

# Incidence of Intestinal Constipation During the COVID-19 Pandemic Period in Medical Students from a Private Institution in São Paulo, SP

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## Abstract

### Keywords

- chronic intestinal constipation
- coronavirus pandemic
- medical students
- ROME criteria
- feces consistency

**Introduction** Chronic intestinal constipation (CIC) presents an incidence of 2.6 to 30.7% in the overall population and due to the social reality imposed by the coronavirus pandemic, some behavior changes in the Brazilian population occurred that might or not be associated with alterations of CIC prevalence.

**Objective** To assess CIC incidence in medical students before and during the COVID-19 pandemic in Brazil in a private higher educational institution in the city of São Paulo, state of São Paulo.

**Methods** Clinic data were collected through Google Forms software from the same students seeking to analyze the variables before (year of 2019) and during the coronavirus pandemic. The data were: age, sex, body mass index, constipation referred in a subjective way and confirmed through the ROME III criteria, feces consistency and anxiety and/or depression during the pandemic.

**Results** A total of 126 medical students from a private higher education institution from São Paulo, SP were included. The average age was 22.9 years old, 70.6% were female and the average BMI was 23.3 kg/m<sup>2</sup>. Regarding the ROME III criteria, 32.5% presented > 2 in 2019 and 42.1% during the pandemic. Concerning the feces consistency, 31.75 and 35.71% presented dry Bristol 1 feces or in both periods, respectively.

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**Conclusion** It was observed an increase in the prevalence of chronic intestinal constipation in medical students from a private higher education institution from São Paulo, state of São Paulo, during the COVID-19 pandemic, as well as dryness in the feces.

## Introduction

Chronic intestinal constipation (CIC) presents an incidence of 2.6 to 30.7% in the overall population. It is a multifactorial condition mainly related to age, female sex, low social economic level, low education, inadequate diet, endocrine and metabolic dysfunctions, physical inactivity, psychiatric disorders, medication use, idiopathic causes, and sedentary lifestyle; it is more frequently noted in industrialized countries.<sup>1-5</sup>

Chronic intestinal constipation can be classified as having primary or secondary causes. Primary causes are intrinsic problems of intestine, subdivided into normal-transit constipation, slow-transit constipation and anorectal dysfunction or obstructed defecation, according to its pathophysiology. The majority of the cases is attributed to functional disorders without structural abnormality, since 68% with normal-transit, 27.6% obstructed defecation and 4.3% with slow-transit or colonic inertia.<sup>5-7</sup> On the other hand, the secondary CIC are related to gastrointestinal, metabolic and endocrine disorders, neurologic conditions, and medication use.<sup>1-3</sup>

Obstructed defecation syndrome is diagnosed through clinical criteria influenced by cultural customs and lifestyle;<sup>6,7</sup> it is defined as unsatisfactory defecation – characterized by unfrequented evacuations or difficulties with feces transit –, dried feces or feeling of incomplete evacuation and the use of digital stimulation to facilitate exoneration.<sup>7-12</sup>

Due to the COVID-19 pandemic, Brazilians started to practice less physical activity, increased time spent on screen (television, tablet and/or computers), reduced the consumption of healthy food and increased the consumption of processed food, as well as the consumption of alcohol and cigarettes as a result of imposed social restrictions.<sup>8,9</sup> Therefore the relevance of the questioning of how the social reality imposed by the COVID-19 pandemic and the change in habits latched on to it, may have altered the bowel movements and influenced the incidence of intestinal constipation in the overall population or in specific groups that somehow may represent it..

## Objective

To assess CIC incidence in medical students before and during the COVID-19 pandemic in Brazil in a private higher educational institution in the city of São Paulo, state of São Paulo, Brazil.

## Material and Method

This is a clinical retrospective observational quantitative cohort study that is focused on the bowel habits of medical

students enrolled in the Medical School Program at Faculdade Santa Marcelina, São Paulo, state of São Paulo, Brazil, during the pandemic. The research was done through an individual questionnaire and identified only to ensure a single answer presenting objective questions elaborated by Google Forms software.

After the data collection period was closed, the application itself computed the answers of the volunteers as tables and graphics in a way to exempt media bias included in the names.

The following questionnaire was developed by the authors, and it is based on objective criteria and spontaneous report.

1. Age, sex, weight, and height (body mass index [BMI])
2. Did you present intestinal constipation in 2019 presented? (Yes or no.)
3. Symptoms presented in 2019, based on the ROME III criteria.<sup>10</sup>
4. Feces consistency according to the Bristol Scale<sup>13</sup> in the year of 2019 (the most prevalent one)
5. Presented anxiety or depression disorders during the pandemic? (Yes or no.)
6. Noticed constipation after the beginning of the COVID-19 pandemic? (Yes or no.)
7. Symptoms presented during the pandemic, based on the ROME III criteria.<sup>10</sup>
8. Feces consistence<sup>13</sup> during the pandemic (the commonest one)

## Ethical Aspects

The present study counted on the voluntary data collection through online formularies and the volunteers answered after completing and accepting electronically a Free and Informed Consent Term. The study was submitted to the Research Ethics Committee from Faculdade Santa Marcelina (COPFASM) and to the Ethics Committee from Associação Santa Marcelina under the number 53879621.0.0000.0066

## Statistical Analysis

All the analyses were executed using the BioStat 5.0.1 (Sociedade Civil Mamirauá: Belém, Pará-Brasil). The sample was composed by dependent groups and the McNemar test was applied in order to compare the qualitative variables. In all the analyses,  $p < 0.05$  was considered as statistically significant.

## Results

**a) Overall data:** 126 medical students from a private higher educational institution in the city of São Paulo,

state of São Paulo, Brazil. The mean age was 22.9 years old (18–45 years old), 89 participants were females (70.6%) and the average BMI was 23.3 Kg/m<sup>2</sup> (17.3–35.9 Kg/M<sup>2</sup>)

**b) Results prior to the pandemic:** Thirty-five students (27.8%) claimed to present CIC, 77.1% were female.

Applying the objective criteria of CIC, it is observed that 34.1% presented  $\geq 2$  criteria and 80.5% were females. Among the ones that previously considered themselves constipated, 80% presented  $\geq 2$  criteria. Thus, the concordance between the self-declaration and the objective diagnosis using the ROME III criteria<sup>10</sup> was 84.1%, meaning that there is 85.7% accordance between the nonconstipated and 80% between the constipated.

Using the Bristol Chart<sup>13</sup> to analyze feces consistency, it was observed that, among the students who presented CIC, 51.4% presented type 1 or 2, 34.3% type 3 or 4, and 14.3% consistency type 5, 6 or 7 (**Graph 1**). On the other hand, among the nonconstipated, type 1 or 2 was presented in 24.2%, type 3 or 4 in 69.2%, and consistency 5, 6 or 7 in 6.6% of students (**Graph 2**).

**c) Results during the pandemic:** Twenty students (57.1%) from those who claimed to present CIC kept the

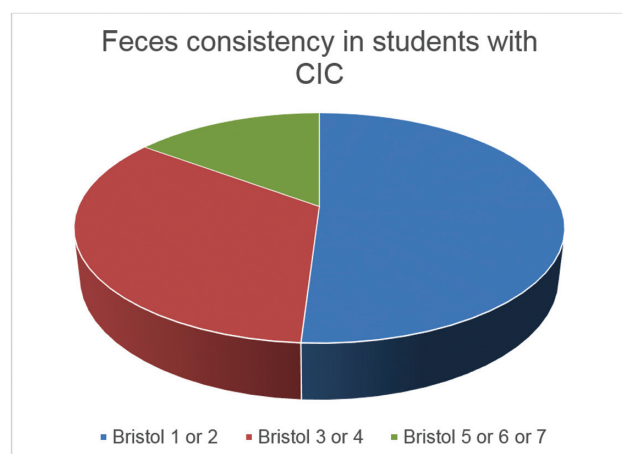
same answer and 27 students who did not consider themselves presenting CIC started to declare to present the condition. Therefore, during the pandemic, the prevalence became 37.3% and the incidence, 29.6%.

When applying the objective criteria for chronic intestinal constipation, it was noted that 42.1% of the students who presented  $\geq 2$  criteria; among those who previously considered themselves as constipated, 80.8% presented  $\geq 2$  criteria. Thus, the concordance between self-declaration and objective diagnosis by ROME III<sup>10</sup> criteria was 80.9%, 81% for the nonconstipated and 80.8% for the constipated.

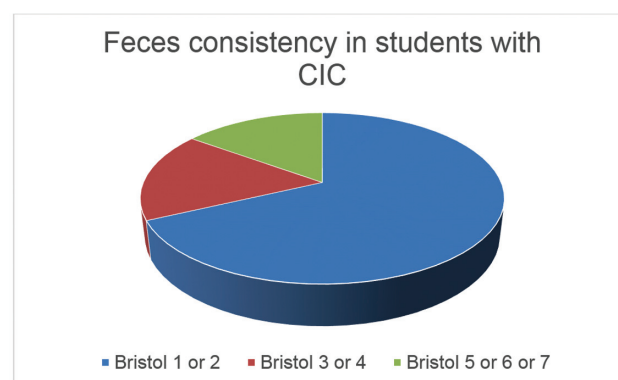
Analyzing feces consistency<sup>13</sup> during the pandemic, it was noticed that, among the students who presented CIC, 68.1% presented type 1 or 2, 17% presented types 3 or 4 and 14.9% presented consistency type 5, 6 or 7 according to the Bristol Stool Chart (**Graph 3**). In contrast, among the nonconstipated ones, type 1 and 2 was present in 17.8%, types 3 and 4 in 67% and consistency 5, 6 or 7 in 15.2% of students (**Graph 4**).

During the pandemic, 105 students (83.3%) affirmed some type of anxiety disorder, the constipated ones were the most anxious, with 93.6% of affirmation. On the other hand, among those who denied CIC, 78% considered themselves anxious.

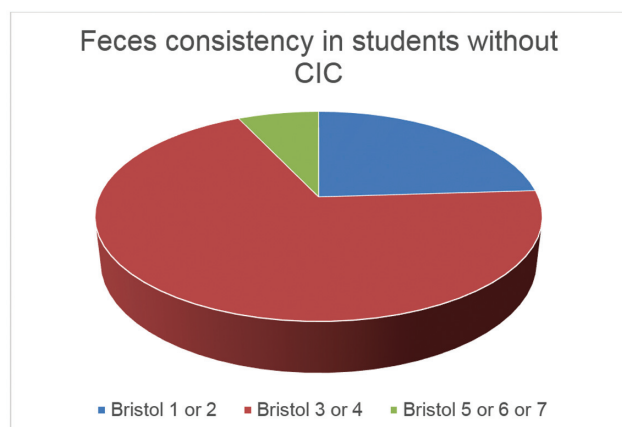
During this period, 44 students (34.9%) used some kind of medication, from which 56.8% were consumed by those who self-declared CIC. In addition, among those with CIC, 29.8%



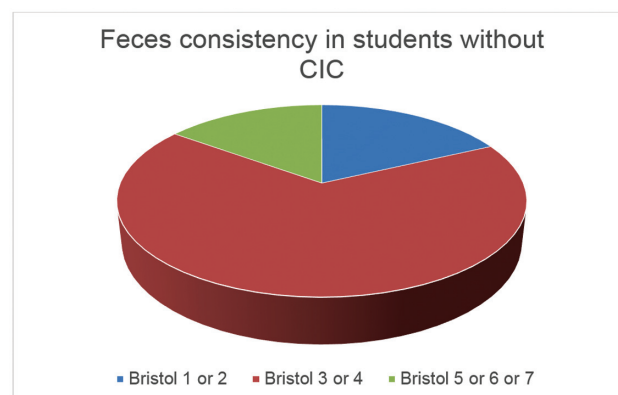
**Graph 1** Feces Consistency (Bristol Chart) among the CIC students in the year of 2019.



**Graph 3** Feces Consistency (Bristol Chart) among the CIC students during the pandemic.



**Graph 2** Feces Consistency (Bristol Chart) among the non-CIC students in the year of 2019.



**Graph 4** Feces Consistency (Bristol Chart) among the non-CIC students during the pandemic.

**Table 1** Comparison between data related to constipation and feces consistence before and during the COVID-19 pandemic

	Prepandemic	During pandemic
Self-declared CC	27.8%	37.3%
CC according to ROME III <sup>10</sup> ( $\geq 2$ )	34.1%	42.1%
Feces consistence among nonconstipated students <sup>13</sup>	Bristol 1 or 2: 24.2% Bristol 3 or 4: 69.2% Bristol 5, 6 or 7: 6.6%	Bristol 1 or 2: 17.8% Bristol 3 or 4: 67% Bristol 5, 6 or 7: 15.2%
Feces consistence among constipated students <sup>13</sup>	Bristol 1 or 2: 51.4% Bristol 3 or 4: 34.3% Bristol 5, 6 or 7: 14.3%	Bristol 1 or 2: 68.1% Bristol 3 or 4: 17% Bristol 5, 6 or 7: 14.9%
Consistence of dry feces (Bristol 1 or 2) <sup>13</sup>	40 (31.75%)	45 (35.71%)
Concordance between the self-declared and the objective diagnosis using the ROME III criteria <sup>10</sup>	84.1%	80.9%

used psychoactive drugs during the pandemic, against only 15.2% of students without CIC.

#### d) Comparison of the results between prior to and during the pandemic:

In ►Table 1, the pre-pandemic data and data during the pandemic are compared regarding the bowel habits of medical students from a private higher educational institution in the city of São Paulo, state of São Paulo, Brazil. It is observed an increase in both self-declared CC and CC based on objective criteria. Moreover, there was a worsening in feces consistence mainly among the constipated students.

## Discussion

### CIC Incidence in College Students

Gastrointestinal disorders are highly prevalent in medical students around the world, as they can be associated to the duties and routine of academic life, behavioral changes, stress, alteration in eating habits, psychosomatic issues, and life quality of these young adults.<sup>14–19</sup>

It is known that the general incidence of CIC is widely variable in the overall population due to many factors<sup>1–4</sup> and, among medical students, it can reach 34%, higher than the level of other university courses.<sup>15,20–24</sup> Gallas et al.,<sup>25</sup> in their pilot study involving medical students from Tunisia, revealed a CIC prevalence of 11.6%. De Aquino et al.,<sup>26</sup> assessing CIC in medical students from a higher educational institution from the state of Tocantins, Brazil, showed a self-declared prevalence of CIC of 15.5 and 26.7% according to the ROME III criteria. Similarly, Trisóglis et al.<sup>18</sup> indicated that 35% of medical students from an institution in northwestern São Paulo state presented constipation, from which the great majority were females (55%).

Regarding the other university courses, it was observed a CIC prevalence of 44%, with higher frequency in females (85%) among physiotherapy students.<sup>27</sup> Jaime et al.,<sup>11</sup> assessing CIC in 200 undergraduates in the state of Goiânia, Brazil, concluded, according to the ROME III criteria,<sup>10</sup> that CIC prevalence was 40%. Lastly, a research with students from the nutrition course showed a CIC frequency of 22.5%.<sup>28</sup>

In the present study, 35 students (27.8%) declared having CIC before the COVID-19 pandemic, from which 77.1% were females. When the ROME III<sup>10</sup> criteria were applied to the objective diagnosis of CIC, the prevalence was even higher: 34.1%, from which 75.5% were females. Studies involving college students, such as the present study, demonstrate a higher proportion of women in relation to men.<sup>15,20</sup> Goyal et al.<sup>21</sup> assessed 1.309 students and evidenced a higher CIC prevalence in females (32.3 versus 17.6%;  $p < 0.001$ ).

### The Impact of the Pandemic on CIC Incidence

The COVID-19 pandemic caused many negative consequences around the world due to social isolation, changes in behavior and lifestyle and an increase of prevalence of psychiatric and psychological disorders.<sup>29,30</sup> In the present study, an increase was observed in the CIC prevalence among medical students from a private higher educational institution in São Paulo, the capital, from 34.1 to 42.1%.

Kayaoglu et al.<sup>31</sup> revealed a decrease in CIC prevalence after social isolation of 15.1 to 1.3% in the general population. Remes-Troche et al.,<sup>32</sup> on the other hand, evidenced in 1.110 volunteers the appearance of complains related to constipation in 25% after 4 weeks of social isolation.

Cabral et al.<sup>43</sup> analyzed CIC prevalence in teachers during the pandemic and observed that 7% kept the intestinal constipation profile, 4.65% presented risks of developing it, and 7% started to present it. In another paper, involving an elderly group, CIC was demonstrated in 22.6% after the pandemic.<sup>34</sup> Finally, a study evaluated the bowel transit of 142 individuals during the pandemic and it presented that 19% showed CIC during the period.<sup>35</sup>

### The Importance of Objective Analysis Criteria in the Investigation and Clinic History of Patients who Suffer from CIC During the Pandemic

The use of objective data in the assessment of CIC patients is paramount for the correct diagnosis and in the verification of answers obtained through the diverse modalities of treatment. Among these ways, the ROME III criteria<sup>10</sup> and feces consistency<sup>13</sup> are well-established methods in the scientific literature and were applied to all students in the present study.<sup>2–4,7</sup>

Lemay et al.<sup>36</sup> have demonstrated with the use of the Bristol Chart feces consistency<sup>13</sup> the relation between dry feces, eating habits and stress ( $p=0.003$ ). A study in the northwestern region of São Paulo<sup>18</sup> in medical students has shown that 30% presented dry feces (Bristol 1 or 2), and another paper has verified that 18.4% of the general population presented the same feces consistence.<sup>35</sup>

Therefore, it may explain the increase of dry feces (Bristol 1 or 2<sup>13</sup>) from 51.4% to 68.1% with the pandemic among the undergraduates of the present study who affirmed having CIC at the time. Besides that, the concordance between hard stools (Bristol 1 or 2<sup>13</sup>) and the spontaneous affirmation of CIC was 68%, and 58.5% with ROME III objective criteria.<sup>10</sup>

The correlation between CIC self-affirmation and the establishment of clinic diagnosis by ROME III criteria allows one to identify the concordance in epidemiologic studies. Corrêa Neto et al.<sup>3</sup> have identified a substantial concordance with Kappa of 0.665. On the other hand, one study has analyzed CIC in health students and has revealed the prevalence of self-declared CIC of 16.6% and by ROME III criteria<sup>10</sup> of 14.5% in concordance with only 30%.<sup>37</sup> In the present study, however, the concordance between self-declared CIC and the ones determined by ROME III criteria was 80.9%.

### The Impact of the Pandemic on the Diagnosis of Anxiety and its Relation to CC

The COVID-19 pandemic and the measurements taken to fight the infection greatly altered the routine of college students around the world. For that matter, research has demonstrated the relation between social isolation and anxiety in the population.<sup>28,29</sup> Chang et al.<sup>30</sup> showed in their meta-analysis that during the pandemic the anxiety prevalence in college students was 31% (95% confidence interval [CI]: 23–39%). Likewise, Son et al.<sup>38</sup> e Wang et al.<sup>39</sup> demonstrated a prevalence of 71% of anxiety related to the pandemic, the latter involved 2.031 undergraduates. Similarly, other study presented the prevalence of mild to severe anxiety in 55.9%.<sup>40</sup>

In the present study, 83.3% of the medical students from a private higher educational institution of São Paulo, state of São Paulo, Brazil, claimed to have some kind of anxiety disorder, the prevalence among the constipated being 93.6% against 78% among the nonconstipated. Besides that, among those with CIC, 46.8% used psychoactive drugs during the pandemic, against only 6.3% of students without CIC.

Many authors reinforce that the gastrointestinal disorders, such as constipation, are somehow associated to depression and anxiety.<sup>24,41</sup> Fond et al.<sup>42</sup> presented in their meta-analysis collecting 10 studies that people who suffered from CC presented considerable higher levels of anxiety than nonconstipated individuals (95%CI: 47–69%;  $p < 0.01$ ). In the pilot study with medical students from Tunisia, anxiety was a risk factor to gastrointestinal disorders as CC (aOR = 2.5; 95% CI: 1.1–5.8).<sup>25</sup> Similarly, in another study, the presence of anxiety was the second higher risk related to bowel constipation (aOR = 2.44; 95%CI: 1.30–4.55), only behind the observed risk in females (aOR = 2.89; 95%CI: 1.65–5.05).<sup>15</sup>

## Conclusion

It was observed an increase in CIC in college students from a private higher educational institution of São Paulo, state of São Paulo, Brazil, during the COVID-19 pandemic, as well as the dryness of feces; however, without statistical significance.

### Conflict of Interests

The authors have no conflict of interests to declare.

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