Original Article

Comparison of the Effect of Sesame and Almond Oil on the Incidence of Striae Gravidarum

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Abstract

Background: Striae gravidarum (SG) is one of the most common skin changes during pregnancy. **Objectives:** This study aimed to compare the effect of almond oil and sesame oil on the incidence of SG. **Methods:** A randomized controlled trial was conducted on 165 pregnant women referring to community health centers of Kashan, Iran. The participants in the two intervention groups received sesame oil or almond oil twice a day, from the 16th week to the end of the 36th week of gestation. The manifestations of SG and its severity were recorded at the end of the study. Data analysis was performed using descriptive statistics, Chi-square, one-way analysis of variance, and logistic regression analysis. **Results:** SG occurred in 63.60%, 60%, and 58.20% in the almond, sesame oil and control groups, respectively. No significant difference was found in the incidence of striae between the three groups in the 36th week of gestation ($P = 0.837$). None of the confounding variables could predict the occurrence of striae ($P > 0.05$). **Conclusion:** Neither sesame oil nor almond oil could significantly affect the occurrence of SG. Given the controversies between the studies, further studies are required to evaluate the effect of almond oil and sesame oil in the prevention of the SG.

Keywords: *Almond oil, Incidence, Pregnancy, Sesame oil, Striae gravidarum*

Introduction

Striae gravidarum (SG) is one of the most common skin changes in pregnancy, which is observed in 50%–90% of pregnancies. It is a physiological change in the skin that is red or purple, slightly deformed, and occasionally itches briefly. After childbirth, these skin lesions gradually change to gray scars, scratch slightly, and remain as wrinkled lines.[1,2]

The etiology of SG is unknown; however, hormonal factors,[3] reduced expression of fibronectin, collagen, and elastin genes,[4] and mechanical stretching of the skin may be involved in its formation.[5] Maternal age, race, skin type, base weight and weight gain during pregnancy, gestational diabetes, poor nutrition, neonatal birth weight, and family history of striae are among other possible risk factors for the development of SG.[6,7]

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These lesions cause pregnant women to worry about their beauty, diminish their self-esteem, and increase their mental health problems.[8,9]

No definite method was provided for the prevention and treatment of SG though it was reported that the use of certain creams and lotions,[10] herbal products, appropriate exercise and nutrition, and drinking water can prevent it or decrease its itching.[11-13] A number of studies investigated the effects of cocoa butter, almond oil, olive oil, and glycerine on the prevention of SG, but there is still insufficient evidence of the effectiveness of these substances.[14]

Almond oil contains compounds such as oleic acid, unsaturated fatty acids of omega-3, 6, 9, and Vitamin E and is used as a skin softener.[15] Sesame oil is also a herbal oil rich in Vitamin E and unsaturated fatty acids (omega-3 and omega-6) with antioxidant properties and makes the skin transparent and delicate.[16,17] It is effective in enzyme activity required for connecting collagen and elastin and may prevent the SG.[17] Collagen and elastin are important in the structure, strength, and vitality of the blood vessels, bones, and joints.[16]

A study in nulliparous women concluded that almond and *Aloe vera* oils without massage were more effective than the base cream in reducing itching and preventing SG, but all three substances had similar effects on the diameter and the number of striae.[18] Another study reported that sesame oil and its combination with sweet almond oil without massage were more effective in reducing the risk of SG than almond oil alone.[19] In a study of the effect of bitter almond oil on the prevention of SG, it has reported that the incidence of SG was lower when the oil was used with massage.[13] However, a review study has concluded that skin massage cannot increase the effect of the creams or other substances used for the prevention or reduction of SG.[20] Considering the compounds of sesame and almond oil, especially their richness in Vitamin E and given the availability and low cost of these oils, and due to the deficiency of evidence of the effectiveness massage, the question still remains: are sesame and almond oils effective in preventing SG when they are used with skin massage?

Objectives

The present study compared the effects of sesame and almond oils on the incidence of SG in pregnant women.

Methods

Design and participants

This randomized controlled, parallel-group, double-blind study was conducted from 2014 to 2017 on 165 pregnant women referring to community health-care centers in the north, south, east, west, and downtown of Kashan, Iran.

Since at the beginning of the study, no study was available on the effect of sesame oil, the effect size index formula was used to calculate the sample size. Considering the type I and the type II errors as 0.05 and 0.1, respectively, and assuming $d = 0.65$, the sample size was estimated at 50 participants per group. However, considering a possible drop out of 10%, the sample size increased to 55 per group.

Iranian, primigravid women with singleton pregnancies, gestational age of 16 weeks, with no abdominal striae, and without a history of diabetes mellitus, adrenal gland disorder, polyhydramnios, abortion at the 16th week or over, and alcohol consumption were included in the study. Exclusion criteria included recent abortion, using other herbs or drugs affecting the striae, allergic reactions to almond and sesame oils, the use of oils for less than two times a day, and a decision to withdraw from the study.

Before the study started, a hypothetical list of 165 numbers was prepared and through block randomization with an allocation ratio of 1:1:1 through a computer software and block sizes of 3 and 6 (15 blocks of size 3 and 20 blocks of size 6) were generated to assign the participants to three groups of 55, namely sesame oil, sweet almond oil, and control. Then, sequentially numbered, opaque, sealed envelopes containing labels with codes "a" or "b" were used to conceal the allocation and maintain blinding. Envelopes were opened in the order of participants' entry into the study. The allocation sequence was prepared by a person not involved in the recruitment, data collection, and analysis. Therefore, the data collectors and participants were unaware of the type of oil administered.

Sesame and sweet almond oil preparation

The sweet almond and sesame oils were purchased from the Barij Essence Pharmaceutical Company, Kashan, Iran. Both oils were prepared in 20 ml opaque glass jars with similar shapes, colors, and labels. Both oils have been prepared through cold pressing (i.e., grain-free squeezing) method[21] and were free from any additives or chemical preservatives. The jars were then coded as "a" or "b," but neither the participants nor the researcher knew the contents.

Intervention

The intervention groups were taught by two trained expert midwives to rub 1 ml of the oil to the abdominal skin twice a day and till the end of the 36th week of gestation and massage it for 5 min in order to prevent the appearance of striae. Participants in the control group received no

intervention. All the women were followed weekly through phone calls and also could call the researcher if they needed further information. All participants were asked to refuse any other materials on their abdominal skin during the pregnancy or inform the researcher if used any material of medication on the area. Finally, at week 36, women in each group were re-examined for subjective and objective criteria by three trained expert midwives who were not aware of the type of intervention.

Data collection instruments

A three-part instrument was used to gather the study data including a demographic questionnaire, the Fitzpatrick classification scale for skin types, and Davey's striae scoring scale. The demographic questionnaire included items on the participants' age, education level, history of abortion, gestational age at the beginning of the study, weight at the start and at the end of the intervention, height, body mass index, history of striae in first-degree relatives, and the neonate's birth weight.

The Fitzpatrick classification scale for skin types classifies the skin by its reaction to exposure to sunlight as follows: type I: white, very pale skin, red or light hair, blue eyes, freckled; Type II: white, pale skin, red or light hair, blue or brown eyes; Type III: cream white skin, with any hair or eye color; Type IV: light brown skin; Type V: dark brown skin; and Type VI: black or deeply pigmented dark brown skin. The incidence of striae and its intensity were determined using Davey's method.[22] To do this, the concerned midwives examined the women's abdominal skin at the end of the 36th week of gestation to assign a striae score to each woman. Accordingly, the abdomen was divided into four quadrants using the midline and a line passed horizontally through the umbilicus. Each quadrant was scored 0 for a clear skin, 1 if there was a mild striae (i.e., the presence of pink striae, with no purplish discoloration, itching, or hives), and 2 for severe striae (i.e., the presence of purple striae with itching and hives around it), giving a total score of 0–8. Finally, the women were classified into four groups of no striae (score 0), mild (scores 1–3), moderate (scores 4–6), and sever striae (scores 7–8).[22]

The inter-observer reliability method was used to assess the reliability of the scales used for assessing the skin type and the striae severity. To this end, the three midwives assessed the skin type and the striae severity of five pregnant women simultaneously. Then, the kappa agreement coefficient was calculated as 0.87. The comments of ten midwifery faculty members were also gathered about the demographic questionnaire and necessary corrections were made.

Ethical considerations

The present study was approved by the Ethics Committee of Kashan University of Medical Sciences (Approval code: 1507/1/5/29/پ) and also was registered at the Iranian Registry of Clinical Trials (registration number: IRCT20091111002699N6). All the participants were informed that they are under investigation during their pregnancy. Without mentioning the name of the oils, participants in the intervention groups were also informed that they will receive an herbal oil to keep the health of abdominal skin during pregnancy. All participants signed an informed consent form at the beginning of the study. The participants were assured about the data confidentiality, and all their rights were observed according to the latest version of the Helsinki Declaration.

Data analysis

Data analysis was performed using SPSS V.16 (IBM, Armonk, NY, USA). Using descriptive statistics, frequency, percentage, mean, and standard deviation were calculated. Chi-square test was used to examine

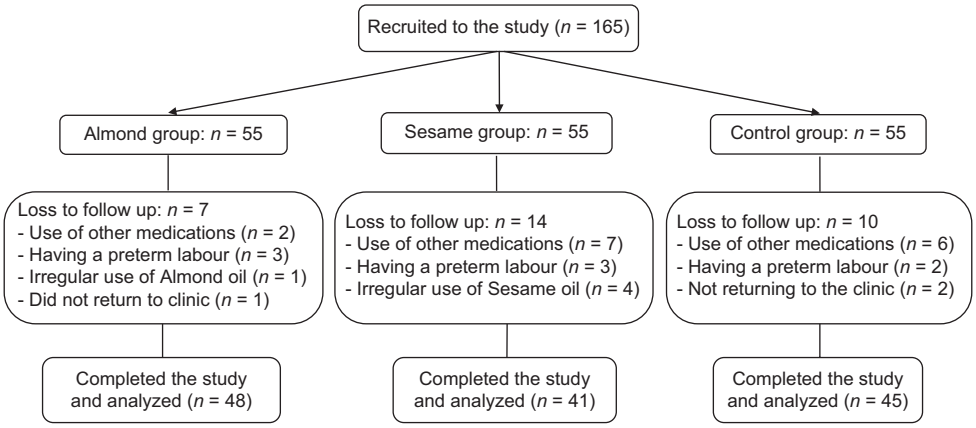

Figure 1: The study flow diagram

the difference between the personal characteristics and also the severity of striae in the three groups. One-way analysis of variance was used to test the difference between the mean neonatal birth weights in the three groups. Logistic regression was used to determine the predictors of the incidence of striae the study groups with adjustment for potential confounding variables. All variables with $P < 0.2$ in univariate analysis were included in the regression model. The Kolmogorov–Smirnov test was used to assess the normality of the quantitative variables. $P < 0.05$ was considered statistically significant.

Results

Seven, 14, and 10 women were excluded from the almond, sesame, and control groups, respectively, during the study [Figure 1]. However, all participants were included in the analysis through the intention to treat analysis. Prediction was performed using logistic regression and given that the incidence of striae had 2 codes of 0 and 1 (negative–positive), and the score of this variable was calculated for those who were missing data: people who scored below 5 as negative for striae incidence and individuals with a predicted score above 5 were identified positive for striae incidence.

The mean age of the participants was 24.98 ± 4.75 years. 46.7% of them had a college education. Most of the women (58.2%) had white creamy skin, and 65.5% had a history of striae in their first-degree relatives.

Significant differences were found between the incidence of striae in the three groups and a positive personal history of stretch marks elsewhere in the body except the abdomen ($P = 0.013$), a history of striae in the first-degree relatives ($P = 0.032$), type of skin ($P = 0.003$), and the neonatal birth weight ($P = 0.047$). No significant association was observed between the other demographic characteristics and the presence of striae in the three groups [Table 1].

No significant difference was found in the incidence of striae in the three groups in the 36th week of gestation ($P = 0.837$) [Table 2]. No significant difference was found in severity of striae in the three study groups ($P = 0.892$) [Table 3].

Table 1: Comparison of demographic characteristics of the participants in study groups

Variables	Almond oil (*n*=55)	Sesame oil (*n*=55)	Control (*n*=55)	*P*
Age				
14-20	10 (18.2)	15 (27.3)	7 (12.7)	0.587[a]
20.1-25	16 (29.1)	20 (36.4)	24 (43.6)	
25.1-30	21 (38.2)	15 (27.3)	17 (30.9)	
30.1-35	7 (12.7)	4 (7.3)	6 (10.9)	
35.1-45	1 (1.8)	1 (1.8)	1 (1.8)	
Education level				
Below high school diploma	8 (14.5)	7 (12.7)	6 (10.9)	0.834[a]
High school diploma	19 (34.5)	23 (41.8)	25 (45.5)	
Academic	28 (50.9)	25 (45.5)	24 (43.6)	
Skin type				
I-II	1 (1.8)	3 (5.5)	1 (1.8)	0.003[a]
III	43 (78.2)	23 (41.8)	30 (54.5)	
IV-V	11 (20.0)	29 (52.7)	24 (43.6)	
Prepregnancy BMI				
≤18.4	4 (7.4)	3 (5.5)	4 (7.3)	0.132[a]
18.5-24.9	22 (40.7)	29 (52.7)	36 (65.5)	
25-29.9	25 (44.4)	20 (36.4)	10 (18.2)	
30-40	4 (7.4)	3 (5.5)	5 (9.1)	
Overweight during pregnancy				
1-8.9	12 (21.8)	7 (12.7)	11 (20.0)	
9-11.9	19 (34.5)	20 (36.4)	17 (30.9)	
12-14.9	15 (27.3)	13 (23.6)	15 (27.3)	
15-17.9	6 (10.9)	10 (18.2)	8 (14.5)	
18-30	3 (5.5)	5 (9.1)	4 (7.3)	
Positive history of striae in family	43 (78.2)	35 (63.6)	30 (54.5)	0.032[a]
Positive personal history of stretch marks (elsewhere in the body except the abdomen)	12 (21.8)	16 (29.1)	4 (7.3)	0.013[a]
Birth weight (g), mean±SD	3180.5 ± 352.1	3148.0 ± 375.7	3319.0 ± 414.7	0.047[b]

[a]Chi-square test, [b]One-way ANOVA. ANOVA: Analysis of variance, SD: Standard deviation

Table 2: Frequency distribution of striae in groups of almond oil, sesame oil, and control at the end of the study

Striae	Group			P^a
	Sesame oil, *n* (%)	Almond oil, *n* (%)	Control, *n* (%)	
Positive	33 (60.0)	35 (63.6)	32 (58.2)	0.837
Negative	22 (40.0)	20 (36.4)	23 (41.8)	

[a]Chi-square test

Table 3: Frequency distribution of severity of striae in groups of almond oil, sesame oil, and control at the end of the study

Severity of striae	Group			P^a
	Almond oil, *n* (%)	Sesame oil, *n* (%)	Control, *n* (%)	
Mild	20 (58.8)	16 (46.9)	17 (51.6)	0.892
Moderate	12 (35.3)	14 (43.8)	12 (38.7)	
Severe	3 (5.9)	3 (9.4)	3 (9.7)	

[a]Chi-square test

Table 4: Variables associated with striae gravidarum in logistic regression analysis

Variable	Unadjusted OR	Adjusted OR	*P*
Group			
Sesame oil	0.048	1.050	0.928
Almond oil	0.276	1.322	0.606
Control	Reference	Reference	0.860
Gravida	−0.017	0.983	0.980
Skin type			
II	19.286	23.769	1.000
III	18.770	14.185	1.000
IV	18.780	14.330	1.000
V	Reference	Reference	0.985
Birth weight	0.000	1.000	0.553
Positive personal history of stretch marks	−0.051	0.951	0.932
Positive history of striae in family	0.244	1.277	0.608
Prepregnancy BMI			
≤18.4	−0.755	0.470	0.571
18.5-24.9	−0.412	0.662	0.722
25-29.9	−2.178	0.113	0.070
30-40	Reference	Reference	0.063

OR: Odds ratio, BMI: Body mass index

Multivariate logistic regression showed that none of the variables included in the model could increase the incidence of striae. The model could predict 9%–13% of the variance of striae incidence. The results remained unchanged after adjustment of potential risk factors in the three groups [Table 4].

Discussion

In the present study, no significant difference was found between sweet almond and sesame oils in preventing and severity of striae. Few studies are available on the effects of these oils in the prevention of striae although some studies examined the effects of olive oil or cocoa butter on this pregnancy-related skin problem.[20,23,24]

In a study, the effect of a mixture of karaveer oil and sesame oil was examined on the incidence and improvement of striae in a group of primiparous and multiparous women. The results indicated that this oil was effective in preventing and improving pregnancy striae. However, this study does not show which component of the used oil was more effective in the improvement or prevention of striae.[25] On the other hand, the synergic effect of the two components might affect the positive results of this study.

Contrary to the present study, another study also compared the effects of sesame oil and almond oil on pregnancy striae and reported that the sesame oil, sweet almond oil, and their combination were effective in reducing the occurrence of abdominal striae.[19] A study also reported that almond oil and glycerine were significantly effective in preventing striae in primiparous women.[14] Timur Tashan and Kafkasli also examined the effect of bitter almond oil and massaging on the occurrence of striae in primiparous women and reported that bitter almond oil without massage could not prevent the formation of striae.[13] In the present study, sweet almond oil in combination with 5-min massaging could not prevent striae when compared with the control group.

The inconsistency between the studies might be attributable to the personal features of the participants. For instance, a majority of our participants, especially in the intervention groups, had a BMI over 25 at the beginning of the study and were, therefore, overweight, which in turn increased the mechanical stretching of the skin and also increased the incidence and the severity of striae.[26-30] However, a number of previous studies did not report anything about the weight or the BMI of their participants.[19,30] On the other hand, the frequency of use or the duration of massage might affect the results, so increasing the frequency of use and increasing the massage time may increase the chance of getting better results.

In the present study, a relationship was found between the family history of striae and the occurrence of SG. This finding confirms the role of genetic factors in the formation of SG[31] although it has not been attributed

to any particular gene.[32] Nonetheless, studies showed that the expression of genes involved in fibroblast metabolism, such as those encoding collagen, elastin, and fibronectin, was lower in the stretched skin than in normal skin.[33] SG has also been described in monozygotic twins.[34] Liu *et al*. have also reported that family history may be the most significant factor in the development of SG.[27] Hence, genetic investigations might be more valuable in finding striae treatment than examining the effects of specific substances.

Evidence showed that the skin type might be involved in the formation of SG and the response to treatment;[5] however, most of the participants in the present study were of the skin types of II, III, and IV, and the skin type had no significant effect on the occurrence of SG. Given the impact of different skin types, this finding might not be generalized and further studies are needed to elucidate the effect of skin type on the development of SG. Factors such as nutrition and fluid intake have not been investigated in this study.

The variables examined in this study could predict 9%–13% of the total variance of the incidence of SG. Based on these results, it can be concluded that other not investigated variables in this study can predict the rest of the variance of the incidence of striae. Therefore, further studies are needed to identify other factors affecting the occurrence of SG.

Although this was a randomized trial, it had few limitations. First, despite training and follow-up about the correct use of the oil, some of the participants might not have used it properly. It is also recommended to provide the participants with a checklist in order to record the use of the oil and also assess the amount of the remaining oil at the end of the study. Some women were also excluded from the study due to improper use of oils, preterm delivery, and migration. We only assessed the abdominal area. Similar studies on other areas such as the breasts and thighs are recommended. Furthermore, we recruited pregnant women at a gestational age of 16 and over, and replication of the study with participants from the beginning of the pregnancy is recommended. It was not possible to conduct the study in a triple-blind method, and it was not possible to use a placebo for the control group due to the possible effects of other oils.

Conclusion

Our findings do not support the use of almond oil and sesame oil in preventing SG. Given the controversies between the studies, further studies are required to evaluate the effect of almond oil and sesame oil in the prevention of the SG.

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Conflicts of interest

There are no conflicts of interest.

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