



Effects of black seed (*Nigella sativa*) on metabolic parameters in diabetes mellitus: A systematic review



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KEYWORDS

Nigella sativa;
Diabetes mellitus;
Glucose status;
Lipid profile

Summary

Background: Current evidence indicated beneficial effects of some medicinal herbs on metabolic parameters. *Nigella sativa* is an example of herbs which can ameliorate metabolic factors in diabetes mellitus. Despite several narrative review studies on medicinal properties of NS, it seems that there is no systematic review to summarize effects of NS on glucose homeostasis and lipid profile in diabetes mellitus. Therefore, the aim of present study was to review effects of *N. sativa* on metabolic parameters in diabetes mellitus.

Methods: Pubmed, Science Direct, Google scholar and Springer databases were searched from 1995 till January 2014. Key words were included: *N. sativa*, black seed, diabetes, glucose level, lipid and insulin. Searching was limited to articles with English language. Review articles, case reports, abstract in symposium and congress, studies on *N. sativa* mixed with other plants were excluded. Based on critically appraise, eligibility of included articles were evaluated.

Results: Finally 19 eligible articles (2 human trials, 14 animal models and 3 *in vivo/in vitro* studies) were selected. They indicated that *N. sativa* can modulate hyperglycemia and lipid profile dysfunction with various potential mechanisms including its antioxidant characteristics and effects on insulin secretion, glucose absorption, gluconeogenesis and gene expression. Some studies compared effects of various types (extract, oil, powdered) of *N. sativa* with each other and they reported different characteristics with various types of black seed.

Conclusion: *N. sativa* can improve glycemic status and lipid profile in diabetes models. However, more clinical trials are necessary to clarify beneficial effects of *N. sativa*, its effective type and dosage for diabetes management and its complications.

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Contents

Introduction	276
Article selection	276
Summary of studies and potential mechanisms	276
Human studies	276
Animal studies	279
<i>In vivo/in vitro</i> studies	279
Future prospects	280
Conclusion	280
Conflict of interest	281
References	281

Introduction

Diabetes mellitus (DM) is a global health concern characterized by impairment in insulin secretion or insulin action. According to an International Diabetes Federation (IDF) report, the prevalence of diabetes was 171 million in 2001 and it is expected to increase to 366 million by 2030.¹ Following the metabolic dysfunction in DM, the risk of developing cardiovascular diseases, dyslipidemia, infection, morbidity and mortality can increase.^{2,3} For controlling diabetes, various treatments including diet, life style changes, biochemical and herbal medicine in combine or alone have been used.^{4,5} Many populations consume complementary and alternative medicine and there is high tendency to use medicinal herbs for diabetes treatment in worldwide.⁶ Due to side effects of some chemical drugs and high tendency of people to consume medicinal herbs, World Health Organization (WHO) persuades researchers to study efficacy and side effects of medicinal herbs with potential therapeutic properties.⁷

Current evidence indicated beneficial effects of some medicinal herbs such as *Urtica dioica*, *Trigonella foenum* and *Nigella sativa* (NS) for controlling glucose level and lipid profile in diabetes models.^{8–10} NS or black seed is one of the medicinal plants with anti-hyperglycemia and anti-hyperlipidemia characteristics.¹¹ It is a plant of Ranunculaceae family which grows widely in many Middle Eastern countries. Its seed colored black and tastes bitter.¹² *N. sativa* has various chemical components including thymoquinone (TQ), unsaturated fatty acids, flavonoids, nigellone, p-cymene and carvone. It is used in traditional medicine in different forms (powder, extract and oil).^{12,13} Evidence indicated many medical characteristics of *N. sativa* including antimicrobial, anti-inflammatory and antioxidative effects.^{14,15} Also anti-diabetic effects of black seed have been reported in several studies.^{16–18} Despite several narrative review studies on medicinal properties of NS, it seems that there is no systematic review to summarize glucose homeostasis and lipid profile effects of NS in diabetes mellitus. Therefore, the aim of present study was to evaluate effects of *N. sativa* on glycemic status and lipid profile in DM.

Article selection

We searched databases of Pubmed, Science Direct, Google scholar and Springer from 1995 till January 2014. Key words were selected based on Mesh terms. They were included: “*N. sativa*” or “black seed” or “black cumin” and “diabetes”, “glucose level”, “lipid”, and “insulin”. Also we hand searched references of articles. Two reviewers extracted data independently, and then titles and abstracts of each article were assessed to delete duplication data. Any irrelevant papers were excluded. The remaining articles were reviewed to determine compatibility with the inclusion criteria. Searching was limited to articles with English language. Review articles, case reports, abstract in symposium and congress, articles about effects of NS mixed with other plants were excluded. After critical appraise of articles, 19 articles were selected (Fig. 1). Characteristic of studies have been summarized in Table 1.

Summary of studies and potential mechanisms

Studies were classified into three groups: human, animal and *in vivo/in vitro* studies.

Human studies

Based on the criteria, two human studies were found.^{16,17} Kaatabi et al. evaluated different dosages of NS (1, 2 and 3 g/day) in patients with type 2 diabetes. They reported that 1 g/day NS increased high-density lipoprotein cholesterol (HDL-c) levels after 12 weeks. Two and 3 g/day of black seed significantly decreased serum levels of total cholesterol (TC), triglyceride (TG) and low-density lipoprotein cholesterol (LDL-c) and increased HDL-C concentration. Increasing dosage from 2 to 3 g/day did not indicate higher improvement in lipid profile status.¹⁶ Also Bamosa et al. demonstrated that only 2 g/day NS seed decreased fasting blood sugar (FBS), 2 h postprandially glucose (2-hPG), glycosylated hemoglobin (HbA1c) and insulin resistance without any renal or hepatic side effects in patients with type 2 diabetes after 3 months.¹⁷

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