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Between knowledge and risk: prevalence and patterns of self-medication among medical students in northern Brazil

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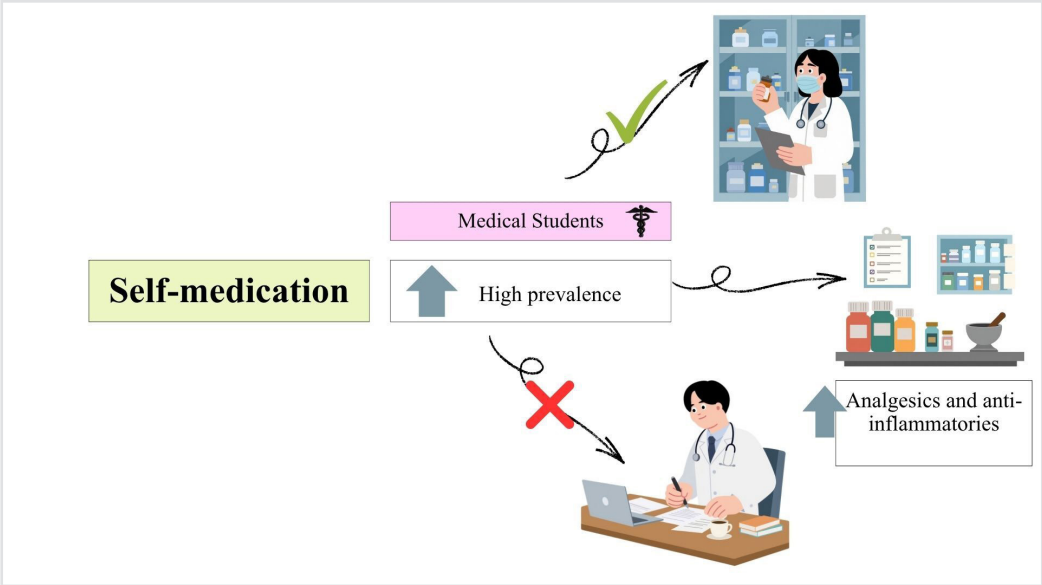
Highlights

- *Approximately 94.4% of medical students reported self-medication practices, primarily with analgesics and anti-inflammatory drugs.*
- *Lack of time, prior use of medications, and confidence in one's own knowledge were the main motivating factors.*
- *It was observed that 80.6% sought advice from pharmacists or pharmacy attendants.*
- *Despite technical knowledge, gaps regarding risks and adverse effects persist, reinforcing the need for education on rational medication use.*

Graphical Abstract



Abstract

Self-medication is a widely prevalent practice and represents an important public health challenge, particularly among health sciences students. This study aimed to describe the prevalence and patterns of self-medication among medical students at a university in northern Brazil. This was a cross-sectional, quantitative, descriptive-analytical study conducted with 216 students. Data collection was performed using a self-administered, anonymous questionnaire adapted from a previously validated instrument. The investigated variables included frequency of self-medication, motivating factors, drug classes used, sources of advice, and knowledge regarding risks and adverse effects. The majority of participants were female (70.8%). Purchase of medications without a prescription was reported by 94.4% of students, and 80.6% reported seeking advice from pharmacists or pharmacy attendants. Analgesics and anti-inflammatory drugs were the most frequently used drug classes. Regarding knowledge of adverse effects, 59.7% reported knowing most of them, while only 12.5% claimed to know all of them. A high prevalence of self-medication was observed among the evaluated students, primarily associated with prior familiarity with medications, lack of time for medical consultations, and the perception of sufficient pharmacological knowledge. The results reinforce the need for educational strategies during medical training focused on rational medication use.

Keywords: Self-Medication. Rational Drug Use. Medical Students. Cross-Sectional Studies.

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INTRODUCTION

Self-medication is defined by the World Health Organization (WHO) as the administration of medications for the control or treatment of self-diagnosed diseases, or for recurrent illnesses and symptoms. Self-medication is also defined as the use of medications without medical guidance, the use of previously prescribed drugs for new conditions, the sharing of medications among friends or family members, among other practices[1]. This practice is highly prevalent in various countries. Some health entities have estimated that at least 50% of prescribed medications are dispensed incorrectly; in developing countries, approximately 80% of medications sold are purchased without a medical prescription[2]. Several over-the-counter drugs present harmful interactions in the body, such as Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), considered the most common agent causing drug-induced liver injury in Latin America[3]. In this context, the reasons that may motivate self-medication are numerous and individual. Among them, one may cite the local healthcare system, socioeconomic status, gender, and age[4].

During the COVID-19 pandemic, self-medication gained greater significance, driven by difficulties in accessing healthcare services, fear of contagion, and the widespread circulation of information, even without scientific support. High consumption of analgesics, antipyretics, anti-inflammatory drugs, vitamins, supplements, antibiotics, and drugs such as ivermectin and hydroxychloroquine was observed, widely promoted as therapeutic alternatives despite the absence of scientific evidence of efficacy against the disease[5]. Furthermore, it is important to emphasize that the tendency toward self-medication is not restricted to the lay population. Health sciences students present high rates of self-medication. Facilitated access to medications and the perception of professional self-sufficiency lead to low utilization of healthcare professionals and ultimately encourage this behavior[6]. It is also worth noting that, although knowledge varies considerably between the beginning and end of undergraduate programs, self-medication is a constant practice throughout all academic years[4].

Self-medication among medical students presents an apparent paradox: despite greater access to pharmacological knowledge, this group frequently adopts potentially risky practices. Health behavior models, such as the Health Belief Model, suggest that individuals may underestimate risks when they perceive greater control over a situation or when previous positive experiences reinforce a given behavior. In the academic context, factors such as high workload, perception of technical self-sufficiency, and facilitated access to medications may contribute to the normalization of self-medication.

In this scenario, it becomes essential to investigate self-medication patterns among medical students. Despite the technical mastery related to pharmacology, the use of medications without adequate medical evaluation also proves detrimental to this group, particularly because it may mask relevant symptoms and compromise the educational process aimed at ethical and responsible clinical conduct. Thus, the present study aims to describe the prevalence, patterns of use, and factors associated with self-medication practices among medical students at a university in northern Brazil.

METHODOLOGY

Study characteristics

This was a cross-sectional, quantitative, descriptive-analytical study. It was conducted among students enrolled in the medical program at the Universidade de Gurupi – Campus Paraíso do Tocantins, located in the municipality of Paraíso do Tocantins, northern Brazil. The primary objective was to investigate the frequency and patterns of self-medication among students, as well as to identify the most commonly used medications, the motivating factors for the practice, and the self-reported level of knowledge regarding associated risks. This study followed all ethical review steps, having been conducted only after approval by the Human Research Ethics Committee (CEP), under approval number 7.596.559.

Selection criteria

The study population comprised students regularly enrolled from the second through the ninth cohort of the medical program (first through eighth semester). The first cohort was excluded from the sampling frame, as students were completing their internship and were therefore outside the regular academic environment during the data collection period. The sample size was calculated using the formula for simple random sampling, considering a 95% confidence level and a 5% margin of error, yielding a minimum estimated sample size of 216 participants. Respondents were selected by convenience sampling, including students who were available and willing to participate at the time of instru-

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ment application. It is important to note that this sampling approach limited the generalizability of results to other institutions.

All students under 18 years of age, those with irregular enrollment, those who did not consent to participate, those who did not sign the Free and Informed Consent Form (FICF), or those who did not complete the questionnaire in full were excluded from the study.

Data collection procedures

The instrument was adapted from the questionnaire validated by Servidoni *et al.* (2006)[7]. Adaptations were made to suit the study population context, including the addition of questions on recent frequency of self-medication and sources of advice. The instrument was previously reviewed by researchers in the field and subjected to a pilot test with students to verify clarity and comprehension. It is important to note that the self-administered nature of the questionnaire may generate recall and social desirability bias.

Data collection was conducted from May to August 2025. A questionnaire was made available digitally through the Google Forms platform. The form link was shared with students via QR code posted in common-use areas of the university and distributed through messaging applications and social media.

Data analysis

Descriptive analysis of the variables was performed initially. Data normality was assessed using the Kolmogorov–Smirnov test. The Kruskal–Wallis test was used for comparisons between academic semesters. Associations between categorical variables were assessed using the chi-squared test, adopting a significance level of 5%.

RESULTS

Participant profile

A total of 216 medical students completed the questionnaire. Table 1 summarizes the participant profile. Based on the results, a predominance of female participants was observed: 154/216 (71.3%), followed by male participants: 62/216 (28.7%). Students in the basic cycle (first through fourth semester) accounted for 123/216 (57%) of responses, while those in the clinical cycle (fifth through eighth semester) represented 93/216 (43.1%). Regarding the distribution by semester, the highest proportion was from the first semester: 42/216 (19.6%), and the lowest from the eighth semester: 18/216 (8.3%). The predominant age group was 18 to 22 years: 133/216 (61.6%), followed by 23 to 27 years: 66/216 (30.6%), with only 2/216 (0.9%) participants aged 38 years or older.

Table 1 - Distribution of characteristics associated with participant profile.

Variable	N	(%)
Sex		
Female	154	71.3
Male	62	28.7
Age		
18–22 years	133	61.6
23–27 years	66	30.6
28–32 years	10	4.6
33–37 years	5	2.3
≥ 38 years	2	0.9
Academic semester		
1st semester	42	19.4
2nd semester	37	17.2
3rd semester	19	8.8
4th semester	25	11.6
5th semester	20	9.2
6th semester	21	9.7
7th semester	34	15.8
8th semester	18	8.3

Degree of knowledge on self-medication and main justifications

The results show that the majority of participants purchase medications without a medical prescription: 204/216 (94.4%). Furthermore, it is observed that even though participants consider themselves to have sufficient knowledge acquired through the medical program — 149/216 (69%) — self-medication remains frequent among these students. Table 2 presents the results related to the degree of knowledge in greater detail.

Table 2 - Degree of participant knowledge regarding self-medication.

Variable	N	(%)
Purchase of medications without a medical prescription		
Yes	204	94.4
No	12	5.6
Advice sought from pharmacist or pharmacy attendant		
Yes	174	80.6
No	42	19.4
Last medical consultation in recent months		
Less than 1 week ago	21	9.7
Between 1 week and 1 month ago	40	18.5
Between 1 and 3 months ago	57	26.4
More than 3 months ago	71	32.9
Does not recall	27	12.5
Complete knowledge of medication side effects		
No, but aware of most	129	59.7
No, but believed benefits would outweigh risks	60	27.8
Yes, all side effects	27	12.5
Knowledge of self-medication risks		
Sufficient knowledge acquired through the medical program	149	69.0
Lay knowledge	49	22.7
Insufficient knowledge	18	8.3

Figure 1 illustrates the main reasons reported for self-medication, which include: prior use of the medication, lack of time to seek a medical professional, and knowledge acquired through the medical program. Other reasons cited included long waiting times and the high cost of specialist medical consultations, as well as the ease of obtaining medications without a prescription. Furthermore, 137 participants reported that, in the past six months, self-medication accounted for most of their medication use; 26 individuals self-medicated on every occasion they used a medication; 50 did so on the minority of occasions; and 3 participants reported never having self-medicated, a result that may reflect individual variability or possible self-report inconsistency.

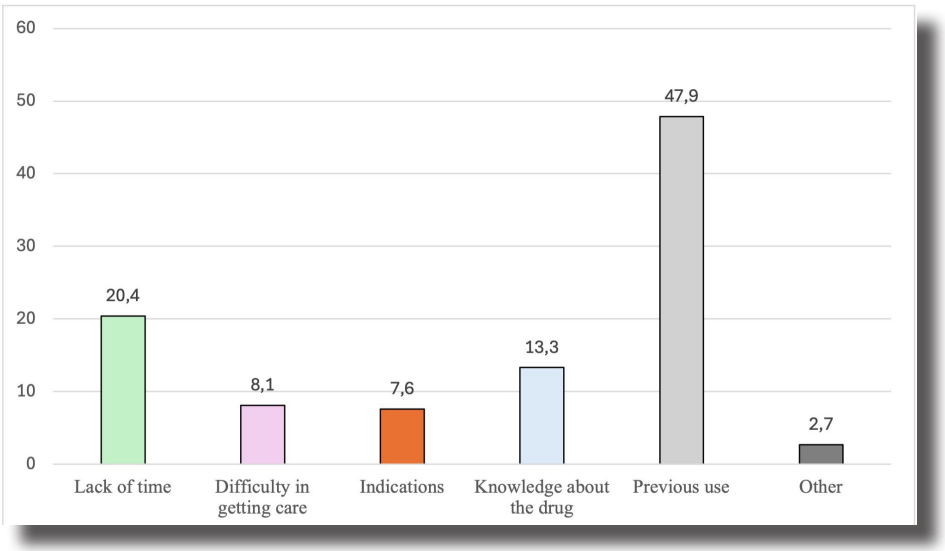

Figure 1 - Main justifications for self-medication.

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Classification of medications used by participants

The most commonly used drug classes were analgesics, anti-inflammatory drugs, cough syrups, antiallergic agents, and antibiotics. However, the use of psychostimulants, antidepressants, and benzodiazepines was also observed. The main symptom reported as the reason for self-medication was headache, followed by the common cold, allergies, and gastrointestinal infections. Candidiasis, bacterial vaginosis, lack of focus, and sadness were also mentioned. Figure 2 represents the proportion of these results.

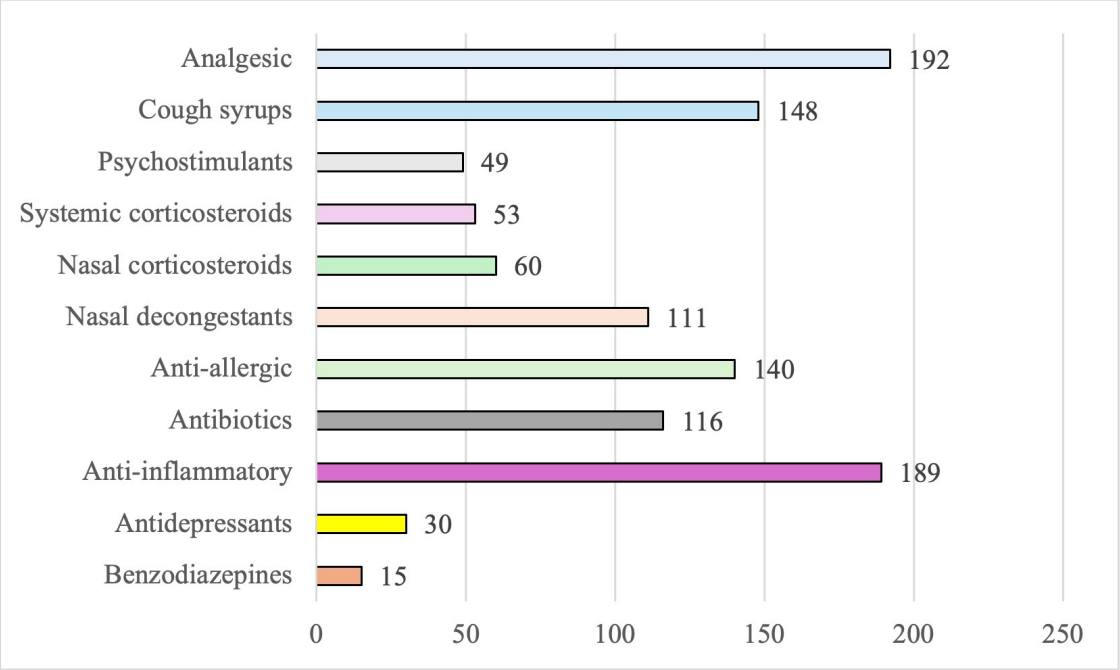

Figure 2 - Types of medications used through self-medication.

Analysis of self-medication practices across academic cohorts

Inferential statistical analysis was performed to verify possible statistical associations between academic semesters and self-medication practices. Based on this analysis, the cohorts with the highest mean scores (indicating greater self-medication) were the eighth and fifth semesters (mean 2.11 and 2.10, respectively). Considering $p < 0.05$, the Kruskal–Wallis test revealed that the difference was not statistically significant across all cohorts ($p = 0.0879$), nor in pairwise comparisons with correction (no significant differences after adjustment). In practical terms, it is not possible to statistically affirm that any particular cohort practices self-medication more than the others.

However, an isolated comparison was also performed between the cohorts with the greatest knowledge discrepancy: the first semester (beginning of the basic cycle) and the eighth semester (end of the clinical cycle). The application of the chi-squared test between cohorts and self-medication categories (4 categories) yielded $p = 0.0199$, demonstrating statistical evidence of an association between cohort and self-medication category by the chi-squared test ($p < 0.05$).

We acknowledge the limitations of this study, particularly regarding sample size, which was small and composed predominantly of students from the more recently established cohorts of the university, which may have affected the results. For future research, evaluation of a larger sample is recommended.

DISCUSSION

The findings of this study demonstrate a high prevalence of self-medication among medical students (94.4%), a value higher than that reported in previous studies, such as Lekhak *et al.* (2024)[8], with a prevalence of 67.7%, and Hassan and Koabar (2025)[9], who observed 71% in medical students from different contexts. It should be noted, however, that these investigations involved larger samples (n = 322 and n = 256, respectively) and distinct sociocultural contexts, which may directly influence the observed patterns. This discrepancy suggests that local factors, such as healthcare system organization, access to services, and characteristics of medical training, may modulate self-medication practices.

The high frequency observed can be interpreted through theoretical models of health behavior, such

as the Health Belief Model, in which reduced perception of susceptibility and confidence in technical knowledge may lead to the adoption of risk behaviors. In this context, medical training may contribute to a perception of invulnerability, in which the student believes they possess sufficient capacity for self-diagnosis and self-management, even in situations that would require professional evaluation[10].

In the present study, a higher prevalence of self-medication was observed among female individuals and in the age group of 18 to 22 years, a finding consistent with the literature, which points to a greater tendency toward self-medication among young adults, possibly related to greater autonomy, access to information, and lower risk perception. Additionally, factors such as prior use of medications, difficulties accessing healthcare services, and time constraints were identified as the main determinants of the practice.

It is important to highlight that the data regarding the reasons for self-medication derive from the present study, although they are corroborated by previous investigations, such as Ramadan (2022)[11], who describes prior knowledge and personal experiences as relevant determining factors. This finding reinforces the ambivalent role of health training, which, while expanding knowledge, may also favor the adoption of inadequate practices when not accompanied by critical reflection.

Among the most commonly used medications, analgesics and anti-inflammatory drugs stood out, in line with studies by Alviz-Amador *et al.* (2023)[12] and Khadka and Kafle (2020)[13]. However, the proportion of students (22.8%) who reported using psychostimulants without a medical prescription is noteworthy, a value higher than that observed in studies conducted with health sciences students in the Federal District (20%) and at the Universidade Federal de Minas Gerais (9%). This behavior may be associated with the high academic workload and the pursuit of improved cognitive performance, although it involves significant risks, including adverse events such as tachycardia, hypertension, and neuropsychiatric disturbances.

Regarding sources of advice, the majority of participants reported turning to pharmacists and pharmacy attendants. It is essential to differentiate between these categories: the pharmacist is a qualified professional with training in pharmacology, authorized to prescribe Over-the-Counter Medications (OTC), which does not constitute self-medication; the pharmacy attendant, on the other hand, does not possess the technical qualifications to provide pharmacological guidance. Furthermore, the use of the internet and digital platforms was widely cited, corroborating studies such as Lin and Lin (2024)[14], which demonstrate an association between intensive internet use and a greater propensity for self-diagnosis and self-medication.

Another relevant aspect concerns knowledge of the medications used. Although 69% of students reported having acquired knowledge throughout the program, only 12.6% claimed to be fully aware of the side effects. Furthermore, 27.4% believe that the benefits outweigh the risks even without adequate knowledge, revealing a dissociation between perceived knowledge and safe behavior.

A higher prevalence of self-medication was also observed in the early semesters of the program, particularly among students who had not yet completed pharmacology courses, suggesting that incomplete training may contribute to inadequate practices. Studies such as Lekhak *et al.* (2024)[8] demonstrate that approximately 30.7% of students who self-medicate experience adverse reactions, with 55.2% subsequently requiring medical care to manage these complications, highlighting the occurrence of unexpected adverse events and reinforcing the need for educational interventions. Thus, self-medication among medical students constitutes a multifactorial phenomenon, influenced by individual, academic, and structural factors.

CONCLUSION

This study demonstrated a high prevalence of self-medication among medical students, with notable frequent use of analgesics, anti-inflammatory drugs, and, to a lesser extent, psychostimulants, as well as the relevant influence of informal sources of guidance. The findings suggest an association between familiarity with medications, barriers to accessing the healthcare system, and characteristics of medical training with the maintenance of this practice.

Considering the methodological limitations, the results should be interpreted with caution and do not allow for the establishment of causal relationships. In view of this, it is recommended to incorporate structured content on rational medication use throughout undergraduate training, to develop institutional educational campaigns aimed at raising awareness of the risks of self-medication, to stimulate academic pharmacovigilance by encouraging the reporting and discussion of adverse reactions, and to integrate approaches that promote ethical reflection on the role of the student as a patient.

CRediT author statement

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All authors have read and agreed to the published version of the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the workreported in this paper.

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