



Changes in the nutritional profile of medicine students during the COVID-19 pandemic period and its correlation with anxiety: a prospective cross-sectional observational study

Letícia Gonçalves Carvalho¹, Leonardo Watanabe Yamamoto¹, Letícia Raiane Fogari¹, Maria Eduarda Leati Caparroz¹, Murillo Esbrogeo Paggiro¹, Rafael Ito Marques¹, Durval Ribas Filho^{1,2*}

¹ FAMECA, Faculty of Medicine of Catanduva - Padre Albino University Center, Catanduva/SP, Brazil.

² Associação Brasileira de Nutrologia (ABRAN)/Brazilian Association of Nutrology, Catanduva/SP, Brazil.

Corresponding Author: Dr. Durval Ribas Filho. FAMECA, Faculty of Medicine of Catanduva - Padre Albino University Center, Catanduva/SP, Brazil.
E-mail: dr.ribas@abran.org.br.

DOI: <https://doi.org/10.54448/ijn21405>

Received: 08-12-2021 Revised: 10-20-2021 Accepted: 11-10-2021 Published: 12-05-2021.

Abstract

Introduction: Pandemics cause strong social, economic, and political impacts. Social isolation to reduce the virus' impact and to retard the health system breakdown caused by SARS-Cov-2 have affected the population's lifestyle, including medical students.

Objective: Identity which impacts the daily meal plan has the COVID-19's Pandemic caused in medical students; Correlate data obtained in different grades of the medical course and present the nutritional profile of the students, who attended the study. **Methods:** Survey realized in students of a private medical course in the São Paulo northwestern region, with a questionnaire containing open questions and tests, sent online in conjunction with the Term of Consent. This study was analyzed and approved by the Research Ethics Committee according to a substantiated opinion number 4.373.785, and obtaining the patient's consent through the Informed Consent Form. **Results:** 117 students, between the 1st and 4th grade of the course, have attended the following study, 75 female, 42 male, allocated in similar proportions in the 4 initial grades of the course, ages between 17 and 31 years old; Most of the students feel more anxiety (78,6%), associated with changes in the nutritional profile, with the increase of high-energy food, highlighted by the bigger propension of this group to the consumption of sweets and white-wheat pasta in the daily meal plan. It is important to notice that many other food groups have suffered an enhancement in consumption as well, such as legumes, dried meat, vegetal oil, olive oil, and

greenery. **Conclusion:** The COVID-19 Pandemic brought impacts to the daily meal plan of the medical students, especially in the ones who feel more anxious. The enhancement of the daily consumption of food by the medical students is notable, in the most diverse food classifications. However, it is concluded in this study that it cannot be said that anxiety and/or self-declared stress is a risk factor for the increase in food consumption observed, as well as a pattern of its impacts on the students' food, cannot be defined.

Keywords: Pandemic. COVID-19. Impact. Medical Students.

Introduction

During the end of 2019, the new SARS-Cov 2 was discovered and surprised everyone for its high degree of virulence, transmissibility and ability to cause acute respiratory syndrome in its carrier (COVID-19). In just 4 months, there were already reports of its occurrence in more than 190 countries, transforming its epidemiological scenario into a pandemic very quickly, which resulted in preventive measures being taken in different states across the globe. In Brazil, a state of public calamity was decreed on March 20, 2020, establishing a collective quarantine to reduce the interpersonal transmission of Coronavirus. Many habits and routines needed to be adapted to the new pandemic scenario, thus, some were prevented from working, others had to adapt their work to the digital or distance environment and, in the case of health professionals,

their efforts were aimed at combating this new disease [1].

As a result, the daily diet underwent significant changes. Among the factors that triggered these changes, there is a reduction in the production of food on a global scale, together with its unequal distribution and supply, a reduction in family income imposed by growing unemployment, dysregulation of mood and, therefore, of hormones, also due to the transformations. negative events [2]. In general, the stress and anxiety experienced lead to a tendency to consume high-calorie foods rich in carbohydrates and fats. However, there are reported cases of decreased nutrition, either total, or of certain types of macro and micronutrients, caused by humoral changes associated with changes in daily habits [3].

Mood is directly related to the expression of certain hormones, which, therefore, are related to feelings of hunger and satiety, as well as the choice of certain types of foods with different nutritional compositions. Based on this premise, the study "Association between stress and eating behavior in university students", by Penaforte, F.R.O. et. al, showed that students whose detected stress levels were higher were more prone to emotional eating and uncontrolled eating behaviors. In other words, these findings indicate that, in stressful situations, food choices are more determined by emotional factors, associated with the difficulty in controlling the amount ingested [4]. This behavior is characterized by the consumption of high-calorie food as an escape strategy, even if temporary, from the emotions generated by academic demands and, in the pandemic context, probably also by the stress that comes with adapting to a new routine and limitations [5].

However, in an ideal scenario, the 2008 Food Guide for the Brazilian Population, in its first edition, shows that healthy meals are opposed to consumption due to stress and should be composed of carbohydrates, fruits, vegetables, proteins and oilseeds. The recommended daily intake of carbohydrates is six servings, with rice, bread, pasta, corn, potatoes and cassava being some of the foods belonging to this group. Fruits, vegetables and vegetables are sources of vitamins, minerals and fiber and should be consumed daily [6]. We also recommend 3 servings for fruits and 3 for vegetables, always trying to diversify these foods. One portion should be reserved for pulses such as beans, peas, lentils, chickpeas and soybeans and another for oilseeds such as nuts and seeds. Milk and dairy products, the main sources of calcium, should have a daily consumption of 3 servings and meat, poultry, fish and eggs, 1 serving. The consumption of simple sugars,

found in sweets and most processed foods, should not exceed 1 serving. Complementarily, the 2014 Food Guide for the Brazilian Population adds that, a healthy diet is not only related to food portions, but also the quality of the nutrients available and the social food system involved, it is recommended, therefore, the intake of fresh food. Thus, the undeniable difficulty of the population in general to follow this guide is evident due to the current global circumstances of confronting COVID-19, limiting food quality by several mechanisms mentioned above [6].

Methods

Study Design

This study followed a prospective observational cross-sectional model, following the rules of clinical research of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology), available at: <https://www.strobe-statement.org/>.

Ethics Approval

This study was analyzed and approved by the Research Ethics Committee (CEP) according to a substantiated opinion **number 4.373.785**, and obtaining the patient's consent through the Informed Consent Form (TCLE) according to CNS/CONEP Resolution 466/12.

Interventions and Application of Questionnaires

This study analyzed the psychosocial condition (specifically, anxiety and/or) stress) and dietary changes related to the quarantine period, due to the COVID-19 pandemic, of students from the first to fourth year of the medical course at the Faculty of Medicine of Catanduva. The choice of the group was based on the similarity of the conditions to which they were submitted, that is, the interruption of in-person classes and the beginning of the distance learning (distance education) class routine, caused by the need for social isolation, which requires students many hours in front of the computer or cell phone; in addition, they experience the lack of social and physical contact they were used to and the instability that came with the pandemic.

A questionnaire was formulated, using the Google Forms digital platform, with questions related to changes in mood and changes in the consumption of different nutrients, analyzing them separately; in addition, in the same form, a 24-hour reminder was attached. After that, the questionnaire, along with the recall and the Informed Consent Form, also pre-formulated, was disclosed to students from the first to

fourth years through Whatsapp, from May 20th to June 4th, 2020, in this way, they had access to the questions and answered them according to their information.

After obtaining a total of responses in the proportion of 25% of the total number of students in each of the rooms, which totaled 133 responses, the questionnaire data was compared and analyzed considering subgroups defined by the absence or presence of mood change, and by the increase or decrease in the consumption of each of the predetermined nutrients in the questionnaire (cereals, tubers and roots; white flour pasta; sweets; soft drinks; meat, fish and eggs; milk and dairy products; jerky and dairy products meat; vegetable oils; olive oil; fruits; vegetables; vegetables; pulses; oilseeds). Duplicate responses from the same student were selected and considered only one, resulting in a final number of 117 responses. The recall was used to analyze and compare the foods consumed by the students in the last 24 hours considering their processing, that is, whether most foods were fresh or processed.

Statistical Analysis

An analysis of the variation in consumption (increase or decrease) of the food groups was performed, comparing the intake pattern before the pandemic and during the pandemic. Then, the variations were statistically analyzed using the Odds Ratio method,

which compares the chance of an event occurring between two independent groups, one exposed and the other not exposed. The statement of "being more anxious" was considered as an exposure factor, and the increased consumption of food groups was interpreted as an event. Minitab 18® software was used.

Results

A total of 117 students from the first to the fourth year of the Faculty of Medicine of Catanduva (FAMECA/UNIFIPA) participated in the survey, with 75 (64.1%) females and 42 (35.9%) males (**Table 1**).

The data found to suggest an increase in anxiety or stress during quarantine in all classes, being reported in greater quantity in students taking the first one. Regarding data, an increase in stress or anxiety during quarantine was observed in 92 students (78.6% of participants). In addition, a greater number of reports of increased anxiety or stress among women was observed, with 65 women (86.7% of the participants) reporting increased anxiety or stress (**Table 2**).

Analyzing the data, it is possible to observe which foods had their intake increased or decreased during the quarantine period by the participants. Furthermore, it is possible to relate the increase or decrease in their intake with an increase in anxiety or stress during the quarantine (**Table 3, Table 4, Figure 1, and Figure 2**).

Table 1. Characteristics of students per year and for reporting more anxiety or stress during quarantine.

<i>Year completed in 2020</i>	<i>more anxious or stressed</i>	<i>No longer anxious or stressed</i>	<i>Total per year</i>
1^o Year	27 (93.1%)	2 (6.9%)	29
2^o Year	24 (75.0%)	8 (25.0%)	32
3^a Year	23 (76.7%)	7 (23.3%)	30
4^o Year	18 (69.2%)	8 (30.8%)	26

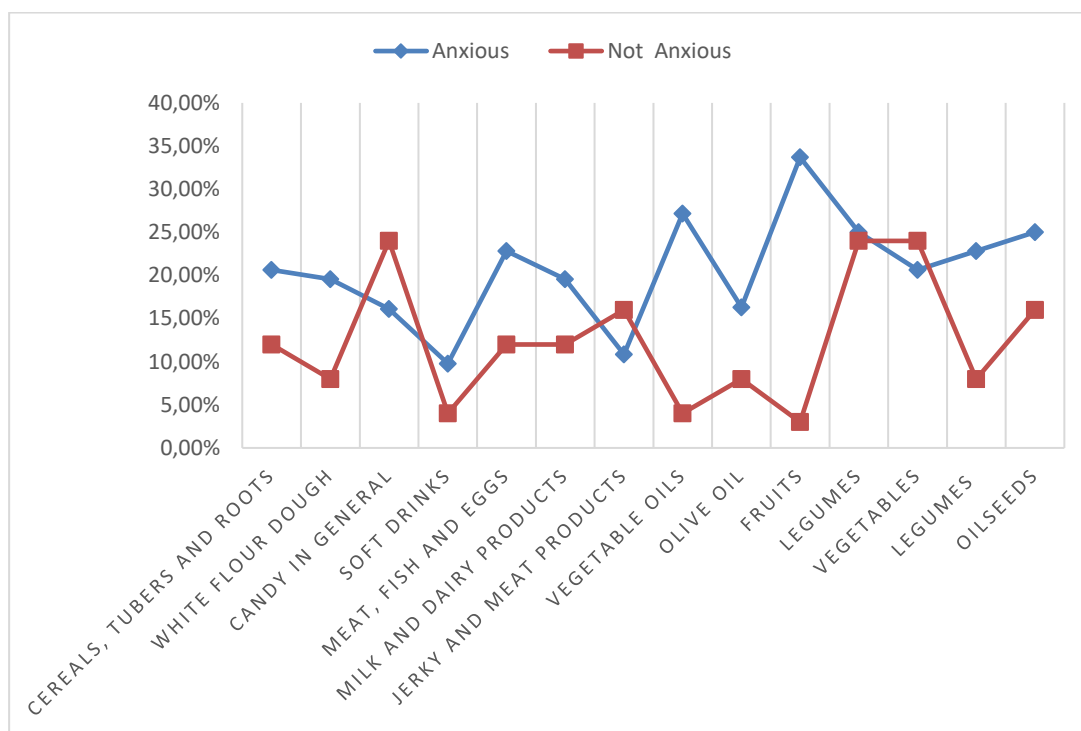
Table 2. Relationship between increased anxiety or stress with sex.

<i>Gender</i>	<i>Reported increased anxiety or stress during quarantine</i>	<i>They did not report increased anxiety or stress</i>
Female	65 (86.7%)	10 (13.3%)
Male	27 (64.35%)	15 (35.7%)
Total	92 (78.6%)	25 (21.4%)

Table 3. Relationship between anxiety and increased intake of specific food groups.

<i>Foods</i>	<i>Anxious or Stressed</i>	<i>Not Anxious or Stressed</i>
<i>cereals, tubers and roots</i>	18 (19.56%)	5 (20%)
<i>white flour dough</i>	34 (36.95%)	5 (20%)
<i>candy in general</i>	43 (46.73%)	9 (36%)
<i>soft drinks</i>	18 (19.56%)	6 (24%)
<i>meat, fish and eggs</i>	8 (8.69%)	8 (32%)
<i>milk and dairy products</i>	28 (30.43%)	10 (40%)
<i>jerky and meat products</i>	25 (27.17%)	4 (16%)
<i>vegetable oils</i>	19 (20.65%)	3 (12%)
<i>olive oil</i>	19 (20.65%)	3 (12%)
<i>fruits</i>	20 (21.73%)	10 (40%)
<i>vegetables</i>	15 (16.3%)	1 (4%)
<i>vegetables</i>	18 (19.56%)	2 (8%)
<i>legumes</i>	13 (14.13%)	4 (16%)
<i>Oilseeds</i>	11 (11.95%)	6 (24%)

Figure 1. Relationship between anxiety and increased intake of specific foods.



It was identified that there was a greater difference in the proportion of increase between the two groups in the white flour pasta category, where the anxious showed a greater increase in consumption, and in the meat, fish, and eggs group, in which the non-anxious showed a greater increase of consumption.

From **Figure 2**, it can be seen that there was a greater difference in the decrease between anxious and non-anxious in the category of vegetable oils, followed by pulses and white flour pasta. Analyzing the data

using the Odds Ratio method, it is identified that the chance of increasing the consumption of jerky and meat products, white flour pasta, sweets in general, vegetable oils, olive oil, legumes, and vegetables is greater in the declared group as anxious to the non-anxious or stressed group (**Table 5**).

The greatest chance of increase is expressed in the group of vegetables, where the chance of an anxious person to increase the consumption of this food category is 4.67 times greater compared to the non-

Table 5. Odds Ratio Calculation and p-value.

<i>Foods</i>	<i>ODDS RATIO</i>	<i>CI 95%</i>	<i>p-value</i>
<i>cereals, tubers and roots</i>	0.97	0.32-2.94	0.961
<i>white flour dough</i>	2.34	0.8-6.81	0.111
<i>candy in general</i>	1.56	0.62-3.88	0.338
<i>soft drinks</i>	0.77	0.26-2.20	0.626
<i>meat, fish and eggs</i>	0.2	0.06-0.61	0.003
<i>milk and dairy products</i>	0.65	0.26-1.63	0.365
<i>jerky and meat products</i>	1.95	0.61-6.27	0.251
<i>vegetable oils</i>	1.94	0.51-7.05	0.265
<i>olive oil</i>	1.94	0.51-7.05	0.265
<i>fruits</i>	0.41	0.16-1.06	0.064
<i>vegetables</i>	4.67	0.58-37.25	0.112
<i>vegetables</i>	2.97	0.6-12.96	0.173
<i>legumes</i>	0.86	0.25-2.95	0.814
<i>Oilseeds</i>	0.46	0.14-1.30	0.13

anxious group. On the other hand, the chance of someone declaring to be anxious to increase their consumption of meat, fish, and eggs is 0.8 times smaller than the chance of a non-anxious person to increase this consumption.

It is observed that anxious people are more likely to increase products composed of white flour dough and sweets in general, and less likely to increase their consumption of fruits, oilseeds, and legumes.

Discussion

Anxiety is clearly a disease that currently affects the world population in considerable proportions. In the present study, 65 women (86.7%) and 27 men (64.3%) reported being more anxious or stressed during quarantine.

Such pathology is characterized by intense concern and fear of everyday situations. In addition, individuals may also experience increased heart rate, rapid breathing, sweating, and feeling tired. According to a literature review on the incidence of anxiety disorders in the adult population, conducted by Remes et al. [7], the prevalence of anxiety disorder is almost twice as high in women as in men [8].

Like other psychological disorders, the phenomenon of anxiety is related to changes in eating behavior and can be triggered by numerous factors, being considered a psychological factor that can activate binge eating. According to a study that evaluated the relationship between psychological disorders and food intake in a group of women, it was observed that the participants reported that when they felt anxiety, they

were discouraged from continuing to diet, exercise, and take care of themselves [9].

However, although women suffer twice as much anxiety as men [8], this disorder is related to changes in eating behavior [9], according to a study conducted by Assumpção et al. [10], in a survey conducted in the city of Campinas, when analyzing the nutritional quality of a population sample through the application of the 24-hour recall, it was observed that women had a better quality diet when compared to men.

In the context of the study, the vast majority of participants declared themselves more anxious and/or stressed during the social isolation established during the COVID-19 pandemic. Among several triggering factors for this problem, there is uncertainty about the current moment and the future in relation to the development of the pandemic; the university obligations of study that, remotely, remained for the most part; the limitation imposed by social isolation on social interaction and the most diverse work and leisure activities; among other personal factors of each one [11].

Among the anxious ones, the foods that showed the greatest chance of having their consumption increased were sweets, white flour pasta, and jerky and meat derivatives (including sausages). In other words, high-calorie foods, which are associated with the pattern of emotional eating - this type of diet is described in the study "Association between stress and eating behavior in university students", carried out at the Federal University of Triângulo Mineiro, and is characterized by consuming food in search of relief from emotional tension [6]. This relationship is established because

high-calorie foods, especially carbohydrates, act by influencing the release of serotonin, which is an important neurotransmitter involved in the sensation of pleasure [6]. Furthermore, the trend towards a decrease in fruit consumption in the anxious group helps support this estimate.

Binge eating associated with anxiety is recurrent in many scientific studies [11,12], as the act of eating goes beyond the nutritional sphere, reaching the sociocultural aspect, as it is related to the demonstration of affection from preparation to the company at the time of snack. Therefore, it is used to relieve psychological stress. Furthermore, from the analysis of the different categories of food separately, the importance of food choice could be observed, which gives preference to foods with high energy value and which, in an intensified way, are associated with the feeling of pleasure when eating. This act of choice is related to an immediate gratification system, being a kind of escape during stressful situations [4]. It is important to mention another relevant survey along the data collected, which is the fact that there is a high prevalence of self-reported anxiety among students in the first grade of college (93.1%) when compared to other years.

Considering that the medical course is known to be quite demanding both from an intellectual and psychological point of view since its workload and content are extensive and require maximum dedication from the academic to the detriment of different areas of their life, it can be stated that several psychological disorders are caused by the academic branch of medicine, being even addressed by the study "The prevalence of symptoms of depression and anxiety among medical students: a multicenter study in Brazil" published by USP, in which 81.7% of the 1650 students evaluated claim to experience some state of anxiety during college [13,14].

Furthermore, when we consider the medical school as a factor aggravating anxiety, it is evident that those not used to the methodology of higher education proved to be the most worn out and, therefore, the most likely to develop anxiety. Thus, first-year students face greater difficulties in adapting to new educational methods, in addition to being exposed to a new environment full of uncertainties and new challenges, which gives them a significant change in their routine, which is an important triggering factor for anxiety as described in the article "Relationship between stressors, stress and anxiety" published in 2003 by the Revista de Psiquiatria of Rio Grande do Sul [15,16].

Based on the collected data, we note the importance of this study, since, according to the Expert Report on Diet, Nutrition and Chronic Disease

Prevention prepared by the UN Food and Agriculture Organization (FAO) and the World Organization Health (WHO) (2003), a diet based on low consumption of saturated fats, sugar and salt and high intake of vegetables and fruits, associated with regular physical activity helps in the prevention of several chronic non-communicable diseases (NCDs) [17], such as obesity, diabetes, cancer, stroke, and cardiovascular disease. In addition, physical inactivity, alcoholism, smoking, consumption of foods low in fiber and antioxidant vitamins and high in saturated fat, trans fat, and simple sugars have been identified as independent predictors of these diseases [18].

For a better quality of life, the dietary recommendations contained in the report include limiting the intake of fat between 15% to 30% of the total energy consumed daily, with less than 10% referring to saturated fat. Carbohydrates should provide 55% to 75% of that energy and for sweeteners, an intake of less than 10% is recommended. Proteins should represent 10% to 15%. Salt consumption should not exceed 5 grams daily and at least 400 grams of fruits and vegetables should be eaten daily [17].

According to Dr. Gro Harlem Brundtland, Director-General of WHO:

Most cases of chronic disease currently occur in developing countries. Our experience demonstrates that even the most modest of dietary and physical activity interventions, applied to a large population, can produce significant changes in the overall chronic disease burden in a short and surprising amount of time. [17].

In Brazil, about 70% of the causes of death in the adult population are due to these diseases [19]. Furthermore, Brundtland also states that high concentrations of saturated fats, sugar, and salt are unhealthy and that the intake of nutritionally poor foods is increasing worldwide, as well as physical inactivity [17]. This nutritional transition, marked by increased consumption of foods with high energy density and decreased consumption of fiber-rich foods, added to lifestyle changes were predisposing factors for the significant increase in the prevalence of overweight and obesity [18]. It is important to emphasize that this dietary pattern associated with smoking is the main cause of the increase in the incidence of CNCD [17].

Since the 1990s, the quantity of processed products has been expanding, mainly in middle-income countries like Brazil, researches have indicated an increase in ultra-processed foods and the increase in the use of ingredients such as oil and sugar, in addition to a reduction in fresh foods [19].

This reduction in the consumption of fresh foods seems to be accompanied by an increase in ultra-processed foods, which have a high content of sugars, fats, and sodium, and are low in fiber. These characteristics are risk factors for obesity, which may then be related to the growing increase in obesity in the country [20]. According to a survey carried out by Vigitel (Surveillance of Risk Factors and Protection for Chronic Diseases by Telephone Survey), in 2018, carried out in 27 Brazilian cities, overweight was observed in 55.7% of the population, while the frequency of adults obese was 19.8%. Food consumption of vegetables and fruits was 33.9%, being higher among females, and tending to increase with age and level of education. The amount recommended by the WHO is 5 daily servings of these foods, with this frequency observed for consumption is 23.1% among the group of adults interviewed. Soft drink consumption was 14%, tending to decrease with age and education level [21].

According to the Food Guide for the Brazilian Population (2014), in its 2nd edition, a classification also made by Monteiro et al. (2010) foods can be divided into natural and minimally processed; processed; in natural products with added salt or sugar and ultra-processed [22,23]. Fresh foods are obtained from plants or animals that have not undergone any change since they were removed from nature, while minimally processed foods are those submitted to the selection, cleaning, or hygiene processes that do not involve the addition of other substances to the original food. Natural foods derived from animals are rich sources of vitamins and proteins, while those of plant origin are rich in fiber [22].

Conclusion

The pandemic period triggered an increase in the feeling of anxiety in medical students, with a higher prevalence in females than in males, which is reflected in changes in the nutritional profile such as increased intake of high-calorie foods, as evidenced by greater propensity in the anxious group to increase the number of foods from the sweets and white flour pasta group in the routine menu. However, other food groups also had increased consumption and are also more likely to increase in the anxious group, such as vegetables, jerky and meat products, vegetable oils, olive oil, and vegetables. Thus, it is concluded that it cannot be stated with conviction that, in this study, anxiety is a risk factor for increased consumption of high-calorie foods, since there was an increase in heterogeneous food groups, while in others there were decreases. In addition, the sample, in this research, is shown as a limiting factor for

the precise analysis of this correlation, highlighting the need for further studies to contest this association, in order to trace the purpose. Impact of anxiety that affects the world population in nutritional intake, analyzing its changes and how they can be prevented. Since the excessive consumption of food groups such as white flour pasta, sweets, and jerky, as a result of this study, characterizes a diet that is harmful to health and increases the risk of developing obesity and non-communicable chronic diseases. Thus, it is inferred that there was an increase in food consumption, however, it is not possible to establish a relationship between the increase in food consumption identified in this study with the level of anxiety and/or self-reported stress, since the study presents some limitations.

Acknowledgement

Not applicable.

Funding

Not applicable.

Ethics approval

This study was analyzed and approved by the Research Ethics Committee (CEP) according to a substantiated opinion **number 4.373.785** and obtaining the patient's consent through the Informed Consent Form (TCLE) according to CNS/CONEP Resolution 466/12.

Informed consent

The patient signed the consent form.

Data sharing statement

No additional data are available.

Conflict of interest

The authors declare no conflict of interest.

About the license

© The author(s) 2021. The text of this article is open access and licensed under a Creative Commons Attribution 4.0 International License.

References

1. World Health Organization. Advice on the use of masks the community, during home care and in health care settings in the context of the novel coronavirus (2019-nCoV) outbreak Interim guidance, 29 Jan. 2020. WHO/nCov/IPC_Masks/2020.1. Available in: <https://www.who.int/emergencies/diseases/no>

- vel-coronavirus-2019/technical-guidance. Accessed in: October 2021.
2. Oliveira Tatiana Coura, Abranches Monise Viana, Lana Raquel Martins. (In)Segurança alimentar no contexto da pandemia por SARS-CoV-2. *Cad. Saúde Pública* [Internet]. Abr 2020 [Accessed in: October 2021; 36(4): e00055220. Available in: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2020000400501.
 3. Silva Isabel, Pais-Ribeiro J.L., Cardoso Helena. Porque comemos o que comemos: Determinantes psicossociais da seleção alimentar. *Psic., Saúde & Doenças* [Internet]. 2008 [citado 2020 Set 07]; 9(2): 189-208. Disponível em: http://www.scielo.mec.pt/scielo.php?script=sci_arttext&pid=S1645-00862008000200002.
 4. Penaforte FRO, Matta NC, Japur CC. Associação entre estresse e comportamento alimentar em estudantes universitários. *Demetra: alimentação, nutrição & saúde* [periódico da internet]. 2016 [acesso em 01 set 2020]; 11(1). Disponível em: <https://www.e-publicacoes.uerj.br/index.php/demetra/article/view/18592>.
 5. Pontes AAD. Ansiedade e Impactos Nutricionais Em Estudantes Universitários: Uma Revisão Integrativa. [monografia da internet]. Cuité. Monografia [graduação em nutrição] – Universidade Federal de Campina Grande; 2019 [acesso em 08 set 2020]. Disponível em: <http://dspace.sti.ufcg.edu.br:8080/xmlui/bitstream/handle/riufcg/12293/ANA%20ALICE%20DOMINGOS%20PONTES%20-%20TCC%20NUTRI%20c3%87%20c3%83O%20019.pdf?sequence=1&isAllowed=y>.
 6. Penaforte FRO, Matta NC, Japur CC. Associação entre estresse e comportamento alimentar em estudantes universitários. *Demetra: alimentação, nutrição & saúde* [periódico da internet]. 2016 [acesso em 01 set 2020]; 11(1). Disponível em: <https://www.e-publicacoes.uerj.br/index.php/demetra/article/view/18592>.
 7. Remes O, Brayne C, Linde RVD, Lafortune L. A systematic review of reviews on the prevalence of anxiety disorders in adult populations. *Wiley Periodicals* [periódico da internet]. 2016 Jun [acesso em 24 Jun 2020]; 6(7): [aproximadamente 33 p.]. Disponível em: <https://onlinelibrary.wiley.com/doi/epdf/10.1002/brb3.497>
 8. Somers JM, Goldner EM, Waraich P, Hsu L. Prevalence and Incidence Studies of Anxiety Disorders: A Systematic Review of the Literature. *Can J Psychiatry* [periódico da internet]. 2006 Fev [acesso em 24 jun 2020]; 51(2):100–113. Disponível em: <https://doi.org/10.1177/070674370605100206>
 9. Contribuições da psicologia e da nutrição para a mudança do comportamento alimentar França CL, Biagini M, Mudesto APL, Alves, ED. Contribuições da psicologia e da nutrição para a mudança do comportamento alimentar. *Estud. Psicol. (Natal)*. [internet]. 2012 Ago [acesso em 2020 Jun 24]; 17(2): 337-345. Disponível em: <https://doi.org/10.1590/S1413-294X2012000200019>
 10. Assumpção D, Domene SMA, Fisberg RM, Canesqui AM, Barros MBA. Diferenças entre homens e mulheres na qualidade da dieta: estudo de base populacional em Campinas, São Paulo. *Ciênc. saúde coletiva* [Internet]. 2017 Fev [acesso em 24 Jun 2020]; 22(2): 347-358. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232017000200347&lng=pt.
 11. Araujo J. Ansiedade e comportamento alimentar durante a pandemia. *Vittude Blog* [periódico na Internet]. 2020 jun [acesso em 31 ago 2020]. Disponível em: <https://www.vittude.com/blog/fala-psico/ansiedade-e-comportamento-alimentar-durante-a-pandemia/>.
 12. Gralle APBP. Associação entre estresse psicossocial no trabalho e compulsão alimentar: resultados da linha de base do ELSA-Brasil. Rio de Janeiro. Dissertação [Mestrado em Epidemiologia em Saúde Pública] – Escola Nacional de Saúde Pública Sergio Arouca; 2015.
 13. Mayer, Fernanda Brenneisen. A prevalência de sintomas de depressão e ansiedade entre os estudantes de medicina: um estudo multicêntrico no Brasil [tese]. São Paulo: Faculdade de Medicina; 2017 [citado 2020-08-30]. doi: 10.11606/T.5.2017.tde-13112017-154429.
 14. Lantyer A da S, Varanda CC, Souza FG de, Padovani R da C, Viana M de B. Ansiedade e Qualidade de Vida entre Estudantes Universitários Ingressantes: Avaliação e Intervenção. *Rev. Bras. de Ter. Comp. Cogn.* [Internet]. 24º de novembro de 2016 [citado 30º de agosto de 2020];18(2):4-19. Disponível em:

<http://www.usp.br/rbtcc/index.php/RBTCC/article/view/880>

15. Margis, Regina, Picon, Patrícia, Cosner, Annelise Formel, & Silveira, Ricardo de Oliveira. (2003). Relação entre estressores, estresse e ansiedade. *Revista de Psiquiatria do Rio Grande do Sul*, 25(Suppl. 1), 65-74. <https://dx.doi.org/10.1590/S0101-81082003000400008>
16. Alves T. Depressão e ansiedade entre estudantes da área de saúde. *Rev. Med. (São Paulo)* [Internet]. 4set.2014 [citado 30ago.2020];93(3):101-5. Available from: <https://www.revistas.usp.br/revistadc/article/view/103400>
17. Organização Mundial da Saúde. FAO/WHO iniciam um relatório pericial sobre dieta alimentar, nutrição e prevenção de doenças crônicas. World Health Organization 2003 Abr.:1-4. Disponível em: <http://www.who.int/>.
18. Azevedo ECC, Diniz AS, Monteiro JS, Cabral PC. Padrão alimentar de risco para as doenças crônicas não transmissíveis e sua associação com a gordura corporal - uma revisão sistemática. *Ciênc. saúde coletiva* 2014 Maio;19(5):1447-1458.
19. Machado FC, Adami FS. Relação do consumo de alimentos in natura, processados e ultra processados com gênero, idade e dados antropométricos. *RBONE* [Internet]. 22 de agosto de 2019 [acesso em 26 ago 2020];13(79):407-16. Disponível em: <http://www.rbone.com.br/index.php/rbone/article/view/975>
20. Martins APB, Levy RB, Claro RM, Moubarac JC, Monteiro CA. Participação crescente de produtos ultraprocessados na dieta brasileira (1987-2009). *Rev. Saúde Pública* [Internet]. Ago 2013 [acesso em 26 ago 2020]; 47(4): 656-665. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102013000400656&lng=en. <https://doi.org/10.1590/S0034-8910.2013047004968>.
21. Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Análise em Saúde e Vigilância de Doenças não Transmissíveis. *VIgitel Brasil 2018: Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros* e no Distrito Federal em 2018. Brasília, DF: Ministério da Saúde, 2019 [acesso em 26 ago 2020]. Disponível em: <https://portalarquivos2.saude.gov.br/images/pdf/2019/julho/25/vigitel-brasil-2018.pdf>
22. Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. *Guia Alimentar Para População Brasileira*. 2. ed. Brasília, DF: Ministério da Saúde; 2014 [acesso em 26 ago 2020]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/guia_alimentar_populacao_brasileira_2ed.pdf
23. Monteiro CA, Levy RB, Claro RM, Castro IRR, Cannon G. A new classification of foods based on the extent and purpose of their processing. *Cad. Saúde Pública* [Internet]. Nov 2010 [acesso em 26 ago 2020]; 26(11): 2039-2049. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2010001100005&lng=en. <https://doi.org/10.1590/S0102-311X2010001100005>.