

Review

Uses of *Nigella sativa* (Ranunculaceae): A Traditional Medicine

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ABSTRACT

Nigella sativa (Ranunculaceae) is an indigenous plant. This paper reports the therapeutic uses of *Nigella sativa* based on the available literature.

Key Words: *Nigella sativa*; Therapeutic uses; Medicine

Nigella sativa is commonly known as Kalwanji, Kalaunji, Kalonji and Kulaunji. Synonymous Latin binomials for this plant are: *Cuminum nigrum*, *Nigella indica* and *Nigella (N.) sativum*. *N. sativa* (Ranunculaceae) is a common indigenous plant which has been used for the treatment of many diseases. Its seed contains Nigellin - a bitter principle, metarbin, melanthin (Saeed, 1969), 2-methyl 4-isopropyl p-quinones (Ikram & Husain, 1978), anthraquinones, glycosides, saponins (Akhter, 1988), volatile oils, fixed oil, tannin, albuminous proteins, mucilage resins, and glucose etc. (Gheznabi, 1988).

Bukhari (1985) reported that Holy Prophet, Muhammad (Peace Be Upon Him) told "there exists, in the black grains, health and cure of all the diseases, except death. Black grain is black cumin *N. sativa* (Kalwanji)". Kalwanji has been used in pickles and for the treatment of stomach diseases since ancient times. In the Middle East its use was started only after the advent of Islam, (Gheznabi, 1988). This paper reviews therapeutic uses of *N. sativa*.

Actions and therapeutic uses

Abortifacient. Hot water extract of *N. sativa* in large oral doses causes abortion in human pregnant female. Abortion also results when whole seeds are swallowed in large doses. Its seeds and hot water extract are used as abortifacient in human pregnant female in Unani Medicine (Chopra *et al.*, 1949; Nayar, 1954; Saha *et al.*, 1961; Burkill, 1966; Lemordant, 1971; Malhi & Triredi, 1972; Vohora *et al.*, 1973; Oomachan & Khan, 1981; Bellakhder *et al.*, 1991).

Amenorrhea. Hot water extract of its plant or the dried seed as such are used orally for amenorrhea (Burkill, 1966; Zagari, 1993).

Antiimplantation effect. Its plant or powder when used

@ 500mg/kg has antiimplantation effect in pregnant rat (Seshadri & Pillai; 1981; Seshadri *et al.*, 1981). A dose rate of 200 mg/kg of its extract in 95% ethyl alcohol inhibits the ovulation in female rabbit (Vohora *et al.*, 1973).

Anthelmintic. Hot water extract or seed are used as oral anthelmintic in human adult (Al-Yahya, 1986; Zagari, 1993). Larvicidal activity has been reported against *Culex pipiens* when its ether extract is used @ 151.7 ppm (Gayar & Shazli, 1968). Its extract in ethyl alcohol-water (1:1) is highly effective against *Entameba histolytica* when a concentration of 125.0 mcg/ml is used (Dhar *et al.*, 1968). An extract of its dried seed in ethyl alcohol (95%) @ 40.0 mg/kg or seed @ 20.0 mg/kg have been used as anticestodal agents (Akhtar & Raffat, 1991).

Antibacterial agent. Its dried seed has the antibacterial effect against *Pseudomonas aeruginosa* when a concentration of 400 mcg/disc is used on agar plate (Hanafy & Hetem, 1991). Its water extract, hexane extract, pet ether extract or extract in 95% ethyl alcohol when used at a concentration of 10 mcg/ml on agar plate shows the weak activity against *Streptococcus pyogenes*, *Staphylococcus aureus*, *Streptococcus viridans*. (Naqvi *et al.*, 1991). While it is ineffective on agar plate when MIC is >3.0 mg/ml against *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Serratia marcescens*, *Staphylococcus aureus* and *Streptococcus faecalis*. Its pet ether extract is also inactive on agar plate when MIC is >3.0 mg/ml against *Enterobacter cloacae*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Serratia marcescens*, *Staphylococcus aureus* and *Streptococcus faecalis* (Tanira *et al.*, 1994).

Seed essential oil on agar plate is active against *Vibrio cholera* and *Shigella shiga* with MIC 50.0 mcg/ml, against *Shigella dysenteriae* and *Shigella flexneri* with MIC 100.0 mcg/ml and, against *Escherichia coli* and *Shigella flexneri* with MIC 200.0 mcg/ml (Rathee *et al.*, 1982; Ferdous *et al.*, 1992).

Several other gram +ve and -ve organisms are sensitive to essential seed oil (Toppozaha *et al.*, 1965). Its extract in diethyl ether at a concentration of 400 mcg/disc on agar plate is effective against *Staphylococcus aureus*, *Escherichia coli* (Ray & Majumder, 1976; Hanafy & Hatem, 1991) while ineffective against *Salmonella typhimurium*. Its acidic extract if made alkaline and then washed with dichloromethane has a strong antibacterial activity on agar plate when used @ 0.20 ml/disc against *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Salmonella gallinarum* and *Staphylococcus albus* (Desta, 1993).

Antifungal activity. Its essential oil is effective against *Colletotrichum capsici*, *Pythium vexans* and *Sclerotinia trifoliorum*; while seeds are ineffective against *Aspergillus flavus*, *Aspergillus niger*, *Geotrichum candidum*, and *Penicillium roquefortii* when a concentration of 2% is used on agar plate (Rathee *et al.*, 1982; Akgul & Kivane, 1988).

Antispasmodic. Hot water extract of seeds are orally used as antispasmodic in human adults in France (Perrot & Paris, 1971; Al-Yahya, 1986). Eighty per cent extract of dried seeds in ethyl alcohol when used orally have been reported to have antispasmodic activity (unspecified type) in human adult in Germany (Graeza, 1986).

Antitumor. Its extract in methyl alcohol has antitumor activity in mouse when given @ 10mg/kg intraperitoneally against Lymphoma-Dalton's, @ 50mg/kg I/P against Ca-Ehrlich-Ascites and @ 100 mg/kg externally against anthracene induced skin carcinogenesis and 20-methylcholanthrene induced soft tissue sarcomas (Salomi *et al.*, 1991, 1992).

Antiyeast activity. *Candida albicans* is sensitive to its bark when used @ 400 mcg/disc or its acid-ethyl alcohol @ 0.20 ml/disc on agar plate while, a MIC of >3.0mg/ml of its extract in 95% ethyl alcohol is ineffective against *Candida albicans* on agar plate (Hanafy & Hatem, 1991; Darta, 1998).

Asthma. Seed, hot water extract of dried seed, seed oil or decoction of plant are orally used for treatment of bronchial asthma in human adult (Zawahry, 1964; Bellekhter *et al.*, 1991; Zagari, 1993; Ghazanfar & Al-Sabahi, 1993; Al-Khalil, 1995).

CNS depressant activity. CNS depressant and neuroleptic activities have been reported in mouse when ethyl alcohol-water (1:1) extract is applied I/P @ 125.0 mg/kg (Dhar *et al.*, 1968).

Cytotoxic. Its extract in methyl alcohol exhibits cytotoxic activities in cell culture against Ca-Ehrlich-Ascites and Sarcoma-180 at IC50 1.5 mcg/ml, against Lymphoma-Dalton's at IC50 3.0 mcg/ml and inhibits DNA synthesis in Lymphoma-Dalton's at IC50 0.1 mcg/ml (Salomi *et al.*, 1992).

Diuretic. Hot water extracts are orally used as diuretic to provoke the urine and to stimulate the kidneys in human adult (Culpeper, 1950; Zawahry, 1964; Burkill, 1966; Jewvachdamrongkul *et al.*, 1982).

Emmenagogue. Seeds and hot water extract are given orally to increase the menstrual flow in human adult female (Chopra *et al.*, 1949; Nayar, 1954; Zawahry, 1964; Burkill, 1966; Suwal, 1970; Malhi & Trivedi, 1972). *N. sativa* is also used to induce menses in human adult female (Jochle, 1974). Commonly used for the said purpose in Unani Medicine (Vohora *et al.*, 1973; Razzade, 1980).

Galactagogue. Hot water extracts of *N. Sativa* seeds in India are used orally as galactagogue in human adult female (Zawahry, 1964; Burkill, 1966; Agrawala, 1968; Suwal, 1970); whereas, a weak galactagogue effect is produced in female rats when its ether extract is added in the ration @ 1.8% of diet. The weak galactagogue activity has been reported in female rats even when rations comprising 100% plants are used (Agrawala, 1968; Agrawala *et al.*, 1971).

Hemostatic activity. A mixture of *N. sativa*, *Commiphora myrrha*, *Ferula assa-foetida*, *Aloe vera* and *Boswellia serrata* (Olive oil extract) or pet ether extract possess the hemostatic activity in rat and rabbit when used in variable doses (Ghoneim *et al.*, 1982).

Hypertensive and hypotensive agent. Alkaloid fraction of its leaves, when administered through I/V route in dog, exhibited the hypertensive activity (Zawahry, 1964). Hypotensive activity has been reported in dog when its extract in 95% ethyl alcohol or ethyl alcohol-water (1:1) is given 50 mg/kg I/V (Zawahry, 1964; Dhar *et al.*, 1968).

Hypocholesterolemic activity. A hot water extract (containing *N. sativa*, *Commiphora myrrha*, *Ferula assa-foetida*, *Aloe vera*) given @ 0.5 gm/kg or 10 ml/kg through intragastric route in rat exhibited the hypocholesterolemic activity in streptozotocin or alloxan-induced hyperglycemia (Al-Awady & Shoukry, 1981; Eskandar *et al.*, 1995).

Lactation. In India, hot water extract of *N. sativa* is used orally in failure of lactation or seeds as such to increase the milk production in human adult female (Jain & Tarefdar, 1970; Zageri, 1993).

Plaque formation suppressant. Extract of *N. sativa* in methyl alcohol at IC₅₀ 20.0 mcg/ml suppresses the plaque formation of *Streptococcus mutans*. Similar results have been obtained with methyl alcohol-water (1:1) extract (Namba *et al.*, 1985).

Scabies. It is used to treat scabies in children. *Ixora coccinea* flowers plus *N. sativa* are used to prepare a medicated oil for treatment of scabies in human adult. *Cynodon dactylon* and *N. sativa* are applied in a paste made with coconut oil used externally to treat scabies in children (John, 1984).

Stomach ache. In Ethiopia, its seeds are chewed with leaves of Ruta and Garlic for the remedy of stomach ache in human adults (Kloos, 1977).

Stomachic/carminative. The decoction of the plant is used orally as stomachic in human adult (Al-Khalil, 1995). In Saudi Arabia, the decoction of the plant and hot water extract of its dried seed is used orally as carminative and digestive in human adult (Jewvachdamrongkull *et al.*, 1982; Al-Khalil, 1995).

Smooth muscle relaxant. Its essential oil has the smooth muscle relaxant effect on the trachea (ED₅₀=46.0 mg/l) and ileum (ED₅₀=74.0 mg/l) in guinea pig while ethyl alcohol extract has also been used as relaxant of intestine in rabbit (Zawahry, 1964; Reiter & Brandt, 1985).

Uterine stimulant. Uterine stimulant effect has been reported with hot water extract in non-pregnant guinea pig (Kapur, 1948).

Miscellaneous effects. Hot water extract of *N. sativa* is orally used as appetizer, antipyretic, antidiarrheal, diaphoretic, sudorific, vermifuge, for the treatment of paralysis, chronic coughs in human adults and abdominal pain in human child (Zawahry, 1964; Burkill, 1966; Al-Yayha, 1986; Yesilada *et al.*, 1995; Al-Khalil, 1995). Seeds are used as antifatulent, antiemetic, condiment, poison antidote, for the treatment of pulmonary catarrh, diabetes mellitus, tongue inflammation, influenza, paralysis, congestion, abdominal pain and various diseases (Fleurentin & Pent, 1982; Ansari *et al.*, 1988; Bellakhdar *et al.*, 1991; Al-Hader *et al.*, 1993; Desta, 1993; Ghazanfer & Al-Sabahi, 1993; Zagari, 1993).

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