

## KNOWLEDGE, ATTITUDES AND PRACTICES ON DIET AND CANCER PREVENTION

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**Abstract.** We know a lot about how diet influences cancer risk, but turning that into personalized, evidence-based recommendations is difficult due to genetic variability, microbiome differences, lifestyle and environment, clinical evidence gap. The main objective of this study was to evaluate the level of knowledge, attitudes, and practices regarding the role of diet in the prevention and evolution of cancer among students and academic staff from the Faculty of Chemistry, Biology, Geography (CBG) at the West University of Timișoara. The research instrument consisted of a structured questionnaire with 33 items, adapted from a previously proposed model, and organized into three sections: Knowledge (true/false and multiple-choice items), Attitudes (Likert scale), and Practices. Data collection was carried out online in June 2025, ensuring anonymity and informed consent. The data were statistically analyzed using IBM SPSS Statistics. Most respondents acknowledged the essential role of nutrition in cancer prevention and management; however, specific information regarding the diets discussed in the literature was less familiar, which suggests the need to integrate nutritional education into the training of future biologists and biochemists. The level of knowledge and attitudes remains comparable between students and teachers. The statistical analysis revealed a significant difference between students and academic staff only with respect to dietary practices.

**Keywords:** Fasting and Caloric Restriction (CR), Mediterranean Diet (MD), Ketogenic Diet (KD), High-Protein Diets (HPDs), Vegetarian and Vegan Diets (VVDs)

### INTRODUCTION

According to the World Health Organization, health is a state of physical, mental, and social well-being, not merely the absence of disease. Maintaining health depends on daily behaviors, and adopting a healthy lifestyle contributes to long-term physical, mental, and emotional balance. Essential factors include a balanced diet, regular physical activity, stress management, and quitting smoking (MARINO et al., 2024). In the current context, increased life expectancy in developed countries poses new challenges for public health. Women live on average to 84 years of age and men to 79, but by 2030 it is estimated that people over 65 will represent 20–25% of the population of the US and Europe. This demographic shift implies a higher incidence of age-related comorbidities, which increases the need for healthy behaviors from an early age (CAMPANIELLO et al., 2022).

Although randomized clinical trials on lifestyle changes during cancer treatment are limited, existing evidence shows that adopting a healthy lifestyle can improve quality of life and reduce the adverse effects of treatment. Thus, current guidelines recommend a balanced diet, regular exercise, and maintaining optimal body weight for cancer patients, highlighting the importance of prevention and behavioral interventions (TUINMAN et al, 2024).

The gut microbiota contributes to essential processes such as carbohydrate digestion, inhibition of pathogenic bacteria, vitamin synthesis, immune system stimulation, and drug metabolism. Considered a "hidden organ," it maintains the host's energy homeostasis and

immune balance (PANEBIANCO et al., 2018). A healthy microbiome is characterized by eubiosis, with a predominance of beneficial bacteria. Imbalance, called dysbiosis, involves a decrease in beneficial microorganisms, proliferation of pathogens, and reduced microbial diversity (ROY & TRINCHIERI, 2017). Combining an active lifestyle with proper nutrition supports health on multiple levels, from physical and mental balance to optimal body function. Adequate nutrition is essential throughout cancer management, from active treatments (surgery, chemotherapy, radiotherapy) to recovery, prevention, and palliative care. Cancer-associated cachexia occurs due to pro-inflammatory cytokines (TNF- $\alpha$ , IL-1, IL-6, IFN- $\alpha$ , IFN- $\gamma$ ) and catabolic factors produced by the tumor which intensify muscle mass degradation and weight loss (POLAŃSKI et al., 2023). A proper diet limits the adverse effects of therapy and supports quality of life, requiring increased protein and energy intake to counteract the catabolism triggered by treatments (BAGAN et al., 2013).

**Fasting and caloric restriction (CR)** are dietary strategies that exploit the metabolic vulnerabilities of cancer cells. These approaches work by limiting the availability of metabolic fuels (glucose, amino acids, and fats), which are essential for the rapid proliferation of malignant cells. Many preclinical and clinical studies have demonstrated that CR and starvation can inhibit tumor growth, enhancing the efficacy of conventional cancer therapies (IBRAHIM et al., 2021). Starvation refers to an acute lack of calories over an extended period of time. Most fasting methods are also called water fasting. Intermittent fasting is a short-term weekly fast of 24 hours, once or twice a week. CR consists of reducing total calorie intake over an extended period, lasting from several months to several years. By decreasing the production of reactive oxygen species and proinflammatory cytokines, CR creates a microenvironment that is less favorable for tumor growth. The typical composition of an CR diet includes 55-65% carbohydrates, 30% fat, and 20% protein, with total calorie intake reduced by 20-40% compared to standard dietary recommendations (SHABKHIZAN et al., 2023).

**The Mediterranean diet (MD)** is recognized by UNESCO as part of humanity's cultural heritage. The MD is based on the customs of the Mediterranean countries of Portugal, Spain, Italy, and Greece. It includes high consumption of fruits and vegetables, and moderate consumption of unprocessed grains, olive oil, fish, and dairy products, with occasional consumption of meat and wine (LĂCĂTUŞU et al., 2019). The macronutrient composition of the MD typically includes 45-55% carbohydrates, 30-35% fat (with a high proportion of monounsaturated fat from olive oil), and 15-20% protein (MONLLOR-TORMOS et al., 2023). This diet positively influences the gut microbiota, reducing inflammation through the intake of polyunsaturated and monounsaturated fatty acids and promoting the synthesis of short-chain fatty acids, compounds essential for intestinal homeostasis. In contrast, the Western diet, rich in fat and low in fiber, increases the presence of the bacterium *Fusobacterium nucleatum*, associated with colorectal cancer (O'KEEFE et al., 2015). Studies show that the Mediterranean diet reduces the risk of certain types of cancer and systemic inflammation. The EPIC study showed a reduction of up to 33% in the risk of gastric cancer (BAMIA et al., 2013). The MOLI-SANI study showed a decrease in inflammatory markers such as C-reactive protein and granulocyte/lymphocyte ratio (BONACCIO et al., 2016). In monkey studies, MD significantly increased the proportion of *Lactobacillus* bacteria in the mammary gland microbiome, accompanied by a reduction in oxidative metabolites and an increase in beneficial bile acid metabolites, highlighting protective effects on mammary tissue (SHIVLEY et al., 2018).

**The ketogenic diet (KD)** is low in carbohydrates (<50 g/day), stimulates the production of ketone bodies, reduces insulin levels, and exerts anti-inflammatory and antioxidant effects, with potential for cancer protection. The KD is a high-fat, low-

carbohydrate diet with low or high protein intake (MALINOWSKA & ŹENDZIAN-PIOTROWSKA, 2024). The standard composition of a ketogenic diet includes approximately 80-85% fat, 10-15% protein, and 5% carbohydrates, with a typical fat-to-carbohydrate ratio of 4:1 (TAN-SHALABY, 2017). Variants that include unsaturated fatty acids and non-starchy vegetables, such as the Mediterranean ketogenic diet, contribute to maintaining intestinal health. Microbiota play an important role in the effectiveness of ketogenic diets, as they can normalize the Firmicutes/Bacteroidetes ratio and reduce inflammation-associated bacteria. Studies show that these changes can support antitumor effects and improve metabolic or neurological diseases (REW et al., 2022).

**High-protein diets (HPDs)**, characterized by a higher proportion of protein compared to fat and carbohydrates, come in various forms. Common variations include high-protein, moderate-fat, low-carbohydrate diets (approximately 30-40% protein, 30-40% fat, 20-30% carbohydrates); HPDs similar to the ketogenic approach (approximately 30% protein, 60% fat, 10% carbohydrates); less common HPDs with 40% protein, 20% fat, 40% carbohydrates (DINGEMANS et al., 2023). Its role in cancer prevention and management remains controversial, with evidence suggesting both potential benefits and risks (BOUTIÈRE et al., 2023). Clinical studies have shown that HPDs can mitigate weight loss, improve muscle strength, improve quality of life and functional outcomes, and reduce hospitalization rates in cancer patients (ORSSO et al., 2024).

**Vegetarian and vegan diets (VVDs)** are plant-based eating patterns that have attracted significant attention for their potential role in cancer prevention and management. Vegetarian diets exclude meat but may include dairy and eggs, while vegan diets eliminate all animal products. Both diets emphasize the consumption of fruits, vegetables, whole grains, legumes, nuts, and seeds, which are rich in fiber, antioxidants, and phytochemicals. These components are believed to contribute to the anticarcinogenic effects of plant-based diets. The typical macronutrient composition of vegetarian and vegan diets includes 50-60% carbohydrates, 20-30% fat, and 15-20% protein, depending on specific food choices and plant-based food sources. These diets may help mitigate treatment-related side effects, such as fatigue and inflammation, by providing a nutrient-rich and anti-inflammatory dietary profile. Focusing on whole, minimally processed plant foods is essential to maximizing the anti-cancer potential of vegetarian and vegan diets (CAPODICI et al., 2024).

The relationship between diet and cancer is complex, involving multiple biological mechanisms. Nutrients can influence carcinogenesis by modulating inflammation, oxidative stress, DNA repair, cell proliferation, and apoptosis (HANAHAN et al., 2011). In addition, dietary factors can interact with the gut microbiome, which has become a key player in cancer development and response to therapy (WHISNER & ATHENA AKTIPIS, 2019). Despite recognition of the role of diet in cancer, translating this knowledge into personalized dietary recommendations remains a challenge. Diets rich in antioxidants, polyphenols, and omega-3 fatty acids may mitigate chronic inflammation and oxidative stress, key factors in tumorigenesis (RUBAN et al., 2025).

## MATERIALS AND METHODS

This research aimed to investigate the level of knowledge, attitudes, and practices of students and teachers at the Faculty of Chemistry, Biology, Geography at the West University of Timișoara regarding the influence of diet on cancer prevention and progression. The study has a quantitative, cross-sectional design and is based on the application of a structured questionnaire, adapted from the instrument developed and validated by Sasanfar et al. (2022). This source

provided a valid scientific framework for the correct dimensioning of the items related to the three main dimensions of the questionnaire: knowledge, attitudes, and practices.

The questionnaire is structured in three sections. The first section, Knowledge, includes true/false and multiple-choice questions designed to assess participants' level of knowledge about the relationship between diet and cancer risk. The second section, Attitudes, uses Likert scale items to explore respondents' perceptions and beliefs about diet and their openness to healthy behaviors. The last section, Practices, examines dietary habits, such as the frequency of consumption of processed meat, dairy products, or supplements, and the preventive measures taken by participants. The questionnaire contains a total of 33 items and was administered online in June 2025. Completion was anonymous, and informed consent was obtained from all participants.

The sample included students from all years of study (bachelor's, master's) and teaching staff, selected by conventional methods, with participation being voluntary and anonymous. The majority of respondents were Biology students (58.7%) and the others came from Geography (25%), Chemistry (13%) and Applied Forensic Sciences (3.3%). In terms of educational level, 51.1% came from the Bachelor's degree cycle and 48.9% came from the Master's degree cycle. The teachers who took part in the study were 63.6% female and 36.4% male. In terms of age, the diversity of the sample was high, but the majority was between 30–52 years old.

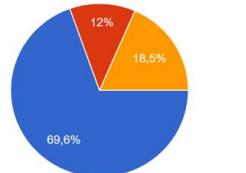
The results were statistically analyzed using descriptive methods, including frequencies, means, and percentages, using IBM SPSS Statistics software. The analysis aimed to identify possible correlations between the level of knowledge, attitudes, and practices and variables such as year of study, specialization, or other demographic characteristics of the participants.

## RESULTS AND DISCUSSIONS

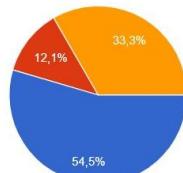
**Knowledge.** The results showed that most respondents have accurate basic knowledge about the relationship between diet and cancer. Thus, 69.6% of students and 54.5% of teachers believe that increased consumption of fruits and vegetables reduces the risk of cancer, which is consistent with the recommendations of the World Health Organization and studies highlighting the role of antioxidants and phytonutrients in inhibiting oxidative stress and systemic inflammation. At the same time, 87% of students and 63.6% of teachers confirmed that unhealthy fats increase the risk of cancer, suggesting a correct understanding of the role of trans and saturated fatty acids in chronic inflammatory processes, which are associated in the literature with the development of colorectal, breast, and prostate cancer. Regarding the role of dietary fiber, 67.4% of students and 60.6% of teachers recognized the protective effect of fiber-rich foods on intestinal health and the prevention of colorectal cancer, supporting the hypothesis that a balanced microbiota contributes to reducing dysbiosis and inflammation. However, the level of knowledge about standard dietary guidelines is low. When asked about the recommended consumption of whole grains, 48.9% of students and 48.5% of staff said "I don't know," indicating that nutritional recommendations are not sufficiently internalized. Figures 1-10 show the percentage distribution of the responses of the members of the two groups (in blue - TRUE, in red - FALSE, in orange - I DON'T KNOW).

**Attitudes.** Overall, participants expressed positive attitudes toward adopting a healthy diet. 72% of students and nearly 79% of faculty stated that prevention through diet is essential for long-term health. However, the perception of personal risk is lower. 34% of students and 27% of staff were undecided about whether their current eating habits could put them at risk of cancer. This discrepancy suggests the existence of a phenomenon known in psychosocial literature as "unrealistic optimism," in which individuals accept the existence of risk at a general level but minimize it at a personal level (JANSEN et al, 2018).

**Food practices and actual behavior.** Analysis of food behaviors showed important differences between stated knowledge and actual habits. This gap between knowledge and behavior confirms that theoretical information does not guarantee behavioral change, and that structural interventions (workshops, nutritional mentoring, etc) are necessary.

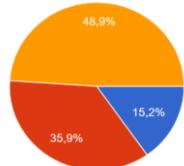


a. Students

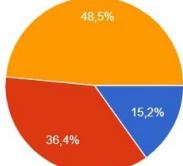


b. Teachers

Figure 1. Distribution of respondents regarding the statement "High consumption of fruits and vegetables prevents cancer"

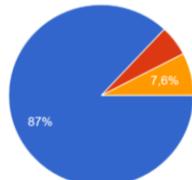


a. Students

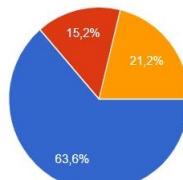


b. Teachers

Figure 2. Distribution of respondents regarding the statement "The food pyramid recommends a daily intake of four servings of grains."

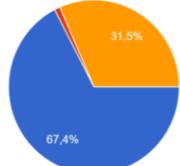


a. Students

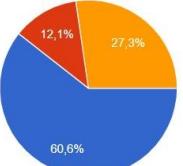


b. Teachers

Figure 3. Distribution of respondents regarding the statement "Unhealthy fats increase the risk of cancer."

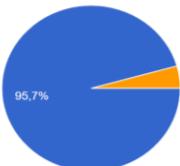


a. Students

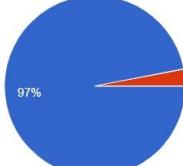


b. Teachers

Figure 4. Distribution of respondents regarding the statement "High-fiber foods reduce the risk of cancer."



a. Students



b. Teachers

Figure 5. Analysis of responses to the statement "Unhealthy cooking methods can produce carcinogenic"

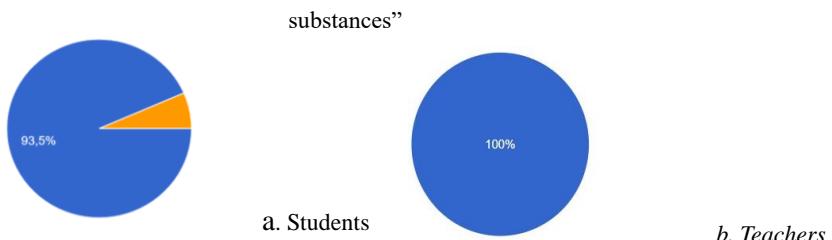


Figure 6. Respondents' answers to the statement "There is a recommended BMI range for adults"

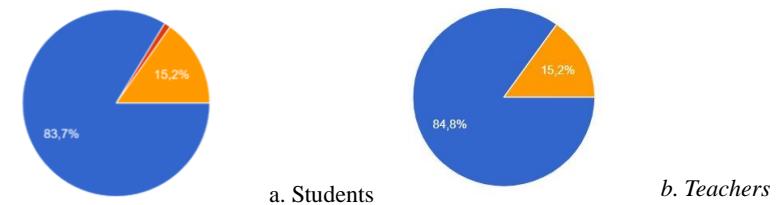


Figure 7. Respondents' answers to the statement "Certain foods have anti-cancer properties"

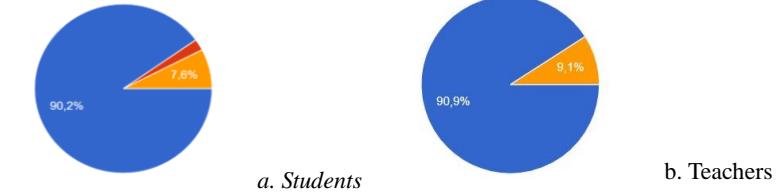


Figure 8. Distribution of results regarding the statement "Some food preservation methods can be dangerous"

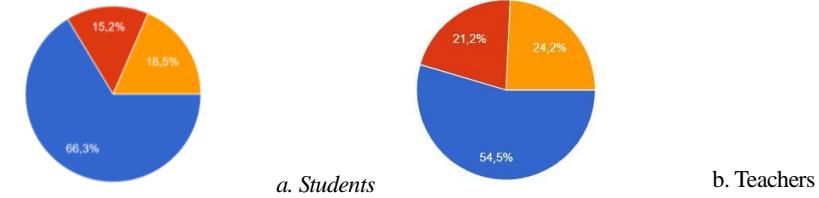


Figure 9. Respondents' answers to the statement "Reading food labels helps prevent cancer"

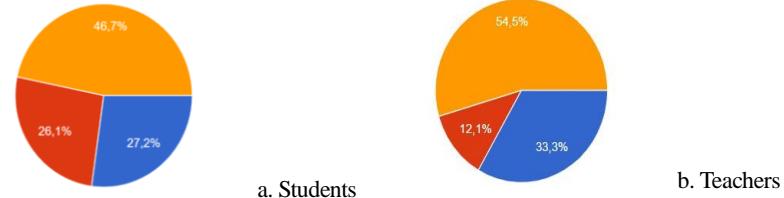


Figure 10. Respondents' answers to the statement "Dietary supplements can help prevent cancer"

**Table 1**  
**Responses to the set of items regarding food practices and actual behavior**

	Students Group	Teachers Group
How often do you eat fresh fruits and vegetables?	Most consume fruits and vegetables regularly (51.1% several times a week, 31.5% daily), with no cases of non-consumption—indicating healthy eating habits.	Most consume fruits and vegetables daily or several times a week (97%) – a healthy eating habit.
How often do you avoid processed foods?	58.7% of respondents consume processed foods only occasionally, and only 8.7% avoid them daily, highlighting the need to raise awareness about their harmful effects.	Most respondents avoid processed foods several times a week, but only 9.1% do so daily.
Do you read food labels before buying them?	30.4% of respondents read product labels several times a week, 27.2% rarely or monthly, and 23.9% daily, highlighting students' interest in information about the food they purchase.	33.3% of respondents read labels daily before purchasing, but a significant portion only check them occasionally or never, indicating that the habit is not consistently adopted by all.
What types of oil do you use for cooking?	63% of students use sunflower oil, 29.3% use olive oil, and the rest use various other oils or butter, highlighting the need for information on the benefits of olive oil in disease prevention.	Most respondents use sunflower oil (60.6%) or olive oil (27.3%), while other types of oils and fats are rarely used.
Do you often use preserved salt, pickles, or smoked meat?	The consumption of salty foods is fairly moderate: 33.7% consume them rarely, and over 60% report weekly consumption.	Most respondents consume pickles, salted or smoked meat rarely (39.4% monthly or less), only a quarter consume them frequently, and 3% never.
Do you frequently consume carbonated drinks or sweets?	43.5% of students frequently consume carbonated drinks and sweets, highlighting the need to limit sugar intake to prevent obesity, cardiovascular disease, and certain types of cancer.	Over 30% of teachers frequently consume carbonated drinks or sweets at least once a week, which highlights the need to promote nutritional education and a healthy lifestyle.
Do you take dietary supplements to prevent disease?	55.4% of students do not use dietary supplements, either due to lack of information, access, or confidence in their own diet, while 40% take them occasionally or daily, showing an interest in disease prevention.	2.4% of respondents do not use dietary supplements, relying on their regular diet, while 45.5% take them occasionally and only 12.1% daily, which shows that more than half are interested in disease prevention.
Do you include whole grains in your daily diet?	47.8% of students consume whole grains very rarely, followed by "several times a week," and a small percentage daily, suggesting a need for information about their benefits.	51.5% of respondents consume whole grains very rarely, 36.4% consume them several times a week, and only a small percentage include them in their diet on a daily basis.
Do you use safe cooking containers (e.g., no aluminum, unsuitable plastic)?	41.3% of students avoid using unsafe cooking containers, while 26.1% have not adopted this practice, highlighting the need for information on healthy cooking methods.	Over 54.5% of teachers avoid using unsafe cookware, 18.2% do so daily, and 21.2% have not yet adopted this practice, highlighting the need for information on healthy cooking methods.
Do you buy seasonal and local vegetables?	62% of students purchase local products on a weekly basis, highlighting a growing interest in supporting this type of consumption.	The high interest in purchasing local products can be seen in the figure above, with 87.9% buying such products weekly. No percentage was recorded in the "never" category.
Do you go shopping with a pre-planned list?	Most said that in most cases they go shopping with a pre-determined list, which shows us a possible control over food choices.	The majority (57.6%) said that in most cases they go shopping with a pre-planned list, which shows us a possible control over food choices.
Trying new, healthier recipes?	A percentage of 48.9% of students mentioned that they often try to prepare healthy recipes, thus showing a moderate interest in diversifying their diet in the healthiest way possible.	63.6% of respondents frequently try to prepare healthy recipes, highlighting their interest in diversifying their diet in a healthy way.
Do you avoid eating fast food?	53.3% of students frequently avoid fast food, demonstrating awareness of the health risks, while 31.5% have not adopted this practice, suggesting a lack of information or indifference towards their own diet.	Over 60% of respondents frequently try to avoid eating fast food, demonstrating awareness of its negative health effects, with equal percentages for the categories "most of the time" and "always."

### Statistical analysis

For the sample of 92 students, a descriptive analysis was performed, determining the minimum, maximum, mean, and standard deviation values for the three dimensions of the questionnaire (knowledge, attitudes, and eating practices), in order to highlight the overall level of responses and their variability. To compare the three dimensions of the questionnaire, the ANOVA test was used, which did not reveal significant differences between knowledge ( $p =$

0.661), attitudes ( $p = 0.771$ ), and practices ( $p = 0.710$ ). Independent variables, such as gender or the study program followed, do not have a significant impact on participants' scores in the three dimensions analyzed.

For teachers, the same approach was applied, performing a descriptive analysis of the results for the three dimensions of the questionnaire, by determining the minimum, maximum, mean, and standard deviation values. Subsequently, the ANOVA test did not identify significant differences between members of group, with all  $p$ -values (0.108; 0.667; 0.252) being higher than the significance threshold.

Table 2

Descriptive data on the results obtained for the three dimensions of the questionnaire - students group

	Minimum	Maximum	Average	Standard deviation	ANOVA test results - Sig.
Knowledge score	.55	2.00	1.4891	.32002	.661
Practice score	1.00	3.00	1.7370	.37875	.771
Attitude score	2.43	4.07	3.2578	.35184	.710

Table 3

Descriptive data on the results obtained for the three dimensions of the questionnaire - teachers group

	Minimum	Maximum	Average	Standard deviation	ANOVA test results - Sig.
Knowledge score	.36	2.00	1.4215	.38086	.108
Attitude score	2.63	4.06	3.3542	.30844	.667
Practice score	1.30	4.50	3.7030	.57199	.252

Finally, the T-test revealed a significant difference between the two groups only for the "Practices" dimension ( $p = 0.014$ ), while for "Knowledge" ( $p = 0.35$ ) and "Attitudes" ( $p = 0.31$ ) the differences were not significant ( $p > 0.05$ ). This result suggests that only in the case of food practices is there a relevant variation between the groups analyzed. The level of knowledge and attitudes remains comparable between students and teachers. There are significant differences between age groups in practices related to diet and cancer prevention. Young people and adults perceive and apply information about nutrition and cancer risks differently. Young people tend to have greater access to information via the internet and social media, but often do not filter scientific sources from commercial or unvalidated ones. Adults are more receptive to medical information and may have a stronger understanding of the link between diet and cancer risk, especially if they have relatives or friends affected (ENG et al, 2020; HAMMOUH et al, 2023).

## CONCLUSIONS

Although there is evidence of diets benefits as adjuvants in cancer treatments, these do not replace medical therapy, but can support it under controlled conditions. The responses collected from students and teachers showed a moderate level of knowledge about the link between diet and cancer, but also an openness to adopting healthier eating habits. Most respondents recognize the essential role of nutrition in cancer prevention, but details about the diets studied in the literature are poorly understood.

Statistical analysis revealed a significant difference only in eating habits between students and teachers, according to the T-test. Knowledge and attitudes did not show significant differences. These results show that, although perceptions of the importance of

nutrition are relatively uniform, the actual application of healthy habits differs between groups. Overall, the findings highlight awareness of the risks associated with an unhealthy diet and acceptance of the idea that nutritional habits can influence the onset and progression of cancer. The results support the need to promote nutrition education and healthy eating in public health policies, actively involving nutrition and medical specialists.

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