

**BLACK CUMIN AS POTENTIAL ANTICANCER AGENT: A REVIEW****Jasvir Kaur^{1*}, Satvinder Kaur¹ and Geeta Aggarwal²**¹G.H.G Khalsa College of Pharmacy Gurusar Sadhar.²Delhi Pharmaceutical Sciences and Research University Delhi.Article Received on
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Corresponding Author*Jasvir Kaur**G.H.G Khalsa College of
Pharmacy Gurusar Sadhar.**ABSTRACT**

Black cumin (*Nigella sativa*) has been used for its medicinal properties for centuries. *N. sativa* is a flowering plant whose seeds are used in the form of spice. The seeds are known as black cumin in English, and 'Panacea' meaning 'cure all'; in Latin. The seeds are also known as Kalonji in local language. Seeds in Arabic are termed as 'Habbah Sawda' or 'Habbat el Baraka' meaning 'Seeds of blessing'. Seeds and oil of *N. Sativa* are used for medicinal purposes by Unani, Ayurveda and the Chinese system of medicine. Black cumin is also known to

have antihypertensive and anti asthmatics property other than anticancer activity. It can be used to control hyper cholesterol levels.

KEYWORDS: Black cumin, herbal anticancer remedy, N. Sativa uses, kalonji uses.

INTRODUCTION

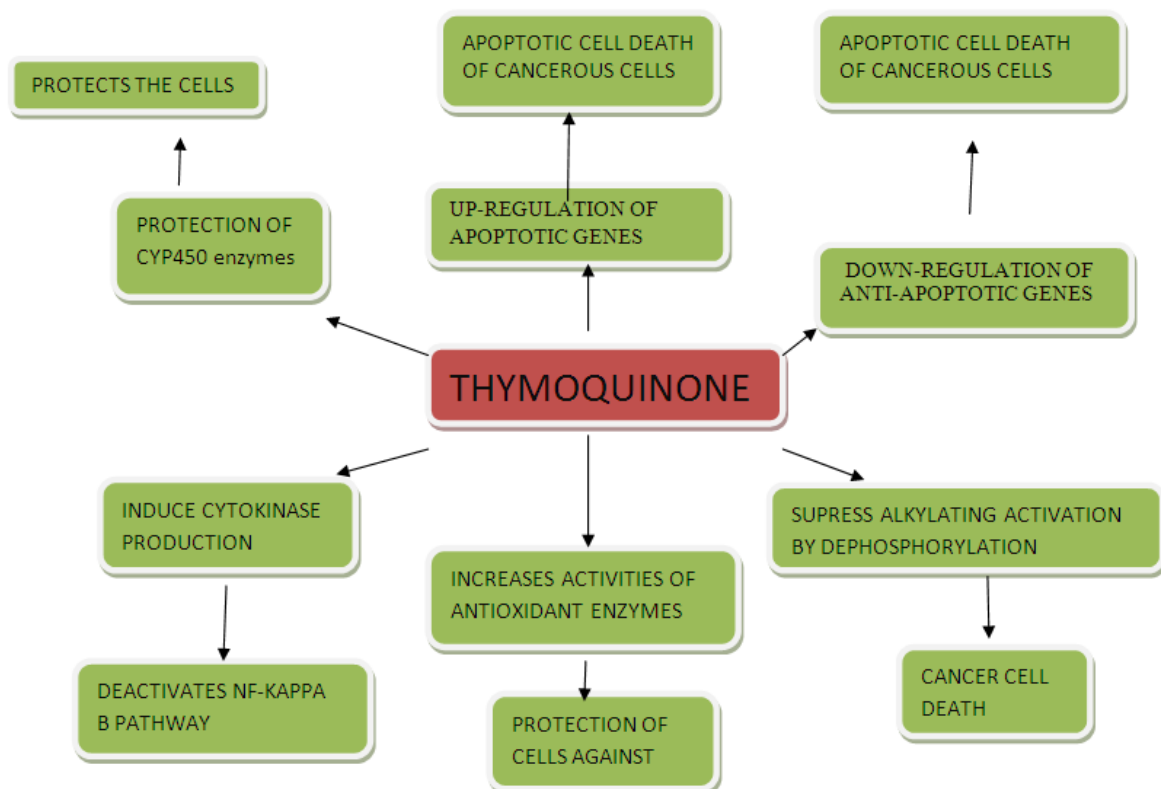
The seeds of black cumin have more than 100 medicinal components. Medically, Kalonji is used as anticancer agent, antiseptic and antioxidant agent. Since, it helps to cure many diseases and disorders and helps in developing the resistance of the body against various ailments, therefore, the seeds are termed as excellent healer. The medicinal activity of this miraculous plant is due to its chemical composition.

Active Ingredients of *N.sativa*: The seeds of *N. sativa* contain both fixed and essential oils, proteins, alkaloids and saponin.^[1,2] Four pharmacologically important components: thymoquinone (TQ), dithymoquinone (DTQ), thymohydroquinone (THQ), and thymol (THY) are quantified in the seeds and oil by HPLC. The biological activities of the seeds are mainly due to thymoquinone, the major component of the essential oil, which is also present in the fixed oil¹. TQ, is considered as potent anti-oxidant^[3], anti-carcinogenic and anti-mutagenic agent.^[4,5] TQ has been proved as a relatively safe compound for oral use.^[6] Alpha

(α)-hederin, a pentacyclic triterpene saponin isolated from the seeds of *N. sativa*, was also reported to have potent *in vivo* antitumor activity.^[7]



Mechanism of Action of Thymoquinone as Anticancer Agent



The active ingredients (mainly TQ) from *N. sativa* act on cancer cell to help to kill them by several molecular pathways. The following literature search has revealed the anticancer activities of *N. sativa* and some of its active compounds, such as thymoquinone and alpha-hederin.

Research Activities	Category in Which It Can BE Used
TQ exhibits anti-proliferative effect in human myeloblasticleukemia HL-60 cells. ^[8] Derivatives of TQ bearing terpene-terminated 6-alkyl residues were tested in HL-60 cells and 518A2 melanoma. ^[9] α -hederin induced death of murine leukemia P388 cells by a dose- and time-dependent increase in apoptosis. ^[7]	Blood Cancer
Aqueous and alcohol extracts of <i>N. sativa</i> were found to be effective <i>in vitro</i> in inactivating MCF-7 breast cancer cells. ^[10] <i>N. sativa</i> , in combination with melatonin and retinoic acid revealed to reduce the carcinogenic effects of DMBA (7, 12-di-methylbenz(a)anthracene) in mammary carcinoma of rats. ^[11] Terpene-terminated 6-alkyl residues of TQ were tested in MCF-7/Topo breast carcinoma. ^[9]	Breast Cancer
TQ has proved as anti-neoplastic and pro-apoptotic against colon cancer cell line HCT116. ^[12] Oil of <i>N. sativa</i> has been shown to exhibit the ability to inhibit colon carcinogenesis of rats in the post-initiation stage. ^[13] ➤ TQ has been proved as chemotherapeutic agent on SW-626 colon cancer cells, in potency, which is similar to 5-fluorouracil in action. ^[14]	Colon Cancer
TQ has been shown to induce apoptosis and inhibit proliferation in PDA (pancreatic ductal adenocarcinoma) cells. ^[15] TQ also can abrogate gemcitabine- or oxaliplatin-induced activation of NF-kappa B, that result into chemosensitization of pancreatic tumors. ^[16] Down-regulatory effect of TQ has been evaluated on MUC4 in pancreatic cancer cells. ^[17]	Pancreatic Cancer
The cytotoxic activity of <i>N. sativa</i> seed was tested on the human hepatoma HepG2 cell line. ^[18] ➤ Oral administration of TQ is reported to be effective in increasing the activities of quinine reductase and glutathione transferase that makes it a promising prophylactic agent against chemical carcinogenesis and toxicity in hepatic cancer. ^[19]	Hepatic Cancer
Antitumor activity of α -hederin from <i>N. sativa</i> has been studied against LL/2 (Lewis Lung carcinoma) in BDF1 mice. ^[7] Supplementation of diet with honey and <i>N. sativa</i> has a protective effect against MNU (methylnitrosourea)-induced oxidative stress, inflammatory response and carcinogenesis in lung. ^[20]	Lung Cancer
Topical application of <i>N. sativa</i> extract inhibited two-stage initiation/promotion [dimethylbenz[a]anthracene (DMBA)/croton oil] skin carcinogenesis in mice. ^[21]	Skin Cancer
Chemo-preventive effect of <i>N. sativa</i> has been studied against ferric nitrilotriacetate (Fe-NTA)-induced renal oxidative stress, hyper-proliferative response and renal carcinogenesis. ^[22]	Renal Cancer
TQ, from <i>N. sativa</i> , has been proved to inhibit DNA synthesis, proliferation, and viability of cancerous but not non-cancerous prostate epithelial cells by down-regulating AR (androgen receptor) and E2F-1 (a transcription factor). ^[23] A study shown that TQ can block angiogenesis <i>in vitro</i> and <i>in vivo</i> , prevented tumor angiogenesis in a xenograft human prostate cancer model in mouse, and inhibited human prostate tumor growth at low dosage with almost no chemotoxic side effects. ^[24]	Prostate Cancer
Methanol, n-Hexane and chloroform extracts of <i>N. sativa</i> has been reported to be effective to kill HeLa (human epithelial cervical cancer) cells by inducing apoptosis. ^[25] Terpene-terminated 6-alkyl residues of TQ has been tested on multidrug-resistant KB-V1/Vb1 cervical carcinoma and found to induce cell death by apoptosis. ^[9]	Cervical Cancer

OTHER USES OF *N.sativa*

- It diminishes the risk of atherosclerosis by decreasing the serum LDL cholesterol level and by increasing the serum HDL cholesterol levels.^[26,27]
- It can be used to control diabetes by decreasing morphological changes and preserving pancreatic beta-cell integrity^[28] and by changing the hepatic enzyme activities.^[29]
- It is effective as antihypertensive agent.^[30,31]
- It has a potent antihistaminic effect on airways of asthmatic patients.^[32]

CONCLUSION

In this era of herbal medicines many investigators now believe that traditional medicines are safe and promising source of new therapeutics against cancer. Although anti-cancer activities of *N. sativa* components were recognized thousands of years ago but proper scientific research with this important traditional medicine is a new area of research. As it is a safe and promising anticancer agent so, investigation of the active ingredients is required, because, there are very few authentic reports about the chemical composition of *N. sativa*. Also, the exact molecular mechanisms of thymoquinone and other components on different cancers should be investigated. However extensive research on *N. sativa* may contribute to the discovery of cheapest and safest anticancer strategies.

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