

## ORIGINAL ARTICLE

### Historical Applications of *Nigella sativa* L. (Black cumin) in the Treatment of *Zokam* and *Nazleh* in Persian Medicine

#### Abstract

Using *Nigella sativa* L. (Black cumin), in traditional medicine, dates back to Tutankhamen, the pharaoh of Egypt. There are abundant historical and religious evidence implying the importance of these curative seeds. Traditionally, they have been used for various therapeutic purposes. *Zokam* and *Nazleh* (ZaN) are two nasal diseases used to be treated by these medicinal seeds. Traditional Persian Medicine (TPM) classifies each of these diseases into warm and cold types. Comparing symptoms, Warm ZaN resembles Allergic rhinitis and cold ZaN is similar to Rhinosinusitis. Many documents have been found in TPM references that explain different ways for preparing Black cumin seeds for the treatment of cold ZaN, but there is no evidence for treating warm ZaN. In recent years, many original articles have been written to explain the therapeutic qualities of these curative seeds. They exhibit that Black cumin seeds, in addition to increasing the mucociliary clearance, histamine release inhibition and antihistaminic effects, have anti-inflammatory, antibacterial, antibacterial biofilm formation. Consequently, they confirm the application of Black cumin in the treatment of rhinosinusitis or cold ZaN.

**Key words:** *Zokam* and *Nazleh*, *Nigella sativa*, Rhinosinusitis, Allergic rhinitis, Traditional medicine

Received: 27 Dec 2013; Accepted: 9 Feb 2014 ; Online published: 20 Feb 2014  
Research on History of Medicine/ 2014 Feb; 3(1): 11-20.

Homayoon Elahi<sup>1</sup>  
Mohammad Reza  
Masroorchehr<sup>2</sup>  
Shadman Nemati<sup>3</sup>  
Mohammad Kamalinejad<sup>4</sup>  
Mehdi Besharat<sup>5</sup>  
Homa Hajimehdipoor<sup>6</sup>  
Maryam Jalessi<sup>7</sup>

1-Department of otolaryngology, Firoozgar Hospital, Iran University of Medical Sciences, Tehran, Iran

2-Department of Traditional Medicine, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

3-Otolaryngology-head and neck surgery Research Center, Amiralmomenin Hospital, Guilan University of Medical Sciences, Rasht, Iran

4-Department of Pharmacognosy, Faculty of Pharmacy, Shahid Bahashti University of Medical Sciences, Tehran, Iran

5-Department of Infectious Diseases, Loqman-e-Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

6-Traditional Medicine and Materia Medica Research Center and Department of Traditional Pharmacy, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

7-ENT- Head & Neck Research Center



## Introduction

*Nigella sativa* L. (NS) is commonly known as Black cumin which belongs to the botanical family of *Ranunculaceae*. It is one of the most ancient medicinal plants that has been reported to be used for the treatment of a variety of diseases in the history. It is cultivated in the Mediterranean region, Middle East and Southeast Asia. The seeds of the plant with a pungent flavor have been utilized for medical purposes. Based upon the historians' reports, along with certain items, black cumin seeds were found in the tomb of Tutankhamen, the pharaoh of Egypt.<sup>1</sup> The oil extracted from the seeds was so effective in curing ailments that Egyptians, considering it precious, named it Pharaoh's oil.<sup>2</sup> Hippocrates and Dioscorides have called it "*melanthion*" while Bible refers to it as "curative black cumin" (Isaiah 28:25, 27 NKJV).<sup>1</sup> Concerning the importance of Black cumin, it is also mentioned by Prophet Mohammad (peace be upon him) that Black cumin can cure all disorders except death.<sup>3</sup> Because of its abundant medical applications, in different regions and languages, various names are given to it. For example, in old Latin, it is called "*panacea*" which means "cure all" and in Arabic it is famous as "*Habbat el Baraka*" meaning the "blessing seed" or "*Habbat el souda*" as the translation of the "Black seed". In South Asia it is called "*Kalonji*" and in Iran it is known as "*Siah Daneh*" that is a translation for "Black seed".<sup>1,4,5</sup> But in Persian and Arabic references of TPM "*Shuniz*" is the equal word for Black cumin.<sup>6-10</sup>

Traditionally, Black cumin has been used as diuretic, emmenagogue, galactagogue, anthelminic and carminative. And by different preparations, it has been utilized to treat some ailments like Jaundice, chronic fever, renal calculus, bladder calculus, articular pain, scab, asthma, dyspepsia, piles and some skin diseases.<sup>6-8</sup> The other therapeutic application of Black cumin is for the treatment of two nasal diseases, *Zokam* (Coryza) and *Nazleh* (Catarrh).<sup>10,11</sup> The aim of this article is to elucidate the application of Black cumin and introduce its different preparations for treating ZaN. This article represents some evidence of classic medicine that confirms the application of Black cumin in the therapy of ZaN.

## Materials and Methods

To present a precise definition, along with different types, causes, symptoms and signs of ZaN, and to introduce different preparations of Black cumin applied in their treatment,

and Department, Hazrat Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran

### Correspondence:

Mohammad Reza Masroorchehr  
Department of Traditional Medicine,  
School of Traditional Medicine, Shahid  
Beheshti University of Medical Sciences;  
No.8, Shams Alley, Valie-asr Ave., Tehran,  
Iran  
Masroor\_shahr@yahoo.com

- 1- Padhye et al, 2008: 495-510.
- 2- Ramadan, 2007: 1208-1218.
- 3- Majlesi, 1981
- 4- Paarakh, 2010: 409-429
- 5- Hajhashemi et al, 2004: 195-9
- 6- Avicenna, 2005
- 7- Momen-e-Tonekaboni, 2011
- 8- Aghili-Khorasani, 2011
- 9- Chishti, 2008
- 10- Aviceinna, 1998
- 11- Avicenna, 2005



the authors considered five important TPM references including *Al-Qanoon-fi-al-Tebb* (Canon of Medicine), *Zakhire-e-Kharazmshahi*, *Tohfah-al-Momenin*, *Makhzan-al-Adviyeh* (Storehouse of Medicaments) and *Eksir-e-Azam* (Great Elixir). Three keywords consisting of *Zokam*, *Nazleh* and *Shuniz* were used in this survey. After the primary evaluation, including the symptoms and signs of the diseases, the authors looked for possible equivalent ailments discussed in classic medicine and found in textbooks and articles on nose illnesses. Next, they found and introduced several preparations which were used in the treatment of ZaN. Finally, based on the findings of classic medicine, they exhibited some evidence testifying the use of Black cumin for treating ZaN.

12- Bayan et al, 2013

**Table 1:** Bibliographic information of Traditional Persian Medicine  
References used in this paper

Book	Author	Century	Language	subject
The Canon of medicine	Avicenna	11 <sup>th</sup> AD	In Arabic	Basics of Traditional Medicine, Materia Medica, Diseases of Different organs, pharmacopoeia
[Zakhire-e-Kharazmshahi]	Jorjani	12 <sup>th</sup> AD	In Persian	Basics of Traditional Medicine, Materia Medica, Diseases of Different organs, pharmacopoeia
[Tohfah-al-Momenin]	Momen-e-Tonekaboni	17 <sup>th</sup> AD	In Persian	Materia Medica
[Makhzan-al-Adviyeh]	Aghili-Khorasani	18 <sup>th</sup> AD	In Persian	Materia Medica
[Eksir-e-Azam]	Chishti	19 <sup>th</sup> AD	In Persian	Diseases of Different organs

## Results and Discussion

Avicenna, one of the most influential Persian physicians<sup>12</sup>, in his masterpiece, The Canon of Medicine, has dedicated a separate chapter to ZaN. He believes they are common in flowing down (*sayalan*) of material (*Maddeh*) from the brain to the lower organs. There are, of course, some people who believe that the flow of material into the throat is *Nazleh* and through the nose is *Zokam*. But there are some other people who call both of them *Nazleh* and only when the state of what flows down is watery and salty, and frequently running, preventing smell with the involvement of the eyes, skin and forehead organs of face, they name it *Zokam*. He adds that *Nazleh* may move to lower organs like the throat, esophagus, stomach and lungs, and may transmit to the far away organs through nerves. Avicenna, however, while explaining the symptoms of the diseases, calls both of them *Nazleh* but di-





vides them into *Zokami* (through nose) and *Halghi* (through throat).<sup>11</sup> Jorjani in *Zakhire-e-kharazmshahi* and Chishti in *Eksir-e-Azam* consider the brain to be the origin of the material and define *Nazleh* as descending of this material to the throat and lung.<sup>9,13</sup>

ZaN, depending upon their etiology and causes are divided into warm (*Harr*) and cold (*Bared*) groups. The former is subdivided into the disorder caused by internal factors, like warm-tempered brain (*Mezaj-e-Harr-e-Demagh*), and external heat reaching the head, including sunlight heat, warm wind (*Samoom*), smelling warm condiments such as musk, saffron, mustard, onion, garlic, or rubbing warm (warm-tempered) oils on head,<sup>9,11</sup> or even residing in a warm house with no current air in summer.<sup>13</sup> Dominance of warm humors such as yellow bile (*saфра*) or blood (*dam*) in the body and head may also cause them.<sup>9</sup> The cold (*Bared*) group also has two subdivisions: Internally, cold-tempered brain (*Mezaj-e-Bared-e-Demagh*) and externally, the cold reaching the head, especially when the head is exposed to the cold air and cold wind, especially when the brain becomes rarefied after a warm bath, exercise, anger and thinking hard. The dominance of cold humors, such as phlegm (*Balgham*) or black bile (*souda*), in the body and head is the other cause of cold ZaN. It is noticed that, compared with cold-tempered persons, warm-tempered people are more likely to be affected by external factors leading to *Zokam*.<sup>11,13</sup> However, both internal and external factors are needed to induce the diseases.<sup>9</sup>

### **Symptoms, signs and diagnosis**

To diagnose the disease, one must distinguish between warm and cold types based on their symptoms and signs. Conjunctival injection (*Homratol eynein*), reddened face, tearing (*sayalan-e-ashk*), feel of warmth while touching the head, acute irritating itchy nose or throat, itching of uvula (*Lahat*), ear, gums and face (*Daghdagha-tol-Herrifiyah*); feeling a burning fluid flowing down; and yellow or reddened sputum or nasal secretions are the symptoms of the warm ZaN.<sup>9,11</sup>

Cold sense of nasal secretions or sputum when expectorated, sensing a tickle or a mild stimulation in the nose or throat (*Daghdagheh*), feeling stretch on forehead, severe nasal blockage, sever nasal twang, the possibility of thick white or livid sputum or nasal secretion, weakness of all senses, loss of taste, fatigue, heavy headedness, headache (*Sodaa*), feeling a taste of burnt object in the mouth or perceiving an



infected smell are the symptoms of the cold ZaN. Patients receive benefit from probable fever in this group.<sup>9,11</sup> In addition, in severe cases of both warm and cold groups, the sense of smell is disturbed and whenever *Zokam* prolongs, it afflicts the lung and may cause coughing.<sup>13</sup> Comparing colors, the worst color of secretions in the cold group is green and then black but in the warm group is yellow.<sup>9</sup>

- 14- Flint et al, 2010: 612-23  
15- Szilasi et al, 2012: 49  
16- Lim et al, 2010: 542-550

**Table 2:** Comparison between Classic medicine and Traditional medicine findings.<sup>9,11,13,14,18</sup>

	Classic medicine findings	Traditional medicine findings	Translation of Traditional medicine findings
<b>Allergic Rhinitis</b> <b>(Warm Zokam and Nazleh)</b>	Conjunctival injection	<i>Homratol eynein</i>	Reddened eyes
	Itching of eyes	<i>Soozeshe cheshm</i>	Eye Irritation
	Lacrimation	<i>sayalan-e-ashk</i>	tearing
	itching of nose, palate, throat, and ears	<i>Daghdagha-tol-herrifyah, khareh dar bini, halgh, lahat va goosh</i>	Burning itchy nose or throat, itching of uvula and ear
	throat clearing	<i>Tanakhwa</i>	expectoration
	postnasal drip	<i>Sayalan-e-maddeh</i>	feeling a burning fluid flowing down
	Runny nose	<i>Reghat-e-maddeh (Tonok)</i>	Watery nose
	Cough	<i>Sorfeh</i>	Cough
<b>Rhinosinusitis</b> <b>(cold Zokam and Nazleh)</b>	nasal blockage, obstruction	<i>Sheddat-el- soddeh</i>	severe nasal blockage
	facial pain or pressure	<i>Tamadod-el-jebha</i>	feeling stretch on forehead
	reduction or loss of smell	<i>Botlan-e-booyayi</i>	loss of smell and taste
	mucopurulent discharge	<i>Maddeh setabr, sepid va kabood</i>	possibly thick white or livid sputum or nasal secretion
	Fatigue	<i>Kasel-e-badan</i>	Body tiredness
	anterior nasal discharge or posterior nasal drip	<i>Sayalane maddeh</i>	Flowing material through nose or throat
	Nasal congestion	<i>Ghonneh</i>	sever nasal twang
	headache	<i>Sodaa</i>	headache

Perusing symptoms and signs of nasal diseases in classic medicine, authors found two comparable prevalent ailments. In the examination, symptoms of Allergic rhinitis, including sneezing, itching of the nose, palate, throat, eyes and ears, clear rhinorrhea, throat clearing, postnasal drip, loss of smell, conjunctival injection, lacrimation, eyes itching and puffiness of the eyelids, attests the presence of warm ZaN.<sup>14-16</sup> Rhinosinusitis (RS), inflammation of the nose and paranasal



sinuses, comprises certain symptoms in the middle meatus, including nasal blockage, obstruction, congestion; anterior nasal discharge or posterior nasal drip; facial pain or pressure; reduction or loss of smell, nasal polyps, mucopurulent discharge, oedema or mucosal obstruction primarily. However, RS does not imitate all the symptoms of cold ZaN but it exhibits most of them.<sup>17,18</sup>

### ***Black cumin applications in the treatment of ZaN***

Studying the traditional methods of treating ZaN reveals that there is no evidence of using Black cumin in the treatment of the warm group. Great physicians like Avicenna, Jorjani and Chishti believe that applying every warm condiment (as Black cumin with a warm nature) not only does not alleviate the symptoms of warm ZaN but also makes it worse. On the contrary, in the treatment of cold ZaN, the authors of the article have found the use of several Black cumin preparations for alleviating the disease. Avicenna in Canon explains smelling of roasted Black cumin which is kept in a linen bag benefits *Zokam* would decongest ethmoidal (*Mesfat*) sinuses.<sup>6</sup> He also mentions applying Black cumin as incense helps *Zokam* too.<sup>11</sup> Smelling crushed roasted Black cumin after wetting the seeds with vinegar for a night is the other preparation that is cited.<sup>13</sup> *Kemad* is another traditional therapeutic procedure in which dried medical herbs, seeds or materials are placed on the surface of an organ.<sup>19</sup> In cold ZaN, it is recommended to heat a small bag containing Black cumin seeds and put it on the head. Drip (*saoot*) water-soaked or oily preparation of Black cumin are used to treat *Zokam*.<sup>7</sup>

*Makhzan-al-Adviyeh* collects and summarizes all different ways of Black cumin applications:

- 1) Smelling raw Black cumin alone.
- 2) Smelling vinegar-soaked Black cumin bagged in a pouch.
- 3) Soaking Black cumin seeds in vinegar over a night, crush them and then snuff the preparation.
- 4) *Kemad* as mentioned before.
- 5) Putting Black cumin poultice on the forehead to remove nose congestion.
- 6) For ZaN with too much sneezing: boiling crushed roasted seeds in olive oil and after filtering the mixture, dripping the oil in the nose.<sup>8</sup>

Although rhinosinusitis and cold ZaN, based on their different theories, do not have the same etiologies, they have the

- 17- Fokkens, 2012: 1-298
- 18- Flint et al, 2010: 703-8
- 19- Heravy, 2008





same symptoms and manifestations. Rhinosinusitis, in which inflammatory reactions play a major role, is an inflammatory disease which affects nose and paranasal sinuses. Every factor which interferes in inflammation may begin or exacerbate rhinosinusitis. A variety of medications are used to treat acute or chronic rhinosinusitis, including antibiotics, anti-inflammatory drugs (mostly topical steroid), mucolytics, antihistamines and decongestants.

Black cumin has more than 100 different constituents. In recent years, many studies have been done on therapeutic characteristics of these chemical components.<sup>2</sup> For instance, Thymoquinone (TQ) is the most abundant and effective volatile oil. However, numerous studies have shown TQ therapeutic capabilities, other constituents of Black cumin have their own therapeutic properties as well. TQ, polyphenols and crude fixed oils of Black cumin have anti-inflammatory activity. Moreover, it is revealed that its essential oils have analgesic effects too.<sup>1,4,5,20-22</sup> Ethanol extract and essential oils of seeds, extracted by different methods, have considerably antibacterial effects. They are more active on Gram-positive than Gram-negatives.<sup>4,23</sup> However, another study has concluded that the volatile oil of Black cumin is more active on Gram-negatives than Gram-positive.<sup>24</sup> Furthermore, they have antibacterial activity against multi-drug resistant bacteria from clinical isolates as well.<sup>25</sup> Bacterial biofilm formation is another issue regarded as the cause of chronic rhinosinusitis,<sup>26,27</sup> but there is some evidence showing that TQ has the potency to prevent bacterial biofilm formation.<sup>28</sup> In a study, it is shown that Nigellon, another Black cumin effective volatile oil, has increased the mucociliary clearance.<sup>29</sup> In addition, it efficiently inhibits histamine release from mast cells.<sup>29,30</sup> It is demonstrated that Black cumin has antihistaminic potentials and decreases nasal symptoms in allergic patients.<sup>31</sup>

### Conclusion

The application of Black cumin seeds dates back to Tutankhamen, the pharaoh of Egypt and there are several historical and religious documents that confirm their medical benefits. They have been used to treat different human ailments. Great traditional physicians used these medicinal seeds, in a variety of preparations, to treat ZaN. ZaN have warm and cold subdivisions. However, while there are many documents in TPM references recommending these curative seeds for the treatment

- 20- Al-Ghamdi, 2001: 45-8
- 21- Ghannadi et al, 2005: 488-93
- 22- El Gazzar et al, 2006: 1135-42
- 23- Salem, 2005: 1749-70
- 24- Gerige et al, 2009: 1189-1192.
- 25- Salman et al, 2008: 10-14
- 26- Tamashiro, 2009: 232-5
- 27- Li et al, 2012: 155-163
- 28- Chaieb, 2001: 29
- 29- Wienkötter, 2008: 105-108
- 30- Chakravarty, 1993: 237
- 31- Nikakhlagh, 2011: 402-407



of cold ZaN, there is no evidence to apply them for treating the warm group. Although, from theoretical and etiologi- cal viewpoints, there are differences among rhinosinusitis and cold ZaN, their symptoms are mostly similar. In recent years, findings of numerous studies have exhibited Black cumin therapeutic qualities, such as anti-inflammation, antibacte- rial, antibacterial biofilm formation; mucociliary clearance enhancement, histamine release inhibition and antihistamin- ic effects. These characteristics confirm their applications in the treatment of rhinosinusitis or cold ZaN.

### Acknowledgements

This article is based on PhD thesis number 126, school of traditional medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Authors thank the library of School of Traditional Medicine, Firoozgar Hospital and Amiralmomenin Hospital library staff for providing them with the re- quired resources.

### References

- Aghili-Khorasani M.H. *Makhzan-al-Adviyeh*. Tehran: Sabz-Arang. 2011: 503-4. [in Persian]
- Al-Ghamdi MS. The anti-inflammatory, analgesic and antipyretic activ- ity of *Nigella sativa*. *J Ethnopharmacol* 2001; 76: 45-8.
- Avecinna H. *Al-Qanun fi'l-Tibb*. Vol. 2. New Delhi: Jamia Hamdard. 1998: 292-3
- Avicenna H. *Canon of Medicine*. Vol.2. Beirut: Alaalami Library. 2005: 147-8. [in Arabic]
- Avicenna H. *Canon of Medicine*. Vol.2. Beirut: Alaalami Library. 2005: 432-7. [in Arabic]
- Bayan L, Modarres Mousavi SM, Gorji A. History of Neurological Dis- orders in Persian Medicine. *J of Research on History of Medicine* 2013; 2.
- Chaieb K, Kouidhi B, Jrah H, et al. Antibacterial activity of Thymoqui- none, an active principle of *Nigella sativa* and its potency to prevent bac- terial biofilm formation. *BMC Complement Altern Med* 2011; 11: 29.
- Chakravarty N. Inhibition of histamine release from mast cells by nigel- lone. *Annals of allergy* 1993; 70: 237.
- Chishti M.A. *Eksir-e-Azam*. Vol. 1. Tehran: Iran University of Medical sciences. 2008: 524-8. [in Persian]
- El Gazzar M, El Mezayen R, Marecki JC, et al. Anti-inflammatory effect of thymoquinone in a mouse model of allergic lung inflammation. *Int Im- munopharmacol* 2006; 6: 1135-42.
- Flint PW, Haughey BH, Lund V, et al. *Cummings Otolaryngology*. Head & Neck Surgery. Vol.1. Philadelphia, Pa.: Mosby Elsevier. 2010. 612-23.
- Flint PW, Haughey BH, Lund V, et al. *Cummings Otolaryngology*. Head





- & Neck Surgery. Vol.1. Philadelphia, Pa.: Mosby Elsevier. 2010. 703-8.
- Fokkens WJ, Lund VJ, Mullol J, et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2012. *Rhinol Suppl* 2012; 3 p preceding table of contents, 1-298.
- Gerige SJ, Gerige MKY, Rao M. GC-MS analysis of *Nigella sativa* seeds and antimicrobial activity of its volatile oil. *Brazilian Archives of Biology and Technology* 2009; 52: 1189-92.
- Ghannadi A, Hajhashemi V, Jafarabadi H. An investigation of the analgesic and anti-inflammatory effects of *Nigella sativa* seed polyphenols. *J Med Food* 2005; 8: 488-93.
- Hajhashemi V, Ghannadi A, Jafarabadi H. Black cumin seed essential oil, as a potent analgesic and antiinflammatory drug. *Phytother Res* 2004; 18: 195-9.
- Heravy M. *Bahr-al- Javaher*. Qhom: Jalaaleddin. 2008: 323.
- Jorjani E. *Zakhire-e-kharazmshahi*. Vol. 2. Qhom: Moasese-Ehya-e-Tebb-e-Tabiyi. 2012: 340-8. [in Persian]
- Li H, Wang D, Sun X, et al. Relationship between bacterial biofilm and clinical features of patients with chronic rhinosinusitis. *European Archives of Oto-Rhino-Laryngology* 2012; 269: 155-63.
- Lim M, Leong J. Allergic rhinitis: evidence-based practice. *Singapore Med J* 2010; 51: 542-50.
- Majlesi M. *Behar-al-Anvar*. Vol. 59. Beirut: Dar Ehya-el Toras-el Arabi. 1981: 100. [in Arabic]
- Momen-e-Tonekaboni M. *Tohfah-al-momenin*. Vol. 1. Qhom: Noore-Vahy. 1390: 547-8. [in Persian]
- Nikakhlagh S, et al. Herbal treatment of allergic rhinitis: the use of *Nigella sativa*. *Am J Otolaryngol* 2011. 32(5): p. 402-7.
- Paarakh PM. *Nigella sativa* Linn.—A comprehensive review. *Indian J of natural products and resources* 2010; 1: 409-29.
- Padhye S, Banerjee S, Ahmad A, et al. From here to eternity - the secret of Pharaohs: Therapeutic potential of black cumin seeds and beyond. *Cancer Ther* 2008; 6: 495-510.
- Ramadan MF. Nutritional value, functional properties and nutraceutical applications of black cumin (*Nigella sativa* L.): an overview. *International J of food science & technology* 2007; 42: 1208-18.
- Salem ML. Immunomodulatory and therapeutic properties of the *Nigella sativa* L. seed. *Int Immunopharmacol* 2005; 5: 1749-70.
- Szilasi M, Gálffy G, Fónay K, et al. A survey of the burden of allergic rhinitis in Hungary from a specialist's perspective. *Multidisciplinary respiratory medicine* 2012; 7: 49.
- Tamashiro E, Antunes MB, Palmer JN, et al. Implications of bacterial biofilms in chronic rhinosinusitis. *Braz J Infect Dis* 2009; 13: 232-5.
- Wienkötter N, Höpner D, Schütte U, et al. The effect of nigellone and thymoquinone on inhibiting trachea contraction and mucociliary clearance. *Planta medica* 2008; 74: 105-08.





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