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Original paper

The Protective Effect of Nigella Sativa Oil on Connective Tissue Inflammation Due to Chemotherapy in Rats

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Abstract

Background and aim: Animal studies have shown that Nigella Sativa oil can accelerate the wound healing process. The aim of this study was to evaluate the preventive effect of Nigella Sativa oil on the connective tissue inflammation in rats undergoing chemotherapy.

Materials and methods: In this animal-experimental model, 32 rats were divided into the control and the treatment groups. The treatment group was pretreated by 400 micro l/kg NS oil once a day for 15 days then both groups received chemotherapy. The injections of the treatment group were continued throughout twelve days. All rats were euthanized 12 days later then their buccal mucosa was assessed histopathologically.

Results: Our results showed that the connective tissue inflammation score in the treatment group was significantly lower than the control group.

Conclusion: According to our finding, pretreatment with Nigella sativa has some therapeutic effect on stomatitis due to chemotherapy in rats.

Keywords: *Nigella Sativa, Chemotherapy, Mucositis*

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Introduction

Nigella Sativa (NS) commonly known as black seed or black cumin is an annual flowering plant in the Ranunculaceae family native to the eastern Mediterranean region and southwest Asia [1]. Most of the reported pharmacological properties of NS have been shown to be associated with the presence of thymoquinone the major bioactive constituent of plant seeds [2]. Disruption of the mucosal integrity and impaired epithelial cell maturation following chemotherapy result in mucosal ulcer formation thus make patients uncomfortable. Mucositis is the inflammation of mucous membranes of the mouth that appears clinically as pain, redness, edema, and ulceration of the mucous membranes [3]. Anticancer treatments are believed to be the main leading cause of oral mucositis [4-5]. Therefore, it would have been a great help if we could find out a drug as a treatment for this complication. According to several previous studies during the recent decades and based on some proved therapeutic properties of NS including anti-microbial, anti-inflammatory and antioxidant, we can guess this plant may have some preventive effects in chemotherapy-induced oral mucositis [6-7]. This study aimed at investigating the preventive effect of Nigella Sativa oil on connective tissue inflammation due to chemotherapy in rats.

Materials and Methods

In this animal-experimental model, 32 rats were divided into the control and the treatment groups. The treatment group was injected with 400 micro l / kg NS oil once a day for 15 days
then both groups were received 100 and 65 mg/Kg 5-fluorouracil on days 1 and 3, respectively. [8] The treatment group was given NS during the study period. Rats were euthanized by deep anesthesia on day 12, and the left cheek pouch mucosa was removed for histopathological analysis. Analysis of variance (ANOVA) using the Kruskal-Wallis test, followed by Mann Whitney multiple comparisons test, was used to compare data from the various groups. The data were analyzed using SPSS software.

Results

Mann-Whitney test showed a significantly higher inflammatory scale for the control group connective tissue than the treatment group (u=10.968, p=.004) (Figure 1).

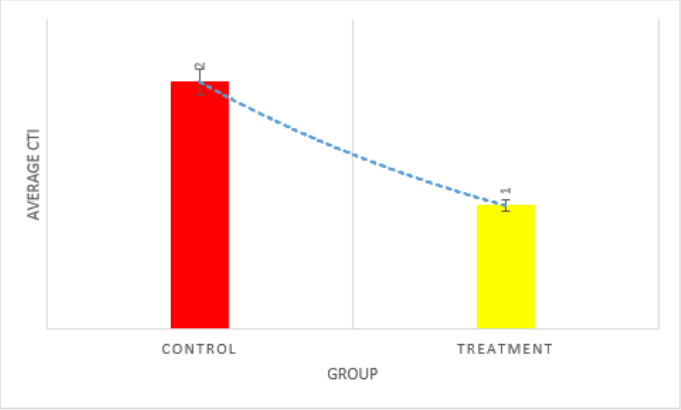

Fig. 1. The difference of average severity of connective tissue inflammation between the control and the treatment group ($p<0.05$).

Discussion

In this research, we found that NS oil administration can significantly reduce the amount of inflammatory infiltration. Some experimental research has confirmed the anti-inflammatory activity of NS [9, 10].

One possible mechanism by which NS exerts its anti-inflammatory effect is linked to the inhibition of both cyclooxygenase and lipoxygenase pathways [11]. Also, the anti-inflammatory and antioxidant effect of N.S oil can enhance its phagocytic activity, so it can play a significant therapeutic role in fighting against microorganisms [10]. Moreover, many studies have shown that reactive oxygen species (ROS) inhibition may successfully ameliorate inflammation induced by mucositis [12]. On the other hand, a broad range of antioxidant properties of NS has been shown by numerous studies. The antioxidant properties of this plant have mostly linked to the presence of thymoquinone and carvacrol. However, more detailed studies are needed to uncover the exact mechanism of Nigella sativa function and its therapeutic effect on chemotherapy-induced oral mucositis.

Conclusion

According to our finding, pretreatment of rats with NS has some therapeutic effects on oral inflammation due to chemotherapy.

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Conflict of interests

The authors declare that there is no conflict of interests.

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