ORIGINAL RESEARCH

Bagcilar Med Bull 2023;8(2):188-193
DOI: 10.4274/BMB.galenos.2023.2022-11-097

Can the Use of Omega-3 During Pregnancy Prevent Striae Gravidarum?

Gebelikte Omega-3 Kullanılması Stria Gravidarum Oluşumunu Önleyebilir mi?

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Abstract

Objective: The main aim of the study was to investigate the effect of Omega-3 use on the formation of striae gravidarum in pregnant women.

Method: In 2020 and 2021, 201 primigravida pregnant women who had at least four antenatal check-ups in a first-trimester pregnancy outpatient clinic and gave birth in the same center were included in the study. These patients were grouped according to the drugs they used (Omega-3 group, multivitamin and irregular medication group). Age, education level, weight gained during pregnancy, history of the additional disease, medication use and birth weight of the baby was recorded. During pregnancy follow-up and at the 24th hour of birth, striae in four parts of the body (abdomen, hips, buttocks, and breasts) were scored according to their color and number with the scoring system developed by Atwal et al.

Results: A severe striae score was detected in one puerperium in the patients included in the study. Striae started between 21 and 24 weeks in about one-third of the patients (26.9%). There was a significant difference between the SG scores of pregnant women on regular medication and those on the irregular medication (p<0.001). Pregnant women on irregular medication had a higher postpartum striae score. There was also a positive correlation between SG score and young pregnancy, high weight gain during pregnancy, and early onset of striae. No significant correlation was found between infant weight and SG score (p>0.05).

Conclusion: According to the results of our study, a regular multivitamin along with Omega-3 reduces the occurrence of striae gravidarum.

Keywords: Omega-3, pregnancy, stretch marks, striae gravidarum

Öz

Amaç: Bu çalışmanın ana amacı gebelerde Omega-3 kullanımının stria gravidarum oluşumuna etkisini araştırmaktır.

Yöntem: Bu prospektif olgu kontrol çalışmasına 2020-2021 yılları arasında ilki 1. trimesterde olmak üzere en az 4 antenatal takibi yapılmış 201 primigravid gebe dahil edildi. Çalışmaya alınan gebeler kullandıkları ilaçlara göre (multivitamin, Omega-3 ile beraber multivitamin kullananlar ve düzensiz ilaç kullananlar) gruplandırıldı. Kadının yaşı, eğitim seviyesi, gebelikte aldığı kilo, ek hastalıkları, kullandığı ilaçlar, bebeğin doğum kilosu kaydedildi. Gebelik takibi yapılmış ve doğumu aynı merkezde olmuş hastalara doğum sonrası 24. saatte vücudun 4 bölgesindeki (karın, kalça, basen ve memeler) stria gravidarumları Atwal ve ark. tarafından belirlenmiş kriterlere göre puan verildi.

Bulgular: Çalışmaya alınan 201 kadından 1 tanesinde şiddetli stria skoru saptandı. Stria gravidarum hastaların yaklaşık 1/3'ünde (%26,9) 21-24. gebelik haftaları arasında başlamıştı. Düzenli vitamin kullanan gebelerin SG skorları arasında anlamlı fark saptandı (p<0,001). Vitamin ilaçlarını düzensiz kullanan kadınlarda SG skoru düzenli ilaç kullanan lohusalardan daha yüksek bulundu. SG skoru genç yaş, gebelikte fazla kilo almak ve erken başlayan stria oluşumu ile artmıştı. Doğan bebeğin kilosu ile SG skoru arasında anlamlı bir ilişki bulunmadı (p>0,05).

Sonuç: Çalışmamızın sonuçlarına göre, Omega-3 ile birlikte düzenli bir multivitamin, stria gravidarum oluşumunu azaltır.

Anahtar kelimeler: Çatlaklar, gebelik, Omega-3, stria gravidarum

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Cite this article as: Okuyan E, Karabay Akgül Ö. Can the Use of Omega-3 During Pregnancy Prevent Striae Gravidarum?. Bagcilar Med Bull 2023;8(2):188-193

Introduction

Striae gravidarum (SG) is a cosmetic problem specific to pregnancy. SG affects 50-90% of pregnant women and occurs mostly in primigravidae. It usually starts in the second or third trimester and most commonly occurs in the abdomen and breasts (1). Other symptoms may include an increased volume of subcutaneous fat and muscle tissue during pregnancy accompanied by a gradual expansion of the skin that is itchy, erythematous in the acute phase, and white silver colored linear lesions when chronic. Risk factors for SG include genetic predisposition, hormonal status, teenage pregnancy, being overweight before pregnancy, gaining excess weight during pregnancy, and having an overweight baby (2). The pathogenesis of striae has not been clearly explained, but it is thought to be caused by the separation and disorganization of collagen bundles due to physical stresses in the extracellular matrix (3,4). Omega-3 fatty acids have shown anti-allergic and anti-inflammatory effects on the skin and have been an important metabolite for the remodeling of skin cells (5,6).

Although there are a large number of studies on the pathogenesis and treatment of SG in the literature, publications on its prevention are limited. In this study, we wanted to conduct a study investigating the effects of the systemic administration of vitamins and Omega-3 to prevent the development of striae in pregnancy.

Materials and Methods

This prospective observational study was performed in a tertiary hospital under the principles of the Helsinki Declaration. After Ethics Committee approval of Batman Training and Research Hospital (no: 2020-02) the study commenced. The study included 201 primiparous pregnant women who were followed up in the antenatal outpatient clinic of the tertiary center between 2020 and 2021 and who voluntarily agreed to participate in the study and gave written informed consent. The patients who gave birth by cesarean section were excluded from the study due to the possibility of the drugs used during surgery affecting the striae. Twenty-four patients who did not meet the inclusion criteria for the physical study performed 24 hours after delivery by normal vaginal delivery were also excluded from the study (Flow Chart). Every pregnant woman included in the study was initially given a multivitamin (Fe+2 80 mg, folic acid 0.35 mg) during their first examination in the first trimester. Starting from the 12th week of pregnancy, Omega-3 [380 mg eicosapentaenoic acid (EPA), 200 mg docosahexaenoic acid (DHA)] was offered as an option and the drugs were started according to the wishes of the pregnant women. At each follow-up visit, the pattern of drug use of pregnant women was recorded. Patients who were followed up throughout their pregnancies were given a daily follow-up chart, and at each visit, the patients were divided into three groups by looking at the regularity of the drugs used in the follow-up chart (without directing the patients and without considering the company's interest relationship):

- Pregnant women who did not use drugs every day (irregular drug users);

- Pregnant women who did not use Omega-3 and used only multivitamins (containing Fe+2 and folic acid); and

- Pregnant women who used Omega-3 and multivitamins (containing Fe+2 and folic acid).

Pregnant women who did not attend regular follow-up visits at the center where the study was conducted and/or delivered in another hospital were excluded from the study. Pregnant women with surrenal disease, diabetes mellitus, dermatologic disease, thyroid disease, autoimmune disease, physical mobility restriction, chronic constipation, as well as those who had undergone surgery before or during pregnancy and pregnant women with alcohol, smoking, and substance abuse were excluded from the study. Pregnant women who used local skin products such as massage oils, moisturizing creams or natural skin solutions (e.g., olive oil applications) before pregnancy and until delivery, pregnant women with malnutrition, pregnant women younger than 18 years of age, and betamethasone use for preterm delivery were excluded. Multiple pregnancies, scarred uterus pregnancies, and deliveries with breech presentation were also not included. In the study, primigravida pregnant women, whose first examination was performed between the sixth and twelfth week of gestation, who had at least four antenatal visits at the hospital where the study was conducted, who gave birth between 37 and 40 weeks, who gave birth to a baby between 2,500 g and 4,000 g, and who gave written and verbal consent were evaluated. According to the inclusion criteria, pregnant women who were included in the study were informed that they should not use any skin solutions, moisturizers, or creams, and if they did, they would be excluded from the study follow-up and they should inform their physicians during their examinations. The age, parity, educational status, gestational week, and weight gained during the entire pregnancy and weight of the newborn were recorded. In antenatal controls, in the first visit

of pregnancy and Atwal et al.'s (1) SG score at 24 hours postpartum was noted after delivery. For scoring, four regions of the pregnant woman (abdomen, hips, buttocks, and breasts) were examined. The striae in each region were graded from 0 to 6 according to color and number of striae (0-3 points for the number of striae, 0-3 points for the striae color). The total striae score (TSS) ranged from 0 to 24. Those with a TSS score of ≤12 were classified as mild striae; those with a TSS score of 13 to 18 as moderate striae and those with a TSS score >18 as severe striae (1). White-cream colored striae were not evaluated as they were old striae.

Statistical Analysis

Mean, standard deviation, median, and minimum maximum values were given in descriptive statistics for continuous data, and number and percentage values were given in discrete data. The Shapiro-Wilk test was used to examine the conformity of the continuous data to the normal distribution. The Kruskal-Wallis Analysis of Variance for comparisons of total scores between groups was used. The Kruskal-Wallis multiple comparison tests were used to determine which groups were different. The relationships between continuous data were analyzed with Spearman's correlation coefficient.The IBM SPSS version 20 (Chicago, IL, USA) program was used in the evaluations with $p<0.05$ being accepted as the limit of statistical significance.

Results

The study commenced with 229 pregnant women and 28 non-compliant pregnant women were excluded from the study. The mean age of the patients was 21.97±2.23 years with a minimum patient age of 18 and a maximum patient age of 29 (Table 1). Approximately 60% of the pregnant women were high school graduates (Table 1). The SG score was higher in younger pregnant women ($r=-0.169$ $p<0.05$) (Table 2).

When the Kruskal-Wallis multiple comparison tests was performed, the SG score was found to be lower in the pregnant women who used regular medication compared to the pregnant women who did notuse regular medication ($p<0.001$, $p<0.001$, respectively) (Table 3). SG was observed in every pregnant woman included in the study with one patient having a total score of over 18 points (severe striae). In 155 patients (76%), we obtained a score of less than 12 points (mild striae). The mean SG score was 9 points (minimum 3, maximum 18) (Table 4). Striae started on average during the 27th week of gestation (min. 16 weeks, max. 38 weeks). Lesions started between 21 and 24 weeks in approximately one-third of the patients (26.9%). There was a negative correlation between the SG onset week and SG score ($r=-0.719$, $p<0.001$) (Tables 1 and 4). The average weight gain of the pregnant women until birth was 10 kg. The SG score was also found to be higher in pregnant women who gained more weight ($r=-0.195$, $p<0.01$) (Table 4). The pregnant women in the study gave birth on average at 39 weeks of gestation. The total SG score of the pregnant women whose SG development started early gestational weeks was found to be higher ($r=-0.719$, $p<0.001$). Approximately 90% of the pregnant women delivered

Table 1. Characteristics of the patients

Age mean ± SD, (min-max)	**21.97±2.23 (1729)**
Education n (%)	
Elementary school	79 (39.3)
High school	120 (59.7)
University	2 (1.0)
SG onset week mean ± SD, median (min-max)	27.15±5.11 27 (1638)
SG onset weeks n (%)	
≤20 weeks	25 (12.4)
21-24 weeks	54 (26.9)
25-28 weeks	28 (13.9)
29-32 weeks	54 (26.9)
≥33 weeks	40 (19.9)
Weight gained mean ± SD, median (min-max)	10.40±1.35 10 (714)
Birth week mean ± SD, median (min-max)	38.94±0.70 39 (3740)
Baby weight n (%)	
2500-3000 g	6 (3)
3100-3500 g	178 (88.6)
3600-4000 g	17 (8.4)
Medication use during pregnancy	
Multivitamin	55 (27.4)
Multivitamin + Omega-3	100 (49.8)
Irregular medication use	46 (22.8)

SD: Standard deviation, SG: Striae gravidarum

Table 2. Correlations between age, weight gain, week of SG onset and time to delivery and total scores

	Total score	
	r*	**p**
Age (year)	**-0.169**	**0.016**
Weight gain (kg)	**0.195**	**0.005**
SG onset week (week)	**-0.719**	**<0.001**
Baby's weight	-0.102	0.152

*Spearman's correlations coefficient, SG: Striae gravidarum

Table 3. Comparison of total scores of multivitamin, multivitamin + Omega-3 and irregular medication users

	Total score		
	Mean ± SD	Median (min-max)	p-value
Medication use during pregnancy			
Multivitamin	11.53±2.31	11 (818)	<0.001*
Multivitamin + Omega-3	6.41±1.43	6 (311)	
Irregular medication use	13.85±1.78	14 (1017)	

*Kruskal-Wallis Analysis of Variance, SD: Standard deviation

Table 4. Patients' striae gravidarum scores

	Median (min-max)
Abdomen score	3 (06)
Breast score	2 (05)
Hip score	2 (15)
Buttocks score	2 (13)
Total score	9 (318)

3100-3500 g babies. No significant correlation was found between infant weight and SG score (p>0.05). The reason why we did not do power analysis before the study; since patients in 2021 were selected, we included all patients who met the inclusion criteria. Thus, we wanted to see the rates of vitamin use. In the study where 55 patients using MV, 100 patients using MV + Omega-3, 46 patients not using drugs, and the total score of pregnancy stretch marks as a primary outcome, the power of the test was f=0.25 with effect size (effect size), type I error =0.05, power =0.89 (89%) found as the calculation was made using the "G*Power 3.1.9.4" package program.

A difference was found between the total scores of those who used MV + Omega-3 and those who did not use drugs (p<0.00). The total scores of MV+ Omega-3 users were found to be lower than those who did not use drugs. Post-hoc test results:

1. MV - MV+ Omega-3 p=0.000 p<0.001 difference

2. MV - no drug p=0.023 p<0.05 difference

3. MV+ Omega-3 - no drug p=0.000 p<0.001 difference

Discussion

According to the results of our study, multivitamin use significantly decreases the SD score. In particular, SG is significantly milder in pregnant women who use multivitamins with Omega-3. Ninety percent of the SG is seen in primigravids (1). New lesions would usually begin after the 24th week of pregnancy and are most commonly seen in the abdomen, breasts, and hips (7). In pregnant women with striae, it was also observed that there was a decreased serum relaxin level in their serum (8). Other publications in the literature show increases in estrogen and epinephrine facilitating the formation of SG (9). Since it occurs in more women during pregnancy, new mechanical, hormonal, cellular, and immunologic causes of pregnancy will also be important in the development of striae (2,8,10-12). SG is an indicator of skin quality and has been reported in the literature. The perineal tear rate increases in pregnant women with SG if they give birth vaginally (13-15).

In the literature, several studies have determined the independent risk factors for the occurrence of SG. Despite many studies, the results are conflicting, and confounding factors (such as diet, nutritional content, fluid intake, mobility, alcohol consumption, and stress) cannot be eliminated. It is difficult to determine which of the many coexisting factors is the main influencing factor (16). Among the risk factors for SG, maternal weight and age are the most debated factors. Findik et al. (17) found pre-pregnancy weight or maternal age as a risk factor. Atwal et al. (1) considered maternal age, maternal BMI, total weight gained by the mother during pregnancy, and birth weight of the baby as independent risk factors for SG. Picard et al. (9) observed pre-pregnancy weight as an important risk factor. Osman et al. (10) found maternal age, weight gain, infant weight, family history of SG, and birth week to be effective. Current evidence has revealed that in addition to the positive effects of Omega-3 on skin health, it reverses the negative effects of chemotherapy on the skin in the adjuvant treatment of psoriasis and eczema (14). High estrogen level may be induced by pregnancy, slowing the anti-inflammatory process and skin regeneration, and there are positive effects with the use of systemic Omega-3 preparations. In addition, the fact that striae were observed with lower scores in pregnant women who used multivitamins even if they did not use Omega-3 may have provided vitamin and mineral supplementation effectively on collagen synthesis and skin structure.

Elastin provides mechanical elasticity in the skin, as well as cell growth and wound healing, and it has other effects such as regeneration and dermis remodeling (15). Inflammation disrupts the structure of elastin; however, Omega-3 fatty acids have anti-inflammatory effects (15). In our results, the striae score of women with Omega-3 supplementation was even lower than the patients using only vitamins. This may be related to the curative effect of EPA and DHA on possible inflammation and edema. It is possible to attribute the fact

that our group, which does not contain Omega-3, has less SG than those who did not take vitamins regularly, due to the high levels of vitamins and minerals in the circulating blood and since they are more attentive to themselves and their babies psychologically and mentally. Those pregnant women who participated in the study but did not use the vitamin supplements regularly or never used them had TSSs that were 13 and above. In other words, the number and severity of striae increased in pregnant women who used an inadequate amount of supplements or no supplements at all. This suggests that patients with better socio-economic circumstances had fewer striae. The fact that our group without Omega-3 also had less SG compared to those who did not take regular vitamins can be attributed to the high levels of vitamins and minerals in the circulating blood and to the fact that they were pregnant women who were psychologically and mentally more attentive to themselves and their babies.

In a large-scale SG study conducted on 420 women in 2022, who being younger than 25 years of age, having an abdominal circumference greater than 100 cm, gaining more than 15 kg in weight in total during pregnancy, having SG in the family, having gestational DM, having altered bowel movements during pregnancy and having striae in the breasts, hips, and upper leg were considered independent risk factors (16). In this research, we found that factors such as gaining a large amount of weight during pregnancy and young maternal age would increase the frequency of SG; however, the weight of the baby did not affect the SG score.

Although there are several studies in the literature evaluating SG by looking at vitamin levels in the blood, blood levels, and tissue utilization may not be the same. It is also possible that pregnant women who received vitamin and Omega-3 supplements spent the pregnancy process more wisely and diligently and were more successful in terms of exercise, quality food consumption, and stress-coping strategies. The most important strength of our study is that we prospectively followed the development of SGs in young, healthy first pregnancies in which the inclusion criteria were clearly defined, the exclusion criteria were strictly adhered to, and the scoring system was performed regularly. The fact that we evaluated SGs that occurred before 24 weeks of gestation also shows that hormonal and chemical changes in the skin, which are specific to pregnancy, begin during the earlier weeks of pregnancy. Although the history of striae in the mother and sister was taken in our study, the reliability of this anamnesis data is limited due to the low socio-cultural levels of the participants, and since striae are seen in all pregnant women, we could not obtain sufficient data to discuss whether it is possible to prevent striae with this study. In addition to these factors, the most important limitations are that vitamin and Omega-3 levels were not examined in tissue and serum simultaneously. It is not cost-effective to look at serum vitamin levels in pregnant women in clinical observational or prospective studies.

There are promising signs that the impact of clinical nutrition on skin health will be more comprehensively interconnected scientifically soon. Therefore, it is obvious that more precise data can be obtained with well-designed studies including serum vitamin levels, especially in experimental animal studies.

Conclusion

Pregnant women should be given multivitamins and/or Omega-3 supplements to prevent SG. The presence of Omega-3 in multivitamins to be used as pregnancy supplements in the next generation of pharmaceuticals may play a role as a preventive measure against the development of SD.

Ethics

Ethics Committee Approval: This study was approved Batman Training and Research Hospital Local Ethics Committee of the Medical Center; Ethics Committee approval (no: 2020-02).

Informed Consent: Informed consent was obtained.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Concept: E.O., Ö.K.A., Design: E.O., Ö.K.A., Data Collection or Processing: E.O., Ö.K.A., Analysis or Interpretation: E.O., Ö.K.A., Drafting Manuscript: E.O., Ö.K.A., Critical Revision of Manuscript: E.O., Ö.K.A., Final Approval and Accountability: E.O., Ö.K.A., Writing: E.O., Ö.K.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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