 860 mg calcium, 249 g free nitrogen extract, 57 mg niacin, 38 g moisture, 105 mg iron, 15.4 mg thiamin, 18 mg copper and 160 mg folic acid per kg. It is used traditionally in Northern Africa, Southeast Asia and Middle East for treatment of headaches, dysentery, bronchitis, asthma, rheumatism etc. It has also been found to have anti microbial activity, anti-oxidant activity, anti-hyperlipidemic activity, anti-inflammatory activity, cardiovascular protective activity, anti-cancer activity, gastro protective activity, anti-diabetic activity, nephro protective activity, neuro protective activity, immuno protective activity, hepato protective activity, wound healing activity, effects on reproductive activity. The herb is used for various therapeutic purposes worldwide and has been found to be effective. However, further studies need to be done to define the dosage of the herb and higher dosage may cause side effects.

Similarly, Zahra Gholamnezhad et.al, in their study titled, "Preclinical and clinical effects of *Nigella Sativa* and its constituent, thymoquinone: A review", reviewed the clinical effects of *Nigella Sativa*. Studies which were published within the time span of 1979 to 2015 were reviewed through different database like Science Direct, PubMed, Google Scholar and Scopus. Multiple studies have been done in the last 30 years on *Nigella sativa* and it has been found to have positive antioxidant, antiproliferative, anti-inflammatory, antibacterial, proapoptotic, and antiepileptic properties, and its effect on improvement in endothelial dysfunction, atherogenesis, glucose metabolism, endothelial dysfunction and lipid profile dysfunction. Several studies on clinical trials show positive effects of the plant and its extracts on various disorders. However, more standardized clinical trials need to be done to start using the plant and its extracts as a herbal remedy for various diseases. Similarly, E.Z. Dazani, et.al, in their study titled, "Overview of the preclinical pharmacological properties of *Nigella Sativa* (black seeds): a complementary drug with historical and clinical significance, which was a review of various research papers available on pubmed and other Medline researches on the various effects of *Nigella Sativa*. Published literatures on *Nigella sativa* during Jan 1960 to April 2016 on Pubmed were covered. Research on Medline was also identified on

the same topic. It was found that in the 829 articles found on Pubmed based on *Nigella Sativa*, its toxicological, biochemical, pharmacological, pharmaceutical actions were covered. Detailed overview of the chemical composition, pharmacological investigations, analgesic, anti-inflammatory and immunodulatory actions, anti-tumor and chemotherapeutic actions, central nervous system and neurological actions, metabolic effects, antihypertensive and cardiovascular effects, pulmonary effects, anti-microbial actions, gastrointestinal pharmacology, safety considerations etc. were discussed. However, this study was only done on the published literature during a particular span of time and therefore older literature could not be covered. The study was also limited to publications in English language only.

Similarly, Hira Ijaz et.al, in their study titled, "*Nigella sativa* (Prophetic Medicine): A Review", did research on the positive effects of *Nigella Sativa*. Numerous Research Papers were studied. *Nigella Sativa* has 32-40% fixed oil, 0.4-0.45% volatile oil, 16-19.9% proteins, 1.79-3.74% minerals. 33.9% carbohydrates, 5.5% fiber, 6% water. Rest are alkaloids, coumarins, saponins and other chemicals. The *Nigella sativa* has anti-inflammatory, cardiovascular, antihyperlipidemic, hypoglycemic, antinociceptive, anti-oxytocic, gastro-protective, neuroprotective, nephro-protective, anti-schistosomiasis and anxiolytic effects. The main constituent of *Nigella sativa* which has medicinal properties is Thymoquinone which has antibacterial, antifungal and antioxidant, anti-cancer, antitumor, anti-angiogenic, anti-inflammatory, analgesic, gastroprotective, hepatoprotective, testicular protective properties. Its cardiovascular effects are decrease in prothrombotic events and platelet numbers. *Nigella Sativa* has strong medicinal and therapeutic properties and can be used for therapeutic purposes on refinement of thymoquinone and *Nigella sativa* oil.

Similarly, A Najmi, *et al*, in their study titled, "Effect of *Nigella Sativa* oil on various clinical and biochemical parameters of metabolic syndrome", did study the effect of *nigella sativa* oil on blood sugar levels and lipid profile. The study was conducted on the OPD adults of nephrology department at the JN Medical college, Aligarh. 60 adults were selected based on their weight, waist circumference, BMI, Blood glucose level and lipid levels. They were divided into 2 groups of 30 each. The first group was given a regular treatment However, the second group was given *nigella sativa* oil (2.5mg/day) for 6 weeks. After the said period, the group on the *nigella sativa* oil had a better weight loss. their blood glucose level and lipid profiles also went down while the HDL levels went up. The study shows a positive effect of *Nigella sativa* on the weight reduction, blood sugar level reduction and improvement of lipid profile. Similarly, Anwar-ul hasan Gilani, *et al*, in their study titled, "A review of medicinal uses of pharmacological activities of *Nigella Sativa*", where study was done extensively on the uses of *Nigella Sativa* plant. The effective therapeutic uses of *Nigella Sativa* plant were studied. They categorized the uses as below:

1. Traditional Uses: The seeds of the plant are used as condiments spices and aromatics. They are used in stomachache, digestives, liver tonics, diuretics, diaphoretic and in dyspepsia.
2. Hypoglycemic effect: There are several studies where *nigella sativa* has been found to have a blood glucose

- lowering effect. It is because of hepatic gluconeogenesis is inhibited by the volatile oil present in *nigella sativa*.
- Effect on immune system and cancer: The seeds are found to enhance the immune system. Its ethanol extract helps in inhibiting the growth of cancer cells.
  - Effects on nervous system: *Nigella sativa* has also shown narcotic analgesic activity. The oil has CNS depressant effects.
  - Effects against microbials: The alcoholic effects of *nigella* seeds have shown anti-bacterial activities against many stomach related harmful bacteria.
  - Effects against inflammation: The seed oil has been found to have a positive effect on lowering back pain, rheumatism, skin eruption, paralysis etc.
  - Effects on gastrointestinal system: The aqueous extract has been found to have anti-ulcer activity. It has also hepatoprotective effect.
  - Effects on respiratory system: The active ingredient called nigellon in the powder of the seeds is helpful in the disorders like asthma, broncho spasm and chest congestion.
  - Effect on cardiovascular system: The volatile oil thymoquinone have cardiovascular depressant activity. It also lowers blood pressure and helps control dyslipidemia.
  - It was concluded that the plant has multiple therapeutic uses.

Previous studies show *Nigella Sativa* was used as a traditional spice and had positive effects on lowering blood glucose levels, lowering total cholesterol levels, anti-cancer effect, increases immunity, lowers CNS, has anti-bacterial effect, is hepatoprotective and anti-ulcer, lowers blood pressure and many more. Later further precisely detailed studies were done which have shown *Nigella Sativa* has inhibiting effect on the release of histamine in mast cells, thus giving positive effect on asthma. Detailed studies on the components of *Nigella Sativa* and their benefits have been studied. The major component, thymoquinone has an antinociceptive and anti-inflammatory effect other than anti-oxidant effect which causes various benefits. It was also discovered that *Nigella Sativa* had a positive impact on lipid peroxidation of brain in diabetic rats. It is also found that thymoquinone has a role in suppression of many types of tumors in their growth, their development and even their metastasis. There was also drastic reduction in the BMI and Weights by consumption of *Nigella Sativa*. Thus, through various studies more detailed benefits of the spice have been found.

### Results and Discussion

Previous studies showed *Nigella Sativa* was used as a traditional spice and had positive effects on lowering blood glucose levels, lowering total cholesterol levels, anti-cancer effect, increases immunity, lowers CNS, has anti-bacterial effect, is hepatoprotective and anti-ulcer, lowers blood pressure and many more (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17). Later further precisely detailed studies were done which have shown *Nigella Sativa* has inhibiting effect on the

release of histamine in mast cells, thus giving positive effect on asthma. Detailed studies on the components of *Nigella Sativa* and their benefits have been studied. The major component, thymoquinone has an antinociceptive and anti-inflammatory effect other than anti-oxidant effect which causes various benefits. It was also discovered that *Nigella Sativa* had a positive impact on lipid peroxidation of brain in diabetic rats. It is also found that thymoquinone has a role in suppression of many types of tumors in their growth, their development and even their metastasis. There was also drastic reduction in the BMI and Weights by consumption of *Nigella Sativa*. Thus, through various studies more detailed benefits of the spice have been found.

### Conclusion

It is thus concluded that *Nigella Sativa* has therapeutic effect on multiple non-communicable diseases and with the support of further research, it can be used as a herbal alternative therapy.

### Limitation

International tie ups and involving research data from different parts of the world. More in depth research should be done on existing herbal products to eliminate nutritional and therapeutic dilemma.

### Acknowledgement

I acknowledge my Supervisor Dr. Mahak Sharma for guiding and enlightening me for this research work.

### Funding

There has been no funding for this review paper.

### Conflict of Interest

This is to declare that there is no Conflict of Interest between the authors.

### References

- Goldstein JL, Hazzard WR, Schrott HG, Bierman, EL, Motulsky AG. Hyperlipidemia in Coronary Heart Disease I. Lipid Levels In 500 Survivors OF Myocardial Infarction. *Journal of Clinical Investigation*. 1973; 52(7):1532-1543.
- Muneera KE, Majeed A, Naveed AK. Comparative evaluation of *Nigella sativa* (Kalonji) and simvastatin for the treatment of hyperlipidemia and in the induction of hepatotoxicity; *Pakistan Journal of Pharmacology Science*. 2015; 28(2):493-498.
- Lea PM, Benhaddou-Andaloussi A, Elimadi, A, Settaf A, Cherrah, Y, Haddad PSM, *et al*. The petroleum ether extract of *Nigella sativa* exerts lipid-lowering and insulin-sensitizing actions in the rat. *Journal of Ethnopharmacology*. 2004; 94(2-3):251-259.
- Tasawar Z, Siraj Z, Ahmad N, Lashari MH. The effects of *Nigella Sativa* (Kalonji) on lipid Profile in patients with stable coronary artery disease in Multan, Pakistan. *Pakistan Journal of Nutrition*. 2011; 10(2):162-167.
- Sahebkar A, Beccuti G, Mendía LES, Nobili SB. *Nigella Sativa* (Black Seed) Effects on Plasma Lipid Concentrations in Humans: a Systematic Review and Meta-Analysis of Randomized Placebo-Controlled Trials. *Pharmacological Research*. 2016; 106:37-50.

6. Ikhsan Mukhtar, Hiedayati N, Maeyama K, Nurwidya F. *Nigella sativa* as an anti-inflammatory agent in asthma. *BMC Research Notes*, 2016, 11
7. Majdalawieh AF, Fayyad MW. Immunomodulatory and anti-inflammatory action of *Nigella sativa* and thymoquinone: A comprehensive review. *International Immunopharmacology*. 2015; 28(1):295-304.
8. Amin B, Hosseinzadeh Hossein. Black Cumin (*Nigella sativa*) and Its Active Constituent, Thymoquinone: An Overview on the Analgesic and Anti-inflammatory Effects. *Planta Med*. 2016; 82(01-02):8-16
9. Mahmoud B, Shaymaa A, Abdulmalek SK. Oxidative stress and expression of insulin signaling proteins in the brain of diabetic rats: Role of *Nigella sativa* oil and antidiabetic drugs. *PLoS One*, 2017, 12(5)
10. Khotbehsara RD, Golzarand M, Ghaffari MP, Djafarian K. *Nigella Sativa* Improves Glucose Homeostasis and Serum Lipids in Type 2 Diabetes: A Systematic Review and Meta-analysis. *Complementary Therapies in Medicine*. 2017; 13:6-13.
11. Mahmoud B, MarwaEl-Z, Doaa G, Nabil T, Abdel WM. *Nigella sativa* Relieves the Altered Insulin Receptor Signaling in Streptozotocin-Induced Diabetic Rats Fed with a High-Fat Diet. *Oxidative Medicine and Cellular Longevity*, 2016. Article ID 249210716.
12. Mathur ML, Gaura J, Sharma R, Haldiyaa KR. Antidiabetic Properties of a Spice Plant *Nigella sativa*. *Journal of Endocrinology and Metabolism*. 2011; 1(1):1-8.
13. Majdalawieh AF, Muneera WF. Recent advances on the anti-cancer properties of *Nigella sativa*, a widely used food additive. *Journal of Ayurveda and Integrative Medicine*. 2016; 7(3):173-180.
14. Majdalawieh AF, Muneera WF, Nasrallah GK. Anti-cancer properties and mechanisms of action of thymoquinone, the major active ingredient of *Nigella sativa*. *Critical Reviews In Food Science And Nutrition*. 2017; 57(18):3911-3928.
15. Beheshti F, Hosseini Mahmoud, Shafei MN, Soukhtanl M, Ghasemi S, *et al*. The effects of *Nigella sativa* extract on hypothyroidism-associated learning and memory impairment during neonatal and juvenile growth in rats. *Nutritional Neuroscienc*. 2014; 20(1):49-59.
16. Farhangi MA, Dehghan P, Tajmiri S, Abbasi MM. The effects of *Nigella sativa* on thyroid function, serum Vascular Endothelial Growth Factor (VEGF) – 1, Nesfatin-1 and anthropometric features in patients with Hashimoto's thyroiditis: a randomized controlled trial. *BMC Complementary and Alternative Medicine*, 2016, 471
17. Namazi N, Larijani B, Ayati MH, Abdollahi M. The effects of *Nigella sativa* L. on obesity: A systematic review and meta-analysis. *Journal of Ethnopharmacology*. 2018; 219:173-181.
18. Ahmed A, Husain A, Mujeeb Mohd, Khan SA, Najmi AK, Siddique NA, *et al*. A review on therapeutic potential of *Nigella sativa*: A miracle herb. *Asian Pac J Trop Biomed*. 2013; 3(5):337-352
19. Kooti W, Noohi ZH, Ahvazi NS, Samani MA, Larky DA. Phytochemistry, pharmacology, and therapeutic uses of black seed. *Chinese Journal of Natural Medicines*. 2016; 14(10):732-745.
20. Gholamnezhad Z, Havakhah S, Boskabady MH. Preclinical and clinical effects of *Nigella Sativa* and its constituent, thymoquinone: A review. *Journal of Ethnopharmacology*. 2016; 190:372-386.
21. Dajani EZ, Shahwan TG, Dajani NE. Overview of The Preclinical Pharmacological Properties Of *Nigella Sativa* (Black Seeds): A Complementary Drug With Historical And Clinical Significance. *Journal of Physiology And Pharmacology*. 2016; 67(6):801-817.
22. Ijaz H, Tulain UR, Qureshi J, Danish Z, Musayab S, Akhtar MF, Saleem A, *et al*. *Nigella sativa* (Prophetic Medicine): A Review. *Pakistan Journal of Pharmaceutical sciences*. 2017; 30(1):229-234.
23. Najmi A, Haque SF, Naseeruddin M, Khan RA. Effect of *Nigella Sativa* oil on various clinical and biochemical parameters of metabolic syndrome. *International Journal of Diabetes & Metabolism*. 2004; 16:85-87.
24. Gilani AH, Jabeen Q, Khan MAU. A review of medicinal uses of pharmacological activities of *nigella sativa*. *Pakistan Journal of Biological Sciences*. 2004; 7(4):441-451.