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Research

Striae Gravidarum: Associated Factors in Turkish Primiparae

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Abstract

Introduction: Studies investigating the associations of stria gravidarum (SG) are few in number with controversial results.

Objective: This study evaluated the risk factors associated with SG in 191 Turkish primiparae whose genetic background might be different from previous reports.

Material and Methods: The data was collected via questionnaire and physical examination. The dependent variables in this study group were the presence and absence of striae and the severity of striae which was evaluated by Davey's score. The possible predictor 8 variables evaluated were maternal age, maternal weight gain, neonatal weight, personal history of striae, family history of SG, skin type, maternal height and the use of a topical emollient for the prevention of striae. To determine the possible risk factors for the development of SG, a forward stepwise logistic regression analysis was used.

Results: Of the 8 variables investigated, 3 variables; family history, maternal weight gain and maternal age were found to be significantly associated with SG.

Conclusion: It appears that the group at higher risk of developing striae is younger women with maternal obesity who have a positive family history of SG. Use of a topical emollient for the prevention of stretch marks does not appear to reduce the likelihood of developing SG.

Introduction

Striae gravidarum (SG) is a common disfiguring but poorly characterized condition of pregnancy which may cause cosmetic concerns in many patients [1]. Although the etiology of SG is unclear, it is generally accepted that the combined effects of endocrinological factors and skin stretch play a key role [2]. It is estimated that up to 90% of pregnant women develop SG, though some authors report the prevalence to be as low as 50% [3]. SG tends to develop in the third trimester and fade postpartum to leave permanent silvery scars and they are commonly found on the abdomen and breasts [2].

Although SG is a great concern for women, studies investigating the associations of SG are few in number. Various clinical and demographic variables have been reported in the literature with controversial results. Some studies suggested that race, hence genetic factors might play role in the development of SG [1]. Therefore, this study evaluated the risk factors associated with SG in Turkish primiparae, whose genetic background might be different from previous reports. To the best

of our knowledge, this is the first report on this topic from Turkey.

Materials and Methods

The data was collected via questionnaire and physical examination. Primiparae were defined as women who had delivered after 28 weeks of gestational age and had no previous pregnancies lasting more than 12 weeks. Exclusion criteria included history of diabetes mellitus, gestational diabetes and multiple pregnancy.

191 primiparae consented for interview and examination within two days after delivery. The questionnaire asked whether the subject's first degree relatives (mother, sister) developed striae gravidarum during pregnancy, whether the subject had striae prior to the pregnancy and whether the subject used topical emollient for the prevention of stretch marks. The subjects were asked to record their age, height (<155cm, 1; 155-160cm, 2; 161-166cm, 3; 167-172cm, 4; 172cm>, 5), weight gain during pregnancy (<10kg, 1; 10-15kg, 2; 16-20kg, 3; 20kg>, 4) and the weight of the newborn (<2500g, 1; 2500-3000g, 2; 3001-3500g, 3; 3501-4000g, 4; 4000g>, 5).

Skin type was determined by interview questions based on the Fitzpatrick classification (1-6), which is based on how often a person burns and how well they tan when exposed to sun. Severity of SG was scored by *Davey*'s method [**4**]. According to this scoring system, the abdomen was divided into four quadrants. Each quadrant was scored 0 for clear skin, 1 for a moderate number of striae and 2 for many striae, giving a total score of 0-8. Informed consent was obtained from all subjects.

Data Analyses: Results were analysed using SPSS for Windows® VER 11.5 (SPSS Inc., Chicago, IL, USA).

The dependent variables in this study group were the presence and absence of striae and the severity of the striae which was measured by *Davey*'s score and the possible predictor 8 variables evaluated were maternal age, maternal weight gain, neonatal weight, personal history of striae, family history of SG, Fitzpatrick skin type, maternal height and the use of a topical emollient for the prevention of stretch marks. To determine the possible risk factors for the development of SG and severity of striae which was evaluated by *Davey*'s score, forward stepwise and ordinal binary logistic regression analysis were used respectively. Levels of significance set at 0.05. Variants were evaluated by one sample *Kolmogorov-Smirnov* test for compability with normal distribution. As the data did not fit normal distribution, data are presented as median values and their individual ranges.

Results

191 primiparae were enrolled the study and of the population 74.9% (143 of 191) women had SG with a median age of 26 ranging between 17-39 and with a median Davey's score of 3 ranging between 1-8. 25% (48 of 191) women did not have SG with a median age of 33 ranging between 21-38. 96.5% (138 of 143) women with SG and 10.4% (5 of 48) women without SG had family history of SG. 100% (143 of 143) women with SG and 33.3% (16 of 48) women without SG had personal history of stria. 69.2% (99 of 143) women with SG and 60.4% (29 of 48) women without SG used topical emolients for the prevention of stretch marks. Clinical data of the subjects are summarized in **Tables 1, 2, 3. 4 and 5**.

Of the 8 variables investigated, 3 variables; family history, maternal weight gain and maternal age were found to be significantly associated with the presence and severity of SG (**Table 6, 7**). The most significant association with SG found was family history (Exp β=

Table 1. Clinical Data of the Subjects

Variables	With (Number of patients)	Without (Number of patients)
SG	143 (74,9%)	48 (25,1%)
Family history of SG	143 (74,9%)	48 (25,1%)
Personnal history of SG	159 (83,2%)	32 (16,8%)
History of topical emollient use	128 (67%)	66 (33%)

SG: Striae gravidarum

Table 2. Clinical Data of the Subjects (Neonatal Weight [g])

Patients	<2500	2500-3000	3001-3500	3501-4000	>4000	Total
With SG	0 (0%)	46 (32,2%)	61 (42,7%)	24 (16,8%)	12 (8,4%)	143 (100%)
Without SG	1 (2,1%)	19 (39,6%)	22 (45,8%)	6 (12,5%)	0 (0%)	48 (100%)
Total	1 (0,52%)	65 (34%)	83 (43,5%)	30 (15,7)	12 (6,3%)	191 (100%)

SG: Striae gravidarum

Table 3. Clinical Data of the Subjects (Maternal Weight Gain [kg])

Patients	<10	10-15	16-20	>20	Total
With SG	6 (4.2%)	46 (32.2%)	76 (53.1%)	15 (10.5%)	143 (100%)
Without SG	5 (10.4%)	22 (45.8%)	19 (39.6%)	2 (4.2%)	48 (100%)
Total	11 (5.8%)	68 (35.6%)	95 (49.7)	17 (8.9%)	191 (100%)

SG: Striae gravidarum

Table 4. Clinical Data of the Subjects (Maternal Height [cm])

Patients	<155	155-160	161-166	167-172	172	Total
With SG	3(2.1%)	39(27.3%)	73(51.0)	18(12.6%)	10(7%)	143(100%)
Without SG	0(0%)	19(39.6%)	15(31.3%)	11(22.9%)	3(6.3%)	48(100%)
Total	3(1.6%)	58(30.4%)	88(46.1%)	29(15.2%)	13(6.8%)	191(100%)

SG: Striae gravidarum

Table 5. Clinical Data of the Subjects (Fitzpatrick Skin Type [1-6])

Patients	1	2	3	4	5	6	Total
With SG	3(2.1%)	54(37.8%)	58(40.6%)	21(14.7%)	7(4.9%)	0(0%)	143(100%)
Without SG	0(0%)	20(41.7%)	22(45.8%)	4(8.3%)	2(4.2%)	0(0%)	48(100%)
Total	3(1.6%)	74(38.7%)	80(41.9%)	25(13.1%)	9(4.7%)	0(0%)	191(100%)

SG: Striae gravidarum

Table 6. Forward Logistic Regression Stepwise Analysis for the Determination of Independent Association of SG (Variables in Equation)

Steps	Variables	Exponential β	P value	Nagelkerke R square
Step1	Family history	237.360	p=0.00	0.768
Step 2	Family history Maternal age	379.638	p=0.00	0.820
	Family history	538.752	p=0.00	
Step 3	Maternal age	0.672	p=0.01	0.840*
	Maternal weight	5.899	p=0.032	

*Correct classification percentage

Table 7. Ordinal Binary Logistic Regression for the Determination of Independent Association of Severity of Striae (Variables of Equation)

Variables	Estimate (β)	p Value
Family History	-2.463	p=0.008*
Maternal Age	-0.133	p=0.032*
Maternal Weight Gain (<10 Kg)	-5.048	p=0.000*
Maternal Weight Gain (10-15 Kg)	-2.952	p=0.007*
Maternal Weight Gain (16-20 Kg)	-1.738	p=0.044*

538, P=0.00). An inverse relationship was observed with maternal age and the development of SG (Exp β= 0.672, P=0.01). A steady decrease in the severity of SG was seen with increasing maternal age (R= -0.341, P= 0.00). Maternal weight gain proved to be a significant factor associated with the development of SG (Exp β= 5.899 P=0.032). Severity of striae was found to be significantly associated with family history (Exp β= 11.73, P=0.008), decreased maternal age (Exp β= 1.142, P=0.032) and maternal weight gain; <10 kg (Exp β= 155.7, P=0.00), 10-15 kg (Exp β= 19.1, P=0.007), 16-20 kg (Exp β= 5.68, P=0.044). In other words, women who gained 20> kg during pregnancy was found 155.7, 19.1 and 5.68 times at risk for developing severe striae when compared with women who

gained <10 kg, 10-15 kg, 16-20 kg respectively. Although neonatal weight was not found to be significantly associated with SG in logistic regression, 100% (12 of 12) women developed SG who had newborn weight more than 4000 g. In addition, median Davey's scores of women who had newborn weight 2500-3000 g, 3001-3500 g, 3501-4000 g and 4000 g > were as follows; 3 (1-7), 3 (1-7), 3.5 (1-7) and 7 (2-8) respectively. Although personal history of striae was not found to be significantly associated with SG, 100% (143 of 143) women had positive previous history of striae, however 33.3% (16 of 48) women who had a personal history of striae did not develop SG. 69.2% (99 of 143) women used topical emolients for the prevention of striae developed SG and 60.4% (29 of 48) women who did not use topical emolients did not develop SG.

Discussion

Many women experience SG during their first pregnancy [**5**]. Often, the lesions appear earlier than expected with one study demonstrating 43% of the women enrolled developing SG before 24 weeks of gestation [**1, 5**]. It was suggested that genetics might play a role because family history, personal history of striae and race were found to be predictive of the development of SG [**1**]. As race was found predictive, our study evaluated the risk factors associated with SG in Turkish primiparae for the first time. The prevalence of SG was 74.9% in this study. A wide range of prevalence (50-90%) has been reported for SG [**3, 5, 6**]. Genetic factors and lifestyle (including nutrition and exercise) could explain this variation in prevelance [**6**].

In this study strongest association was found with family history supporting the role of genetic background, which had been reported earlier [**1, 2, 6**]. However, personal history of striae was not found to be significantly associated with SG, though 100% women with SG had positive personal history of striae in this study. This finding is contrary with a previous report [**1**], but consistent with another report [**2**]. This finding could be explained by the role of hormonal factors as previous history of striae was a result of weight gain or adolescent growth, hence might be different from SG. We found that young women had more striae, supporting some previous reports [**3, 7**]. It has been suggested that the connective tissue of young women with more collagen and less cross-linking of collagen is more ready to undergo the partial tearing that occurs in response to stretch of connective tissue [**7**]. Younger skin has been associated with increased fragility of fibrillin, as fibrillin loss has been demonstrated in the development of striae [**2**]. We also found maternal weight gain to be significantly associated with the presence and severity of SG. This finding is consistent with some previous reports [**2, 6**]. In this study, neonatal weight was not found to be significantly associated with SG, though 100% (12 of 12) women developed SG who had newborn weight more than 4000 g with a median Davey's score of 7 ranging between 2-8. The link between newborn weight and SG has been reported previously [**6**]. In our study multiple pregnancy was excluded which might be a factor for this different study outcomes, unlike the previous report [**6**]. In addition, maternal weight gain does not always correlate with newborn weight, which might be an additional factor for the lack of the association with SG. Our finding might also be explained by previous finding that 43% of women developed SG before 24 weeks of gestation, before the newborn weight increased [**1, 5**].

In our study, use of a topical emollient for the prevention of stretch marks did not appear to reduce the likelihood of developing SG. This finding was consistent with a previous report [**3**]. Our study did not take into account factors like the differences of the emollient applied or number of application per day. A previous report showed the lack of efficacy of topical application of a lotion containing cocoa butter [**8**]. However, it was concluded that any cream massaged onto the abdomen might help a little for the prevention of SG [9] which might not be statistically significant as it was not in our study. In our study no relationship was noted between skin type consistent with some previous reports [**2, 3**]. No association between SG and maternal height was found.

Conclusion

It appears that the group at higher risk of developing striae is younger women with maternal obesity who have a positive family history

of SG. Use of a topical emollient for the prevention of stretch marks does not appear to reduce the likelihood of developing SG.

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