Original Article

Nutrition Label Use in Relation to Obesity Among Female College Students at Taibah University

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Abstract

Background:
Nutrition labels are a basic requirement for every prepackaged food product. In the last decades, nutrition labels have been used as a tool to help people choose healthy foods to control body weight. The objective of the study was to estimate the prevalence of nutrition label users and to assess the effect of using nutrition labels on body mass index and body fat percentage among female students at Taibah university.

Methods:
A cross-sectional study was performed with 552 university students aged 18-24 years who were randomly selected from two different colleges at Taibah University in Madinah. A self-administered questionnaire was given, and BMI and body composition were measured.

Results:
The outcomes of this study indicated that over 60% of the participants were not using nutrition labels. The prevalence of not using nutrition labels was significantly higher among participants who were from colleges of arts and humanities, unmarried, and obese. More than half (58.8%) of the participants reported that they looked at the number of calories listed on the nutrition labels first. Students' responses showed that 62% of the participants wanted to take classes on how to read nutrition labels, and because of that, 40.7% participants did not read nutrition labels. After adjusting for demographic characteristics, obesity was significantly associated with nonuse of nutrition labels; the prevalence of obesity was 1.74-times higher in those who did not use nutrition labels than in those who used them (aOR 1.74 and 95% CI: 1.07- 2.81, P<0.000).

Conclusion:
This study showed the need to raise awareness about the importance of using nutrition labels among females. Health policy makers should implement nutritional guidance at all levels to encourage healthy eating habits among the young population. Regardless of BMI status, female college students would benefit from using nutrition labels.

Keywords:
Nutrition label, Health, body mass index (BMI), body composition (BC), body fat percentage (BF%), visceral fat level (VFL).

الملخص

خلفية:
تعتبر البطاقة الغذائية مطلباً أساسياً لكل منتج غذائي معبأ مسبقاً. على مدار العقود الماضية، استخدمت البطاقة الغذائية كأداة لمساعدة الأشخاص لاختيار الأغذية الصحية للحفاظ على وزن الجسم. هدفت هذه الدراسة إلى معرفة مدى انتشار قراءة البطاقة الغذائية الموجودة علي الأغذية المعلبة وعلاقتها بمؤشر كتلة الجسم ونسبة الدهون في الجسم ومستوى الدهون الحشوية بين الطالبات في جامعة طيبة.

طريقة البحث:
هذه دراسة مقطعية، تم اختيار عينة الدراسة من كليتين بجامعة طيبة في المدينة المنورة. حيث بلغ عدد أفراد العينة ٥٥٢ طالبة تراوحت أعمارهن ما بين ١٨-٢٤ سنة. كما تم إعداد استبيان بهدف معرفة مدى انتشار قراءة البطاقة الغذائية وجمع القياسات الجسدية لمؤشر كتلة الجسم وقياس نسبة الدهون ومستوى الدهون الحشوية بالجسم.

النتائج:
أشارت نتائج هذه الدراسة إلى أن أكثر من (٦٠٪) من المشاركات لا يقرأن البطاقات الغذائية. كما أتضح أن النسبة الأعلى لغير القارئات للبطاقات الغذائية كن من كلية الآداب والعلوم الإنسانية وغير المتزوجات والمصابات بالسمنة. كما أفادت الدراسة أن أكثر من نصف المشاركات (٦٢٪) يطلعن على عدد السعرات الحرارية كأول معلومة موجودة في البطاقة الغذائية. وأظهرت ردود الطالبات أن (٦٠,٢ ٪) أردن أخذ دروس عن كيفية قراءة البطاقة الغذائية ولهذا السبب فان (٤٠,٧٪) منهن لا يقرأن البطاقات الغذائية. وعند استخدام الانحدار اللوجستي للتنبؤ بمدى تأثير عدم قراءة البطاقة الغذائية على مؤشر كتلة الجسم، فأتضح ارتفاع معدل انتشار السمنة بين المشاركات الغير قارئات للبطاقات الغذائية عند مقارنتهن بقارئات البطاقات الغذائية.

الخلاصة :
استنتجت الدراسة عددا من التوصيات أبرزها الحاجة إلى رفع مستوى الوعي حول أهمية استخدام البطاقات الغذائية بين الإناث. كما يجب على واضعي السياسات والبرامج الصحية زيادة التوعية بالبطاقات الغذائية على جميع المستويات لتحسين عادات الأكل الصحية بين فئة الشباب. فبغض النظر عن حالة مؤشر كتلة الجسم، هناك فوائد عديدة لطالبات الجامعة من استخدام البطاقات الغذائية.

الكلمات المفتاحية :
البطاقة الغذائية، الصحة، مؤشر كتلة الجسم، مكونات الجسم، نسبة دهون الجسم، ومستوى الدهون الحشوية

Introduction

Obesity is defined as a medical condition in which excess body fat accumulates to the degree that causes negative health effects, leading to an increase in health problems and a reduction in the average life expectancy of the individual. Obesity is a major preventable cause of death globally and is common or increasingly common among adults and children worldwide [1]. In 2016, the World Health Organization (WHO) reported that more than 650 million adults were obese and more than 1.9 billion were overweight [2]. In the Kingdom of Saudi Arabia (KSA), the predictions of earlier secular trends indicate that over 75% of adult women and over 40% of adult men would be obese by 2022 [3].

Research on the relationship between obesity and health problems has indicated that being overweight or obese might increase the risk of other diseases, such as cardiovascular disease (CVD), diabetes mellitus (DM), and cancer [4]. According to the Health Awareness Information Center at the Ministry of Health (MOH), the rapid growth in the rate of CVD accounted for 42% of noncommunicable disease deaths in 2010 due to obesity and other health issues [5]. Moreover, compared to nonobese adults, obese adults have a higher DM rate, possibly due to the dietary habits and greater physical inactivity of Saudis [6–8]. Most populations in the developed world are affected by obesity, and cancer is also often associated with obesity [9,10]. For instance, the prevalence of overweight and obesity was reported to be significantly higher among Saudi breast cancer patients than among healthy controls [11].

There are many factors that may influence the risk of obesity. Diet composition is one of the important factors that should be considered in obesity processes [12]. Nutrition labels or food labels are often displayed as a panel or grid and include information on energy in kilojoules (kJ) and kilocalories (kcal), fat, saturated fat, carbohydrates, sugars, protein, and salt [13,14]. Other nutrition information that must be on the label is the name of the food, the list of ingredients, the quantity of certain ingredients, instructions for use, storage conditions and/or conditions of use, name or business name, address of the food business operator, place of origin or provenance, and food allergens. The main purpose of nutrition labels is to educate customers about the food they purchase to help them make informed decisions. Education about food also enables the safe storage and use of food [15].

One way of reducing the prevalence of overweight and obesity is by encouraging consumers to use nutrition labels. In 2004, the WHO recommended using a nutrition label to help people make healthy choices by knowing the content of food items [16]. In 2010, the European Union (EU) also listed the use of nutrition labels in the "Strategy for Europe on Nutrition" for the same reason [17]. To our knowledge, only one study among 400 consumers in the KSA reported that most of the participants did not use nutrition labels [18]. Therefore, the present study was formulated to assess the knowledge, attitudes, and practices of female college students at Taibah University regarding nutrition label use and to predict the effect of nutrition label use on BMI.

Methods

A cross-sectional study was conducted at Taibah University, KSA, during the spring of 2019. This study has been approved by the committee of research ethics at Taibah University and the number of this ethical approval is TUCDREC/20180420/ JALLOUN. A total of 662 students aged 18-24 years who attended Introduction to Health and Nutrition class (GS 135) in different two colleges, were invited to participate in the study, among them 552 students participated in the present study based on the inclusion criteria. All underweight,

pregnant, and lactating subjects were excluded from the study. A written consent form was used. Participants were informed with a brief description of the study, along with instructions on how to fill out the questionnaire. Demographic data collected included: college name, age, status, smoking habits, and physical activity. The questionnaire was designed to study student attitudes, knowledge, and practices regarding nutrition labels. In the last part of the questionnaire, we provided a picture of a nutrition label and asked the participants if they understood the picture. The questionnaire was piloted for validity, and subsequently, minor modifications were made.

Anthropometrics: After completion of the questionnaire, height was measured to the nearest 0.1 cm using a standard stadiometer, and anthropometric measurements, body fat percentage (BF%) and visceral fat level (VFL) were assessed using a bioelectrical impedance analysis (BIA) device (Omron Healthcare Co. Ltd., Kyoto, Japan; BF 501). Measurements were collected with the subjects in either socks or barefoot, and all heavy items were removed from the participants. Body mass index (BMI) was computed as weight/height (weight in kilograms and height in centimeters) [2]. According to the values given by the Omron Healthcare catalog based on sex and age, subjects were classified as underweight (BMI ≤ 18.0), normal (BMI = 18.5–24.9), overweight (BMI = 25.0–29.9), or obese (BMI ≥ 30.0). BF% was categorized as low (BF% < 21.0%), normal (BF% 21.0–32.9%), high (BF% 33.0–38.9%), and very high (BF% ≥ 39%). VFL was classified as normal (VFL = 1–9), high (VFL = 10–14), and very high (VFL = 15–30).

Statistical Analysis: The Statistical Package for Social Sciences (SPSS Ins., Chicago, IL, USA) version 23 was used to enter and analyze the data on a personal computer. Demographic characteristics of the study population were calculated as frequencies and percentages. The chi-square test was used for categorical variables. Multiple logistic regression was performed to determine the significant differences among the different variables. All reported p-values are based on two-tailed tests. Statistical significance was set at 0.05.

Results

As indicated in Table 1, of the 552 respondents, 68.2% were from the College of Arts and Humanities, and 31.8% were from the College of Science. Most of the participants (52.8%) were aged 18-20 years and had normal body mass indexes (BMIs). Most of the participants were not married and did not smoke. Regarding physical activity, 60.7% of the respondents were physically inactive. In addition, only 63.5% of the total students reported not using nutrition labels.

Table 1: Demographic characteristics of the study population (n = 552) and their correlation with attitudes toward nutrition labels.

Variables	Frequency	Percent
College		
College of Arts and Humanities	377	68.2
College of Science	175	31.8
Age (years)		
18-20	292	52.8
21-22	180	32.6
≥23	80	14.6

Marital Status		
Single	476	86.2
Married	76	13.8
BMI		
Normal	354	64.2
Overweight and obese	198	35.8
Smoking		
Yes	17	3.1
No	535	96.9
Physical Activity		
Yes	217	39.3
No	335	60.7
Do you always read nutrition labels?		
Yes	201	36.5
No	351	63.5

According to Table 2, our results showed that 56.4% of the participants believed products' nutritional labels were not truthful. Regarding the question of "what is the first thing you look at?", over half of the participants (58.8%) were looking for the calorie count on the labels. In contrast, they were less concerned with "serving size", "fats and cholesterol", and "product claims". When we asked the participants if they were interested in enrolling in a class on how to understand nutrition labels, 62.5% of them were interested. Most of the participants were not using nutrition labels because either they did not take a class on how to read the labels (29.7%) or they were not interested in using nutrition labels (40.7%). The rest of the sample population indicated that the reason for not using the nutrition label was either that they did not have time to read it (13.9%) or the information was too complicated (7.4%). Finally, 8.3% of the participants mentioned that the reason for not using nutrition labels was that the information was not important.

Table 2 : The respondents' nutrition labeling choices, N (%).

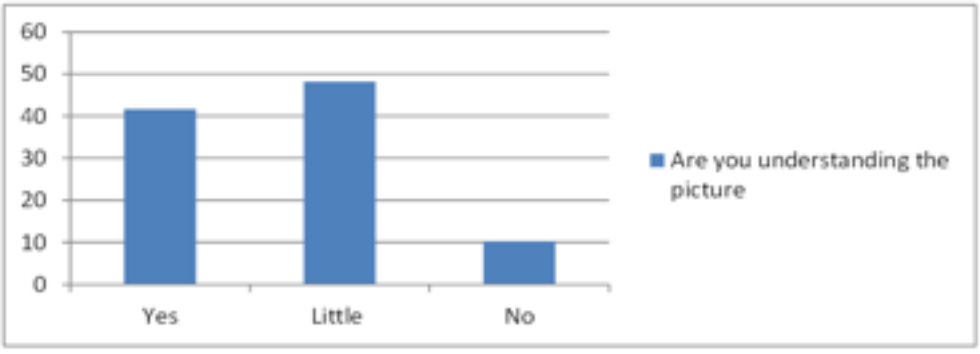
* Students' knowledge and attitude regarding nutrition labels					
Do you think the nutrition label information is truthful?		Yes 88 (43.6%)		114 (56.4%)	
* Information that consumers are looking for on the nutrition labels					
When looking at nutrition labels, what is the first thing you look at?	Serving size 20 (7.5%)	Calories 98 (58.8%)	Ingredients 55 (20.6%)	Fat & cholesterol 20 (7.5%)	Claims 9 (5.6%)

* Information that consumers are looking for on the nutrition labels					
Do you want to take a class on how to understand and use the nutrition facts label?		Yes 311 (62.5%)		No 241 (37.5%)	
Why are you not using nutrition labels?	Not interested 225 (40.7%)	Information is not important 46 (8.3%)	Did not take a class 164 (29.7%)	Information is too complicated 40 (7.4%)	No time 77 (13.9%)

* Only nutrition label users were respondent (202)
** Whole participants were respondent (552)

When we showed a picture of the nutrition label for a product and asked the participants if they understood it, most of them reported either "yes" or "a little", and 10.1% reported "no" (Fig 1).

Figure .1. Respondents on Picture Understanding



* Values are percentages

Over half of the participants had normal BMI, high BF%, and low VFL. Regarding the correlation between body composition (BMI, BF%, and VFL) and attitude towards nutrition labels, BMI and BF% were significantly correlated with the participant's attitude towards nutrition labels, while VFL was not significantly correlated (Table 3).

Table 3 Correlations between body compositions (BMI, BF%, and VFL) and attitude towards the

nutrition labels		
Do you read a nutrition label?		
Body Composition	Yes (N = 227) N (41.1%)	No (N = 325) N (58.9%)
- BMI		
Normal	145 (63.8%)	209 (64.3%)
Overweight	53 (23.3%)	70 (21.5%)
Obese	29 (12.9%)	46 (14.2%)
p-value	0.005	

- BF%		
Low	4 (1.8%)	5 (1.6%)
Normal	67 (29.5%)	97 (29.8%)
High	156 (68.7%)	223 (68.6%)
p-value	0.029	
- VFL		
Normal	226 (99.5%)	323 (99.5%)
High	1 (0.5%)	1(0.5%)
p-value	0.112	

Stepwise multiple regression was performed on BMI categories, with unadjusted and adjusted odds ratios shown in Table 4. Adjustments were made for BF%, VFL, smoking, weekly allowances, college, age, and physical activity. The contributions of BMI were observed after using normal body weight as a reference, and both overweight and obese individuals had higher odds ratios. In overweight participants, the odds ratio was 1.4-times higher in those who were not using nutrition labels than in those who were using nutrition labels (OR 1.42, 95% CI 1.025- 2.77, P<0.003). The prevalence of obesity was significantly associated with nonusers of nutrition labels; the prevalence of obesity was 1.74-times higher among those who were not using nutrition labels (OR 1.74, 95% CI 1.79- 2.81, P<0.000). Moreover, not using nutrition labels increased the risk of having high levels of BF% by 2.5-times compared to those who used nutrition labels (OR 2.52, 95% CI 1.21- 3.98, P<0.031).

Table 4 Odds ratio of not using nutrition labels among BMI categories by multiple logistic regression

Variables	p-value	OR	95% CI for adjusted OR	
			Lower	Upper
BMI	References			
BMI1	0.003	1.429	1.025	2.779
BMI2	0.000	1.743	1.079	2.815
BF%	0.031	2.524	1.211	3.987
VFL	0.479	1.823	0.346	9.598
Smoking	0.552	0.773	0.264	2.036
Weekly allowances	0.216	1.049	0.972	1.131
College	0.432	1.332	0.073	2.343
Age	0.238	1.144	0.890	2.541
Physical activity	0.543	1.376	0.981	2.561

* significant at 5% level of significance. OR: odds ratio; CI: confident interval.
** BMI categories; BMI; Normal Body Weight, BMI (1); Overweight, BMI (2); Obese
Tested by multivariable logistic regression analysis (adjusting for covariate variables such as BF%, VFL, smoking, weekly allowances, college, age, physical activity.

Discussion

The objective of the present study was to examine awareness of food labeling and the association between food label use and BMI and body composition among female college students in the KSA.

The current data demonstrated that 36.5% of the students reported using nutrition labels. These findings were consistent with the results of similar studies in African countries. For instance, the prevalence of self-reported use of nutrition labels was 40.5% in Lesotho [19] and 48% in South Africa [20]. In contrast, these prevalence estimates were lower than those observed in prior studies in other Middle Eastern, Asian, and some Western countries. In the Arab Gulf countries, the prevalence of respondents who read nutrition labels was 92% of 430 participants in Bahrain [21] and 89.5% of 1200 consumers in the United Arab of Emirates (UAE) [22], and 63.2% of 500 participants reported "sometimes to always" using nutrition labels in the UAE [23]. In Malaysia, the corresponding percentage of consumers who read nutrition labels was 85.1% out of 2690 consumers, while in China, consumers who reported using nutrition labels accounted for approximately 66.4% of 500 consumers [24]. Moreover, only 78% of African Americans reported using nutrition labels [25]. Another study conducted among 1,450 adult residents of Washington State found that 80% read the nutrition information on labels [26]. A review of research in 15 European countries reported the following prevalence of nutrition label use among European consumers: France, 63%; Sweden, 50%; and the United Kingdom, 52% [27]. Even though the participants in the present study were all women, all of the above-mentioned studies reported that women tend to read nutrition labels more than men. This finding may reflect that women are more likely to engage in household shopping and/or to be more health conscious than men [23].

It is well documented that education is one of the most relevant factors for using nutrition labels. The majority of these studies reported significant associations between consumer education and nutrition label use [28,29]. For example, a self-reported survey of 658 African Americans found that a high level of education was significantly associated with self-reported nutrition label use, even after adjusting for demographic characteristics and health-related variables in a multivariate model [25]. A random-digit-dial telephone survey selected a group of 1,450 adult residents of Washington State and found that education level was associated with self-reported food label use [26]. Our research indicated that education is not a factor that affects the association between education and nutrition label use, and this could be due to either the lack of knowledge of how to read nutrition labels or not knowing the reason for having nutrition information on the label. However, the SFDA is working hard towards the 2030 deadline by designing nutrition campaigns on many topics, and one of these campaigns focuses on how to read nutrition labels. Unfortunately, these campaigns are implemented only in large cities in the country (Riyadh, Jeddah, and Dammam), but it may now be the time for the SFDA to raise awareness in more cities such as Madinah, Makkah, Al-Ahsa, Taif, Tabuk, and other cities throughout the country.

Data from the present study demonstrated that nearly 30% of the students were overweight and obese. The overweight participants represented 22.2% of the sample, whereas 13.6% were obese. These outcomes were similar to the results of similar studies conducted in the KSA and Arab Gulf countries. In the KSA, the prevalence of overweight and obesity among female students in the eastern region of the country was 54.2% and 17.4%, respectively [30]. In southwestern Saudi Arabia, a study reported that approximately 23.8% of female students were in the overweight and obese cat-

egory [31]. In Riyadh, which is located in the center of the KSA, the prevalence of overweight and obesity among female college students was 31.5% and 18.83%, respectively [32]. According to research conducted at King Faisal University, the prevalence of obesity/overweight among students was 29.7% [33]. In the United Arab Emirates, the corresponding percentages of obese and overweight individuals were 17.6% and 6.9% [34], respectively, while in Bah rain, the prevalence of obesity was 19.4% [35]. In a study conducted at Kuwait University, the prevalence of obesity was reported to be 8.9% [36]. These findings indicated the severity of obesity among the female population.

The analysis showed that the majority of the participants did not use the nutrition labels, which might have affected their body composition. Significant relationships were found between BMI and nutrition label usage. The results indicated that over half of the students had a normal body weight with a high level of BF%. The findings of our study were consistent with those reported in studies conducted in some Western countries [37–39]. BF% represents a risk factor for mortality [40,41] and other health problems [42], such as CVD [43–47], even if the participants had a normal BMI. Moreover, nutrition label use was significantly lower among participants, which might elevate the risk of high levels of BF% [48]. This indicates the dire need to raise awareness about the importance of using nutrition labels to reduce health problems.

We confirmed the reports of many international and large -scale studies that the use of nutritional labels plays a role in reducing obesity among users, notably among women globally [48–53]. However, a study demonstrated that nutritional label use did not have an effect on BMI [54]. This could be attributed to the technique that was used, which was a propensity score matching technique.

Adolescents and young adults accounted for 30% of the 33.5 million Saudis [55]. In recent years, poor self-awareness of nutrition label usage and increased unhealthy food consumption may explain the increase in diet-related diseases in the KSA [18]. The risky behaviors of the young population contribute to the occurrence of most chronic diseases [56]. One way of reducing the burden of these diseases is early interventions such as awareness campaigns and health programs in schools and universities that educate young adults about the importance of using and understanding nutrition information on food labels.

Because of the large size of our sample and the prevalence of young people using nutrition labels, the results of the survey of the present study can be considered representative of the whole female college population. Students who participated in the study, in fact, were mainly young female adults with a normal BMI. These elements let us assume that the sample analyzed includes people who are sufficiently aware of the health-diet relationship, who are interested in keeping their diet balanced and who are more likely to use food labels as a tool to guide their decisions in food and beverage selection.

This study has two limitations. First, the cross-sectional study design did not allow us to causally link the impact of the use of nutrition labels on obesity. Second, the data on nutrition label use was based on the self-report of the respondents and their use of information on nutrition labels, which might have resulted in biased answers in some cases.

Conclusion

The results indicated that most respondents were not using nutrition labels. In addition, more than half of them wanted to take a professional class on how to read nutrition labels. This study showed that there was a statistically significant positive association between BMI and the use of nutrition labels among

female college students. Not using nutrition labels might be a risk factor for being obese. These findings may have important implications in terms of health outcomes and preventive methods. One suggestion is to provide education and awareness programs through the nutrition labeling campaign in the KSA about how to read nutrition labels and be familiar with the terminology and language written on nutrition labels. Further studies among the Saudi population on using nutrition labels should quantify the harmful effect of not using nutrition labels.

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