

Prevalence of cellulite in Brazilian women: a cross-sectional study

Prevalência de celulite nas mulheres brasileiras: um estudo transversal

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ABSTRACT

Introduction: Cellulite is a highly prevalent condition among women. However, its prevalence is not currently based in high-quality population studies.

Objectives: To estimate the prevalence of cellulite among Brazilian women.

Methods: Cross-sectional study with 385 participants and a convenience sampling. The survey was based on the Hexsel & Hexsel cellulite evaluation scale and shared by SBD members.

Results: The study included 614 women, primarily between 20 and 29 years-old (32.8%). The prevalence of cellulite was 92.5%. In women between 12 and 19 years-old, the prevalence reached 72%; above 70 years-old, it was 100%. Among women reporting cellulite, 82.7% reported depressed lesions and 19.4% described elevated lesions. There was a significant association between body weight and presence of cellulite.

Conclusions: Cellulite has an estimated prevalence rate of 92.5% in the Brazilian population; it is less prevalent among adolescents (72%) and reaches scores close to 100% among women over 70 years-old. It is most prevalent among overweight and obese women.

Keywords: Cellulite; Prevalence; Cross-Sectional Studies

RESUMO

Introdução: Embora a celulite seja uma condição altamente prevalente entre as mulheres, as estimativas de sua prevalência não são baseadas em estudos populacionais de alta qualidade.

Objetivo: Estimar a prevalência da celulite entre mulheres brasileiras.

Métodos: Estudo transversal com tamanho amostral calculado de 385 participantes e amostragem por conveniência. O questionário foi baseado na escala para avaliação celulite de Hexsel & Hexsel e foi divulgado por membros da SBD.

Resultados: Participaram da pesquisa 614 mulheres, principalmente entre 20 e 29 anos (32,8%). A prevalência de celulite foi de 92,5%. Entre mulheres de 12 a 19 anos de idade, foi de 72%; entre as acima de 70 anos, de 100%. Das mulheres que referiram ter celulite, 82,7% relataram a presença de lesões deprimidas e 19,4% relataram lesões elevadas. Houve associação significativa entre o peso corporal e a presença de celulite.

Conclusões: A prevalência estimada da celulite na população brasileira é de 92,5%, sendo menor entre adolescentes (72%) e atingindo valores próximos a 100% em mulheres acima de 70 anos. É mais prevalente em mulheres com sobrepeso e obesas.

Palavras-chave: Celulite; Prevalência; Estudos Transversais

Original Article

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INTRODUCTION

Cellulite is a highly prevalent condition in the female population, characterized by irregularities on the skin surface, and it affects primarily the thighs and buttocks. Its typical clinical presentation consists of depressed and elevated skin lesions, especially in areas with a higher percentage of body fat and greater laxity. Although it is highly prevalent among women, with some authors estimating rates of 80% to 90% worldwide, these figures are not based on observational studies conducted at national or global levels.^{1,2}

Specifically in Brazil, one regional study assessed the prevalence of cellulite among female adolescents in the state of São Paulo,³ but there are still no representative data on the prevalence of this condition among Brazilian women as a whole.

Given this gap in statistical knowledge regarding such a highly prevalent condition, this study intended to estimate the prevalence of cellulite among Brazilian women aged 12 years and older.

METHODS

This is a cross-sectional study with a convenience sample, and the inclusion criteria were Brazilian women, literate, aged 12 years or older. Data collection was conducted through an online survey on the Google Forms platform, completed anonymously either by the participant directly or by her legal guardian, after signing the Informed Consent Form (or the Informed Assent Form for participants aged 12 to 18). The instrument was based on the validated Hexsel & Hexsel cellulite scale.⁴

The survey asked participants about their age, self-declared ethnicity, region of residence, place of residence (urban or rural), income range, weight, height, presence of cellulite in any body area, and the appearance of their lesions. All information was self-assessed.

The survey was distributed and publicized via the Internet. The survey link was shared by the researchers to their contact networks and, in each region of the country, sent to dermatologists through members of the Regional Chapters of the Brazilian Society of Dermatology. The survey was shared through different regional groups as a strategy to mitigate the selection bias inherent to the study design and thereby ensure better representativeness of the Brazilian population. The data were collected from 04/14/2023 to 03/05/2025.⁵

The project was approved by the Hospital Moinhos de Vento de Porto Alegre Research Ethics Committee before its execution, and the researchers followed the principles of the Declaration of Helsinki and Good Clinical Practice. The sample size was calculated based on the profile of the Brazilian female population according to 2019 data from the Brazilian Institute of Geography and Statistics (IBGE).⁵ The Brazilian population profile was considered according to age, region, income, place of residence, and color or race, with a tolerance interval of 5% for each category. This resulted in a minimum sample size of 385 participants for the primary objective of the study (analysis of cellulite prevalence).

For the statistical analysis of categorical variables (Tables 1 and 2), the chi-square test was used to evaluate the association between each variable (age, income, and race/ethnicity) and the presence or absence of cellulite. When conducting the chi-square test, if the association Tables and expected count Tables did not meet the prerequisite of expected frequencies equal to or greater than 5, Fisher's exact test was applied. The significance level for all tests was set at $\alpha < 0.05$. Cramér's V coefficient (V) was also calculated to assess the degree of association in Tables larger than 2×2 . In statistically significant associations, the adjusted standardized residual, also known as the Z-residual, was calculated as a post-hoc interpretation method. Residual differences were considered significant when greater than 1.96 or lower than -1.96 (confirmation of the null hypothesis = $-1.96 > Z > 1.96$), with the Z value corresponding to a significance level of alpha equal to 5% ($\alpha < 0.05$).

The independent-samples t-test was used in the analysis of numerical variables (Table 3) to assess differences in body mass, height, or BMI given the presence or absence of cellulite. In these cases, Cohen's d effect size was calculated and classified as: negligible (N) < 0.20 ; small (S), 0.20–0.49; medium (M), 0.50–0.79; or large (L), above 0.80.^{6,7} The significance level adopted for all analyses was set at $\alpha < 0.05$. The statistical procedures followed the recommendations of Field (2013)⁸ and were performed using IBM SPSS Statistics, version 23.0. The sample size was not based on the objectives of the analyses presented in Tables 2 and 3 and, therefore, the data should be interpreted with caution and as exploratory in nature.

RESULTS

In total, 614 women participated in the study. Participants aged 18 years or older accounted for 98.7% of respondents, whereas adolescents between 12 and 17 years represented only 1.1%. The age group with the highest representation in the sample was 20 to 29 years (32.8%). Of the total, 608 (99.1%) lived in urban areas. The sample included participants from all regions of Brazil: 29 (4.7%) from the Central-West, 41 (6.7%) from the North, 155 (25.2%) from the Northeast, 178 (29%) from the Southeast, and 211 (34.3%) from the South. Complete demographic data are shown in Table 1. Tables 3 and 4 show the relationship between the presence of cellulite and self-reported ethnicity, income, weight, height, and BMI. Table 5 presents reports from participants who classified the appearance of their cellulite as "other appearance."

The vast majority of participants (92.5%) reported having cellulite. Of these, 82.7% reported depressed lesions, and 19.4%, elevated lesions. A little more than half (50.3%) reported an "orange peel" appearance. When stratified by region, 100% of participants from the North and Center-West reported having cellulite, as did 93% in the South and Southeast and 88% in the Northeast.

TABLE 1: Survey given to participants

Question	Answer options
How old are you?	() 12 to 19 () 20 to 29 () 30 to 39 () 40 to 49 () 50 to 59 () 60 to 69 () 70 to 79 () 80 or older
What is your ethnicity?	() White () Asian () Mixed () Black
In what region of Brazil do you live?	() North () Northeast () Southeast () South () Central-West
Do you live in an urban or rural area?	() Urban () Rural
What is your income level?	() Up to 2 Brazilian minimum monthly salaries () 2 to 5 Brazilian minimum monthly salaries () More than 5 Brazilian minimum monthly salaries
What is your weight in kilograms? Example answer: 70.2 kg	Open-ended question
What is your height in centimeters? Example answer: 162 cm	Open-ended question
Do you have cellulite?	() Yes () No
If yes, your lesions are (mark all that apply):	() Depressed ("holes") () Elevated ("lumps") () Other appearance () I don't have cellulite
If you marked "other appearance," please briefly describe what your cellulite looks like. If you did not mark "other appearance," please leave the answer blank.	Open-ended question
Your cellulite lesions look like:	() Orange peel () Cottage cheese () Quilt () I don't have cellulite () Other appearance
If you marked "other appearance," please briefly describe what your cellulite looks like. If you did not mark "other appearance," please leave the answer blank.	Open-ended question

DISCUSSION

This study estimated the prevalence of cellulite across different age groups in the Brazilian female population. The finding that cellulite is less prevalent among younger women (12 to 19 years) is consistent with expectations, given what is known about the pathophysiological mechanisms involved in

the development of cellulite.⁹⁻¹¹ Interestingly, the self-reported prevalence in this age group was similar to that found in the study by Soares et al.,³ which estimated the prevalence of cellulite in adolescents through clinical evaluation conducted by trained professionals. This indicates that self-diagnosis of cellu-

TABLE 2: Descriptive results and chi-square inferences for association between age and cellulite outcomes

Age range (n)	Has cellulite n (%)	Has depressed lesions n (%)	Has elevated lesions n (%)	Has other lesion types n (%)	Has other lesion types n (%)
12 to 19 years (43)	31 ↓ (72%)*	27 (63%)	5 (12%)	2 (5%)	3 (7%)
20 to 29 years (203)	186 (92%)	171 (84%)	35 (17%)	9 (4%)	28 (14%)
30 to 39 years (157)	149 (95%)	138 (88%)	38 (24%)	13 (8%)	37 (24%)
40 to 49 years (120)	118 ↑ (98%)*	106 (88%)	23 (19%)	16 (13%)	24 (20%)
50 to 59 years (50)	45 (90%)	38 (76%)	8 (16%)	10 (20%)	9 (18%)
60 to 69 years (33)	31 (94%)	22 (67%)	9 (9%)	8 (24%)	6 (18%)
70 to 79 years (8)	8 (100%)	5 (63%)	2 (2%)	1 (13%)	0 (0%)
	p ($\chi^2(f)$; df; V): 0.00 (26.4; 6; 0.24)	**	**	**	**

p: Fisher's exact test. $\chi^2(df)$: chi-square for each test for a given number of degrees of freedom. V: Cramér's V for tables larger than 2×2. *significant association (p < 0.05); ↑ Count higher than expected count, adjusted residual (Z) greater than 1.96. ↓ Count lower than expected count, adjusted residual (Z) less than -1.96.

** Statistical tests not performed.

TABLE 3: Descriptive results and chi-square inferences for association between income, ethnicity, and presence of cellulite

Region of the country (n)	Has cellulite n (%)	Self-reported ethnicity (n)	Has cellulite n (%)
Up to 2 Brazilian minimum monthly salaries (135)	122 (90%)	Asian (11)	11 (100%)
			433 (93%)
2 to 5 Brazilian minimum monthly salaries (160)	148 (93%)	White (467)	26 (87%)
() More than 5 Brazilian minimum monthly salaries (319)	298 (93%)	Black (30) Mixed (106)	98 (92%)
	p ($\chi^2(f)$; df; V): 0.54 (1,3; 2; 0.05)		p(f) ($\chi^2(f)$; df; V): 0.56 (2; 3; 0.06)

p: chi-square test; p(f): Fisher's exact test when the prerequisite of expected count greater than 5 was not met. $\chi^2(df)$: chi-square found in each test for a given number of degrees of freedom; V: Cramér's V for tables larger than 2×2.

lite is reasonably accurate even when performed by younger patients.

The prevalence of 100% in the population aged 70 to 79 years was also expected, since skin laxity is an aggravating factor for cellulite that worsens with aging, showing that the pathophysiological mechanisms responsible for the onset of cellulite tend to add up and intensify with advancing age.⁹⁻¹¹ The study also found increased prevalence of cellulite in the 40 to

49 age group. This finding may be a statistical fluctuation in the analysis (type I error, false positive) and/or be the result of the fact that assessments were self-reported. Participants in this age group may be more perceptive than others regarding changes in how their body looks.

No statistically significant differences were observed in the prevalence of cellulite among patients of different ethnicities or household income levels, underlining the universality of this

TABLE 4: Descriptive results and independent-samples t-test inferences for comparison of body weight, height, and BMI among groups with different cellulite outcomes

	Has cellulite	
	Yes	No
	M (SD)	M (SD)
Body mass (kg)	66.82 (13.44)	57.00 (10.01)
p (T; d ES)		0.08* (-4.84; -1.17 L)
Height (cm)	163.59 (7.25)	163.21 (5.42)
p (T; d ES)		0.11 (-0.34; -0.08 N)
BMI (kg/m²)	25.03 (5.55)	21.39 (3.60)
p (T; d ES)		0.14 (-4.36; -1.09 L)

BMI: body mass index; M: mean; SD: standard deviation; p: significance calculated for each test; t: independent-samples t-test. d: Cohen's d effect size. ES: effect size, classified as negligible (N) <0.20; small (S), 0.20–0.49; medium (M), 0.50–0.79; or large (L), above 0.80. *significant association (p < 0.05).

TABLE 5: Self-reported appearance of cellulite and description of other types of cellulite presented by participants who marked “other appearance.”

Appearance of cellulite	Occurrences
Orange peel	310
Quilt	130
Cottage cheese	110
Other types	Occurrences
Ripples / irregularities	21
Visible only when pressed	9
Skin laxity / excess skin	4
Minimally visible / imperceptible	3
Holes / craters	3
Lumps	1
Darkening of the area	1
Wounds	1
Fibrosis	1
Surface lines	1
Lipedema	1
Frank lipodystrophy	1
Cannot describe	1
Fat nodules	1
Frizzy skin	1
Laced	1
Pleated skin	1

condition among Brazilian women. Traditionally, Caucasian ethnicity has been considered a risk factor for developing cellulite,^{12,13} but the data from this study do not support that hypothesis. Because Brazil is a highly mixed-race country, it is possible that ethnic influences on the development of cellulite play a smaller role among Brazilians, with their effect overwhelmed by factors such as overweight and age.

Many studies cite estimates of 80% to 90% prevalence for cellulite in the general female population,^{13,14} but the data that originated these estimates lack statistical grounding in prevalence studies with broad population coverage. Several articles mention these estimates without citing primary sources. The data from this study indicate an even higher overall prevalence of cellulite among Brazilian women, at 92.5%.

In this study, individuals with cellulite also had higher body weight, but no significant differences were found in terms of height or BMI compared with women without cellulite. A higher prevalence of cellulite among women with greater body weight was expected, given that the thickness of the subcutaneous adipose tissue influences how the skin surface looks.^{9,10} The mean BMI of participants with cellulite was 25.03, compared with 21.39 for participants without cellulite. This difference was not significant, likely due to the study's low statistical power, since this was a secondary analysis variable that was not included in the sample size calculation.

Regarding statistical analyses of secondary data, subgroup analyses were not performed based on the type of cellulite lesion reported by participants (for example, depressed versus elevated lesions). Given the large number of analyses that would have been required (more than 60) and the considerable sample size of this study (614), there would have been a prohibitively high probability of type I errors (false positives), which would have made a reliable interpretation of the results impossible. Thus, the data were reported quantitatively and descriptively in Table 1, stratified by age group. In the specific case of cellulite prevalence by region, statistical tests were not performed because the

participants' region of residence is only a confounding factor, indirectly related to determinants that could actually influence the development of the condition, such as ethnicity, income, and weight.¹³

This study has limitations. The main one is the use of a convenience sampling rather than a randomized sample, which increases the risk of selection bias, partially mitigated by the inclusion of a large number of participants. Other biases inherent to the study methodology include the exclusive participation of literate women with Internet access, which reduces participation among socially vulnerable women, and the fact that cellulite was self-assessed. In addition, although all women could participate in the survey once they received the recruitment link, it is likely that women with cellulite were more inclined to respond, possibly leading this study to overestimate the prevalence of the condition.

Even though the distribution of participants in this study does not reflect the Brazilian population in terms of income, age group, ethnicity, and state population, the sample included 467 Caucasian women of various income levels, aged 20 to 59 years, a number large enough to ensure internal validity for data analysis in this population subgroup. Self-assessment is also not a major limitation, since, as previously discussed, even young women seem able to diagnose the presence of cellulite with a reasonable degree of accuracy. Thus, even under a conservative interpretation, the data reported in this study have external validity for the subgroup of Caucasian women aged 20 to 59 years.

CONCLUSIONS

Prevalence of cellulite is extremely high among Brazilian women, with an estimated rate of 92.5%. It is less common during adolescence (72%) and may reach values close to 100% in older age groups, above 70 years. It is more prevalent among women with higher body weight, and in the Brazilian population, self-declared ethnicity does not appear to be a risk or protective factor for the development of cellulite. ●

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