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Adult female acne: prevalence and risk factors in a sample of the Brazilian population

Acne da mulher adulta: prevalência e fatores de risco em uma amostra da população brasileira

Original Article

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ABSTRACT

INTRODUCTION: Adult female acne (AFA) affects women over 25 years old. Although there are no solid data in the Brazilian literature, genetic, hormonal, and environmental factors are believed to contribute to its pathogenesis.
OBJECTIVE: To assess the prevalence of AFA and its possible risk factors in a sample of the Brazilian population.
METHODS: A cross-sectional clinical study was conducted with 258 women aged 25 to 55 stratified by race and age according to the Brazilian population (2010 census). The study analyzed their demographic, clinical, psychological, and exposure-related information.
RESULTS: Acne complaints were reported by 41.1% of participants, ranging from 15% in those aged 50–55 to 60% in those aged 25–29. Clinical examination confirmed lesions in 36.6% of women. In 70% of cases, acne had persisted since adolescence, and 13.2% of participants were undergoing treatment. Acne was significantly associated with age, race, age at menarche, hirsutism, smoking, oily skin, and makeup use ($p<0.05$).
CONCLUSIONS: Acne was a prevalent issue, especially before age 40, and was more common in Black and mixed-race individuals, those with clinical signs of hyperandrogenism, and makeup users. However, it was inversely associated with smoking.
Keywords: Acne Vulgaris; Adult; Hyperandrogenism.

RESUMO

INTRODUÇÃO: A acne da mulher adulta (AMA) afeta mulheres com mais de 25 anos. Apesar de não haver dados sólidos na literatura brasileira, acredita-se que fatores genéticos, hormonais e ambientais contribuam para sua patogênese.
OBJETIVO: Avaliar a prevalência da AMA e seus possíveis fatores de risco em uma amostra da população brasileira.
MÉTODOS: Estudo de investigação clínica do tipo transversal com 258 mulheres, estratificadas por raça e idade de acordo com a população brasileira (censo 2010), entre 25 e 55 anos, que avaliou suas informações demográficas, clínicas, psicológicas e fatores de exposição.
RESULTADOS: A queixa de acne esteve presente em 41,1% das pacientes, variando de 15% entre 50 e 55 anos a 60% entre 25 e 29 anos. Ao exame, 36,6% das mulheres apresentavam lesões. Setenta por cento dos casos de acne persistiram desde a adolescência, e 13,2% estavam em tratamento. A acne correlacionou-se significativamente com idade, raça, idade da menarca, hirsutismo, tabagismo, pele oleosa e uso de maquiagem ($p < 0,05$).
CONCLUSÕES: A acne foi um problema prevalente, principalmente antes dos 40 anos de idade, esteve mais associada a raças negra e parda, sinais clínicos de hiperandrogenismo e uso de maquiagem, porém inversamente associada ao tabagismo.
Palavras-chave: *Acne Vulgar; Adulto; Hiperandrogenismo.*

INTRODUCTION

Acne is considered a chronic disease of the pilosebaceous unit, and its high prevalence among adolescents is well documented worldwide.[1] However, in recent years, there has been increasing recognition of this condition among women over 25 years, where it may persist continuously or intermittently from adolescence or appear for the first time in adulthood.[2] Studies estimate that the prevalence of adult female acne (AFA) in English and French women is 41%[3] and 54%,[4] respectively. Persistent AFA is believed to be the most common form, reported in 80% of adult women with acne.[5]

Early studies suggested that AFA lesions were primarily located in the lower third of the face, including the mandibular, perioral, and mental regions, forming a U-shaped pattern, as well as in the anterior neck area.[6] However, this classic distribution was later questioned by studies that reported lesions in other areas of the face and body. A European study found that most women (89.8%) had acne in multiple facial areas, including the forehead, malar region, mandibular area, and temples, with a severity spectrum similar to adolescent acne.[2] This multicenter study also indicated that the most common clinical presentation was mixed facial acne, with both inflammatory and noninflammatory lesions. Most women (93.7%) had comedones, 48.4% had trunk involvement, and only 11.2% had acne in the mandibular region. Notably, among those with mandibular acne, most reported the onset of lesions during adolescence.[2] Another American study found the presence of mild to moderate inflammatory lesions, with few comedones or closed microcysts. It also highlighted post-inflammatory hyperpigmentation, with scarring occurring in 20% of affected women.[6]

Given the possible clinical distinction between AFA and common acne, new classification scales have been developed to assess different degrees of acne severity and guide appropriate treatment. The most widely recognized include the Global Evaluation Acne (GEA) scale and the Adult Female Acne Scoring Tool (AFAST), which includes an assessment of the submandibular region.[7,8] Since persistent acne is a continuation of adolescent acne and is the most frequent clinical form, AFA has been suggested to share similar pathogenic factors with common acne. However, the causes of post-adolescent acne remain unclear, with strong evidence pointing to the role of hyperandrogenism, among other factors.[9,10]

In an effort to investigate these causes, a multicenter study involving 15 countries—excluding Brazil—proposed some hypotheses for AFA, including a personal history of adolescent acne (75%), a first-degree family history (56.8%), moderate psychological stress (83.2%), and smoking (24.8%).[2] Androgens play a key role in sebum production, as supported by observations that individuals with androgen insensitivity do not produce detectable sebum and that the production of sebum decreases in response to estrogen and antiandrogen treatment. Conversely, administering testosterone to adult men and women increases sebum production and consequently acne lesions.[11]

The consumption of high-glycemic-index foods and dairy products has been linked to acne exacerbation as they increase insulin levels and insulin-like growth factor 1 (IGF-1), which stimulate androgen production.[12] Psychological stress is also known to trigger the release of proinflammatory cytokines and elevate cortisol levels; one study found that stress worsens acne in 50% of women.[4]

Common acne is among the skin diseases most associated with psychiatric morbidity. One study estimated that 21.9% of individuals with acne had a psychiatric disorder.[13] Moreover, acne after age 25 appears to cause greater distress related to appearance and a greater impact on quality of life compared to adolescent acne.[9,14]

Despite the growing presence of AFA in dermatological practice, there are no studies estimating its prevalence in Brazil or identifying its risk factors. Because prevalence studies are essential for health care system planning, identifying susceptible groups, and improving understanding of disease pathophysiology, this study aims to determine the prevalence of AFA in a stratified sample of the Brazilian female population as well as explore associations between demographic, clinical, and environmental factors and AFA prevalence.

METHODS

A cross-sectional study was conducted and approved by a Research Ethics Committee in September 2021 under approval number 4,962,888. The sample size of 258 women was precalculated to allow an exploratory multivariate analysis with up to 15 independent variables, following Freeman's method, with a 95% CI and a ±5% margin of error in the total detected acne prevalence. Women were also stratified by age (25–29, 30–34, 35–39, 40–44, 45–49, 50–54) and race (White, Mixed-race, Black, and Asian), according to the proportions of the Brazilian population based on the 2010 Brazilian Institute of Geography and Statistics (IBGE) census (Chart 1).

Women were evaluated in a city in the interior of the state of São Paulo (SP) at a single large public health center. They were recruited through convenience sampling, including

CHART 1: Distribution of 258 women stratified by age and race according to the 2010 Brazilian Institute of Geography and Statistics (IBGE) census

	White	Mixed-race	Black	Asian
25–29	24	23	4	1
30–34	24	22	4	1
35–39	21	19	3	0
40–44	20	18	3	0
45–49	18	17	3	0
50–54	16	15	2	0

Interviews were conducted between September 2021 and September 2022.

students, patient companions, employees, and other women attending the study site at the time.

Women aged 25 to 55 years who fit the stratified sample criteria and provided informed consent were included. Pregnant or lactating women and those attending the center for a dermatological consultation at the time of recruitment were excluded to avoid selection bias.

Participants answered a questionnaire assessing acne complaints at the time of the interview through the question: "Do you believe you have an acne problem?" The questionnaire also collected demographic and anthropometric data (age, weight, height, race, and abdominal circumference), exposure factors (smoking, alcohol consumption, medication use, diet), and hormonal factors (hirsutism assessed using the Ferriman scale, use of hormonal contraceptives, age at menarche and menopause, and number of pregnancies). Additionally, the Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale (PSS-10), and the Cardiff Acne Disability Index (CADI) adapted to Portuguese were applied. A clinical evaluation of facial and neck lesions was conducted to classify AFA severity using the Adult Female Acne Scoring Tool (AFAST).

Data were organized in Microsoft Office Excel 365 and analyzed to determine the prevalence of acne complaints and their associations with the studied variables. A bivariate analysis was performed, and variables with $p \leq 0.3$ were included in the final multivariate model. Continuous variables were analyzed using the Student's t-test for parametric data or the Mann-Whitney test for nonparametric data based on data normality, which was assessed using the Shapiro-Wilk test. Categorical variables were compared using the chi-square test or Fisher's exact test depending on the number of events in each analysis. Correlations were analyzed using Spearman's test. Multivariate analysis was performed using a generalized linear model with a binomial distribution and a logistic link function, in which the dependent variable was the presence of acne complaints. Categorical data were presented as absolute values and percentages, while quantitative data were reported as mean ± standard deviation or median and quartiles depending on normality. Data analysis was conducted using IBM SPSS 25.0, and statistical significance was set at $p<0.05$ (two-tailed).

RESULTS

In this sample of 258 women, 41.1% (95% CI: 35.3%–46.1%) reported acne complaints, ranging from 60% among those aged 25–29 to 15% in the 50–55 age group (Graph 1). At the time of the clinical examination, 36.6% of participants presented acne lesions. Among those who reported having acne, 70% had experienced it continuously since adolescence, and 26.6% were undergoing treatment (Graph 2).

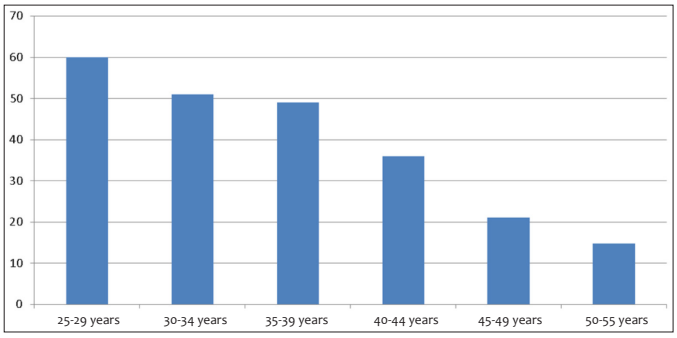
For 69% of the sample, acne was not a significant concern, while 28% considered it a minor issue, and 3% viewed it as a major problem. Women who reported acne tended to be younger (median age: 34; p25-p75: 28–39) compared to those who did not report acne (median age: 41; p25-p75: 34–48) ($p<0.01$, Mann-Whitney test).

Acne complaints were also significantly associated with race, being more prevalent among Black and mixed-race women (Table 1). Body mass index (BMI) and abdominal circumference showed no significant association with acne complaints. However, among gynecological factors, earlier age at menarche was associated with acne complaints, while menstrual irregularity was not (Table 1).

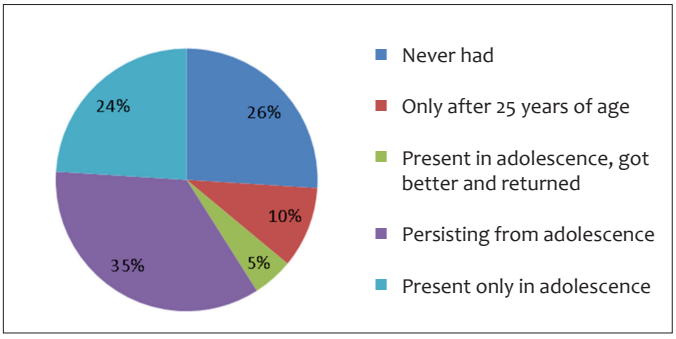
A lower number of pregnancies was associated with acne complaints in the bivariate analysis, likely acting as a confounder related to patient age, as younger women presumably had fewer pregnancies. Additionally, 15.8% of women without acne complaints were postmenopausal, compared to 4.7% of those with acne, indicating an association between the absence of acne complaints and menopause in the bivariate analysis.

Hirsutism, defined by a Ferriman score >8, was strongly associated with acne complaints, with a prevalence of 11.3% in women with acne compared to 2.6% in those without.

Dietary factors such as food restrictions, milk consumption, dietary supplements, sugar, and artificial sweeteners



Graph 1: Prevalence of acne complaints by age group (N = 258)



Graph 2: Acne progression over lifetime (N = 258)

Table 1: Association between studied variables and acne complaints in 258 women

Characteristic	Acne present n=106	No acne n=152 n(%)	PR (95% CI)	p-value	p-value (multi)†
Race					**<0.01**
Asian	1(1)	6 (4)	0.33 (0.04 to 2.68)	0.42	0.63
Black	14 (13.2)	6 (4)	3.58 (1.46 to 8.77)	<0.01	<0.01
Mixed-race	49 (46.2)	60 (39.5)	1.26 (0.96 to 1.65)	0.10	0.01
White	42 (39.6)	80 (52.6)	-	-	-
Age (years)★	34 (28-39)	41 (34-48)	-	<0.01	0.02
Body mass index★	27 (24-32)	27 (23-30)	-	0.43	-
Waist circumference (cm)★	90 (80-98)	90 (80-98)	-	0.83	-
Menarche age (years)★	12 (11-14)	12 (11-14)	-	0.30	0.03
Number of pregnancies★	1 (0-2)	2 (1-3)	-	<0.01	0.60
Postmenopausal	5 (4.7)	24 (15.8)	0.30 (0.12 to 0.76)	<0.01	0.45
Irregular menstrual cycle	29 (27.4)	39 (25.7)	1.07 (0.71 to 1.61)	0.76	-
Hirsutism	12 (11.3)	4 (2.6)	4.30 (1.43 to 2.98)	<0.01	0.01
Restricted diet	3 (2.8)	4 (2.6)	1.08 (0.25 to 4.71)	0.92	-
Days per week consuming milk★	4 (3-7)	6 (2-7)	-	0.82	-
Takes exercise supplements	8 (7.6)	7 (4.6)	1.64 (0.61 to 4.38)	0.42	-
Days per week consuming chocolate★	1.5 (0-4)	1 (0-2)	-	<0.01	0.18
Days per week consuming fast food★	1 (0-2)	1 (0-1)	-	<0.01	0.08
Consumes sugar	94 (88.7)	129 (84.9)	1.04 (0.95 to 1.15)	0.38	-
Consumes artificial sweetener	19 (17.9)	38 (25)	0.72 (0.44 to 1.17)	0.18	0.18
Smoker	9 (8.5)	27 (17.8)	0.48 (0.23 to 0.97)	0.03	<0.01
Days per week consuming alcohol★	0 (0-1)	0 (0-1)	-	0.63	-
Age of acne onset★	14 (12-15)	14 (13-15)	-	0.79	-
Previous use of oral isotretinoin	12 (11.3)	5 (3.3)	3.44 (1.25 to 9.48)	0.02	0.15
Family history of acne	60 (56.6)	80 (52.6)	1.08 (0.86 to 1.35)	0.53	-
Oily skin	87 (82.1)	87 (57.2)	1.43 (1.22 to 1.69)	<0.01	0.01
Face washes per day★	2 (2-3)	2 (2-3)	-	0.94	-
Sun exposure hours per week★	4 (2-7)	5 (2-8)	-	0.36	-
Regular sunscreen use	59 (55.7)	82 (54)	1.03 (0.82 to 1.29)	0.79	-
Days per week using makeup★	1 (0-2)	0 (0-1)	-	<0.01	0.01
Hours per day wearing a mask★★★	8 (5-10)	8 (2-9)	-	0.15	0.51
Mask type used					-
Surgical	32 (30.2)	40 (26.3)	1.14(0.81 to 1.62)	0.46	-
N95	36 (34)	52 (34.2)	1.05 (0.77 to 1.42)	0.77	-
Cloth	38 (35.9)	60 (39.5)	-	-	-
Facial acne severity★	1 (0-2)	0 (0-0)	-	<0.01	-
Submandibular acne severity★	0 (0-1)	0 (0-0)	-	<0.01	-
Cardiff acne scale★	2 (1-4)	0.5 (0-1)	-	<0.01	-
HADS anxiety★	9 (5-12)	7 (3-11)	-	<0.01	0.23
HADS depression★	5 (2-7)	5 (2-8)	-	0.62	-
Perceived stress★	22 (18-25)	18 (13-25)	-	<0.01	0.41

★ Mann-Whitney test, median (p25–p75).

† Generalized linear model with binomial distribution and logistic link function. Variables with p≤0.30 in the bivariate analysis were included.

HADS = Hospital Anxiety and Depression Scale; PR = prevalence ratio.

showed no significant correlation with acne. However, chocolate and fast-food consumption were statistically significant in the bivariate analysis, suggesting a possible bias related to eating habits and age. Family history of acne was not significantly associated with AFA complaints. Prior isotretinoin use was reported by 17 patients, 12 of whom had adult acne.

Oily skin was reported by 82% of women with acne compared to 57% of those without. More frequent makeup use was significantly associated with acne complaints.

Other factors such as face-washing frequency, weekly sun exposure hours, and sunscreen use showed no correlation with acne. Since the present study was conducted during the COVID-19 pandemic, questions about mask use were included, but no association with acne was found.

Self-perception of AFA showed a significant correlation with clinical assessment of acne severity, including submandibular acne, as evaluated by the AFAST scale (Graphs 3 and 4).

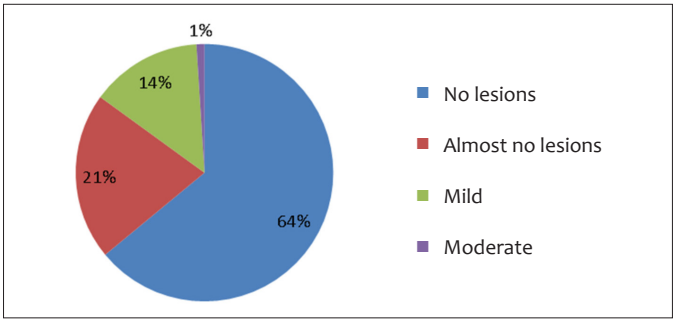
Regarding psychosocial impact, the perceived stress and anxiety scales showed a correlation with acne perception in the bivariate analysis, while the depression scale did not. In terms of lesion types observed in the clinical evaluation, retentional lesions were the most prevalent (39%), followed by mixed patterns (32%) and inflammatory lesions (29%). The severity of both facial and submandibular acne was associated with the impact of the disease on quality of life as measured by the CADI among women with acne complaints ($p=0.02$ and $p<0.01$, Spearman's test).

DISCUSSION

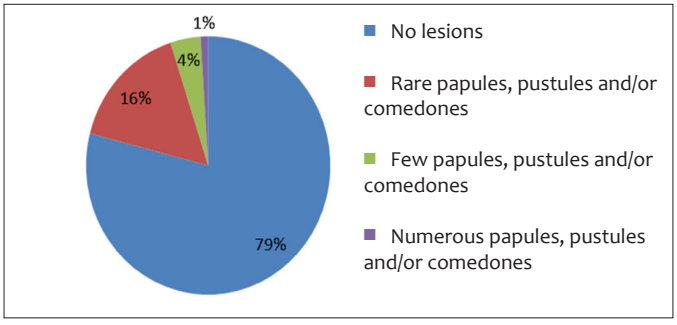
The overall prevalence of AFA in our study population was 41.1%, similar to that observed in adult women from England[3] and France,[4] ranging from 60% in the 25–29 age group to 15% in those aged 50–55. The median age of women with acne was 34 years, comparable to a previous Brazilian study that analyzed medical records of patients with AFA (33.9 years).[15] At the time of the clinical examination, 36.6% of participants had acne lesions, with retentional lesions being the most prevalent (39%), followed by mixed patterns (32%) and inflammatory lesions (29%). This contrasts with the same Brazilian study, where moderate inflammatory acne was the predominant clinical classification.[15] Similarly, Dréno et al. (2015) reported mixed acne as the most common presentation, with only 6.4% of patients exhibiting purely inflammatory lesions and 17.1% presenting exclusively comedonal acne.[2]

Higher makeup use was associated with acne complaints, though further studies are needed to determine whether this reflects a causal relationship or if individuals with acne use cosmetics to conceal lesions. A multicenter study similarly found that 70.7% of individuals with acne used cosmetics for camouflage, and cosmetic use was significantly associated with increased acne severity.[2] Most women with acne in our study also reported oily skin (82.1%), aligning with findings from a multicenter study on AFA, in which seborrhea was observed in 72.2% of cases.[2]

Hirsutism, assessed using the Ferriman scale, was present in 11.3% of women reporting acne, similar to the 10.8% prevalence observed in a multicenter study. In that study, androgenic signs, including alopecia, hirsutism, and acanthosis nigricans, were evaluated in order of frequency.[2] Hirsutism may serve as a sensitive marker for hormonal disorders, as it is strongly associated with menstrual irregularity (31.4%).[2] However, in our study, menstrual irregularity was not correlated with AFA, possibly due to hormonal contraceptive use, which may have acted as a confounder. Similarly, in the multicenter study, 81.0% of women with AFA reported regular menstrual cycles, indicating that menstrual irregularities are not a defining feature of the condition.[2] We identified a significant inverse association between age at menarche and acne complaints, with earlier menarche associated with higher acne prevalence. While memory bias cannot be ruled out, previous studies have linked early menarche to higher risks of metabolic syndrome and insulin resistance. Supporting these findings, our sample showed a significant inverse correlation between BMI and menarche age (Rho = -0.16, $p=0.01$; Spearman's test). However, we did not find other studies



Graph 3: Severity of facial acne (N=258)



Graph 4: Severity of submandibular acne (N=258)

specifically examining the relationship between menarche age and AFA, despite suggestions of a correlation between hormonal and metabolic characteristics.[16]

In our analysis, higher perceived stress scores (PSS) were associated with AFA in the bivariate analysis. Previous research has linked work-related stress to more severe acne in women, showing that localized acne is more common in individuals with high stress levels or psychologically demanding jobs.[2] However, in our multivariate analysis, acne complaints were not correlated with anxiety or depression, suggesting a lower psychiatric impact compared to pigmentary disorders like melasma, which has an established association with anxiety and depression.[13,17]

Smoking was inversely associated with AFA complaints in our study, even after adjusting for other variables. Acne complaints were twice as common among non-smokers. Clinically, only 22.2% of smokers had acne lesions, compared to 38.7% of non-smokers (p=0.06; chi-square test). The relationship between smoking and acne remains controversial, but it is believed that smoking promotes retentional lesions while reducing seborrhea. The effect of smoking on sebaceous glands may be mediated by aryl hydrocarbon receptors (AhR). Cigarette smoke contains strong activators of these receptors, stimulating the dioxin pathway. In sebocytes, this activation induces glandular atrophy and ductal keratinization, increasing cytokeratin expression.[10] This combination of effects may explain the contradictory role of smoking in AFA, as it may increase retentional lesions while reducing seborrhea.[18,19] Additionally, a study of 27,000 young men found an inverse association between smoking and severe acne, suggesting a potential anti-inflammatory effect of nicotine.[20]

Among patients with AFA, 70% had persistent acne since adolescence, consistent with another Brazilian study that reported 80% persistent acne. This finding underscores the importance of long-term monitoring for adolescent females with acne, even into early adulthood, as well as the need for studies to identify risk factors for acne persistence.[5] Although our study was conducted at a single center, we believe our findings represent a meaningful segment of the Brazilian female population, as our sample was stratified by age and race according to IBGE census data. However, we recognize that a larger multicenter study with a larger sample size will be necessary to confirm our results.

CONCLUSION

In a stratified sample of adult women from the Brazilian population, acne was a prevalent condition (41.1%), especially before the age of 40. However, it was generally of mild to moderate severity, with most cases persisting from adolescence. Acne complaints were independently correlated with Black and mixed-race ethnicity, hirsutism, earlier menarche age, oily skin, and makeup use. Conversely, smoking and older age were inversely associated with acne. ●

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