An evaluation of the relationship between striae gravidarum and intra-abdominal adhesions in caesarean section

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Abstract

Objective: Recurrent cesarean deliveries are associated with intra-abdominal adhesions, and these adhesions affect maternal and neonatal morbidity. The aim of this study was to evaluate the relationship between the severity of striae gravidarum (SG) and intra-abdominal adhesions detected during cesarean section (CS).

Material and Methods: In this prospective, case-control study, women undergoing a second CS were divided into three groups according to the severity of SG (group 1 - no SG; group 2 - mild SG; group 3 - moderate to severe SG). Demographic and clinical characteristics, grade of intra-abdominal adhesions, Fitzpatrick skin type (FST), and serum 25-hydroxy vitamin D [25(OH)D] levels were assessed in all groups.

Results: A total of 150 cases were divided into three equal groups. There was no significant difference in body mass index among the groups (p=0.155). Although lower vitamin D levels were observed in group 3 compared to the other groups (p=0.034), the grade of adhesions was not associated with vitamin D level (p=0.281). All of the grade 2-4 adhesions occurred in mild to moderate cases of SG. Intra-abdominal adhesion was absent in 92% of CS (p<0.001) in pregnancies where SG was not detected. No intra-abdominal adhesions were observed in women with FST type 1 and in 80% of cases with type 6 skin, grade 2-4 adhesions were found (p<0.001).

Conclusion: Pregnant women with moderate SG and dark skin are at high-risk of increased incidence of intra-abdominal adhesions in subsequent CS. (J Turk Ger Gynecol Assoc. 2025; 26: 41-8)

Keywords: Adhesion, caesarean section, striae distensae, vitamin D

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Introduction

Striae gravidarum (SG), also known as striae distensae, is a dermatological condition that is particularly prevalent during pregnancy, affecting approximately 60-90% of women (1,2). The lesions develop predominantly on the skin of the abdominal wall, whereas the skin of the breasts, back, and proximal extremities are areas where this condition is less commonly observed (3). SG has been associated with several factors, including maternal obesity, gestational weight gain, family history, and genetic factors (4). SG may cause itching, discomfort, and psychological distress in pregnant women, as it is a permanent change in the appearance of the skin, and current treatments to prevent and treat SG have had limited success (1-4).

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Tensile strength and elasticity of the skin are related to structural changes in skin components, such as fibrillin, elastin, and collagen (5). The constant stretching of the extracellular matrix in the skin during pregnancy can lead to the remodeling of elastic fibers and the appearance of clinical striae in susceptible individuals (5). The Fitzpatrick skin type (FST) classification, originally developed to assess the susceptibility of the skin to burning during phototherapy, has also become a widely used system for categorizing skin color and ethnicity (6). However, the results of studies investigating the relationship between FST classification and SG formation have been inconsistent. One study found that light-skinned women had an increased risk compared to darker-skinned women (4), while another study found that darker-skinned women had an increased risk (7).

The balance between fibrin deposition and migration is of great importance in the process of normal peritoneal healing and adhesion formation (5,8). Complete degradation of fibrin leads to collagen production by fibroblasts, whereas ineffective collagen degradation leads to peritoneal adhesion formation (8). Adhesions are present in 95% of cases following abdominal surgery (8), and adhesions have been reported as a common complication of cesarean section (CS) (9). Intra-abdominal adhesions may cause abdominal discomfort, pain, and consequently reduced quality of life (10). In addition, adhesions could potentially complicate subsequent CSs, particularly in cases of emergency or multiple births (10,11). This is due to the increased difficulty of the surgical procedure, which can lead to complications, such as bladder damage and prolonged surgery time (10,11). In addition, intra-abdominal adhesions may also lead to an increased risk of birth asphyxia and maternal morbidity (11).

The objective of this study was to examine the association between the severity of abdominal SG, which occurs during pregnancy, and the grade of intra-abdominal adhesion formation following a history of CS deliveries.

Material and Methods

Written informed consent was obtained from all participants before the start of the prospective case-control study. Ethical approval was subsequently granted by the Etlik Zübeyde Hanım Women's Health Training and Research Hospital Local Ethics Committee (approval number: 2021/50, date: 07.05.2021). The study included pregnant Turkish women who underwent CS at 37-40 weeks gestation in a tertiary care center between 2020 and 2023. The women had a singleton pregnancy with estimated fetal weight of 2000-4000 g and body mass index (BMI) of 18-30 kg/m^2. To minimize the effect of multiple CS on the results, only pregnant women with a single previous CS were included. Multiple pregnancies, women with comorbidities (e.g. hypertension, diabetes mellitus, Cushing's disease, etc.), connective tissue disorders (e.g. Marfan syndrome, etc.), those using corticosteroids, and those with conditions that may cause adhesion formation (e.g. pelvic inflammatory disease, other previous abdominopelvic surgery, and a history of endometriosis) were excluded.

The data set included information on age, parity, height, weight, gestational weight gain, comorbidities, family history of SG, lotions used during pregnancy to prevent SG, and skin type. In addition, serum 25-hydroxy vitamin D [25(OH)D] levels (ng/mL) were obtained. The lotions used by participants were of a mixed oil composition, exhibiting comparable constituents. The FST scoring system (12) was used to assess the women's skin types. The severity of intra-abdominal adhesions and SG were assessed using the Nair scoring system (13) and the Davey scoring system (14), respectively.

The patients' skin types were scored according to the FST scoring system (12). According to the FST classification, the types are as follows;

FST type 1: Individuals with a very fair complexion, frequent sunburns, no tanning, light eyes (blue-green), and yellow or red hair.

FST type 2: Individuals with a fair complexion, burn easily, tan poorly and have light blue eyes.

FST type 3: Individuals with dark white skin, tan after the first burn.

FST type 4: Individuals with light auburn tan, burns easily, tans easily, brown-black hair color.

FST type 5: Individuals with auburn tan, rarely burn, and tans easily.

FST type 6: Individuals with dark auburn or black tan, never burns, usually dark tan.

The intra-abdominal adhesions of the women were scored intra-operatively using the Nair scoring system (13) and the abdominal adhesions were graded into five categories as follows.

Grade 0: No adhesion.

Grade 1: Single band between viscera or from a single point on the viscera to the abdominal wall.

Grade 2: Two bands between viscera or from viscera to abdominal wall.

Grade 3: Intra-visceral mass, defined as a collection of viscera or intestines not adhering to the abdominal wall with more than two bands or the entire length of the intestines.

Grade 4 is characterized by the direct adhesion of viscera to the abdominal wall, regardless of the number and size of the bands.

The women's abdominal striae were scored using the Davey abdominal striae scoring system before CS (14). The skin of the abdominal wall was divided into four quadrants by the midline and horizontal lines passing through the navel, and the striae for each quadrant were scored as 0 points clear skin, 1-point moderate striae, and 2-points multiple striae. The total score ranged from 0 to 8. The severity of SG was divided into three categories: 0 points, no SG; 1-2 points, mild SG; and 3-8 points, moderate to severe SG. The cases included in the study were divided into three groups: group 1, women with no SG; group 2, women with mild SG; and group 3, women with moderate-severe SG. The primary outcomes were the comparison of the demographic and clinical characteristics of the cases, the grade of intra-abdominal adhesions and the serum 25(OH)D levels between the three groups. Secondary outcomes included the division of intra-abdominal adhesions into three groups according to grade, followed by comparison of demographic and clinical characteristics, FST types, SG severity, and serum 25(OH)D levels.

A power analysis was conducted using the G*Power 3.1 program to determine the requisite sample size based on data from Chang et al. (4). When the gross enrollment index was set at 1, the alpha level was set at 0.05, and the desired power was 95%, resulting in a minimum sample size of 78, with 26 pregnant women in each group. In consideration of the findings of the power analysis, a total of 150 patients, 50 patients in each group, were included in the study.

Statistical analysis

Data analysis was conducted using SPSS, version 21.0 (SPSS, Inc., Chicago, IL, USA) and was evaluated at a 95% confidence level. Variables exhibiting normality were analyzed with the independent ANOVA test. The Kruskal-Wallis test was employed for variables that did not distribute normally. In the event of a statistically significant difference in the ANOVA test, multiple comparisons were conducted using the LSD test. Conversely, in the case of a significant difference in the Kruskal-Wallis test, the Mann-Whitney U test with Bonferroni correction was employed. The relationship between categorical variables was analyzed using the chi-square test.

Results

A total of 150 women were included, divided into three equal groups based on severity of SG. The groups were: group 1 - 50 women with no SG; group 2 - 50 with mild SG; and group 3 - 50 with moderate-severe SG. The most prevalent skin type was type 5, observed in 29.3% (n=44) of the study population, while the least prevalent was type 6, observed in 3.3% (n=5) of the study population. The majority of participants exhibited grade 0 adhesions (71.3%). The distribution of the severity of SG, skin type, and the grade of intra-abdominal adhesion in the study population is presented in Figure 1.

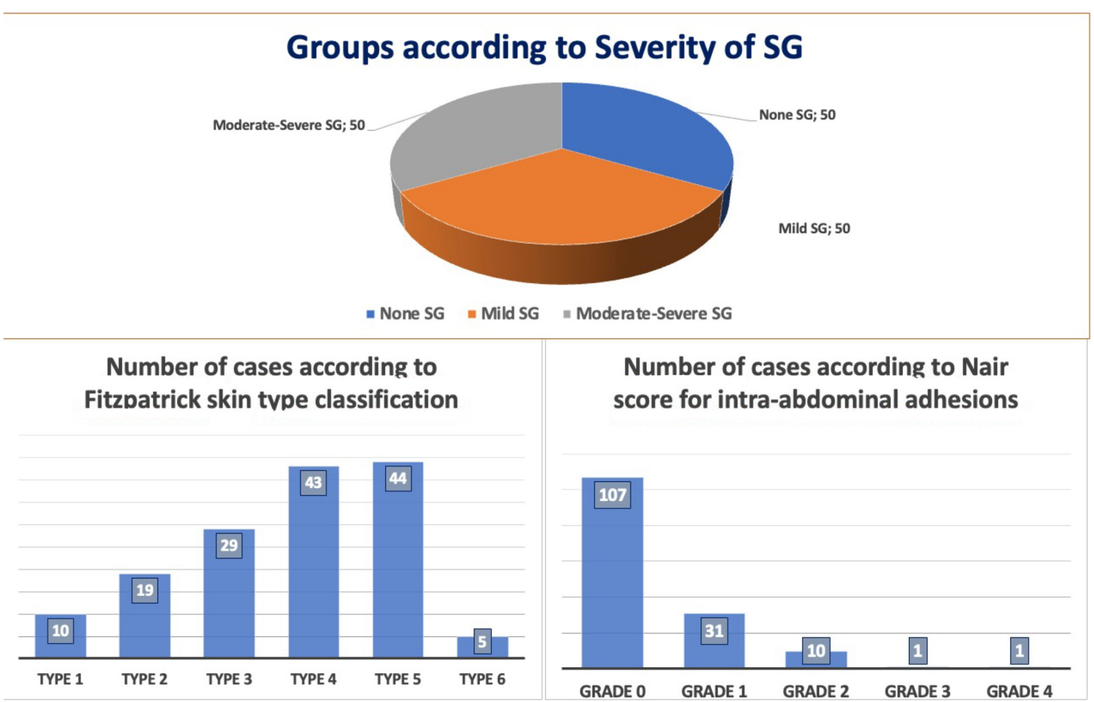

Figure 1. Distribution of study population according to severity of stria gravidarum, Fitzpatrick skin type, and grade of intra-abdominal adhesions in cesarean birth
SG: Striae gravidarum

Table 1 presents the demographic and clinical characteristics of the study groups. Group 3 was younger than group 1 (27.86±4.54 years vs. 30.24±5.83 years, p<0.05). There was no significant difference in the mean BMI of the groups (p>0.05). However, the serum 25(OH)D levels of the SG groups were significantly different. The mean 25(OH)D level was significantly lower in group 3 than in the other two groups (32.48±18.29 ng/mL in group 1, 31.82±20.73 ng/mL in group 2, and 24.12±13.10 ng/mL in group 3, p=0.034). There was no significant difference among the groups in terms of gravidity, parity, education status, profession, smoking, presence of comorbidities, and family history for SG (p>0.05). However, the use of oil lotion during pregnancy was significantly more common in group 2 compared to the other two groups (p=0.021).

The intrabdominal adhesion grade was significantly higher in group 3 compared to the other two groups (p<0.001). The proportion of subjects with grade 0 adhesion (none) was highest in group 1 (92%), whereas the proportions of subjects with grade 1 (34%), grade 2 (20%), grade 3 (2%), and grade 4 (2%) adhesions were higher in group 3 than in the other groups (p<0.05, Table 1).

A comparative analysis of the groups formed according to the grade of intra-abdominal adhesions is presented in Table 2. The demographic characteristics, age and BMI of the groups were found to be similar (p<0.05). In contrast with the findings presented in Table 1, no significant difference was observed between the grade of adhesions and 25(OH)D levels (p=0.281). The group with grade 0 adhesions, defined as the absence of any adhesions, exhibited markedly elevated rates of vaginal delivery when compared to the other groups (p=0.006). The absence of intra-abdominal adhesion was observed in 92% of CS performed on pregnancies where SG was undetected, a finding that was significant, as seen Table 2 (p<0.001). All of the grade 2-4 adhesions occurred in cases of mild to moderate SG. No intra-abdominal adhesion was observed in cases with FST type 1 skin (n=10) during CS. However, in 80% of cases with FST type 6 skin, grade 2-4 adhesions were found.

Table 1. A comparison of the severity of Striae Gravidarum across the groups

Variables		Severity of striae gravidarum			p
		Group 1 No SG	**Group 2 Mild SG**	**Group 3 Moderate-severe SG**	
		Mean ± SD or n (%)	**Mean ± SD or n (%)**	**Mean ± SD or n (%)**	
Age (y)		30.24±5.83	28.36±4.43	27.86±4.54	**0.044[a]**
Height (cm)		160.56±5.61	161.02±5.14	162.06±5.90	0.387[a]
Weight (kg)		80.16±12.06	83.46±8.40	85.92±11.89	**0.003[b]**
BMI (kg/m^2)		31.46±2.43	32.14±2.72	32.66±3.65	0.155[b]
Gestational weight gain (kg)		11.00±5.10	12.18±4.95	11.12±5.77	0.472[a]
25-hydroxy vitamin D level (ng/mL)		32.48±18.29	31.82±20.73	24.12±13.10	**0.034[a]**
Education status	Illiterate	1(2.0)	4 (8.0)	3 (6.0)	0.728[c]
	Primary school	9(18.0)	7 (14.0)	8 (16.0)	
	Middle school	17 (34.0)	13 (26.0)	13 (26.0)	
	High school	13 (26.0)	18 (36.09	20 (40.0)	
	Licence	10 (20.0)	8 (16.0)	6 (12.0)	
Profession	None	42 (84.0)	45 (90.0)	44 (88.0)	0.656[c]
	Yes	8 (16.0)	5 (10.0)	6 (12.0)	
Smoking	None	39 (78.0)	46 (92.0)	42 (84.0)	0.150[c]
	Yes	11 (22.0)	4 (8.0)	8 (16.0)	
Presence of comorbidity	None	48 (96.0)	46 (92.0)	46 (92.0)	0.651[c]
	Yes	2 (4.0)	4 (8.09	4 (8.0)	
Family history for SG	None	42 (84.0)	38 (76.0)	32 (64.0)	0.069[c]
	Yes	8 (16.0)	12 (24.0)	18 (36.0)	
Use of oil lotion during pregnancy	None	45 (90.0)	38 (76.0)	47 (94.0)	**0.021[c]**
	Yes	5 (10.0)	12 (24.0)	3 (6.0)	

Table 1. Continued

Variables		Severity of striae gravidarum			p
		Group 1 No SG	Group 2 Mild SG	Group 3 Moderate-severe SG	
		Mean ± SD or n (%)	Mean ± SD or n (%)	Mean ± SD or n (%)	
Gravidity	2	28 (56.0)	26 (52.0)	28 (56.0)	0.454[c]
	3	14 (28.0)	15 (30.0)	11 (22.0)	
	4	4 (8.0)	8 (16.0)	5 (10.0)	
	≥5	4 (8.0)	1 (2.0)	6 (12.0)	
Parity	1	37 (74.0)	36 (72.0)	34 (68.0)	0.488[c]
	2	9 (18.0)	11 (22.0)	8 (16.0)	
	3-4	4 (8.0)	3 (6.0)	8 (16.0)	
Number of children	1	37 (74.0)	37 (74.0)	34 (68.0)	0.691[c]
	2	9 (18.0)	9 (18.0)	8 (16.0)	
	3	4 (8.0)	4 (8.0)	8 (16.0)	
Number of abortus	0	37 (74.0)	38 (76.0)	41 (82.0)	0.571[c]
	1	10 (20.0)	11 (22.0)	6 (12.0)	
	2-3	3 (6.0)	1 (2.0)	3 (6.0)	
Number of vaginal birth	0	37 (74.0)	36 (72.0)	34 (68.0)	0.488[c]
	1	9 (18.0)	11 (22.0)	8 (16.0)	
	2-3	4 (8.0)	3 (6.0)	8 (16.0)	
Nair score	Grade 0	46 (92.0)	40 (80.0)	21 (42.0)	**<0.001[c]**
	Grade 1	4 (8.0)	10 (20.0)	17 (34.0)	
	Grade 2	0 (0.0)	0 (0.0)	10 (20.0)	
	Grade 3	0 (0.0)	0 (0.0)	1 (2.0)	
	Grade 4	0 (0.0)	0 (0.0)	1 (2.0)	

[a]: ANOVA test, [b]: Kruskal-Wallis test, [c]: Chi-square test. Bold is statistically significant. SD: Standard deviation, SG: Striae gravidarum, BMI: Body mass index. In the case of a significant difference in the ANOVA test, multiple comparisons were carried out with the LSD test, while in the case of a significant difference in the Kruskal-Wallis test, the Mann-Whitney U test with Bonferroni correction was used. Significant parameters with $p<0.05$ in post-hoc analysis; for age, group 1 > group 3; for weight, group 1 < group 2 and group 1 < group 3; for 25-hydroxy vitamin D level, group 1 > group 3 and group 2 > group 3.

Table 2. A comparative analysis of the groups according to the grade of intra-abdominal adhesions

Variables		Grade of intra-abdominal adhesions according to Nair score			p
		Grade 0	Grade 1	Grade 2-4	
		Mean ± SD or n (%)	Mean ± SD or n (%)	Mean ± SD or n (%)	
Age (y)		28.92±5.04	27.55±5.05	31.25±4.43	0.091[a]
BMI (kg/m^2)		32.07±3.07	32.06±3.07	32.25±2.34	0.650[b]
Height (cm)		161.18±5.31	160.97±5.89	162.17±7.15	0.813[a]
Weight (kg)		83.22±11.63	82.19±9.92	85.33±9.41	0.576[b]
Gestational weight gain (kg)		11.35±5.07	10.84±5.98	13.75±4.96	0.256[a]
25-hydroxy vitamin D level (ng/mL)		28.64±15.96	33.81±23.90	25.75±16.67	0.281[a]
Education status	Illiterate	5 (62.5)	2 (25.0)	1 (12.5)	0.707[c]
	Primary school	16 (66.7)	6 (25.09	2 (8.3)	
	Middle school	30 (69.8)	11 (25.6)	2 (4.7)	
	High school	37 (72.5)	10 (19.6)	4 (7.89)	
	University	19 (79.2)	2 (8.3)	3 (12.5)	

Table 2. Continued

Variables		Grade of intra-abdominal adhesions according to Nair score			p
		Grade 0	Grade 1	Grade 2-4	
		Mean ± SD or n (%)	Mean ± SD or n (%)	Mean ± SD or n (%)	
Smoking	None	90 (70.9)	27 (21.3)	10 (7.9)	0.934[c]
	Yes	17 (73.9)	4 (17.4)	2 (8.7)	
Family history for SG	No	79 (70.9)	23 (20.59)	10 (8.9)	0.904[c]
	Yes	28 (73.79)	8 (21.1)	2 (5.3)	
Use of oil lotion during pregnancy	No	89 (68.59)	29 (22.3)	12 (9.2)	0.190[c]
	Yes	18 (90.09)	2 (10.0)	0 (0.0)	
Gravidity	2	57 (69.5)	20 (24.4)	5 (6.1)	0.367[c]
	3	32 (80.0)	6 (15.0)	2 (5.0)	
	4	11 (64.79)	3 (17.6)	3 (17.6)	
	≥5	7 (63.6)	2 (18.2)	2 (18.2)	
Number of children	1	77 (71.3)	26 (24.1)	5 (4.6)	**0.015**[c]
	2	20 (76.9)	4 (15.4)	2 (7.7)	
	3	10 (62.5)	1 (6.3)	5 (31.3)	
Number of vaginal birth	0	75 (70.1)	27 (25.2)	5 (4.7)	**0.006**[c]
	1	23 (82.1)	3 (10.7)	2 (7.1)	
	2-3	9 (60.0)	1 (6.7)	5 (33.3)	
Severity of SG	None SG	46 (92.0)	4 (8.0)	0 (0.0)	**<0.001**[c]
	Mild SG	40 (80.0)	10 (20.0)	0 (0.0)	
	Moderate-severe SG	21 (42.0)	17 (34.0)	12 (24.0)	
FST score	Type 1	10 (100.0)	0 (0.0)	0 (0.0)	**<0.001**[c]
	Type 2	17 (89.5)	2 (10.5)	0 (0.0)	
	Type 3	24 (82.8)	3 (10.3)	2 (6.9)	
	Type 4	30 (69.8)	11 (25.6)	2 (4.7)	
	Type 5	25 (56.8)	15 (34.1)	4 (9.1)	
	Type 6	1 (20.0)	0 (0.0)	4 (80.0)	

[a]: ANOVA test, [b]: Kruskal-Wallis test, [c]: Chi-square test. Bold is statistically significant. FST: Fitzpatrick skin type, SD: Standard deviation, SG: Striae gravidarum, BMI: Body mass index

Discussion

The capacity to anticipate the occurrence of intra-abdominal adhesions in subsequent CSs is important for obstetricians. The findings of this study indicate that as the severity of SG increases and the skin color darkens, the degree of intra-abdominal adhesions also increases. Furthermore, an increased rate of adhesion may be encountered in CS of pregnancies in this group of women.

Chang et al. (4) reported that family history, race, and genetic factors are more indicative of SG development than pre-pregnancy BMI, mean gestational weight gain, mean percent weight gain, and mean change in BMI during pregnancy. The present study, conducted with Turkish women with similar family history rates, revealed that the moderate-severe SG group exhibited higher weight, despite being younger than the other groups. As in our study, Davey, who devised the SG classification, demonstrated that women with higher BMIs were more likely to develop SG (15).

A paucity of published studies has investigated the relationship between the severity of SG during pregnancy and serum 25(OH) D levels. In a study by Hocaoglu et al. (16), serum 25(OH)D levels were measured in 91 primigravid female patients. The results indicated that women with normal serum 25(OH)D levels (≥30 ng/mL) had a lower risk of having SG than women with low serum 25(OH)D levels. Similarly, in the present study, 25(OH)D levels were found to be significantly lower in the moderate-severe SG group (24.12±13.10 ng/L) compared to the non-SG and mild SG groups. Unfortunately, vitamin D deficiency is currently considered to have become a global epidemic and during pregnancy, vitamin D supplementation is recommended (17). Nevertheless, no significant association was found between intra-abdominal adhesions and vitamin D in our study. To our knowledge, this is the first study to investigate the relationship between intra-abdominal adhesions and vitamin D, and further randomized controlled trials are needed to provide clearer information.

A review of topical methods used to prevent SG (18), especially in pregnancy, found that there was limited evidence that massages with almond oil can prevent and/or reduce the severity of SG. Furthermore, cocoa butter and olive oil were not effective in preventing SG or reducing the severity of lesions. In the present study, the mild SG group used more lotions containing mixed oils with more ingredients than the moderate-severe group. Further research is required to elucidate the pathogenesis of SG, as reliable methods of prevention are scarce. Furthermore, the heterogeneity of topical methods and the lack of strong evidence from well-designed, randomized controlled trials necessitate further investigation.

The grades of intra-abdominal adhesions demonstrated a significant increase in accordance with the Nair score in women who exhibited heightened SG severity, as classified by the Davey score, prior to their second CS. In a case-control study by Elprince et al. (19), involving 408 women, thick intraperitoneal adhesions were observed in 43.75% of women with severe SG. Additionally, Davey scores and Vancouver scores, which are used to classify cesarean scars, demonstrated highly significant predictive performance for intraperitoneal adhesions. In a similar study by Abbas et al. (20), 300 women were observed. The results indicated that dense adhesions were significantly higher (57.4%) in the severe SG group. A significant positive moderate correlation was observed between the Nair score and the Davey score ($r=0.541$). The authors concluded that the only variable associated with an increased risk of pelvic adhesions was the Davey score >2. Furthermore, another study reported higher rates of intraperitoneal adhesions in women with no or mild striae than in those with severe striae (67.3%, 65.9%, and 36.3%, respectively) (21).

Consequently, abdominal striae and CS scar were identified as significant predictors of intraperitoneal adhesions, as evidenced by the findings of earlier studies and the present one (19-21). Nevertheless, Jaafar et al. (22) observed in a comparable study involving 100 patients that abdominal scar width, collapsed scar, and striae color grading were significantly associated with intra-abdominal adhesions. However, they noted that these markers may not be reliable due to their low validity. One of the few studies on this subject, by Altınboğa et al. (23) in 115 patients, showed a significant increase in adhesion density with increasing skin color. Furthermore, the frequency of abdominal adhesions increased significantly with increasing Fitzpatrick score (23).

It is of the utmost importance to take all possible measures to minimize the incidence of pelvic adhesions in cases of repeat cesarean deliveries. Two principal strategies are currently being investigated: peritoneal closure and/or the use of adhesion barriers during cesarean deliveries (24). A significant number of researchers are engaged in the pursuit of efficacious methodologies for the prevention of adhesions (24,25). Individual studies employing barrier materials, Ringer's lactate solution and anti-adhesive components have yielded encouraging outcomes in the prevention of postoperative adhesions (24,25). A 2020 Cochrane review, which addressed the efficacy of barrier agents in the prevention of adhesions following gynecological surgery (25), concluded that certain absorbable adhesion barriers reduce the incidence of adhesion formation after laparotomy. However, no conclusions specifically pertinent to cesarean deliveries were made since no published randomized controlled trials were available. At present, there is no standardized agent in use at our clinic. However, peritoneal closure is a routine procedure in cases where adhesion is present in cesarean birth. It seems reasonable to suggest that the most effective strategy for the prevention of post-cesarean adhesions is to reduce the incidence of primary CS and to provide appropriate support to families and obstetricians.

Study Limitations

This study is, to the best of our knowledge, one of the first to show an association between FST and intra-abdominal adhesions. The formation of intra-abdominal adhesions increased significantly with increasing FST category. A more accurate evaluation of the relationship between SG and intra-abdominal adhesions may be achieved by including only women who will have a second CS and excluding conditions that may act as cofactors for adhesion formation, such as a history of multiple CS, previous intra-abdominal surgery, pelvic inflammatory disease and endometriosis. In addition, FST were assessed for all groups and the potential influence of skin color on adhesion formation was also considered. As a limitation, severe and moderate SG were evaluated together as there were only seven cases in the severe group.

Conclusion

The results of this study suggest that as the severity of SG and the FST score increases, the incidence of intra-abdominal adhesions at second Cesarean delivery also increases significantly. It is therefore important for obstetricians to be aware that pregnant women with severe SG and dark skin are at higher risk of adhesion formation after cesarean delivery and to counsel them appropriately regarding the potential adverse maternal and perinatal outcomes that may occur with subsequent CSs.

Ethics

Ethics Committee Approval: *Ethical approval was subsequently granted by the Etlik Zübeyde Hanım Women's Health Training and Research Hospital Local Ethics Committee (approval number: 2021/50, date: 07.05.2021).*

Informed Consent: *Written informed consent was obtained from all participants before the start of the prospective case-control study.*

Footnotes

Author Contributions: *Surgical and Medical Practices: Y.A.R., F.B.F., S.Y.E., B.S.Ü., Concept: Y.A.R., A.A., R.S.K., Y.E.Ü., Design: Y.A.R., A.A., R.S.K., Y.E.Ü., Data Collection or Processing: Y.A.R., N.M., Analysis or Interpretation: Y.A.R., A.A., T.K., Literature Search: Y.A.R., A.A., T.K., Writing: Y.A.R., A.A., F.B.F., S.Y.E., N.M., B.S.Ü., T.K., R.S.K., Y.E.Ü.*

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