Postpartum weight retention among women in Rio de Janeiro: a follow-up study

Retenção de peso ao longo de nove meses pós-parto em mulheres residentes no Município do Rio de Janeiro: um estudo de seguimento

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Abstract *This study presents follow-up results on trends in postpartum weight retention among women in the city of Rio de Janeiro, Brazil, at 0.5, 2, 6, and 9 months postpartum. The outcome variable, weight retention, was calculated by subtracting the reported pre-pregnancy weight from the observed weight at each interview. Statistical analyses used means and a 95% confidence interval for weight retention. Mean weight retention was 4.7, 4.1, 3.4, and 3.1kg at 0.5, 2, 6 and 9 months postpartum, respectively. At completion of the study, the largest weight retention was observed in women over 30 years of age (4.2kg) and with 30% or more of body fat (5.9kg). The rate of reduction in weight retention was 0.4kg/month, 0.2kg/month, and 0.1kg/ month for the periods 0.5-2, 2-6, and 6-9 months, respectively. The largest reductions were observed among young, single women and those with < 30% of body fat at baseline. The results suggest that variables such as age, parity, schooling, and body fat may be important predictors of postpartum weight retention.*

Key words *Obesity; Maternal Welfare; Maternal Nutrition*

Resumo *O objetivo deste estudo é apresentar resultados sobre a evolução da magnitude da retenção de peso em mulheres brasileiras, acompanhadas durante nove meses pós-parto. O desenho consistiu de um estudo de seguimento com medições aos 0,5, 2, 6 e 9 meses pós-parto. A variável retenção de peso foi calculada subtraindo-se o peso pré-gestacional reportado pela mãe, do peso observado em cada consulta. A análise estatística envolveu o cálculo de médias e intervalo de confiança de 95% para retenção de peso. A retenção média foi de 4,7, 4,1, 3,4 e 3,1kg aos 0,5, 2, 6 e 9 meses pós-parto, respectivamente. Ao final do estudo, as mais elevadas retenções foram observadas entre mulheres com mais de trinta anos (4,2kg) e com 30% ou mais de gordura corporal (5,9kg). A taxa de redução na retenção de peso foi de 0,4kg/mês, 0,2kg/mês e 0,1kg/mês, para os períodos 0,5-2; 2-6 e 6-9 meses, respectivamente, e as maiores reduções foram observadas entre mulheres com menos de vinte anos, solteiras e as com menos de 30% de gordura corporal no início do estudo. Os resultados sugerem que idade, paridade, escolaridade e gordura corporal se constituem em importantes preditores da retenção de peso no pós-parto.*

Palavras-chave *Obesidade; Bem-Estar Materno; Nutrição Materna*

Introduction

Postpartum weight retention is considered a major public health problem due to its magnitude and especially due to the risks it poses for the development of obesity (Kac, 2001; Lederman, 2001).

There are few studies on weight retention in Brazilian women (Fornes & Dorea, 1995; Gigante et al., 2001; Kac, 2002), and there is also a major gap in the discussion of its determinants.

In the international scenario, the main studies conducted thus far have identified the following principal determinants of postpartum weight retention: gestational weight gain, high parity, and duration of breastfeeding (Janney et al., 1997; Lederman, 1993; Ohlin & Rossner, 1990). The literature still presents conflicting results in relation to the effect of breastfeeding, but there is a consensus that higher weight increases during pregnancy are associated with greater postpartum weight retention (Lederman, 2001). Other determinants such as reproductive variables, physical activity, and diet require further investigation.

The current article presents the results on the evolution in weight retention over the course of nine months postpartum in Brazilian women, particularly identifying the magnitude of the problem among various sub-groups according to age, skin color, schooling, and parity, among others.

Methods

The data presented below were obtained from a cohort study with nine months follow-up on weight retention, body composition, and obesity. The study was conducted with Brazilian women ranging in age from 15 to 45 years, residing in the city of Rio de Janeiro. The study was performed with users of the "Marcolino Candau" Municipal Health Center, located in the central region of the city of Rio de Janeiro (Program Area 1 /3rd Municipal Administrative Region), which provides health care to the Estácio, Catumbi, Rio Comprido, and Cidade Nova neighborhoods.

The data collection process lasted 24 months (15 months of recruitment and 9 month of follow-up) and was carried out from May 1999 to April 2001. A total of 709 women were recruited, 479 were enrolled in the cohort, and 405 were selected for the present analysis, in which they were studied through a longitudinal design with four weight measurements, at approximately 0.5, 2, 6, and 9 months postpartum.

Participants were childbearing-age women recruited voluntarily for the study at three different moments and in distinct places: (i) in the central reference maternity hospital in the study area during immediate postpartum, (ii) during prenatal consultations, and (iii) at routine infant BCG immunization, the latter two in the Municipal Health Center. Recruitment during prenatal consultations and at routine BCG immunization was performed by the principal researcher (G. K.), while recruitment at the Praça XV Maternity Hospital was done by three interns trained according to a standard protocol.

For the current analysis, the only eligibility criterion in addition to those implemented in the research was age ≥ 18 years (n = 47). The following exclusion criteria were also used: lack of information on pre-pregnancy weight (n = 13) and extreme weight retention values (n = 14), specifically lying outside the -10.0/+16.0kg interval, thus ensuring the exclusion of adolescents still in their physiological growth phase and women with biologically improbable weight retention values. Thus, 47, 13, and 14 women were excluded on the basis of the above criteria, respectively. The final sample for the first follow-up measurement thus consisted of 405 women. For the other observation points, the samples were 359, 298, and 271 women at 2, 6, and 9 months, respectively.

Analyses were performed using absolute postpartum weight retention as the dependent variable. This variable was calculated based on the difference between the weight observed at each follow-up consultation and pre-pregnancy weight reported by the mother. Co-variables included the following socio-demographic variables: marital status (single, married, living with partner), age category (18-19, 20-29, 30-45 years), skin color (white, brown, black – corresponding to three official Brazilian census categories *branca*, *parda*, and *negra*), place of birth (Rio de Janeiro, another State of Brazil), residential stratum (urban, rural), schooling (≤ 4, ≥ 5 years); life style: smoking (smoker, never smoked, former smoker); reproductive variables: parity (1, ≥ 2 children); and maternal nutritional status: height (< 159, ≥ 159cm) and body fat (BF) (< 30, ≥ 30%).

Anthropometric measurements were performed by a trained observer and obtained according to standard recommendations (Lohman et al., 1988). BF percentage was estimated based on the bioimpedance technique, using the BIA-Quantum Bioelectrical Impedance Analyzer (RJL Systems, United States). BF values ≥ 30% were defined as obesity.

Weight retention values are presented as means with a 95% confidence interval for the four study follow-up measurements for several of the variables described above. In order to allow better visualization of the tendencies and their differences using the confidence interval, we selected variables with the greatest visual impact and constructed tendency graphs.

We also present loss-to-follow-up data on several study variables. The traditional approach to assess the presence of selection bias (selective loss) was implemented and consisted of comparing the final follow-up rates for the target variables according to the chi-square test (χ^2). The variables used in the comparison and which have not been described thus far are listed as follows: work in last 12 months (yes, no, never worked), total income in quartiles (0-279, 280-499, 500-869, ≥ 870 *reais*), type of breastfeeding (exclusive or predominant / partial or artificial), dichotomized pre-pregnancy weight (< 56, ≥ 56kg), and postpartum weight retention (< 7.5, ≥ 7.5kg).

The indicators absolute reduction in weight retention and relative reduction in weight retention were also constructed. The former was calculated as the absolute difference between final weight retention at nine months postpartum and the initial value at 15 days, and the latter as a proportion between the absolute reduction in weight retention and weight retention at 15 days. For the latter indicator, 95% CI are also presented.

The current study was approved by the research ethics committee of the Nucleus for Studies in Collective Health (NESC) at the Federal University in Rio de Janeiro (UFRJ). All participants signed a term of informed consent to enter the study. Further details on methodology are provided in Kac (2002).

Results

The data in Table 1 show the distribution of some study variables for censures and women who completed follow-up. The final follow-up rate was 66.9%, that is, a 33.1% loss-to-follow-up rate. Age category was the only variable for which significant non-random loss occurred. No significant differences were found in additional analyses comparing the median duration of predominant breastfeeding and mean weight retention at first follow-up, for censures and complete follow-up, stratified by age category (Figure 1).

Mean weight retention was 4.7, 4.1, 3.4, and 3.1kg at 0.5, 2, 6, and 9 months postpartum, respectively. Meanwhile, the mean difference in weight retention between the final and initial observations was 1.6kg. Based on the slope of the curves, one notes that the reduction was more intense in the first interval as compared to the latter two (Figure 2).

As shown in Table 2, white women and smokers started with the highest weight retention values soon after childbirth, while brown women presented the lowest retention values at the end of the study.

Figures 3 and 4 present the evolution in postpartum weight retention for selected variables. Married women started at the highest retention values soon after childbirth, followed by those over 30 years of age. At the end of the study, single women and those under 20 years of age were the ones with the lowest retention values (Figure 3). In relation to schooling, there was a total absence of reduction among women with four years of schooling or less, while there was a clear tendency towards reduction among women with five or more years of schooling. An analogous behavior was observed for the variable parity, where only primiparous women showed an important reduction in weight retention. The most contrasting pattern for reduction in weight retention is observed when the women are categorized according to BF percentage. No reduction in weight retention was observed in obese women, while for women with < 30% BF the reduction was intense (Figure 4).

The greatest absolute reductions in weight retention were observed in women with less than 30% BF, young women (< 20 years of age), primiparae, and single women. These reductions varied from 2.5 to 2.8kg. The results were compatible, considering the relative reduction in weight retention indicator. Note also the absence of relative reduction in weight retention in women with ≥ 30% BF and a low relative reduction in black women (Table 3).

Discussion

Although relatively worrisome, the loss-to-follow-up rate in this study is compatible with that of other similar studies, like Ohlin & Rossner (1990) and Janney et al. (1997), with 38 and 35%, respectively. The current analysis showed a final follow-up rate of 40% for women 18 and 19 years old, as compared to 81% for women from 30 to 45 years of age. Although this difference is statistically significant, complementary analyses comparing mean postpartum weight retention and median predominant breastfeeding at 15 days among younger and older women

Table 1

Distribution of frequency of variables between censures and complete follow-up and final follow-up rate for Brazilian women from 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Variables	Initial no. of observations	Censures (n)	Complete follow-up (n)	Final follow-up rate (%)	p
Age category (years)					
18-19	60	36	24	40.0	
20-24	136	42	94	69.1	
25-29	114	38	76	66.7	
30-45	95	18	77	81.0	0.0000
Marital status					
Single	74	18	56	75.7	
Living with partner	230	76	154	66.9	
Married	101	40	61	60.4	0.1051
Worked in last 12 months					
Yes	251	79	172	68.5	
No	120	42	78	65.0	
Never worked	34	13	21	64.8	0.6375
Total income in quartiles (reais)					
Q1 (0-279)	86	34	52	60.5	
Q2 (280-499)	109	36	73	67.0	
Q3 (500-869)	96	25	71	73.9	
Q4 (870-5,500)	114	39	75	65.8	0.2801
Type of breastfeeding					
Exclusive/predominant	355	123	232	65.3	
Partial/artificial	50	11	39	78.0	0.0751
Pre-pregnancy weight (kg)					
< 56	194	63	131	67.5	
≥ 56	211	71	140	66.3	0.8017
Body fat (%)					
< 30	195	59	136	69.7	
≥ 30	210	75	135	64.3	0.2434
Weight retention (kg)					
< 7.5	295	96	199	67.4	
≥ 7.5	110	38	72	65.4	0.7031

did not show additional differences, thus minimizing the presence of bias in the data presented here.

The magnitude of postpartum weight retention was 3.1kg at nine months in this sample of women and can be considered relatively high as compared to the results from Ohlin & Rossner (1990) and Janney et al. (1997). The latter two studies showed a mean retention of 1.5 and 2.5kg at 12 and 9 months postpartum, respectively.

When the analyses consider the gross reduction rates in weight retention in the three study intervals, we obtain 0.4kg/month, 0.2kg/month, and 0.1kg/months for the periods 0.5-2, 2-6, and 6-9 months, respectively. The overall rate was 0.177kg/month, compatible with that observed in women in developing countries in general, according to data compiled by Butte & Hopkinson (1998). According to these authors, the mean reduction in weight retention was 0.8kg/month for women from affluent countries and only 0.1kg/month for women from developing countries. These comparisons should take into consideration the fact that such studies were conducted in the 1980s and early 1990s, besides reporting only the first six months postpartum. Despite this

proviso, it is interesting to note that the greatest rate of reduction, which occurs from 0.5 to 2 months postpartum (0.4kg/month), is still short of the reduction levels reported in affluent populations; still, it is on a different level from the mean overall reduction reported for developing countries (Butte & Hopkinson, 1998).

Note that the results presented in this article can provide support for more complex analyses. For example, there is a clear need to explore the role of marital status in weight retention, to the extent that it may represent the effect of social support, already identified as a determinant factor in weight retention in the study by Janney et al. (1997). Another variable that appears to play a potentially important role is the baseline percentage of body fat, principally because it is known that weight retention at the end of the postpartum period represents mainly body fat. The importance of schooling was also observed as a lower tendency towards weight retention, as was the effect of lower parity. More schooling has been observed systematically as having a protective effect against obesity (Monteiro et al., 2001), and high parity has been systematically associated with obesity (Coitinho et al., 2001).

Few studies are available on weight retention patterns in Brazilian childbearing-age women (Fornes & Dorea, 1995; Gigante et al., 2001; Kac, 2002). The results presented in the current article, although limited to just a few variables, are interesting from the perspective of identifying a pattern that would allow to implement weight monitoring and control policies during prenatal and postpartum care Such interventions should focus predominantly on the groups most exposed to the risks of weight retention and consequently those of obesity. According to the set of data presented here, these groups include women with excess baseline body fat, black women, those over thirty years of age, and those with limited schooling.

In short, such interventions should be based on improvements in the quality of prenatal care provided by public health care services, especially in relation to nutritional issues. These prenatal measures should emphasize the control of gestational weight gain, systematically monitoring weight throughout pregnancy, discussion of a series of specific nutritional guidelines, encouragement for exclusive or predominant breastfeeding (Kac, 2002; Lederman et al., 2002), and light physical exercise (Dewey, 1998; Lovelady et al., 2000). These measures should be implemented immediately in order to prevent persistently high obesity rates associated with the reproductive cycle.

Figure 1

Mean postpartum weight retention (a) and median predominant breastfeeding pattern (b) at 15 days postpartum comparing censures and complete follow-up, by age category, for Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Figure 1a

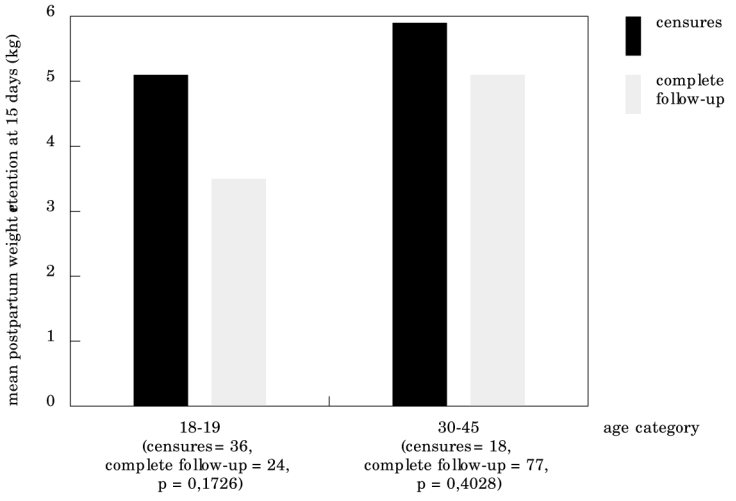

Figure 1b

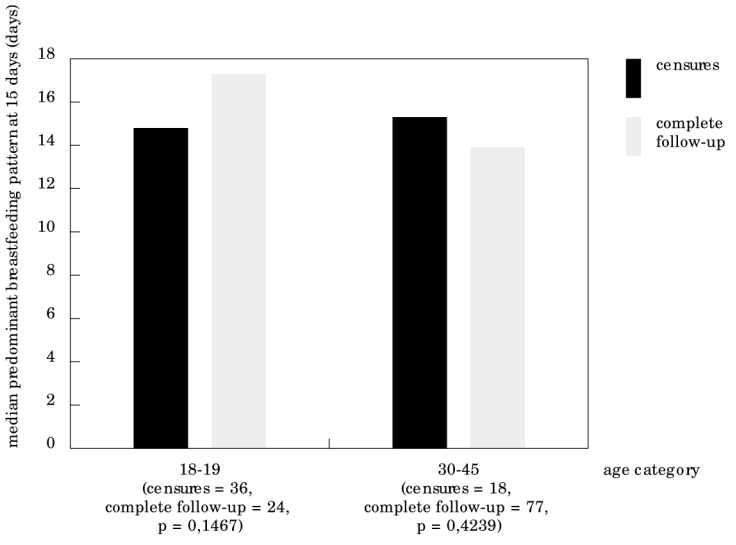

Figure 2

Evolution in means and 95% CI for postpartum weight retention in Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

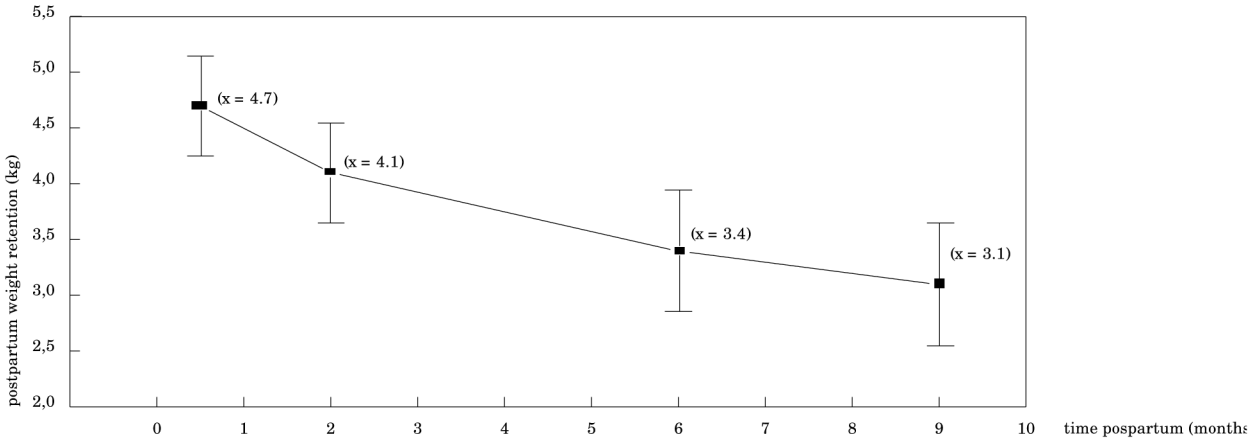

Table 2

Evolution of postpartum weight retention according to selected variables among Brazilian women from 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Variables	Time elapsed postpartum											
	0.5 months			2 months			6 months			9 months		
	Postpartum weight retention (kg)											
	n	x	95% CI	n	x	95% CI	n	x	95% CI	n	x	95% CI
Skin color												
White	154	5.3	4.6-6.0	137	4.7	4.0-5.4	115	3.9	3.0-4.7	105	3.5	2.5-4.4
Brown	179	4.3	3.7-5.0	161	3.6	2.9-4.3	133	2.7	1.9-3.5	121	2.3	1.4-3.1
Black	72	4.5	3.5-5.6	61	4.1	2.9-5.3	50	4.3	2.8-5.7	45	4.2	2.7-5.8
Place of birth												
Rio de Janeiro	263	4.8	4.2-5.4	229	4.1	3.5-4.7	194	3.5	2.9-4.2	176	3.1	2.4-3.9
Other State	142	4.6	3.9-5.3	130	4.0	3.3-4.7	104	3.2	2.3-4.1	95	2.9	1.9-3.9
Residential stratum												
Urban	330	4.8	4.3-5.3	289	4.0	3.5-4.5	243	3.2	2.6-3.8	221	2.9	2.3-3.6
Rural	75	4.5	3.5-5.4	70	4.4	3.5-5.3	55	4.2	2.9-5.4	50	3.6	2.3-5.0
Smoking												
Former smoker	62	4.3	3.1-5.5	56	3.6	2.4-4.9	47	3.7	2.3-5.1	40	3.0	1.4-4.6
Never smoked	278	4.7	4.2-5.2	247	4.1	3.6-4.6	206	3.2	2.6-3.9	189	2.9	2.2-3.6
Current smoker	65	5.3	4.1-6.5	56	4.5	3.3-5.8	45	4.0	2.5-5.4	42	3.9	2.3-5.5
Height (cm)												
< 159	212	4.5	3.9-5.1	188	4.0	3.5-4.6	155	3.6	2.8-4.3	140	3.2	2.5-4.0
≥ 159	193	5.0	4.3-5.7	171	4.1	3.4-4.8	143	3.3	2.4-4.1	131	2.8	1.9-3.7

Figure 3

Evolution in means and 95% CI for postpartum weight retention according to (a) marital status and (b) age category for Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Figure 3a

Marital status

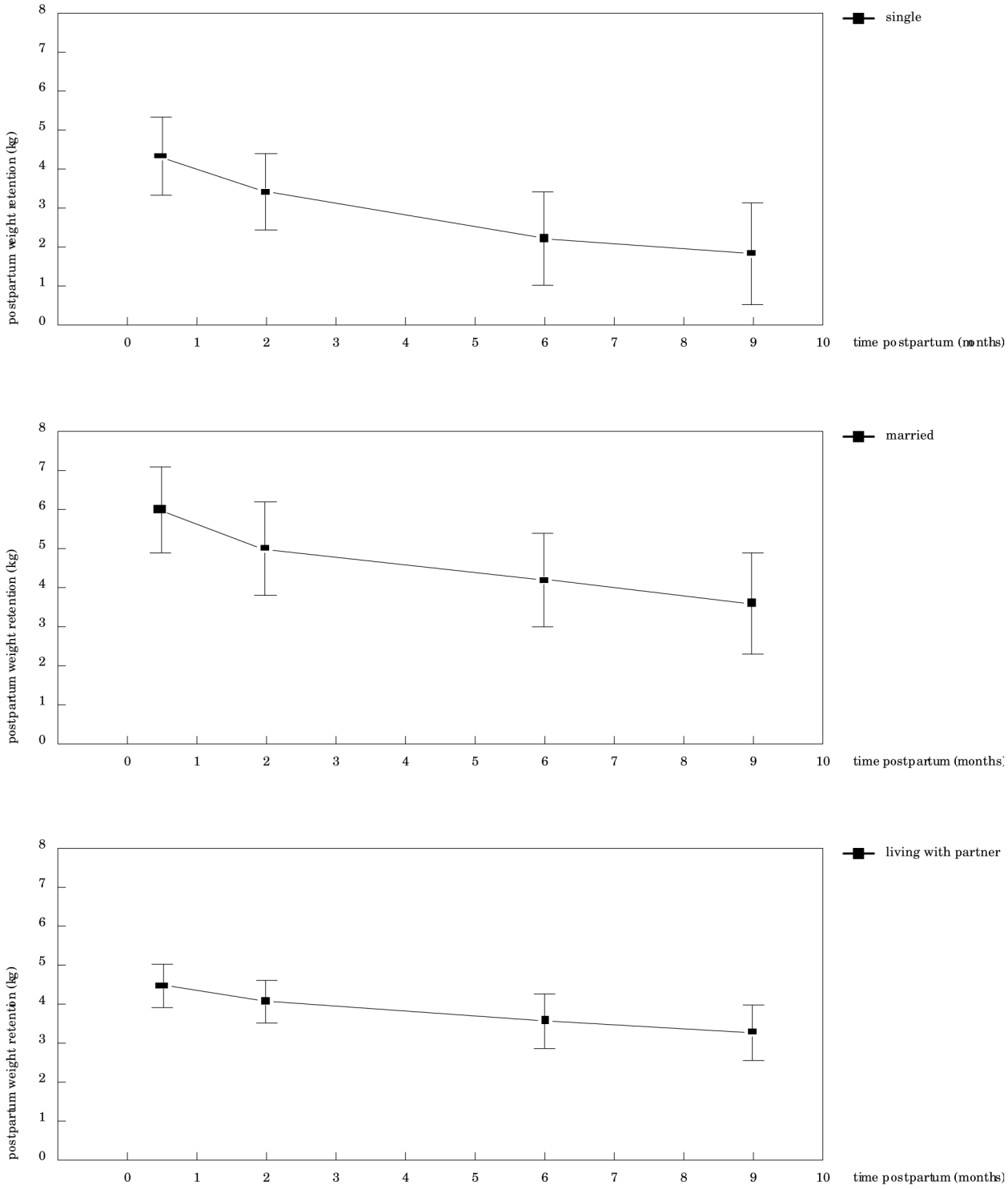

Figure 3

Evolution in means and 95% CI for postpartum weight retention according to (a) marital status and (b) age category for Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Figure 3b

Age category

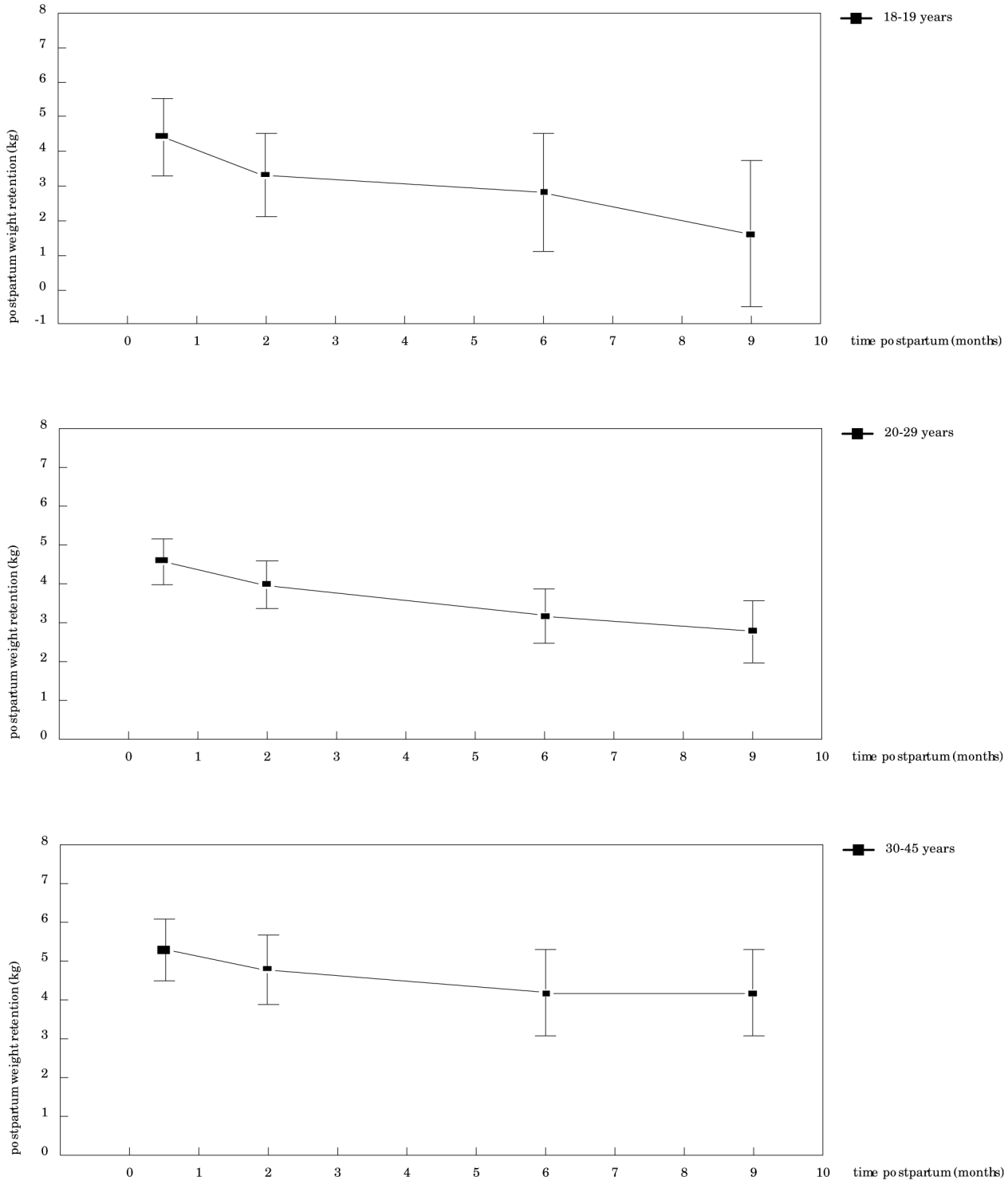

Figure 4

Evolution in means and 95% CI for postpartum weight retention according to (a) schooling, (b) parity, and (c) body fat for Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Figure 4a

Schooling

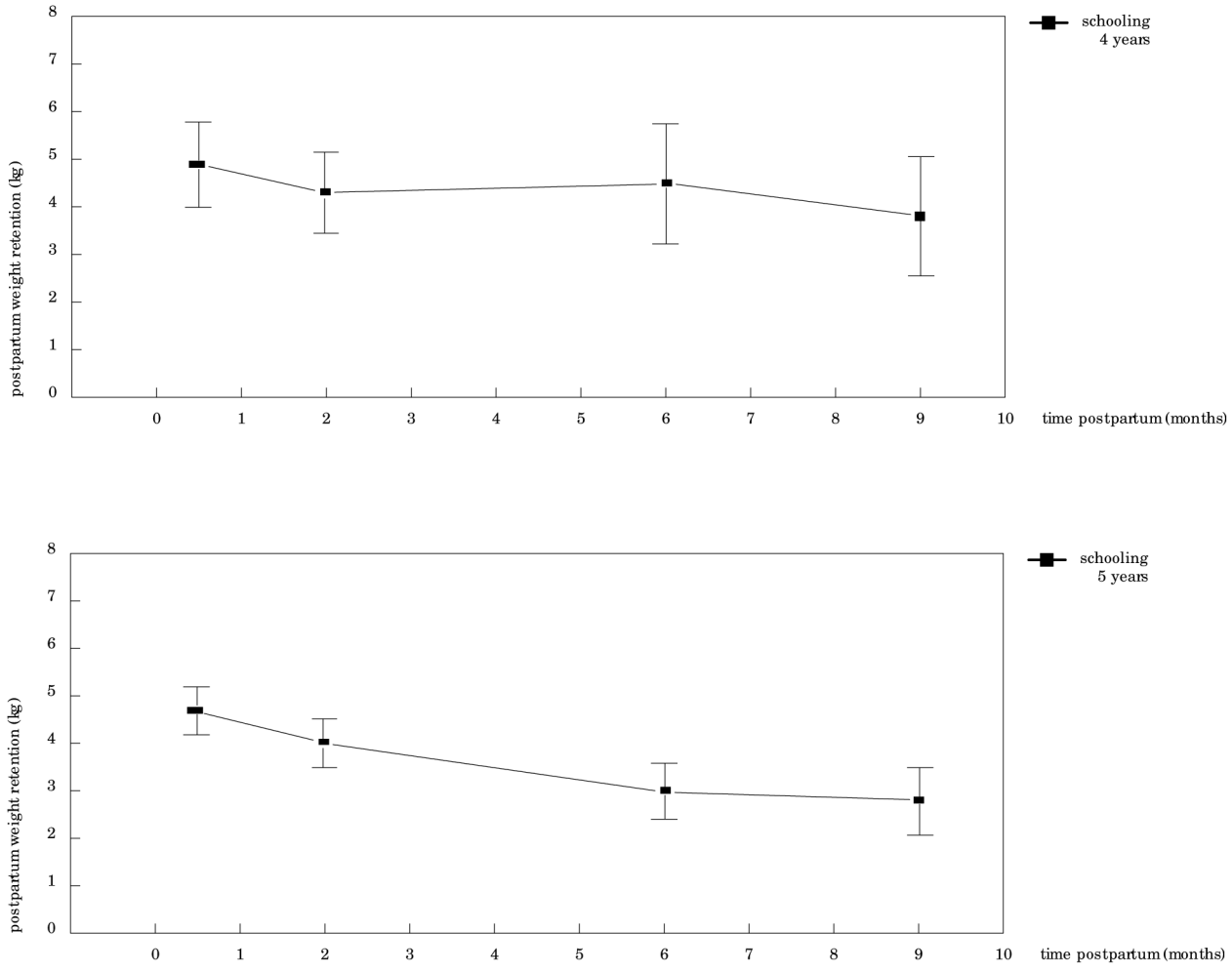

Figure 4

Evolution in means and 95% CI for postpartum weight retention according to (a) schooling, (b) parity, and (c) body fat for Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Figure 4b

Parity

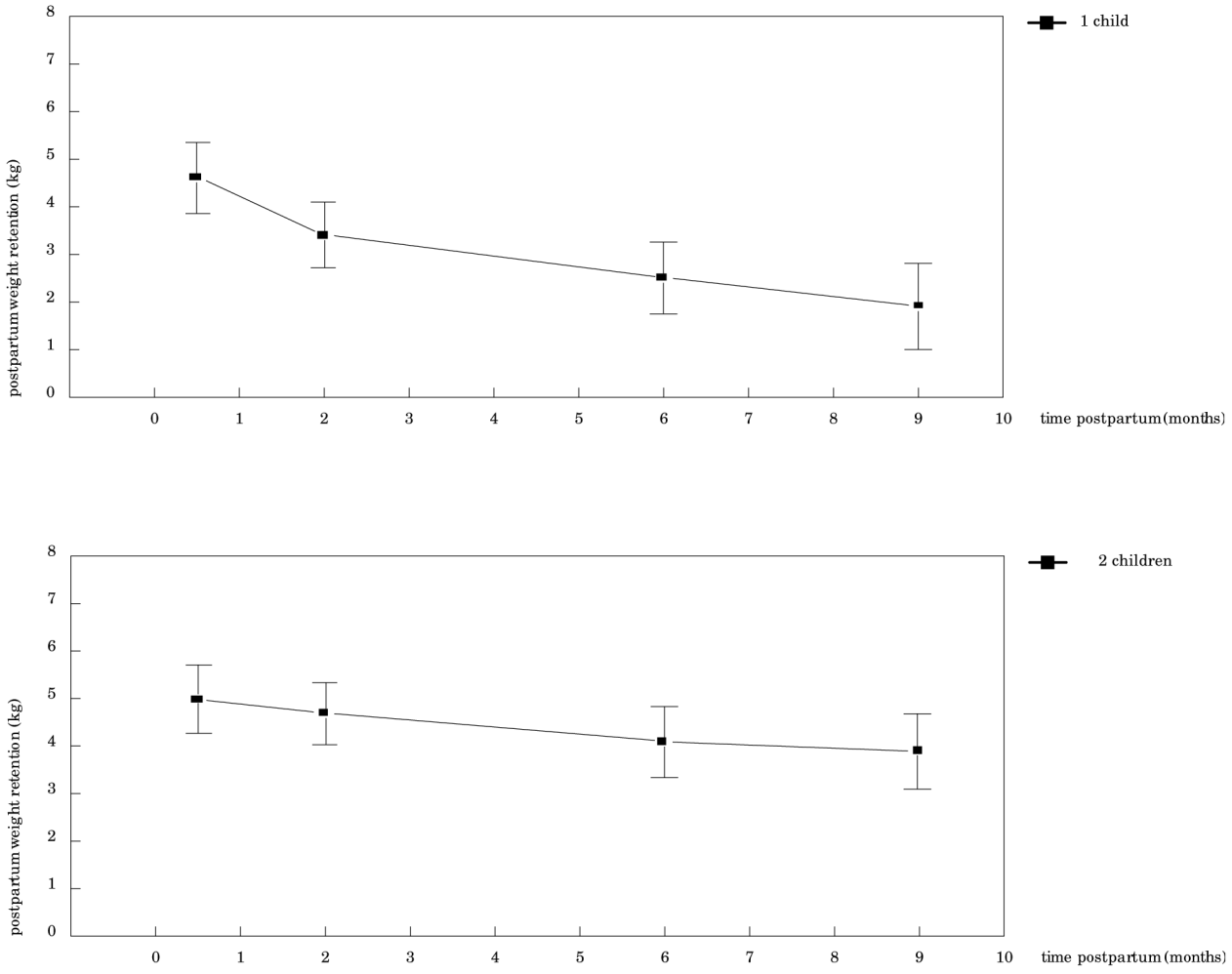

Figure 4

Evolution in means and 95% CI for postpartum weight retention according to (a) schooling, (b) parity, and (c) body fat for Brazilian women 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Figure 4c

Body fat

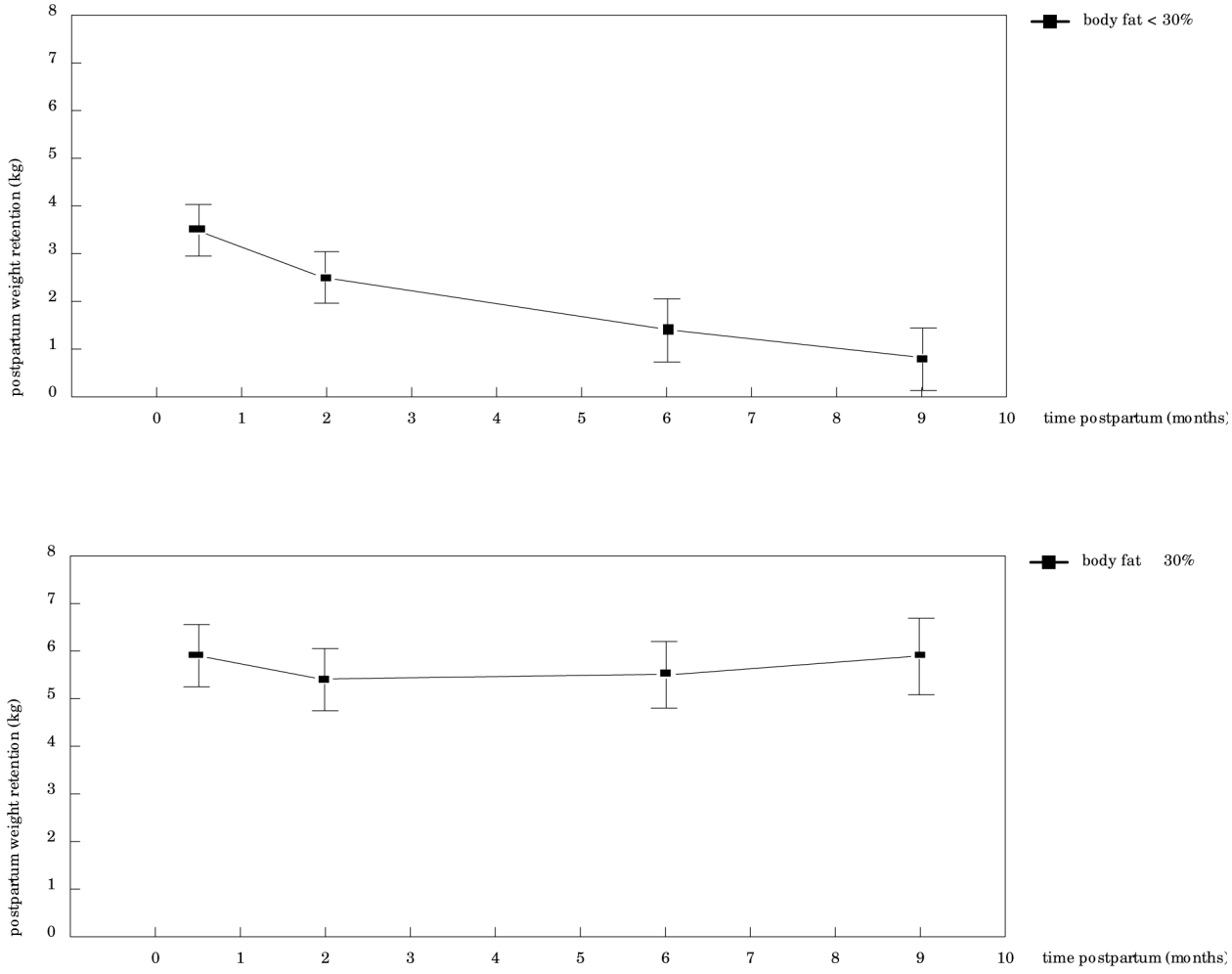

Table 3

Absolute and relative (%) reduction in postpartum weight retention among Brazilian women from 18 to 45 years of age. Rio de Janeiro, Brazil, 1999-2001.

Variables	Absolute reduction in weight retention (kg)	Relative reduction in weight retention (95% CI)
Marital status		
Married	2.5	41.7 (35.2-51.0)
Living with partner	1.2	26.7 (24.0-30.0)
Single	2.5	58.1 (49.0-71.4)
Age category (years)		
18-19	2.8	63.6 (50.9-84.8)
20-29	1.9	41.3 (36.5-47.5)
30-45	1.3	24.1 (21.0-28.3)
Skin color		
White	1.9	35.8 (31.7-41.3)
Brown	2.1	47.7 (42.0-55.3)
Black	0.3	6.7 (5.4-8.8)
Smoking		
Former smoker	1.3	31.2 (23.6-41.9)
Never smoked	1.9	40.4 (36.5-45.2)
Current smoker	1.4	26.4 (21.5-34.1)
Place of birth		
Rio de Janeiro	1.7	35.4 (32.1-40.5)
Other State	1.8	39.1 (34.0-46.1)
Residential stratum		
Urban	1.9	39.6 (35.8-44.2)
Rural	0.9	20.0 (16.7-25.7)
Parity		
1 child	2.7	60.0 (50.9-73.0)
≥ 2 children	1.1	22.0 (19.3-25.6)
Schooling (years)		
≤ 4	1.1	22.9 (20.0-26.8)
≥ 5	1.9	40.4 (37.2-46.3)
Height (cm)		
< 159	1.3	28.9 (25.5-33.3)
≥ 159	2.2	40.4 (38.6-51.2)
Body fat (%)		
< 30	2.8	80.0 (70.0-96.5)
≥ 30	0.0	0.0 (0.0-0.0)

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