DIET AS A RISK FACTOR FOR BOWEL CANCER IN UNIVERSITY STUDENTS

Alimentação como fator de risco para câncer de intestino em universitários

Alimentación como factor de riesgo para cáncer de intestino de universitários

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ABSTRACT

Objective: To analyze the diet quality of university students as a risk factor for bowel cancer. **Methods:** Cross-sectional study with 100 university students of the Gastronomy undergraduate course of a private teaching institution in Montes Claros, Minas Gerais. The body mass index (BMI) was assessed. Data on eating behavior, physical activity practice, and feeding frequency was collected. Descriptive analysis was conducted. **Results:** From the results, it was verified that 46% (n=46) of the students presented increased body mass, that is, BMI $\geq$ 25 kg/m^2 (overweight and obesity). Analysis of the eating habits showed body weight change in 44% of the interviewees; of these, 25% presented body mass gain. Among the interviewees, 41% reported consuming encased meats, pizzas and fast foods, among others, and 57% reported consuming processed foods 1 to 3 times a week. High-sugar foods (sugar-sweetened coffee, soft drinks and chocolate) were daily consumed by 71%, 30% and 24% of the participants. The consumption of grains (chia, flaxseed and quinoa) was reported by 7% of them. **Conclusion:** High consumption of processed and/or industrialized foods was observed, with high contents of fat and sugar, in conjunction with low intake of grains. This dietary situation associated with a sedentary lifestyle represent risk factors for the onset of a neoplasia.

Descriptors: Intestinal Neoplasms; Foods; Nutrition.

RESUMO

Objetivo: Analisar a qualidade da alimentação de universitários como fator de risco para câncer de intestino. Métodos: Estudo transversal com 100 universitários do curso de Gastronomia de uma instituição de ensino privada em Montes Claros, Minas Gerais. Aferiu-se o índice de massa corporal (IMC). Coletaram-se o comportamento alimentar, prática de atividade física e a frequência alimentar. Utilizou-se a análise descritiva. Resultados: A partir dos resultados, verificou-se que 46% (n=46) dos estudantes estavam com a massa corporal elevada, ou seja, IMC $\geq$ 25 kg/m^2 (sobrepeso e obesidade). A análise dos hábitos alimentares demonstrou mudança de peso corporal em 44% dos entrevistados, destes 25% apresentou ganho de massa corporal. Dentre os entrevistados, 41% alegou consumir embutidos, pizzas e fast foods dentre outros, e 57% relatou consumir alimentos industrializados de 1 a 3 vezes por semana. Os alimentos ricos em açúcar (café com açúcar, refrigerantes e chocolate) eram consumidos diariamente por 71%, 30% e 24% dos participantes. O consumo de grãos (chia, linhaça e quinoa) foi relatado por 7%. Conclusão: Observou-se alto consumo de alimentos processados e/ou industrializados com alto teor de gorduras e açúcares, juntamente com uma baixa ingestão de grãos. Essa conjuntura alimentar associada a um estilo de vida sedentário são fatores de risco para a instalação de um quadro de neoplasia.

Descritores: Neoplasias Intestinais; Alimentos; Nutrição.

RESUMEN

Objetivo: *Analizar la calidad de la alimentación de universitarios como factor de riesgo para el cáncer de intestino.* **Métodos:** *Estudio transversal con 100 universitarios del curso de Gastronomía de una institución privada de Montes Claros, Minas Gerais. Se verificó el índice de masa corporal (IMC). Se recogieron datos de la conducta alimentaria, la práctica de actividad física y la frecuencia de alimentación. Se utilizó un análisis descriptivo.* **Resultados:** *A partir de los resultados se verificó que el 46% (n=46) de los estudiantes tenían la masa corporal elevada o sea el IMC ≥ 25 kg/m² (sobrepeso y obesidad). El análisis de los hábitos alimentarios ha demostrado cambio en el peso corporal en el 44% (n= 44) de los entrevistados, de estos el 25% presentó ganancia de la masa corporal. De entre los entrevistados, el 41% relató el consumo de embutidos, pizzas y fast foods, entre otros, y el 57% afirmó consumir alimentos industrializados entre 1 y 3 veces a la semana. Los alimentos ricos en azúcar (el café con azúcar, los refrescos y el chocolate) eran consumidos a diario por el 71%, el 30% y el 24% de los participantes. El consumo de granos (la chía, la linaza y la quinoa) fue relatado por el 7%.* **Conclusión:** *Se observó elevado consumo de alimentos procesados y/o industrializados con elevada proporción de grasas y azucares asociado a una baja ingesta de granos. Ese conjunto de alimentos asociado con un estilo de vida sedentario son factores de riesgo para la instalación de un cuadro de neoplasia.*

Descriptores: *Neoplasias Intestinales; Alimentos; Nutrición en Salud Pública.*

INTRODUCTION

Cancer is a major burden of disease worldwide and the second leading cause of death in the Brazilian population, behind only cardiovascular diseases[1]. In 2014, gastric cancer was the fourth most common type of cancer in men and the sixth in women in Brazil. Despite that, there was a reduction in its incidence, which was associated with a lower exposure to risk factors[2]. Colorectal cancer (CRC), also known as bowel cancer, which includes malignant tumors located in the large intestine (colon, rectum and anus), is a treatable and curable disease when no metastasis is spread to other organs[3].

The high consumption of processed foods, which contain nitrates and nitrites, is related to the increased risk of bowel cancer. These substances are used to preserve and enhance the taste of some processed foods, such as processed meats – for instance, sausages, ham, and bacon – and some preserves such as pickles and canned foods. The substances are transformed into nitrosamines in the gastrointestinal tract (GIT)[3].

Nitrosamine is one of the major carcinogenic substances that make up an extensive group of compounds with great ability to induce cancer. About 300 different nitrosamines are known to be carcinogenic[4]. Salt-preserved foods, such as sun-dried meat, jerky and salted fish, are also associated with bowel cancer in regions where the consumption of such foods is common[5]. A person's diet directly influences intestinal carcinogenesis and therefore plays a key role in the onset, promotion and development of colorectal cancer. Dietary factors and lifestyle are estimated to account for one-third of all cancer cases[1].

Currently, Brazil has an estimated 34,280 new cases of bowel cancer – 17,620 among women and 16,660 among men. These values correspond to an estimated risk of 16.84 new cases per 100,000 men and 17.10 cases per 100,000 women according to data from the National Cancer Institute (*Instituto Nacional de Câncer José Alencar Gomes da Silva – INCA*)[5]. Some factors, such as obesity and excessive consumption of red meat, fats and alcohol, are reportedly related to the increased risk of colorectal cancer. On the other hand, a balanced diet rich in fiber, vitamins and minerals is found to prevent cancer and help – along with the clinical treatment – in the retrogression of the carcinogenic stage. Therefore, the objective of this study was to analyze the diet quality of university students as a risk factor for bowel cancer.

METHODS

This is a quantitative cross-sectional research carried out in a private teaching institution in the city of Montes Claros, Minas Gerais, in 2016.

Participants were 100 university students, regardless of gender and age, who were enrolled in the Gastronomy undergraduate course in the selected institution. No exclusion criteria were adopetd.

Nutritional status was assessed using a digital platform-type weighing scale with maximum capacity of 150 kilograms and sensitivity of 100 grams (TANITA®). Weight was measured with the participants wearing light clothes and standing barefoot and upright with their feet parallel on the center of the platform of the scale and arms along the body[6]. Height was measured using a stadiometer.

The body mass index (BMI) was calculated by dividing the body weight (in kilograms) by the height (in meters) squared. BMI was classified into underweight (BMI < 18.5 kg/m²), normal weight (BMI ≥ 18.5 kg/m² and < 25 kg/m²), overweight (BMI ≥ 25 kg/m² and < 30 kg/m²) and obesity (BMI ≥ 30 kg/m²).

After measurements, participants were requested to answer an adapted questionnaire[7] containing questions about their eating behavior and physical activity and a food frequency questionnaire.

The data were tabulated in an Excel spreadsheet and then analyzed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, USA). The data underwent descriptive statistics and frequency and percentage values were calculated.

The study was approved by the Research Ethics Committee (Approval No. 1.778.113) and is in compliance with the ethical precepts for research involving human beings established in Resolution No. 466/2012 of the National Health Council (*Conselho Nacional de Saúde – CNS*). All the participants who accepted to participate in the research provided their written informed consent.

RESULTS

The sample was composed of 100 students enrolled in the Gastronomy undergraduate course of a private college in Montes Claros. In all, 89% (n=89) of the participants were women.

Nutritional status was assessed using the body mass index (BMI) method, which provides information on weight and height. The calculation of the BMI revealed that 46% (n=46) of the students have a high BMI value (BMI ≥ 25 kg/m²), which is shown in Table I.

Table I - Distribution of Gastronomy students of a private institution according to nutritional diagnosis and gender. Montes Claros, Minas Gerais, 2016.

Nutritional diagnosis	Gender				Total	
	Men		Women			
	n	%	n	%	N	%
Underweight	0	0	3	3.4	3	3
Normal weight	5	45.4	46	51.7	51	51
Overweight	3	27.3	23	25.8	26	26
Obesity	3	27.3	17	19.1	20	20
Total	**11**	**100**	**89**	**100**	**100**	**100**

In all, 54% (n=54) of the men reported gaining weight over the last two weeks. As for women, 44% (n=44) reported some type of change in weight; of these, 22% (n=22) said they have gained weight (Table II).

Table II - Eating behavior and physical activity of Gastronomy students of a private institution. Montes Claros, Minas Gerais, 2016.

Variables		Men (n=11)	Adequacy (%)	Women (n=89)	Adequacy (%)
Weight variation over the last two weeks	Decreased	0	0	19	21,4
	Did not change	5	45.4	50	56.1
	Increased	6	54.6	20	22.5
Assessment of the eating pattern in the last month	Did not change	2	18.2	40	45.0
	Eating more	5	45.4	25	28.1
	Eating less	4	36.4	24	26.9
Amount of food consumed	Little	2	18.2	55	61.8
	Very little	2	18.2	0	0
	Much	7	63.6	34	38.2
Physical activity	Yes	7	63.6	31	34.8
	No	4	36.4	58	65.2
Physical activity frequency (days per week)	7	1	14.3	0	0
	6 to 3	1	14.3	15	55.6
	Less than 3	5	71.4	12	44.4
Frequency of consumption of fried foods and sweets	7 days	7	63.6	41	46.0
	6 to 3 days	2	18.2	35	39.3
	Less than 3 days	1	9.1	5	5.7
	Few times in a month	1	9.1	8	9.0

Regarding the assessment of the diet in the last month, 45% (n=5) of the men reported they have increased food consumption. On the other hand, 45% of the women (n=40) reported that there were no changes in their diet. As for the amount of food eaten,

63% (n=7) of the men and 38% (n=34) of the women reported eating much. Physical activity was more common in men than in women. The consumption of fried foods and sweets was also higher among men.

Regarding food frequency, Table III shows that whole milk is consumed daily by 23% (n=23) of the participants. In addition, yoghurt is consumed daily by 18% (n=18) the participants and skimmed or semi-skimmed milk is consumed daily by 20% (n=20) of the participants. Beef and chicken are consumed daily by 29% (n=29) and 33% (n=33) of the participants, respectively. Butter is consumed daily by 46% (n=46) of the respondents and olive oil is consumed daily by 43% (n=43) of the participants.

Encased meats, pizza, sandwiches and snack foods were consumed monthly by 62% (n=62) of the respondents.

Polished rice was consumed daily by 54% (n=54) of the participants and beans were consumed daily by 68% (n=68) of the respondents. Cake was consumed weekly by 26% (n=26) of the respondents. The consumption of grains (chia, flaxseeds and quinoa) was irrelevant, since only 7 (n=7) participants reported daily consumption.

Raw leaves (lettuce, collards, arugula and watercress) and fruits were consumed daily by 54% (n=54) and 45% (n=45) of the respondents, respectively. Chocolate was consumed weekly by 21% (n=21) of the participants and sugar-sweetened coffee was consumed daily by 71% (n=71) the respondents. Ice cream, cookies and crackers, and soft drinks were consumed daily by 16% (n=16), 24% (n = 24) and 30% (n=30) of the respondents, respectively. (Table III).

Table III - Food frequency questionnaire answered by Gastronomy students of a private institution. Montes Claros, Minas Gerais, 2016.

| Products | Food Frequency Questionnaire (FFQ) | | | |
| | Daily | Weekly | Monthly | Rarely/Never |
	n (%)	n (%)	n (%)	n (%)
Skimmed or semi-skimmed milk	20 (20)	13 (13)	13 (13)	54 (54)
Whole milk	23 (23)	14 (14)	31 (31)	32 (32)
Yogurt	18 (18)	31 (31)	36 (36)	15 (15)
Boiled/fried egg	16 (16)	15 (15)	43 (43)	26 (26)
Beef	29 (29)	49 (49)	15 (15)	7 (7)
Pork	15 (15)	17 (17)	58 (58)	10 (10)
Chicken	33 (33)	33 (33)	34 (34)	0 (0)
Fresh fish	8 (8)	7 (7)	39 (39)	46 (46)
Canned fish (sardines/tuna)	5 (5)	6 (6)	22 (22)	67 (67)
Encased meat (sausages, bacon)	12 (12)	17 (17)	62 (62)	9 (9)
Salt-cured meat	8 (8)	11 (11)	57 (57)	24 (24)
Viscera (liver, kidneys, heart)	7 (7)	5 (5)	50 (50)	38 (38)
Olive oil	43 (43)	21 (21)	17 (17)	19 (19)
Lard	14 (14)	7 (7)	18 (18)	61 (61)
Butter	46 (46)	22 (22)	21 (21)	11 (11)
Potato Chips	10 (10)	21 (21)	36 (36)	33 (33)
Sandwiches, pizza, snack foods	8 (8)	20 (20)	65 (65)	7 (7)
Preserves	8 (8)	25 (25)	55 (55)	12 (12)
Brown rice	32 (32)	6 (6)	8 (8)	54 (54)
Polished rice	54 (54)	8 (8)	5 (5)	33 (33)
Brown bread	30 (30)	11 (11)	21 (21)	38 (38)
Bread roll/white bread	39 (39)	25 (25)	25 (25)	11 (11)
Cookies and crackers	24 (24)	16 (16)	41 (41)	19 (19)
Cake	20 (20)	26 (26)	42 (42)	12 (12)
Oats	20 (20)	13 (13)	28 (28)	39 (39)
Beans	68 (68)	23 (23)	6 (6)	3 (3)
Chia	7 (7)	8 (8)	13 (13)	72 (72)
Flaxseed	7 (7)	5 (5)	16 (16)	72 (72)
Quinoa	7 (7)	6 (6)	9 (9)	78 (78)
Raw leaves	54 (54)	24 (24)	8 (8)	14 (14)
Tubers	23 (23)	32 (32)	26 (26)	19 (19)
Fruits	45 (45)	27 (27)	13 (13)	15 (15)
Ice cream	16 (16)	13 (13)	55 (55)	16 (16)
Pies	14 (14)	14 (14)	49 (49)	23 (23)
Chocolate	24 (24)	21 (21)	42 (42)	13 (13)
Sugar-sweetened coffee	71 (71)	6 (6)	6 (6)	17 (17)
Soft drinks	30 (30)	15 (15)	37 (37)	18 (18)
Alcoholic beverages	19 (19)	19 (19)	25 (25)	37 (37)

DISCUSSION

Cancer is a chronic and degenerative disease in which the tumor present is sufficiently capable of promoting changes in the body that alter nutritional needs due to metabolic disorders[8] that promote increased glucose consumption, increased lipolysis, and increased energy requirements[9].

A study to assess the frequency of consumption of food groups in 99 students of a university in the Araguaia valley, located in the state of Mato Grosso, Brazil, showed that 43% of the Nutrition and Pedagogy students reported consuming processed foods (sausage, mortadella, bacon, sausage, ham, among others) one to three times a month[10]. This value is a little lower than that found in the present study, in which the same foods were consumed monthly by 57% of the respondents. These foods are rich in chemicals with carcinogenic potential, such as nitrite and nitrate. Researchers from Rio de Janeiro, Brazil, analyzed the dietary profile of 94 university students enrolled in health courses at a private university and found that 60% of the respondents consumed fast food (hamburgers, snack foods, pizza and chocolate) three or more times a week[11]. In contrast, only 20% of the students who participated in the present research reported weekly consumption of fast food.

Inadequate lifestyle[8,12] and unbalanced diet[13], coupled with physical inactivity, are risk factors for the onset of cancer[9]. Food is found to be the main source of human exposure to carcinogens/mutagens. Currently, more than 35% of the many types of cancers result from inadequate and inefficient diets[13] in which the consumption of vegetables, fruits, and whole grains is low[12]. The foods are rich in substances such as phenolic compounds, which play an important role in preventing oxidative stress, inflammation, diabetes and cancer[14]. The high consumption of processed foods, which are rich in refined sugars, salt, condiments[15] and preservatives, is reported to be strongly associated with development of this disease[8].

In a study carried out with 129 Physical Education and Physiotherapy students of a higher education institution in the western area of the state of Rio de Janeiro, Brazil, 45.7% of the participants reported consuming vegetables, fruits and grains three times a week[16]. In another study that assessed fruit consumption among 155 students of the Federal University of Viçosa (Minas Gerais, Brazil), more than 60% of the respondents reported consuming fruits three times or more a week[17]. In the present research, the consumption of these foods was higher when compared to the studies carried out in Rio de Janeiro and Minas Gerais, with 54% and 45% of the students reporting daily consumption of vegetables and fruits, respectively.

Results lower than those found in this study are also reported in the literature. In a study with a sample of 863 students of the Federal University of Acre, Brazil, only 14.8% of the respondents reported regular consumption of fruits and vegetables. According to the authors, these foods are important because they are rich in micronutrients and low in energy density and their consumption is protective against various non-communicable diseases. The same study reports a direct association of cardiovascular diseases and cancer with poor consumption of vegetables and fruits[18]. In addition, the intake of fibers, which are present in fruits and vegetables, is also involved in the prevention of some types of cancer[19].

Diets rich in animal and trans fats[13] and red[20] and processed meats are usually poor in dietary fiber[14], which, when present in food, slow down bowel transit time and facilitate the removal of carcinogenic agents[12]. A low intake of fiber makes the body more susceptible and predisposed to cancer because it decreases bowel protection[13]. However, the effect will be the opposite if the individual includes and/or increases daily consumption of foods sources of fiber in association with fish consumption[12,20].

The new concepts of nutrition show that eating is not only aimed at providing satiety or energy, but also at preventing diseases of the modern world. Diets with intakes of vegetables, fruits, grains and whole grains below the recommended levels have low amounts of dietary fiber, a nutrient that is known to have a strong effect on the prevention and treatment of colorectal cancer[21].

The literature proves the importance of food in the development and in the prevention of different types of cancers. The preparation of some foods, as well as the compounds present in them, may influence the development of neoplasms[22]. There is evidence that the risk of cancer is decreased when fruits and vegetables are consumed and when the consumption of red meat is reduced. Therefore, a balanced diet and good eating habits tend to prevent or delay the development of cancer[22].

Despite warnings by nutrition education projects, the consumption of processed foods and beverages is still high. These foods are rich in fats and sugars, which helps increase the rates of overweight, obesity and other chronic diseases in the population[23].

CONCLUSION

There was a high consumption of processed and/or industrialized foods high in fat and sugars and a low consumption of grains. This situation in conjunction with sedentary lifestyle are risk factors for the development of neoplasms.

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