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ORIGINAL ARTICLE

Effects of Virgin Coconut Oil as Adjunct Therapy in the Treatment of Allergic Rhinitis

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ABSTRACT

Introduction: The role of virgin coconut oil in the treatment of allergic rhinitis is controversial. Thus, the aim of the present study is to determine the effects of virgin coconut oil ingestion, in addition to standard medications, on allergic rhinitis. We also studied the side effects of consumption of virgin coconut oil. **Methods**: Fifty two subjects were equally divided into test and control groups. All subjects received a daily dose of 10mg of loratadine for 28 days. The test group was given 10ml of virgin coconut oil three times a day in addition to loratadine. The symptoms of allergic rhinitis were scored at the beginning and end of the study. **Results:**, the symptom score were divided into nasal and non-nasal symptom scores. Sneezing score showed a significant difference, however the score was more in control group than test group, indicating that improvement in symptom was more in control group. The rest of the nasal symptom and non-nasal symptom score showed no significant difference between test and control groups. Approximately 58% of the test subjects developed side effects from consumption of virgin coconut oil, mainly gastrointestinal side effects. **Conclusion**: In the present study, ingestion of virgin coconut oil does not improve the overall and individual symptoms of allergic rhinitis, furthermore it has side effects.

Keywords: Virgin coconut oil, allergic rhinitis

INTRODUCTION

Allergic rhinitis represents a global health problem. It is estimated that about 20-40 million people are affected in the US. The prevalence of allergic rihitis in other countries ranges from 3% to 19% [1]. In Kelantan, Malaysia, the prevalence was 27% amongst school children; was being more prominent in the 12-14 year age group (38.2%) compared to 5-7 year age group (18.2%) [2]. The disease is a long standing disease and may affect patients' quality of life considerably. Because of this, it can affect the cost of the treatment as a whole. The estimated cost of allergic rhinitis is 2.7 billion dollars for the year 1995, excluding costs for associated medical problems such as sinusitis and asthma [3].

Many classes of drug are available for the treatment of allergic rhinitis. Intranasal corticosteroids, have a good safety profile with fast rate of symptoms reduction. However incorrect use leads to treatment failure or adverse events such as epistaxis in 10-15% of patients. First-generation antihistamines are associated with sedation, psychomotor retardation and reduced academic performance. Even with the pharmacotherapy, one in five affected individuals remains highly symptomatic, and therefore further research is needed in this area [4].

Currently, alternative medicine is increasingly employed to treat diseases which have no cure in modern medicine or which have risks of side effects. Virgin coconut oil (VCO) is well known as a nutraceutical. VCO is promoted as a supplementary diet due to its beneficial effects on various health problems. A lot of testimonials about its benefit have been reported in many web publications. However, there is scant published data in scientific journals. For this reason many researchers would like to conduct a study to determine its therapeutic effects.

VCO is obtained by wet processing which involves extraction of cream from the fresh coconut milk and subsequently breaking the cream emulsion [5]. In contrast to commercial coconut oil or also known as Refined, Bleached and Deodorized (RBD) coconut oil the refining process to make the oil edible will render it to oxidative rancidity and contamination

with aflatoxin, and will cause loss of its active biological substances [6]. VCO was able to attract interest from the community since its first appearance in the market and became popular due to its perceived therapeutic values, availability and cheaper cost as an alternative treatment [5]. If VCO is proven to have beneficial effects towards allergic rhinitis, then it will helps to reduce the financial burden in the treatment since it also has other beneficial effects for instance reduction of total cholesterol, triglycerides, phospholipids and low density lipoprotein [7].

The aim of this study is to determine the efficacy and side effects of virgin coconut oil as an adjunct to the conventional treatment with antihistamine and topical steroid and compare it with treatment using antihistamine and topical steroid alone on the basis of symptoms score.

METHODS

Study Design

This open label, randomized, parallel-group controlled clinical trial was conducted over the period of two years. The subjects were recruited patients attending the Otorhinolaryngology clinic, Universiti Sains Malaysia (USM), Kubang Kerian. Patients aged 18 to 50 years old who were diagnosed clinically to have allergic rhinitis and had consented for skin prick test were invited to participate in the study. Patients who were diabetic, pregnant or with evidence of rhinosinusitis were not included in the study. Those who were allergic to coconut oil or coconut oil based product were also not included.

Each subject who agreed to participate in the study was asked to answer questionnaires at the beginning of the study to assess their symptoms score. The questionnaires were asked in Malay. The initial symptoms score would be the baseline reading to be compared with symptoms score post treatment. Seven symptoms were assessed in the symptom score, which include nasal blockage, nasal discharge, sneezing, nasal, eye and palate itchiness and hyposmia. The symptom score was based on 7-point visual analog scale, published by the Joint Task Force on Practice Parameters on Allergy, Asthma, and Immunology [8]. Eligible patients were recruited either in test or control group. The allocation of participants into test or control group was done using systematic random sampling using random table. The enrolment into the study and allocation into the group were done by a research assistant. A total of 26 patients were allocated in each group of test subject and control (Figure 1). The sample size was calculated using PS: Power and Sample Size Calculation software version 3.0.

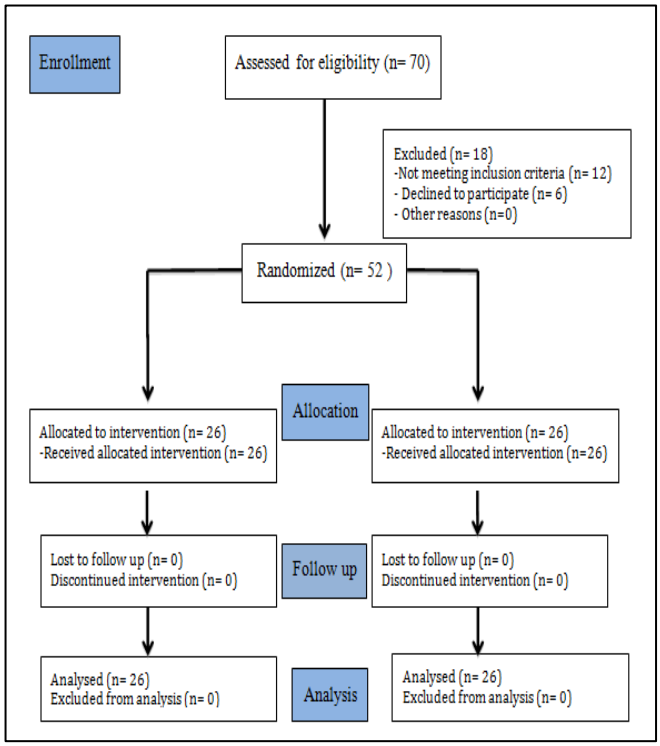

Figure 1 Participant Flow Diagram

Participants in test group were given 10 ml virgin coconut oil orally three times per day and antihistamine (loratadine) for 28 days. VCO was prepared in small packs, which consists of 10ml per pack. Each patient was given 84 packs of VCO. The virgin coconut oil was taken with meal or separately, but each participant was instructed not to use it during food preparation for instance cooking at high temperatures. The control group was treated with 10mg loratadine once daily. All participants were reassessed after 28 days of treatment to determine their symptoms score. The research assistant followed up with the participants through a telephone call for next appointment after completion of treatment. After 14 days, the same research assistant will make a telephone call to monitor progress of treatment and complications or side effects from treatment. After 28 days of treatment, participant in the test group should finish all VCO given. The participants who still have few packs left, were considered as non-compliants.

The results of symptoms score were compared pre and post treatment. The complications or side effects from the treatment, if any, were assessed after 28 days. The same research assistant asked and marked the scoring at all times. The data were analysed using SPSS software version 18 to an 80% power of study.

Skin Prick Test Protocol

Skin prick test was done (ALK-Abello skin prick test kit, Bege Alle, 2970 Horsholm, Denmark) for the common allergens found to be positive in Kelantan area based on data from immunology department in USM, for examples *Dermatophagoides pteronyssinus*, *Dermatophagoides farina*, *Blomia tropicalis*, *Felis domesticus* and shrimp. Skin prick test was done by the same research assistant. During the skin prick test, histamine was used as the positive control and physiologic saline was used as negative control. Fifteen minutes were allowed for the reactions to ensue. The presence of a wheel with a diameter of 3 mm or more is considered a positive reaction [9].

RESULTS

A total of 52 participants (26 in each test and control group) were enrolled into the study. There was no dropout in the study.

Table 1 Age distribution in control and test group

Group	Age	Frequency	Percentage (%)
Control Group	Below 20	5	19.2
	21 - 25	3	11.5
	26 - 30	9	34.6
	31 - 35	5	19.2
	36 and above	4	15.4
	Total	26	100
Test Group	Below 20	0	0
	21 - 25	7	26.9
	26 - 30	5	19.2
	31 – 35	4	15.4
	36 and above	10	38.5
	Total	26	100

In test group the highest age group was 36 years and above (38.5%), followed by 21 to 25 years (26.9%), 26 to 30 years (19.2%) and lastly 31 to 35 years (15.4%). However in control group the majority of subjects were within 26 to 30 years (34.6%), followed by 18 to 20 years and 31 to 35 years in same proportion (19.2%), 36 and above (15.4%) and 21 to 25 years (11.5%) (Table 1).

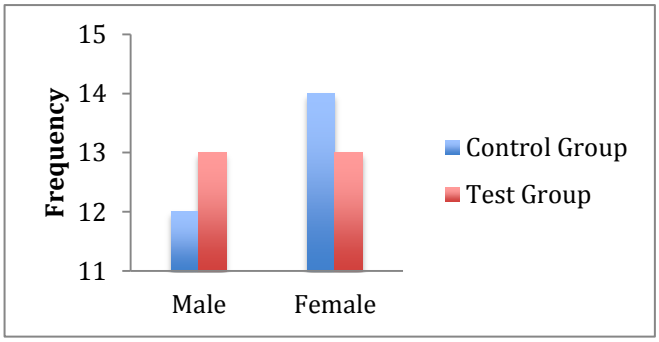

Figure 2 Gender distribution among control and test group

In this study, male and female subjects were equally allocated in test group. However, there is slight increase in the number of female subjects (53.8%) as compared to male (46.2%) in control group. Based on gender distribution, there is no significant difference between male and female in control group. (Figure 2)

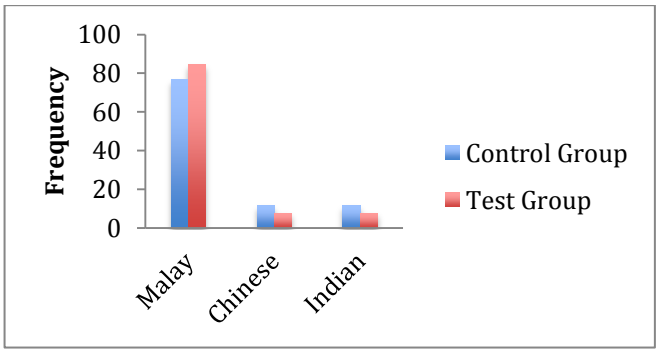

Figure 3 Racial distribution in both control and test group

Participants in this study were predominantly Malays (80.8%), followed by Chinese (9.6%) and Indians (9.6%) (Figure 3).

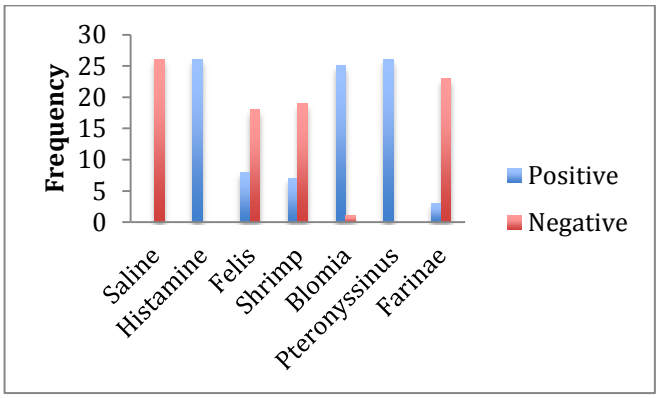

Figure 4 Frequency of skin prick test in control group

The majority of participants in control group were positive for house dust mite (*Dermatophagoides pteronyssinus* and *Blomia tropi*calis); the highest was *Dermatophagoides pteronyssinus* 100%, followed by *Blomia tropicalis* 96.2%. The third most common allergen was to *Felis domesticus* 30.8%, followed by shrimp 26.9% and the least *Dermatophagoides farinae* 11.5% (Figure 4). In test group, most of the participants were positive for house dust mite; *Dermatophagoides pteronyssinus* 96.2%, *Blomia tropicalis* 92.3% and *Dermatophagoides farinae* 92.3%, followed by shrimp 57.7% and *Felis domesticus* 42.3% (Figure 5).

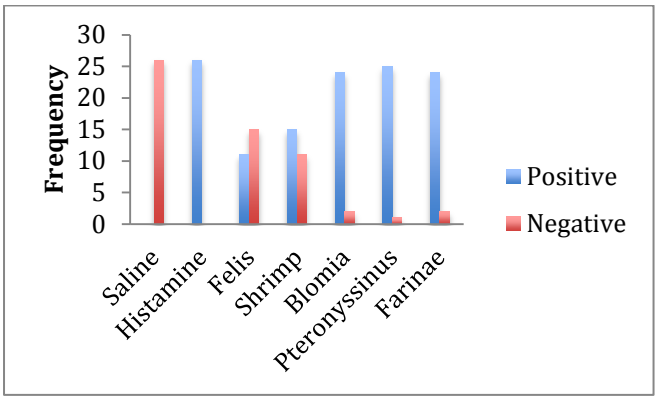

Figure 5 Frequency of skin prick test in test group

Nasal Symptoms Score

When Nasal Symptom Score were compared between test and control groups, there were no significant difference in symptoms of nasal blockage, discharge and itchiness. However, sneezing score showed a significant difference ($p < 0.05$) (Table 2). Mean difference in sneezing symptoms score in control group between pre and post treatment is -2.69, while in test group is -1.65. This showed that the difference in sneezing symptoms score was more in control group as compared to test group (Table 3).

Table 2 Mean difference of nasal symptom score between initial and end of the study for a given period calculated using t-test

Nasal Symptom	Mean Difference	p-value	Standard error difference	95% CI of the difference	
				Lower	Upper
Blockage	0.538	0.244	0.457	-1.456	0.379
Discharge	0.087	0.876	0.492	-0.912	1.066
Itchiness	0.538	0.285	0.498	-1.539	0.462
Sneezing	0.538	0.033	0.498	-1.539	0.462

Table 3 Mean difference of nasal symptoms score in control and test group between pre and post treatment calculated using t-test

Symptoms	Group	N	Mean	Standard deviation
Blockage difference	Control	26	-2.15	1.377
	Test		-1.62	1.878
Discharge difference	Control	26	-1.88	1.681
	Test		-1.96	1.865
Itchiness difference	Control	26	-1.58	1.362
	Test		-1.04	2.144
Sneezing difference	Control	26	-2.69	1.806
	Test		-1.65	1.599

Non Nasal Symptoms Score

Table 4 Mean difference of non-nasal symptoms score in control and test group between pre and post treatment calculated using t-test

Symptoms	Group	N	Mean	Standard deviation
Smell difference	Control	26	-1.42	1.419
	Test	26	-0.65	1.958
Eye itchiness difference	Control	26	-1.23	0.951
	Test	26	-1.62	2.699
Palate itchiness difference	Control	26	-0.46	1.067
	Test	26	-0.81	1.132
Symptoms in general	Control	26	-2.58	1.362
	Test	26	-1.69	1.914

Table 5 Mean difference in non-nasal symptom score between initial and end of the study for a given period calculated using t-test

Non-nasal symptom	Mean difference	p-value	Standard error of difference	95% CI of the difference	
				Lower	Upper
Smell	0.769	0.111	0.498	-1.722	0.183
Eye itchiness	0.385	0.496	0.561	-0.743	1.512
Palate itchiness	0.346	0.262	0.305	-0.267	0.959

Side Effects of Virgin Coconut Oil

Approximately 15 subjects in this study (58%) developed gastrointestinal tract side effects, for instance abdominal bloatedness, oily stool, nausea and oily taste in throat. Two subjects (7.7%) complained of headache and palpitation. Most of the side effects reported were temporary and resolved spontaneously. Most of the subjects who experienced side effects took VCO without meals. Only 9 subjects (34.6%) did not have any complain when consuming virgin coconut oil and most of them took virgin coconut oil with meals (Figure 6).

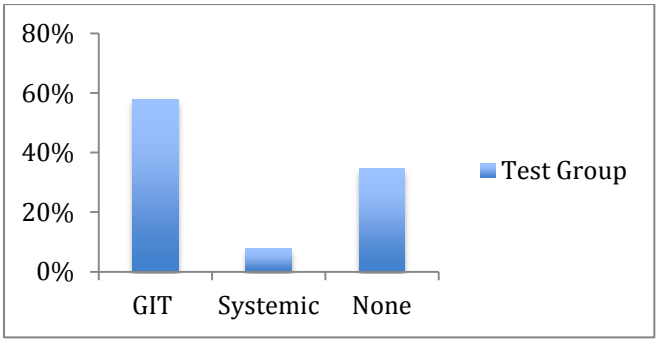

Figure 6 Side effects after consumption of virgin coconut oil in a test group. GIT – gastrointestinal side effects

DISCUSSION

General principles in the clinical management of allergic rhinitis include: avoidance of triggering factors or allergens, pharmacotherapy, patient education and follow up [10]. The aims of pharmacotherapy are to control symptoms, prevent sequel and improve patient's quality of life [11]. Often, treatment using combination drugs offer better relief as compared to single therapy. This is due to involvement of several mediators in the pathophysiology of allergic rhinitis. This preliminary study aims to determine the effect of virgin coconut oil in the treatment of allergic rhinitis, and if the result is significant, the molecular mechanisms can be studied. To the best of our knowledge, there is no previous study to assess the effect of virgin coconut oil (VCO) on allergic rhinitis. However, only testimonials have been produced so far.

In this study, we compared the mean difference for nasal symptom score between control and test groups. For all symptoms except sneezing, the results showed no statistically significant difference between control and test groups. However, the sneezing score was significantly different between control and test groups with p-value 0.033 (< 0.05). However, when the mean differences in sneezing score were compared between pre and post treatment in control (-2.69) and test (-1.65) groups, the results showed that the control group had larger sneezing score difference between pre and post treatment. This implied that sneezing score was reduced in control group than test group after completion of treatment. It is unusual to have better improvement in symptom score in control group as compared to the test group. The above results showed that virgin coconut oil has no beneficial effect on nasal symptom score and only has side effects especially involving gastrointestinal tracts. We presumed that because of the side effects, the amounts of the VCO taken maybe reduced and its compliance maybe affected as well. Furthermore, when the subjects developed gastrointestinal side effects, they may forget to take loratadine. This could probably affect the results of nasal symptom score in the test group.

We also compared the mean difference for non-nasal symptom score between control group and test group. For all symptoms, i.e smell, eye itchiness, palate itchiness and symptoms in general score there is no statistically significant difference between control and test groups. This result also showed that short term use of virgin coconut oil 30 ml per day has no effect on non-nasal symptom score of allergic rhinitis.

In our study, more than half of the total subjects in test group reported adverse effects from consumption of virgin coconut oil throughout the study period. About 50% of them complained of gastrointestinal side effects, such as abdominal bloatedness, oily stool, nausea and oily taste in throat. A small number of the subjects (7.7%) complained of headache and palpitation. However, all the symptoms were mild and tolerable. Only 9 out of 26 subjects (34.6%) did not have any adverse reaction and on further questioning, most of them took VCO with food. In a study conducted by Cecille in 2010, about twenty participants complained of gastrointestinal side effects [12]. The findings of gastrointestinal effects in this present study are consistent with the acute toxidrome syndrome of VCO intake seen in rats which consisted of blood-streaked feces and oily mucoid stool [13]. Therefore in our study, the side effects experienced by most of our subjects most likely come from the virgin coconut oil and not because of other foods that they took.

Flavonoids are the most biologically active phenolic substances found in VCO. Initially we postulated that its phenolic content might be attributed to the high antioxidant and antiallergic acitivity [5]. Flavonoids not only inhibit histamine release, but also inhibit synthesis of IL-4 and IL-13 and CD40 ligand expression by basophils [14].

A number of studies have reported promising results of flavonoid towards allergy. An unpublished preliminary study to assess effect of persimmon leaf

extract, which contain flavonoid on atopic dermatitis, was attempted by Takigawa and showed significant improvement. An animal study was also done on mice to evaluate its effect on improvement of dermatitis. The results showed that flavonoid in persimmons leaf extract significantly reduced the severity of dermatitis, scratching behaviour and transepidermal water loss even after onset [15]. A 30-year longitudinal epidemiological study reported that incidence of allergic related diseases was lower in populations with higher intake of flavonoids [16].

Despite many studies showed promising results of flavonoid toward improvement of allergy symptoms, this present study showed contradictory results. We assume based on the clinical assessment, which can be subjective that the amount of virgin coconut oil for daily intake, patient compliance to treatment and the preparation of virgin coconut oil may affect the results post treatment. Nevertheless, the combination of clinical judgement from nasal symptom score and objective assessment for instance serial serum specific IgE will be more useful to determine effects of VCO on allergic rhinitis.

Since the amount of virgin coconut oil to be consumed has not been standardized, we used the amount based on the previous studies to assess for other parameters, which showed good results on their subjects.

In the present study, the participants can take the virgin coconut oil without food or by mixing it with food or drink as recommended by manufacturers, but not during food preparation, for instance cooking. We presumed that when mixing the virgin coconut oil with food or drink, some amount of the virgin coconut oil might be left in the plate or glass after meal, which make the total dose of virgin coconut oil inadequate and inconsistent throughout the period of study. Furthermore, the results of subjects who take the VCO with food will probably differ with those taking it separately. When we compared the method of consumption of VCO to the subjects with other studies, for example a study by Monica in 2009, the coconut oil were taken by the test subject with preparation of food, and yet still revealed promising results [17]. In contrast to a study done by Cecille in 2010, the participants were instructed to consume virgin coconut oil three times a day before each main meal, and at the end of treatment period, the study has produced contradictory results [12].

Limitations and Recommendations

The findings in this study should be considered as preliminary, as there are several limitations of this study. First the sample size of subjects in this study is relatively small and may not truly represent the whole population. So a multicentered, larger randomized controlled trial is needed to provide further evidence and validate the results. Second, severity and response towards treatment were only based on clinical criteria, i.e symptoms score. Even though we used validated symptoms score and employed a single research assistant for scoring assessment throughout the study to limit the potential bias, however an immunological test for instance serum specific IgE would be more objective. Due to limited budget, the assessment was based on only symptoms score. Third the amount or dosage of VCO used in this study was not the standard dose. The amount used in this study was based on the study by Monica in 2009 [17], 30ml a day. The VCO used is not a standardized commercially manufactured coconut oil. Therefore the results are only applicable to the batches of VCO used here. Work is currently under way to study the effects of VCO active compound, flavonoid on the mechanism of allergic rhinitis using objective molecular analysis.

CONCLUSIONS

This study showed that consumption of virgin coconut oil as an adjunct treatment of allergic rhinitis has no significant effect towards improvement of allergic rhinitis symptoms based on symptom score. Furthermore, it has side effects, which may affect patients' compliance.

Conflicts of interest

Authors declare none.

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