Original Article

Reading the Nutritional Information on Food Labels Among Teachers with and without Hypertension in Brazil

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Abstract

Background: To examine the associations among nutritional label use, medically diagnosed hypertension, and sociodemographic factors among teachers. **Methods:** A cross-sectional study of elementary and secondary school teachers in Londrina, Paraná, Brazil, was conducted. Data regarding sociodemographic variables, hypertension diagnosis, and the reading of nutritional information on food/beverage labels were collected in 2012–2013. Associations were analyzed using Chi-square test or Fisher's exact test, and multivariate binary logistic regression models were used to adjust for possible confounders; odds ratios (ORs), 95% confidence intervals (CIs), and adjusted *P* values were calculated. **Results:** Of the 978 teachers interviewed, 15% were diagnosed with hypertension, and 62.5% read nutritional information in the 12 months prior to the survey (41% frequently or always). No differences were found between teachers with and without hypertension with regard to frequent reading (frequently/always) of nutritional labels. The frequent use of nutritional labels was significantly associated with female sex (OR = 1.39; 95% CI = 1.04–1.85) and the highest monthly family income level (OR = 1.82; 95% CI = 1.07–3.11). Teachers with hypertension reported checking for sodium more frequently than those without (adjusted *P* value = 0.040). Medical advice (adjusted *P* value <0.001) and choosing healthier foods (adjusted *P* value = 0.002) were the major reasons for reading labels provided by teachers with and without hypertension, respectively. **Conclusions:** Checking for sodium values on nutritional labels was significantly higher among teachers with hypertension, which most likely results from medical advice, and was the major reported reason for reading these labels.

Keywords: *Food labels, hypertension, nutritional information*

Introduction

Adopting a healthy diet is one of the most significant protective factors regarding cardiovascular health.[1,2] However, the consumption of sodium, sugar, and saturated fats exceeds the maximum recommended limits in major Western societies and plays an important role in the development of hypertension and other chronic diseases.[3] The practice of reading food and drink labels can help individuals make healthier choices regarding what they consume.[4,5] However, variations exist among population subgroups, with lower label-reading rates among children, adolescents, and the elderly.[4] In addition, reading nutritional information labels is associated with higher socioeconomic status and higher education.[6]

Little is known regarding the possible differences among the practice of reading food labels in individuals with and without chronic disease.[7] In the United States, people with diagnosed diabetes or prediabetes are more likely to report the use of food labels compared with those without these diagnoses.[8] On the other hand, a study conducted in Korea did not reveal a difference in the use of food labels by adults with hypertension, diabetes, or hyperlipidemia.[9] These dissimilarities may be because of the differences in the prevalence of risk factors, access to medical diagnosis, participation in annual health examinations, and sociocultural characteristics. Studies of these relationships in Brazil have not been found in our literature review.

Hypertension is one of the most common risk factors for cardiovascular diseases and mortality in Brazil, and this condition affects approximately 23% of adults aged 18 years and older.[10] Studies conducted in other countries have found that school

How to cite this article: Sekiyama FM, Rodrigues R, Mesas AE, González AD, de Andrade SM. Reading the nutritional information on food labels among teachers with and without hypertension in Brazil. Int J Prev Med 2019;10:1.

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Access this article online

Website: www.ijpvmjournal.net/www.ijpvm.ir

DOI: 10.4103/ijpvm.IJPVM_40_18

Quick Response Code:

teachers are at higher risk of developing hypertension and other cardiovascular diseases.[11,12] In Brazil, although studies comparing specific working populations are scarce, teachers exhibit a prevalence of hypertension similar to that of the general population of adults (approximately 20%–23%).[10,13,14] A diagnosis of hypertension, among other factors, may contribute to the adoption of a healthier lifestyle to help control blood pressure levels, including restricting consumption of sodium, calories, and saturated fats and increasing consumption of fruits, vegetables, fibers, potassium, calcium, and magnesium.[15] Given that the practice of frequently consulting food labels is related to healthier food choices,[5] the high prevalence of hypertension among Brazilian teachers,[14] and the scarcity of studies examining the associations between chronic disease and this practice,[7-9] this study sought to examine the associations among nutritional label reading, medically diagnosed hypertension, and sociodemographic factors among elementary and secondary school teachers, a working group that, in Brazil, has a prevalence rate of hypertension similar to that of the general population.

Methods

This is a cross-sectional study conducted among elementary and secondary public school teachers in Londrina, Paraná State, southern Brazil. The cohort was chosen via convenience sampling and was composed of all the teachers who were responsible for classes from the 20 largest schools of the state education network. These teachers represented approximately 70% of all faculty members who work in elementary and secondary education in the state education network of the city.

After a pilot study, data were obtained between August 2012 and June 2013 through face-to-face interviews followed by a self-report questionnaire. The self-report was applied to collect data on more sensitive issues such as family income.

The interviews and the questionnaires were completed in a private room at the school where the teacher worked. A trained team conducted the interviews after receiving two training sessions to standardize their approach and data collection. The Research Ethics Committee of our institution approved the study protocol. All respondents signed an informed consent document before the interview. Teachers who were not available after five attempts to interview them on different days and those who refused to participate were considered losses.

Information regarding sociodemographic variables (i.e., age, sex, race/color, marital status, education, and monthly family income) was obtained through the self-reported questionnaire. Data on the practice of checking food labels and hypertension diagnosis were provided through the interviews. The classification of teachers' hypertension status was based on the following question: "Have you ever been told by a doctor that you have arterial hypertension (elevated blood pressure), or are you under treatment for hypertension?" with "yes" and "no" as possible answers. The reading of nutritional information in the previous 12 months and its frequency were questioned. The response options were never, rarely, sometimes, frequently, and always. Afterward, the responses were dichotomized as frequently/always (frequent use) versus never/rarely/sometimes. The foods and beverages most often checked (e.g., sausages, frozen foods, ready meals) and the items observed on food labels (e.g., calories, fats, sodium, sugar) were recorded. The main reasons for checking food labels were also questioned.

Double-entry data corrections were performed using the program Epi Info (Centers for Disease Control, Atlanta, GA, USA). Data were tabulated using SPSS 19.0 (IBM Corp., Armonk, NY, USA). Bivariate analyses were conducted using Pearson's Chi-square test or Fisher's exact test to assess differences between categorical variables. Teachers who reported reading food labels only for checking the expiration date were considered nonlabel readers. Binary and multivariate logistic regression analyses were performed to detect associations of sociodemographic variables and hypertension status with the practice of reading food labels. Age, sex, race/color, marital status, level of education, and monthly family income were considered possible confounders in the association between hypertension status and the frequency of reading food labels, foods/beverages most often checked, items observed in food labels, and reasons for checking. Confounding variables that were associated with a P value of <0.20 with the outcome were entered in the multivariate models for adjusting the associations. Those variables with a significance level of <0.05 were considered significant in the final models. Odds ratios (ORs), 95% confidence intervals (CIs), and adjusted P values were calculated.

Results

Of the 1,126 teachers who met the inclusion criteria, 978 were interviewed (86.9%); 85 (7.5%) could not be found after five attempts, and 63 (5.6%) refused to participate. The majority of respondents were women (68.5%) and married (59%). Their average age was 41.5 years, ranging from 19 to 68 years. Education levels were high; the majority (72.3%) had a specialist degree, and 14.0% had a master's or doctorate degree.

A total of 147 teachers reported having medically diagnosed hypertension (15.0%). Although the bivariate analyses revealed that a greater proportion of individuals with hypertension were older and divorced/separated/widowed, the multivariate binary logistic regression analysis indicated that only age remained associated with diagnosed hypertension.

Of the teachers interviewed, 62.5% (n = 611) said that they had consulted nutritional labels in the previous 12 months

before buying or consuming food, and 41.0% (n = 401) reported that they had adopted this behavior frequently or always.

Consulting labels over the previous 12 months was mentioned by 91 teachers with hypertension (61.9%) and 520 (62.6%) teachers without hypertension; this difference was not significant (P = 0.877). In addition, no significant differences were observed between teachers with and without hypertension with respect to the frequent use of food labels (38.1% and 41.5%, respectively; P = 0.437). Characteristics associated with frequent food label consulting included sex, level of education, and monthly family income. After a multivariate binary logistic regression analysis that accounted for all the variables with a P value of <0.20, only female sex and having the highest monthly family income (>R$5,000) remained associated with the frequent use of food labels [Table 1]. We also conducted multivariate models to explore the relationship between hypertension and frequent use of food labels after adjusting for possible confounders (age, sex, marital status, race/color, level of education, and monthly income), individually and together, but the P value remained largely unchanged.

Considering only teachers who reported frequently or always reading food labels, sodium, calories, total fat, and trans fats were the components most commonly observed. Only 8.7% checked for fiber, and this behavior was less common among teachers with hypertension. Teachers with hypertension reported more frequently checking for sodium content, whereas teachers without hypertension reported more frequently observing calories. These differences remained significant, even after adjusting for sex, age, and monthly family income [Table 2]. Dairy products were the type of food for which labels were most frequently checked (80%). Labels in ready-to-eat and frozen meals were checked by less than 50% of the teachers. No differences were found with respect to the types of food most checked by teachers with and without hypertension [Table 2].

The major reasons for frequently consulting nutritional labels reported by teachers with and without hypertension were medical advice and choosing healthier foods, respectively. These differences remained significant after adjusting for possible confounding variables [Table 2].

Table 1: Characteristics of the teachers based on the frequency of food label consultation

	Always/frequently (n=401)		Never/rarely/sometimes (n=577)		$P^{\dagger}$	OR	95% CI
	n	%	*n*	%			
Sex					0.023		
Male	110	35.7	198	64.3		Reference	
Female	291	43.4	379	56.6		1.39	1.04-1.85‡
Age (years)					0.311	-	-
≤34	108	36.7	186	63.3			
35-44	130	43.9	166	56.1			
45-54	121	42.6	163	57.4			
≥55	42	40.4	62	59.0			
Color/race*					0.191		
Asian	20	45.5	24	54.5		Reference	
White	304	42.2	417	57.8		0.91	0.49-1.69
Mixed race (Black/White)	54	35.5	98	64.5		0.71	0.35-1.41
Black	14	30.4	32	69.6		0.56	0.23-1.35
Marital status*					0.468	-	-
Single	102	38.3	164	61.7			
Married/living as married	243	42.5	329	57.5			
Separated/divorced/widowed	51	38.8	80	61.1			
Level of education*					0.023		
Higher	51	38.3	82	61.7		Reference	
Specialized	279	39.7	423	60.3		0.91	0.61-1.36
Master's/doctorate	66	48.5	70	51.5		1.35	0.82-2.24
Monthly income*					0.007		
Up to R$2,000	24	31.6	52	68.4		Reference	
R$ 2,001-R$5,000	189	37.8	311	62.2		1.30	0.77-2.21
>R$5,000	183	46.6	210	53.4		1.82	1.07-3.11‡
Hypertension					0.437	-	-
Yes	56	38.5	91	61.9			
No	345	41.5	486	58.5			

OR=odds ratio; CI=confidence interval, Variables entered in the model: Age, color/race, level of education, monthly income (P<0.20), *Missing information; †Pearson's Chi-square test; ‡P<0.05

Table 2: Types of food, items/ingredients most checked on nutritional labels, and major reasons for checking among public education teachers who frequently/always read nutritional labels

Variables	Hypertension						*P**	Adjusted *P*‡
	Total (*n*=401)		Yes (*n*=56)		No (*n*=345)			
	n	%	*n*	%	*n*	%		
Foods/beverages most checked								
Dairy products	321	80.0	46	82.1	275	79.7	0.673	-
Soft drinks/processed beverages	280	69.8	37	66.1	243	70.4	0.509	-
Sausages	260	64.8	41	73.2	219	63.5	0.157	0.382
Ready meals	196	48.9	24	42.9	172	49.9	0.331	-
Frozen meals	191	47.6	21	37.5	170	49.3	0.102	0.278
Items most observed								
Sodium	250	62.3	42	75.0	208	60.3	0.035	0.040
Calories (energy)	205	55.1	15	26.8	190	51.1	<0.001	0.002
Total fat	145	36.2	16	28.6	129	37.4	0.203	-
Trans fats	124	30.9	13	23.2	111	32.2	0.178	0.143
Carbohydrates	94	23.4	9	16.1	85	24.6	0.160	0.251
Saturated fats	94	23.4	11	19.6	83	24.1	0.469	-
Unsaturated fats	61	15.2	6	10.7	55	15.9	0.312	-
Sugar	50	12.5	10	17.9	40	11.6	0.188	0.133
Dietary fiber	35	8.7	1	1.8	34	9.9	0.043†	0.071
Main reasons for checking								
Choosing healthier foods	276	68.8	29	51.8	247	71.6	0.003	0.002
Own weight control	84	20.9	9	16.1	75	21.7	0.334	-
Medical advice because of own health	75	18.7	31	55.4	44	12.8	<0.001	<0.001
Curiosity about food composition	41	10.2	5	8.9	36	10.4	0.730	-

*Pearson's Chi-square test, unless noted otherwise; †Fisher's exact test; ‡Adjusted for sex, age, and monthly family income

Discussion

The results of this study reveal that there were no differences in the frequency of food label consultation between teachers with and without hypertension, but significant differences were found regarding items most frequently checked and the reasons for checking food labels. Teachers with hypertension more frequently checked food labels for sodium information and because of medical advice, whereas those without hypertension checked primarily calories and to choose healthier foods. Women and those with the highest family income more frequently checked food labels.

The absence of differences in the frequency of consulting food labels between those with and without hypertension in this study was similar to the results reported in a representative sample of adults in South Korea.[9] However, frequent sodium consultation was more commonly reported by teachers with hypertension, even after adjusting for sociodemographic variables. This specific result is consistent with an observation in a study conducted in the United States, where adults with hypertension more often checked food labels for sodium or salt compared with adults without hypertension.[16]

Although sodium was the major element observed by teachers, it was clear that foods with the most sodium, including frozen and ready-to-eat meals, were not among the foods most frequently checked. In a population with a high educational level, individuals seeking to consume healthy foods might already have knowledge regarding which foods have higher sodium content and therefore do not need to consult the nutritional information of these foods; alternatively, such individuals might even avoid their consumption. However, a study of New York City adults found that although people with hypertension reported more frequently reading food labels for sodium information, sodium intake (measured via urine samples) did not differ based on hypertension status with regard to the frequency of food label consultation,[17] which indicates that an interest in food label content does not necessarily promote a healthier diet.

Medical advice was the reason for reading nutritional labels reported significantly more often among teachers with hypertension, regardless of sex, age, or monthly family income. To our knowledge, there is no study that has investigated this relationship; however, patients with type 2 diabetes mellitus who receive health professional counseling are significantly more likely to modify their dietary habits to lose weight,[18] thereby reinforcing the importance of access to medical care and the role that these professionals play in the adoption of healthier behaviors.

The percentage of individuals who reported frequently consulting nutritional information in this study (41%) was nearly identical to that observed in the general population

of the United States (41.54%).[8] In Brazil, previous studies[19,20] have investigated the use of nutrition labels among supermarket shoppers. However, these studies have used diverse categorizations of food label reading, which has hindered comparisons of the results. Because less than half of the teachers of this study reported checking food labels frequently despite being highly educated, it is important to promote this behavior. Such promotion might be attained by educational activities supported by nutritionists and other health professionals to raise knowledge of food label content, the impact of each ingredient on health, and the relevance of other elements such as serving size and percentage daily values.[21]

As previous studies have observed, women and participants with higher family incomes were significantly more likely to read labels.[19,20] Perhaps individuals with more purchasing power have more options when choosing products and can base their buying decisions more strongly on nutritional value than on price,[22] provided that they have this knowledge.[19] Women usually take the responsibility for buying foods and preparing meals for their family,[23] which may explain their greater interest in food labels content. Education level has been associated with checking nutritional information in other studies,[19,24] but this association was not observed in this study, which might be explained by the homogeneous educational level of the teachers studied.

Our study observed that individuals primarily read nutritional information associated with negative connotations, such as sodium, calories, and fat. Simultaneously, these readers ignored items that are important for healthy nutrition, such as fiber, minerals, and proteins; these items were also among the least checked by consumers in other studies.[4,19] A high intake of fiber is related to a lower incidence of diseases and health problems such as colorectal cancer,[25] cardiovascular diseases,[26] and diabetes,[27] highlighting the importance of encouraging their consumption.

The limitations of this study include the possible recall bias regarding habits over the past 12 months and the possibility of hypertension underdiagnosis.[28] However, the primary objective of this study was to compare the nutritional label reading habits of individuals who know their high blood pressure status with those without this knowledge or without hypertension. The external validity regarding the prevalence of the frequent use of food labels is limited because our sample included more women and people with higher education levels than the general population. Additionally, the cross-sectional research design does not allow us to ascertain the temporal relationship between the studied variables. The strengths of this study include its several methodological steps to improve internal validity, such as the performance of a pilot study, the training of interviewers, the environment in which the survey was conducted, and double-data entry.

In summary, the practice of checking for sodium values on nutritional labels was significantly higher among teachers with hypertension, which most likely results from medical advice. Increasing the population's access to healthy foods should involve incentives to reduce the price of natural and less-processed products. The education of the public in general, and of teachers in particular, should also help encourage the use of nutritional labels as effective tools in dietary control, particularly if these labels are designed to facilitate reading and understanding.[29]

Financial support and sponsorship

National Council for Scientific and Technological Development - Brasil (CNPq).

Conflicts of interest

There are no conflicts of interest.

Received: 17 Jan 18 **Accepted:** 26 Sep 18
Published: 15 Jan 19

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