The Effectiveness of Applying Coconut Oil and Lime in Reducing Stretch Marks in Pregnant Women in the Second and Third Trimesters

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ARTICLE INFORMATION	ABSTRACT
	Introduction: *Stretch marks are a common complaint among pregnant women caused by excessive stretching of the skin. Approximately 90% of pregnant women experience stretch marks, especially in the third trimester. The World Health Organization (2020) reported that of 300,900 pregnant women worldwide, approximately 198,000 (66%) experienced stretch marks. In Indonesia, data from the 2018 Household Health Survey (SKRT) showed that 67.4% of 1,000 pregnant women experienced striae gravidarum. A preliminary study at BPM Affah Fahmi found that of 76 pregnant women observed for one week, 35 (46%) experienced stretch marks.* ***Objective:*** *This study aims to analyze the effectiveness of the combination of coconut oil and lime in reducing stretch marks in pregnant women in the second and third trimesters .* ***Method:*** *The research method used was a pre-experimental one-group pre-test post-test design. The sample consisted of 32 randomly selected pregnant women. Treatment was administered for two months, with coconut oil applied in the morning and lime juice applied at night. The Atwal method was used to assess the number of stretch marks. Data were analyzed using a paired t-test.* ***Results:*** *The results of the paired t-test showed a p value < 0.05, which indicated a significant difference in the number of stretch marks before and after treatment.* ***Conclusion:*** *This study concluded that the use of coconut oil and lime juice was effective in fading stretch marks. It is recommended that healthcare providers educate pregnant women about this natural and affordable skin care method.*

Introduction

Stretch marks , also known as striae gravidarum , are a common complaint experienced by pregnant and postpartum women, both those who delivered vaginally and via cesarean section. Stretch marks may appear darker, and approximately 90% of women experience them, especially during the third trimester. While some stretch marks may fade over time, others remain permanent. The presence of permanent stretch marks can be a cause for concern for mothers, making them feel less attractive and bothered by the marks that may persist even in subsequent pregnancies (Hidayatunnikmah et al., 2022) . They are characterized by red or purple lines on the skin that later fade to a white or silvery color (Istikomah et al., 2025) . Stretch marks form when the skin stretches rapidly, causing damage to the tissue, which in turn causes skin damage. (Hastuti & Sukesi, 2023) . Stretch marks disrupt the elastic fiber network in the dermis. The skin consists of three main layers: the epidermis (outer layer), the dermis (middle layer), and the hypodermis or subcutaneous layer (the deepest layer) (Rita et al., 2023).

For some people, stretch marks are not a major concern. However, in many cases, stretch marks can cause significant discomfort, such as itching on the abdomen, breasts, thighs, or upper arms. These symptoms are a normal response to skin stretching or may arise from an allergic reaction to placental antigens. Proper care is essential from the beginning of pregnancy, including avoiding scratching the itchy areas (Syarifah et al., 2024) . Striae gravidarum usually stretches transversely along the abdominal wall or is located above the hips. In pregnant women, especially in the third trimester, stretch marks commonly appear on the anterolateral abdomen (35%), hips (25%), thighs (14%), breasts (13%), and buttocks (13%) (Latifah & Tsaqilla, 2024) .

Organization (WHO) reported a 5% increase in the number of pregnant women in 2020 compared to the previous year, reaching approximately 300,900 worldwide. An estimated 198,000 of these, or approximately 66%, experienced stretch marks during pregnancy (WHO, 2020). A 2019 survey conducted by the Yale School of Medicine in the United States found that out of 100 pregnant women, 63.4% experienced stretch marks, or in medical terms, striae gravidarum (Nengsih & Rahayu, 2023) and (Handayani et al., 2024) .

In Indonesia , data on striae gravidarum is limited and not widely reported by the Ministry of Health. However, the 2018 Household Health Survey (SKRT) recorded that approximately 67.4% of 1,000 pregnant women experienced striae gravidarum. A study by Meisura & Triana (2023) reported that the incidence of striae gravidarum based on hospital records in Indonesia ranges between 53% and 64% (Lestari et al., 2023) . One possible solution is through herbal medicine , a form of complementary and alternative medicine that is more affordable than laser therapy or cosmetic surgery. Prevention and treatment of stretch marks follow the same principles as wound healing and scar repair (Safitri & Mulyani, 2022) .

Based on preliminary data collected at BPM Afah Fahmi, Surabaya, it was found that of 76 pregnant women who underwent antenatal checkups, 35 (46%) showed signs of stretch marks or striae gravidarum with varying degrees of severity. This prevalence distribution indicates that the incidence of striae gravidarum at the study site is relatively high, both in the initial observation (preliminary study) and in the population selected as study respondents. This high prevalence is likely influenced by physiological factors such as significant skin stretching during the second and third trimesters, hormonal changes, a history of previous pregnancies, and inadequate skin care during pregnancy.

To treat stretch marks, non-pharmacological treatments containing hydroxyproline-C, vitamin E, and coconut oil can be an alternative. Previous research has shown that one of the easiest ways to reduce stretch marks is to apply coconut oil , which is extracted from coconut flesh through a cold or low-heat process. This method produces a clear, non-rancid oil that is free from free radicals caused by high heat (Nastiti & Umairo, 2024) .

Coconut oil also contains fat-soluble vitamins such as vitamins A, D, E, and K, along with pro-vitamin A (carotene), which is essential for metabolism. Its mechanisms of action include antioxidant and anti-inflammatory properties, helping to keep skin moisturized and improve its elasticity. The antioxidant properties of vitamin E play a key role in protecting the skin from free radical damage (Rasyidah & Hasanah, 2024) . The main components of coconut oil are approximately 90% saturated fatty acids and approximately 10% unsaturated fatty acids. The saturated fatty acids in coconut oil are predominantly lauric acid. Coconut oil contains approximately 53% lauric acid and approximately 7% caprylic acid (Suharcaryo & Yuwidiantoro, 2020) . Coconut oil is not a good source of vitamins and minerals; however, it still contains certain vitamins in limited amounts, with vitamin E being the most abundant (1–3%) (Gondokesumo et al., 2023) . According to the Ministry of Health (2022) , the substances contained in 100 grams of lime are: Energy 44 calories, Protein 0.5 grams, Fat 0.2 grams,

Carbohydrate 10 grams, Fiber 0.4 grams, Calcium 18 milligrams, Phosphorus 22 milligrams, Iron 0.2 milligrams, Sodium 3 milligrams, and Potassium 108.9 milligrams.

Besides coconut oil, lime (Citrus aurantifolia) has become a popular natural remedy for reducing striae gravidarum. Lime is an affordable and readily available ingredient. Lime contains citric acid and vitamin C , which are known for their skin-lightening properties . This lightening effect helps reduce the contrast between striae and the surrounding skin. The natural oils in lime also provide a moisturizing effect , improving skin elasticity, and reducing the risk of striae gravidarum. Vitamin C in lime stimulates the production of collagen , a structural protein essential for maintaining skin elasticity and preventing or minimizing striae gravidarum (Yusnida et al., 2023) .

The urgency of this research lies in the high prevalence of stretch marks in pregnant women, which can impact physical and psychological health. Physically, stretch marks can cause itching, discomfort, and interfere with daily activities. Psychologically, this condition can affect body image and lower self-confidence, especially in postpartum women. Although various commercial methods exist to reduce stretch marks, many are relatively expensive and contain chemicals that can cause irritation. Therefore, it is necessary to find safer, more affordable, and easier-to-apply alternative therapies, such as the use of coconut oil and lime, which empirically contain active compounds that have the potential to increase skin elasticity and reduce stretch marks. This research is expected to provide scientific evidence on the effectiveness of combining these two natural ingredients as a non-pharmacological approach to minimize stretch marks in pregnant women.

Based on these properties and benefits, this study aims to scientifically examine the effectiveness of a combination of coconut oil and lime in reducing striae gravidarum in pregnant women in the second and third trimesters, so that it can become a natural treatment alternative that is safe, affordable, and easy to apply by the public.

Method

This study used a quantitative approach with a pre-experimental design, specifically a one-group pre-test post-test design, which aims to determine changes in the number of stretch marks before and after the coconut oil and lime application intervention without a comparison group (control). The study was conducted at BPM Afah Fahmi, Surabaya, from February to April 2025. The study population was all pregnant women in the second and third trimesters who had stretch marks and underwent antenatal care at BPM Afah Fahmi during the study period, totaling 35 people. The sample size was determined using the Slovin formula. Rounding resulted in 32 respondents, all of whom met the inclusion criteria and were selected as research samples. The Slovin formula was chosen because the research population was limited, and this method provided a proportional sample size with an acceptable margin of error, thus making the research results more representative. The sampling technique used was purposive sampling, taking into account the inclusion and exclusion criteria. The inclusion criteria for this study were: (1) pregnant women in the second and third trimesters; (2) having stretch marks in the abdominal area; (3) willing to participate as respondents and signing an informed consent; and (4) not currently using any cream or medication to reduce stretch marks. Exclusion criteria included: (1) pregnant women with a history of allergies to coconut oil or lime; (2) pregnant women with severe pregnancy complications; and (3) pregnant women who did not attend regularly during the intervention period.

The research instrument used was an observation sheet with the Atwal assessment method. This instrument was chosen because it provides an objective quantitative score for the number of stretch marks, thus facilitating the analysis of differences before and after the intervention. Scores were assigned based on the number of lines: 0 if no lines appeared, 1 if there were fewer

than 5 lines, 2 if there were 5–10 lines, and 3 if there were 11 or more lines. Data analysis began with a normality test using the Shapiro-Wilk test. Because the data were normally distributed, the analysis continued with a parametric statistical test, the paired t-test, to determine the difference in the average number of stretch marks before and after the intervention, with a significance level of $p < 0.05$. The paired t-test was chosen because it is suitable for examining the difference in the means of two measurements taken on the same subject, in line with the pre-test post-test design without a control group.

Results

Table 1 Characteristics of Research Subjects

Characteristics	Frequency	Percentage(%)	Mean ±SD Median;Min-Max
Age (yrs)			
<20	0	0	26.97±4.068
20-35	32	100	27.00;20-34
>35	0	0	
Gestational age			
14-27 Weeks	2	6.3	28.91±2.085
28-40 Weeks	30	93.8	29.00;25-32
Education			
Elementary	3	9.4	
, Middle, and High School	23	81.3	
PT	3	9.4	
Balance			
Primigravida	9	28.1	
Multigravida	23	71.9	
Grandgravida	0	0	
Pregnancy			
Single pregnancy	32	100	
Twin/multiple pregnancy	0	0	
Skin color			
Fair skin	1	3.1	
Brown skin	31	96.9	
Dark skin	0	0	

Based on Table 1 , the characteristics of the respondents are described as follows. The general characteristics of the respondents show that the majority are in the age range of 20–35 years , with the number of respondents being 32 people (100%) . The average age is 26.97 , the standard deviation is lower than the average, namely 4.068 , the median (middle value) is 27.00 , with a minimum age of 20 years and a maximum age of 30 years . For the characteristics of gestational age , the majority of respondents are in the range of 28–40 weeks , with the number of respondents being 30 people (93.8%) . The average gestational age is 28.91, with a standard deviation of 2.085, a median of 29.00 , a minimum value of 25, and a maximum value of 32. The characteristics of educational background show that most respondents have completed junior high or high school , with 26 respondents (81.3%) . Parity characteristics show that most respondents were multigravida , with a total of 23 respondents (71.9%) . Regarding the number of pregnancies , all respondents had singleton pregnancies ,

with 32 respondents (100%) . As for skin color , the majority of respondents had brown skin , with 31 respondents (96.9%) .

Table 2. Frequency Distribution of Coconut Oil and Lime Application to Reduce Stretch Marks in Pregnant Women in the Second and Third Trimesters

Coconut Oil and Lime	Number of stretch marks					
	<5 Lines		6-10 Lines		>11 Lines	
	F	%	F	%	F	%
Pre-Test	0	0	12	37.5	20	62.5
Post Test						
Irregular	0	0	4	12.5	0	0
Normal	4	12.5	19	59.4	5	15.6

Based on Table 2 , the majority of respondents who received coconut oil and lime treatment had 6–10 stretch marks , namely 23 respondents (71.9%) . Among those who received treatment regularly , the majority also had 6–10 stretch marks , namely 19 respondents (54.4%) . Meanwhile, among those who received treatment irregularly , 4 respondents (12.5%) had 6–10 stretch marks .

Table 3. Frequency Distribution of the Number of Stretch Marks Before and After Using Coconut Oil and Lime in Pregnant Women in the Second and Third Trimesters

Number of stretch marks	F	%	Mean±SD Median;Min-Max
Pre-Exam			
<5 lines	0	0	11.81±3.623
6-10 lines	12	37.5	11.00;7-21
>11 lines	20	62.5	
Post Test			
<5 lines	4	12.5	8.31±2.334
6-10 lines	23	71.9	8:00 AM; 4:00 AM - 2:00 PM
>11 lines	5	15.6	

Based on Table 3 , the number of stretch marks on respondents before applying coconut oil and lime juice shows that the majority have more than 11 lines , namely 20 respondents (62.5%) . The mean value is 11.81 , with a standard deviation of (3.623) , a median of (11.00) , a minimum value of (7) , and a maximum value of (21) . Meanwhile, after two months of treatment using coconut oil once every morning and lime juice once every night , the number of stretch marks on pregnant women in the second and third trimesters shows that the majority have 6–10 lines , namely 23 respondents (71.9%) . The mean value is (8.31) , a standard deviation of (2.334) , a median of (8.00) , a minimum value of (4) , and a maximum value of (14) . The average reduction of about 3.5 lines indicates that the combination of coconut oil and lime juice is effective in fading stretch marks .

Table 4. Data Normality Test

	Kolmogorov-Smirnov [and]			Shapiro-Wilk		
	Statistics	df	signature	Statistics	df	Signature
PRE-TEST	.135	32	.146	.953	32	.171
POST TEST	.123	32	.200	.969	32	.482

Based on Table 4 , it can be concluded that the results of the normality test in this study indicate that the data on stretch marks of pregnant women in the second and third trimesters have a pretest significance value of 0.171 and a posttest significance value of 0.482 , both of which are greater than 0.05 . Therefore, according to the decision rule of the Shapiro-Wilk normality test , the data are normally distributed .

Table 5. Statistical test analysis Independent T-Test

	Means	Cstd Deviation.	Mean Standard Error	95% Interval Difference Lower	Confidence of the On	T	df	Signature (2-tails)
Pre-test-Post-test	.594	.499	.088	.414	.774	6,731	31	.000

The results of the Independent T-Test show a significance value (2-tailed) = 0.000 < 0.05 , which indicates that H_1 is accepted and H_0 is rejected . This means that there is a significant effect on reducing stretch marks in pregnant women in the second and third trimesters .

Discussion
Stretch Marks Before Using Coconut Oil and Lime in Second and Third Trimester Pregnant Women

The results of research conducted at BPM Afah Fahmi showed that before the intervention, the majority of pregnant women in the second and third trimesters, namely 20 respondents (62.5%) had more than 11 stretch marks, while only 12 respondents (37.5%) had 6–10 stretch marks.

This indicates that stretch marks are a common problem during pregnancy, especially in the second and third trimesters. This is supported by a WHO report (2020) which states that around 66% of mothers experience stretch marks during pregnancy (Nengsih & Rahayu, 2023) . This research is in line with research conducted by Fenny & Nia (2020) on the use of virgin coconut oil for the prevention of striae gravidarum during pregnancy at PMC Hospital, which reported that of 32 respondents, 6 pregnant women (18.8%) had less than 5 stretch marks, 15 pregnant women (46.9%) had 5–10 lines, and 11 pregnant women (34.4%) had more than 10 lines.

This is due to various physical changes often experienced by pregnant women in the second and third trimesters, including weight gain during pregnancy, which causes rapid and significant stretching of the skin due to fetal growth and hormonal changes. These changes can lead to reduced skin elasticity, making it more susceptible to tearing or the formation of stretch

marks. The appearance of stretch marks during the second and third trimesters can be influenced by several factors, including age, gestational age, education, parity, number of pregnancies, and skin color. Furthermore , stretch marks can also appear due to genetic factors in the family (Mammadov et al., 2024) . Based on Table 1, it can be seen that the majority of pregnant women in the second and third trimesters (32 respondents (100%) were aged between 20 and 35 years, which is categorized as the optimal reproductive age. The 20–35 age range is considered the safest for pregnancy and childbirth. Several studies also report a higher prevalence in those with larger abdominal circumference and greater weight due to fetal size (Safitri & Mulyani, 2022) . Based on previous research theories and findings, researchers believe that maternal age is a significant risk factor for the appearance of stretch marks, as younger women have a higher risk than older women .

Besides maternal age, gestational age can also influence the appearance of stretch marks. In this study, 2 respondents (6.3%) were in their second trimester, while 30 respondents (93.8%) were in their third trimester. Stretch marks often appear during the second and third trimesters of pregnancy; the longer the pregnancy progresses, the greater the likelihood of stretch marks developing. In early pregnancy, hormonal changes and skin stretching are relatively minimal, so the risk of stretch marks is lower. During pregnancy, the body undergoes significant hormonal changes (Variha et al., 2024) . Hormones such as estrogen and progesterone can weaken the skin structure, making it more susceptible to stretch marks. However, as pregnancy enters the second and third trimesters, fetal growth and weight gain can cause greater skin stretching (Stefaniak et al., 2022) . The results of this study are consistent with research conducted by Awal Permata & Khairiah (2023) , which showed that the most vulnerable gestational age is between 28 and 35 weeks, or the third trimester. This is in line with research findings showing that the highest proportion of mothers experiencing striae gravidarum is in the 26–30 year age group, which is 57.5%, and in third trimester pregnant women it is 100% (Maternity & Eva, 2019) . Based on previous research theories and findings, researchers argue that the third trimester of pregnancy is at high risk of triggering the appearance of stretch marks, because this period is marked by rapid fetal growth and significant maternal weight gain, so that the skin experiences maximum stretching.

In terms of education level, the majority of respondents, 26 respondents (81.3%), had junior high or high school education. The higher a person's education, the greater their knowledge of specific issues. Therefore, the higher a mother's education, the more likely she is to actively seek information regarding conditions and complaints experienced during pregnancy (Suyani, 2020) .

Parity, or the number of previous births, is a contributing factor to skin elasticity. Mothers who have given birth more than once have a higher risk of developing stretch marks compared to those who are pregnant for the first time. In this study, there were 9 respondents (28.1%) who were primigravidas and 23 respondents (71.9%) who were multigravidas. Each pregnancy causes skin stretching; therefore, the more pregnancies, the more skin elasticity decreases, making it more susceptible to tissue rupture. Stretch marks may appear darker in multigravida women with dark or black skin, although some stretch marks may fade over time (Syarifah et al., 2024) . Based on theory and previous research findings, researchers argue that mothers with more than one pregnancy are at higher risk of developing stretch marks because the skin has experienced repeated stretching, which reduces its elasticity.

In this study, all respondents had singleton pregnancies (32 respondents, 100.0%). Twin pregnancies can cause greater skin stretching compared to singleton pregnancies, thereby increasing the risk of stretch marks. This condition triggers significant dermal stretching and increases the likelihood of collagen fiber damage and reduced skin elasticity (Yolanda & Jusuf, 2022) . Based on theory and previous research findings, researchers argue that singleton

pregnancies can still cause stretch marks, although twin pregnancies generally carry a higher risk due to greater skin stretching.

Skin color plays a significant role in the visibility of stretch marks. In this study, 31 respondents (96.9%) had brown skin, while only 1 respondent (3.1%) had white skin. Stretch marks are common in women, especially those with dark skin. Mothers with dark skin tend to have more prominent stretch marks than those with lighter or white skin (Yolanda & Jusuf, 2022) . Based on theory and previous research findings, researchers believe that stretch marks are more easily visible on dark skin due to the higher color contrast, and in this skin type, stretch marks tend to appear more prominent and last longer .

Stretch Marks After Applying Coconut Oil and Lime to Pregnant Women in the Second and Third Trimesters

The results in Table 2 show that pregnant women in their second and third trimesters at PMB Affah Fahmi experienced significant improvements in the appearance of their stretch marks after being given coconut oil and lime juice once each. The majority of respondents reported a reduction in the number of stretch marks, with 23 respondents (71.9%) having 6–10 lines.

According to Nastiti & Umairo (2024), the use of coconut oil by pregnant women has been shown to have a positive effect on fading stretch marks and helping maintain skin moisture balance and elasticity. The main components of coconut oil are medium-chain saturated fatty acids such as lauric acid, caprylic acid, myristic acid, and palmitic acid, which function as natural moisturizers and are easily absorbed by the skin. Furthermore, according to research by Fenny & Nia (2020) , these compounds can help accelerate the process of skin cell regeneration and maintain the integrity of the dermal structure, thereby preventing further damage due to skin stretching .

Based on the research results of Rasyidah & Hasanah (2024), coconut oil functions as an antioxidant and anti-inflammatory, so it can maintain skin moisture and increase skin elasticity. The antioxidant properties of vitamin E function as a defense against free radicals. Vitamin E prevents fat oxidation, especially Polyunsaturated Fatty Acids (PUFA), and protects metabolic components that play a role in converting energy sources into ATP. The inhibitory mechanism of vitamin E is known as the chain-breaking antioxidant mechanism. Thus, vitamin E has an antagonistic effect against free radicals. Vitamin E is not only effective as an antioxidant but can also counteract the neurotoxic effects of free radicals. In a study conducted by Fenny & Nia (2020), administering coconut oil to pregnant women was proven effective in reducing stretch marks, with a p-value of 0.000 (p <0.05).

According to research conducted by Yusnida et al., (2023) , limes contain citric acid and vitamin C, which have skin-brightening properties, thus helping to reduce the contrast between stretch marks and the surrounding skin. The natural oils in limes provide a moisturizing effect on the skin, thereby increasing skin elasticity. Vitamin C in limes is known to stimulate collagen production, where collagen is a structural protein that is important for skin firmness, flexibility, and elasticity. By increasing collagen production, the healing process of stretch marks can occur more quickly and optimally. The use of limes can also provide a natural aromatherapy effect, increasing relaxation and emotional calm in pregnant women. These psychological benefits are very important for reducing anxiety and increasing self-confidence, especially in dealing with changes in body shape during pregnancy.

The results of this study are in accordance with the theory which states that stretch marks can occur due to activity patterns such as scratching, because stretch marks can cause itching, burning, dry skin, and emotional disturbances that make pregnant women feel uncomfortable (Rasyidah & Hasanah, 2024) .

Based on research conducted, an intervention of applying coconut oil in the morning and lime juice in the afternoon/evening for eight weeks resulted in significant changes in the appearance of stretch marks. Many pregnant women experienced a reduction in the number of stretch marks to 6–10, and in some cases, even fewer than five. The vitamin E and fatty acids in coconut oil act as antioxidants and anti-inflammatories, maintaining skin moisture and improving elasticity, while the vitamin C and citric acid in lime help stimulate collagen production and brighten skin tone. These findings indicate that the combination of these two natural ingredients is effective in reducing stretch marks in pregnant women. These improvements also demonstrate that consistent and appropriate use of coconut oil and lime can produce significant results.

The Effectiveness of Coconut Oil and Lime Application in Reducing Stretch Marks in Pregnant Women in the Second and Third Trimesters

Based on the results of a paired t-test, this study obtained a p-value of $0.00 < 0.05$, indicating a significant difference between before and after the intervention. These findings indicate that the use of coconut oil and lime is effective in reducing stretch marks in pregnant women during the second and third trimesters.

This research aligns with research conducted by Fenny & Nia (2020) which states that in the second and third trimesters of pregnancy, stretch marks occur due to changes in the skin, including excessive stretching of the skin surface and increased hormone secretion from the adrenal cortex during pregnancy. This condition causes collagen fibers to break. The application of coconut oil functions as an important moisturizer for the skin, because adequate moisture helps maintain skin cells, preventing premature aging and cracking. Good skin hydration and elasticity also support the skin regeneration process, so the skin does not become dry and wrinkled. Based on the results of the test conducted, the use of coconut oil showed effectiveness in reducing stretch marks in pregnant women, with a p-value of 0.000 ($p < 0.05$).

According to research by Yusnida et al. (2023) , limes have a whitening effect and can help reduce the contrast between skin tone and stretch marks through gentle exfoliation and collagen stimulation. Limes also contain natural oils that provide a moisturizing effect on the skin.

Based on the results of a pre-test and post-test study, the use of coconut oil and lime juice proved effective in reducing the appearance of stretch marks in pregnant women during the second and third trimesters. This was evidenced by significant changes in the number and appearance of stretch marks before and after the intervention. The majority of respondents who initially had more than 11 stretch marks experienced a reduction in the number. Furthermore, several pregnant women showed improved skin elasticity, as indicated by the absence of new stretch marks during the intervention period. This effectiveness is supported by the combined mechanism of coconut oil and lime juice. Coconut oil functions as an emollient that moisturizes the skin, prevents further damage, and maintains the integrity of the skin structure through its vitamin E and fatty acids, which act as antioxidants. Meanwhile, lime juice improves skin tone and texture through its vitamin C and citric acid content, which stimulate collagen production and accelerate the fading of stretch marks while improving overall skin integrity. The reduction in stretch marks is also influenced by mothers' compliance with regular coconut oil use. Therefore, the researchers concluded that the use of coconut oil and lime is a simple, safe, economical, and non-pharmacological intervention that can be widely implemented in the community as a self-care effort to reduce and fade stretch marks during pregnancy.

Conclusion

The results of stretch mark classification before the use of coconut oil and lime in pregnant women in the second and third trimesters generally showed a relatively high number of stretch marks . After using coconut oil and lime, respondents showed a decrease in the number of stretch marks . The combination of coconut oil and lime has been proven effective in fading stretch marks . Further research is recommended to evaluate the long-term effects of using coconut oil and lime. Future research is also expected to be expanded by using a wider design and population, applying probability sampling techniques, and including a control group.

Ethics approval and consent to participate

This research has passed the Ethical Feasibility test, Faculty of Science and Health, PGRI Adi Buana University, Surabaya with number: 153-KEPK dated January 30, 2025.

Thank-you note

Thanks are expressed to the practice for granting permission to conduct the research.

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