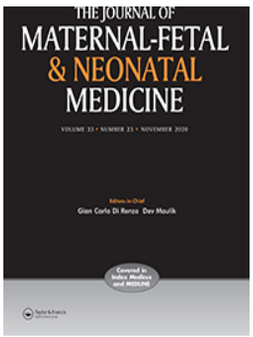

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ORIGINAL ARTICLE

Striae gravidarum in primigravid women: prevalence, risk factors, prevention interventions and body image

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ABSTRACT

Objectives: The study was conducted to identify the striae gravidarum (SG) prevalence in primigravid women, the influencing risk factors and the preventive interventions, and also to investigate its effect on body perception.

Methods: This cross-sectional and descriptive study was conducted on 421 primigravid women who presented to a training and research hospital to have a nonstress test during routine follow-up. The data of the study were collected with the "Data Collection Form", "Fitzpatrick Skin Type Scale", "Davey's Severity Score of Striae Gravidarum" and "Body Image Scale (BIS)".

Results: SG was found to be present in 67% of primigravid women. According to the results of the logistic regression analysis conducted, the presence of social security, sleep duration, BMI in pregnancy, and a history of striae in the mother and/or sister were found to be associated with SG presence ($p < 0.05$). A very weak positive relationship was found between SG severity in primigravidas and the score obtained from BIS ($p < 0.05$). The body perception of the pregnant women worsened in the presence of SG and a very weak negative relationship was found between the number of interventions used for prevention and the BIS score ($p < 0.05$).

Conclusion: SG is seen in 7 of 10 women and affects body perception negatively. We recommend providing training and consultancy services both before and during pregnancy on the interventions and lifestyle changes required and topical preparations that can be used to prevent or decrease the severity of SG while taking the risk factors causing the problem into account.

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KEYWORDS
Body image; pregnancy; prevalence; risk factors; stretch marks

Introduction

Striae gravidarum (SG) are atrophic linear scars commonly seen in the connective tissues of pregnant women [1]. SG have been reported to occur in 55–90% of pregnant women [1] and usually occur in the abdomen but can also develop in the hips, breasts, thigh, groins, and armpits [2]. SG especially occur during the sixth and seventh months of pregnancy and are initially seen as dark pink and bright atrophic strips, but later become pale and take a cream color. These changes ensure SG become less visible. However, SG never disappear by themselves [3].

Factors causing SG development are not fully known [1,3,4]. It is reported that genetic [5] and hormonal [6] factors, connective tissue changes and mechanical stress [7–9] in pregnancy may play a role in SG development. Besides, the age at pregnancy [10–13], maternal weight gain, newborn weight [10–12,14], family history [7,11–14] and chronic diseases [14] have been reported to increase the risk of SG development in pregnant women in various studies.

Although SG does not cause any health problems [4], the permanent scar tissue or the similar changes it creates in the skin may cause undesirable consequences such as itching and burning sensation in the women [2]. Besides, SG leads to cosmetic concerns in many women [10] and this may be a source of stress [4]. Such changes may adversely affect the quality of life. There is no specific treatment to prevent the condition although it is a significant source of anxiety for women [2].

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There are several studies on the prevalence and development risk factors of SG, a condition that leads to physical and psychological health problems in women [1,7,10–18]. However, there are only a few studies on the psychological effects of SG in women [19,20] and such studies have investigated the quality of life of pregnant women. We did not come across a study evaluating the effects of SG on body image perception and the relationship with the preventive interventions performed by pregnant women. This study was conducted to identify the SG prevalence in primigravid women together with the influencing risk factors and preventive interventions, and also to investigate its effect on body image perception.

Materials and methods

The population of this descriptive and cross-sectional study consisted of primigravid women who presented to the Department of Obstetrics and Gynecology of a training and research state hospital between 05 December 2016 and 03 March 2017 to undergo a nonstress test for routine follow-up during pregnancy. No sample selection was conducted and all pregnant women who met the inclusion criteria were included in the study. Study inclusion criteria were (1) primigravid state; (2) not having a multiple pregnancy; (3) the pregnancy being in the 32nd–42nd week; (4) absence of polyhydramnios; (5) absence of any systemic disease; (6) not using steroid derivatives or collagen synthesis inhibiting drugs; (7) ability to answer the study questions; and (8) accepting to participate in the study. The study was completed with 421 primigravid women meeting the aforementioned criteria.

The "Data Collection Form" created by the researchers by reviewing the relevant literature [10–12,15,17–19,21], the "Fitzpatrick Skin Type Scale," "Davey's Severity Score of Striae Gravidarum," and "Body Image Scale (BIS)" were used to collect the data of the study. The data form contained a total of 31 questions including 11 regarding the sociodemographic characteristics of the women; 14 regarding the gestational week, prepregnancy weight, weight in the study period, height, weight of the infant, hair and eye color, intestinal habits, smoking status, daily water consumption, the vegetable and fruit consumption and exercising status; and 6 questions regarding SG.

The Fitzpatrick Skin Type Scale was developed by Fitzpatrick in 1975 to identify the skin type and reaction to sunlight. The genetic structure, eye color, reaction to sunlight and sunbathing habits can be determined with this scale. Skin types in this scale vary from the extremely sensitive, always burning and nontanning skin type to sun-resistant, never-burning very dark pigmented skin type [22].

Davey's Severity Score of SG is a method developed by Davey in 1972 to score SG severity. The abdomen is divided into four quadrants. Each quadrant is scored as "0" for clean skin, "1" for moderate striae and "2" for multiple striae. Accordingly, the total score varies between 0 and 8 [23].

The BIS was developed in 1953. The satisfaction of the individuals with 40 separate body parts or functions is evaluated. The form of the scale used in our country is a five-point Likert-type measurement tool consisting of 40 items. A minimum of 40 and a maximum of 200 point can be obtained from the scale. An increase in scale total score reflects decreased satisfaction of the individual with the body parts or functions [24].

This study was started after obtaining ethics committee approval from the Niğde University Ethics Committee (decision no: 2016/06-01, date: 21 June 2016) and written permission from the hospital where the study was conducted. Before applying the data collection tools, the women who met the study inclusion criteria were informed on the purpose of the study and were asked to participate in the study voluntarily, followed by obtaining their verbal and written informed consent.

The statistical evaluation for the study was conducted after entering the data in the SPSS IBM (24.0) program (IBM, USA). Descriptive statistics, chi-square tests and the Mann–Whitney U test were used for data analysis. Backward logistic regression analysis was used to determine the categorical potential risk factors related to SG. The relationship between SG severity, gestational week, number of preventive interventions, body mass index (BMI) before and during pregnancy and body image perception were evaluated by Pearson's correlation analysis. The statistical significance level was identified as $p < .05$.

Results

The mean age of the primigravid pregnant women was 22.26 ± 3.59 years and the mean gestational week was 36.12 ± 2.41 weeks; 46.3% were primary school graduates, 11.2% were working in an income-generating job and 17.8% had no social security. Among the women, 3.3% were smoking during their pregnancy, 92.6% had a hair color of black/brown, 11.6% had an eye color of blue/green, 11.6% had type I and 36.9% type III skin type. Striae before the pregnancy were

Table 1. SG prevalence in primigravid women, development time and interventions for prevention.

Characteristics	*n*	%
Presence of striae gravidarum in pregnancy		
Yes	282	67.0
No	139	33.0
Time of development of striae (*n*: 282)		
First trimester	10	3.5
Second trimester	72	25.6
Third trimester	200	70.9
Use of interventions to prevent striae		
Yes	172	40.9
No	249	59.1
Type of intervention performed[a]		
Bitter almond oil	47	27.1
Olive oil	45	26.1
Cocoa butter	15	8.8
Massage with moisturizing cream	52	30.1
Striae preventing cream recommended by the physician	15	8.8
Other[b]	35	19.1

[a]Multiple answers were given.
[b]Other: baby oil, St. John's Wort oil, sweet almond oil, Vaseline.

reported by 24.9% of the primigravid women; 57.5% said that their mother or sister had striae and 32.5% reported striae in the aunt.

Among the primigravid pregnant women, 67.0% expressed that SG had developed during their pregnancy and the time of development was the third trimester in 70.9% of them (Table 1). When the risk factors were evaluated, a statistically significant difference was found between SG presence in the primigravid women and the presence of social security, BMI before pregnancy, BMI during pregnancy, daily sleep duration, striae development before pregnancy, and striae in the mother or sister ($p < .05$) (Table 2). The effect of significant risk factors on SG was evaluated with Multivariate Logistic regression analysis. In the presence of other variables, the possibility of developing SG was approximately two times higher in those without social security than in those with social security (OR = 2.364, 95% CI: 1.217–4.592). The possibility of developing SG in those with a sleep duration of 9 h and more was found to be approximately 2 times higher than those with a sleep duration of 7–8 h (OR = 1.977, 95% CI: 1.149–3.402). The possibility of developing SG was found to be approximately 5.5 times higher in those with 30.00 kg/m^2 and higher BMI during pregnancy than those with 24.99 kg/m^2 and lower BMI (OR = 5.629, 95% CI: 2.577–12.296). The possibility of developing SG in those with striae in their mother and/or sister was approximately three times compared to those without (OR = 3.280, 95% CI: 1.792–6.006). Besides, the possibility of developing SG was approximately five times in those who did not know whether striae was present in their mother and/or sister than those who knew striae were not present (OR = 4.876, 95% CI: 2.300–10.339) (Table 3).

We found that score median of the primigravid women from the SG severity scale at the 37th gestational week had increased sufficiently to create a significant difference compared to the 32nd–36th gestational week ($Z = -2.859$, $p = .04$). According to the correlation analysis, a very weak positive relationship was found between the score obtained from SG severity and BIS ($r = 0.157$, $p = .001$) and gestational week ($r = 0.189$, $p < .0001$) and a weak positive relationship was found between the prepregnancy ($r = 0.325$, $p < .0001$) and pregnancy BMI ($r = 0.375$, $p < .0001$).

An intervention for SG had been used by 40.9% of the study subjects during their pregnancy. The intervention consisted of massage with moisturizing cream in 30.1%, bitter almond oil in 27.1% and olive oil in 26.1% (Table 1). No statistically significant association was found between using interventions to prevent SG and the score median obtained from BIS in the primigravid pregnant women ($Z = -0.263$, $p = .793$). A very weak negative relationship was found between the number of interventions used and the score obtained from BIS ($r = -0.152$, $p = .047$).

Discussion

SG can cause psychological problems and lack of confidence due to the cosmetic appearance it causes and is common in pregnant women [25]. The SG prevalence has been reported as 52.0–87.7% in various studies conducted on primigravid pregnant women [9,10,12,21]. The SG prevalence in primigravid women was 67.0% in our study. The SG prevalence has been reported as 74.9–84.0% in various studies conducted with primigravid pregnant women in our country [13,15,16]. Our result was low compared to similar studies from our country [13,15,16]. The reason could be that abdominal SG was only evaluated according to Davey's SG severity scoring in our study.

The distribution of the gestational week with SG onset varies in the literature [10,13]. Atwal et al. [10] reported a rate of 17% for the 12–20th gestational week, 25% for the 21–28th gestational week and 29% after the 28th gestational week for SG in their study on primigravid women. Timur Taşhan and Sever [13] reported that SG developed before the 12th gestational week in 25%, the 21–28th gestational week in 31.6% and after the 28th gestational week in 21.9% of their primigravid women. SG developed in the third trimester in 70.9% of the primigravid women in our study. In support of our study findings, SG is reported to usually develop in the late second trimester and

Table 2. Existence of SG according to some characteristics of the Primigravids (continuation).

	Striae gravidarum				
	Present ($n = 282$)		Absent ($n = 139$)		
Characteristics	*n*	%	*n*	%	*p*
Age group					
≤19	75	68.8	34	31.2	.752
20–29	196	66.0	101	34.0	
≥30	11	73.3	4	26.7	
Educational status					
Illiterate/ literate	11	78.6	3	21.4	.823
Primary school graduate	129	66.2	66	33.8	
High school graduate	85	66.9	42	33.1	
University and above	57	67.1	28	32.9	
Occupational status					
Employed	26	55.3	21	44.7	.071
Not working	256	68.4	118	31.6	
Social security					
Yes	223	64.5	123	35.5	.018
No	59	78.7	16	21.3	
Smoking					
Has never smoked	253	67.5	122	32.5	.712
Smoking	8	57.1	6	42.9	
Has quit	21	65.6	11	34.4	
Natural hair color					
Brown/black	262	67.2	128	32.8	.762
Blond/red	20	64.5	11	35.5	
Natural eye color					
Brown/black	203	67.2	99	32.8	.094
Hazel	41	58.6	29	41.4	
Green/blue	38	77.6	11	22.4	
Fitzpatrick skin color scale					
Type I	30	61.2	19	38.8	.366
Type II	106	68.4	49	31.6	
Type III	94	63.9	53	36.1	
Type IV	52	75.3	18	25.7	
Prepregnancy BMI					
≤18.4 kg/m^2	18	51.4	17	48.6	<.0001
18.5 to 24.9 kg/m^2	191	63.2	111	36.8	
25.0 to 29.9 kg/m^2	55	84.6	10	15.4	
≥30.0 kg/m^2	18	94.7	1	5.3	
BMI during pregnancy					
≤18.4 kg/m^2	1	50.0	1	50.0	<.0001
18.5 to 24.9 kg/m^2	57	52.8	51	47.2	
25.0 to 29.9 kg/m^2	133	63.6	76	36.4	
≥30.0 kg/m^2	91	89.2	11	10.8	
Water consumption (l/day)					
Less than 1 l	36	76.6	11	23.4	.326
1–3 l	198	65.6	104	34.3	
More than 3 l	48	66.7	24	33.3	
Daily sleep duration (h/d)					
6 h and less	50	56.8	38	43.2	.001
7–8 h	119	63.0	70	37.0	
9 h and more	113	78.5	31	21.5	
Gender of the fetus					
Female	123	67.4	67	35.3	.558
Male	144	68.2	67	31.8	
Unknown	15	75.0	5	25.0	
Gestational week					
32 to 36 weeks	144	62.9	85	37.1	.051
≥37	138	71.9	54	28.1	
History of striae with gaining or losing weight before pregnancy					
Present	84	80.0	21	20.0	.001
Absent	198	62.7	118	37.3	
Presence of striae in the mother and/or sister (*n*: 336)[a]					
Yes	181	74.8	61	25.2	<.0001
No	38	40.4	56	59.6	
Presence of striae in aunts (*n*: 178)[a]					
Present	106	77.4	31	22.6	<.0001
Absent	18	43.9	23	56.1	
Use of interventions to prevent striae					
Yes	122	70.9	50	29.1	.152
No	160	64.3	89	35.7	

[a]Calculated by excluding the "I don't know" answers of the pregnant women.

Table 3. Statistical analysis of associated factors for SG according to the logistic regression analysis.

Risk Factors	*B*	SE	*p**	OR	95% CI	
					Lower	Upper
Social Security						
Absent versus present	0.861	0.339	.011	2.364	1.217	4.592
Sleep Duration						
≤6 h versus 7–8 h.	−0.259	0.298	.385	0.772	0.430	1.385
≥9 h versus 7–8 h.	0.682	0.277	.014	1.977	1.149	3.402
BMI in Pregnancy						
25.0–29.9 kg/m^2 versus ≤24.99 kg/m^2	0.363	0.265	.170	1.437	0.856	2.414
≥30.00 kg/m^2 versus ≤24.99 kg/m^2	1.728	0.399	<.0001	5.629	2.577	12.296
Striae Before Pregnancy						
Absent versus present*	−0.574	0.304	.073	0.579	0.319	1.051
Striae in Mother and/or Sister						
Present versus absent	1.188	0.309	<.0001	3.280	1.792	6.006
Unknown versus absent	1.584	0.383	<.0001	4.876	2.300	10.339
Striae in Aunt						
Present versus absent	0.616	0.461	.181	1.852	0.751	4.569
Unknown versus absent	−0.015	0.424	.972	0.985	0.429	2.264

Pseudo (Nagelkerke) $R^2 = 0.279$; Hosmer–Lemeshow $\chi^2 = 5.372$; $p = .717$. Dependent variable: 1 = SG absent; 0 = SG present. Abbreviations: CI: confidence interval; OR: odds ratio; SE: standard error; SG: striae gravidarum. The level of statistical significance was set at $p < .05$.

third trimester in the literature [1,7]. No statistically significant association was found between SG presence in pregnant women and the gestational week in our study ($p > .05$). However, a very weak increase was found in SG severity as the gestational week progressed. Similar to our study findings, Osman et al. [12] reported that no statistically significant association was present between the gestational week and SG presence, but a significant association was found between SG severity and gestational age in weeks.

Although there are many factors affecting the development of SG in pregnant women, the reports are contradictory [12]. One of the factors affecting SG development in our primigravid women was the presence of social security coverage. The probability of SG development increased to approximately two times in pregnant women who do not have social security. No statistically significant association was reported between the presence of private health insurance and SG development incidence in the study of Picard et al. [17]. However, the development of SG was significantly more common in unemployed women than in the employed in the same study [17]. Social security coverage is obtained as a result of depositing health insurance premiums while the person or his/her spouse is working in our country. Our study result is therefore consistent with the results of Picard et al. [17]. The lack of social security is thought to increase the risk of developing SG by affecting the nutritional state.

The probability of developing SG increased by approximately 2 times in those with a sleep duration of 9 h and more compared to those with a sleep duration of 7–8 h in our study. No statistically significant association was found between sleep duration and SG presence in another study [11]. It is emphasized that sleep disturbance is both the cause and result of obesity. Although a short duration of sleep has been reported to be associated with obesity, long sleep duration may also cause high BMI in middle-aged women [26]. Conditions stretching the skin and creating stress such as weight gain are thought to increase the risk of SG development [2]. We found increased SG rates with the increase in BMI both before and during pregnancy in this study. According to the logistic regression analysis, the possibility of developing SG in those with a BMI of 30.00 kg/m^2 or more was found to be approximately 2.5 times higher than those with a BMI of 24.99 kg/m^2 or less. The relevant studies have reported contradicting results. Some report that the increased weight during pregnancy or the maternal weight itself affects the development of SG [9,10,12,14,16,17,27] while others report the opposite [11,18,21]. Maternal weight gain was found to affect SG severity in the study of Osman et al. [12]. Similarly, we found a weak positive relationship between SG severity and BMI, both before and during pregnancy.

Genetic factors and a previous history of striae in the individual are reported to increase the risk of SG development in pregnancy [7]. SG was significantly more common in those with a history of striae in themselves or in their first and second degree relatives compared to those without such a history in our study. However, logistic regression analysis revealed a significant relationship between subjects with a history of striae or those who were unaware of such a history in the mother and/or sister and those definitely without such a history. The risk of developing SG was approximately twice in subjects whose mother and/or sister had SG. Similarly, a family history of striae has

been reported to increase the risk of developing SG in many studies [7,10–14,16,18,21,25].

SG causes cosmetic problems in women [2,25]. Many women, therefore, use topical creams or preparations during pregnancy to prevent SG development and decrease its severity [2]. However, the number of studies on the prevention of SG is limited. Cocoa butter, almond oil and olive oil, and various creams with various active ingredients have been reported to decrease the incidence of SG development in pregnancy. It is emphasized that massage alone may have a preventive effect [1]. The use of topical preparation to prevent SG was reported by 40.9% of the women in our study. Timur Taşhan and Sever reported that 32% of the pregnant women in their study used a cream to prevent SG development [13]. The reports on the cream or preparation use and SG development relationship are also contradictory. Another study from our country reported that 62.9% of pregnant women were using topical emollients to prevent SG but these products were not useful in 60.4% of them [16]. Narin et al. [25] reported SG development to be less frequent in those using a cream. However, no significant association was reported between cream use and SG presence and severity in the study of Osman et al. [12]. Similarly, no statistically significant relationship was found between the presence and severity of SG and the use of preventive measures.

SG is reported to cause anxiety and psychological problems in women due to cosmetic concerns [2,10]. However, there are only a few studies on the psychological effects of SG on pregnant women [19,20,27]. Significant deteriorations in the physical and emotional subdimensions of the quality of life were reported in pregnant women with SG compared to those without SG in the study of Yamaguchi et al. [20]. Another study reported no difference between those with and without SG in terms of quality of life but SG severity was found to affect the emotion subdimension of Skindex-29 [19]. How SG influences the body image perception in women was not investigated in these studies [19,20,27]. Pregnancy itself may affect the body image of women. The lack of a relationship between the gestational week of primigravid women and the BIS score in our study is a significant result regarding the effect of SG on body image perception. The BIS score median of the women with SG (81.0) was found to be significantly higher than those without SG (78.0) in our study ($p = .003$). Besides, the body image perception was found to have deteriorated as the severity of SG increased but the relationship was very weak. Although no statistically significant difference was found between using preventive interventions for SG and the score median obtained from BIS, the body image perception of pregnant women was found to improve as the number of interventions for prevention increased but the relationship was weak.

Conclusion

We found that SG develops in two out of every three primigravid women and the prevalence and severity of this pathophysiological condition increases with gestational week progression in this study. The possibility of developing SG was found to increase in primigravid women who have no social security, sleep 9 h a day or more, have a BMI of 30 kg/m^2 or more and whose mother and/or sister has striae. The body image of pregnant women deteriorate with the presence and increasing severity of SG. Approximately four of every 10 women use preventive measures for SG. The severity of SG does not decrease but the body image perception is improved as the number of interventions used by the woman increases. It is necessary to raise awareness about the need to make changes in the lifestyle regarding the relevant risk factors (such as good nutrition, limiting excess weight gain, regulation of sleep duration) in order to prevent the development of SG or decrease its severity by providing counseling and training sessions to women before their pregnancy. Interventions to prevent SG and decrease its severity are required in order to prevent the development of a negative body image perception in these women. Health care professionals should, therefore, inform all pregnant women on evidence-based interventions to preventing the development of SG, together with when to start and how to use them. Evaluation of the psychological effects of these interventions for preventing SG and their influence on body image perception is also recommended for future randomized controlled studies.

Disclosure statement

No potential conflict of interest was reported by the authors.

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