Article ID: WMC005829 ISSN 2046-1690

Determinants of the influence of calorie labels displayed on menus in restaurants and cafes among Adults in Saudi Arabia, 2023: a cross-sectional study

Peer review status:
No

Corresponding Author:
Dr. Abdullah Alqefari,
Riyadh Second cluster, Ministry of health - Saudi Arabia

Submitting Author:
Dr. Ezzuddin A Okmi,
Saudi Center for Disease prevention and Control, Department of Communicable diseases prevention and control, Saudi Public health Authority - Saudi Arabia

Article ID: WMC005829

Article Type: Research articles

Submitted on:07-Mar-2024, 01:30:28 AM GMT **Published on:** 26-Mar-2024, 03:11:15 AM GMT

Article URL: http://www.webmedcentral.com/article_view/5829

Subject Categories:PHARMACEUTICAL SCIENCES

Keywords:calorie Adults labels menus Determinant

How to cite the article: Alqefari A, Okmi EA. Determinants of the influence of calorie labels displayed on menus in restaurants and cafes among Adults in Saudi Arabia, 2023: a cross-sectional study. WebmedCentral PHARMACEUTICAL SCIENCES 2024;15(3):WMC005829

Source(s) of Funding:

none

Determinants of the influence of calorie labels displayed on menus in restaurants and cafes among Adults in Saudi Arabia, 2023: a cross-sectional study

Author(s): Alqefari A, Okmi EA

Introduction

Introduction

Obesity is one of the leading risk factors for many chronic diseases. It is ranked as forth fourth most common risk factor for NCDs. In the European Region Overweight and obesity affect about 60% of adults according to World Health Organization(1)

The obesity prevalence in Saudi Arabia is 35% which is three times higher than the global prevalence.)2)

The Global Burden of the Diseases report stated that the health effects of high Body mass index (BMI) accounted for about 4 million deaths and 120 million disability-adjusted life-years worldwide in 2015. Moreover, the report found approximately two-thirds of the deaths that were related to high BMI. (3)

Calorie labeling in restaurants and cafes is an important way that provide customers with the informed knowledge that can help them choose healthier food choices. (4)

Some evidence demonstrates calorie restriction causes a 5–10% loss of weight. (5) In 2014, a study conducted in the UK, found that Calorie labeling may decrease weight by about 3.5 kg over 36 weeks. (6)

Therefore, investigating the factors that can determine the influence of using calorie information is very important in reducing the prevalence of obesity which is considered a leading risk factor for chronic diseases in Saudi Arabia. Although there are studies conducted on the effects of using Calorie labeling and lifestyle among the general adult population worldwide (4-18), the number of studies on the influence of calorie information utilization in the KSA is scant. Thus, our study is very important to determine the effects of factors related to sociodemographic and lifestyle , on the influence of Calorie labels displayed on menus in restaurants and cafes among the adult population in KSA, Saudi Arabia, 2023

We want to detect the determinants of the influence of Calorie labeling and how this influence can be predicted based on sociodemographic and lifestyle factors.

Materials and methods

Materials and methods

Study Design

A cross-sectional study was conducted. A Google Form questionnaire comprising 30 questions written in both Arabic and English was distributed electronically in the previous three weeks using social media platforms, including WhatsApp, Twitter, and Instagram. We used snowball sampling to select prospective participants across all the principal regions of the KSA (central, eastern, western, northern, and southern regions). The participants were asked to share the link to the questionnaire with their contacts.

Sample Size Calculation and Participants

The sample size calculated by Raosoft (Raosoft Inc., Seattle, WA, USA, www.raosoft.com) was 385 participants, assuming a 50% response rate, 95% confidence interval (CI), 1.96 Z, and 5% margin of error.

Respondents were eligible to participate if they were 18 years or older, currently residing in the KSA, and were willing to complete the questionnaire. A total of 434 respondents participated in the study, of whom 28 were excluded. Of the excluded participants, 6 were under 18 years and 22 refused to participate or resided outside Saudi Arabia. Therefore, the final sample size of the current study was 406 respondents.

Data Collection

The initial draft of the questionnaire was developed in English and then translated into Arabic based on previous literature(4-6). Then, it was reviewed by two expert researchers with medical backgrounds and

subsequently validated.

The pre-test of the questionnaire was initially performed by asking randomly chosen individuals to complete the online self-administered questionnaire (about 10% of the sample size). After they completed the questionnaire, we conducted face-to-face interviews with each one of them to ensure that they understood the questions in the manner in which they were intended. Based on the pre-test of the questionnaire, we further modified some questions and response options to ensure the clarity of the questionnaire.

The questionnaire included the following sections: socio-demographic characteristics, the health status of the participants, lifestyle experience, and calorie labeling information.

To assess the participants' characteristics, we asked questions about age, gender, nationality, level of education ,monthly outcome, and occupation. To investigate the health status of the participants, we included a question about the diagnosis of chronic diseases. To assess the participants' healthy lifestyle, we asked about the frequency of practicing exercise, knowing the ideal weight, frequency of eating in restaurants, and using diet. The influence of calorie labels was measured using a question with two response options ("yes" or "no,").

We asked one question to measure Knowledge about calories labels and three questions to assess attitudes, we used three response options for some questions: agree, neutral, and disagree, and we used two response options for others: ("yes" or "no,").

Statistical Analysis

Descriptive analysis was used to describe the participants' characteristics. Frequencies and proportions were used for categorical variables. The dependent variable of interest was the influence of calorie information and was measured using a question with dichotomous variables "yes" and "no." (coded as 0 for "no." and 1 for "yes")

A univariate analysis using chi-square testing identified candidate variables for the multivariate logistic regression at the p-value of < 0.05 at 95%CI set as a cut-off point. Multivariate logistic regression analysis was used to determine the association between multiple predictor variables and the influence of the calorie information variable at the p-value of < 0.05 at 95%CI set as a cut-off point.

No backward selection was used, and only variables with a significance level of < .05 remained in the model. All data analyses were performed using SPSS Version 29 (IBM Corp, Armonk, NY).

Results

A univariate analysis using chi-square testing identified candidate variables for the multivariate logistic regression at the p-value of < 0.05 at 95%CI set as a cut-off point. Multivariate logistic regression analysis was used to determine the association between multiple predictor variables and the dichotomized utilization of calorie information available at the p-value of < 0.05 at 95%CI set as a cut-off point.

No backward selection was used, and only variables with a significance level of < .05 remained in the model. All data analyses were performed using SPSS Version 29 (IBM Corp, Armonk, NY).

The null and alternative hypotheses are written symbolically

$\log[p(X) / (1-p(X))] = ?_0 + ?_1x_1 + ?_2x_2 + \ldots$

H0: ?1 = ?2 = … = ?k = 0

The null hypothesis stated that **none of the predictor variables including sociodemographic factors, lifestyle factors, and calories related factors have a statistically significant relationship with the response variable which is the influence of calorie labels displaced on the menus of restaurants and cafes**

HA: ?1 = ?2 = … = ?k ? 0

Alternative hypotheses stated that not every coefficient or factor is simultaneously equal to zero.

A chi-square test for association was conducted between the influence of calorie labels and participants' characteristics. All expected cell frequencies were greater than five. There was a statistically significant association between performing exercise (p< .001), knowing your ideal weight(p =040), and being on diet. (p< .001) There was no significant association with other participants' characteristics(Table 1).

Regarding, the information related to calories, there were statistically significant association with all factors related to knowledge and attitude. (Table 3)

We used multivariate logistic regression to adjust the model. The logistic regression model was statistically

significant, ?2(10) = 134.569, < .001. The model explained 37.0% (Nagelkerke R2) of the variance in the influence of calorie labels and correctly classified 76.8% of cases. Sensitivity was 78.5%, and specificity was 75.5%. The area under the ROC curve was .82 (95% CI, .773 to .857), which is an excellent level of discrimination according to Hosmer et al. (2013). (Figure 4).

Of the seven predictor variables, only four were statistically significant: as shown in Table 4. Those who are on a diet have 1.8 times higher odds of being influenced by calorie labels than those who are not on a diet. Those who perform exercise regularly are about three times more likely to be influenced by calorie labels than those who are not doing exercise. Those who know their daily calorie need are 2.7 times more likely to be influenced by calorie labels than others. Finally, those who notice that there is calorie information displayed on menus are more times to be influenced than those who do not.

Discussion

Discussion

In this study, there was no significant association between any sociodemographic characteristic and the influence of calorie labels or numbers. In contrast, it was reported in another study in Saudi Arabia, that marital status, education, and income are positive predictors for the influence calorie labels.(4-6) However, these dissimilarities could be explained by the differences in the study population or methodology used.

The participants in this present who are on one diet and those who exercise regularly tend to be influenced by the labels of calories than those who are not. These findings is expected because those participants are more aware than others regarding the importance of calories information. Moreover, some studies reported a significant association between diet exercise and calorie utilization. (4-6)

Moreover, our results showed that people know their daily calorie need are more likely to be influenced by calorie labels than others and those who notice that there is calorie information displayed on menus has more odds to be influenced by calories numbers. These results also are in agreements with the previous literatures(4).

Therefore, the findings of our study will be useful to decision-makers and health authorities, who must establish public health programs such as educational campaigns to enhance the knowledge, attitude, and practice in Saudi Arabia. Moreover, these will improve the public's awareness about the importance of calorie labels and information and will increase their effects in reducing negative health impacts such as obesity and chronic diseases.

Conclusion

Our research is one of few studies carried out in the KSA employing the many factors to investigate the determinants of calorie label influences in restaurants among the general adult population.

We included a sample size from all regions of the country to overcome the limitations of previous studies. We found that those who are on one diet and those who exercise regularly tend to be influenced by the labels of calories than those who are not. Moreover, we found that the elements of knowledge and attitude were positive predictors of using calorie labels in restaurants. Therefore, the findings of our study will be useful to decision-makers and stakeholders in health sectors to establish public health programs such as educational campaigns to enhance the knowledge, attitude, and practice of using calorie labels in Saudi Arabia. Moreover, these will improve the public's awareness about the importance of calorie labels and the related information and will increase their effects in reducing negative health impacts such as obesity and chronic diseases.

Recommendation

We recommend that a prospective study with random probability sampling and face-to-face interviewing with larger sample to be conducted to overcome these limitations and to confirm our findings.

References:

1. World Health Organization. (2022). *WHO European*

regional obesity report 2022. World Health Organization. Regional Office for Europe.?
2. Salem, V., AlHusseini, N., Abdul Razack, H. I., Naoum, A., Sims, O. T., & Alqahtani, S. A. (2022). Prevalence, risk factors, and interventions for obesity in Saudi Arabia: a systematic review. *Obesity Reviews*, *23*(7), e13448.?
3. GBD 2015 Obesity Collaborators. (2017). Health effects of overweight and obesity in 195 countries over 25 years. *New England journal of medicine*, *377*(1), 13-27.?
4. Alassaf, H. I., Alaskar, Y. A., Alqulaysh, B. F., Alshehri, M. A., Alnosian, M. Y., Alshamrani, A. A., & Al-Tannir, M. A. (2020). Assessment of knowledge, attitudes, and practices of Saudi adults about calorie labeling in central Saudi Arabia. *Saudi Medical Journal*, *41*(3), 296.?
5. Locher, J. L., Goldsby, T. U., Goss, A. M., Kilgore, M. L., Gower, B., & Ard, J. D. (2016). Calorie restriction in overweight older adults: Do benefits exceed potential risks? *Experimental gerontology*, *86*, 4-13.?
6. Restrepo, B. J. (2017). Calorie labeling in chain restaurants and body weight: evidence from New York. *Health Economics*, *26*(10), 1191-1209.?
7. Nikolaou, C. K., Hankey, C. R., & Lean, M. E. J. (2014). Preventing weight gain with calorie?labelling. *Obesity*, *22*(11), 2277-2283.?
8. Restrepo, B. J. (2017). Calorie labeling in chain restaurants and body weight: evidence from New York. Health Economics, 26(10), 1191-1209.?
9. Driskell, J. A., Schake, M. C., & Detter, H. A. (2008). Using nutrition labeling as a potential tool for changing the eating habits of university dining hall patrons. Journal of the American Dietetic Association, 108(12), 2071-2076.?

1. *10. AlShehri, N. M., & AlMarzooqi, M. A. (2022). Consumers' Knowledge, Attitudes, and Practices Toward Calorie Labeling in Riyadh City, Saudi Arabia: A Cross-Sectional Assessment. Frontiers in public health, 10, 893978. https://doi.org/10.3389/fpubh.2022.893978*

1. YEE, L. S., NAZRI, A. W., ROSLE, N. E. F., YEE, K. P., YI, P. C., YI, L. Y., ... & KRISHNASAMY, S. (2022). Association between Knowledge, Attitude, and Practice of Nutrition and Food Labels among Selected Higher Educational Institution Students in Klang Valley. *Malaysian Journal of Health Sciences/Jurnal Sains Kesihatan Malaysia*, *20*(2).?
2. Pourmoradian, S., Kermanshahi, M., Chaeipeima, M., Farazkhah, T., & Roudsari, A. (2020). Consumers' knowledge, attitude, and practice regarding Front-of-package (FOP) labels at the point of purchase.?

13. Liu, Deying, et al. "Calorie restriction with or without time-restricted eating in weight loss." *New England Journal of Medicine* 386.16 (2022): 1495-1504.?

1. Laferrère, B., & Panda, S. (2022). Calorie and time restriction in weight loss. *The New England Journal of Medicine*, *386*(16), 1572
2. Magkos, F. (2022). Is calorie restriction beneficial for normal-weight individuals? A narrative review of the effects of weight loss in the presence and absence of obesity. Nutrition Reviews, 80(7), 1811-1825.?
3. Lv, C., Jiang, X., Long, Y., Liu, Z., Lin, J., Wu, C., ... & Li, W. (2022). Association between caloric adequacy and short-term clinical outcomes in critically ill patients using a weight-based equation: secondary analysis of a cluster-randomized controlled trial. Frontiers in Nutrition, 9, 902986
4. Lorenzo, P. M., Sajoux, I., Izquierdo, A. G., Gomez-Arbelaez, D., Zulet, M. A., Abete, I., ... & Crujeiras, A. B. (2022). Immunomodulatory effect of a very low-calorie ketogenic diet compared with bariatric surgery and a low-calorie diet in patients with excessive body weight. Clinical Nutrition, 41(7), 1566-1577.?
5. Felisbino-Mendes, M. S., Cousin, E., Malta, D. C., Machado, Í. E., Ribeiro, A. L. P., Duncan, B. B., ... & Velasquez-Melendez, G. (2020). The burden of non-communicable diseases attributable to high BMI in Brazil, 1990–2017: Findings from the Global Burden of Disease Study. *Population Health Metrics*, *18*(1), 1-13.?