

***NIGELLA SATIVA* LINN: BRIDGING TRADITIONAL USES WITH CONTEMPORARY PHARMACOLOGICAL EVIDENCE**

V. KarunaSree | A. Suneetha | V. Lakshmana Bhaskar

Kommareddy Venkata Sadasivarao Siddhartha College of Pharmaceutical Sciences, Vijayawada, Andhra Pradesh – 520010, India.

Corresponding Author Email: vemulalakshmanbhaskar@gmail.com

Received: 31 August 2025 | **Revised & Accepted:** 25 September 2025

Keywords: Acne, Anti-Aging, Skin Conditions, Hyperpigmentation, black seed.

ABSTRACT

Black seed, also known as *Nigella Sativa*, is a fascinating periodic flowering factory that hails from the Ranunculaceae family and is native to the vibrant geographies of southwest Asia. This remarkable factory boasts a variety of culinary and medicinal operations. Its seeds and oil painting are constantly used to attack a range of health issues, including rheumatoid arthritis, asthma, seditious conditions, diabetes, and digestive diseases. The end of this review is to offer a thorough scientific literature girding *N. Sativa*. The information and statistics included in this review are strictly gathered from estimable journals set up in believable databases like Science Direct, Medline, PubMed, Scopus, EBSCO, EMBASE, SID, and Iran Medex. We searched for keywords in both Persian and English literature on medicinal shops and traditional drug, fastening on terms like "Black seed," "*Nigella Sativa*," "remedial effect," and "medicinal factory." The findings revealed that *N. Sativa* exhibits a wide array of natural goods, including anti-inflammatory, anti-hyperlipidemic, anti-microbial, anti-cancer, anti-oxidant, anti-diabetic, anti-hypertensive, and crack mending parcels. also, it influences colorful systems in the body, similar as reproductive, digestive, vulnerable, and central nervous systems, showcasing conditioning like anticonvulsant and analgesic goods. In conclusion, this factory holds great pledge as a precious resource for developing new specifics aimed at treating multitudinous conditions.

INTRODUCTION

Medicinal herbs have been used to treat diseases for many centuries in different forms of folk medicine. Additionally, these herbs are used to make herbal medicines since they are often seen as safer than modern drugs. Researchers have concentrated on medicinal plants because only a few species have been studied in depth regarding their potential

medicinal properties, how they work, their effectiveness, and safety. One notable medicinal plant is black seed (Family Ranunculaceae). It is becoming recognized as a remarkable herb with a rich history and religious significance. Research has shown that it has a wide range of potential pharmacological benefits. Black Seed and its

oil have been used for centuries to treat various diseases around the world. It plays a significant role in traditional medicine practices like Unani and Ayurveda. Many Muslims regard it as one of the best forms of medical healing, as the Prophet Muhammad mentioned that Black Seed is a cure for all diseases. ⁽¹⁾

Black Seed has been studied for its biological effects and possible health benefits. It shows a wide range of activities, including antioxidant and anti-cough properties. ⁽²⁾ Research has confirmed the medical potential of the seed of *Nigella sativa*, along with its oil and extracts. Some of its active components, especially thymoquinone and alpha-hederine, show strong activity both in the lab and in living organisms against a wide range of diseases. It has also been determined that using Black Seed is relatively safe. ⁽³⁾ The seeds have two kinds of oil, fixed and essential and also contains other components such as proteins, alkaloids, and saponins. ⁽⁴⁾ The well-known book "The Canon of Medicine" by Ibn-Sina states that black seeds stimulate the body's energy and aid in recovery from fatigue. ⁽⁵⁾

Many chemical compounds are isolated from the *N. sativa* plant, including thymoquinone (30-48%), thymohydroquinone, Di thymoquinone, p-cymene (7-15%), carvacrol

(6-12%), 4 cymene, carvacrol, 4 terpineol, t-anethol, sesquiterpene longifolene, and a-pinene. These compounds have many pharmacological properties. Thymoquinone is the most active phytochemical among them. ⁽⁶⁾

The herb is long, measuring about 44 cm to 60 cm. Its leaves are divided into two linear segments, reaching up to 3 cm in length. They grow in pairs on either side of the stem. The lower leaves are small and have petioles, while the upper leaves are longer. The plant has divided foliage. Its flowers are pale blue and grow on long, solitary stems. They appear at the ends of the branches. The seeds are triangular and black. *N. sativa* reproduces with itself and produces a fruit capsule that contains many white, triangular seeds when it matures. The fruit opens automatically, exposing the seeds to the air, which turn black; these seeds are commonly known as black seeds. The seeds are triangular in shape, black in color, and have a strong smell. The plant contains a significant amount of oil. ⁽⁷⁾⁽⁸⁾

Tables No. 1 and No. 2 display the taxonomical classification and colloquial names for *Nigella sativa*. in turn.

Table 1: Vernacular names of *Nigella sativa*

English	Fennel Flower, Nutmeg Flower, Raman coriander, Blackseed, black caraway, black sesame
Hindi/Urdu	Kalonji/Mangrail
Russian	Chernushka, Herbrew, Ketzakh
Turkish	Corek out
Arabic	Habbat ak-barkah
Indonesian	Jintan hitam

Table 2: Taxonomical classification of *Nigella sativa*

Taxonomical Rank	Taxon
Kingdom	Plantae
division	Magnoliophyta
class	Magnoliopsida
Order	Ranunculales
Family	Ranunculaceae
Genus	<i>Nigella</i>
Species	<i>sativa</i>

History

The history of black seed stretches back over 2500 years. It's even mentioned in ancient Greek medical texts, highlighting its significant role in the medical practices of the time, including those used by the Egyptians. Interestingly, black seed was found in the tomb of Pharaoh Tutankhamun, suggesting it was highly valued in ancient Egyptian culture. The earliest mentions of black seed can be traced back to the book of Isaiah in the Old Testament. According to Easston's Bible Dictionary, the Hebrew term "ketsah" is believed to refer to the plant *Nigella sativa*.⁽³¹⁻³²⁾

Botanical Description of *Nigella sativa*

The herb grows between 44 cm and 60 cm tall. Its leaves are divided into two long segments, reaching up to 3 cm. They grow in pairs on either side of the stem. The lower leaves are small and stemmed, while the upper leaves are longer. The plant has split leaves. Its flowers are pale blue and grow on long, solitary stems. They appear at the tips of the branches. The seeds are triangular and black. *N. sativa* can self-pollinate and produces a fruit capsule filled with many white triangular seeds once it matures. The

capsule opens automatically, exposing the seeds to air, which turn black; these are commonly referred to as black seeds. The seeds are triangular in shape, black, and have a strong smell. They contain a significant amount of oil.⁽⁹⁾

Geographical Distribution

This type of herb grows all over the globe but is primarily found in India and Pakistan. Other countries where this herb grows include Bangladesh, Israel, South Europe, Lebanon, Syria and more. *N. Sativa* is sown during winter just like wheat. In India, it is mostly cultivated in the regions of Punjab, Himachal Pradesh, Bihar, Assam, the Wienetic plains and Maharashtra.⁽¹⁰⁾



Fig (1) *Nigella sativa* seeds



Fig (2) *Nigella sativa* flower and fruit

Phytochemical of *N. sativa*

Study work on the phytochemical constituents on **Nigella sativa** is very limited. The seeds of this plant are said to possess a few chemical compounds such as nigellone, nigellicine, nigellimine, and nigellimine-N-oxide. In addition, campesterol, cholesterol, citrostadienol, cycloeucalenol, 24-ethyllophenol, sitosterol, stigmastanol, stigmasterol and its derivative, β -amyrin, butyrospermol, cycloartenol, 24-ethyl-lophenol, gramisterol, 24-methyllophenol, and 24-methylenecycloartenol are also present. The plant also contains taraxerol, tirucallol, 3-O-[β -D-xylopyranosyl (1-3)- α -L-rhamnopyranosyl (1-4)- β -D-glucopyranosyl (1-6)- β -D glucopyranosyl] hederagenin, volatile oil (0.5-1.6%), fatty oil (35.6-41.6%), oleic acid, esters, esters of unsaturated fatty acids with C15 and higher terpenoids, esters of dehydrosteraric and linoleic acid, aliphatic alcohol, nigellidine, carvone, d-limonene, cymene, α , β -unsaturated hydroxyl ketones, steroids, hederegenin glycosides, and melanthins.

The thymoquinone mostly involved in the given activities

Anticonvulsant,⁽³³⁾ Antioxidant⁽³⁴⁾, anti-inflammatory⁽³⁵⁾, anti-carcinogen,⁽³⁶⁾ antibacterial,⁽³⁷⁾ antifungal⁽³⁸⁾

Folk View

As we may have wondered, the reason of using this herb in Egypt is not yet known. The literature tells that *N. sativa* used to be an old-time condiment and the seeds of the herb were widely used to season food. The seeds of *N. sativa* have also been used for relieving indigestion. *Nigella sativa* seeds have been used for the relief of asthma, bronchitis, and rheumatism and related inflammation in the Middle East and Southeast Asian countries. The seeds have also been used to increase milk production in nursing mothers, to improve digestion, and to combat parasitic infections. As per the Unani Tibetan medicine, *N. sativa* is considered an effective treatment for many diseases. The seeds of *Nigella sativa* help the body recover from fatigue and low spirits. The seed oil has also been used to treat skin conditions like eczema and boils. The Arabs called this plant 'Habbatul barakah,' which means seed of blessing. *Nigella sativa* is used by Africans and Asians for different medicinal purposes, like respiratory, stomach, intestine, kidney and liver functions, circulatory and immune systems, and for general well-being. It is also one of the best herbal medicines in Islam.⁽¹¹⁾

The seed oils from *N. sativa* have been used for ages in traditional practices across Arabian and Indian cultures. People often sprinkle them among woolen fabrics to keep insects at bay.⁽¹²⁻¹⁵⁾

The seeds and seed oil of *N. sativa* are not only edible but also play a role in traditional dishes. They're often used to add flavor to pickles. Additionally, Rasa Panchak, which comes from *N. sativa* (also known as kalonji), is noteworthy.⁽¹⁶⁾

Kalonji Benefits & Uses

1. Halitosis (Bad Breath):

Ayurveda suggests using kalonji to tackle bad breath, thanks to its antihalitosis properties. These benefits come from its antibacterial and antimicrobial effects in the mouth. To combat bad breath, simply chew half a teaspoon of kalonji seeds twice a day. For lasting relief from halitosis, it's recommended to continue this for a month.

2. Anorexia, Indigestion & Flatulence:

Kalonji, with its appetite-boosting, stimulant, digestive, and carminative properties, is a great ally for those dealing with anorexia, indigestion, and flatulence. It helps enhance the secretion of digestive juices and supports liver function, making it particularly beneficial for improving appetite in cases of anorexia. Additionally, it works to prevent the buildup of intestinal gas and assists in relieving discomfort. So, if you're struggling with flatulence, abdominal bloating, or pain caused by gas, consider chewing half a teaspoon of kalonji seeds right before your meals.

3. Asthma:

Kalonji is known for its ability to ease airway inflammation and help control mucus production. Some studies in Ayurveda have found that a decoction of kalonji can lessen

both the severity and frequency of wheezing in asthma sufferers.

4. Dysmenorrhea:

In Ayurveda and traditional folk medicine, Kalonji seeds are often used to enhance menstrual flow and ease menstrual discomfort.

5. Galactogenic Action:

Just like cumin seeds, kalonji seeds are known for their galactagogic properties. They can boost breast milk production and help prevent any abnormalities in it. These seeds even make their way into breast milk, aiding in the baby's digestion. However, it's worth noting that in some cases, they might lead to constipation in little ones.

Reported Therapeutic Studies of *Nigella sativa*

Researchers have explored this plant extensively to uncover its potential pharmaceutical and therapeutic benefits. However, we still need large-scale clinical trials to really establish how effective this herb is, particularly for skin conditions, immune system disorders, and various types of cancer.⁽²²⁾

Anti-bacterial Activity:

Numerous studies have highlighted the antibacterial properties of *N. sativa*. The primary active compound extracted from this plant is thymoquinone, which has shown effectiveness against a wide range of bacteria, particularly Gram-positive cocci like *Staphylococcus aureus* and *Staphylococcus epidermidis*.⁽²³⁾

Antiviral activity:

Recently, a few studies have explored the antiviral properties of *Nigella sativa*. One notable study from 2013 revealed some promising results regarding the impact of *N. sativa* oil on the hepatitis C virus (HCV). This clinical trial involved 30 patients with HCV who weren't suitable for IFN/ribavirin therapy. They were given 450mg of *N. sativa* oil in capsule form, taken orally three times a day. After three months, researchers observed a decrease in overall viral counts, along with improvements in oxidative stress, clinical condition, and glycemic control in a diabetic patient. ⁽²⁴⁾

Antifungal Activities:

A comparative study revealed that the antifungal properties of *Nigella sativa* were found to be more effective than those of Amphotericin B, a well-known antifungal medication. Another study also highlighted the antifungal potential of *N. sativa*. Researchers examined both methanolic and ethanolic extracts from the seeds of *N. sativa* against various pathogenic fungal strains, including *Aspergillus*, *Candida*, *Cryptococcus*, and *Issatchenkia* species. The extracts were prepared using a cold maceration technique and evaluated according to the guidelines set by "The National Committee of Clinical Laboratory Science" (NCCLS). The findings showed that the methanolic extract significantly inhibited fungal growth, particularly against *Candida parapsilosis* and *Issatchenkia orientalis*, while the ethanolic extract also demonstrated notable inhibition against *Issatchenkia orientalis*. ⁽²⁵⁾

Antiparasitic Activity:

A study was carried out to assess the antiparasitic properties of the methanolic extract of *N. sativa*. The extract was tested on mice infected with *Plasmodium* to determine its effectiveness. The results revealed an impressive suppression rate of up to 94%, with a significance level of $P < 0.05$ when compared to chloroquine. The antimalarial effects observed in the mice were attributed to the antioxidant properties of the *N. sativa* extract. ⁽²⁶⁾

Wound Healing Properties:

Thymoquinone is a key chemical that helps protect tissues from oxidative damage and prevents the peroxidation of membrane lipids. Because of these properties, it has been suggested that *Nigella sativa* could be useful in wound healing. In a study involving rats with wounds, researchers looked into how effective the *N. sativa* plant is for promoting healing. The findings indicated that it speeds up the healing process through a mechanism that remains unclear, especially when compared to silver sulfadiazine. ⁽²⁷⁾

Skin Pigmentation

Vitiligo:

The effects of *Nigella sativa* on wound healing were recommended. A study was carried out using a wound model in rats to explore how the *N. sativa* plant impacts the healing process. The findings revealed that it significantly speeds up the wound healing process. ⁽²⁸⁾

Anti-Diabetic Effect:

According to the study, the extract from *Nigella sativa* shows strong potential for managing diabetes. Thymoquinone was

administered to diabetic mice, and the results indicated a decrease in blood glucose levels, along with an increase in insulin and C-peptide levels in the test subjects. Another in-vivo study was carried out on mice to further assess the antidiabetic effects. The aqueous extract of *Nigella sativa* was given daily through gavage, and it was found to significantly lower glycemia, triglycerides, total cholesterol, LDL cholesterol, and TBARS. Additionally, it demonstrated antihyperglycemic, antihyperlipidemic, and antioxidant properties.⁽²⁹⁾

Toxicity of the *Nigella sativa* and its derivatives

Based on the studies reported, it was discovered that the toxicity of fixed oil from *N. sativa* in mice, following both intraperitoneal (i.e.) and oral administration, showed an LD50 for thymoquinone ranging from 89.7 to 119.7 mg/kg and from 647.1 to 1094.8 mg/kg, respectively. In rats, the LD50 values were found to be between 45.6 and 69.4 mg/kg for i.e. administration and between 469.8 and 1118.8 mg/kg for administration.⁽³⁰⁾

The Benefits of Black Seed

Raw black seed, in its full form, aids in the body's natural healing process, in overcoming disease or maintaining health. It acts on those parts of the body that are considered to be affected by the disease without disturbing the natural balance.

The effect of the combined nutritional and medicinal value of Black Seed is that it not only helps to alleviate the current condition, but also helps the body to build further resistance against future diseases (acquired immunity). Although historical evidence

shows the use of Black Seed for a wide variety of diseases, we have limited the descriptions of the main healing properties in the latest scientific research findings on Black Seed.

CONCLUSION

Medicinal plants have played a crucial role in supporting community health since ancient times. One of the most popular medicinal herbs is *Nigella sativa*, commonly known as kalonji, which is widely used across various traditional medicine systems, including folk medicine, Ayurveda, Siddha, and Yunani. This remarkable herb is linked to several important therapeutic benefits and is used to treat a variety of ailments. According to numerous studies, thymoquinone, a key active compound in *Nigella sativa*, boasts a range of biological properties such as promoting wound healing, managing diabetes, reducing inflammation, acting as an antidepressant, protecting the kidneys, and fighting bacterial, viral, and fungal infections. Many clinical studies indicate that *Nigella sativa* offers a broad spectrum of benefits for skin disorders.

REFERENCES

1. Hosseinzadeh H, Moghim FF, Mansouri SMT. Effect of *Nigella sativa* seed extracts on ischemia reperfusion in rat skeletal muscle. *Pharmacologyonline*. 2007; 2:326–35.
2. Hosseinzadeh H, Eskandari M, Ziaee T. Antitussive effect of thymoquinone, a constituent of *Nigella sativa* seeds, in guinea pigs. *Pharmacologyonline*. 2008; 2:480–4.

3. Ahmad A, Husain A, Mujeeb M, 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; 3:337–52. Doi: 10.1016/S2221-1691(13)60075-1.
4. Ahmad A. Husain A, Mujeeb M et al., “A review on therapeutic potential of *Nigella sativa*: a miracle herb,” *Asian Pacific Journal of Tropical Biomedicine*, vol. 3, no. 5, pp. 337–352, 2013.
5. Chevallier A. *Encyclopedia of medicinal plants*. New York, NY: DK Publishing. 1996. p. 237.
6. Badary, O.A., Al-Shabanah, O.A., Nagi, M.N., Al-Rikabi, A.C., Elmazar, M.M.: *Eur. J. Cancer Prev*, 8 (5):435–440 (1999).
7. Chevallier A. *Encyclopedia of medicinal plants*. New York, NY: DK Publishing. 1996. p. 237.
8. Varghese E. SVD “Applied Ethnobotany- A case study among the Kharias of Central India”, Deep Publications, New Delhi, (1996)
9. Varghese E. SVD “Applied Ethnobotany- A case study among the Kharias of Central India”, Deep Publications, New Delhi, (1996)
10. Paarakh, P. M. 2010. *Nigella sativa* Linn. - A comprehensive review. *Indian J. Nat. Prod.* 1: 409- 429.
11. Akhtar, M.S. & Rifaat, S. 1991. Field trial of *Saussurea lappa* roots against nematodes and *Nigella sativa* seeds against cestodes in children. *Journal of the Pakistan Medical Association* 41: 185–187.
12. Dwivedi, S. N., Dwivedi, Sangeeta & Patel, P. C. “Medicinal Plants used by the tribals and rural people of Satna district, Madhya Pradesh for the treatment of gastrointestinal disease and disorders”, *Nat. Pro. Rad.* (2006), 5(1): 60-63. 10.
13. Dwivedi, Sumeet; Shrivastava, Satyaendra; Dubey, Darshan; Kapoor, Shweta & Jain, Sanjay “Status and conservation strategies of herbal oral contraceptives”, *Planta Indica*, (2007)3(1): 5- 7. 11.
14. Kurion, J.C. “Plants that heals”, 5th ed. Pune, Oriental watchman publishing house, (2003).
15. Khare, C.P. “Encyclopedia of Indian Medicinal Plants”, Springer-Verlag Berlin Heidelberg, New York, (2004).
16. Sharma P.V. *Dravyaguna Vijnana*. Chaukambha Bharti Academy, Varanasi. 2019.
17. Gupta AK. Quality standards of Indian medicinal plants. Volume 1. Quality standards of Indian medicinal plants. Volume 1. 2003.
18. Monika, Kaushal K. Adulteration in Ayurvedic Raw Herbs. *International Journal of Science and Research.* 2015. 19. Afaq SH. A comparative introduction of the Unani and Tibetan medical traditions. *Ayur Vijnana.* 1999.
19. Mitra SK, Kannan R. A note on unintentional adulterations in Ayurvedic herbs. *Ethnobotanical Leaflets.* 2007.
20. More DB, Giradkar PS. Herbal Drug Adulteration: A Hindrance to the Development of Ayurveda Medicine.

ARTICLE ID: BTS0326012

21. Chaieb K, Kouidhi B, Jrah H, Mahdouani K, Bakhrouf A. Antibacterial activity of Thymoquinone, an active principle of *Nigella sativa* and its potency to prevent bacterial biofilm formation. *BMC complementary and alternative medicine*. 2011 Dec;11(1):1-6.
22. Islam MH, Ahmad IZ, Salman MT. Antibacterial activity of *Nigella sativa* seed in various germination phases on clinical bacterial strains isolated from human patients. *E3 Journal of Biotechnology and Pharmaceutical Research*. 2013;4(1):8-13.
23. M. Suthar, P. Patel, T. Shah et al., "In vitro screening of *Nigella sativa* seeds for antifungal activity," *International Research Journal of Pharmaceutical and Applied Sciences*, vol. 1, no. 1, pp. 84–91, 2010.
24. H. Mahmoudvand, A. Sepahvand, S. Jahanbakhsh, B. Ezatpour, and S. A. A. Mousavi, "Evaluation of antifungal activities of the essential oil and various extracts of *Nigella sativa* and its main component, thymoquinone against pathogenic dermatophyte strains," *Journal of Medical Mycology*, vol. 24, no. 4, pp. e155– e161, 2014.
25. Asdadi, H. Harhar, S. Gharby et al., "Chemical composition and antifungal activity of *Nigella Sativa* L. oil seed cultivated in Morocco," *International Journal of Pharmaceutical Science Invention*, vol. 3, pp. 9–15, 2014.
26. E. I. Aboul-Ela, "Cytogenetic studies on *Nigella sativa* seeds extract and thymoquinone on mouse cells infected with schistosomiasis using karyotyping," *Mutation Research - Genetic Toxicology and Environmental Mutagenesis*, vol. 516, no. 1-2, pp. 11–17, 2002. [51]
27. Ghorbanibirgani A, Khalili A, Rokhafrooz D. Comparing *Nigella sativa* oil and fish oil in treatment of vitiligo. *Iranian Red Crescent Medical Journal*. 2014 Jun;16(6).
28. El Rabey HA, Al-Seen MN, Bakhawain AS. The antidiabetic activity of *Nigella sativa* and propolis on streptozotocin-induced diabetes and diabetic nephropathy in male rats. *Evidence-based Complementary and Alternative Medicine*. 2017 Jan 1;2017.
29. Rastogi RP, Mehrotra BN. BN Compendium of Indian Medicinal plants Central Drug Research Institute Lucknow & NISC. New Delhi. 1993; 4:1.
30. Padhye S, Banerjee S, Ahmad A, Mohammad R, Sarkar FH. From here to eternity the secret of pharaohs: Therapeutic potential of black cumin seeds and beyond. *Cancer Ther*. 2008; 6:495–510.
31. Ibn Sina H. *Kitab al Qanoun fi Al Toubb* (The book of the canon of medicine) Beirut: American University of Beirut; 2007.
32. Hosseinzadeh H, Taiari S, Nassiri Asl M. Effect of thymoquinone, a constituent of *Nigella sativa* L., on ischemia–reperfusion in rat skeletal muscle. *Naunyn Schmiedebergs Arch Pharmacol*. 2012; 385:503–8. doi: 10.1007/s00210-012-0726-2.

33. El Gazzar M, El Mezayen R, Marecki JC, Nicolls MR, Canastar A, Dreskin SC. Anti-inflammatory effect of thymoquinone in a mouse model of allergic lung inflammation. *Int Immunopharmacology*. 2006; 6:1135–42. doi: 10.1016/j.intimp.2006.02.004.
34. Gali-Muhtasib H, Ocker M, Kuester D, Krueger S, El-Hajj Z, Diestel A, et al. Thymoquinone reduces mouse colon tumor cell invasion and inhibits tumor growth in murine colon cancer models. *J Cell Mol Med*. 2008; 12:330–42. doi: 10.1111/j.1582-4934.2007.
35. Halawani E. Antibacterial activity of thymoquinone and thymohydroquinone of *Nigella sativa* L. and their interaction with some antibiotics. *Adv Biol Res*. 2009; 3:148–52.
36. Abdel Azeiz AZ, Saad AH, Darweesh MF. Efficacy of thymoquinone against vaginal candidiasis in prednisolone induced immunosuppressed mice. *J Am Sci*. 2013; 9:155–9.
37. Deepak, Suri S, Sikender M, Garg V, Samim M. Entrapment of seed extract of *Nigella sativa* into thermosensitive (NIPAAm–Co–VP) co polymeric micelles and its antibacterial activity. *International Journal of Pharmaceutical Sciences and Drug Research*. 2011; 3:246–52.