



Assessing the relationship between smoking and abdominal obesity in a National Survey of Adolescents in Brazil



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ABSTRACT

Abdominal obesity is even a stronger risk factor than overall obesity for noncommunicable chronic diseases. We examined the association between smoking and abdominal obesity among adolescents. Analyses were based on 38,813 subjects aged 15–17 years from the Study of Cardiovascular Risks in Adolescents (ERICA), a Brazilian school-based national survey. Abdominal obesity was defined considering waist circumference (WC) percentiles. Statistical analyses, stratified by sex, considered the sample complex design. Poisson regression with robust variance was used to estimate smoker-to-nonsmoker abdominal obesity prevalence ratio (PR), adjusting by sociodemographic and lifestyle variables. Higher prevalence of abdominal obesity was observed among adolescents who consumed > 1 cigarettes/day, comparing to nonsmokers: considering WC > 80th percentile, adjusted-PR for boys was 1.27 [95%CI:1.05,1.52] and, for girls, 1.09 [95%CI:1.00,1.19]; using the 90th percentile, adjusted-PR were 2.24 [95%CI:1.70,2.94] and 1.27 [95%CI:1.12,1.46], respectively for male and female adolescents. Our findings suggest a positive association between cigarette consumption and the prevalence of abdominal obesity, for both boys and girls. Although other studies had found this association in adults, our study contributes to this discussion by assessing it in adolescents using a nationwide representative sample of medium and large municipalities.

1. Introduction

Smoking and obesity are associated with incidence and mortality of several chronic diseases (World Health Organization, 2004; Office of the Surgeon General (US), and Office of Disease Prevention and Health Promotion (US), Centers for Disease Control and Prevention (US), National Institutes of Health (US), 2001). Abdominal obesity is even a stronger risk factor than overall obesity for noncommunicable chronic diseases (Fox et al., 2009) and is a better predictor of diabetes (Freemantle et al., 2008) and metabolic syndrome (Phillips and Prins, 2008).

A marked reduction in adult smoking prevalence was observed in Brazil between 1989 and 2013 (34.6% and 14.7%, respectively) (Szklo et al., 2016); however, prevalence rates of overweight and obesity are still very high (Malta et al., 2014). Prevalence of abdominal obesity for women and men in 2013 was 52.1% and 21.8%, respectively (Vieira, n.d.). Recent population-based surveys estimated cigarette use and elevated waist circumference to be present in around 5–7% and 13%, respectively, of Brazilian adolescents (Figueiredo et al., 2016; Kuschnir et al., 2016; BRASIL, 2016).

Previous studies in the adult population have shown a positive association between cigarette consumption and measures of central adiposity (Akbarbartoortoori et al., 2005; Clair et al., 2011; Morris et al., 2015; Kim et al., 2012). Indeed, higher cortisol levels in smokers, which are related to fat depots, may explain its association with abdominal fat (Direk et al., 2011). Studies in youth/adolescents evaluating the association between tobacco consumption and increased abdominal obesity are scarce and inconclusive (Akbarbartoortoori et al., 2005; de Moraes and Falcão, 2013), perhaps because metabolic and hormonal changes in adolescence influence abdominal fat accumulation (Cediel et al., 2016; Medina-Bravo et al., 2011). Additional problems in past studies included difficulties in accurately measuring adolescent nicotine exposure and recruiting a large number of young smokers. It is worth mentioning that, although tobacco consumption in adults generally reduces body mass index (BMI) (Tian et al., 2015), the findings of studies that attempted to investigate the relationship between cigarette smoking and BMI among adolescents have also been inconclusive (Cooper et al., 2003; Pasch et al., 2012; Saarni et al., 2009), probably because of the same above-mentioned reasons.

The present study examined the association between smoking and

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Table 1
Weighted estimates of selected variables in adolescents aged 15 to 17 Years, according to smoking status and sex, ERICA, Brazil, 2014.

	BOYS				GIRLS												
	TOTAL	Did not smoke	< 1 cigarette/day	≥ 1 cigarettes/day	TOTAL	Did not smoke	< 1 cigarette/day	≥ 1 cigarettes/day									
	n = 17,142	n = 15,783	n = 902	n = 236	n = 21,671	n = 20,280	n = 972	n = 191									
	(N = 2,398,123) ^a	(N = 2,170,009) ^a	(N = 143,391) ^a	(N = 40,120) ^a	(N = 2,401,376) ^a	(N = 2,219,577) ^a	(N = 121,152) ^a	(N = 28,970) ^a									
	%	95%CI	%	95%CI	%	95%CI	%	95%CI									
Abdominal obesity (≥ 80th weighted percentile)	19.9	18.5, 21.3	19.8	18.4, 21.1	20.8	13.7, 27.8	26.5	13.8, 39.3	20.2	18.3, 22.2	20.0	17.8, 22.2	23.4	17.0, 29.8	24.3	14.4, 34.1	
Abdominal obesity (≥ 90th weighted percentile)	10.0	9.0, 11.0	9.8	8.9, 10.8	10.9	5.0, 16.8	22.7	9.9, 35.6	10.0	8.8, 11.2	9.8	8.3, 11.2	12.5	6.7, 18.2	15.3	6.9, 23.7	
Nutritional Status ¹																	
Low/normal weight	77.0	75.5, 78.6	77.3	75.6, 79.0	77.5	70.5, 84.4	64.9	52.2, 77.5	77.7	75.8, 79.5	78.0	75.8, 80.1	75.2	68.8, 81.6	68.0	56.5, 79.5	
Overweight	15.7	14.1, 17.2	15.6	13.8, 17.3	14.2	8.4, 20.0	17.7	9.4, 25.9	15.7	14.3, 17.0	15.5	13.9, 17.0	17.0	11.1, 22.9	22.4	11.4, 33.4	
Obesity	7.3	6.5, 8.1	7.2	6.4, 7.9	8.4	3.7, 13.0	17.5	8.0, 26.9	6.6	5.7, 7.6	6.5	5.5, 7.6	7.8	4.1, 11.5	9.6	4.0, 15.2	
Alcoholic drinks (past 30 days)																	
Did not drink	68.6	66.4, 70.9	73.1	71.1, 75.2	21.4	15.8, 27.0	19.1	8.4, 29.9	67.3	65.2, 69.4	70.8	68.9, 72.7	21.8	14.9, 28.6	22.4	8.5, 36.3	
Consumed < 1 drink/day	27.1	25.0, 29.2	23.7	21.9, 25.6	65.2	58.1, 72.2	52.0	40.8, 63.1	29.3	27.3, 31.3	26.9	25.1, 28.7	63.8	57.2, 70.5	46.4	31.5, 61.3	
1 or more drinks/day	4.3	3.6, 4.9	3.1	2.6, 3.7	13.4	9.5, 17.3	28.9	18.6, 39.2	3.4	2.9, 3.9	2.3	1.9, 2.7	14.4	10.3, 18.5	31.2	18.2, 44.1	
Healthy eating habits ²	50.0	47.5, 52.5	51.1	48.4, 53.8	38.7	31.0, 46.4	38.4	26.3, 50.4	40.2	37.5, 42.9	41.2	38.3, 44.1	30.0	23.6, 36.4	28.9	16.6, 41.1	
Self reported morbidity ³	12.0	11.1, 12.9	11.8	10.9, 12.6	13.7	8.7, 18.7	10.9	5.4, 16.5	13.8	12.5, 15.0	13.3	12.0, 14.6	19.8	12.9, 26.7	19.0	10.3, 27.6	
Lower socioeconomic status ⁴	16.3	14.5, 18.1	16.7	14.8, 18.5	13.5	9.1, 17.9	7.7	3.6, 11.9	17.5	15.9, 19.1	17.5	15.8, 19.2	18.0	13.8, 22.3	11.5	2.5, 20.6	

^a Estimated population.

¹ Classified according to Body Mass Index (BMI), based on reference curves from WHO, using the BMI-for-age chart for each sex.

² Based on reported breakfast consumption (always/often).

³ Reported at least one of the following chronic diseases: Diabetes, Hypertension and altered levels of cholesterol.

⁴ Assessed by the information on the number of people sharing the same bedroom with the adolescent (lower = three or more persons per bedroom).

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