

Research Article

The Effectiveness of the Combination of Virgin Coconut Oil (VCO) and Lemongrass (*Cymbopogon nardus* L) on Skin Moisture in Patients Undergoing Hemodialysis

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Abstract

Chronic kidney disease causes significant damage to other organs, including the skin. It becomes dry, rough, and itchy due to inadequate fluid intake and the buildup of urea in the skin tissue. This condition requires immediate treatment to prevent further skin damage, one approach being the use of a combination of coconut oil and lemongrass. This study aims to analyze the combination of Virgin Coconut Oil and Lemongrass for skin care in patients undergoing hemodialysis therapy. This research method is quantitative using a quasi-experimental design with a one group pre-test-post-test design between the intervention group and the control group. The sampling technique used purposive sampling on 20 respondents in the intervention group and 20 respondents in the control group. The results of the Wilcoxon test showed an increase in skin moisture in the intervention group with a p value = 0.002 and the control group with a p value = 0.046 ($P < 0.005$). The results of the visual skin dryness test and uremic pruritus did not show significant results, so it is hoped that patients can use the combination of VCO and lemongrass as an alternative for skin care for CKD patients undergoing hemodialysis.

Keywords: Virgin Coconut Oil, Lemongrass, Skin care, Hemodialysis

Introduction

Chronic Kidney Disease (CKD) is a chronic condition characterized by the failure of the kidneys to filter metabolic wastes from the body. This is usually progressive and irreversible, preventing normal recovery. This kidney failure often affects other vital organs, seriously endangering bodily functions (Tanoto & Zaenal B., 2022). CKD is currently a widespread disease in the community, making it known as the world's deadliest disease. The prevalence of CKD is quite

high, reaching 10% of the population. An estimated 843.6 million individuals worldwide experience chronic kidney failure in stages 1-5, caused by increasing risk factors such as obesity, diabetes mellitus, and other kidney infections (Kovesdy, 2022). Meanwhile, the results of the 2018 Basic Health Research (RISKESDAS) showed that chronic kidney disease in Indonesia increased from year to year, reaching 0.38% or 3.8 people per 1,000 population, and approximately 60% of kidney failure sufferers require dialysis or renal replacement therapy. Data from the 2020 Indonesian Renal Registry (IRR) showed that the prevalence of CKD undergoing dialysis was highest among those with a previous background of hypertensive kidney disease, diabetic nephropathy, and glomerulopathy (Ministry of Health, 2020).

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Summited: 17-01-2026 Revised: 23-05-2026

Accepted: 04-06-2026 Published: 10-07-2026

Chronic Kidney disease with a rapidly increasing global health and healthcare burden due to the increasing number of patients undergoing hemodialysis. Therefore, hemodialysis has become a treatment option, along with peritoneal dialysis and kidney transplantation, as well as renal replacement therapy (Mailani, 2025).

Chronic kidney disease (CKD) is a complex disease that can cause various organ dysfunctions, including skin dysfunction. Skin disorders can include xerosis and pruritus. Xerosis, also known as dry skin, is caused by skin atrophy, decreased sebaceous and sweat gland function, and reduced skin fat and water content, resulting in reduced moisture in the epidermis. Furthermore, vitamin A retention due to kidney failure to secrete this substance leads to accumulation in the subcutaneous tissue of the skin, leading to atrophy of the sebaceous and sweat glands, ultimately leading to dry and itchy skin (Yonathan & Darmawan, 2021).

Dry and itchy skin can also be caused by chronic kidney disease (CKD), due to the buildup of urea in the skin, known as uremic pruritus, in patients undergoing hemodialysis. Uremic pruritus itself causes itching. Uremic pruritus is also caused by the accumulation of toxic metabolites resulting from inadequate excretion, such as increased blood phosphorus levels. This then combines with serum calcium to form calcium phosphate, which eventually settles in the skin and other tissues. This activates local nerve fibers and causes pruritus (Agarwal et al., 2021).

Dry and pruritic skin conditions can cause discomfort, so immediate treatment is essential. One potential use is the use of VCO (Virgin Coconut Oil) and citronella. VCO is pure coconut oil, with a primary component of saturated and unsaturated fatty acids, approximately 90% saturated and 10% unsaturated fatty acids. It also contains medium-chain fatty acids (48-53% lauric acid) and 7% caprylic acid, which act as antioxidants (Salimi et al., 2023). VCO contains highly beneficial polyphenols such as methyl catechin, gallic acid, myricetin glycoside,

quercetin, and dihydrokaempferol. These polyphenols and phenolic acids can exhibit various therapeutic benefits, including skin hydration, anti-inflammatory, antibacterial, antioxidant, and wound healing properties (Abdalla et al., 2024).

VCO has a significant effect on skin moisture, this was found in the results of previous research which stated that the intervention group was compared with the control group after administering the therapy program (p value <0.05) which means that VCO can be used safely to increase skin moisture in CKD patients undergoing hemodialysis (Saodah et al., 2020). The results of other studies also stated that the intervention of applying VCO topically in the morning and evening for 14 days to CKD patients undergoing hemodialysis at Dr. M Djamil Padang General Hospital using a skin moisture analyzer found that there was a significant effect on skin moisture in patients who were given this therapy with a value (p value = 0.000) (Rahmi & Nelwati, 2023). However, both studies only used pure VCO obtained from naturally dried coconuts.

Apart from giving VCO, Lemongrass can also be used in skin care with its main ingredients, essential oils, namely citronellal, citronellol, and geraniol. This essential oil has various benefits, including antibacterial and antifungal properties, and potential use in perfumes and cosmetics. Furthermore, lemongrass also has a strong antioxidant content of 8.23 ppm (Najmah et al., 2023). Citronella also contains secondary metabolite compounds such as terpenoids, flavonoids and phenolic acids which can be used as anti-inflammatory agents (Du et al., 2024).

Lemongrass, besides being an antioxidant and anti-inflammatory, is also an anti-fungal, as shown by the results of previous research, which found that lemongrass has the potential to be an anti-fungal, namely *Candida Albican* with an MIC of 256 µg/mL (Trindade et al., 2022). Other research also suggests that lemongrass essential oil and mango seed extract can treat acne inflammation and have the potential to act as natural anti-inflammatory drugs (Nguyen et al.,

2024). Other studies show that Lemongrass exhibits the highest inhibitory activity against *Aspergillus flavus* and *Aspergillus parasiticus*, which is effective as an antifungal and antiflatulogenic (Sawadogo et al., 2022).

A survey from Royal Prima Medan Hospital found that the average number of CKD patients undergoing hemodialysis was 112 per month, and many patients experienced decreased skin moisture (xerosis), *uremic pruritus* (itchy skin), then with the above background, researchers are interested in conducting research on "Analysis of the Combination of Virgin Coconut Oil (VCO) with Lemongrass (*Cymbopogon nardus* L) in Skin Care of Hemodialysis Patients at RSU Royal Prima Medan". Previous research only used Virgin Coconut Oil to reduce dry skin in patients undergoing hemodialysis, while this study combines Virgin Coconut Oil with Lemongrass, this is because both ingredients have a synergistic effect, namely Virgin Coconut Oil works primarily as an emollient and skin barrier repair through lauric acid, medium chain triglycerides, and skin hydration effects, while Lemongrass is rich in compounds such as citronellal, geraniol, and citronellol which have anti-inflammatory, antibacterial, antioxidant activities, while providing a mild aromatherapy effect so that novelty appears when the two are combined to produce skin barrier repair and active anti-inflammatory in one natural formula. Thus, the combination of VCO and Lemongrass is expected to be a skin treatment to reduce dry skin, improve inflammation and reduce itching or pruritus

Methods

This study is a quantitative study using a quasi-experimental design through a pre-test-post-test design with one intervention group and one control group (Saputra et al., 2020). This design allows researchers to analyze the comparison of skin moisture and uremic pruritus before and after the combination of VCO and lemongrass. The population in this study consisted of 112 patients undergoing hemodialysis at Royal Prima Hospital in May using propositional sampling and the

Slovin formula with a sample of 40 people consisting of 20 people were selected as the intervention group for the combination of VCO and Lemongrass and one group of 20 people as a control Positive who were given Vaseline lotion.

For raw materials, the combination of VCO and Lemongrass is carried out through the centrifugation method of 20 grated green coconuts and 1 kg of finely lemongrass, then the two ingredients are mixed and macerated with water, then filtered, then centrifuged at a speed of 3500 RPM for 45 minutes to become a combination of VCO and lemongrass, then the results of the combination of VCO and Lemongrass are examined for their content in the laboratory (Salimi et al., 2023). The content of VCO and Lemongrass is determined through organoleptic testing and chemical analysis of the purity of the material at the BARISTAN Laboratory (Center for Industrial Research and Standardization).

Measurement of skin dryness level was done visually using the Overall Dryness Score (ODS) scale with a grade of 0–4 adapted from the Highley et al or Kligman method. Visual measurement of skin dryness with the following criteria 0: Normal skin, no peeling, 1: Slight peeling, skin looks rough, looks slightly whitish, 2: Peeling, slightly rough surface, 3: Marked by the presence of scales and looks a little gap, rough, looks cracked, 4: Severely scaly, very rough. Measurement of uremic pruritus is by using the Numeric Rating Scale (NRS) assessment sheet, namely a scale of 0: no itching, 1-3: mild itching and does not interfere with activities, 4-6: moderate itching and interferes with activities, 7-10: severe itching that really interferes with activities and sleep (Fishbane et al., 2020).

Measuring skin moisture using a Skin Moisture Analyzer, a digital device widely used in the beauty and health fields, offers remarkable capabilities in measuring skin moisture levels. The Skin Moisture Meter automatically detects skin condition and displays results as a percentage. The Skin Moisture Meter measures the skin's electrical resistance, which depends on the level of hydration and dryness. The average

moisture content of normal skin is 35-40% (Saodah et al., 2020).

Results

VCO and Lemongrass Content

The results of research from the laboratory show that the content of VCO and the combination of VCO and Lemongrass it was found that Smell, color, flavor, water Content, Oleic Fatty Acid, Palmitic Fatty Acid, Pelikan Oil, Lead (Pb) Levels, Cadmium (Cd) Levels, and Tin (Sn) Content still within normal limits according to SNI 01-2896-1998.

Demographic and univariat data

The research results obtained from demographic data conducted during the research on intervention and control patients can be seen in Table 1. The research results obtained from pre and post skin care data for patients with a combination of VCO and lemongrass intervention carried out during the research can be seen in Table 2. Furthermore, the research results obtained from pre- and post-skin care data for control patients who were given lotion during the research can be seen in table 3.

Bivariate Analysis of Treatment Pre and Post Skin of Intervention and Control Group

Research results with comparing two groups of paired (dependent) data or pre and post treatment using the Wilcoxon test on intervention patients given a combination of VCO and Lemongrass can be seen in table 4. Research results with comparing two groups of paired (dependent) data or pre and post treatment using the Wilcoxon test on control patients given lotion can be seen in table 5.

Discussion

VCO and Lamongrass Content

The results of the study found that the content of VCO with a combination of VCO showed chemical characteristics such as odor, color, taste, water content, fat content in normal status, as well as lead, cadmium and tin levels having a value of

<0.01 mg / kg which means that the material is safe from heavy metal contamination that is harmful to health. From the results of previous studies, it was stated that VCO is safe for health, it is proven that VCO has high antioxidants such as polyphenols as hepatoprotective and reduces oxidative stress (Famurewa et al., 2019).

The results of the study showed that the content of VCO and the combination of VCO with fragrant lemongrass is still safe to use because it still meets SNI standards, and it can be seen that the content of the combination of VCO with fragrant Lemongrass has a lower water content and higher levels of oleic and palmitic fatty acids compared to VCO alone.

Demographic Data

Demographic data shows that the highest prevalence of CKD is >50 years, with more men than women, and the most common cause of CKD is hypertension. Previous research has shown that hypertension can significantly increase the decline in kidney function, which can impact glomerular filtration damages the small blood vessels in the kidneys, making them narrow and weak, so that the kidneys do not get enough blood, nutrients, and oxygen to filter waste and excess fluid from the body, which eventually disrupts kidney function gradually and can lead to kidney failure (On et al., 2023). Therefore, the data shows that many men suffer from CKD, previously diagnosed as hypertension. Hypertension is the most common disease in society, largely due to poor lifestyle choices, such as diets high in saturated fat, high in purines, high in salt, and preservatives, food colorings, and flavorings. It can also be caused by smoking and lack of exercise, which can lead to obesity.

Chronic kidney disease (CKD) is a chronic condition characterized by impaired kidney function and decreased glomerular filtration rate. This disease is influenced by various factors, including diabetes mellitus (DM), chemotherapy, and kidney disease. CKD affects >10% of the global population, primarily in individuals with DM and hypertension (Prahastuti et al., 2025).

The results of this study align with previous research, which found that hypertension can contribute to CKD, particularly in those aged 60 years and older with a history of obesity. In addition to reducing glomerular filtration, it has also been shown that continuous use of antihypertensive medications can worsen kidney function (Monique et al., 2022). Hypertension has a close relationship with the occurrence of CKD due to decreased glomerular filtration and side effects of drugs, but other factors can also cause CKD, such as age, gender, education, work, marital status and other diseases such as diabetes mellitus and a history of previous kidney disease.

Univariate Analysis of Skin Care Pre and Post Intervention and Control Group

The results of the study in the intervention group above showed that the skin condition was visually normal in 16 people (80%), the majority of skin moisture was abnormal in 20 people (100%), and Uremic pruritus was mostly mild itching in 13 (65%). From the study above, it was found that the use of a combination of VCO and fragrant lemongrass was more effective in overcoming skin moisture, as evidenced by the fact that out of 20 patients who experienced abnormal skin moisture, 20 people (100%) could be overcome by a combination of VCO with Lemongrass to 10 people (50%).

The results of the study in the control group using lotion can be found that the skin condition is visually normal skin in 9 people (45%), the majority of skin moisture is abnormal in 20 people (100%), and uremic pruritus is mostly mild itching in 16 people (80%). From the above study it was found that the use of lotion can overcome skin moisture, as evidenced by the use of lotion in 4 people (20%).

Chronic kidney disease (CKD) is characterized by a gradual, often irreversible, loss of kidney function, which severely affects the body's ability to excrete waste products, resulting in uremia, fluid overload, and a number of other metabolic complications, one of which is the accumulation of urea and creatinine in the skin which will affect

skin health (Sample, 2025). From the research results, the patient has experienced skin disorders such as dry skin, decreased moisture and itching. This is caused because the patient has experienced an increase in urea in the skin due to the effects of chronic kidney failure that has been going on for years.

The research results show that CKD patients have dry skin with abnormal moisture, with uremic pruritus, predominantly characterized by mild itching. This is consistent with previous research that found that CKD can affect skin health, such as pruritus, which is caused by poor excretory mechanisms. This is primarily due to the buildup of toxins such as urea and an imbalance of minerals such as phosphorus and calcium in the blood, which can cause dry, irritated skin and trigger an inflammatory response and the release of chemicals that cause itching. Poorly functioning kidneys fail to remove waste and maintain electrolyte balance, causing these substances to build up and affect skin health (Wang et al., 2025).

Hemodialysis is a kidney replacement therapy needed for CKD patients which functions to remove fluids and waste from the body when the kidneys are progressively or acutely unable to perform their duties (Siregar et al., 2022). However, because CKD is a chronic and long-term condition that can affect skin health, immediate treatment is needed to avoid further complications, such as by combining VCO and Lemongrass.

Bivariate Analysis of Treatment Pre and Post Skin of Intervention and Control Group

From the above research, it is known that the results of the Wilcoxon test showed a significant difference of 0.002 ($p < 0.05$) between skin moisture before and after being given a combination of VCO and Lemongrass. Likewise in the control group, the results of the Wilcoxon test showed a significant difference of 0.046 ($p < 0.05$) between skin moisture before and after being given lotion, so it can be concluded that the combination of VCO and Lemongrass is effective

in increasing skin moisture, as well as in the control group that lotion can increase skin moisture. However, from the results of the study, the combination of VCO and Lemongrass is better than the use of lotion in increasing skin moisture, while visual skin dryness and uremic pruritus have not shown significant values ($p > 0.05$).

Thus, the results of the above study align with previous research, which stated that VCO is a processed vegetable oil extracted from mature coconuts. VCO has anticancer, antimicrobial, analgesic, antipyretic, and anti-inflammatory properties, as well as a natural moisturizer that can be used safely (Rao et al., 2024). The combination of VCO and Lemongrass has the effect of maintaining skin moisture and can reduce itching on the skin because Lemongrass also has active antioxidant and anti-inflammatory substances such as phenolics which are very beneficial for skin health (Cymbopogon et al., 2022).

Conclusions

Based on the research results, it was concluded that administering a combination of VCO and lemongrass to the skin of hemodialysis patients can significantly increase skin moisture as well as in positive control patients who were given lotion, but there has not been a decrease in the level of skin dryness and uremic pruritus. For further research, it is hoped that it can use a larger sample with a Randomized controlled trial method, Long-term safety tests, analysis of effectiveness compared to standard medical moisturizers, and more in-depth testing of active chemical content.

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Table 1. Demographic Data (intervention group n=20, control group n=20)

Demographi	Intervention Patient		Control Patient	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Age (years)				
< 20	1	5	0	0
20-30	2	10	4	20
31-40	2	10	3	15
41-50	3	15	6	30
>50	12	60	7	35
Gender				
Man	12	60	7	35
Woman	8	40	13	65
Education				
Elementary School	1	5	1	5
Junior High School	1	5	1	5
High School	12	60	14	70
PT	6	30	4	20
Marital Status				
Not married yet	4	20	3	15
Marry	15	75	17	85
Widow/Widower	1	5	0	0
Job				
Private sector employee	4	20	1	5
Farmer	0	0	0	0
Self-employed	5	25	6	30
civil servant	1	5	2	10
Housewife/ Not Working	10	50	11	55
Duration of HD Therapy				
< 1-5 Years	13	65	13	65
> 5 Years	7	35	7	35
Accompanying Diseases				
Diabetes Melitus	3	15	2	10
Hypertension	12	60	14	70
Kidney Disease	4	20	3	15
Other	1	5	1	5

Table 2. Pre- and Post-Intervention Skin Care for Patients (Combination of VCO and Lemongrass)

Demographic Data	Pre-Intervention		Post Intervention	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Visual Dryness of the Skin				
Normal skin	16	80	15	75
A Little Peeling	3	15	4	20
Peeling	1	5	1	5
Scaly and slightly gapped	0	0	0	0
Severely scaly and very rough	0	0	0	0
Total	20	100	20	100
Skin Moisture				
Normal	0	0	10	50
Abnormal	20	100	10	50
Total	20	100	20	100
Uremic Pruritus Condition				
Not Itchy	5	25	6	30
Mild Itching	13	65	12	60
Moderate Itching	2	10	2	10
Severe Itching	0	0	0	0
Total	20	100	20	100

Table 3. Pre- and Post-Care for Control Patients (Lotion Administration)

Demographic Data	Pre-Patient Control		Post Patient Control	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Visual Dryness of the Skin				
Normal skin	9	45	10	50
A Little Peeling	8	40	7	35
Peeling	1	5	1	5
Scaly and Few Gaps	2	10	2	10
Severely Scaly and Very Rough	0		0	0
Total	20	100	20	100
Skin Moisture				
Normal	0	0	4	20
Abnormal	20	100	16	80
Total	20	100	20	100
Uremic Pruritus Condition				
Not Itchy	0	0	0	0
Mild Itching	16	80	16	80
Moderate Itching	4	20	4	20
Severe Itching	0	0	0	0
Total	20	100	20	100

Table 4. Results of Visual Analysis of Skin Dryness, Skin Moisture, and Uremic Pruritus Before and After Administration of the Combination Intervention of VCO and Lemongrass in the Intervention Group

	Visual Skin Dryness After Intervention - Visual Skin Dryness Before Intervention	Skin Moisture After Intervention - Skin Moisture Before Intervention	Uremic Pruritus After Intervention - Uremic Pruritus Before Intervention
Z	-1,000b	-3.162c	-1,000c
Asymp. Sig. (2-tailed)	0.317	0.002	0.317

Table 5. Results of Visual Analysis of Skin Dryness, Skin Moisture, and Uremic Pruritus Before and After Lotion Administration in the Control Group

	Visual Skin Dryness After Lotion Intervention - Visual Skin Dryness Before Lotion Intervention	Skin Moisture After Lotion Intervention - Skin Moisture Before Lotion Intervention	Uremic Pruritus After Lotion Intervention - Uremic Pruritus Before Lotion Intervention
Z	-1,000b	-2,000b	0.000c
Asymp. Sig. (2-tailed)	0.317	0.046	1,000