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Abstract

Nigella sativa—A Promising Source of Bioactive Compounds with Beneficial Effects in CVD †

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Abstract: Introduction: Cardiovascular diseases (CVD) continue to be the major cause of morbidity and mortality worldwide, despite socioeconomic status [1]. Plant bioactive compounds are studied as complementary therapies in CVD. Among natural products, *Nigella sativa* and its bioactive compounds or derived products proved their efficacy against multiple cardiovascular risk factors through its antioxidant capacity, antihypertensive, hypolipidemic, or anti-atherosclerotic effects [2–6]. Therefore, this study aimed to evaluate the *Nigella sativa* oil (*N. sativa* oil) effect using an in vivo model of induced myocardial infarction with isoproterenol in rats. **Materials and Methods:** *N. sativa* oil was characterized for its bioactive compounds using Fourier-transform infrared spectroscopy (FTIR), Liquid chromatography-mass spectrometry (HPLC-MS), and gas chromatography-mass spectrometry (GC-MS) analysis. Thirty rats were divided into three groups as follows: the control group (saline solution), the isoproterenol group (45 mg/kg), and *N. sativa* oil group (isoproterenol—45 mg/kg and *N. sativa oil* 0.4 mL/100 g). Myocardial infarction was induced on the 14th day of the experiment. Electrocardiography was performed at the beginning and after one day from infarct induction. Serum analysis was evaluated using biochemical evaluation like alanine aminotransferase (ALT), aspartate aminotransferase (AST) and the myocardial fraction of creatine kinase (CK-Mb). The inflammatory status was evaluated by measuring tumor necrosis factor-alpha (TNF-α), interleukin-6 (IL-6), and interleukin-1β (IL-1β) inflammatory cytokines. **Results:** *N. sativa* oil was rich in flavonoids, thymol derivatives α-thujene, p-cymene, α-pinene, and thymoquinone. Administration of *N. sativa* oil had a significant effect in reducing ventricular conduction while preventing isoproterenol cardiotoxic effects in the ventricular myocardium. Also, *N. sativa* oil administration significantly decreased the levels of pro-inflammatory cytokines when compared to the isoproterenol group. The levels of CK-Mb were as well significantly reduced. **Conclusions:** The anti-inflammatory and cardioprotective effects of *N. sativa* oil in the isoproterenol-induced experimental myocardial infarction indicate its potential use in human diets with promising applicability in the control of several associated CVD risk factors.

Keywords: *Nigella sativa* oil; isoproterenol; myocardial infarction

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References

1. World Health Organization Cardiovascular Diseases. Available online: https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1 (accessed on 11 May 2022).
2. Pop, R.M.; Trifa, A.P.; Popolo, A.; Chedea, V.S.; Militaru, C.; Bocsan, I.C.; Buzoianu, A.D. *Nigella sativa*: Valuable perspective in the management of chronic diseases. *Iran. J. Basic Med. Sci.* **2020**, *23*, 699. [PubMed]
3. Tiji, S.; Benayad, O.; Berrabah, M.; El Mounsi, I.; Mimouni, M. Phytochemical Profile and Antioxidant Activity of *Nigella sativa* L. Growing in Morocco. *Sci. World J.* **2021**, *2021*, 6623609. [CrossRef] [PubMed]
4. Asgary, S.; Ghannadi, A.; Dashti, G.; Helalat, A.; Sahebkar, A.; Najafi, S. *Nigella sativa* L. improves lipid profile and prevents atherosclerosis: Evidence from an experimental study on hypercholesterolemic rabbits. *J. Funct. Foods* **2013**, *5*, 228–234. [CrossRef]
5. Dehkordi, F.R.; Kamkhah, A.F. Antihypertensive effect of *Nigella sativa* seed extract in patients with mild hypertension. *Fundam. Clin. Pharmacol.* **2008**, *22*, 447–452. [CrossRef] [PubMed]
6. Majdalawieh, A.F.; Yousef, S.M.; Abu-Yousef, I.A. Thymoquinone, a major constituent in *Nigella sativa* seeds, is a potential preventative and treatment option for atherosclerosis. *Eur. J. Pharmacol.* **2021**, *909*, 174420. [CrossRef] [PubMed]