

Prevalence of weight-loss strategies and use of substances for weight-loss among adults: a population study

Prevalência de estratégias de emagrecimento e uso de substâncias para perder peso entre adultos: um estudo populacional

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Abstract

This paper concerns a cross-sectional population-based study conducted with adults living in the city of Pelotas, Rio Grande do Sul State, Brazil. It aims to determine the prevalence of weight-loss practices and use of substances for weight-loss during the 12 months preceding the interview. The prevalence of weight-loss attempts was 26.6%. Although dietary control and regular physical exercise were the most commonly used strategies, the prevalence of the combined use of these methods was only 36% for individuals trying to lose weight. The prevalence of use of substances for weight-loss was 12.8% (48.4% of those who tried to lose weight). The use of dietary control and substances was more common among women, while men practiced physical exercise with greater frequency. Teas were the most frequently used substances for weight-loss. Multivariate analysis identified being female, excess weight and self-perception of excess weight as major associated factors for the use of substances for weight-loss. Finally, we found that, although weight-loss attempts are common, the majority of obese individuals do not make attempts to lose weight and only a minority follows the recommended practices.

Weight Loss; Anti-obesity Agents; Phytotherapy; Cross-Sectional Studies

Introduction

High prevalence of excess weight has been repeatedly documented in the literature ^{1,2}, mainly because of its strict relationship with several chronic diseases and risk of death ^{3,4}. In addition, overweight individuals suffer discrimination and stigma because of their appearance in a culture that excessively values a prototype of beauty associated with thinness, limiting the social and professional opportunities of those with this profile ⁵.

Despite scientific interest and a proposal of the World Health Organization (WHO) in 2004 to create a set of strategies and goals to prevent obesity and chronic diseases ⁶, the prevalence of obesity is increasing around the world. Recent data shows that 50% of the Brazilian adult population is overweight and 15% is obese ⁷. International projections indicate that by 2015, approximately 700 million people aged 15 years and over will be obese ⁸. There is no sign that the pandemic is being controlled, indicating failures in the implementation of effective treatment and prevention strategies.

There is a consensus that lifestyle modification, such as healthy dietary habits and regular practice of physical activity ^{9,10}, is necessary for long-term weight control. There are no highly efficacious and safe medicines for weight-loss ¹¹ and, although there have been important surgical advances in this area, the use of this solution

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in the public health sector is limited due to contraindications and cost issues and should therefore be restricted to a limited sub-population¹². Therefore, strategies besides lifestyle modification should be seen as complimentary.

Nonetheless, adherence to lifestyle modifications is low, as demonstrated by data from the *Behavioral Risk Factor Surveillance System* (BRFSS) from 1996¹³ and the *National Health Interview Survey* (NHIS) from 1998¹⁴. Both studies indicate that while more than 30% of United States residents were attempting to lose weight, only 20 to 30% combined physical activity and dietary change in their strategy.

Despite clear evidence that modern lifestyles, increasing professional demands, the focus on technology and the influence of the media facilitate sedentary behavior and unhealthy dietary practices, it is possible that noncompliance with lifestyle modifications occurs partly because the effectiveness of this strategy does not match up to the individual's expectations¹⁵. Social pressure often demands improbable weight loss, thereby creating a highly favorable environment for unproven practices. The use of "alternative" treatments with no scientific foundation, that focuses on losing weight for aesthetic reasons and includes promises of rapid weight-loss without any effort, exposes individuals to dangerous substances that are ineffective (e.g.: teas, dietary supplements)^{16,17} and hold possible health risks which are greater than their potential benefits (e.g.: weight-loss formulas, amphetamines)^{18,19}.

Although a widespread practice, the total extent of the use of substances for weight-loss in Brazilian society is unknown. The last 10 years has seen an absence of published population studies regarding the use of these substances, however, recent reports indicate that Brazil is a major consumer of weight-loss drugs^{20,21}. In an article published in 1998, Lima et al.²² found a 1.3% prevalence of amphetamine use among adults. International data, although scarce, suggests high consumption of substances for weight-loss, which appears unaccompanied by adequate counseling and emphasis on lifestyle modification^{23,24,25,26}.

The lack of Brazilian publications on this subject reinforces the need for contemporary studies regarding weight-loss practices among the population and associated characteristics. This knowledge is fundamental to better understand our reality, as well as to develop strategies to raise awareness regarding truly efficacious practices and the risks associated with unproven practices.

The goal of this work was to evaluate the prevalence of weight-loss strategies among the population during the 12 months that preceded

the study, and identify the factors associated with the use of substances for weight-loss.

Methods

Between January and June of 2010, a cross-sectional population based study was conducted with adults aged 20 years and over residing in the urban zone of Pelotas, a municipality with approximately 350,000 inhabitants²⁷, in Southern Brazil. The study united data collected through a series of projects undertaken by a consortium of different researchers using a common tool²⁸.

The multistage sampling process focused on sectors of the municipality taken from the 2000 demographic census, stratified by income. The necessary sample size was calculated for an estimated 11% prevalence of the use of substances for weight loss, with an acceptable error of 1.5 percentage points based on an unpublished study of weight-loss practices conducted in same city in 1999. The lowest prevalence ratio estimate for associations was 2.0 with a power of 80% and 95% confidence level. The study design effect was estimated at 50%. The needed sample size was calculated as 2,656 individuals.

Sectors and households were randomly selected and all resident adults that did not meet exclusion criteria (non-Portuguese speaker, institutionalized person, physical or mental incapacity to answer questions) were invited to participate.

Questionnaires were administered using personal digital assistants (PDAs). Anthropometric measurements (weight and height) were taken of all eligible individuals that were able to stand. Data was collected by interviewers and anthropometrists trained on standard practices proposed by Lohman et al.²⁹ and Habitch³⁰.

Use of substances for weight-loss was defined as the use of any medication (tea, herbs, natural remedy, nutritional supplements or other substance) with the aim of weight loss over the preceding 12 months reported by answering yes to the question: "*have you done or used something to lose weight in the last year?*". Those individuals that answered yes were asked specific questions about the use of each particular method (diet, exercise, medicines, teas, shakes, etc.).

The following independent variables were analyzed:

- Demographic: sex, age, observed skin color and marital status;
- Socioeconomic: education level (number of years of schooling) and family income;
- Anthropometric: body mass index (BMI), calculated based on the measured weight and height

and categorized according to the WHO definition of overweight and obesity (normal weight up to 24.9kg/m², overweight 25.0 to 29.9kg/m² and obese > 30.0kg/m²);

- Behavioral: leisure time physical activity evaluated by the short version of the *International Physical Activity Questionnaire* (IPAQ) and tobacco use defined as at least one cigarette per day for at least a month;
- Self-perception variable: where the participant chose one of six alternatives for how they viewed their body weight (too skinny, skinny, normal, fat, very fat).

Data from the PDAs was transferred frequently to a central computer using the PENDRAGON forms manager program version 5.1 (Pendragon Software Corp., Buffalo Grove, USA), allowing for review and timely correction of inconsistencies and missing data. Anthropometric data were collected using printed questionnaires and entered in the program Epi Info 6.04 (Centers for Disease Control and Prevention, Atlanta, USA), with double entry and validation.

Data quality was evaluated for 11% of the participants using a simplified questionnaire administered by field coordinators.

Statistical analysis was performed using Stata 11.0 (Stata Corp., College Station, USA). A descriptive analysis of sample characteristics and weight-loss strategies, stratified by sex, was also carried out. The prevalence of use of substances for weight-loss and type of substance utilized were also evaluated in relation to gender. Factors associated with use of substances for weight-loss were analyzed using Poisson regression to estimate the prevalence ratio (PR) and confidence intervals³¹. Statistical significance of associations was evaluated using the Wald test of heterogeneity of trends, using a p-value < 0.05 for statistically significant associations. All variables were analyzed using this model regardless of the results of crude analysis. To control for confounding factors, a p-value ≤ 0.2 was selected to keep variables in the model. We used a three-level hierarchical model to perform the multivariate analysis, where each variable was adjusted to variables at the same and higher levels with each level consisting of the following variables: level one – demographic and socioeconomic variables (more distal); level two – BMI, level of leisure time physical activity, tobacco use; level three – self-perception of body weight. All participants signed a voluntary informed consent form that informed them about the study and their rights. The project was approved by the Research Ethics Committee of the Medical School of the Federal University of Pelotas.

Results

A total of 2,732 individuals were interviewed, of which 2,448 were measured and weighed. Losses or refusals amounted to 10.7% for interviews and 19.1% for anthropometric measurements. Regarding the use of substances for weight-loss, the sample design effect was 1.2 and the intraclass correlation coefficient was 0.01. For the use of a weight-loss strategy in the preceding 12 months, the Kappa coefficient was 0.56.

The characteristics of the sample are presented in Table 1. The average age of participants was 46.1 years with a standard deviation (SD) of 17.0 years. The majority of the sample was female, white and had eight or less years of schooling. Overall, 39% of the sample had household incomes of was over 3.6 minimum wages. Although excess weight was identified in 62% (BMI ≥ 25.0kg/m²) of the sample, almost half of the individuals (49.3%) perceived themselves to be normal weight. Insufficient leisure time physical activity was observed in 75.6% of the sample.

Table 1 also shows the prevalence of weight-loss attempts according to sample characteristics. Some kind of weight-loss attempt in the last year was reported by 26.6% (95%CI: 24.6-28.6) of the sample. Higher prevalence of weight-loss strategies was observed among females (30.8%; 95%CI: 28.5-33.2), individuals aged between 30 and 39 years (31.9%; 95%CI: 27.0-36.7) and single people (29.8; 95%CI: 26.0-33.6). There was a positive association between prevalence rates and education level, household income, BMI and self-perception of being overweight. A total of 41.5% of obese individuals and 60.6% of individuals that perceived themselves as very fat reported having attempted to lose weight over the last 12 months.

The strategies used by those who attempted weight-loss are demonstrated in Table 2. The most frequent practices were dietary control (70.3%; 95%CI: 67.0-73.7) and physical exercise (55.7%; 95%CI: 51.9-59.6). The combination of both these methods occurred in 36% (95%CI: 32.4-39.6) of cases. Among individuals that tried to lose weight, 48.4% (95%CI: 44.3-52.5) used a substance, which is equivalent to 12.8% (95%CI: 11.5-14.2) of the total sample. The most commonly used substances for weight-loss among men and women were teas, followed by drugs among women and nutritional supplements among men.

A comparison between the sexes revealed that practicing exercise to lose weight was more common among men (66.7 vs. 50.4%; p < 0.001), while more women reported using dietary control (74.1 vs. 62.6%; p = 0.001) and use of substances (59.5 vs. 25.6%; p < 0.001).

Table 1

Sample characteristics and prevalence of weight-loss attempts. Pelotas, Rio Grande do Sul State, Brazil, 2010 (N = 2,732).

Variables	n (%)	Weight-loss attempts (95%CI)	p-value
Sex			< 0.001 *
Male	1,151 (42.1)	20.7 (17.8-23.6)	
Female	1,581 (57.9)	30.8 (28.5-33.2)	
Age (years)			< 0.001 *
20-29	595 (21.8)	30.5 (26.7-34.3)	
30-39	462 (16.9)	31.9 (27.0-36.7)	
40-49	545 (20.0)	27.3 (23.4-31.3)	
50-59	495 (18.1)	28.7 (24.8-32.6)	
60 or +	635 (23.2)	16.7 (13.7-19.7)	
Skin color			0.04 *
White	2,218 (81.2)	27.3 (25.1-29.6)	
Non-white	513 (18.8)	23.0 (19.6-26.4)	
Marital status			< 0.001 *
With a partner	1,606 (58.8)	27.0 (24.4-29.5)	
Single	644 (23.6)	29.8 (26.0-33.6)	
Divorced	234 (8.5)	26.9 (20.6-33.2)	
Widowed	248 (9.1)	14.9 (10.4-19.4)	
Schooling (years)			< 0.001 **
0-4	678 (24.9)	15.3 (12.4-18.3)	
5-8	773 (28.3)	24.0 (20.5-27.5)	
9-11	732 (26.8)	30.6 (27.3-33.9)	
12 or +	547 (20.0)	38.6 (34.7-42.5)	
Family income (terciles)			< 0.001 **
Lower	742 (27.4)	20.7 (17.5-23.9)	
Medium	907 (33.6)	23.4 (20.5-26.2)	
Higher	1,054 (39.0)	33.4 (30.4-36.4)	
Current tobacco use			< 0.001 *
No	2,149 (78.7)	29.5 (27.2-31.8)	
Yes	583 (21.3)	15.6 (12.5-18.8)	
Self-perception of weight			< 0.001 **
Very skinny/Skinny	286 (10.5)	4.9 (2.4-7.4)	
Normal	1,338 (49.3)	17.9 (15.4-20.5)	
Fat	958 (35.3)	40.6 (37.1-44.1)	
Very fat	133 (4.9)	60.6 (51.8-69.4)	
BMI ***			< 0.001 **
Normal	922 (37.7)	14.3 (11.7-16.8)	
Overweight	888 (36.3)	29.9 (26.3-33.6)	
Obese	638 (26.0)	41.5 (37.7-45.3)	
Leisure physical activity (IPAQ)			< 0.001 *
Insufficiently active	2,007 (75.6)	24.7 (22.5-26.9)	
Active	649 (24.4)	34.0 (30.2-37.7)	

BMI: body mass index; IPAQ: *International Physical Activity Questionnaire*; 95%CI: 95% confidence interval.

* Chi-square test of heterogeneity;

** Chi-square test for trends;

*** Variable with most number of unknowns (284), equivalent to 10.4%.

Table 2

Weight-loss strategies adopted by those who attempted weight-loss in the last year according to gender. Pelotas, Rio Grande do Sul State, Brazil, 2010.

	% (95%CI)	Women (n = 487)		Men (n = 238)		p-value *
		n	% (95%CI)	n	% (95%CI)	
Change in diet	70.3 (67.0-73.7)	361	74.1 (69.9-78.4)	149	62.6 (56.8-68.4)	0.001
Physical exercise	55.7 (51.9-59.6)	245	50.4 (45.6-55.3)	158	66.7 (60.4-73.0)	< 0.001
Diet + exercise (combined)	36.0 (32.4-39.6)	181	37.2 (32.7-41.7)	80	33.6 (27.5-39.7)	0.3
Use of some substance **	48.4 (44.3-52.5)	290	59.5 (54.5-64.6)	61	25.6 (19.9-31.4)	< 0.001
Teas	32.8 (28.6-37.0)	203	41.8 (36.3-47.2)	34	14.4 (9.7-19.0)	< 0.001
Nutritional supplements	15.6 (13.1-18.1)	92	18.9 (15.7-22.1)	21	8.8 (5.6-12.0)	< 0.001
Medicines	18.1 (15.3-20.8)	114	23.4 (19.7-27.1)	17	7.1 (3.6-10.7)	< 0.001
Use of 2 or more types of substances	15.7 (13.1-18.3)	101	20.9 (17.3-24.6)	11	5.0 (2.0-8.1)	< 0.001

95%CI: 95% confidence interval.

* Chi-square test of heterogeneity;

** Defined as any drug, tea, phytotherapy or nutritional supplement used for weight loss.

Note: Confidence intervals were measured considering the effect from the sample design.

Regarding BMI, weight-loss attempts in the last 12 months was more common among obese people (41.5%; 95%CI: 37.7-45.3), as were dietary modifications (29.6%; 95%CI: 26.5-32.8) and physical exercise (20.9%; 95%CI: 17.8-24.0). The combination of both practices was reported by 14.2% (95%CI: 11.5-16.8) of obese individuals and 11% (95%CI: 8.9-13.2) of overweight people. The prevalence of weight-loss attempts and the strategies utilized by the study population according to BMI are presented in Figure 1.

Usage of all weight-loss substances was greater among women (Figure 2). Use of teas was reported by 8.7% (95%CI: 7.5-9.9) of the population and was the most commonly used substance by women and men. Weight-loss drugs were utilized by 7.3% (95%CI: 6.0-8.6) of women and 1.5% (95%CI: 0.7-2.2) of men.

Table 3 shows crude and adjusted analysis of factors associated with use of substances for weight loss, according to the hierarchical model. In the crude analysis, women younger than 40 years of age, with more than 11 years of schooling and increased family income, were more likely to use substances. Regarding self-perceived weight, 42.9% of those who perceived themselves as very fat and 24.3% of obese people used some kind of weight-loss substance.

In the adjusted analysis, being female and obese were the strongest predictors of the use of a substance for weight loss. Women were 3.48 (95%CI: 2.59-4.68) times more likely than men to use some kind of substance. Among obese individuals PR was 5.31 (95%CI: 3.93-7.18) times greater than in normal weight individuals. High-

er prevalence of the use of substances for weight-loss was also found among individuals younger than 60 years of age, with more than 4 years of schooling, increased family income and that perceived themselves as fat or very fat. In contrast, even after adjustment, smoking was associated with decreased use of substances for weight-loss (PR = 0.68; 95%CI: 0.50-0.93).

Discussion

Despite their importance, weight-loss strategies have not been studied at a population level in Brazil. For the first time, this study shows high prevalence of weight-loss practices and use of substances for weight-loss among a sample of the Brazilian adult population.

The observed frequency of weight-loss practices was similar to that reported more than 10 years ago in the US by Serdula et al.¹³ Prevalence was less than that identified by Weiss et al.³², using *National Health and Nutrition Examination Survey* (NHANES) data in 2002, than that observed in a Malaysian study carried out by Kong et al.²⁴ and that found by Kruger et al.¹⁴ in a study involving the NHIS in 1998.

Our data indicates that the pursuit of weight-loss is frequently not combined with healthy practices. This observation is similar findings of Kruger et al.¹⁴ in the US, where slightly more than 1/3 of individuals who tried to lose weight in the previous year reported a combination of diet modification and physical activity. However, the fact that it is widely known that physical

Figure 1

Prevalence of weight-loss attempts and strategies used for reducing weight during the last year, according to current body mass index (BMI). Pelotas, Rio Grande do Sul State, Brazil, 2010.

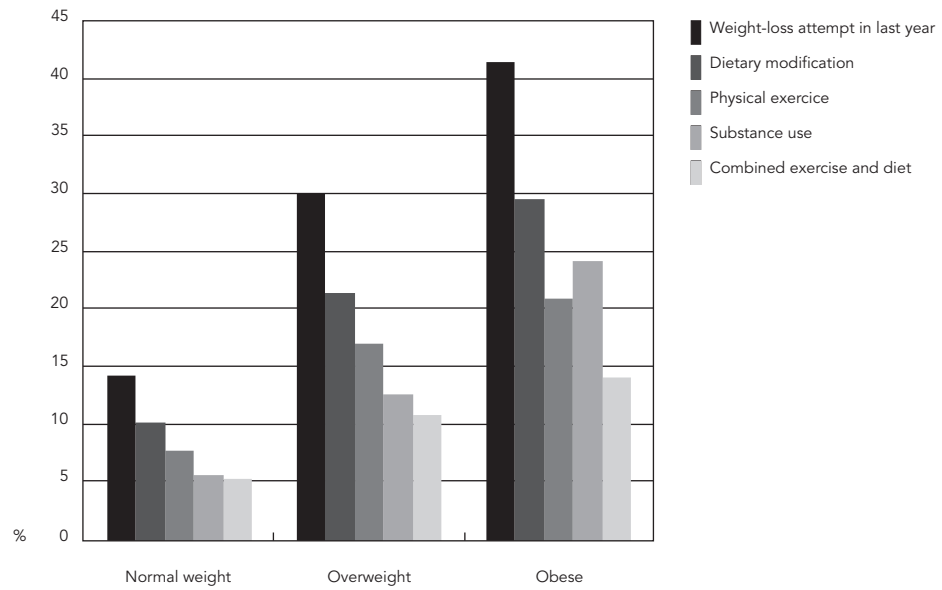
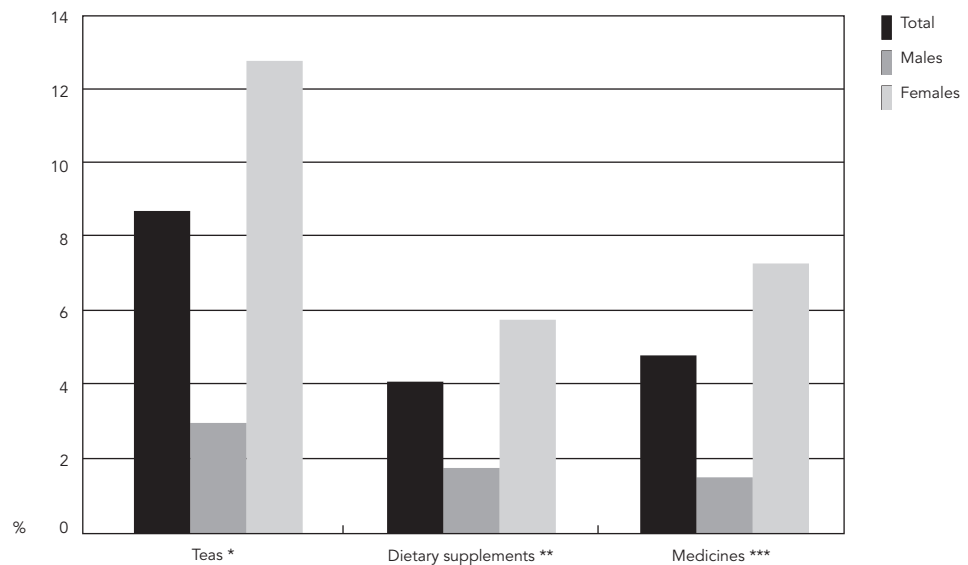


Figure 2

Prevalence of substances used for weight loss in the population, according to gender. Pelotas, Rio Grande do Sul State, Brazil, 2010.



* p < 0.001; ** p < 0.001; *** p < 0.001.

Table 3

Factors associated with the use of substances for weight-loss -crude and adjusted analysis. Pelotas, Rio Grande do Sul State, Brazil, 2010 (N = 2,732).

Level *	Variables	Prevalence (95%CI)	Crude analysis		Adjusted analysis	
			PR (95%CI)	p-value	PR (95%CI)	p-value
1	Sex			< 0.001 **		< 0.001 **
	Male	5.3 (3.9-6.7)	1.00		1.00	
	Female	18.3 (16.2-20.5)	3.46 (2.59-4.63)		3.48 (2.59-4.68)	
	Age (years)			< 0.001 **		< 0.001 **
	20-29	16.1 (13.0-19.3)	2.77 (1.90-4.03)		2.34 (1.59-3.45)	
	30-39	17.1 (13.6-20.6)	2.93 (1.93-4.46)		2.72 (1.79-4.14)	
	40-49	13.4 (10.5-16.3)	2.30 (1.53-3.46)		2.23 (1.47-3.38)	
	50-59	13.3 (10.3-16.4)	2.29 (1.57-3.34)		2.20 (1.51-3.21)	
	60 or +	5.8 (3.9-7.8)	1.00		1.00	
	Skin color			0.5 **		0.5 **
	Non-white	12.1 (11.5-14.5)	1.00		1.00	
	White	13.0 (9.2-14.9)	1.08 (0.84-1.38)		0.93 (0.74-1.18)	
	Marital status			0.02 **		0.7 **
	With a partner	12.5 (10.8-14.1)	1.72 (1.16-3.44)		1.26 (0.80-2.00)	
	Single	15.4 (12.7-18.1)	2.12 (1.31-3.42)		1.27 (0.77-2.09)	
	Divorced	14.5 (9.8-19.3)	2.00 (1.16-3.44)		1.39 (0.80-2.42)	
	Widowed	7.3 (4.1-10.5)	1.00		1.00	
	Schooling (years)			< 0.001 ***		0.02 ***
	0-4	6.5 (4.5-8.5)	1.00		1.00	
	5-8	12.7 (10.1-15.2)	1.95 (1.34-2.85)		1.60 (1.09-2.34)	
9-11	14.5 (11.9-17.1)	2.23 (1.57-3.17)		1.56 (1.09-2.24)		
12 or +	18.7 (15.9-17.1)	2.87 (2.00-4.14)		1.74 (1.15-2.65)		
Family income (terciles)			< 0.001 ***		0.007 ***	
Lower	9.8 (7.7-12.0)	1.00		1.00		
Medium	11.5 (9.3-13.6)	1.17 (0.88-1.55)		1.16 (0.88-1.53)		
Higher	16.3 (14.0-18.6)	1.66 (1.29-2.14)		1.50 (1.12-2.02)		
2	Current tobacco use			< 0.001 **		0.02 **
	No	14.2 (12.6-15.9)	1.00		1.00	
	Yes	7.7 (5.7-9.8)	0.54 (0.41-0.72)		0.68 (0.50-0.93)	
	BMI (kg/m ²)			< 0.001 ***		< 0.001 ***
	< 25.0 (normal weight)	5.7 (4.1-7.4)	1.00		1.00	
	25.0-29.9 (overweight)	12.7 (10.5-15.0)	2.21 (1.59-3.08)		3.08 (2.26-4.18)	
	≥ 30.0 (obese)	24.3 (20.9-27.7)	4.23 (3.03-5.90)		5.31 (3.93-7.18)	
Leisure time physical activity (IPAQ)			1.0 **		0.8 **	
Insufficiently active	13.2 (11.4-14.9)	1.00		1.00		
Active	13.3 (10.8-15.7)	1.01 (0.80-1.27)		1.03 (0.80-1.32)		
3	Self-perceived body weight			< 0.001 ***		< 0.001 ***
	Very skinny/Skinny	0.7 (0.03-1.7)	0.11 (0.03-0.43)		0.15 (0.04-0.60)	
	Normal	6.5 (5.1-7.9)	1.00		1.00	
	Fat	21.4 (18.5-24.3)	3.29 (2.55-4.24)		2.11 (1.52-2.91)	
	Very fat	42.9 (34.4-51.4)	6.59 (4.89-8.88)		3.30 (2.26-4.81)	

BMI: body mass index; IPAQ: *International Physical Activity Questionnaire*; PR: prevalence ratio; 95%CI: 95% confidence interval.

* Level of the variable according to the hierarchical analysis model. The measure of effect is controlled for all the variables of the same level or higher levels that present a p-value < 0.2;

** Wald test of heterogeneity;

*** Wald test for trends.

activity is a healthy practice may have induced some individuals to choose this answer. We can therefore assume that physical activity is less common than reported and that the data overestimates prevalence³³.

Lifestyle modifications are essential and are universally recommended in the treatment of overweight individuals^{34,35}. The study found that less than 30% of overweight individuals and more than 40% of obese people reported a weight-loss attempt in the last year. Although weight-loss strategies are more prevalent in these subgroups than among groups with appropriate weight, the combination of healthy practices was the exception and was reported by less than 15% of these individuals. Although obesity may limit physical activity and the frequency of combined health practices, it seems that even those individuals who most need to lose weight tend to opt for inadequate strategies whose use is based on low levels of scientific evidence.

Gender differences were found with respect to weight-loss strategy. As reported by other studies^{13,14,36}, weight-loss attempts and consumption of substances for diet and weight-loss were greater in women. In contrast to Serdula et al.¹³, that reported equal use of physical activity by men and women as a weight-loss strategy, in our study men used physical activity more often to lose weight.

Regarding the consumption of substances for weight-loss, the observed prevalence differed from findings of other population studies. It should be noted that the prevalence of obesity and the variety of cultural characteristics between different populations may significantly influence this practice and no comparable Brazilian studies were identified on this subject. However, international publications show that use of substances for weight-loss varies between 4%, in the NHIS study of 1998¹⁴, and 33.9%, reported in a study undertaken by Pillitteri et al.²⁶ which had a 19% response rate. Another study in the US with high refusal rates²⁵ found a prevalence of 8.7% for the use of non-prescribed substances during the preceding year.

Teas were the most common weight-loss substances consumed in our sample, among both men and women. Nonetheless, few publications evaluate the use of these substances at the population level. Blank et al.²³ and a Malaysian study carried out by Konget al.²⁴, showed that approximately 10% of adults used some herbal product for weight loss. Also, the *National Physical Activity and Weight-loss Survey* in 2002²⁵, found a higher than 15% prevalence rate.

It is interesting to note that when we evaluated herbal supplements, there were no usage

indications for the treatment of excess weight and no scientific evidence that these methods are effective^{17,37,38}. Indeed, several publications suggest potentially harmful effects of these substances, especially gastrointestinal and psychological disorders and hepatic lesions^{39,40}.

In accordance with other studies^{23,35,41}, we found an association between use of substances for weight-loss and being female and overweight. The consistency of these findings reinforces the idea that both characteristics are undeniably associated with use of weight-loss substances and are the strongest predictors of this behavior.

In relation to age, there was an increased likelihood of use of substances for weight-loss in people younger than 60 years of age, regardless of sex. This finding is similar to that observed by Kruger et al.¹⁴. However, other publications found an association only in younger age groups^{36,42}.

Skin color and marital status were not associated with use of substances or weight-loss practices. Although some US publications^{26,41} report non-white skin color as a risk factor, it is likely that this finding is associated with the specific cultural characteristics of the population. In Brazil, skin color is not associated with weight-loss practices due to higher levels of cultural miscegenation and an increased diffusion of concern over body shape.

An inverse association with tobacco use was also identified in other studies¹³, with evidence of increased risk of weight gain associated with tobacco cessation⁴³. This finding may reflect the belief that smoking could work as a weight control strategy⁴⁴ and demonstrates the emphasis on the aesthetic aspects of weight loss, irrespective of the health implications. Furthermore, the lower prevalence of weight-loss attempts in obese smokers than in obese nonsmokers (44.1% vs. 27.7%) could be an indication of worse general health-care associated with smoking, as has been demonstrated in other studies⁴⁵.

Self-perceived excess weight was a factor independently associated with use of substances for weight loss. No publication regarding this specific association was identified, but studies with adolescents have found increased risk of weight-loss practices^{46,47} and unhealthy weight-loss strategies^{48,49} associated with self-perception of excess weight.

Our study has certain limitations. The cross-sectional design hampers the evaluation of causality for some associations. Prevalence of 5.4% for substance use in the subgroup with normal BMI could reflect the effectiveness of the treatment, where previously obese individuals may have normalized their weight due to the use of

the reported substance. This possibility is unlikely however, since the vast majority of substances for weight-loss do not show substantial ability to reduce body weight and therefore normalize the BMI of an obese person.

The causal association with physical activity may also be biased due to reverse causality. However, no evidence was found for this, since the prevalence of physical activity and reports of physical activity were similar between users and non-users of substances for weight-loss. The most relevant finding was the high prevalence (> 75%) of sedentary behavior among users of weight-loss supplements.

One of the strong points of this study is that the response rate is the highest among the identified publications with similar objectives^{13,14,23,25,26}. The greater frequency of men among losses may lead to an overestimate of the frequency of weight-loss strategies and use of substances. However, this does not appear to have influenced the estimates of association, and effect modification associated with gender was not found.

Our findings reinforce the idea that, although weight-loss attempts and use of substances for weight-loss are common practices, these strategies are not used by the majority of individuals that need to lose weight. The fact that most individuals who attempt to lose weight do not adhere to recommended practices, may reflect the aesthetic emphasis of weight-loss strategies. In addition, the high usage of unproven substances with potentially adverse effects reveals the need for greater control of teas, phytotherapies and dietary supplement sales, and highlights the importance of awareness raising actions concerning the lack of efficacy and risk of these methods.

Finally, the findings show that the issue of "weight loss" is extremely prominent and important in our society, and there is a public health need to spread clear information about the risks associated with certain weight-loss practices and emphasize the necessity to create public policies to promote lifestyle modification and the regulation of substances with unproven efficacy and safety.

Resumo

Estudo transversal de base populacional conduzido com adultos residentes na cidade de Pelotas, Rio Grande do Sul, Brasil, que objetivou determinar a prevalência de práticas de emagrecimento e uso de substâncias para emagrecer, nos últimos 12 meses antes da entrevista. A prevalência de tentativas de emagrecimento foi de 26,6%. Controle dietético e prática regular de exercícios físicos foram as estratégias mais frequentes, mas apenas 36% daqueles que tentaram emagrecer combinaram-nas. A prevalência do uso de substâncias para emagrecer foi de 12,8% (48,4% daqueles que tentaram emagrecer). Mulheres utilizaram controle dietético e substâncias mais frequentemente do que homens, enquanto estes utilizaram mais exercícios físicos. As substâncias de uso mais frequente foram os chás. A análise ajustada identificou sexo feminino, excesso de peso e percepção do excesso de peso como os maiores fatores associados ao uso de substâncias. Assim, identificamos que tentativas de emagrecimento são frequentes, porém, não são referidas pela maioria dos obesos e apenas uma minoria daqueles que tentam emagrecer segue as práticas recomendadas.

Perda de Peso; Fármacos Antiobesidade; Fitoterapia; Estudos Transversais

Contributors

E. C. Machado participated in all stages of the study, including conception and design, acquisition, analysis and interpretation of data and drafting this article. M. F. Silveira and V. M. F. Silveira participated in the conception and design of the study, data interpretation and critical revision of this article.

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