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Posted Date: 13 May 2025

doi: 10.20944/preprints202505.0962.v1

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Article

Evaluation of Young People's Behaviors and Attitudes Toward Carbohydrate Nutrition: A Cross-Sectional Study

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Abstract: Background/Objectives: According to WHO, clear food labeling would allow identification of carbohydrates (CHO) and could reduce the incidence of dental caries. **Methods:** An approved questionnaire no. 300/04.05.2023 with 20 questions using the Lickert scale regarding CHO consumption and their labeling was used for young people. Statistical data processing was performed using SPSS 26.00 Windows (IBM, Armonk, NY, USA), $p \leq 0.05$. **Results:** Study included 150 subjects, 72% (108) women, 28% (42) men and 42.7% (64) with completed university studies. Although 22% (33) considered carbohydrate consumption very important ($p=0.47$, age), only 13.33 (20) read the label very often ($p=0.48$, gender). The majority consume sweets 27.3% (41), and the rest carbonated drinks together with other sweets ($p \geq 0.05$). Subjects consume sweets often 44% (66), $p \geq 0.05$. Most read label of sweets 40.7% (61), dairy products 19.3% (29), carbonated drinks 9.3% (14), but 30.7% (46) read only the expiration date and only 11.3% (17) read the nutritional information ($p \geq 0.05$). They neither agree nor disagree regarding the veracity of the data on the labels 48% (72), and 14% (21) disagree. The harmful effects of CHO on oral health are very well known by 23.3% (35), 77.3% (116) have associated diet with cavities, but most choose consumption based on taste 68.7% (103), and only 16.7% (25) chose a nutritional value $p \geq 0.05$. **Conclusions:** Results of this study emphasize the urgent need for the development of targeted educational interventions addressing young people's carbohydrate consumption, in parallel with the enforcement of transparent and informative food labeling policies to support healthier dietary choices.

Keywords: carbohydrates; daily diet; carbohydrate labeling

1. Introduction

CHO (Carbohydrates) in foods are macronutrients found in fruits, cereals, vegetables, and dairy products. These organic compounds are present in foods in the form of sugars, starch, and fiber, and they are composed of carbon, hydrogen, and oxygen. These wide-ranging macromolecules can be classified into three major groups based on their chemical structure: mono- and disaccharides with low molecular weight, oligosaccharides with intermediate molecular weight, and polysaccharides with high molecular weight [1]. The increased awareness among consumers regarding the link between diet and health has generated demands for broader nutritional labeling. In most countries, the inclusion of information about "CHO" is necessary, and their value is usually obtained through difference and used for calculating energy content. However, the value itself does not provide detailed nutritional information. Food labels should provide values that help consumers choose a healthy diet [2].

From a regulatory perspective, many jurisdictions allow the use of nutrient content claims to communicate the presence of nutrients or other components of healthy foods, including dietary fibers, in foods. Health claims that referring to a physiological function or a health benefit could be supported by the presence of a CHO, such as certain types of dietary fibers. Other labeling statements and programs communicate the presence of intact or reconstituted foods and ingredients, such as whole grains, which contain CHO and other nutrients but also align with the nutritional policies of a jurisdiction. The discussed labeling frameworks align with established measures of CHO quality, such as: dietary fiber content claims and associated health claims based on dietary fiber; the presence of whole grain foods and ingredients that are intact or reconstituted, such as whole grains and low glycemic index and glycemic response claims [3].

The term "CHO quality" can be controversial and is open to interpretation, not only from a scientific perspective but also from the consumer's point of view. CHO significantly contributes to diets worldwide. CHO-containing foods are found in many forms (processed and unprocessed) with diverse physiological and health benefits. CHO quality should not be defined by a single attribute. Often, dietary guidelines have focused on sugar, starch, and dietary fiber to inform the consumption of high-quality CHO foods [4]. Some of these attributes are often quantified on the nutrition facts labels of prepackaged foods. However, in addition to these qualities, there are opportunities to use voluntary labeling to highlight attributes that allow the identification of high-quality CHO foods.

With multiple dimensions of CHO quality, the next challenge is the use of labeling tools that encourage consumers to choose higher-quality CHO foods over lower-quality ones. Increased consumption of refined and rapidly digestible CHO, where dietary fiber, micronutrients, and, in some cases, proteins have been removed, has been linked to the development of cardiometabolic diseases and certain cancers [5]. Studies demonstrate that diets containing higher levels of dietary fiber and intact CHO foods, such as whole grains, are associated with lower mortality and reduced risk of chronic diseases [6]. The aim of this study was to assess the behavior of young Romanians, aged between 18 and 30, regarding the consumption of CHO and their labeling. The objectives of the study include emphasizing the importance of CHO in the daily diet, raising awareness among young individuals about the labeling of products containing CHO, and educating them about nutritional labeling and the importance of understanding the relationship between diet and oral health.

2. Materials and Methods

2.1. Study Design and Setting

The level of knowledge assessment was conducted using a questionnaire method. A cross-sectional study was conducted from May to June 2023. For this study, a preliminary semi-structured questionnaire with multiple-choice questions was used. The questions focused on the level of knowledge among young individuals regarding the consumption of CHO and their labeling. The questionnaire was tested on a group of 20 subjects to ensure understanding of the questions and response options. Ethical review and approval were obtained for this study, with reference number 300/04.05.2023.

2.2. Study Sample

The estimation of the sample size was based on a probability of alpha error ≤ 0.05 and power = 0.95. This means that for our study, a sample size of 109 subjects would be representative. We included a total of 150 subjects in the study, making the chosen sample representative for Romania. The selection of the study group followed specific criteria. The inclusion criteria were young individuals aged between 18 and 30 years who agreed to participate. The exclusion criteria were subjects who did not consent to participate and those who did not fall within the age range. The questionnaire was completed by 150 young individuals.

2.3. Study Instrument Development and Validation

The knowledge and attitudes of the subjects regarding habits related to the understanding of information on food product labels were assessed. For this evaluation, a questionnaire method was employed. The questionnaire was evaluated by a group of experts from the Faculty of Dental Medicine following a qualitative pretesting of the content, followed by its validation. The questionnaire was pilot tested with a sample of twenty subjects to ensure simplicity and clarity of the requirements.

2.4. Questionnaire Contents

The study included 4 demographic Q (questions), which included age, gender, place of residence, and highest level of education completed. To supplement this data, four questions were answered. A series of questions, specifically 5 questions, comprised 5 multiple-choice answers (1, 2, 3, 4, or 5 options) regarding the most consumed CHO in each participant's diet, the information that the young buyer reads from the product label, the sources of information the participant relies on regarding CHO consumption, and what factors determine their choice of a CHO-based product. The remaining 11 questions were single-choice questions, and Likert scale options with four or five points were used to evaluate the rest of the questions.

The questions asked were: Q 5 = How important do you believe the consumption of CHO is in the daily diet; Q 6 = How often do you usually read the nutritional values on product labels; Q 7 = In what form do you most commonly consume CHO; Q 8 = Which of the following products do you most often read the label; Q 9 = Which of the following information are you attentive to when reading the label of a CHO-type product; Q 10 = From which sources do you gather information about CHO consumption; Q 11 = How informed are you about the fact that CHO are classified into beneficial and harmful ones, Q 12 = How often do you consume sweets and carbonated drinks; Q 13 = Do you agree with the statement "food labeling is truthful"; Q 14 = How important do you think awareness of the sugar content in food is; Q 15 = How often do you usually go to the dentist; Q 16 = How informed are you about the harmful effects of CHO on oral health; Q 17 = Have you associated the occurrence of cavities with excessive CHO consumption; Q 18 = Are you willing to reduce CHO consumption for the improvement of oral health; Q 19 = What factors determine your choice of CHO-type products; Q 20 = To what extent do you agree with the statement "Taste is one of the main factors that determine the purchase of a food product"?

2.5. Statistical Analysis

The data was collected and entered a database. Descriptive statistics of frequency distribution, percentages, and mean knowledge scores were calculated. A descriptive statistic of the study was conducted by applying cross-tabulation tables. The statistical data processing was performed using the SPSS version 26.00 software for Windows (IBM, Armonk, NY, USA), with a statistical significance threshold set at $p \leq 0.05$. The Cronbach's Alpha index was .433. The Chi-square test was used for comparative analysis based on the educational level. The correlation of general knowledge and attitudes among students was conducted using Pearson's correlation test.

3. Results

3.1. Demographic Data

The study included 150 young participants, of whom 42.7% (64) were in the age range of 18-21 years, 39.3% (59) in the age range of 22-25 years, and 18% (27) in the age range of 26-30 years. Among the participants, 72% (108) were female and 28% (42) were male. Additionally, 78.7% (118) came from urban areas, while 21.3% (32) came from rural areas.

3.2. Responses Regarding the Last Completed Level of Education

Regarding the question about the last completed level of education, the responses indicated that 42.7% (64) of the participants completed university studies, 41.3% (62) completed high school, 13.3% (20) completed postgraduate studies, and 2.7% (4) completed primary school.

3.3. Evaluation of Responses Regarding the Importance of CHO Consumption

Table 1. Chi-square test function by age, gender, environment.

Pearson Chi-Square Tests				
		Age	Gender	Enviroment
Q5	Chi-square	18.48	3.82	0.98
	Sig.	.047 ^{a,b,c}	.576 ^{b,c}	.964 ^{b,c}
Q 6	Chi-square	2.85	2.49	1.97
	Sig.	0.83	0.48	0.58
Q 7	Chi-square	16.36	12.96	11.87
	Sig.	.875 ^{b,c}	.372 ^{b,c}	.456 ^{b,c}
Q 8	Chi-square	19.93	6.02	8.67
	Sig.	.701 ^{b,c}	.915 ^{b,c}	.731 ^{b,c}
Q 9	Chi-square	27.56	17.89	21.45
	Sig.	.842 ^{b,c}	.463 ^{b,c}	.258 ^{b,c}
Q 10	Chi-square	16.77	6.26	4.04
	Sig.	.159 ^{b,c}	.395 ^{b,c}	.671 ^{b,c}
Q 11	Chi-square	9.47	2.31	1.91
	Sig.	.304 ^b	.680 ^b	.753 ^b
Q 12	Chi-square	2.45	2.22	3.03
	Sig.	.874 ^{b,c}	.528 ^{b,c}	.387 ^{b,c}
Q 13	Chi-square	7.31	1.38	10.28
	Sig.	.503 ^{b,c}	.847 ^b	.036 ^{a,b,c}
Q 14	Chi-square	15.51	14.88	1.31
	Sig.	.050 ^{a,b,c}	.005 ^{a,b,c}	.859 ^{b,c}
Q 15	Chi-square	14.66	7.63	1.47
	Sig.	.066 ^{b,c}	.106 ^{b,c}	.832 ^{b,c}
Q 16	Chi-square	8.03	3.30	2.81
	Sig.	0.24	0.35	0.42
Q 17	Chi-square	4.94	0.41	0.13
	Sig.	0.09	0.52	0.72
Q 18	Chi-square	7.37	3.26	2.01
	Sig.	.497 ^{b,c}	.516 ^b	.734 ^b
Q 19	Chi-square	8.20	2.83	0.07
	Sig.	.224 ^{b,c}	.418 ^b	.995 ^{b,c}
Q 20	Chi-square	9.72	7.21	7.63
	Sig.	.285 ^{b,c}	.125 ^{b,c}	.106 ^{b,c}

Results are based on nonempty rows and columns in each innermost subtable.
*. The Chi-square statistic is significant at the .05 level.
b. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.
c. The minimum expected cell count in this subtable is less than one. Chi-square results may be invalid.

3.4. Analysis of the Answers for Q5 `How Important Do You Think Is the Consumption of CHO in the Daily Diet? `

The responses to the question about the importance of CHO consumption in the daily diet highlighted that only 22% (33) considered it very important, 41.3% (62) considered it important, 26.67% (40) considered it moderately important, 7.3% (11) considered it slightly important, and 2.7% (4) considered it not important at all. The statistical analysis showed $p=0.47$ based on age, $p =5.76$ based on gender, and $p =9.64$ based on the origin environment (Table 2).

Table 2. Distribution of answers to Q5=How important do you think is the consumption of CHO in the daily diet?

No	Questions	Frequency of responses		A	G	E
		%	N	p	p	p
Q5	How important do you think is the consumption of CHO in the daily diet?					
	Not important at all	2.67	4			
	More less important	7.33	11			
	Moderate important	26.67	40	.047 ^{a,b,c}	.576 ^{b,c}	.964 ^{b,c}
	Important	41.33	62			
	Very important	22.00	33			
	Total	100.00	150			

N= count, A=area, G=gender, E=enviroment, p=significance level

3.5. An Analysis of the Answers for Q 6 `How Often Do You Usually Read the Nutritional Values on the Product Label?

The responses regarding how often the participants usually read the nutritional values on product labels highlighted that only 13.3% (20) read them very often, 38% (57) read them often, 28.7% (43) read them rarely, and 20% (30) never read them (Table 3). The statistical analysis showed that the differences between the responses were not statistically significant based on age ($p=8.28$), gender ($p=4.77$), and origin environment ($p=5.80$) (Table 3).

Table 3. Distribution of answers to Q6 = `How often do you usually read the nutritional values on the product label? `.

No	Questions	Frequency of responses		A	G	E
		%	N	p	p	p
Q 6	How often do you usually read the nutritional values on the product label?					
	Never	20.00	30			
	Quite Rarely	28.67	43			
	Often	38.00	57	0.83	0.48	0.58
	Very often	13.33	20			
	Total	100.00	150			

N= count, A=area, G=gender, E=enviroment, p=significance level

3.6. Analysis of the Answers to Q7 `In What Form Do You Most Commonly Consume CHO?`

The responses to Q7 regarding the form in which subjects consume CHO most frequently showed that the majority consume sweets 27.3% (41), followed by dairy products 16% (24), whole grains 10% (15), carbonated beverages 8.7% (13), dairy products and sweets 8% (12), dairy products, sweets, and carbonated beverages 6% (9), dairy products, whole grains, and sweets 6% (9), sweets and carbonated beverages 4.7% (7), whole grains and sweets 4% (6), dairy products and whole grains 4% (6), dairy products, whole grains, sweets, and carbonated beverages 4% (6), dairy products and carbonated beverages 0.7% (1), whole grains, sweets, and carbonated beverages 0.7% (1). The statistical analysis showed that the differences between the responses were not statistically significant based on age ($p=8.75$), gender ($p=3.72$), and environment ($p=4.56$) (Table 1).

3.7. Analysis of the Answers to Q8 `Which of the Following Products Do You Most Often Read the Label of?`

The responses to Q8, regarding which products subjects most often read the label of, showed that the majority read the label on sweets 40.7% (61), followed by dairy products 19.3% (29), carbonated beverages 9.3% (14), whole grains 6.7% (10), whole grains and sweets 5.3% (8), dairy products and sweets 4.7% (7), sweets and carbonated beverages 3.3% (5), whole grains, sweets, and carbonated beverages 2.7% (4), dairy products, whole grains, sweets, and carbonated beverages 2.7% (4), dairy products and whole grains 2.0% (3), dairy products and whole grains 1.3% (2), dairy products, sweets, and carbonated beverages 1.3% (2), whole grains and carbonated beverages 0.7% (1). The statistical analysis showed that the differences between the responses were not statistically significant based on age ($p = 7.01$), gender ($p = 9.15$), and original environment ($p = 7.31$) (Table 1).

3.8. Analysis of the Answers to Q 9 ‘Which of the Following Information Are You Attentive to When Reading the Label of a CHO Type Product?’

The responses to Q9, regarding which information subjects pay attention to when reading the label of a CHO product, highlighted that the majority 30.7% (46) read the expiration date, 12.7% (19) read the expiration date and the list of ingredients, 11.3% (17) read the nutritional information, 10% (15) read the list of ingredients, 7.3% (11) read the list of ingredients and the nutritional information, 3.3% (5) read the allergen statement, 2.7% (4) read the expiration date and the allergen statement, 2.7% (4) read the expiration date and the nutritional information, 1.3% (2) read the expiration date, the list of ingredients, the nutritional information, and the recommended serving, 1.3% (2) read the expiration date, the list of ingredients, the nutritional information, the recommended serving, and the allergen statement. The rest of the responses had values below 1%. The statistical analysis showed that the differences between the responses were not statistically significant based on age ($p = 8.42$), gender ($p = 4.63$), and origin environment ($p = 2.58$) (Table 1).

3.9. Analysis of the Answers to Q 10 ‘From Which Sources Do You Gather Information About CHO Consumption?’

The answers regarding Q 10 about the sources subjects rely on for information about hydrocarbon consumption highlighted that most of them, 58.7% (88), prefer the internet. 13.3% (20) do not seek information, 10% (15) prefer both the internet and television, 9.3% (14) rely solely on television, 6.7% (10) gather information from books and the internet, 1.3% (2) from books, magazines, the internet, and TV, and only 0.7% (1) from books, magazines, and the internet. The differences between the responses are statistically insignificant, with $p = 1.59$ based on age, $p = 3.95$ based on gender, and $p = 6.71$ based on the background environment (Table I).

3.10. Analysis of the Answers to Q 11 ‘How Informed Are You About the Fact That CHO Are Classified into Beneficial and Harmful Ones?’

The answers regarding Q 11, specifically how informed the subjects are about the classification of CHO into beneficial and harmful, indicated that only 10.7% (16) are highly informed, 34% (51) are informed, 31.3% (47) are moderately informed, 18% (27) are slightly informed, and 6% (9) are not informed at all (Table 4). The differences between the responses are statistically insignificant, with $p = 3.04$ based on age, $p = 6.80$ based on gender, and $p = 7.53$ based on the background environment (Table 4).

Table 4. Distribution of answers to Q11 = How informed are you that CHO are classified as beneficial and harmful?

No	Questions	Frequency of responses		A	G	E
		%	N	p	p	p
Q 11	How informed are you that CHO are classified as beneficial and harmful?					
	Not informed et all	6.00	9	.304b	.680b	.753b

More less informed	18.00	27
Moderate informed	31.33	47
Informed	34.00	51
Very informed	10.67	16
Total	100.00	150

N= count, A=area, G=gender, E=enviroment; p=significance level

Analysis of the Answers to Q12 ` How Often Do You Consume Sweets and CHO Drinks? `

The answers regarding Q12 about how often the subjects consume sweets and carbonated beverages have revealed that 18.7% (28) consume them very often, 44% (66) consume them often, 36.7% (55) consume them rarely, and 7% (1) never consume them (Table 5). The differences between the responses are statistically insignificant, with $p=8.74$ based on age, $p=5.28$ based on gender, and $p=3.87$ based on the background environment (Table 5).

Table 5. Distribution of answers to Q12= How often do you consume sweets and CHO drinks?

No	Questions	Frequency of responses		A	G	E
		%	N	p	p	p
Q 12	Never	0.67	1			
	Quite rarely	36.67	55			
	Often	44.00	66	.874b,c	.528b,c	.387b,c
	Very often	18.67	28			
	Total	100.00	150			

N= count, A=area, G=gender, E=enviroment, p=significance level

3.11. Analysis of the Answers to Q 13 Do You Agree with the Statement "Food Labeling Is Truthful"?

Regarding the agreement on the statement "Food labeling is accurate," the responses showed that 7.3% (11) of subjects totally agree, 28% (42) agree, 48% (72) neither agree nor disagree, 14% (21) disagree, and 2.7% (4) totally disagree (Table 6). The differences between the responses are statistically insignificant, with $p=5.03$ based on age, $p=8.47$ based on gender, and $p=0.36$ based on the background environment (Table 6).

Table 6. Distribution of answers Q13 = Do you agree with the statement "food labeling is truthful"?

No	Questions	Frequency of responses		A	G	E
		%	N	p	p	p
Q 13	Do you agree with the statement "food labeling is truthful"?					
	Totally agree	7.33	11			
	Agree	28.00	42			
	Neither disagree nor agree	48.00	72	.503b,c	.847b	.036*,b,c
	Disagree	14.00	21			
	Totally disagree	2.67	4			
	Total	100.00	150			

N= count, A=area, G=gender, E=enviroment, p=significance level

3.12. Analysis of the Answers to Q 14 `How Important Do You Think It Is to Be Aware of the Amount of Sugar in Food?

`Regarding the importance of being aware of the amount of sugar in food, the subjects stated that it is very important for 60.7% (91) of them, important for 22% (33), moderately important for 14% (21), slightly important for 2% (3), and not important at all for 1.3% (2) (Table 7). The differences between the responses are statistically significant, with $p =0.05$ based on gender and statistically insignificant with $p =0.50$ based on age and $p =8.59$ based on the background environment (Table 7).

Table 7. Distribution of answers Q14 = How important do you think it is to be aware of the amount of sugar in food?

No	Questions	Frequency of responses		A	G	E
		%	N	p	p	p
Q 14	How important do you think it is to be aware of the amount of sugar in food?					
	Not important at all	1.33	2			
	More less important	2.00	3			
	Moderate important	14.00	21	.050*,b,c	.005*,b,c	.859b,c
	Important	22.00	33			
	Very important	60.67	91			
	Total	100.00	150			

N= count, A=area, G=gender, E=enviroment, p =significance level

3.13. Analysis of the Answers to Q 15 `How Often Do You Usually Go to the Dentist? `

Regarding the question about how often subjects usually go to the dentist, the responses have shown that 36% (54) go once every 6 months, 34.7% (52) go once a year, 14% (21) go every few years, 14% (21) only go in case of emergencies, and 1.3% (2) never go. The differences between the responses are statistically insignificant, with $p =0.66$ based on age, $p =1.06$ based on gender, and $p =8.32$ based on the background environment (Table 1).

3.14. Analysis of the Answers to Q 16 How Informed Are You About the Harmful Effects of CHO on the Oral Environment?

Regarding how informed the subjects are about the harmful effects of CHO on oral health, the responses have indicated that 23.3% (35) are highly informed, 38% (57) are informed, 28.7% (43) are moderately informed, and 10% (15) are not informed at all (Table 8). The differences between the responses are statistically insignificant, with $p =2.36$ based on age, $p =3.47$ based on gender, and $p =4.23$ based on the background environment (Table 8).

Table 8. Distribution of answers Q16 = How informed are you about the harmful effects of CHO on the oral environment?

No	Questions	Frequency of responses		A	G	E
		%(count)				
Q 16	How informed are you about the harmful effects of CHO on the oral environment?	%	N	p	p	p
	Not important at all	0.00%	0	0.24	0.35	0.42
	More less important	10.00%	15			

Moderate important	28.67%	43
Important	38.00%	57
Very important	23.33%	35
Total	100.00%	150

A=area, G=gender, E=enviroment, p=significance level

3.15. Analysis of the Answers to Q17 `Have You Associated the Occurrence of Cavities with Excessive CHO Consumption? `

Regarding the association between cavities and excessive CHO consumption (Q17), the results showed that 77.3% (116) of the subjects associated them with them, while 22.7% (34) did not. The differences between the responses are statistically insignificant, with $p = 0.85$ based on age, $p = 5.20$ based on gender, and $p = 7.22$ based on the background environment (Table 1).

3.16. Analysis of the Answers to Q18 `Are You Willing to Reduce CHO Consumption for the Improvement of Oral Health? `

Regarding the question of whether subjects are willing to reduce their hydrocarbon consumption for the improvement of oral health (Q18), the results indicated that 18% (27) are extremely likely to be willing, 48.7% (73) are likely to be willing, 21.3% (32) have a neutral opinion, 8.7% (13) are unlikely to be willing, and 3.3% (5) are extremely unlikely to be willing. The differences between the responses are statistically insignificant, with $p = 4.97$ based on age, $p = 5.16$ based on gender, and $p = 7.34$ based on background environment (Table 1).

3.17. Analysis of the Answers to Q19 `What Factors Determine Your Choice of CHO Type Products? `

Regarding the factors that determine subjects' choice of hydrocarbon products (Q19), the majority, 68.7% (103), chose taste, 16.7% (25) chose nutritional value, 12% (18) chose price, and the fewest, 2.7% (4), chose the brand. The differences between the responses are statistically insignificant, with $p = 2.24$ based on age, $p = 4.18$ based on gender, and $p = 9.95$ based on the background environment (Table 1).

3.18. Analysis of the Answers to Q20 `To What Extent Do You Agree with the Statement "Taste Is One of the Main Factors That Determine the Purchase of a Food Product?" `

Regarding the agreement with the statement "Taste is one of the main factors that determines the purchase of a food product" (Q20), the results showed that 32.7% (49) totally agree, 42% (63) agree, 22% (33) have a neutral opinion, 2.7% (4) disagree, and 7% (1) totally disagree. The differences between the responses are statistically insignificant, with $p = 2.85$ based on age, $p = 1.25$ based on gender, and $p = 1.06$ based on the background environment (Table I).

3.19. Analysis of the Correlation of the Results Obtained from Q5 "How Important Do You Think the Consumption of CHO Is in Your Daily Diet?" with Q6 "How Often Do You Usually Read the Nutritional Values on Product Labels?"

The correlation of the results obtained from Q5 "How important do you think the consumption of CHO is in your daily diet?" with Q6 "How often do you usually read the nutritional values on product labels?" highlighted that although 33 subjects consider the consumption of CHO in their daily diet to be very important, only 8 of them read the nutritional values on product labels very often and 13 read them often. Among the 62 subjects who consider it important, only 7 read the nutritional values on product labels very often and 28 read them often. The differences between the responses to the two questions are significant, with $p = 0.052$ (Table 9).

Table 9. Correlation of the results obtained Q5 = "How important do you think the consumption of CHO is in your daily diet?" with Q6 = "How often do you usually read the nutritional values on product labels?".

		Q6. How often do you usually read the nutritional values on product labels ?				Total	χ^2	p
		Very often	Often	Rarely	Never			
Q5. How important do you think the consumption of CHO is in the daily diet ?	Very important	8	13	5	7	33	20.90 ^a	0.05
	Important	7	28	19	8	62		
	Moderately important	4	13	13	10	40		
	Slightly important	1	2	6	2	11		
	Not important at all	0	1	0	3	4		
Total		20	57	43	30	150		
χ^2 = Pearson Chi-Square; p = Asymptotic Significance (2-sided)								

3.20. Analysis of the Correlation of the Results Obtained from Question "Q10: From What Sources Do You Inform Yourself About CHO Consumption?" and "Q11: How Informed Are You About the Classification of CHO into Beneficial and Harmful?"

The correlation between the results obtained from the question "Q 10: From what sources do you inform yourself about CHO consumption?" and question "Q 11: How informed are you about the classification of CHO into beneficial and harmful?" highlighted that most subjects who considered themselves very informed (16 subjects) obtained their information from the internet (11 subjects). Among the subjects who considered themselves informed (51 subjects), 33 of them obtained information from the internet. Furthermore, most subjects gather information from the internet. The differences between the responses to the two questions are significant, with a $p=0.003$ (Table 10).

Table 10. Correlation of the results obtained from Q 10 = "From what sources do you inform yourself about CHO consumption?" with Q 11 = "How informed are you about the classification of CHO into beneficial and harmful?"

		Q11 How informed are you that CHO are classified as beneficial and harmful ?					Total	χ^2	p
		Very informed	Informed	Moderatly informed	Slightly informed	Not informed			
Q10 From what sources do you get information about the consumption of CHO	Internet	11	33	24	16	4	88	47.14a	0.00
	TV	0	2	8	2	2	14		
	I don't inform myself	0	6	3	8	3	20		
	Books, Internet	2	4	4	0	0	10		
	Internet, TV	1	6	7	1	0	15		
	Books, Magazines, Internet	0	0	1	0	0	1		
	Books,Magazines , Internet, TV	2	0	0	0	0	2		
Total		16	51	47	27	9	150		
χ^2 = Pearson Chi-Square; p = Asymptotic Significance (2-sided)									

3.21. Analysis of the Correlation of the Results Obtained from Question the Correlation Analysis of the Results Obtained for Q17 "Did You Associate the Occurrence of Cavities with Excessive Consumption of CHO?" with Q18 "Are You Willing to Reduce Your Consumption of CHO to Improve Oral Health?"

The correlation analysis of the results obtained for Q17 "Did you associate the occurrence of cavities with excessive consumption of CHO?" with Q18 "Are you willing to reduce your consumption of CHO to improve oral health?" highlighted that out of 116 subjects who associated the occurrence of cavities with excessive consumption of CHO, only 24 responded that they are willing to reduce their consumption of CHO, while 58 responded that they will prob-ably reduce their consumption of CHO. The differences between the responses to the two questions are not statistically significant, with a *p*-value of 0.294 (Table 11).

Table 11. Correlation of the results obtained for Q17 "Did you associate the occurrence of cavities with excessive consumption of CHO?" with Q18 "Are you willing to reduce your consumption of CHO to improve oral health?".

				Q18 Are you willing to cut back on CHO to improve your oral health ?					Total	χ ²	p
				Extremly unlikely	Unlikely	Neutral	Probable	Extremly probable			
Q17	Have you associated the appearance of cavities with excessive consumption of CHO ?	Yes	3	9	22	58	24	116	4.93 ^a	0.29	
		No	2	4	10	15	3	34			
Total				5	13	32	73	27	150		
χ ² = Pearson Chi-Square; p= Asymptotic Significance (2-sided)											

3.22. Analysis of the Correlation of the Results Obtained from Question the Correlation Analysis of the Results Obtained for Q20 "To What Extent Do You Agree with the Statement 'Taste is One of the Main Factors Determining the Purchase of a Food Product'?" with Q19 "What Factors Determine Your Choice of CHO Products?"

The correlation analysis of the results obtained for Q20 "To what extent do you agree with the statement "Taste is one of the main factors determining the purchase of a food product?" with Q19 "What factors determine your choice of CHO products?" highlighted that the majority of subjects choose a CHO product based on taste, while only 17 choose it based on nutritional value, with 10 subjects agreeing and 7 subjects totally agreeing. The differences between the responses to the two questions are marginally significant from a statistical point of view, with a *p*-value of 0.083: Correlation of the results obtained for Q20 "To what extent do you agree with the statement "Taste is one of the main factors determining the purchase of a food product?" with Q19 "What factors determine your choice of CHO products?" (Table 12).

Table 12. Correlation of the results obtained for Q19=What factors determine your choice of CHO products? - Q20=To what extent do you agree with the statement "Taste is one of the main factors that determine the purchase of a food product"?

		Q 19 What factors determine your choice of CHO products?				Total	χ^2	p
		Taste	Nutritional value	Price	Brand			
20. To what extent do you agree with	Totally disagree	1	0	0	0	1	19.22a	0.08
	Disagreement	1	1	1	1	4		

the statement "Taste is one of the main factors that determine the purchase of a food product"?	Neither disagree	18	7	8	0	33
	nor agree					
	Agree	46	10	6	1	63
	Totally agree	37	7	3	2	49
Total		103	25	18	4	150
χ^2 = Pearson Chi-Square; p= Asymptotic Significance (2-sided)						

3.23. Analysis of the Correlation of the Results Obtained from Q12 "How Often Do You Consume Sweets and Carbonated Drinks?" - Q14 "How Important Do You Consider the Awareness of the Amount of Sugar in Foods?"

The correlation analysis of the results obtained for Q12 "How often do you consume sweets and carbonated drinks?" with Q14 "How important do you consider the awareness of the amount of sugar in foods?" highlighted that although 91 subjects find it very important and 33 find it important to be aware of the amount of sugar in foods, 25 and 52 of them consume sweets and carbonated drinks frequently and very frequently, respectively. The correlation coefficient is $p=0.76$ (Table 6).

Table 13. Correlation of the results obtained for Q12 "How often do you consume sweets and carbonated drinks?" with Q14 "How important do you consider the awareness of the amount of sugar in foods?".

		Q 14. How important do you think it is to be aware of the amount of sugar in food?					Total	χ^2	<i>p</i>
		Very important	Impor tant	Moderately important	Slightly important	Not at all important			
Q 12. How often do you consume sweets and carbonated drinks?	Very often	19	6	2	0	1	28	8.26 ^a	0.76
	Frequently	37	15	11	3	0	66		
	Pretty rare	34	12	8	0	1	55		
	Never	1	0	0	0	0	1		
Total		91	33	21	3	2	150		
χ^2 = Pearson Chi-Square; <i>p</i> = Asymptotic Significance (2-sided)									

4. Discussion

The energy intake of individuals can come from fats, proteins, or CHO. CHO has been an important part of our ancestors' diet because many CHO-rich foods were easier to store compared to protein and fat-rich foods such as fish and meat [7]. CHO-rich foods are an essential part of a healthy diet as they provide the body with glucose to support bodily functions and physical activity, which are essential for the proper functioning of the brain, nervous system, and muscles. However, excessive consumption of refined, simple, and low-quality CHO has a direct implication on the physical, mental, and dental physiopathology [8].

In our study, only 21.3% (32) consider the consumption of CHO in their daily diet to be very important, while for 2.7% (4), it is not important at all.

Nutritional literacy can be generally described as an individual's ability to gather and synthesize information about nutrition to make healthy decisions in everyday life. Higher nutritional knowledge is associated with positive health behaviors, including making healthier food choices (i.e., consuming more fruit and vegetables) and in-creasing daily activity. Nutritional literacy falls under the broader term of health literacy or someone's ability to make decisions that affect overall health. The use of

food labels is an important aspect for many consumers when making nutritional choices for themselves and their families. The results of a study indicate that over 75% of consumers report reading the ingredient list on a product label "sometimes" or "often" when purchasing a product for the first time [9]. One of the major reasons why consumers read food labels is to identify unfavorable and potentially harmful ingredients.

Another study conducted on 265 participants noted that out of these, 178 read food labels and only 78 did not read them [10]. Participants who reported reading labels were asked to indicate which information they pay attention to, and they stated that they place particular emphasis on information related to the composition of the food product [10]. As for the information sought on the product label, the highest percentage of indications was for sugar content (75.4%), followed by calorie content (65.2%), the presence of preservatives (56.7%), and fat content (31.5%) [10].

In the present study mentioned above, it was highlighted that the majority of young individuals, 30.7% (46), pay attention to the expiration date, while a smaller percentage pay attention to other information: 12.7% (19) to both the expiration date and the ingredient list, 11.3% (17) to nutritional information, 10% (15) to the ingredient list, and 3.3% (5) to the allergen statement.

Regarding the choice of products based on the information on the packaging/label regarding the sugar content of the product, previous studies have shown that respondents who reported noticing low-sugar products on the market were significantly more likely to agree that they would choose products labeled "contains only natural sugars," "no added sugars," "reduced sugar," "sugar-free," and "zero sugar" compared to respondents who stated that they had not noticed low-sugar products on the market. Reducing sugar intake in certain products is recommended worldwide as part of healthier dietary patterns to help reduce energy intake, the risk of obesity, and obesity related disorders.

Other studies in the literature also indicate that for some food groups, reducing sugar content could have the greatest impact on oral health and overall health [11–13], as well as early childhood carious lesions [14].

Regarding Polish consumers, it appears particularly important that the information on the label (including information about the sugar content of the product) is presented in an appropriate manner so that the label can be properly interpreted and understood by consumers, especially in the face of a worrying increase in the number of overweight and obese individuals in recent years. In the current study, the subjects share the same opinion regarding the importance of being aware of the amount of sugar in foods. The participants declared that it is very important for 60.7% (91), important for 22% (33), moderately important for 14% (21), and of little importance for a very small percentage, 2% (3), and not important at all for 1.3% (2). In terms of sugar content, it is useful to identify specific groups of food products where reducing sugar can have a significant impact on public health. Therefore, proper labeling can be an appropriate tool for implementing and evaluating actions aimed at reducing sugar consumption. CHO-rich foods with sugar have long been associated with an increased risk of dental caries formation [15].

Dental carious lesions, also known as tooth decay, are the most common non-communicable disease worldwide. Dental caries occurs due to the fermentation of CHO by acid-producing bacteria in the dental biofilm. The bacteria present in dental plaque ferment dietary CHO, especially sucrose, into acids that then cause a decrease in the pH of the plaque adjacent to the tooth surface, leading to demineralization of hard dental tissues such as enamel, dentin, and cementum. The frequency of consumption, texture, and duration of exposure to different CHO are important factors that influence the formation of dental caries [16]. Individuals with high rates of dental caries or poor oral health can benefit from consuming diets that contain CHO that are digested and absorbed slowly. In the current study mentioned above, the results highlighted that 77.3% (116) of the subjects associated the presence of dental caries with the consumption of CHO, while 22.7% (34) did not associate it with it.

The harmful impact of sugar-containing foods, such as carbonated beverages, fruit juices, and sweet snacks, on dental health has been extensively studied, demonstrating the link between CHO consumption and the occurrence and progression of carious lesions [17]. Usually, these products

cause a significant decrease in the pH of the dental plaque. In the current study, the subjects were asked how often they consume sweets and carbonated drinks, and the responses indicated that 18.7% (28) consume them very often, 44% (66) consume them often, 36.7% (55) consume them quite rarely, and only 7% (1) never consume them.

Previous studies have demonstrated that taste and price are the most important factors influencing consumers' food choices. Although considering the healthiness of food in consumption decisions is important for preventing nutrition-related chronic health conditions [18,19]. The present study shows that for most subjects, 68.7% (103), taste determines their choice of CHO-rich products, while 16.7% (25) consider nutritional value, 12% (18) consider price, and only 2.7% (4) consider the brand.

Results from other studies have suggested that a vegetarian diet may influence the occurrence of dental erosion [20–22]. Other research highlights the role of protective principles that should be consumed for the prevention of dental caries [23]. Furthermore, there is discussion about the influence of an anti-inflammatory diet on oral health [24].

Research indicates that there are several concerns individuals have when considering a dental appointment [25–27]. Among these, psychological and emotional factors such as control, shame, and trust are highly important and, for many people, cause more anxiety than the fear of pain [28–30]. This is important because most research and interventions so far have focused on addressing the fear of pain as the primary approach to dental anxiety [31]. Some of the expressed concerns can be addressed through relatively simple means that can be easily integrated into current practice.

In the current study, the subjects were asked how often they usually go to the dentist, and the responses were as follows: 36% (54) go every 6 months, 34.7% (52) go once a year, 14% (21) go every few years, 14% (21) only go in case of emergencies, and 1.3% (2) never go. Regular dental visits are important for receiving preventive care, maintaining good oral health, and identifying oral and dental diseases at an early stage. However, many people do not visit the dentist regularly.

The limitations of this study include the sample size, which, although sufficient for the studied category, could improve the results by increasing the sample size. The consistency of the responses to questions is borderline.

5. Conclusions

The assessment of knowledge regarding the behavior of young people in relation to CHO consumption and labeling showed that only 21.3% (32) of the study participants consider CHO consumption in their daily diet to be very important. Less than 50% of the participants stated that they are informed about the classification of CHO into beneficial and harmful categories, with most of them, 58.7% (88), preferring the internet as their source of information.

Regarding product labeling, only 13.3% (20) reported reading labels very often, with a particular interest in the expiration date for 30.7% (46) of them. Taste was chosen as the main factor for purchasing a CHO-rich product by 68.7% (103), outweighing considerations of nutritional value, price, and brand.

Although 77.3% (116) of the subjects associated the occurrence of cavities with excessive CHO consumption, only 36% (54) of them visit the dentist every 6 months, and 18% (27) are extremely likely to give up consuming CHO.

Based on this study, it can be concluded that there is a need for more educational programs targeting young people regarding CHO consumption and labeling.

Author Contributions: Conceptualization, Catalina Saveanu; Data curation, Catalina Saveanu, Paula Ilie and Alexandra Saveanu; Investigation, Paula Ilie; Methodology, Catalina Saveanu and Paula Ilie; Software, Catalina Saveanu; Supervision, Loredana Golovcencu; Validation, Catalina Saveanu, Daniela Anistoroaei and Livia Bobu; Visualization, Daniela Anistoroaei, Livia Bobu and Loredana Golovcencu; Writing – original draft, Catalina Saveanu, Paula Ilie, Alexandra Saveanu and Octavian Boronia; Writing – review & editing, Catalina Saveanu, Daniela Anistoroaei and Alexandra Saveanu.

Funding: “This research received no external funding”.

Institutional Review Board Statement: “The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Grigore T Popa University of Medicine and Pharmacy Iasi MF (300/04.05.2023).” for studies involving humans.

Informed Consent Statement: “Informed consent was obtained from all subjects involved in the study.”.

Conflicts of Interest: “The authors declare no conflict of interest.”.

Data Availability Statement: We share the research data processing in three sections. Data Availability Statements are available in section “MDPI Research Data Policies” at <https://www.mdpi.com/ethics>.

Abbreviations

The following abbreviations are used in this manuscript:

MDPI	Multidisciplinary Digital Publishing Institute
DOAJ	Directory of open access journals
TLA	Three letter acronyms
LD	Linear dichroism
CHO	Carbohydrates
Q	questions
N	Count
A	Area
G	Gender
E	Enviroment
p	significance level
χ2	Pearson Chi-Square

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