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Herbal treatment of allergic rhinitis: the use of *Nigella sativa*☆

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Abstract

Background and aims: Allergic rhinitis is the most common chronic and allergic disease, especially in children. This study aimed to investigate the anti-inflammatory effects of *Nigella sativa* and its effects on inflammatory factors in patients with allergic rhinitis symptoms and the process their clinical study charges.

Setting: The present study is a clinical trial that conducted as prospective and double blind with descriptive analytic.

Materials and methods: The sample included 66 patients (case and placebo) with allergic rhinitis exposed to *N. sativa* oil. Individual characteristics, including age and sex, and characteristics of the disease, including nasal congestion, runny nose, itchy nose, and sneezing attacks, were evaluated. From the start of the study, that is, day 0, up to the end of the study, that is, day 30, an observer completed the symptoms severity questionnaire.

Statistical analysis: Data were presented as means ± SEM. Comparisons between groups were performed by using paired Student *t* test. Differences were considered significant if *P* values are less than .05 and .01.

Results: In the present study, 66 patients with allergic rhinitis, including 22 males (33.3%) and 44 females (66.7%) with a mean age of 47.19 years, were included. Immunoglobulin E total of more than 100 was reported in 38 patients before treatment. Immunoglobulin E in nasal wash from 7 patients was observed and was not measurable in 59 cases. Only 6.1% of the study population had nasal mucosal eosinophil.

Conclusion: The results show that *N. sativa* could reduce the presence of the nasal mucosal congestion, nasal itching, runny nose, sneezing attacks, turbinate hypertrophy, and mucosal pallor during the first 2 weeks (day 15). The present findings are consistent with evidence that the antiallergic effects of *N. sativa* components could be attributed to allergic rhinitis. Moreover, *N. sativa* should be considered for treating allergic rhinitis when the effects of other antiallergic drugs need to be avoided.

1. Introduction

Allergic rhinitis is the most common chronic and allergic disease, especially in children, and its prevalence in the communities is increasing due to industrialization [1]. The prevalence has been reported from 1.4% to 39.7% in different Western countries, and in England, it increased 4 times during the previous 30 years, in which the cause is not clearly known [2,3]. The reported prevalence in our country includes the wide spectrum ranging from 7.2% to 23.6% [4–6]. The disease develops due to increased inflammatory cells such as neutrophil, eosinophil, and basophil and mast cell [7]. The signs and symptoms of this disease include stimulation of mucous glands, vasodilatation, increased vascular permeability, and stimulated mucus that themselves are responsible for

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creating typical symptoms such as itching, sneezing, rhinorrhea, and nasal congestion [8]. Allergens that usually caused allergic rhinitis include 2 seasonal and permanent categories that divided mainly to the pollen group, and the second group includes plants Mayt, mold, animal particles, and cockroach particles [9]. Treatment of seasonal allergic rhinitis usually is done by a histamine receptor antagonist, sympathomimetic, and corticosteroids [10].

Considering the growing importance of research that works on the effects of treatment plants and stuck them in the treatment of the diseases, this study aimed to investigate the anti-inflammatory effects of *Nigella sativa* and its effects on inflammatory factors in patients with allergic rhinitis symptoms and the process their clinical study charges.

2. Materials and methods

2.1. Study design and population

The present study is a clinical trial that conducted as prospective and double blind with descriptive analytic. The sample included 66 patients (case and placebo) with allergic rhinitis referred to ear nose and throat clinic of Imam Khomeini Hospital, Ahwaz, during the years 2007 to 2009 and were exposed to *N. sativa* oil. The study was approved by the University Hospital and Ahvaz Jundishapur University of Medical Sciences Ethics Committees, and all subjects provided informed consent to participate.

2.2. Exclusion criteria

All patients who had a previous history of major psychiatric illness, current dependence on drugs like sedatives or hypnotics, as well as cardiac and liver diseases were excluded.

2.3. Patient evaluation and data collection

Individual characteristics, including age and sex, and characteristics of the disease, including nasal congestion, runny nose, itchy nose, and sneezing attacks, were evaluated. Laboratory features including nonspecific serum IgE, IgE from nasal mucosa wash, serum eosinophil, and nasal mucosa before and after treatment were observed. The selected patients were enrolled, and data and progress of patients were recorded. From the start of the study, that is, day 0, up to the end of the study, that is, day 30, an observer completed the symptoms severity questionnaire.

2.4. Clinical evaluation

Before treatment, patients symptoms including nasal congestion, sneezing attacks, and nasal itching in 4 levels (0 = no symptoms, 1 = mild, 2 = moderate, 3 = severe) were evaluated and recorded in a questionnaire [11]. The patient's condition was evaluated every 2 weeks and at end of treatment (after 4 weeks) and recorded in the same questionnaire. The eosinophil measurement from nasal mucosa epithelium with eosinophil to calm lower frontal turbinate and then to be collected by a swap method was performed. Nasal smear for eosinophil classification–based method was set. Methods used are as follows: 0 = no cells, + = low eosinophil or small clump, 2+ = average or large clump, 3+ = much larger but all fields are not filled, and 4+ = all fields are filled. When the number of eosinophil cells in the 2 high-powered field is considered, 10 or more cells positive for these cells are seen (<+2) [12]. Nasal mucosa IgE measurement is as follows: nasal mucosa epithelium was washing by 10-mL syringe washing and 40 mL of solution in test tube to collect the wash by normal saline solution; serum 9/0% is done [13].

2.5. Preparation of N. sativa extract

N. sativa oil from a Gorgan plant extract was purchased from Gorgan Co Ltd (Gorgan, Iran). The obtained oil (0.5 mL) was filled in the empty capsules and was kept in the refrigerator for short time before consumption.

2.6. Statistical analysis

Data were presented as means ± SEM. Comparisons between groups were performed by using paired Student *t* test on a Statistical Software Package (SPSS, Chicago, IL). Differences were considered significant if *P* values are less than .05 and .01.

3. Results

In the present study, 66 patients with allergic rhinitis, including 22 males (33.3%) and 44 females (66.7%) with a mean (SD) age of 20.81 (7.27) years, were included. From the total sample, 3 patients from the case group and 4 subjects from placebo were excluded from the study because they refused to complete the study. The age distribution of the patients in the study group is shown in Fig. 1. Immunoglobulin E total of more than 100 was reported in 38 patients before treatment. Immunoglobulin E in nasal wash from 7 patients was observed and was not measurable in 59 cases. Only 6.1% of the study population had nasal mucosal eosinophil.

The total serum IgE means before treatment in the study and placebo groups were 201.9890 and 179.0392, and in the end of the treatment, they were 205.30212 and 194.42408, respectively. The individual differences in the study and placebo groups were not statistically significant (P = .828, P = .608; Fig. 2). The averages of IgE from nasal wash in the study group before treatment and at the end of treatment were 0.45 and 0. 06, respectively, which shows no statistically significant difference (P = .0017; Fig. 3). The averages of IgE from nasal wash in the placebo group before treatment and at the end of treatment were 0.51 and 0.23, respectively, which also shows no statistically significant difference (P = .455; Fig. 3).

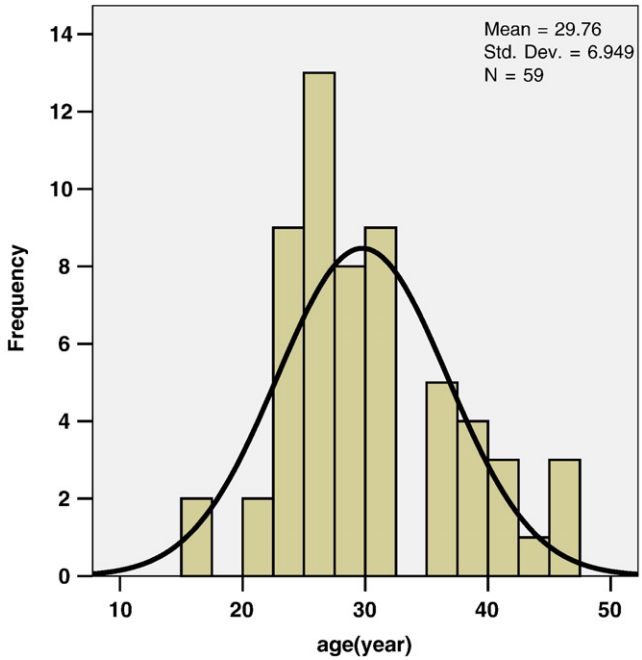

Fig. 1. The graph illustrates the distribution of age variable in the study group.

The mean percentages of peripheral blood eosinophil in the study group before treatment and at the end of treatment were 2.97% and 2.13%, which shows that their difference was not statistically significant ($P = .130$; Fig. 4). The mean percentages of peripheral blood eosinophil in the placebo group before treatment and at the end of treatment were 2.39 and 2.24, which shows that their difference was not statistically significant ($P = .810$; Fig. 4).

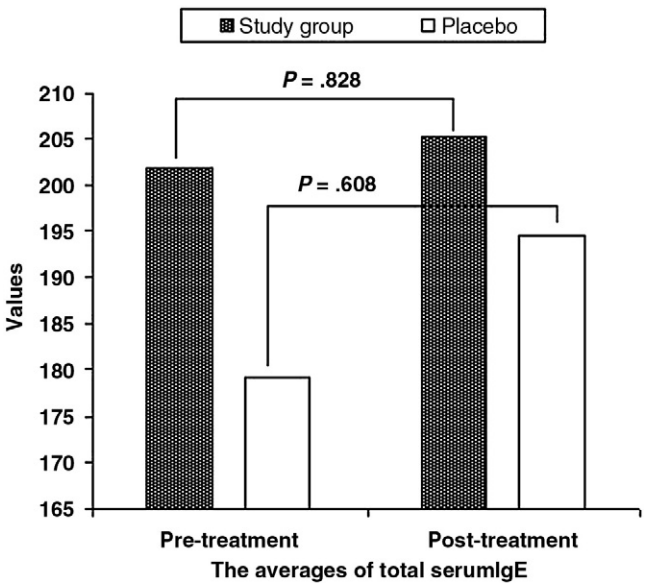

Fig. 2. Comparing the mean of total serum IgE before and after the end of treatment with *N. sativa* between the study and placebo groups.

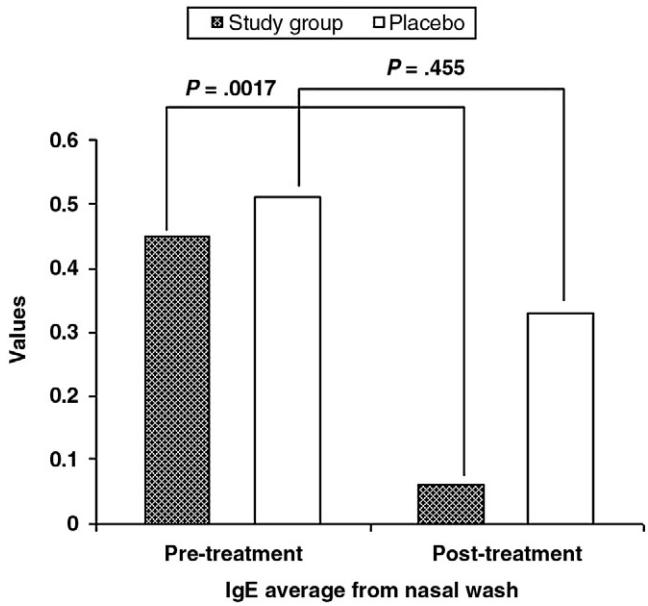

Fig. 3. Comparing the mean IgE in nasal wash before and after the end of treatment with *N. sativa* between the study and placebo groups.

The mean eosinophil of nasal mucosa in the study group was 0.03, and at the end of treatment, it was 0.13, which shows that their difference was not statistically significant ($P = .184$; Fig. 5). The mean eosinophil of nasal mucosa in the placebo group was 0.06, and at the end of treatment, it was 0.03, which shows that their difference was not statistically significant ($P = 572$; Fig. 5).

The changes in complication in days 0 and 15 in both study and placebo groups were discussed in detail (Table 1). The change in itching in the study group in days 0 and 15

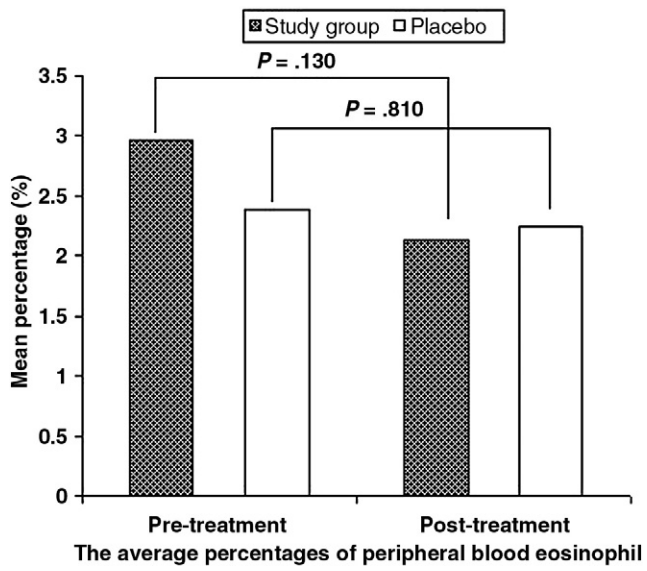

Fig. 4. Comparing the mean percentage of peripheral blood eosinophil before and after the end of treatment with *N. sativa* between the study and placebo groups.

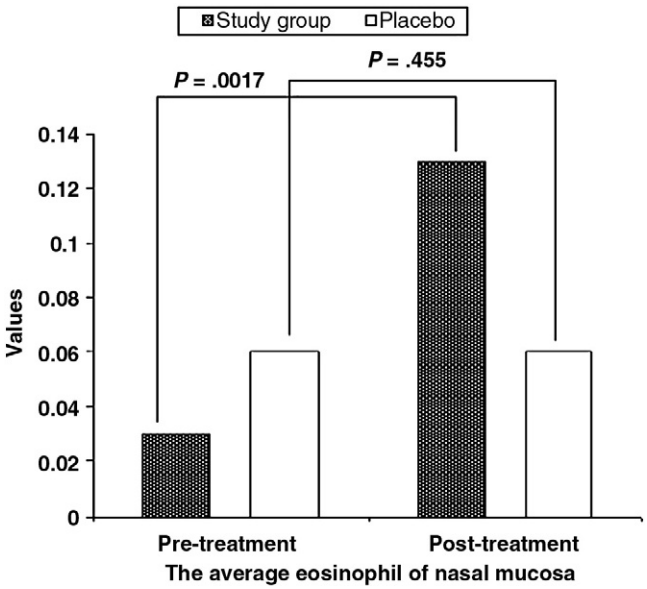

Fig. 5. Comparing the mean eosinophil in nasal mucosa before and after the end of treatment with *N. sativa* between the study and placebo groups.

was statistically significant ($P = .0014$). Itching in placebo group in days 0 and 15 was statistically significant ($P = .031$). The change in itching between the study and placebo groups in days 0 and 30 was statistically significant ($P = .001$ and $P = .016$, respectively). The change in nasal congestion in the study group in days 0 and 15 was statistically significant ($P = .0012$). The change in nasal congestion in the placebo group in days 0 and 15 was not statistically significant ($P = .125$). The change in nasal congestion between the study and placebo groups in days 0 and 30 was statistically significant ($P = .001$ and $P = .070$, respectively).

The change in sneezing among the study group in days 0 and 15 was statistically significant ($P = .001$). The change in sneezing in the placebo group in days 0 and day-15 was not statistically significant ($P = .198$). The change in sneezing in the study group in days 0 and 30 was statistically significant, whereas in the placebo group in days 0 and 15, it was not statistically significant ($P = .001$ and $P = .453$, respectively). The presence of runny nose in the study group in days 0 and 15 was statistically significant ($P = .0019$). The presence of runny nose in the placebo group in days 0 and 15 was statistically significant ($P = .016$). The presence of runny nose between the study and placebo groups in days 0 and 30 were statistically significant ($P = .001$ and $P = .070$, respectively).

The presence of turbinate hypertrophy and mucosal pallor in the study group in days 0 and 15 was statistically significant ($P = .0012$). The presence of turbinate

Table 1
Comparing the change in signs and symptoms between the study and placebo groups in different treatment time courses

Parameters	Case group, no. (%)			Placebo group, no. (%)		
	Day 0	Day 15	Day 30	Day 0	Day 15	Day 30
Itching						
No	5 (18/2%)	16 (54/2%)	19 (63/6%)	4 (15/2%)	8 (27/3%)	9 (30/3)
Mild	6 (21/2%)	9 (30/3%)	8 (27/3%)	7 (24/2%)	6 (21/2%)	6 (21/2%)
Moderate	12 (39/4%)	3 (9/1%)	2 (6/1%)	12 (42/4%)	11 (36/4%)	10 (33/3%)
Severe	6 (21/2%)	2 (6/1%)	1 (3%)	5 (18/2%)	4 (15/2%)	4 (15/2%)
Total	30 (100%)	30 (100%)	30 (100%)	29 (100%)	29 (100%)	29 (100%)
Nasal congestion						
No	2 (6/1%)	9 (30/3%)	9 (30/3%)	4 (12/1%)	3 (9/1%)	3 (9/1%)
Mild	6 (21/2%)	10 (33/3%)	12 (39/4%)	3 (9/1%)	6 (21/2%)	7 (24/2%)
Moderate	8 (27/3%)	9 (30/3%)	7 (24/2%)	11 (36/4%)	12 (42/4%)	11 (39/4%)
Severe	14 (45/5%)	2 (6/1%)	2 (6/1%)	12 (42/4%)	8 (27/3%)	8 (27/3%)
Total	30 (100%)	30 (100%)	30 (100%)	29 (100%)	29 (100%)	29 (100%)
Sneezing						
No	4 (12/1%)	11(36/1%)	15(48/5%)	2(6/1%)	3 (9/1%)	2 (6/1%)
Mild	0 (0%)	10 (33/3%)	12 (39/4%)	9 (30/3%)	10 (36/1%)	12 (42/4%)
Moderate	9 (30/3%)	6 (21/2%)	3 (9/1%)	10 (33/3%)	9 (30/3%)	8 (27/3%)
Severe	17 (57/6%)	3 (9/1%)	1 (3/0%)	9 (30/3%)	7 (24/2%)	7 (24/2%)
Total	30 (100%)	30 (100%)	30 (100%)	29 (100%)	29 (100%)	29 (100%)
Rhinorrhea						
No	4 (12/1%)	15 (48/5%)	21 (69/7%)	1 (3%)	4 (12/1%)	3 (9/1%)
Mild	6 (21/2%)	10 (33/3%)	6 (21/2%)	7 (24/2%)	7 (24/2%)	8 (27/3%)
Moderate	10 (33/3%)	2 (6/1%)	1 (3%)	6 (21/2%)	7 (24/2%)	7 (24/2%)
Severe	11 (36/4%)	4 (12/1%)	2 (6/1%)	15 (51/5%)	11 (39/4%)	11 (39/4%)
Total	30 (100%)	30 (100%)	30 (100%)	29 (100%)	29 (100%)	29 (100%)
Turbinate hypertrophy and mucosal pallor						
Yes	26 (87/9%)	15 (51/5%)	12 (39/4%)	26 (90/9%)	27 (93/9%)	27 (93/9%)
No	4 (12/1%)	15 (48/5%)	18 (60/6%)	3 (9/1%)	2 (6/1%)	2 (6/1%)
Total	30 (100%)	30 (100%)	30 (100%)	29 (100%)	29 (100%)	29 (100%)

Table 2
The evaluation of the complications between the study and placebo groups in different treatment time courses

Parameters	Decrease, no. (%)			No change, no. (%)			Increase, no. (%)		
	D	PL	*P*-Val	D	PL	*P*-Val	D	PL	*P*-Val
Itching									
Mild	20 (66.4)	5 (24.2)	<.001	10 (33.6)	22 (75.8)	<.05	0	0	NS
Moderate	22 (73.3)	6 (20.7)	<.001	8 (26.7)	23 (79.3)	<.001	0	0	NS
Severe	6 (20)	2 (7)	NS	23 (76.4)	26 (89.5)	NS	1 (3.6)	1 (3.5)	NS
Nasal congestion									
Mild	19 (70)	6 (20.7)	<.05	10 (36.6)	22 (75.8)	<.01	1 (3.6)	1 (3.5)	NS
Moderate	22 (73.3)	4 (13.8)	<.001	7 (23.3)	24 (82.7)	<.001	1 (3.6)	1 (3.5)	NS
Severe	4 (13.4)	1 (3.5)	NS	24 (80)	28 (96.5)	NS	2 (6.6)	0	NS
Sneezing									
Mild	22 (73.3)	5 (24.4)	<.001	6 (20)	23 (76.3)	<.001	2 (6.7)	1 (3.5)	NS
Moderate	25 (82)	4 (16.7)	<.001	4 (13.4)	23 (76.3)	<.001	1 (3.6)	2 (7)	NS
Severe	8 (26.7)	2 (7)	NS	22 (73.3)	25 (86)	NS	0	2 (7)	NS
Runny nose									
Mild	20 (66.4)	6 (20.7)	<.01	9 (30)	23 (79.3)	<.05	1 (3.6)	0	NS
Moderate	23 (76.7)	6 (20.7)	<.05	7 (23.3)	22 (73.8)	<.05	0	1 (3.5)	NS
Severe	8 (26.6)	1 (3.5)	NS	22 (73.4)	26 (89.5)	NS	0	2 (7)	NS
Observer completed the evaluation	No improvement			No change			Improvement		
	D	PL	*P*-Val	D	Pl	*P*-Val	D	PL	*P*-Val
Day 0	0	1 (3.5)	NS	20 (66.4)	28 (96.5)	<.05	10 (33.6)	0	<.05
Day 15	0	1 (3.5)	NS	16 (53.4)	28 (96.5)	<.01	14 (46.6)	0	<.001
Day 30	0	0	NS	28 (93.3)	29 (100)	NS	2 (6.7)	0	NS

D indicates drug group (n = 30); PL, placebo group (n = 29); P-Val, *P* value; NS, nonsignificant.

hypertrophy and mucosal pallor in the placebo group in days 0 and 15 was not statistically significant ($P = 1.05$). The presence of turbinate hypertrophy and mucosal pallor between the study and placebo groups in days 0 and 30 was statistically significant ($P = .001$ and $P = .070$, respectively).

The mean difference of total serum IgE before and after between the study and placebo groups (3.31 vs 15.38) was statistically significant ($P = .0708$). The differences in IgE before and after nasal wash in the study and placebo groups were 0.0065 and 0.2800, respectively, which was statistically significant ($P = .051$). The mean peripheral blood eosinophil percentage differences before and after treatment the study and placebo groups were 0.086 and 0.350, respectively, which was not statistically significant ($P = .601$). The presence of the itchy nose between the study and placebo groups was evaluated, which shows statistically significant difference ($P < .001$). This means that *N. sativa* could reduce the nasal itching significantly more than placebo in the first 2 weeks and after the second 2 weeks.

The nasal congestion between the study and placebo groups was evaluated and showed statistically significant difference ($P < .001$), which means that *N. sativa* could reduce nasal congestion more significantly than placebo after the first 2 weeks ($P < .001$) and after the second 2 weeks ($P = .041$).

Runny nose change difference between the 2 study groups was statistically significant ($P < .001$), which means that *N. sativa* could reduce the presence of the runny nose considerably more than placebo in the first 2 weeks ($P < .001$) and after the second 2 weeks ($P = .007$). The sneezing attacks change difference between the 2 study groups was significant ($P < .001$), which explains the concept that *N. sativa* could reduce the sneeze attacks significantly more than placebo after the first 2 weeks ($P < .001$) and the second 2 weeks ($P = .025$). Difference changes in the amount of turbinate hypertrophy and mucosal pallor between the 2 study groups were statistically significant ($P < .001$). This means that *N. sativa* could reduce significantly more than placebo after the first 2 weeks ($P < .001$), but after the second 2 weeks, it was not statistically significant ($P = .11$; Table 2).

4. Discussion

N. sativa is widely known to have wide therapeutic applications in herbal medicine, and scientific advancement through technology has provided substantial evidence to support most of its medicinal claims. The present study has further demonstrated the antihistamine potential of this plant seeds.

More than 50% of the patients (57.5%) in this study presented with high total IgE (>100 IU/mL). In the other hand, high total IgE (>100 IU/mL) is not always accompanied by allergy symptoms, and even patients who have low total IgE have severe allergy symptoms. Hence, the value of total IgE in diagnosis of the allergy has low importance [11]. The presence of the eosinophils in nasal smear suggests the progressive allergic reaction. In fact, only in the mucosal infiltrations during allergic rhinitis the presence of the eosinophils is significant [12,13]. Actually, the eosinophil

in nasal mucosa during allergic rhinitis is characteristic [14]. In the present research, 6.1% of the study population had nasal mucosal eosinophil. This is different from the study done by Miri et al [15], which proclaimed the 28% value, which was because the study included children aged 11 to 15 years. Al-Ghamdi [16] investigated the anti-inflammatory response induced by treatment with 500 mg *N. sativa* oil, which has equivalent anti-inflammatory response of 1 aspirin tablet.

Hajhashemi and colleagues [17] investigated the anti-inflammatory properties of *N. sativa* in mice. Although, oral administration of 100, 200, and 400 μL/kg doses of the oil did not significantly have anti-inflammatory effect, the same dose injected intraperitoneally significantly reduced the edema. In the present study, determined subjective symptoms of the patients during a 1-month treatment with *N. sativa* oil were significantly reduced in study group. Kalus and colleagues conducted a study that found that the subjective symptoms during treatment did not significantly reduce, but the complaint in patients with allergic rhinitis in study group significantly reduced [18]. In agreement with this study, present research also found significant difference in study group comparing with placebo.

5. Conclusion

The present findings are consistent with evidence that the antiallergic effects of *N. sativa* components could be attributed to allergic rhinitis. Moreover, *N. sativa* should be considered for treating allergic rhinitis when the effects of other antiallergic drugs need to be avoided.

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