

# Risk Factors for Development of Striae Gravidarum: Prospective Observational Study

A. S. Sanjana<sup>1</sup>, Rajendra Okade<sup>2</sup>

## ABSTRACT

**Background:** Striae gravidarum (SG) are the “stretch marks” that occur in pregnancy. SG are atrophic linear scars along the natural skin lines and occur due to connective tissue changes during pregnancy. There are very few published data from Indian subcontinent and often contradictory. **Aims and Objectives:** The aim of the study was to determine the incidence of SG in primigravida pregnant women in our population and to identify the risk factors associated with their development. **Materials and Methods:** A cross-sectional prospective observational study involving 110 primigravida patients in the third trimester visiting obstetric outpatient department for antenatal checkup during January 2017–June 2017. The association between development of SG and various factors is analyzed. **Results:** Among the 110 primigravida pregnant women included in the study, 99 (90%) patients had SG. The age ranged from 18 years to 33 years with mean age of 23.3 years. Gestational weight gain ranged from 6 kg to 30 kg (mean 12 kg). The gender of the baby was 52 females and 47 males. The birth weight ranged from 1.9 kg to 3.7 kg with mean of 2.8 kg. 82 (75.8%) patients delivered at term and 28 (24.2%) delivered preterm. There was no statistically significant difference between age of the patient, gestational weight gain, birth weight, gender of baby, gestational age, and incidence of SG. Among 61 women with positive family history of SG, all 61 patients had SG and among 49 patients with negative family history 38 patients had SG. The difference between the two groups in the incidence of SG was statistically significant ( $P < 0.001$ ). **Conclusion:** The incidence of SG is high among South Indian primigravidae. Primigravidae with positive family history of SG has significantly increased risk of developing SG.

**KEY WORDS:** Striae gravidarum, primigravida, pregnancy, stretch marks.

## Introduction

Striae gravidarum (SG) are the “stretch marks” that occur in pregnancy. SG are atrophic linear scars along the natural skin lines and occur due to connective tissue changes during pregnancy.<sup>[1]</sup> SG represents an important cosmetic, emotional, and psychological concern for pregnant women.<sup>[1]</sup>

Hormonal factors as well as mechanical stretching of the skin have been implicated in the pathogenesis of SG.<sup>[2–5]</sup> Estrogen, relaxin, and adrenocortical hormones may decrease the adhesiveness between collagen fibers and increase ground substance thus resulting in SG.<sup>[6]</sup>

The data on the prevalence of SG and risk factors associated with their development are mostly from the western countries. The prevalence of SG, among pregnant women range from 50% to 90% in various studies.<sup>[3,7]</sup> The risk factors identified for SG includes younger age, maternal and family history of SG, increased gestational weight gain, increased birth weight, fetal gender, and poor nutrition.<sup>[3,5,8]</sup> There are very few published data from Indian subcontinent and often contradictory.

We conducted a prospective observational study to determine the incidence of SG in primigravida pregnant women in our population and to identify the risk factors associated with their development.

## Materials and Methods

A cross-sectional prospective observational study was conducted at a large private teaching hospital in Bengaluru, India, after obtaining institutional ethical committee approval.

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The primigravida patients visiting obstetric outpatient department for antenatal checkup during January 2017–June 2017 were considered for the study. The first 110 primigravida patients visiting antenatal clinic during third trimester were included in the study. The study patients who were eligible for inclusion in the study were explained in detail about the study and a written informed consent was taken before enrolling them for the study. The consent included physical examination, photography of the lesions and their utilization for academic purposes. The following category of patients including multiparous pregnant patients, those patients visiting antenatal clinic in the first and second trimester and those patients who had striae before pregnancy were excluded from the study.

All the 110 pregnant primigravida patients underwent physical examinations of the breast region, lower abdomen, flanks, lower back, and thighs to look for the presence of SG. The presence of striae at any one of the above sites was documented as presence of SG (Figures 1-3). The striae were documented as absent if it was not present at any locations mentioned above.

The findings recorded for all the patients included age of patient, gestational weight gain, gender of the baby, birth weight of the baby, and family history of SG. Family history of SG was considered positive, if the women's mother and or sister had developed during their pregnancy. The association between the presence of SG and age of the patient, family history of SG, gestational weight gain, gender of the baby, and weight of the new born was recorded.



**Figure 1:** Severe form of striae gravidarum on the abdominal wall

The data were analyzed using SPSS 22 version software for determining statistical significance. Chi-square test, Fisher exact test, and odds ratio are used to check for the associated factors, p value <0.05 was considered to be statistically significant.

## Results

Among the 110 primigravida pregnant women included in the study, 99 (90%) patients had SG (Figure 4). The age ranged from 18 years to 33 years with mean age of 23.3 years. The age distribution of study population and incidence of SG in all age groups is represented in Table 1 and Figure 5. There is no statistically significant difference in the incidence of SG in age groups <23 years (median) and more than 23 years.

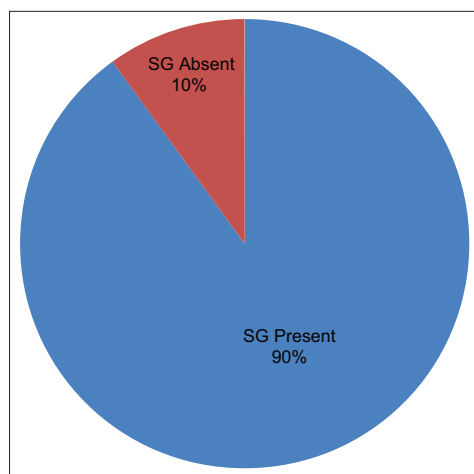
Family history of SG was present in 61 and absent in 49 patients. Among 61 women with positive family history of SG, all 61 (100%) patients had SG. Among 49 patients with negative family history, only 38 (77.6%) patients had SG (Table 2 and Figure 6). The



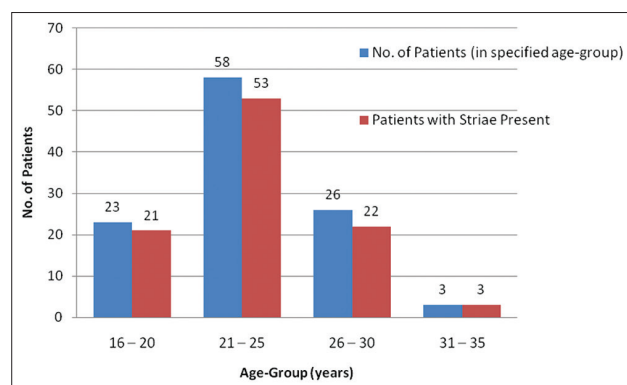
**Figure 2:** Linear striae gravidarum on the lower abdominal wall



**Figure 3:** Striae gravidarum on the flank



**Figure 4:** Incidence of striae gravidarum in the total study population



**Figure 5:** Age-distribution of the study population and striae gravidarum (SG)

difference between the two groups in the incidence of SG was statistically significant ( $P < 0.001$ ).

The gestational weight gain among the study population ranged from 6 kg to 30 kg with mean weight gain of 12 kg. The distribution of gestational weight gain and incidence of SG in each group among the study population is represented in Table 3 and Figure 7. Among 110 patients, 70 primis had gestational weight gain  $<12$  kg and remaining 40 had more than 12 kg. The distribution of SG is 69 out of 70 in the first group and 38 out of 40 in the second group. The difference between two groups was not statistically significant.

The gender of the baby in the study population was 52 females and 47 males. The distribution of SG among study population with male babies (90.9%) and female babies (89.7%) is presented in Table 4 and Figure 8. The difference between the two groups was not statistically significant.

**Table 1: Age-distribution and incidence of striae gravidarum (SG)**

Age group	Total no. of patients	No. of patients SG present	%
16-20	23	21	91.3
21-25	58	53	91.4
26-30	26	22	84.6
31-35	3	3	100
Total	110	99	

Mean age (Years)	SG		Total	P value
	Present	Absent		
$\leq 23$	60	5	65	0.332
$> 23$	39	6	45	
Total	99	11	110	

**Table 2: Family history and distribution of striae gravidarum (SG)**

Family history	Total no. of patients	No. of patients SG present	%	P value
Present	61	61	100	0.0001
Absent	49	38	77.6	
Total	110	99		

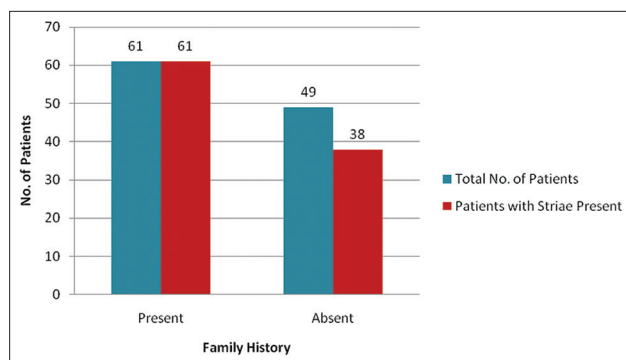
**Table 3: Gestational weight gain and distribution of striae gravidarum (SG)**

Gestational weight gain	Total no. of patients	No. of patients SG present	%
6-10	35	33	94.3
11-15	60	52	86.7
16-20	11	10	90.1
21-25	3	3	100
26-30	1	1	100
Total	110	99	

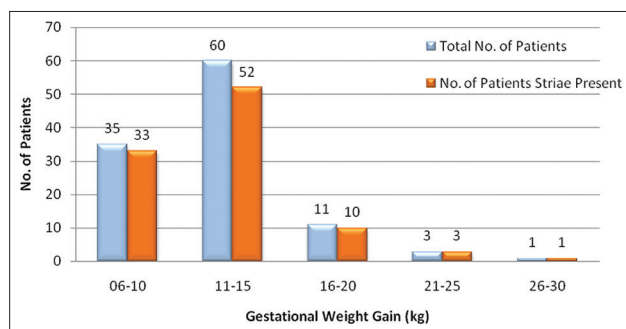
  

Gestational weight gain (kg)	SG		Total	P value
	Present	Absent		
$\leq 12$	61	9	70	0.321
$> 12$	38	2	40	
Total	99	11	110	

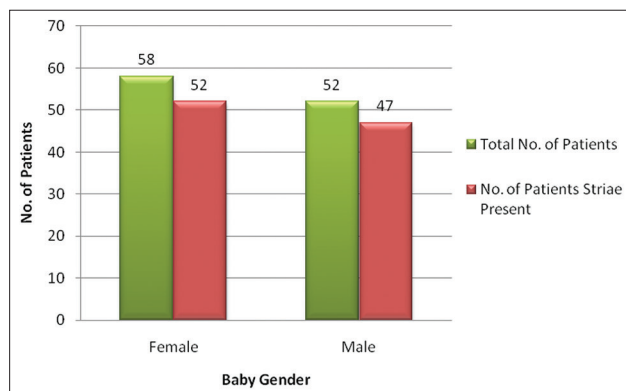
Among 110 study population 16, 92, and 2 women delivered newborns with birth weight  $<2.5$  kg, 2.5-3.5 kg, and  $>3.5$  kg, respectively. About 93.8% mothers who delivered babies  $<2.5$  kg had SG, 89.1% where babies weighed between 2.5 kg and 3.5 kg had SG and 100% of mothers whose babies



**Figure 6:** Family history and distribution of striae gravidarum (SG)



**Figure 7:** Gestational weight gain and distribution of striae gravidarum (SG)



**Figure 8:** Distribution of striae gravidarum (SG) according to gender of the baby

had birth weight >3.5 kg had SG. The association between birth weight of the new born and presence of SG is summarized in Table 5 and Figure 9. The birth weight ranged from 1.9 kg to 3.7 kg with mean of 2.8 kg. There was no statistically significant association between birth weight and incidence of SG in this study.

Among 110 women in the study, 82 (75.8%) delivered at term and 28 (24.2%) delivered preterm.

**Table 4:** Distribution of striae gravidarum (SG) according to gender of the baby

Baby gender	Total no. of patients	No. of patients SG present	%	P value
Female	58	52	89.7	0.899
Male	52	47	90.4	
Total	110	99		

**Table 5:** Association between birth weight and striae gravidarum (SG)

Birth weight	Total no. of patients	No. of patients SG present	%
<2.5	16	15	93.8
2.5–3.5	92	82	89.1
>3.5	2	2	100
Total	110	99	

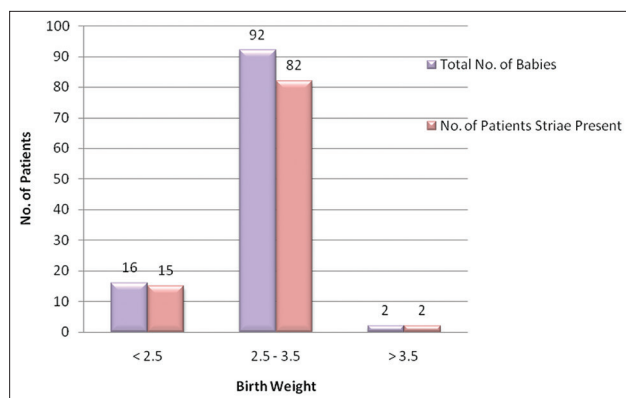
  

Baby weight (kg)	SG		Total	P value
	Present	Absent		
≤3.0	78	9	87	0.876
>3.0	21	2	23	
Total	99	11	110	

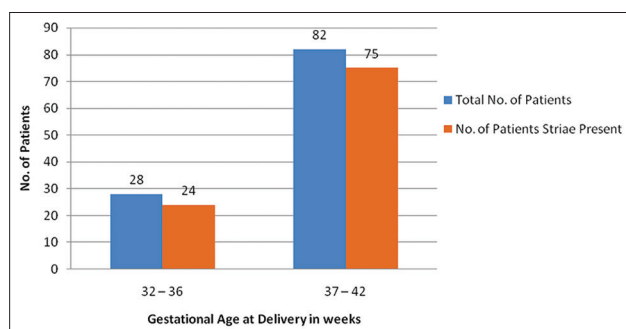
Earliest delivery occurred at 33 weeks and the latest at 41 weeks with a mean gestational age of 37.8 weeks at delivery. About 85.7% of women with preterm deliveries had SG whereas 91.5% with term deliveries had SG. The association between gestational age at delivery and incidence of SG is summarized in Table 6 and Figure 10. There was no statistically significant difference between two groups for incidence of SG.

## Discussion

This study involved a cohort of racially homogenous women, that is, South Indian population. The clinical assessment of prevalence of SG and associated risk factors was done at a single tertiary care referral hospital. The prevalence of SG in our study is 90%, which is higher than that in the reported literature,<sup>[5,8]</sup> although Wang *et al.* have found similar incidence.<sup>[3]</sup> The seemingly high prevalence of SG in our study can be attributed to inclusion of multiple sites including abdomen, hip, thighs, lower back, and breast region. The high prevalence may also be related to race of study population (South Indian race). However, the literature on the race and risk of development of SG is conflicting. Some researchers found that women with lighter skin were more likely to develop SG,<sup>[9]</sup>



**Figure 9:** Association between birth weight and striae gravidarum (SG)



**Figure 10:** Association between gestational age and striae gravidarum (SG)

**Table 6: Association between gestational age and striae gravidarum (SG)**

Gestational age at delivery	Total no. of patients	No. of patients SG present	%	P value
32-36	28	24	85.7	0.609
37-42	82	75	91.5	
Total	110	99		

while others found women with darker skin were more likely to develop SG.<sup>[8]</sup> Our study population being racially homogenous, involving brown skin women of Dravidian race probably is more vulnerable to develop SG than other population.

The correlation between positive family history of SG and development of SG (in the study population) is well identified in our study with a statistically significant association ( $P = 0.0001$ ). Similar correlation between family history of SG and development of SG was noted in various studies.<sup>[5,10-14]</sup> Other studies have found that positive family history of SG were more likely to

develop severe rather than mild; however, overall incidence of SG was not significantly high in this study.<sup>[12]</sup>

There was no statistically significant correlation between gestational weight gain and incidence of SG in our study. This is contrary to various other published studies, where increased weight gain during pregnancy had positive correlation with the development of SG.<sup>[4,12]</sup> We did not find statistically significant correlation between development of SG and birth weight of baby, gender of baby, and gestational age at delivery.

Osman *et al.*<sup>[12]</sup> in their study have found that birth weight and gestational age at delivery were strongly associated with developing moderate/severe SG. Fetal gender did not correlate with development in the same study. Similar to another study done by Davey *et al.*,<sup>[4]</sup> we did not find significant correlation between maternal age and development of SG, though this is not consistent with other studies.<sup>[5,12]</sup>

We have not assessed the effects of smoking on the development of SG as the proportion of smokers was negligibly small in our study. Theoretically, it can affect connective tissue properties and might predispose to SG. The limitation of this study was that it was a cross-sectional observational study, where patients were examined only once and no follow-up was done.

## Conclusion

The incidence of SG is high among South Indian primigravida pregnant women. Primigravida pregnant women, with positive family history of SG has significantly increased risk of developing SG themselves and hence they should be counseled about the same and prophylactic use of creams and lotions should be considered.

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