

Stretch marks in pregnancy: a comparative study of risk factors among primiparae in private and public health system maternity hospitals

Estrias de distensão na gravidez: estudo comparativo dos fatores de risco entre primíparas de maternidades do sistema público de saúde e particular

ABSTRACT

Introduction: Stretch marks are linear, atrophic, and well-defined cutaneous lesions, secondary to modifications in the conjunctive tissue. Their etiology is unclear.

Objective: To evaluate and compare risk factors for the occurrence of stretch marks during the first pregnancy of women who gave birth in public and private maternity hospitals.

Methods: Observational, transversal, and descriptive study with puerperae 48 hours after giving birth. Observations were carried out for 4 months in the maternity hospital of the public health system and at the private maternity hospital (n = 324).

Results: In both groups, maternal age and weight of the newborn were statistically significant risk factors. Of women aged 25 or less, 70.1% developed stretch marks during pregnancy, compared to 29.0% of women over 25. Likewise, the greater the baby's weight, the greater the risk of stretch marks.

Conclusions: Women cared for in the public health system developed a greater number of stretch marks during pregnancy because they were younger. Among the study population, women aged 31 and older were less likely to develop stretch marks during pregnancy, as were those with babies weighing less than 3.5 kg.

Keywords: pregnancy; dermis; risk factors.

RESUMO

Introdução: Estrias de distensão são lesões cutâneas lineares, atróficas, bem definidas e secundárias a alteração do tecido conjuntivo. A etiologia parece ainda obscura.

Objetivo: Avaliar e comparar os fatores de risco para a ocorrência de estrias de distensão, durante a gravidez, de primíparas, encontrados na maternidade do sistema público de saúde e de uma maternidade particular.

Métodos: Estudo observacional, transversal, descritivo, com puérperas após 48 horas do parto atendidas durante quatro meses no sistema público de saúde e na maternidade particular (n = 324).

Resultados: Os fatores de risco, que apresentaram significância estatística, foram iguais para os dois grupos: idade materna e peso do recém-nascido. Das mulheres com 25 anos ou menos, 70,1% desenvolveram estrias durante a gestação, contra 29% das mulheres com mais de 25 anos. E, quanto maior o peso do recém-nascido, maior a proporção de mulheres com estrias na gestação.

Conclusões: As mulheres da rede pública desenvolveram mais estrias na gestação porque eram mais jovens. Sendo assim, para a população em estudo, as mulheres com 31 anos ou mais apresentaram na idade fator de proteção para o surgimento de estrias na gestação. Assim como as mulheres cujos recém-nascidos apresentaram peso inferior a 3.500g.

Palavras-chave: gravidez; derme; fatores de risco.

Original Article

Authors:

Marcus Maia¹
Carolina Reato Marçon²
Sarita Bartholomei Rodrigues³
Tutomu Aoki⁴
Antonio Rahme Amaro⁵

¹ Assistant Professor, Dermatology, Santa Casa de Misericórdia de São Paulo (Hospital) – São Paulo (SP), Brazil.

² Dermatology Specialist, Santa Casa de Misericórdia de São Paulo.

³ Intern, Dermatology, Santa Casa de Misericórdia de São Paulo.

⁴ Assistant Professor, Gynecology, Santa Casa de Misericórdia de São Paulo.

⁵ Gynaecologist, Hospital Santa Joana – São Paulo (SP).

Correspondence:

Dr. Marcus Maia
R. Turiassu, 143 conjunto 123
05005 001 - São Paulo - SP, Brazil
Phone/Fax: +55 11 3666 3393
E-mail: marcusmaiasp@uol.com.br

Submitted on: 05/07/2010

Approved on: 20/08/2010

This study was conducted at the Santa Casa de Misericórdia de São Paulo

Conflicts of interest: none
Financial support: none

INTRODUCTION

Stretch marks are linear, atrophic, clearly defined cutaneous lesions resulting from alterations in the conjunctive tissue¹. Morphologic observations and molecular data suggest that striae develop when fibroblasts lose their ability to synthesize, thus changing the structure of the conjunctive tissue. In addition, collagen, elastin, and fibrillin fibers are significantly reduced near striae, compared to normal skin². They are correlated with several medical conditions and physiological situations, including pregnancy³. Striae occur in more than 70% of pregnant women⁴ and are more commonly found on the abdomen, hips, buttocks and breasts⁵. They tend to develop from the 25th gestational week^{5,6} with erythematous coloration, fade in color after childbirth, and remain as silver scars. Their unattractive appearance is of great concern for most women⁴.

Although the etiology of striae is still not well understood, there is general acceptance that the combination of mechanical stretching of the skin, genetic factors, endocrine alterations and possibly the secretion of relaxin during pregnancy⁷ – isolated or associated – play a significant role⁸ in their formation in pregnant women. The clinical and demographic risk variables – described in the literature as independent or correlated factors – and the conclusions are frequently conflicting⁶. Maternal age, skin type, and weight of the healthy newborn are some of the variables regarded as significant. However, other factors such as weight gain during pregnancy, family history, socioeconomic class, hair color, limited tolerance to glucose, and nutrition have been implied⁴.

As a result of the different results found in the literature, and due to the fact that these results were obtained from studies focusing on general aspects of pregnancy⁹, the authors have, in a previous study, evaluated risk factors for striae in primiparae in a public health system (PHS) maternity hospital. This study found that only the maternal age group and the weight of the newborn were significant predictors of striae. The exclusive observation of primiparae allowed for more standardized analysis, however the risk factors are not influenced by a previous pregnancy. Given that one of the risk factors referenced in the literature refers to socioeconomic status⁴, the question of whether the results of this study would be the same if it were carried out in a private maternity hospital was soon raised. Consequently, a new study was proposed, with the objective of comparing the results obtained in the PHS with those from a private maternity hospital.

METHODS

This was an observational, transverse, comparative and descriptive study (not controlled for risk factors) for women developing stretch marks in their first pregnancy.

The study population was constituted of primiparae, defined as women that gave birth after 28 weeks of gestation, and who did not have previous gestations for more than 12 weeks (abortion). Observations were conducted over a period of four months (January 2008 to May 2008) in the maternity ward of Santa Casa de Misericórdia de São Paulo (PHS) and 5 months

(October 2008 to February 2009), in the private Santa Joana maternity hospital (São Paulo, Brasil).

The data were collected, with the approval of the Hospital Ethics Committee, through interviews, physical examination followed by the filling of a protocol (attached) and the signature of a term of free and informed consent.

Primiparae of single fetuses were interviewed and examined 48 hours after childbirth at the PHS (n = 164) and private maternity hospital (n = 160). A total of 14 variables was recorded for each patient: 1) maternal age at childbirth; 2) maternal weight gained during pregnancy (less than 15 kg or more than 15 kg); 3) educational level (illiterate, basic, secondary and higher education); 4) skin color (white, brown, black and yellow); 5) previous history of striae developed before pregnancy; 6) family history of striae developed during pregnancy in 1st degree relatives (mother and/or sisters); 7) gestational age when striae first appeared; 8) cutaneous disorder history before pregnancy; 9) history of smoking before or during pregnancy; 10) use of steroids (topical, oral, inhaled or intravenous) during pregnancy; 11) use of oils and/or creams during pregnancy; 12) gestational age at birth; 13) type of childbirth; and 14) weight of the newborn.

The data used in the analysis were obtained from a transversal descriptive study on risk factors for the development of stretch marks in the pregnancy of primiparae. A total of 324 patients were studied. Data were analyzed using Stata version 9.0.

A univariate analysis was conducted to compare the occurrence of striae during pregnancy in the two studied populations, taking into consideration the significant variables found in each studied group. The univariate analysis was conducted employing the chi-square test in order to measure the correlation among the studied variables and the consequence (striae).

A multivariate analysis on the Poisson regression was subsequently performed in order to evaluate the relationship among the variables significantly linked with the occurrence of striae during

pregnancy¹⁰. The "use of oils and/or creams during gestation" variable was included in the analysis to evaluate whether the use of such substances is a significant factor in striae prevention in pregnancy. The multivariate analysis was carried out using a logistic regression in order to evaluate the relationship among the variables significantly linked with the risk of developing striae.

RESULTS

PHS hospital

Of the 164 women studied in the PHS, 98 (59.8%) developed striae during pregnancy. In the univariate analysis (Table 1), the consequence "development of striae during gestation" correlated significantly with: the mother's age group ($p < 0.001$), maternal weight gain during pregnancy ($p = 0.001$), and the weight of the newborn ($p = 0.011$).

Age

The development of striae during pregnancy occurred in 79.6% of the 54 women aged less than 19, in 62.5% of the 72 women aged 20–25, in 29.4% of the 17 women aged 26–30, in 16.7% of the 12 women aged 31–35 and in 33.4% of the 9 women aged 36 or older. The proportion of affected women decreases as the age group increases (Table 1).

Maternal weight gain

Striae occurred in 50% of the women who gained up to

15 kg during pregnancy (n = 100) and in 75% of the women who gained 15 kg or more (n = 64) (Table 1).

Weight of the newborn

Of the 25 women who gave birth to babies weighing more than 3.5 kg (n = 25), 80% developed striae during pregnancy, compared with 64.7% of the women whose babies weighed 3–3.5 kg (n = 68), and 47.9% of the women who had babies weighing less than 3 kg (n = 71) (Table 1).

No statistically significant correlation was found between

Table 1 - Univariate analysis in the PHS maternity hospital: primiparae's profiles and correlation with the occurrence of striae during pregnancy (São Paulo, Jan/May 2008)

		STRIAE DURING PREGNANCY											
		N	(%)	N	(%)	p-value			N	(%)	N	(%)	p-value
		SOCIO-DEMOGRAPHIC PROFILE											
AGE GROUP													
Younger than 19		54	(32,9)	43	(79,6)								
20 to 25		72	(43,9)	45	(62,5)								
26 to 30		17	(10,4)	5	(29,4)								
31 to 35		12	(7,3)	2	(16,7)								
36 or older		9	(5,5)	3	(33,4)	< 0,001 *							
EDUCATION LEVEL													
Illiterate		10	(6,1)	8	(80,0)								
Basic		0	(0,0)	0	(0,0)								
Secondary		126	(76,8)	76	(60,3)								
Higher education		28	(17,1)	14	(50,0)	0,243							
SKIN COLOR													
White		84	(51,5)	51	(60,7)								
Brown		66	(40,5)	40	(60,6)								
Black		9	(5,5)	4	(44,4)								
Yellow		4	(2,5)	2	(50,0)								
n.a.		1	(0,6)			0,782							
SMOKING													
No		32	(19,5)	24	(75,0)								
Yes		132	(80,5)	74	(56,1)	0,050							
		PREVIOUS HISTORY											
SKIN ILLNESSES													
No		25	(15,2)	15	(60,0)								
Yes		139	(84,8)	83	(59,7)	0,978							
STRIAE													
Without striae		60	(36,6)	34	(56,7)								
With striae		104	(63,4)	64	(61,5)	0,540							
		FAMILY (STRIAE)											
Without striae		82	(50,0)	45	(54,9)								
With striae		73	(44,5)	46	(63,0)								
n.a.		9	(5,5)									0,309	
		PREGNANCY											
WEIGHT GAINED													
Up to 15 kg		100	(61,0)	50	(50,0)								
15 kg or more		64	(39,0)	48	(75,0)	0,001 *							
GESTATIONAL AGE OF NEWBORN													
Up to 36 weeks		36	(21,9)	19	(52,8)								
37 to 40 weeks		107	(65,3)	68	(63,6)								
41 weeks or longer		21	(12,8)	11	(52,4)	0,398							
CHILDBIRTH TYPE													
Normal		81	(49,4)	55	(67,9)								
Cesarean		83	(50,6)	43	(51,8)	0,036 *							
WEIGHT OF NEWBORN													
Up to 3.0 kg		71	(43,3)	34	(47,9)								
From 3.0–3.5 kg		68	(41,5)	44	(64,7)								
More than 3.5 kg		25	(15,2)	20	(80,0)	0,011 *							
		USE OF MEDICINES											
STEROIDS													
No		151	(92,1)	91	(60,3)								
Yes		13	(7,9)	7	(53,8)	0,651							
OILS AND CREAMS													
No		143	(87,2)	87	(60,8)								
Yes		21	(12,8)	11	(52,4)	0,460							

* Significant difference between groups (p < 0.05) using Chi-square test.

the occurrence of striae during pregnancy and the other variables studied (Table 1). In the multivariate analysis (Table 2) employing the Poisson model¹⁰, the variables that presented p-values equal to or less than 0.25 in the correlation with the occurrence of striae were used as possible misleading factors¹¹. In this model, the dichotomous variable representing the result was the "development of striae during pregnancy," and the correlated risk factors were: age group, maternal weight gain during pregnancy, newborn weight, smoking history and education level.

The statistically significant variables in the final model were age group and newborn weight (Table 2). The higher the age group, the greater the protection against developing striae: from 20 to 25 years old (prevalence ratio (PR) = 0.76, CI 95%: 0.60-0.95), from 26 to 30 years old (PR = 0.38, CI 95%: 0.19-0.76), and from 31 to 35 years old (PR = 0.22, CI 95%: 0.06-0.75). Above 36, the protection effect was not significant for the studied population, probably due to the reduced number of patients in that age group.

The greater the weight of the newborn, the greater the risk of the mother developing striae during pregnancy (3.0-3.5 kg: PR = 1.35, CI 95%: 1.04-1.77 and 3.5 kg or more: PR = 1.72, CI 95%: 1.23-2.40).

Table 2 - Multivariate analysis in the PHS maternity hospital: Poisson Regression. Occurrence of striae during pregnancy and correlated factors			
	Odds ratio	p-value	CI 95%
AGE GROUP (base: <19 years)	1,00	-	-
20 to 25	0,76	0,019	(0,60 - 0,95)
26 to 30	0,38	0,006	(0,19 - 0,76)
31 to 35	0,22	0,016	(0,06 - 0,75)
36 or older	0,40	0,051	(0,16 - 1,00)
WEIGHT GAINED (base: up to 15 kg)	1,00	-	-
15 kg or more	1,39	0,005	(1,10 - 1,74)
WEIGHT OF NEWBORN (base: up to 3.0 kg)	1,00	-	-
3.0-3.5 kg	1,35	0,027	(1,04 - 1,77)
More than 3.5 kg	1,72	0,001	(1,23 - 2,40)
SMOKING (base: no)	1,00	-	-
Yes	0,79	0,065	(0,61 - 1,02)
EDUCATION LEVEL (base: illiterate)	1,00	-	-
Basic	-	-	-
Secondary	1,08	0,628	(0,80 - 1,46)
Higher Education	1,01	0,947	(0,66 - 1,56)

Private maternity hospital

Of the 160 studied women in the private maternity hospital, 77 (48.1%) developed striae during pregnancy. In the univariate analysis (Table 3), the result "development of striae during pregnancy" correlated significantly with: mothers' age group ($p < 0.001$), maternal weight gain during pregnancy ($p = 0.030$), and weight of the newborn ($p = 0.002$).

Age

The development of striae during pregnancy occurred in 73.1% of the women under 25 ($n = 67$), in 48.6% of the women aged 26-30 ($n = 35$), in 19.5% of the women aged 31-35 ($n = 41$), and in 17.6% of the women aged 36 and over ($n = 17$) (Table 3).

Maternal weight gain

Striae occurred in 59.3% of the women who gained 15 kg or more during pregnancy ($n = 59$), compared with 41.6% of the women who gained less than 15 kg during pregnancy ($n = 101$) (Table 3).

Weight of the newborn

Of the 24 women who gave birth to babies weighing more than 3.5 kg, 66.7% developed striae during pregnancy, compared with 54.7% of the women who had babies weighing 3-3.5 kg ($n = 86$), and 28% of the women whose babies weighed less than 3 kg at birth ($n = 50$) (Table 3).

No statistically significant correlation was found between the occurrence of striae during pregnancy and the other studied variables (Table 3). In the multivariate analysis (Table 4) using the Poisson model¹⁰, the variables that presented p-values equal to or less than 0.25 in the correlation with the result were used as possible misleading factors¹¹. In this model the dichotomous variable was the "development of striae during pregnancy." The correlated risk factors were: age group, maternal weight gain during pregnancy, weight of the newborn, smoking history, previous history of striae, gestational age at birth, and use of oils/creams during pregnancy.

The statistically significant variables in the final model were age group for the women above 31 years old (31 to 35 years: PR = 0.27, CI 95%: 0.12-0.58; 36 years or older: PR = 0.26, CI 95%: 0.09-0.78), and weight of the newborn, for babies weighing more than 3.5 kg (PR = 1.86, CI 95%: 1.07-3.26).

Comparative analysis of results

Given that the statistically significant variables in the two groups' final models were the same, a comparative analysis of the variables was carried out. A total of 324 women were studied, with 49% (160) originally from the private system, and 51% (164) from the PHS – of which a total of 54% (175) developed striae during pregnancy. A significant correlation was found between the care service (private or PHS) and the occurrence of striae during pregnancy ($p = 0.036$) (Table 5), 59.8% in the PHS compared with 48.1% in private maternity care.

In the two studied groups, there were statistically

Table 3 - Univariate analysis in the private maternity hospital: Primiparae's profiles and correlation with the occurrence of striae during pregnancy

SOCIO-DEMOGRAPHIC PROFILE							
	STRIAE DURING PREGNANCY						p-value
	No	%	Yes	%	Total	%	
AGE GROUP							
Younger than 19	3	33,3	6	66,7	9	5,6	
20 to 25	15	25,9	43	74,1	58	36,3	
26 to 30	18	51,4	17	48,6	35	21,9	
31 to 35	33	80,5	8	19,5	41	25,6	
36 or older	14	82,4	3	17,6	17	10,6	<0,001*
EDUCATION LEVEL							
Illiterate	0	0,0	0	0,0	0	0,0	
Basic	0	0,0	0	0	0	0,0	
Secondary	41	51,9	42	50,6	83	51,9	
Higher education	42	48,1	35	45,5	77	48,1	0,515
SKIN COLOR							
White	49	50,5	48	49,5	97	60,6	
Red	27	51,9	25	48,1	52	32,5	
Black	4	80,0	1	20,0	5	3,1	
Yellow	3	50,0	3	50,0	6	3,8	0,645
SMOKING							
No	49	48,0	53	52,0	102	63,8	
Yes	34	58,6	24	41,4	58	36,3	0,198
	PREVIOUS HISTORY						
	STRIAE DURING PREGNANCY						
	No	%	Yes	%	Total	%	p-value
SKIN ILLNESSES							
No	71	50,4	70	49,6	141	88,1	
Yes	12	63,2	7	36,8	19	11,9	0,294
PREVIOUS STRIAE							
Without striae	29	46,0	34	54,0	63	39,4	
With striae	54	55,7	43	44,3	97	60,6	0,233
	FAMILY (STRIAE)						
Without striae	48	57,1	36	42,9	84	52,5	
With striae	33	46,5	38	53,5	71	44,4	
n.a.	2	40,0	3	60,0	5	3,1	0,360
	PREGNANCY						
	STRIAE DURING PREGNANCY						
	No	%	Yes	%	Total	%	p-value
WEIGHT GAINED							
Up to 15 kg	59	58,4	42	41,6	101	63,1	
15 kg or more	24	40,7	35	59,3	59	36,9	0,030*
GESTATIONAL AGE OF NEWBORN							
Up to 36 weeks	13	72,2	5	27,8	18	11,3	
37 to 40 weeks	66	49,6	67	50,4	133	83,1	
41 weeks or longer	4	44,4	5	55,6	9	5,6	0,178
WEIGHT OF NEWBORN							
Up to 3.0 kg	36	72,0	14	28,0	50	31,3	
From 3.0-3.5 kg	39	45,3	47	54,7	86	53,8	
More than 3.5 kg	8	33,3	16	66,7	24	15,0	0,002*
	USE OF MEDICINES						
	STRIAE DURING PREGNANCY						
	No	%	Yes	%	Total	%	p-value
STEROIDS							
No	80	51,9	74	48,1	154	96,3	
Yes	3	50,0	3	50,0	6	3,8	0,925
OILS AND CREAMS							
No	4	80,0	1	20,0	5	3,1	
Yes	79	51,0	76	49,0	155	96,9	0,201

* Significant difference between groups ($p < 0.05$) using Chi-square test.

significant correlations between age group and the occurrence of striae during pregnancy. Among the patients from the private maternity hospital,

that correlation was statistically significant for patients over 31 years old. The correlation for PHS patients was statistically significant for all age groups. The correlation presented the same direction in both groups: the greater the age, the greater the protection against developing striae during pregnancy.

When comparing the two maternity hospitals, a statistically significant difference can be observed between age groups ($p < 0.001$) (Table 6). PHS patients were younger than those in the private maternity hospital; more than 65% of the PHS patients were younger than 25, and 5% were older than 36, while in the

private maternity hospital 42% were under 25, and 10% were over 36. The average age of patients in the PHS hospital was 23, while in the private hospital it was 28. Overall, 70.1% of the women aged 25 years or younger developed striae during pregnancy, compared with 29% of women older than 25. This difference is statistically significant ($p < 0.001$) (Table 5).

Finally, the weight of the newborn is correlated to the occurrence of striae ($p < 0.001$, chi-square test): the greater the weight of the newborn, the greater the chance of developing striae during pregnancy.

Regarding the use of oils and/or creams during pregnancy, 96.9% of the private patients used them, compared with 12.8% of the PHS patients. Yet, no significant correlation was found

Table 4 - Multivariate analysis in the private maternity hospital: Poisson Regression. Occurrence of striae during pregnancy and correlated factors.

	PR	p-value	CI 95%
AGE GROUP (base: <19 years)	1,00	-	-
20 to 25	0,96	0,868	(0,58 - 1,59)
26 to 30	0,64	0,150	(0,35 - 1,17)
31 to 35	0,27	0,001	(0,12 - 0,58)
36 or older	0,26	0,016	(0,09 - 0,78)
WEIGHT GAINED (base: up to 15 kg)	1,00	-	-
15 kg or more	1,23	0,144	(0,93 - 1,61)
WEIGHT OF NEWBORN (base: up to 3.0 kg)	1,00	-	-
3.0-3.5 kg	1,67	0,058	(0,98 - 2,84)
More than 3.5 kg	1,86	0,029	(1,07 - 3,26)
SMOKING (base: no)	1,00	-	-
Yes	0,86	0,317	(0,64 - 1,16)
PREVIOUS STRIAE (base: without striae)	1,00	-	-
With striae	0,92	0,574	(0,71 - 1,20)
GESTATIONAL AGE OF NEWBORN (base: up to 36 weeks)	1,00	-	-
37 to 40 weeks	1,10	0,831	(0,46 - 2,62)
41 weeks or longer	0,99	0,997	(0,38 - 2,60)
OILS AND CREAMS DURING GESTATION (base: no)	1,00	-	-
Yes	2,13	0,444	(0,31 - 14,91)

Table 5 - Univariate analysis (PHS + private): Primiparae' profiles and correlation with the occurrence of striae during pregnancy.

SOCIO-DEMOGRAPHIC PROFILE	STRIAE DURING PREGNANCY						
	No	%	Yes	%	Total	%	p-value
TYPE OF HOSPITAL							
Private	83	51,9	77	48,1	160	49,4	
PHS	66	40,2	98	59,8	164	50,6	0,036*
AGE GROUP							
25 or younger	56	29,0	137	71,0	193	59,6	
Older than 25	93	71,0	38	29,0	131	40,4	< 0,001*
WEIGHT GAINED							
Up to 15 kg	109	54,2	92	45,8	201	62,0	
15 kg or more	40	32,5	83	67,5	123	38,0	< 0,001*
WEIGHT OF THE NEWBORN							
Up to 3 kg	73	60,3	48	39,7	121	37,3	
3.0-3.5 kg	63	40,9	91	59,1	154	47,5	
More than 3.5 kg	13	26,5	36	73,5	49	15,1	< 0,001*
OILS OR CREAMS							
No	60	40,5	88	59,5	148	45,7	
Yes	89	50,6	87	49,4	176	54,3	0,071

* Significant difference between groups (p<0.05) using Chi-square test.

between using oils and/or creams and preventing striae in pregnancy (p = 0.071, chi-square test). In the multivariate analysis utilizing the Poisson model¹⁰, the variables that presented p-values equal to or less than 0.25 in the correlation with the result were used as possible misleading factors¹¹. In this model, the resulting dichotomous variable was the "development of striae during pregnancy." The correlated risk factors were: the type of maternity hospital, age group of the mother, weight gained by the mother during pregnancy, and weight of the newborn. The variable "use of oils and/or creams during pregnancy" was also included in the model.

The statistically significant variables in the final model were: age group, maternal weight gain, and weight of the newborn. The type of health system variable did not correlate significantly with the occurrence of striae, suggesting that developing striae is linked to the age group variable and is a possible misleading factor (Table 7).

The use of oils and/or creams during pregnancy also did

not correlate significantly with the occurrence of striae when the type of maternity hospital variable was controlled for (Table 7).

DISCUSSION

In a previous study¹², the authors demonstrated that the significant risk factors in a PHS maternity hospital were: maternal age, maternal weight gain during pregnancy, and weight of the newborn at birth. The sample for that study was collected from a PHS maternity hospital, meaning a social group of limited purchasing power. Consequently, this factor was taken into account in the interpretation of the results, assuming that individuals in this group would become pregnant more precociously, would have less control over weight gain, and would not use preventive creams.

After the initial study, the authors questioned whether the significant risk factors found in the PHS maternity hospital were similar to those found in a private maternity hospital. To address this question, the authors evaluated risk factors for the occurrence of stretch marks during the pregnancy of primiparae at a private maternity hospital and compared the results with those obtained in the PHS.

The risk factors found in the PHS hospital were analyzed

Table 6 - Univariate analysis: Primaparae's profile and correlation with type of hospital.

SOCIO-DEMOGRAPHIC PROFILE							
	HOSPITAL TYPE				Total	%	p-value
	Private %	PHS %					
AGE GROUP							
Younger than 19	9	14,3	54	85,7	63	21,1	
20 to 25	58	44,6	72	55,4	130	43,6	
26 to 30	35	67,3	17	32,7	52	17,4	
31 to 35	41	77,4	12	22,6	53	17,8	
36 or older	17	65,4	9	34,6	26	8,7	< 0,001*
WEIGHT GAINED							
Up to 15 kg	101	50,2	100	49,8	201	62,0	
15 kg or more	59	48,0	64	52,0	123	38,0	0,690
WEIGHT OF NEWBORN							
Up to 3 kg	50	41,3	71	58,7	121	37,3	
3.0-3.5 kg	86	55,8	68	44,2	154	47,5	
More than 3.5 kg	24	49,0	25	51,0	49	15,1	0,057
OILS AND CREAMS							
No	5	3,4	143	96,6	148	45,7	
Yes	155	88,1	21	11,9	176	54,3	< 0,001*

* Significant difference between groups (p<0.05) using Chi-square test.

with a new methodology of multivariate analysis – the Poisson model¹⁰ – which allows the selection of significant variables (mother's age and weight of the newborn). These risk factors corresponded precisely to the significant variables in the private maternity hospital.

When comparing the occurrence of striae in the PHS (59.8%) and in the private maternity hospital (48.1%), with a statistically significant result, an immediate impression arises that patients with less privileged socioeconomic conditions are more predisposed to develop striae.

What is the reason for this difference?

When comparing the composition by age group between the hospitals, the difference between them was unambiguous: the PHS patients were much younger than the private patients. Given that the age group was the main significant factor for the occurrence of striae in the two hospitals, we concluded that the women cared for in the PHS developed more striae in pregnancy due to their younger ages. Women belonging to a higher socioeconomic class currently tend to have their first gestation later in life⁶, as evidenced by the pregnant women cared for at the private maternity hospital. With this study it was possible to understand that the greater the age, the greater the protection against developing striae during pregnancy. More

Table 7 - Multivariate analysis: Poisson Regression. Occurrence of striae during pregnancy and correlated factors.

	Odds Ratio	p-value
AGE GROUP (base: <19 years)		
20 to 25	1,00	–
26 to 30	0,77	0,008
31 to 35	0,48	< 0,001
36 or older	0,21	< 0,001
	0,28	< 0,001
WEIGHT GAINED (base: up to 15.0 kg)		
15 kg or more	1,00	–
	1,36	0,001
WEIGHT OF NEWBORN (base: up to 3.0 kg)		
3.0-3.5 kg	1,00	–
More than 3.5 kg	1,49	0,001
	1,76	< 0,001
HOSPITAL TYPE (base: private)		
PHS	1,00	–
	0,81	0,238
USE OF OILS AND CREAMS (base: no)		
Sim	1,00	–
	0,87	0,391

specifically, regarding the patients cared for at the private hospital, women aged 31 or older have, in their age, a protection factor against the occurrence of striae in pregnancy, with a reduction of approximately 70% in the risk of that outcome.

All patients experienced stretching of the skin, however only some presented more striae, especially women aged up to 25 years. How can maternal age have this effect?

Striae only occur in skin in which the connective tissue is only partially mature. Fully matured collagen permits a limited amount of stretching, allowing partial intra-dermal ruptures to happen with relative ease¹³. According to this theory, aging (and consequently, the maturation) of the connective tissue would yield a greater resistance, reducing the risk of striae caused by stretching. Shuster¹⁴ suggests that striae are always triggered by stretching, regardless of whether the stimulus is excessive or minimal. Other studies¹⁵⁻¹⁸ did not succeed in establishing stretching as an isolated risk factor for the occurrence of striae. However, given the possible variations of the characteristics of the connective tissue with the ageing process, further studies are necessary to better understand the changes in the frequency of striae occurrence according to age.

This study also demonstrated that women whose newborns were over 3.5 kg at birth presented a significantly greater risk of developing striae during pregnancy, regardless of

other risk factors.

Taking into account the total number of patients (n = 324), the relationship between weight gain during pregnancy and the occurrence of striae was significant, independently of the type of hospital. However, when the hospitals were studied individually (multivariate analysis), there was not a statistically significant difference, reinforcing the idea that the age group is the most relevant risk factor.

Another important finding relates to the use of creams for preventing striae, a common practice in pregnancy that was not found to be significant regardless of the type of maternity hospital. This subject therefore deserves greater attention, with a controlled investigation for better conclusions.

CONCLUSION

Given that the age group is correlated to the type of maternity hospital and to the occurrence of striae, the fact that the patients cared for at the PHS hospital were younger leads to the conclusion that this group developed more striae because they belong to a younger age group. In this manner, for the studied population, women aged 31 or older presented the variable "age" as a protection factor against the occurrence of striae in pregnancy. There is a reduction of approximately 70% in the occurrence of striae during pregnancy for this group. The women whose newborns were over 3.5 kg at birth were twice as likely to develop striae during pregnancy than women whose babies weighed less than 3.5 kg at birth. ●

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