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The Effect of Food Labels on Consumers' Choice of Milk and Dairy Products

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Abstract: The information on food labels helps consumers to make conscious and correct choice. The aim of this study is to determine how information on milk and dairy product labels influences consumer preferences. Subjects participating in the study were randomly divided into two homogeneous groups. Subjects in group 1 (n=19) tasted only the test foods without looking food labels, subjects in group 2 (n=19) tasted by looking food labels. After tasting, subjects were asked about their general dietary habits, to rate the tasted foods using the visual analog scale (VAS), and, their health literacy level was determined using the newest vital signs (NVS) test. 63.2% (n=12) of subjects in group 1 and 52.6% (n=10) of group 2 were female. 52.6% of individuals in group 1 and 57.9% of individuals in group 2 ate three main meals per day. It is noteworthy that the most frequently skipped main meal in both groups is lunch, and individuals eating outside generally prefer dinner on weekends. The VAS value of group 1 was 6±0.9; VAS value of group 2 was 7.4±0.36. The study power was 0.99, effect size was 2.04 (Cohen's d) and a margin of error was 0.05 (α=0.05), calculated according to t-test performed with the VAS results. While individuals in group 1 have adequate health literacy (4.8±1.7), individuals in group 2 have limited health literacy (3.8±2.4). This indicates that food label information is an effective factor in evaluating the visual appeal, odor, taste, aftertaste, and flavor of food products. In this context, labeling seems to be very effective in the selection of healthy foods that form the basis of an adequate and balanced diet. It is believed that the results of this study may provide a new perspective for the development of strategies for the selection of healthy foods by individuals.

Keywords: Food labels, Milk and dairy products, Food choice

Introduction

Food labels are intended to facilitate consumers' purchasing behavior and help them make more conscious and healthier choices (Egnell et al., 2018). From an individual and public health perspective, food labels are critical to addressing the global increase in diet-related diseases (Crockett et al., 2018). A randomized controlled trial found a significant association between the use of labels and the health value of the products purchased (Mhurchu et al., 2018).

Taste and smell perception increases people's intention to buy (Bialkova et al., 2016). Perceptions of health, taste, and aroma can be influenced by both the internal and external characteristics of the product. Package design, brands, colors, labels, and other visual elements are among the factors that influence consumer expectations and dietary preferences (Mazzù et al., 2021). Taste-based labeling is offered as an alternative to health-based labeling, which primarily emphasizes the health attributes of foods (e.g., low calorie, low fat, or low sugar). One study has shown that taste-oriented labeling increases healthy food choices by 38% (Turnwald & Crum, 2019).

Improving the knowledge of some consumer groups about nutrition may increase their motivation in this regard. A potential benefit of adequate nutrition information is that it may encourage individuals to make healthier choices by improving their ability to use nutrition labels. For example, knowledge of the link between diet and cancer may lead consumers to focus on fiber claims on the nutrition label and whole grain products on the ingredient list. This is consistent with the notion that the long-term working memory provided with nutritional information promotes both frequencies of label use and understanding of food labeling (Miller & Cassady, 2015). The more consumers know about nutrition, the more likely they are to read and understand the nutrition information on food labels. Nutrition labels are an important source of nutrition information, but the information contained on labels can be complex and not used appropriately by consumers. Food labels can raise expectations about the sensory or hedonic properties of a product (Li & Dando, 2019).

The purpose of this study is to determine how information on milk and dairy product labels (brand, nutrition declaration, nutrition and health claims, etc.) influences consumers' sensory and hedonic perceptions. Previous studies have mostly been cross-sectional, surveying people's reading habits and purchasing behavior regarding food labels, but unlike other studies, this study identifies the parameters by which people make their food choices.

Method

This study, designed to investigate how nutrition labels affect consumer preferences, followed the principles of the Declaration of Helsinki. Prior to the study, individuals were fully informed of the purpose and method of the study, and verbal consent was obtained from those individuals who agreed to participate. Furthermore, the study was approved by the Ethics Committee of the University of Mersin for Social and Human Sciences with a decision dated 28.08.2023 and number 199.

Participants

The study involved educated individuals aged 18 to 65 years who did their own shopping, had no chronic or metabolic diseases, were not lactose intolerant, were not pregnant or breastfeeding, and were women who were not menstruating. Before starting the survey, a mini questionnaire was conducted to determine whether the participants met the inclusion criteria. First, a homogeneous group was formed by considering the inclusion and exclusion criteria. Then, simple random sampling was used to determine which group the participants belonged to. The sample size was calculated using the G-power 3.1.9.2 program, considering α=0.05, effect size=0.5, and 1-ß=0.8. It was sufficient to conduct the study with a total of 38 subjects, 19 subjects in each group.

Data Collection

Sociodemographic Characteristics and General Dietary Habits

The survey questionnaire asking for sociodemographic characteristics and general eating habits was prepared by the researcher. In the sociodemographic characteristics section, gender, age, education level, marital status, income level, disease status, smoking, and alcohol consumption were queried. Regarding general dietary habits, subjects were asked about the number of main meals and snacks, skipping meals, which meal those who skip meals generally skip, frequency of eating away from home, use of dietary supplements, and amount of physical activity.

Visual Analogue Scala (VAS)

In this study, subjects tasted the same foods from different brands. After tasting, the different characteristics of the foods were rated using a visual analog scale. Participants were asked to rate the visual stimulus, odour, taste, aftertaste, and aroma of the tested foods on the scale. Water was drunk between each assessment to ensure that the assessments of test nutrients consumed did not influence each other. The evaluation results were calculated using the following formula: [visual stimulus+odour+taste+flavour+(100-aftertaste)/5] (Gonzalez-Anton et al., 2015).

Newest Vital Sign (NVS)

The NVS, first developed by Weiss et al. (2005), consists of six questions and measures reading and comprehension of a food label. The NVS test consists of questions about the information found on the nutrition label of a carton of ice cream, and the correct answer to each question in the test, which requires basic reading and math skills, is worth 1 point. Those who score between 4 and 6 points on the NVS test are considered adequate, those who score between 2 and 3 points are considered limited, and those who score 0 to 1 point are most likely to be considered a person with limited health literacy.

Study Design

The subjects were randomly divided into two groups, group 1 and group 2, and were given the following foods from milk and dairy products:

- Plain milk
- Chocolate milk
- Fortified milk
- Yoghurt
- Fruit yoghurt
- Plain kefir
- Fruit kefir
- Plant-based milk

After the study, the sociodemographic characteristics and general dietary habits of all subjects participating in the study were obtained. Group 1 participants sampled and evaluated without seeing the nutrition label. Group 2 participants looked at the food labels and then tasted. Both groups answered VAS and NVS tests, respectively, after tasting.

Statistical Analysis

Data obtained from the study were analyzed using the SPSS (Statistical Package for Social Science) program. Normality test was performed using the Shapiro-Wilk test. Non-parametric statistical methods were used for non-normally distributed values. Mean and standard deviation were used for normally distributed variables, and median (and minimum-maximum) were used for non-normally distributed variables. Nonparametric statistical methods were used for skewed distributed values. Mann Whitney U test was used to compare two independent groups that were not normally distributed. The Wilcoxon signed test was used for comparison of two dependent groups that were not normally distributed. To analyze the correlation between two continuous variables that were not normally distributed Spearman's rho correlation analysis was used.

Results

Table 1. Sociodemographic characteristics

Gender (%)	Group 1	Group 2
Female	63.2	52.6
Male	36.8	47.4
Age ($\bar{x}$±SD)	36.8±12.4	38.6±12.1
BMI (kg/m^2)	26.5	24.7
Education level (%)		
Primary-secondary school	15.8	15.8
High school	31.5	15.8
Associate degree	15.8	0.0
Bachelor	31.6	52.6
Master and above	5.3	15.8
Smoking status (%)		
No	57.9	52.6
Yes	42.1	47.4
Alcohol consumption (%)		
No	94.7	68.4
Yes	5.3	31.6

In this study, which included 19 subjects in each group and a total of 38 subjects, 63.2% of the subjects in the group 1 and 52.6% of the subjects in group 2 were women. The average age of the group 1 is 36.8±12.4 years, that of the group 2 is 38.6±12.1 years. The average BMI of the group 1 is 26.5 kg/m^2, that of the group 2 is 24.7 kg/m^2. The majority of participants in both groups have a bachelor degree (31.6% of group 1; 52.6% of group 2). The majority of participants in both groups are nonsmokers (57.9% of group 1; 52.6% of group 2). 94.7% of individuals in group 1 and 68.4% of individuals in group 2 do not consume alcohol (Table 1).

For all food groups, the VAS rating of those who tasted by examining the nutrition labeling (group 2) was higher than the VAS rating for those who tasted without looking at the nutrition labeling (group 1). The highest VAS score in group 1 belongs to yoghurt (x̄: 7.0 point), while the highest VAS score in group 2 belongs to fruit yoghurt (x̄: 7.9 point). The lowest VAS score in group 1 belongs to fortified milk (x̄: 4.8 point), while the lowest VAS score in group 2 belongs to plant-based milk (x̄: 7.0 point) (Figure 2).

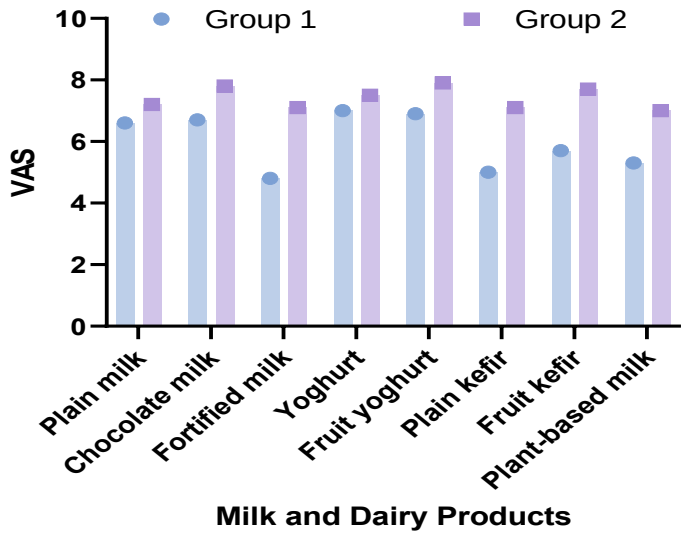

Figure 2**.** Visual analogue scale

The Newest Vital Sign is a new tool designed to quickly and simply assess a patient's health literacy skills. It can be administered in only 3 minutes and is available in English. The patient is given a specially designed ice cream nutrition label to review and is asked a series of questions about it. Based on the number of correct answers, health care providers can assess the patient's health literacy level and adjust the way they communicate to ensure patient understanding. In this study, health literacy of both groups is adequate literacy. The NVS score of group 1 (x̄: 4.8 point) is higher than the NVS score of group 2 (x̄: 3.8 point) (Figure 3).

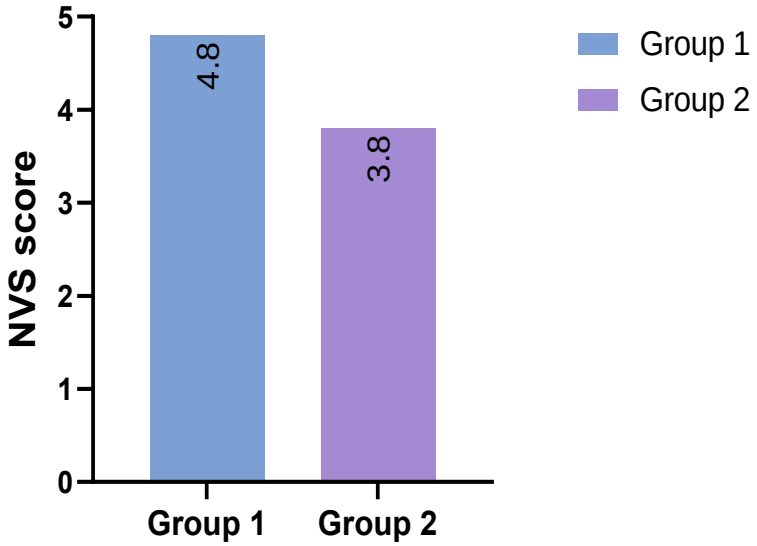

Figure 3. NVS score

Discussion

Individuals have some basic needs to continue their lives and improve their quality of life. Nutrition is at the forefront of these needs, and nutrients must be provided. The information that companies provide about the product when providing nutrients is an important issue because it affects consumers' decision-making processes. The most important and common form of this information transfer is labels, product composition, price, expiration date and origin. In particular, nutrition labeling, which provides information about nutritional value, makes it easy for consumers to make healthy and informed choices. The common goal of the national and international programs developed in this regard is to inform consumers so that they can make healthy food choices and to provide nutrition labeling according to scientific principles.

This study is the first to investigate how information on milk and dairy product labels (brand, nutrition declaration, nutrition and health claims, etc.) affects consumers' sensory and hedonic perceptions. The results of the current study showed that people who look at food labels are deceived by the label and believe that the food is more delicious, regardless of the taste of that food. People who tasted food without seeing the nutrition label gave a different rating because they focused only on the taste of the food. While both groups had adequate levels of health literacy, this did not affect how individuals rated food groups.

Nutrition labelling is a recognised strategy that influences consumers to make healthier food choices (WHO 2004; Ikonen et al., 2020). Consumers generally believe that food with good labels and high quality is better, regardless of the taste of the food. They have a different opinion when they taste foods that they believe will taste good because their labels are very good without seeing the labels. Many even believe that food products from some origins are of higher quality, safer, more environmentally friendly, and otherwise superior to food products from other origins (Thøgersen, 2023). In this study, subjects found foods with better labeling more delicious, even when they were produced in the same country of origin.

According to a study, people pay the most attention to the labels of milk and dairy products when shopping for food (Cecchini & Warin., 2015). In this study, individuals in group 2 examined food labels more carefully when the foods tasted were from the milk and dairy products group. The subjects in Group 1 had a biased attitude toward food because they tasted it without seeing the food label. Therefore, they gave low scores when evaluating the taste of foods. In group 2, subjects were fooled by the attractiveness of the nutrition label and gave high scores in evaluating taste. The comparison of these two situations shows that nutrition labeling is very important for consumer preferences and that nutrition labeling influences people's purchasing preferences more than food taste.

Health literacy is the ability to obtain, process, and understand basic information in order to make appropriate health-related decisions. In order for individuals to protect their own health and improve their nutritional status, they must properly understand and apply the information available (Shah et al., 2010). The health literacy test is used to assess the ability of individuals to understand the information on the label when purchasing packaged foods, to interpret this information correctly, and to select appropriate foods. According to the National Adult Literacy Assessment in America, 53% of the adult population was found to have moderate health literacy, 36% had inadequate health literacy, and 22% had basic health literacy (Me et al., 2003). In the Health Literacy Survey (2012) conducted in eight member countries of the European Union (Austria, Bulgaria, Germany, Spain, Ireland, Netherlands, Poland, Greece), the level of health literacy in these countries is most likely limited, as follows: Austria 12.9%; Bulgaria 28.8%; Germany 15.8%; Spain 34.3%; Ireland 19.9%; Netherlands 8.9%; Poland 32.3%; Greece 17.7%. The most likely limited health literacy of these eight countries was 21.44%, and the adequate health literacy was 55%. The average NVS score of these countries is as follows: Austria, 4.1±0.81; Bulgaria, 3±1.9; Germany, 3.9±2.1; Spain, 2.6±2; Ireland, 3.6±2.1; Netherlands, 4.5±1.8; Poland, 2.9±2.1; Greece, 3.6±2 (Consortium et al., 2012). In this study, individuals in group 1 have adequate health literacy (4.8±1.7), individuals in group 2 have limited health literacy (3.8±2.4).

Conclusion

The study, conducted to assess the impact of nutrition labels on consumer preferences regarding milk and milk groups, yielded the following results: Most participants in both groups were women. The average age is 36.8±12.4 years in group 1 and 38.6±12.1 years in group 2. The educational level of the majority of both groups is a university degree. Most of the study participants do not smoke or consume alcohol. The average VAS score of group 2 was higher than that of group 1. Health literacy of both groups is adequate literacy. The NVS score of group 1 ($\bar{x}$: 4.8 point) is higher than the NVS score of group 2 ($\bar{x}$: 3.8 point).

Recommendations

This food labeling study differs from previous studies in the literature because it is an intervention study. While it is important to develop individuals' reading habits when reading nutrition labels to ensure a healthy diet, studies of what individuals understand from what they read are also very important. For this reason, it is believed that individuals' health literacy, and especially nutrition, literacy, is effective in helping them understand what they read and make decisions about their own health, especially when making healthy food choices. The regulations to be made in the Turkish Food Codex are intended to eliminate labeling problems, make labeling more understandable, and focus on consumer safety. It is assumed that the visibility and comprehensibility of nutritional information on packaging will make a significant contribution to consumers' healthy food choices.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPSTEM journal belongs to the authors.

Acknowledgements or Notes

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