

The Effect of Topical Chia Oil and Coconut Oil on Pruritus and Laboratory Parameters in Hemodialysis Patients

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Abstract

Background: Chronic pruritus is one of the most common skin manifestations in patients with End-Stage Renal Disease (ESRD). Omega-3 fatty acids could be used as an efficient drug for treatment of pruritus in uremic patients. Chia seed oil is one of the richest plant sources of omega-3.

Aim: This study aimed to compare the effect of topical chia oil and coconut oil on pruritus and laboratory parameters in ESRD patients.

Method: This semi-experimental study with control group was performed on 105 hemodialysis patients in Kerman, Iran in 2021. The participants were randomly assigned into two intervention groups (chia oil and coconut oil) and one control group. The chia and coconut oils were applied topically twice a day for two weeks. Pruritus was measured before, at the end, and two weeks after the intervention. Some laboratory parameters were measured before and at the end of the intervention. Data collection tool was Yosipovitch pruritus questionnaire. $P < 0.05$ was considered statistically significant.

Results: The mean pruritus score was significantly different between the three groups of chia oil (2.61 ± 1.17), coconut oil (3.00 ± 1.15), and control (4.48 ± 0.88) at the end of the intervention and two weeks after the intervention ($P < 0.001$). The laboratory parameters were not significantly different between the three groups before and after the intervention ($P > 0.05$).

Implications for Practice: Chia and coconut oil were effective on reducing pruritus in ESRD patients. Chia oil and coconut oil are cost-effective without any major complications that can be used to reduce pruritus.

Keywords: Coconut oil, Complementary therapies, End-stage renal disease, Pruritus

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Introduction

Chronic renal failure (CRF) is a general term used to describe impaired kidney structure and function (1, 2). The number of patients with CRF in the world was approximately 3,730,000, of which approximately 2,648,000 undergo hemodialysis (3). Patients undergoing hemodialysis are exposed to a wide range of problems (4). One of the most common physical complications in hemodialysis patients is pruritus (1, 5, 6).

Pruritus (itchy skin) is one of the most common unpleasant symptoms of CRF. About 15% to 49% of patients with CRF and more than 40% of hemodialysis patients suffer from chronic pruritus (5). Pruritus in hemodialysis patients may lead to sleep disturbances, mental problems, and impaired quality of life (1, 7, 8).

Pharmacological and non-pharmacological therapies are used to treat and control this problem. The effect of various drugs to reduce pruritus has been investigated, but none of them has been finally approved (9). Today, traditional therapies are of great importance (10). The prevalence of complementary and alternative medicine (CAM) use in the United States is estimated to be 40 to 60% (11). The National Institutes of Health (NIH) has divided CAM into eight categories, one of which is medicinal and biological therapies, which include medicinal plants (12). Omega-3-rich supplements are helpful in reducing pruritus (13). Chia seed oil is one of the richest plant sources of omega-3. Chia seed oils contain α -linolenic acid LA along with Flavonol, which has antioxidant and anti-inflammatory effects. In a controlled study on Patients with uremic pruritus which compared the effects of 4% Chia seed oil lotion with moisturizers only, itching and skin disorders such as skin hydration and lichen simplex chronicus were all improved on the treatment side (14, 15). The coconut oil has been also increasingly used in food and skin products in recent years that has several healing properties (16, 17). The study by Sembiring et al. showed that topical application of peppermint oil in patients undergoing dialysis had a positive effect on reducing pruritus in these patients (7).

Considering the aforementioned studies and the importance of this issue in the quality of life of patients undergoing hemodialysis, as well as the fact that topical use of omega-3-rich supplements has not been studied, therefore performing the present study was necessary. Since nurses spend the most time with hemodialysis patients and are aware of their problems (6), nursing services are important to solve the patients' problems and improve their quality of life. Nurses can use CAM, including topical use of vegetable oils as a non-invasive method with easy use and limited side effects in hemodialysis patients (6, 18). No specific side effects have been reported in the topical use of chia oil and coconut oil in these patients; also the effect of topical chia and coconut oils has not been compared, and no study has checked the effect of vegetable oils on laboratory parameters. Considering the characteristics of this disease and its problems, the researchers performed this study aimed to compare the effect of topical chia oil and coconut oil on pruritus and laboratory parameters in hemodialysis patients.

Methods

This semi-experimental study was performed in 2021-2022 in dialysis centers affiliated to Kerman University of Medical Sciences in Kerman, Iran. In this study, 105 patients undergoing hemodialysis who met the inclusion criteria were selected by convenience sampling method and then divided into two intervention groups (chia oil and coconut oil) and one control group (Vaseline) using block randomization with six blocks. To calculate the sample size, the sample volume formula and previous studies were used (19). Accordingly, the samples required for this study was 30 people in each group that considering the probability of dropout, a total of 105 samples was considered (35 samples in each group with a 15% attrition rate).

Among 105 patients, there were 6 dropouts for various reasons (dissatisfaction with oil odor and personal reasons). Finally, 99 participants were analyzed (Figure 1). Inclusion criteria were: age over 18 years, history of pruritus in two last weeks without any known causes such as skin disease, history of hemodialysis treatment at least in the last six months, three hemodialysis treatments per week, not using medication for pruritus, no speech disorders and disabilities, no open wound, and no deep vein thrombosis (DVT), epilepsy, bleeding, paraplegia, cellulite, and pacemaker. Exclusion criteria were: kidney transplantation, history of skin sensitivity to vegetable oils, failure to answer 10% of the questionnaire questions, or not performing the intervention for more than one night.

The control group received the routine care, and Vaseline was used as a placebo by the patients in the control group. Vaseline was applied in the morning and night at a specific time as 5 to 10 cc on the

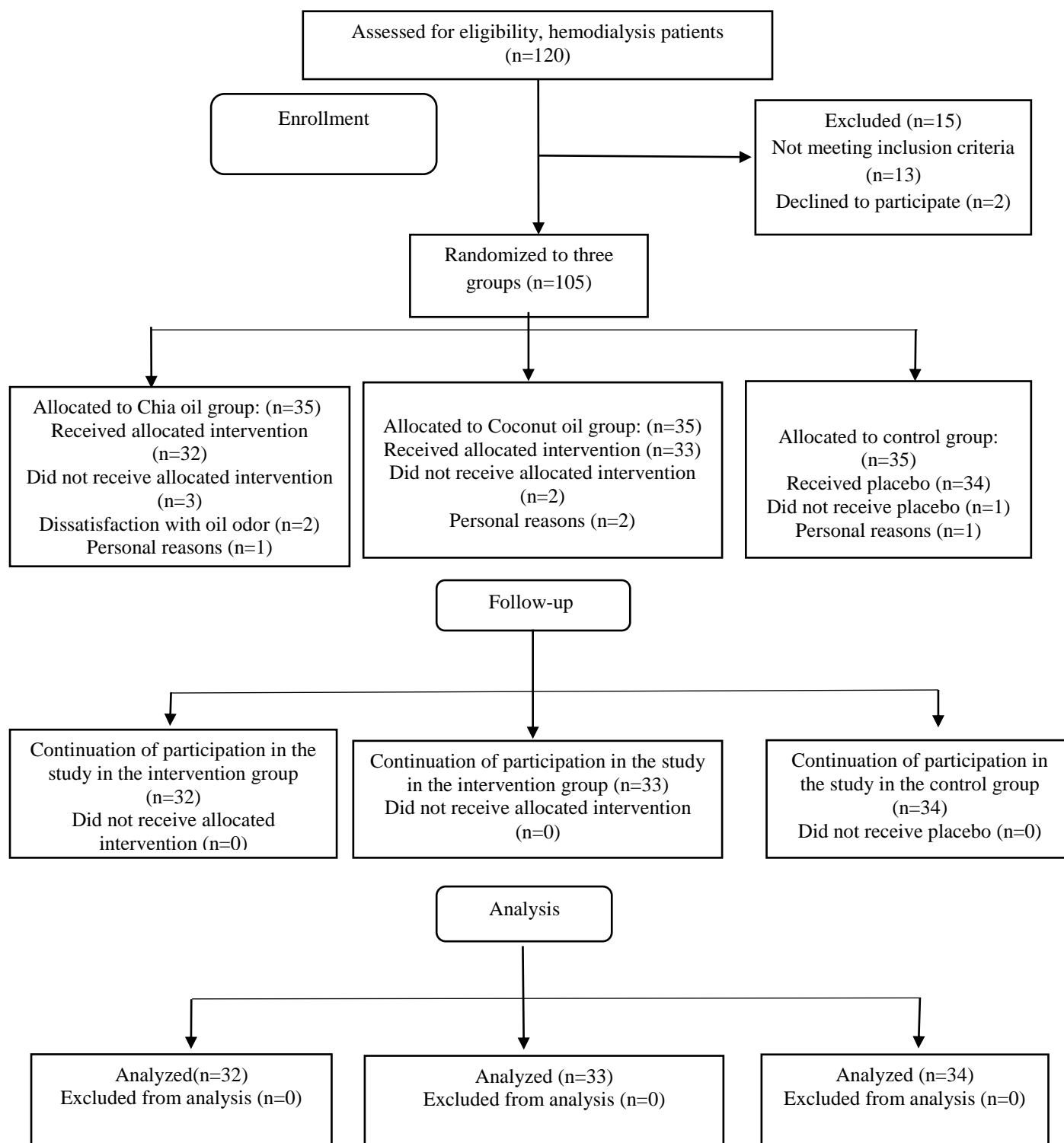


Figure 1. Flowchart of the study

itchy area using the hand (20, 21). According to some studies, the researchers used Vaseline as a placebo to control itching due to skin dryness (1, 20, 21). In the group using chia oil, a 4% solution of water and chia oil with the same brand was used in the morning and night at a specific time for two weeks. In the group using coconut oil, the coconut oil was used in the morning and night at a specific time for two weeks (14, 22, 23).

The pruritus variable was measured before, at the end of the intervention (second week), and two weeks after the intervention (fourth week). Also, the variables of urea, phosphorus, and calcium, were

measured in all three groups before and two weeks after the intervention by 5 cc blood sampling in a mid-week hemodialysis session from the fistula area. All laboratory parameters were measured in the central laboratory of the relevant hospital using the same device and the same technique.

Data collection tool was Yosipovitch Pruritus Questionnaire.

Yosipovitch Pruritus Questionnaire was designed by Gil Yosipovitch (2001) based on the McGill Pain questionnaire. Yosipovitch et al. calculated the internal validity and reliability of this tool using Cronbach's alpha of 0.75 (22). Also, the validity of the questionnaire was confirmed by test-retest and Wilcoxon test; they obtained a correlation coefficient of 0.72, which indicates the high validity of this tool (22). Abbasi et al. in 2011 reported the validity and reliability of Persian version of the questionnaire (23). According to the Yosipovitch Pruritus Questionnaire, Visual Analogue Scale (VAS) was used to measure the severity of pruritus in three groups. A score of zero indicates the least pruritus and a score of ten indicates the most pruritus. The Rule of Nines for burning was used to measure the percentage of pruritus sites (%0-%100) (22).

Data were analyzed by SPSS software (version 15). Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to describe the scores. Also, ANOVA, repeated measures ANOVA, analysis of covariance, and chi-square tests were used to describe and analyze the data. $P < 0.05$ was considered statistically significant.

This study was approved by the Ethics Committee of Kerman University of Medical Sciences. An informed consent was obtained from the participants. The research units were assured that the obtained information would remain confidential and used only to achieve the research objectives, and they were informed that they could leave the study whenever they wished. In order to prevent possible complications, the intervention was started under the supervision of the researcher, but fortunately, no unusual complication which required special intervention was observed.

Results

The mean age of the patients undergoing hemodialysis was 55.93 ± 10.54 years in the chia oil group, 57.21 ± 11.43 years in the coconut oil group, and 55.38 ± 9.79 years in the control group. The mean duration of hemodialysis in the chia oil group was 6.92 ± 6.80 years, in the coconut oil group 5.60 ± 4.69 years, and in the control group 5.22 ± 4.37 years. There was no statistically significant difference between the three groups in terms of mean age and mean duration of hemodialysis ($P > 0.05$).

The results in Table 1 showed that the majority of participants were male. In the majority of participants, diabetes and hypertension were the cause of renal failure. There was no statistically significant difference between the interventions and control groups in terms of the cause of renal failure and socio-demographic characteristics ($p > 0.05$).

Table 2 indicated that before the intervention, the highest mean pruritus score was in the chia oil group (4.67 ± 1.69), and the lowest mean pruritus score was in the coconut oil group (4.36 ± 1.73). Before the intervention, there was no statistically significant difference between the three groups in terms of the mean pruritus score ($P = 0.692$), but in the second week after the intervention, the mean

Table 1. Socio-demographic characteristics of hemodialysis patients in the three groups

Variable		Chia Oil Group		Coconut Oil Group		Control Group		χ^2	P-value
		n	%	n	%	n	%		
Gender	Male	17	53.12	18	54.54	19	55.88	0.51	0.971*
	Female	15	46.87	15	45.45	15	44.11		
Education	Illiterate	5	15.62	11	33.33	4	11.67	7.18	0.122*
	Under Diploma	10	31.25	11	33.33	16	54.40		
	Diploma and Higher	17	53.12	11	33.33	14	41.17		
Cause of ESRD	Diabetes	7	21.87	8	24.24	6	17.64	3.64	0.880*
	Hypertension	5	15.62	3	9.09	6	17.64		
	Diabetes and Hypertension	14	43.75	13	39.39	15	44.11		
	Other	6	18.75	9	27.27	7	20.58		
History of Erythropoietin Injection	Yes	24	75	27	81.81	28	82.35	0.67	0.711*
	No	8	25	6	18.19	6	17.65		

*Chi-square test

Table 2. Intergroup and intragroup comparison of the mean pruritus score and mean percentage of pruritus area

variable	time	Chia Oil Group	Coconut Oil Group	Control Group	P-value (intragroup)
Pruritus	Before	4.67±1.69	4.36±1.73	4.48±0.88	P=0.692*
	Week 2	2.61±1.17	3.00±1.15	3.83±1.08	p<0.001**
	Week 4	3.66±1.46	3.91±1.81	4.33±1.42	0.012**
	P value (intergroup)	<0.001**	<0.001**	0.001**	
percentage of pruritus area	Before	29.81±11.30	30.54±11.89	30.20±9.87	p=0.965*
	Week 2	27.00±11.65	22.09±8.74	27.79±9.49	P=0.005**
	Week 4	29.25±12.52	26.72±9.67	30.44±10.39	0.140**
	P-value (intergroup)	0.175***	<0.001***	0.210***	

*ANOVA

** ANCOVA

*** Repeated measures ANOVA

pruritus score in the two groups of chia oil (2.61 ± 1.17) and coconut oil (3.00 ± 1.15) were lower than the control group (3.83 ± 1.08). Also, in the fourth week after the intervention, the control group had the highest mean pruritus score (4.33 ± 1.42) among all three groups ($P < 0.001$). The results of repeated measures ANOVA test showed that the mean pruritus score was significantly different in the two groups of chia oil ($P < 0.001$) and coconut oil ($P < 0.001$) before, at the end, and two weeks after the intervention.

Also, Table 2 showed that the coconut oil group had the highest mean percentage of pruritus area (30.54 ± 11.89) and the chia oil group had the lowest mean percentage of pruritus area. The percentage of pruritus area before the intervention didn't significantly differ in the three groups of chia oil, coconut oil, and control groups ($P = 0.965$). The results showed the changes in the mean percentage of pruritus area were statistically significant in the coconut oil group, but these changes were not significant in the two other groups. The mean percentage of pruritus area before the intervention was 30.54 ± 11.89 in the coconut oil group which decreased to 22.09 ± 8.74 at the end of the intervention, and finally increased to 26.72 ± 9.67 two weeks after the intervention ($P < 0.001$).

The results of ANOVA and ANCOVA tests showed that serum levels of phosphorus, calcium, and urea were not significantly different between the three groups before and after the intervention ($P > 0.05$) (Table 3).

Table 3. Comparison of mean serum levels of phosphorus, calcium, and urea between the three groups

Time	Variable	Chia Oil Group	Coconut Oil Group	Control Group	P-value
		Mean± SD	Mean± SD	Mean± SD	
Before	Phosphorus	5.38±1.46	5.44±1.54	5.46±1.39	0.974*
	Calcium	8.56±0.85	8.69±0.88	8.36±0.56	0.230*
	Urea	132.40±24.77	125.18±38.41	116.37±38.79	0.177*
Week 4	Phosphorus	5.31±1.38	5.36±1.42	5.56±1.44	0.727**
	Calcium	8.12±1.13	8.55±0.81	8.32±0.66	0.138**
	Urea	115.43±32.44	113.78±37.07	109.94±30.19	0.948**

*ANOVA

**ANCOVA

Discussion

The results of the present study showed that the use of chia and coconut oil is effective in reducing pruritus in hemodialysis patients. Although both chia and coconut oils have a positive effect on reducing pruritus, according to the results of this study, chia oil has a greater and longer-lasting effect than coconut oil. The present study showed that the effect of oils can remain for two weeks. One of the hypotheses related to the pathophysiology of pruritus is the imbalance of essential fatty acids in

the body (9). Since chia seed oil is one of the richest plant sources of Omega-3 fatty acids, this may be one of the reasons why chia seed is more effective than coconut because Omega-3 fatty acids could be used as an efficient drug for the treatment of pruritus in uremic patients (14). In the study by Jeong et al., the researchers found that chia oil was effective in treatment of itching and dry skin (8, 14). A patent application of 1–10% of pure chia seed oil reports a moisturizing effect, while also treating atopic dermatitis, contact dermatitis, ichthyosis, chronic eczema, psoriasis, and xerosis accompanied by pruritus caused by chronic renal failure and diabetes mellitus (15). Melastuti and colleagues stated that topical application of coconut oil had a positive effect on pruritus in hemodialysis patients (24). These results are consistent with the results of the present study. In another study conducted by Lin et al., the results showed that baby oil was effective in reducing pruritus in patients undergoing hemodialysis (6). Due to the fact that baby oil contains coconut oil and mineral compounds, the results of the study by Lin and colleagues can be considered in line with the results of the present study (26).

The study of Shahgholian and colleagues showed that the use of aromatic oils of chia, lavender, and mint had no effect on the pruritus of patients undergoing hemodialysis, which was not consistent with the results of the present study (19).

According to the results of the present study, there was no significant difference between the three groups in terms of laboratory parameters. Since the researchers didn't find a study which was performed based on the effect of vegetable oils, so it is not possible to confirm or rule out the effects of the oils used in this study or other vegetable oils on the laboratory parameters of patients undergoing hemodialysis.

One of the limitations of the present study was the impatience and forgetfulness of the participants which led to forget the use of oils. Therefore, the researchers tried to remind the use of oils and also the use of Vaseline through regular visits during dialysis and using SMS. Other limitations of this study include the duration of the intervention. Therefore, the results obtained in this study are valid only for the short-term effects of chia and coconut oil. It can also be pointed out that pruritus and laboratory parameters can be affected by various physical, psychological, and environmental factors and cannot be completely controlled by the researcher. However, it was tried to control these factors by having a control group and considering the inclusion and exclusion criteria.

Implications for practice

The findings of this study indicated that short-term use of chia and coconut oils had positive effects on pruritus in patients with ESRD. Although it seems that topical application of chia oil has a greater and longer effect than coconut oil on the severity of pruritus, but in this study, the percentage of pruritus area in the coconut oil group was significantly reduced compared to the chia oil group. It can be concluded that topical use of chia and coconut oils has a significant effect on improving pruritus in patients with ESRD undergoing hemodialysis. The topical application of chia and coconut oils is a non-invasive method that can be easily used and reduce health care costs.

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Conflicts of interest

The authors declared no conflict of interest.

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