The Effects of Nigella Sativa Seeds and Honey Mixture on Lipid Profile: Gender Comparison

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ABSTRACT

This study attempts to investigate the effect(s) of a mixture of Nigella sativa seeds (N. sativa; black cumin or fennel) and honey on males and females in modulation of lipid profile. Seventeen males and twenty-eight females were assigned into two groups, healthy and hypercholesterolemic subjects. They were supplemented with N. sativa seeds and honey mixture at 50 mg/kg of body weight daily for three months. Results showed the male subjects with hypercholestrolemic evidenced significant reductions in total cholesterol (TC) and also increased in HDL-c, whereby female subjects with hypercholestrolemic revealed reduction in triglyceride (TG) and an increased in HDL-c. The results provided practical implications of N. sativa seeds and honey mixture on both genders. Overall, these findings suggest that a mixture of N. sativa seeds with honey has beneficial effects in lowering the lipid profile of the hypocholesterolemic subjects, thus perhaps aiding the maintenance of health by lowering cardiovascular disease risk factors.

KEYWORDS: Hypercholesterolemia, Total Cholesterol, Triglyceride, Cardiovascular Disease, Risk Factors, Gender.

INTRODUCTION

Cardiovascular disease (CVD) is an endemic and chronic human disease that over the past century has remained a common health problem globally [3]. According to World Health Organization [26], it is estimated that 17.1 million people died in 2004 from CVD and that this rate will increase to 23.4 million by 2030. Hence, CVD remains a leading cause of death in both developed and developing countries [7]. By 2020, it is expected to be the main cause of morbidity and mortality in most developing countries [4].

In recent years, CVD is a leading killer in both men and women [22]. In [16] reported that CVD contributed higher mortality in male. In 2012, in [20] mentioned by far CVD caused the largest mortality in females. However, in [21] claimed CVD is the common disease that caused death in both male and female. Most of the common risk factors of CVD increase with age in both genders [20]. The reason could possibly due to sex hormones, estrogen and testosterone. This is due to the aging process itself, which has caused the physiological changes in human metabolism and also changes in blood vessel walls that result in atherosclerosis development. In addition, gender differences shown a certain CVD risk at the same age between a male and premenopausal female. However, the risk increases in female after menopause due to the lack of ovarian hormone secretion that caused CVD risk development such as hypercholesterolemia, hypertension, obesity and diabetes [1].

According to [5], CVD is a preventable disease and it can be prevented through lifestyle changes, particularly in modulation of CVD risk factors. Thus, in regards to the present study, the modifiable CVD risk factor has been studied in both male and female is lipid profile which consists of TC, TG, HDL-c and LDL-c. It has been noted that if a person has too much lipids in the blood (hyperlipidemia), it leads to the development of coronary heart disease (CHD) [10]. Hypercholesterolemia is due to rise in LDL-c or dyslipidemia and low in HDL-c are major risk factors contributing to the cardiovascular diseases [9, 11, 25]. Therefore, by modulating the lipid profile in the blood is an important way to prevent the CVD occurrence. In [12] demonstrated that reduction in TC reduced the incidence of cardiac events and high level in HDL-c is associated with CVD protection due to anti-inflammatory and antioxidant activities [17].

The use of natural supplements for disease management is both commonly practiced and gaining more attention. Thus, this study focused on the benefits of natural remedies in N. sativa seeds and honey mixture on modification of CVD risk factors, especially to reduce the level of lipid profile. The seeds of N. sativa contain both fixed and volatile oils [6, 8]. They are also rich sources of unsaturated fatty acids and quinones, especially thymoquinone [2, 14]. N. sativa seeds have also been shown to improve blood lipid profile in human studies [15,
Similarly, other human studies have reported that honey possesses beneficial effects on CVD risk factors on blood lipid profile [18, 27]. Honey has also demonstrated lipid-lowering actions that probably due to the activity of antioxidants in honey to control lipid metabolism [19].

In most studies, favourable effects derived from N. sativa seeds and honey have been reported separately. No research has been attempted on the effects of a mixture of N. sativa seeds and honey in hypercholesterolemic subjects as a secondary intervention on gender. Therefore, it was anticipated that the present study would provide robust evidence in support of N. sativa seeds and honey in combination as a health supplement to both male and female.

**METHODOLOGY**

**Subjects Selection**

Forty-five male and female subjects were enrolled in this study. All subjects were provided with full disclosure via a subject information sheet. Inclusion criteria for healthy subjects were as follows; twenty-five to fifty-eight years of age and no chronic diseases such as hypothyroidism, diabetes mellitus, gastrointestinal disorders, renal impairment or cardiac problems, not taking medications (lipid-lowering drugs, anti-diabetic, aspirin), not taking any dietary supplements, not vegetarian, not a vigorous exerciser (no more than three times for thirty minutes vigorous sessions per week), not pregnant or lactating, not a heavy smoker (< 10 cigarettes per day), not a blood donor for at least three months, not planning to lose body weight and not participating in any clinical trial for the last three months. This study was approved by the Universiti Malaysia Terengganu Committee of Research which following the university’s ethical standards for human trials.

**Study Design**

An eligible subject provided a written informed consent form prior to initiating the trial, and each participant was screened by a Health and Lifestyle Questionnaire. Baseline data for all participants was taken at the first visit. Subjects were categorized into two groups: (1) a group of healthy subjects supplemented with a paste mixture of N. sativa seeds and honey (male, n = 9; female, n = 13); and (2) a hypercholesterolemic supplementation group (hypercholesterolemia, male, n = 8; female, n = 15), all of whom were supplemented with the paste mixture of N. sativa seeds and honey. Subjects were required to consume the supplement daily according to the dosage as instructed for three months (50 mg/kg of body weight). There is no placebo was used for the control group where it was too difficult to mimic the unique taste and aroma of the paste. During the supplemental period, subjects were advised to maintain their usual daily lifestyles. Each participant was followed-up monthly to remind them to consistently consume the paste as instructed.

**Data Collection and Measurements**

Blood collection was carried out in the morning after an overnight fasting of at least 10 hours. About 40 µL of whole blood was collected by using a capillary blood collector to determine total cholesterol (TC), triglycerides (TG), high density lipoprotein-cholesterol (HDL-c), and low density lipoprotein-cholesterol (LDL-c) by using Lipid Panel Test Strips with the auto CardioChek P™ Analyzer (Polymer Technology System, USA). The final data was collected during the second visit during which subjects were required to return the remaining paste mixture, which was then weighed as a measure of compliance. Subjects who consumed less than 90% of the provided supplement were excluded from the final analysis. Of the forty-five subjects recruited, data from forty-one was used for the final analysis.

All data were statistically analyzed with SPSS software version-18. A paired sample t-test and variance analytics (one-way ANOVA) were applied. Data was presented with a mean (SD). In all cases, the ‘P’ value ≤ 0.05 was taken to indicate a significant effect.

**FINDINGS AND DISCUSSION**

Based on the amount of returned N. sativa seeds and honey mixture paste for the supplemented groups, compliance was high, at 98.8%. In addition, no adverse effects were reported by participants. Table 1 shows the effects of supplementation on the lipid profiles according to gender for all the groups at the end of the study’s intervention.
A study shows the *N. sativa* seeds and honey mixture had pronounced effects on blood lipid profiles among hypercholesterolemic group compared to healthy group. The consumption of *N. sativa* seeds and honey mixture had shown a reduction in total cholesterol (TC) among hypercholesterolemic subjects. However, males had more favourable effects compared to female in TC reduction. The supplementation showed a significant reduction ($p = 0.005$) of TC in males by 9% compared to 6.4% in females. In agreement with the present study, a study done by [13] found that blood lipid profile improved in male hypertriglyceridemic subjects than females in response to consumption of oil with medium- and long-chain triglycerides after two months. Interestingly, after three months of study, results had shown that health benefits of both genders among healthy subjects had been maintained TC at normal level after consumption of *N. sativa* seeds and honey mixture.

The present findings seem to be consistent in females for both supplementation groups whereby significant reductions of triglycerides (TG) were observed. This could be due to a protective effect of endogenous estrogen in females. The level of estrogen in female subjects are still high due to the mean age in both groups are less than 39 years. In 2011, in [21] reported that estrogens affect multiple functions in the cardiovascular system including regulation of synergistic pathways that are involved in development of CVD risk factors. The lowering in TG in both supplementation groups might be due to the effect of nigellamines in *N. sativa* seeds. In addition, it is noted that healthy supplementation group showed a significant HDL-c increment in females only, while in hypercholesterolemic supplementation group, both females and males revealed a significant HDL-c improvement in response to *N. sativa* seeds and honey mixture. The present findings had provided important implications of health benefits associated with consuming *N. sativa* seeds and honey mixture in modulating the CVD risk factors in terms of lipid profile.

**CONCLUSION AND RECOMMENDATIONS**

The present results shown more significant cardioprotective effect based on lipid profile modulation for both genders among hypercholesterolemic subjects as compared to healthy subjects. Thus, it clearly suggesting that *N. sativa* seeds and honey mixture had a positive action in CVD management. This is an important finding for further research whereby it might be possible to use a different dosage of *N. sativa* seeds and honey mixture to identify the optimum dose at which the mixture could lower the lipid profile efficiently in order to prevent further CVD events.

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