THE EFFECT OF FOOD LABELS TO THE TOTAL CALORIES OF ORDERED FOOD AT RESTAURANTS

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Abstract

World leaders at the 2012 Conference on Sustainable Development reaffirmed the right of everyone to have access to safe and nutritious food. Food labels help people to understand the information about the nutrient facts in their foods. Many experts have been trying to develop food labels which are not only informative but also effective to improve people's diet. Being able to read and understand food labeling do not necessarily mean being able to choose a healthier food. Thus, knowing the effectiveness of food label on making a healthier food choice for consumers, especially a lower calories food, is important. A narrative review on the effectiveness of food labels at several restaurants in making food choice was conducted through PubMED search and subsequently followed by MeSH terms. A filter of the ages of subject was adolescent and adult and all reviewed papers were in English. The studies selected were experimental studies and should provide the data of calories ordered either in kilocalories (kCal) or kilojoule (kJ). Food label, however, could bring some positive results while nutrition label at restaurants was still recommended. Thus, all restaurants are advised to provide nutrition label which is informative without too much details to consumers prior ordering, instead of only providing the information on websites.

Keywords: menu label, food label, nutrition label, food choice and food calories.

Presenting Author's biography

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BACKGROUND

At the 2012 Conference on Sustainable Development, the world leaders reaffirmed the rights of everyone to have access to safe and nutritious food [1]. It is not everyone has the skills, energy as well as time to make their own food. Thus, some people need to have their foods outside the home. Unfortunately, most food outside the home are associated with big portions[2], high calories, high fat, low fiber, and low micronutrients [3], [4].

The overconsumption behaviors, especially on calorie rich food, might lead to overweight and obesity. Based on a systematical review, frequent dining out showed a

positive relationship with weight gain [5] that might increase the risk of overweight. Overweight is the product of positive energy balance because of relatively low energy expenditure and/or relatively high-energy intake. When energy intake exceeds energy expenditure, the excess is stored in the adipose tissue. Meanwhile, excess body fat has been associated with the increase of mortality and morbidity [6]. Overweight and obesity have been linked to the increased risk of some degenerative diseases. Based on a cohort study of US adults, the risk of death from cardiovascular disease, cancer, or other diseases increased throughout the range of moderate and severe overweight for both genders in all age groups [7]. The increase of body weight was also positively associated with rates of death for all cancers combined and for different types of cancer, including cancer of the esophagus, liver, gallbladder, colon and rectum, pancreas, and kidney in genders [8].

Food labels have been believed to be able in helping people to make a healthy food. Many experts have been trying to develop food labels which are not only informative but also effective to improve people's diet [9]–[12]. In the United States, even though the Nutrition Labeling and Education Act of 1990 states only packed food in stores that should provide nutrition information, subsequently, the Patient and Protection and Affordable Care of Act of 2010 mandates this requirement to some restaurants. The essential aim of the regulation is to provide a direct, accessible, and consistent nutrition information for certain available foods to consumers so they would be able to make informed dietary choices [13].

Being able to read and understand food labeling do not necessarily mean being able to choose a healthier food. Thus, knowing the effectiveness of food label on making a healthier food choice, especially a lower calories food at restaurants, is important.

METHODS

As an attempt to answer the research question, the authors decided to choose food label as the exposure variable and calories ordered as the outcome variable. The food labels on this paper were a variety information comprising of the nutritional value of the food item, serving size, calories in food, grams of fat, % daily intake and nutrient content.

This study is a narrative review. The authors included all studies that investigated the effectiveness of food labels at any type of restaurants in making food choice. The studies also found out the effect of the sort of information on adolescent and/or adult subjects since these age groups are considered as the majority frequently having a meal at restaurants. The authors also excluded studies that the full text could not be accessed or the full text is not in English to avoid misinterpretation and misunderstanding.

The authors started to search through PUBMED using key words that is either exposure or outcome variables separately. A filter of the ages of subject was also used that were adolescent and adult (Fig. 1). Subsequently, the authors tried using both variables as key words and still used the same filters. After getting 57 studies, the authors tried to review each abstract of studies. The authors also tried to access and read the abstract of the studies that might be relevant to answer the research question. The authors also tried using MeSH terms about food labeling and found 169 articles.

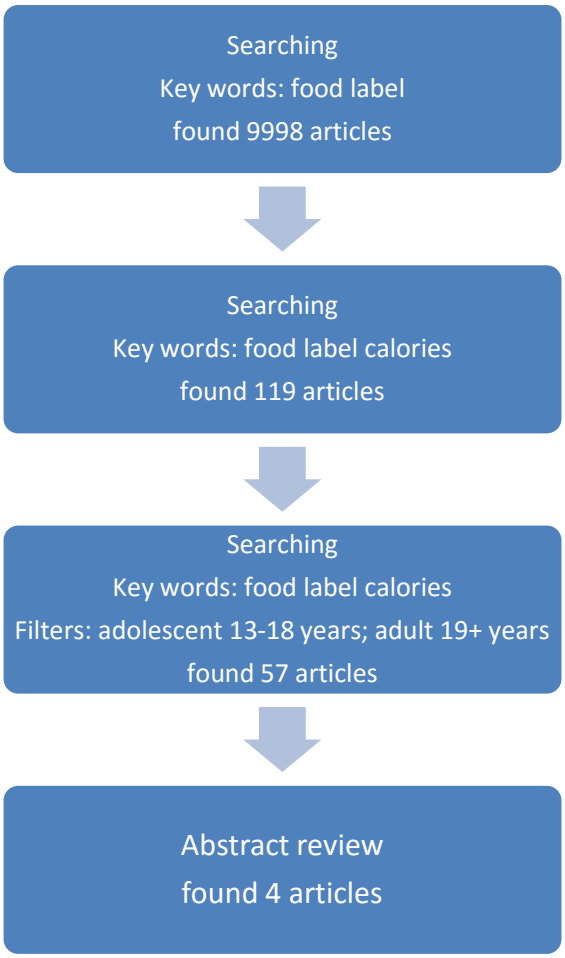

Fig 1. Article selection process

The reviewed studies were experimental studies in which the control groups received no labeled food, thus, the authors might be able to see causal effect of food labeling. The authors chose to use calories of purchased foods instead of consumed foods since it would imply the change of healthier choice behavior after food labeling. Thus, the selected studies should provide the data of calories ordered either in kilo calories (kCal) or kilojoule (kJ).

RESULTS

The authors chose four studies that were experimental studies and were published between 2009 and 2013. They also involved many subjects in participating in the studies (Table 1). Some studies also adjusted some factors that might confound the findings.

Table 1. Characteristics of reviewed studies.

No.	Reference, location	Types of restaurant served food	Total subjects	Settings	Groups Allocations (control (C) or intervention (I))	Energy intake (kCal)	Significance between control (C) and intervention (I) groups
1.	Elbel (2009), New York, the USA[14]	Fast food chains (McDonald's, Burger King, Wendy's and KFC)	1,156	Real world	No label (C)	846 [758, 889] [a]	-
					Calorie label (I)	826 [746, 906] [a]	Not significant
2.	Roberto (2010), Connecticut, the USA[15]	A chain restaurant (Au Bon Pain) and non-chain restaurant	295	Laboratory	No calories label (C)	2189.37±1080.51 [b]	-
					Calorie label (I)	1862.23±937.29 [b]	p = 0.03
					Calorie label plus information (I)	1859.7±1062.58 [b]	p = 0.03
3.	Liu (2012), Northeastern United States[16]	Chain restaurants (Chili's Grill and Bar for food and Applebee's for beverages)	418	Web based	No Calories label (C)	1759.61±194.63 [c]	-
					Calories menu (I)	1675.52±132.79 [c]	p = 0.262
					Rank-ordered calories label (I)	1605.50±146.44 [c]	p = 0.013
					Colored calories label (I)	1454.55±85.76 [c]	p = 0.095
4.	Morley (2013), Victoria, Australia[17]	Fast-food restaurant	1,294	Web based	No label (C)	1105.14	-
					Kilojoule (kJ) label (I)	988.11	< 0.05
					Kilojoule (kJ) +% Daily Intake (%DI) label (I)	1014.14	Not significant
					Kilojoule (kJ) + Traffic light label (I)	985.72	< 0.05
					Kilojoule (kJ) + Traffic light + % Daily	1081.97	Not significant

		Intake (%DI) label (I)

Notes: [a] mean ± 95% CI,
[b] mean ± Standard deviation,
[c] mean ± Standard error

In the studies, different settings were applied. One study was in a real world situation [14], one study was in laboratory setting [15] and two studies were through websites[16], [17]. Different types of clinical trial designs were applied, one community trial study [14], a non-blinded randomized controlled trial study [15] and two blinded randomized controlled trial studies [16], [17].

The studies also used different intervention groups, such as calories or kilojoules label only,[14]–[17] calorie label plus recommended daily caloric intake for average adult [15], [16] rank ordered calorie label (calorie label was shown next to items offered from low to high calories)[16], green or red colored calorie label [16], kJ +% DI label [17], kJ + traffic light[17] and/ or kJ + traffic light + %DI label[17] group.

In these studies, food labels were applied on menu board [14], menu sheet [15] or menu board on computer screen [16], [17]. Thus, there might be some different effect to the calories ordered after labeling in different types of restaurant as consumers had different time to decide and notice the food label.

Some studies adjusted for age [14], gender [14]–[16], race/ethnicity [14], [15], whether the food was consumed in the restaurant or taken "to go" [14], hunger level prior assessment [15], [16], BMI [15] and/or frequency of nutrition label use [16] that might influence calories ordered. Meanwhile, a study [17] did not find any confounders.

Among these four studies, participants in no label groups had higher calories ordered than those in other groups. However, two studies [14], [16] showed that calories ordered in calories label group was not significantly different with those in no label group. Beside, kilojoule (kJ) +% daily intake (%DI) label group and kJ + traffic light + %DI label group were also insignificantly different with the control group[17]. Furthermore, based on the type I error rate that researchers had used at, the total energy ordered in colored calories label group in a study [16] indicated marginal significance with those in control group (p–value=0.095). In a study, traffic light label was more effective than the %DI label [17] indicated that consumers might prefer label which was informative without too much details.

Among these four studies, there might be some misclassifications. First, database of nutritional value was provided through each fast-food's website [14]–[17] and the Food Processor SQL calorie content [15] which might be relatively different to each other. Moreover, different classification of coding in colored calories [16] and traffic light [17] labels in two studies might happen and make some subjects ordering food that had higher or lower calories than they expected.

There might be a bias in calorie measurements as well. The studies with web-based methodology [16], [17] might have recall bias since the authors of those studies could not control whether participants were influenced by other people when choosing the ordered items or not. Price label that was held in two studies [15], [17] which might control the influence on purchase behavior. Nevertheless, since participants did not need to pay the food they ordered [15]–[17] participants might tend to order more than they usually bought,

although in one of studies [15] the participants were already told that they could not take their food home. In addition, food item purchased as well as any modifications were confirmed by recall in a study [14] might possible of recall bias.

Even though this was not set up, there might be selection bias since in two studies that were web-based settings [16], [17] most of convenience subjects were female who minimum finished one college education. In a study [14] the subjects were low-income people. Additionally, a study [17] already excluded participants that were employed (or had close family/friends) and participants who had nutrition background but not for the other three studies. Thus, the results in these studies might not represent the general population.

Moreover, there might be a publication bias here since the author only searched from one database search and used language restriction as only included studies that the full text is in English. Most of studies were also conducted in the USA [14]–[16] since this regulation is implemented extensively as well as mandated in the country.

Even though some studies did not show significant effect in calorie intake from calorie only labeled food,[14], [16] or marginally significant in colored calorie label[16], it does not mean that this action gives no result. Food labeling may encourage chain restaurants to provide lower calorie food choice or improve food offered [14]. This labeling also helped participants to estimate calories consumed more accurately than those in no-calorie labels condition [15], [16]. Although the results were not significant, reduction about 300 kCal than those in no label group [16] might be clinically significant in addressing overweight and obesity. Furthermore, consumers preferred label which was informative without too much details.

Overall, as food label brought some positive results, giving nutrition label at restaurants is still recommended. Thus, all restaurants are advised to provide nutrition information to consumers prior ordering (not just from their websites) that is informative without too much details. The menu label may also be a nutrition education tool for consumers as well. However, there will be other things to be concern about, especially for the restaurants' owners, such as redesigning format of menu and menu board which might mean reducing their total profit, or whether the healthier choices will bring good profits to the owners if more people order them.

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