

Severity of irritable bowel syndrome symptoms and FODMAPs intake in University students

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ABSTRACT – Background – Irritable bowel syndrome (IBS) symptoms such as diarrhea, bloating and abdominal pain can reduce University student's productivity and learning ability. One of the possible treatments for IBS is the temporarily exclusion of foods that have a high content of short-chain fermentable carbohydrates, the fermentable, oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs). **Objective** – This study aimed to assess University student's intake of foods that are rich in FODMAPs, looking for possible associations with the severity of IBS symptoms. **Methods** – A cross-sectional study was carried out, with undergraduate students from a private University in the city of São Paulo, Brazil, aged between 19 and 46 years old and that were enrolled in different courses and stages. Students were invited to participate and those who gave their formal consent were included in this research. A sociodemographic and lifestyle questionnaire was applied, in addition to the Gastrointestinal Symptom Rating Scale – GSRS. Students also responded a short Food Frequency Questionnaire, developed to investigate habitual FODMAPs intake of Brazilian adult population. Spearman's correlation analysis between the student's GSRS scores and the frequency of foods rich in FODMAPs intake were performed in SPSS v.21. **Results** – Fifty-six students were interviewed, with mean age of 21.4 years old (SD=4.41), with a predominance of women (76.8%). The GSRS results showed that 58.9% of students felt minimal to moderate abdominal discomfort and 14.3% had moderately severe to very severe abdominal pain during the prior week to the interview. Besides abdominal pain, the gastrointestinal symptoms that were most reported by students were flatulence (98.2%), stomach rumbling (89.3%) and eructations (85.7%). Greater symptom severity was observed in women ($P=0.004$) and sedentary students ($P=0.003$). Regarding FODMAPs consumption, honey ($P=0.04$), chocolate ($P=0.03$) and milk table cream ($P=0.001$) intakes were positively correlated with the greater severity of symptoms. **Conclusion** – Although clinical diagnosis is necessary to establish IBS, 73.2% of the students presented minimal to very severe abdominal pain during the prior week. Female had sedentary students had greater severity of gastrointestinal symptoms. A low FODMAP diet, well oriented, could bring some symptoms relief to these University students.

Keywords – FODMAPs; irritable bowel syndrome; gastrointestinal symptoms.

INTRODUCTION

Young University students present important changes in their lifestyles and eating habits throughout their undergraduate course, as a result of their study routines and curricular internships. These students go through constant stress, being a vulnerable group to trigger metabolic and physiological changes that can result in a symptom picture related to irritable bowel syndrome (IBS), including diarrhea, constipation, abdominal pain, in addition to flatulence and abdominal distention^(1,2). Undergraduate students suffering from these symptoms state that is difficult to deal with social life and University appointments and tasks because they cannot stand being away from home for many hours, having difficulty concentrating on academic activities and exams, and they often miss classes⁽³⁾.

IBS is a chronic, often debilitating, and highly prevalent disorder of gut-brain interaction (previously called functional gastrointestinal [GI] disorders)^(1,2). Although the etiology of IBS is still unclear, several factors contribute to its appearance, such as eating habits, stress, psychosocial factors, the presence of comorbidities, intestinal dysbiosis, among others⁽⁴⁾. Research carried out, especially in the last decade, has linked the increase in IBS

symptoms not only to stress, but to the consumption of short-chain carbohydrates, which are poorly absorbed and fermented by the intestinal flora, called fermentable, oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs)⁽⁴⁻⁸⁾.

Australian researchers were the first to define what these carbohydrates were and designated them by the acronym FODMAPs, representing: fermentable, oligosaccharides, disaccharides, monosaccharides and polyols^(4,9). The exclusion of foods that have a high content of these carbohydrates in patient's diet is currently one of the main non-pharmacological therapy for IBS^(1,7), following gradual reintroduction between the eighth to the twelfth week after the disappearance of symptoms⁽⁶⁾.

The genesis of the clinical presentation of IBS after consumption of rich foods in FODMAPs, it is attributed to several factors, with emphasis on the intestinal malabsorption resulting from the absence of enzymes capable of hydrolyzing the luminous glycosidic bonds of carbohydrates, the low activity of brush edge enzymes (for example, lactase) or even the reduced capacity of epithelial transporters⁽¹⁰⁾. Furthermore, the FODMAPs can increase GI water secretion and fermentation in the colon, leading to bloating and triggering IBS common symptoms⁽¹⁾.

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Therefore, knowledge of the importance of the low FODMAPs diet and its adoption could bring relief from gastrointestinal symptoms presented by undergraduate students. On the other hand, although it may play a positive role in improving symptoms, the application of this diet should be well indicated, as it is necessary to exclude a significant list of foods that are present in the dietary patterns of the Brazilian population⁽¹⁰⁾, which makes it difficult its application and justifies that this intervention should always be carried out with the guidance and monitoring of dieticians⁽¹⁾ and gastroenterologists.

In this panorama, the present study aimed to evaluate the consumption of foods rich in FODMAPs from University students seeking associations with the symptoms of IBS.

METHODS

It was a cross-sectional study, carried out with a group of individuals, voluntary participants, men and women, aged between 19 and 46 years old, students from different Undergraduate courses and stages from a private University in São Paulo, SP, Brazil. The study was conducted between January and March of 2020.

After presenting the study's objectives and procedures to potential participants, an individual invitation was made to students to integrate the research sample. Institution and individuals consented to their participation by formally signing the Free and Informed Consent Form (ICF). It was explained to the students that there would be no harm in giving up their collaboration with the research and, in addition, the confidentiality and anonymity of the participants in all stages of the study was guaranteed.

Initially, a standardized questionnaire was applied to students, in person and individually, at University's classrooms, containing questions about age, sex, education, occupation, residence (local and if live alone), lifestyle (smoking, alcohol consumption and physical activity) and self-perceived health.

Then, the participants answered a questionnaire that assessed gastrointestinal symptoms, called Gastrointestinal Symptom Rating Scale (GSRS), which was translated into Portuguese in a study by Souza et al.⁽¹¹⁾. The design of this instrument was carried out by health professionals and the translation was done by translators fluent in the English language, with the questionnaire's efficiency tested by volunteers at the end of the study. It refers to a self-administered questionnaire that has 15 questions and includes five symptoms in the week prior to the application: diarrhea, constipation, abdominal pain, reflux and indigestion. Their responses are organized according to the 7-point Likert scale, in which one indicates absence of the symptom and seven, greater severity. The score is obtained by the average of the items on the scale of each component, being an indicator of greater severity of symptoms (moderate to severe), a score greater than 2.4⁽¹²⁾.

The analysis of the student's FODMAPs was assessed using the self-filling of the Short Food Frequency Questionnaire (FFQ), designed and proposed by Brazilian researchers, to evaluate Brazilian adult population⁽¹³⁾. The FFQ use for the present study was formally authorized by the authors. The daily consumption of each food, by each participant, was estimated by dividing the frequency of consumption reported by them by the referred time unit (times a week; times a month).

Data were analyzed using the statistical package SPSS v. 21, considering a significance level of 5%. Results were evaluated according to central tendency and frequency measures. Student's *t*-test

was used to assess participants according to differences between average ages and scores on the questionnaires. Spearman's correlation analysis was used to assess the correlation between the final score on the GSRS questionnaire and the daily consumption of high FODMAPs foods.

This research was submitted to the local Research Ethics Committee and received approval under number CAAE 24296819.2.0000.0084.

RESULTS

Fifty-six Undergraduate students were interviewed, being 76.8% (n=43) women. The mean age of the participants was 21.4 years (SD=4.41) and only 10.7% (n=6) students were 25 years old or more (TABLE 1).

There was a higher prevalence of students of the Biological Sciences and Health courses, being the most cited: Psychology (35.7%) and Nutrition (26.8%). Nine (16.1%) students reported working in addition to studying and only 12.5% of the participants were living by themselves (TABLE 1).

Regarding to self-perceived health, 23.3% of female and 7.7% of male students considered themselves "healthy". Sixty-six percent of the students (n=37) reported consuming alcoholic beverages weekly and 6 (10.7%) individuals never consumed alcohol before. In contrast, the majority of students (n=35; 62.5%) said they had never smoked cigarettes, while 12 (21.4%) individuals had a frequent smoking habit (TABLE 1).

Almost half of the students (46.4%) declared themselves physically active, practicing exercises for 4 days a week, in average, with a mean session duration of 1 hour and 35 minutes. On the other hand, 53.6% of the students declared not to practice any physical activity, being sedentary (TABLE 1).

When asked about the frequency of IBS-related symptoms in the week prior to the application of the GSRS questionnaire, 26.8% of students reported that they did not experience abdominal pain at all, 58.9% felt minimal to moderate discomfort and 14.3% had moderately severe to very severe pain. Regarding the appearance of the stools, 12.5% said they had soft stools at many times and 16.1%, hard stools. On the other hand, almost half of the students stated that they did not present not once soft (46.4%) and hardened (41.4%) stools in the week prior to the interview.

The most frequently gastrointestinal symptoms cited by students were flatulence (98.2%), stomach rumbling (89.3%) and eructation (85.7%). The least prevalent symptoms in the last week, among the participants, were diarrhea (37.5%), acid reflux (37.5%), nausea (39.3%) and urgent need to evacuate (46.4%). TABLE 2 shows the severity and frequency of the symptoms mentioned by the students.

Greater symptom severity was observed in women ($P=0.004$), with 67.4% of them having a total score greater than 2.4 on the GSRS. On the other hand, 23.1% of men had a score that correspond to higher severity of symptoms, according to the GSRS.

No statistically significant associations were found between the severity of gastrointestinal symptoms, given by the GSRS score, and the type of Undergraduate course ($P=0.19$), student occupation ($P=0.52$) or smoking ($P=0.61$). It was observed that the majority of young people who consumed alcoholic beverages had greater severity and frequency of symptoms, however, the result was also not statistically significant ($P=0.11$). In addition, sedentary students had a higher severity of IBS symptoms ($P=0.03$).

TABLE 1. Distribution of the University students according to general and lifestyle characteristics.

Variables	Men		Women		Total	
	N	%	N	%	N	%
Age						
19–24	11	84.6	39	90.6	50	89.3
25–29	2	15.4	2	4.7	4	7.1
30+	–	–	2	4.7	2	3.6
Undergraduate course						
Biology	2	15.4	–	–	2	3.6
Pharmacy	1	7.7	11	25.5	12	21.4
Physiotherapy	3	23.0	2	4.7	5	8.9
Nutrition	2	15.4	13	30.2	15	26.8
Psychology	5	38.5	15	34.9	20	35.7
Others	–	–	2	4.7	2	3.6
Occupation						
Student	9	69.2	38	88.4	47	83.9
Student and worker	4	30.8	5	11.6	9	16.1
Living alone						
Yes	1	7.7	6	14.0	7	12.5
No	12	92.3	37	86.0	49	87.5
Self-perceived health						
Healthy	1	7.7	10	23.3	11	19.6
Relatively healthy	10	76.9	27	62.7	37	66.1
Not healthy	2	15.4	6	14.0	8	14.3
Smoking						
Frequently	–	–	1	2.3	1	1.8
Sometimes	6	46.1	6	14.0	12	21.4
Rarely	2	15.4	5	11.6	7	12.5
Never	4	30.8	31	72.1	35	62.5
Ex-smoker	1	7.7	–	–	1	1.8
Alcohol consumption						
Frequently	3	23.1	6	14.0	9	16.1
Sometimes	5	38.4	23	53.5	28	50.0
Rarely	3	23.1	10	23.3	13	23.2
Never	2	15.4	4	9.2	6	10.7
Physical activity						
Yes	9	69.2	17	39.5	26	46.4
No	4	30.8	26	60.5	30	53.6
Total	13	100	43	100	56	100

TABLE 2. Severity and frequency of gastrointestinal symptoms presented by the University students, according to GSRS (Gastrointestinal Symptom Rating Scale).

Gastrointestinal symptoms	No discomfort/ not once		Minor to moderate discomfort/rare to few times		Severe to a very severe discomfort/ some to many times	
	n	%	n	%	n	%
Abdominal pain	15	26.8	33	59.0	8	14.3
Heartburn	28	50.0	21	37.5	7	12.5
Acid reflux	35	62.5	19	33.9	2	3.6
Hungry feeling	12	21.4	30	53.5	14	25.1
Nausea	34	60.7	19	33.9	3	5.4
Stomach rumbling	6	10.7	37	66.1	13	23.2
Abdominal distention	27	48.2	16	28.5	13	23.3
Eructation	8	14.3	30	53.5	18	32.1
Flatulence	1	1.8	30	53.6	25	44.6
Constipation	27	48.2	21	37.5	8	14.2
Diarrhea	35	62.5	17	30.4	4	7.2
Soft stools	26	46.4	23	41.0	7	12.5
Hard stools	23	41.1	24	42.8	9	16.1
Urgent need to evacuate	30	53.6	20	35.8	6	10.7
Feeling of incomplete bowel emptying	14	25.0	24	42.9	18	32.1

Honey ($P=0.04$), chocolate ($P=0.03$) and milk table cream ($P=0.001$) intakes were positively associated with the greater severity of symptoms presented by the students, although the correlations found are considered weak to moderate. On the other hand, a statistically significant and inverse association was observed between the consumption of sweet potatoes, soy protein, cassava and oilseeds and the score of the symptom questionnaire. Again, the correlations were shown to be weak to moderate with the exception of soy protein, which appears to be strongly correlated with minor gastrointestinal symptoms (TABLE 3).

TABLE 3. Correlation coefficients between gastrointestinal symptoms and the intake of foods rich in FODMAPs of University students.

Food rich in FODMAPs	Student's intake		r*	P
	n	%		
Honey	30	53.6	0.37	0.04
Oilseeds	38	67.9	-0.31	0.05
Soy protein	6	10.7	-0.81	0.05
Cassava	42	75.0	-0.37	0.01
Chocolate	53	94.6	0.30	0.03
Milk table cream	45	80.4	0.46	0.001

*Spearman's correlation coefficient.

DISCUSSION

The University students of this research were mostly women, of Biological Sciences and Health courses, non-smokers, insufficiently physically active and with regular intake of alcoholic beverages. In a review study carried out by Fernandes et al.⁽¹⁴⁾, 29 articles were analyzed that investigated the use of psychoactive substances in Brazilian University students and, among students from the Southeast region, there was a predominance of women and an elevated consumption of alcohol was observed, as well as in the present study. Another study conducted by Guimarães et al.⁽¹⁵⁾ analyzed the lifestyle of 550 Brazilian University students from a public Institution of Higher Education in Piauí, Brazil, showing an even more elevated prevalence of sedentarism than in the present study (71.6%).

The authors of the present study did not aim to diagnose IBS, which is a very difficult task to clinicians, due to the fact that, at this moment, there is no efficient biological marker that indicates that the person has IBS and also that their symptoms can be shared with other diseases such as, for example, inflammatory bowel disease and celiac disease, which can lead to misdiagnosis^(2,7,16).

However, the presence of IBS-related symptoms in the last week was identified among the University students, and approximately a quarter of the students had at least one symptom causing severe to very severe discomfort, and some of them presented these symptoms many times in their daily lives. In addition, female students were more affected by the gastrointestinal symptoms, with a higher severity. Brazilian and international studies show that the

prevalence of IBS is higher between women^(1,10), but some of them also refer an increased incidence of this syndrome among men⁽¹⁰⁾.

There are few studies that assessed the prevalence of IBS or the IBS-related symptoms in Brazilian University students. Pedreira et al.⁽¹⁷⁾ analyzed 18 medical students who met the IBS criteria, however, 77.8% had not received a previous medical diagnosis of the disease. Stools alterations (66.7%) and feeling of incomplete emptying (50%) were mentioned by these undiagnosed students. In the present study, there was a lower prevalence of changes in stools (58.9%), but a similar frequency of feeling of incomplete bowel emptying (51.8%).

Real⁽¹²⁾ carried out a study with 80 young Portuguese physical activity practitioners, with an average age of 30.6 years, using the GSRQ Questionnaire and observed that reflux and abdominal pain were referred to as “moderate to severe” symptoms in 13.8% and 6.3% of the sample, respectively. In the present study, the same symptoms were mentioned by 19.2% and 73.1% of University students who practiced physical activity, respectively, which may suggest the protective role of physical activity in the frequency of the onset of IBS symptoms.

A diet rich in high FODMAPs may increase gastrointestinal symptoms even in healthy individuals. Ong et al.⁽¹⁸⁾ studied 30 individuals (15 healthy and 15 diagnosed with IBS) and observed that a higher rate of hydrogen gas was produced by both groups throughout the day they adhered to a diet rich in FODMAPs ($P < 0.001$), representing that a certain intolerance to the diet was observed. The group of undiagnosed volunteers showed intensification in flatulence.

Among the foods cited sources of FODMAPs surveyed, the consumption of milk table cream was positively associated with greater severity of symptoms among the University students studied. Like any other cow’s milk derived food, milk table cream can cause discomfort due to lactose malabsorption. On the other hand, it is a food richer in fats than milk itself, because in its production the cream is removed from the milk in order to obtain a fatty cream⁽¹⁹⁾ and the ingestion of fatty foods can favor the appearance of gastrointestinal symptoms⁽²⁰⁾.

The consumption of chocolate also showed a positive association with the greater severity of symptoms presented by the students of this research, which may be related to the fact that, depending on its type, in addition to containing carbohydrates, this can be a fatty food that contributes to the symptoms. Half of the sample studied stated that they had some discomfort with heartburn in the last week and, according to the World Gastroenterology Organization (WGO)⁽²¹⁾, individuals with heartburn should avoid consuming chocolate because it is a food that triggers this symptom. An alternative source of low FODMAPs content than it is in normal chocolate would be dark chocolate⁽²²⁾.

Honey, as well as milk table cream and chocolate, was positively associated with greater severity of symptoms among the University students, being a food highly rich in fructose⁽²³⁾, a monosaccharide not completely absorbed by the intestine and responsible for the production of gases and abdominal distention⁽⁶⁾. In the study conducted by Murray et al.⁽⁶⁾, with 16 volunteers without a diagnosis of IBS, liquids containing glucose, fructose or inulin or a mixture of glucose and fructose were offered. After drinking the drink with fructose, there was an immediate increase in expired hydrogen, as well as the appearance of both symptoms. In the present study, flatulence and abdominal distension caused discomfort in approximately 98% and 52% of students, respectively.

The relation found between soy protein and a lower severity of gastrointestinal symptoms could be explained by the fact that this food is a marker of a healthier or plant-based diet, with few industrialized and dairy products. However, this fact still needs to be further investigated and no studies have been found in this regard.

Studies about the FODMAPs intake are still scarce in Brazil, especially when it comes to University students. In a study conducted at FMUSP Clinical Hospital, in São Paulo, it was observed that beans, coffee and pizza were considered the most aggressive and symptom-causing foods in patients with IBS ($n = 140$)⁽²⁴⁾, which were consumed by 41.4%, 40.7% and 36.6% of participants in the current survey, respectively.

In another study carried out with patients from the school clinic of University of Piauí, wheat, beans and milk and their derivatives were the foods with the lowest consumption by patients with IBS, and their relation with intestinal symptoms increase was observed⁽²⁵⁾. Foods rich in wheat, present in the FFQ used in the present research, such as loaf of bread, bread roll, pasta and pizza were consumed by most students (85%, 87.5%, 100% and 98.2%, respectively), but it was not found a significant correlation between these and gastrointestinal symptoms, as well as beans.

Roest et al.⁽²⁶⁾ studied a sample of 90 patients diagnosed with IBS who started to follow a diet low in FODMAPs and, at the end of the study, there was a significant reduction in the following symptoms: abdominal pain, bloating, flatulence and diarrhea ($P < 0.001$). In the current study, even though a medical diagnosis of IBS was not performed prior to the sample composition, some of the gastrointestinal symptoms of the students could be part of the IBS spectrum of symptoms, being flatulence the most prevalent (98.2%). Therefore, a restricted diet of these foods could reduce the symptoms of these individuals, and certainly, the precise definitive clinical diagnosis performed by a gastroenterologist should be made.

The relationship between certain foods and the triggering or worsening of gastrointestinal symptoms is not yet fully explained, which leads to the need for further investigation on the role of food intolerance as a contributor to IBS⁽¹⁰⁾. Furthermore, the rich FODMAPs foods that are part of the Brazilian diets are different than other world populations, or even between Brazilians of different regions and age groups. In this context, even though several observational studies have exposed the benefits of FODMAPs-restricted diet as an innovative approach to symptom relief, more research is needed to explain pathophysiological mechanisms involved.

The present study has limitations regarding the sample size and its composition by students who did not necessarily have a diagnosis of IBS. In addition, the questionnaires used depended on the volunteers’ memory and the chosen Food Frequency Questionnaire, specific for assessing Brazilians FODMAPs intake, was recently published and has not yet been used on a large scale, so that more effective comparisons could be made.

Another limitation of the current research is that the effects of food sources of FODMAPs are mainly related to intestinal symptoms and GSRQ also takes into account gastric symptoms, which could somehow confuse the observed correlations.

Furthermore, the GSRQ questionnaire assessed the recent gastrointestinal symptoms of the participants, related to the previous week of data collection, that is, the symptoms presented may not be chronic and mean intolerance, but rather, acute symptoms of that specific week.

CONCLUSION

It was observed that several gastrointestinal symptoms, IBS-related, were part of the of the University students' life, mostly female students, and that some rich FODMAPs foods could worsen the severity of these symptoms. There was a greater significant severity of gastrointestinal symptoms among women and students who did not practice physical activity.

In addition, the correlations between a more severe gastrointestinal symptomatology and the consumption of chocolate, milk table cream and honey were significant, and the intake of these foods should be avoided or reduced by symptomatic students.

We reinforce that IBS diagnosis, carried out by a trained medical professional, could bring symptoms relief and a better quality of life for students, as well as the subsequent guidance of an expert dietician.

Further studies should be carried out, using similar instruments to assess FODMAPs intake among Brazilian populations to find the benefits of the low FODMAP and improve gastrointestinal symptoms control and quality of life.

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Authors' contribution

Aufieri MC: study conception and design; analysis and interpretation of the data; data acquisition; drafting of the article. Morimoto JM: analysis and interpretation of the data. Viebig RF: scientific initiation program orientation; study conception and design; analysis and interpretation of the data; drafting of the article; critical revision of the article; final approval of the article.

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RESUMO – Contexto – Os sintomas da síndrome do intestino irritável (SII), como diarreia, “inchaço” e dor abdominal, podem reduzir a produtividade e a capacidade de aprendizagem do estudante universitário. Um dos possíveis tratamentos para a SII é a exclusão temporária de alimentos que possuem alto teor de carboidratos fermentáveis de cadeia curta, os fermentáveis, oligossacarídeos, dissacarídeos, monossacarídeos e polióis (FODMAPs). **Objetivo** – Este estudo teve como objetivo avaliar a ingestão de alimentos ricos em FODMAPs por estudantes universitários, buscando possíveis associações com a gravidade dos sintomas da SII. **Métodos** – Foi realizado um estudo transversal, com alunos de graduação de uma Universidade privada da cidade de São Paulo, Brasil, com idades entre 19 e 46 anos, matriculados em diferentes cursos e estágios. Os alunos foram convidados a participar e aqueles que deram seu consentimento formal foram incluídos nesta pesquisa. Foi aplicado um questionário sociodemográfico e de estilo de vida, além da *Gastrointestinal Symptom Rating Scale* – GSRS. Os alunos também responderam a um pequeno Questionário de Frequência Alimentar, desenvolvido para investigar o consumo habitual de FODMAPs na população adulta brasileira. A análise de correlação de Spearman entre os escores GSRS do aluno e a frequência do consumo de alimentos ricos em FODMAPs foi realizada no SPSS v.21. **Resultados** – Foram entrevistados 56 alunos, com média de idade de 21,4 anos (DP=4,41) e predomínio do sexo feminino (76,8%). Os resultados do GSRS mostraram que 58,9% dos alunos sentiram desconforto abdominal mínimo a moderado e 14,3% tiveram dor abdominal moderadamente intensa a muito intensa durante a semana anterior à entrevista. Além das dores abdominais, os sintomas gastrointestinais mais referidos pelos estudantes foram flatulência (98,2%), roncões estomacais (89,3%) e eructações (85,7%). Maior gravidade dos sintomas foi observada em mulheres ($P=0,004$) e estudantes sedentários ($P=0,003$). Em relação ao consumo de FODMAPs, a ingestão de mel ($P=0,04$), chocolate ($P=0,03$) e creme de leite ($P=0,001$) se correlacionou positivamente com a maior gravidade dos sintomas. **Conclusão** – Embora o diagnóstico clínico seja necessário para o estabelecimento da presença da SII, 73,2% dos alunos apresentaram dor abdominal mínima a muito intensa na semana anterior ao estudo. Estudantes do sexo feminino e sedentários apresentaram maior gravidade dos sintomas gastrointestinais. Uma dieta pobre em FODMAP, bem orientada, poderia trazer algum alívio destes sintomas a estes universitários.

Palavras-chave – FODMAPs; síndrome do intestino irritável; sintomas gastrointestinais.

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