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Reproductive factors associated with overweight in adult women attended by the Family Health Strategy

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Abstract *Overweight stands out as a growing health problem in the population, resulting in individual and societal burdens. This study aimed to identify the association between reproductive factors and overweight in women of reproductive age attended by a Primary Health Care Unit (UAPS).This is a cross-sectional study with home capitation and data collection in two PHC Units, in the city of Juiz de Fora (MG), Brazil, in women aged 20 to 59 years, whose outcome was the overweight measured by the Body Mass Index. The prevalence of overweight was 61.0% among the 2,018 women included in the analysis. In the multivariate analysis, overweight was associated with the variables age at menarche before 12 years of age, having children, age greater than or equal to 30years, and hypertension. The prevalence of overweight in women who had menarche before 12 years of age was 12.4% higher than those who had menarche aged 12 years or more, and the prevalence of overweight in women who had children was 58.2% higher than those who never had any. There was a high prevalence of overweight in the adult female population, emphasizing the influence of reproductive factors.*

Keywords *Reproductive factors, Overweight, Women's health*

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Introduction

Overweight is a serious public health problem and affects several countries worldwide, which may be the result of inappropriate eating habits, sedentary lifestyle, hormonal factors, and genetic factors[1,2]. The biggest concern about this condition is its relationship with chronic non-communicable diseases such as cardiovascular diseases, chronic respiratory diseases, diabetes, and cancer[3].

According to data from the Household Budget Survey (POF) (2008-2009) with an adult population, overweight was diagnosed in about half of men and women. The diagnosis of obesity was found in 12.5% of men and 16.9% of women, corresponding to about a quarter of the total cases of overweight in males and a third in females[4].

Vigitel, a continuous telephone survey monitoring system, points to increasing indicators of overweight in adults in Brazilian capitals.Between 2006 and 2013, the study showed a statistically significant increase of 7.4% in overweight and 47.1% in obesity for both genders, age groups, schooling, and regions[5]. Data from 2014Vigitel, which seeks to describe the prevalence of risk and protective factors for chronic diseases, showed a 52.5% prevalence of overweight in the adult population, 56.5% of men, and 49.1% of women. Among these, 17.9% were obese, with a similar frequency between genders[6].

Overweight is prevalent in adult women and can directly affect the quality of life of the female population. Women's reproductive history represented by factors such as age at menarche, menopause, pregnancy, use of contraceptives, and the number of children can result in excessive weight gain at this stage of life[7,8].

Although some studies are available in the literature on overweight in adult women, there is no consensus on which female reproductive factors are associated with this outcome.Some authors point out the positive association between overweight and factors such as menarche before 12 years of age, having children, and using contraceptives[7]. However, others found few associations with reproductive factors, and the variable number of children was the one most associated with overweight[8-11].

The use of hormonal contraceptives, especially injectables, is associated with being overweight, as can be seen in studies by Lopez et al.[12] and Dal'Ava et al.[13]. However, other studies do not point to an association[9,10], and more work is required to clarify the relationship between some variables related to overweight in this population. The relationship between contraceptive use and overweight is not well defined in the literature[7,9]. Evidence suggests that weight gain may be associated with the use of hormonal contraceptives[13,14].

This study aimed to identify the association between reproductive factors and overweight in women of reproductive age attended by the PHC Unit (UAPS).

Methods

This is a cross-sectional epidemiological study with home capitation and data collection carried out in two PHC Units, in the city of Juiz de Fora, Minas Gerais. This study is part of the research "Evaluation of strategies for cervical cancer screening in women covered by the Family Health Strategy in the city of Juiz de Fora, Minas Gerais" (free translation from Portuguese), approved by the Ethics Committee of the Institute of Social Medicine (IMS) of the State University of Rio de Janeiro (UERJ).

All women in the coverage area of the UAPS in the age group of 20-59 years, which was the age range for the cytopathological screening at the time, were eligibleto participate in the research, excluding pregnant, virgin, and hysterectomized women. In total, 4,516 women in this age group were identified from a survey in the areas covered by the UAPS, carried out by community health workers (ACS). All were invited to participate in the research through home contact by the ACS. Concerning women who did not respond to the invitation, two other scheduling attempts were made through a new home visit or telephone contact. A total of 2,077 women participated in the study, which corresponded to 46% of the universe. In this analysis, 2,018 women whose anthropometric measurements were taken were considered.

Data were collected by a questionnaire that addressed sociodemographic factors, social support, self-assessment of health status, lifestyle, morbidity, women's health, and sexual behavior, applied by previously trained professionals. After the interview, blood pressure and anthropometric measurements were taken, and then the gynecological examination was performed by medical professionals or nurses with the collection of Pap smear material.

An electronic scale of the "Tanita" brand with a 0.1g division was used to measure weight.

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Height was measured by a stadiometerof the "Exact Height" brand, with a 0.1cm division. The scale was supported on a flat, firm, and smooth surface, away from the wall, locked and calibrated. Women stood at the center of the equipment, with minimal clothing, barefoot, in an upright position, and with their feet together and arms extended along their bodies.

The Body Mass Index (BMI) was used to evaluate overweight, calculated by dividing weight (measured in kilograms) by height (measured in meters) squared. BMI was divided into two categories for analysis: No overweight (BMI < 25.0 Kg/m²) and overweight (BMI>=25.0 Kg/m²)[15].

The independent variables were grouped according to socioeconomic characteristics (marital status, schooling, skin color/ethnicity, work, minimum wage per capita and Family Grant), lifestyle (alcohol use, physical activity, watching TV and tobacco use), presence of chronic non-communicable diseases (hypertension, diabetes, heart attack or stroke, and depression), reproductive factors (age at menarche, menopause, use of contraceptives, hormonal contraceptives, previous pregnancy and number of children), and age group.

Bivariate analyses were performed using the Chi-square and multivariate tests, applying Poisson regression models, in the Stata 11.0 program, and the Crude Prevalence Ratios (CPR) were calculated and adjusted (APR) with respective Confidence Intervals of 95% (95% CI).The multivariate analysis was performed in two stages. The first step resulted in a model with previous analysis with reproductive factors only, and variables with $p < 0.05$ were significant. The other variables were then added to see how their inclusion in the model affected the association of reproductive variables with overweight.

Results

The 2,018 women included in the analysis hada mean age of 38.42 years (SD=11.04) and a mean BMI of 27.75 kg/m² (SD=6.16; minimum 13.62 kg/m² maximum 83.36 kg/m²). Among women, 61% showed overweight, and half of them were obese (BMI ≥ 30 Kg/m²).

The characterization found 61.0% of married women, 55.6% were non-white, 54.3% had completed elementary school or more, 53.2% reported working, and 15.6% of women enjoyed the benefit of the Family Grant program. The median monthly income was R$ 1,411.85, and 41.8% of women were living on half minimum wage or less per month.

Regarding reproductive factors, more than half of women (55.5%) had menarche at 12 years or more, 19.2% were in menopause, 87.3% of the population had already become pregnant, and 85.6% had children. Most women reported using contraceptive methods (68.5%), and 66.4% said they used hormonal contraceptive methods.

Table 1 shows the distribution of variables in the bivariate analysis. Overweight was associated with the variables age group older than 30 years, being married, having incomplete elementary school, being non-white, working, not consuming alcohol, not smoking, having hypertension, diabetes, heart attack, and depression. There was also a high association between overweight and reproductive factors, and use of contraceptives was the only variable that was not significant.

Table 2 shows the results of the multivariate analysis. The age group was associated with overweight, and the prevalence in women aged 30 or over was 22.1% higher than in women under 30, and this difference is significant. The reproductive variables with a significant association with overweight were menarche before the age of 12 and having children.The prevalence of overweight in women with menarche age greater than or equal to 12 years was 12.4% lower than women who had menarche before 12 years of age. The prevalence of overweight in women who had children was 58.2% higher than those who never had any.

Besides the reproductive variables, other variables were still significant in the final model: married, non-white, hypertension, diabetes, and 30 years of age or older. The prevalence of overweight in married women was 10.8% higher than in unmarried women, and the prevalence in non-white women was 9.2% higher than in white women.

Regarding the presence of chronic diseases, the prevalence of overweight in hypertensive women was 32.6% higher than in non-hypertensive ones. The prevalence of overweight in diabetic women was 14.7% higher than in non-diabetic women.

The analyses allowed the comparison between the Crude Prevalence Ratio and the Adjusted Prevalence Ratio, to assess how the variables behaved in the multivariate analysis after the isolated analysis was performed. Thus, one could say that the association between overweight and some variables became weaker with the adjusted prevalence ratio closer to the unit. Even so, the variables remained significant (Table 1).

Table 1. Number of cases, percentage of overweight and p-value by category, given by the Chi-square test to verify the significance of association with overweight, according to socioeconomic and demographic variables, lifestyle, chronic non-communicable diseases, and female reproductive factors. In Juiz de Fora, MG, Brazil.

	Overweight (IMC >= 25,0 Kg/m²)		
	N	**%**	**p**
Age Range			< 0.001
< 30 years	532	46.6	
≥ 30 years	1486	62.2	
Marital Status			< 0.001
Married	1230	64.4	
Not Married	788	55.7	
Schooling			< 0.001
Incomplete Elementary school	912	66.1	
Complete Elementary School and over	1084	56.6	
Skin Color / Ethnicity			0.014
White	894	58.1	
Non-White	1119	63.4	
Working			0.005
No	943	64.3	
Yes	1072	58.1	
Alcohol use			0.001
No	1151	64.1	
Yes	865	56.9	
Tobacco use			< 0.001
No	1578	63.6	
Yes	425	51.1	
Systemic Arterial Hypertension			< 0.001
No	1521	54.8	
Yes	485	81.0	
Diabetes			< 0.001
Yes	1895	59.5	
No	123	83.7	
Heart attack or stroke			0.008
Não	1963	60.5	
Sim	55	72.2	
Depression			0.011
No	1545	59.5	
Yes	473	66.0	
Age at Menarche			< 0.001
< 12 years	885	65.8	
≥ 12 years	1103	56.8	
Menopause			< 0.001
No	1631	58.9	
Yes	387	69.8	
Type of contraceptive			< 0.001
Non-Hormonal	1339	65.1	
Hormonal	679	52.9	
Previous pregnancies			< 0.001
No	257	41.0	
Yes	1761	63.9	
Children			< 0.001
No	290	41.7	
Yes	1728	64.3	

Table 2. Multivariate analysis considering overweight in adult women: Distribution of prevalence ratios, confidence intervals, and p-values according to the significant variables. In Juiz de Fora. MG. Brazil.

Variable	Crude PR*	(95%CI)	p	AdjustedPR**	(95%CI)	P
Age at Menarche						
< 12 years	1			1		
≥ 12 years	0.946	0.921 - 0.972	<0.001	0.876	0.819 - 0.937	<0.001
Children						
No	1			1		
Yes	1.582	1.366 - 1.834		1.394	1.194 - 1.626	<0.001
Marital Status						
Not Married	1			1		
Married	1.156	1.027 - 1.085	<0.001	1.108	1.030 - 1.193	0.006
Skin color/Ethnicity						
White	1			1		
Non-White	1.092	1.018 - 1.174	0.015	1.076	1.005 - 1.153	0.034
Systemic Arterial Hypertension						
No	1			1		
Yes	1.170	1.199 - 1.140	<0.001	1.326	1.240 - 1.418	<0.001
Diabetes Mellitus						
No	1			1		
Yes	1.152	1.100 - 1.197	<0.001	1.147	1.048 - 1.256	0.003
Age Range						
< 30 years	1			1		
≥ 30 years	1.133	1.097 - 1.170	<0.001	1.221	1.103 - 1.352	<0.001

Discussion

Knowing more about women's reproductive factors and their influence on excessive weight gain is crucial since there is still no consensus in the studies on the subject. In this study, 61% of women wereoverweight, and 31% were obese, which becomes a cause for concern, considering the importance of this population group. The prevalence levels found were higher than those found in cross-sectional studies that evaluated reproductive factors and overweight in low-income adult women[7,8,10].

The proportion of overweight among those who were under 30 years of age was 42% lower than those over 30 years of age. Data from Vigitel, which uses probabilistic samples from the adult population, also showed an increased prevalence of overweight and obesity with age in 2014, especially from 35 to 44 years, reaching a prevalence of 58.6% for overweight[6]. Other studies conducted with adult women found a high prevalence of overweight in women in older age groups[7-10], which shows the need for greater monitoring of indicators with age to prevent health problems.

Overweight was associated with women's marital status, with a higher proportion among those with a partner. Being single seems to protect women from nutritional disorders, probably due to greater concern for body image, a more active social life, and lower level of concern for the care of the home and children compared to married women[7]. In studies with an adult population, Sá e Moura[16] and Andrade et al.[17] also found a more significant relationship between being overweight and having a partner.

Low schooling was also associated with overweight, and in other studies with women in a similar socioeconomic situation[10,18,19], which shows that limited understanding can affect the adoption of healthier lifestyles and the prevention of weight gain.

The proportion of overweight among non-white women was 9% higher than that of white women in the bivariate analysis, but lost significance in the multivariate analysis. Sá and Moura

also found an inverse association between overweight and white race, using data from adult women who responded to the Vigitel survey in 2008.The result of the bivariate analysis for the work variablepoints to a result similar to that of Linset al.[8], who found that light work activity can protect against overweight. However, when adjusted by the other variables, this factor lost significance in both studies.

The women who worked had a lower proportion of overweight than those who did not, due to the higher energy expenditure during the activity. The same was found in a study carried out with women of reproductive age, which points out that light physical activity can have a protective effect on overweight[8].

An adequate dietary pattern, characterized by the consumption of fruits, vegetables, lean meats, skimmed dairy products, nuts, and moderate intake of vegetable oils and alcohol, can determine a lower risk of chronic diseases such as obesity, metabolic syndrome and cardiovascular diseases[19,20]. In a systematic review, Farpour-Lambert et al.[11] emphasize that a balanced diet should be recommended in early pregnancy and maintained during the postpartum period. It is effective in reducing gestational weight gain and gestational hypertension in women with obesity.

In this study, not consuming alcohol was associated with overweight in the bivariate analysis, unlike Sanvisenset al.[21], who found an association between alcohol consumption and obesity in women. Regarding tobacco use, non-smoking was associated with being overweight, refuting studies showing that there is no direct relationship between smoking and being overweight in women[10,18], due to the possible inhibition of appetite caused by smoking[22].

The assessment of chronic diseases deserves attention, since the proportion of overweight in hypertensive women was 48% higher than in non-hypertensive women, as found by other authors who found a direct relationship between arterial hypertension and overweight[20].

Concerning diabetes, the proportion of overweight in women with the disease was 41% higher than those without it, similar to the study by Kearns et al.[23], who found an association between diabetes and increased BMI.

Most reproductive variables showed a statistically significant association with overweight in the bivariate analysis. The age of menarche is the beginning of women's reproductive life, and in this phase, faster accumulation of body fat can occur, leading to excessive weight gain. Like other studies[7,24,25], an association was found between early menarche and overweight, with women with menarche before the age of 12 having a 16% higher proportion of overweight compared to those who had menarche aged 12 or over.

Menopause was also associated with overweight, as found by Rosa et al.[9], whose study showed that the proportion of overweight and obesity is higher in women at menopause, an expected result taking into account the female body composition change at this stage. Menopausal women had a 19% higher proportion of overweight than those who have not yet entered menopause.

Studies often show that women are more likely to be obese[7,9] when using contraceptive methods due to components present in contraceptives[26,27]. However, the proportion of overweight in women who used non-hormonal contraceptives was 23% higher than women who used hormonal contraceptives but did not remain significantly associated in the multivariate analysis.

Getting pregnant or having children were also variables that showed a strong association with overweight. Those who already got pregnant had a 56% higher proportion of overweight than those who were never pregnant and the proportion of overweight in women who have already had children was 54% higher than those who had no children, an association also reported in the study by Ferreira and Benício[10], with 11,961 Brazilian women aged 20 to 49 years, in which the effect of parity on obesity was significant.

After the multivariate analysis with the overweight outcome, some variables left the regression model because they did not remain significant, which is because only the relationship between two variables is considered during the bivariate analysis. In contrast, the analysis is continuously adjusted,simultaneously,and in the same reference category by the variables in the multivariate analysis. Thus, there is a change in the behavior of the association of the variable with the outcome.

The reproductive variables that were significantly highlighted in the final model, considering the other factors, were menarche age below 12 years and having children. Early menarche increased the risk of obesity by 59%, considering the study by Correia et al.[7] Other authors have shown that the history of three or more pregnancies and menarche at 11 years of age or less had a 25% higher prevalence of abdominal obesity[24]. The association between parity and obesity may still be dose-response, and more pronounced

among women who have children than among nulliparous women[11,12].

It is worth mentioning that we cannot infer causality because of the cross-sectional nature of this study, which is a limitation, and it is hard to determine the existence of a time sequence between exposure to the factor and the development of the disease, as it happens in a single moment. The results found should be interpreted with caution, as they are aimed at this studied group. We can conclude that overweight is a problem with high prevalence in the adult female population studied and that reproductive factors are associated with its development. An adequate assessment of the nutritional diagnosis, especially in women who had children and early menarche is indicated.

Collaborations

DF Gonçalves: Design, statistical analysis, methodology and writing. MTB Teixeira: Research, design and review. GA Silva, KCD Duque and MLSM Machado: Research. LC Ribeiro: Statistical analysis, methodology, writing and review.

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