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Care profile of asthmatic children and adolescents at a university general pediatrics clinic

LARISSA MURICI SOUSA[1], JULIA RODRIGUES COSTA[1], VINÍCIUS OLIVEIRA GANEM[1], MÔNICA VERSIANI NUNES PINHEIRO DE QUEIROZ[1]

[1] FACULDADE DE CIÊNCIAS MÉDICAS DE MINAS GERAIS
EMAIL: LALAMURICI160@GMAIL.COM

ABSTRACT

Introduction: Childhood asthma is the primary non-communicable chronic disease in childhood. In Brazil, the prevalence of asthma symptoms is 24.3% in children and 19% in adolescents, with 17.8% occurring in adolescents in Belo Horizonte. **Objective**: Evaluate the prevalence and treatment of asthma in children and adolescents treated at a university clinic. **Methods**: Cross-sectional observational study, analyzing electronic records of children aged 6 to 18 treated at a general pediatrics outpatient clinic in Belo Horizonte between July 2020 and July 2022. **Results**: Among the diagnostic records of 218 patients, 50 (22.94%) had a clinical diagnosis of asthma, 28 (12.84%) had asthma exacerbation episodes in the last 12 months, and only 2 (4%) reported a functional diagnosis. The symptom control level, according to GINA criteria, was logged in 12 records: 8 well-controlled, 2 partially controlled, and 2 uncontrolled. There was an association between inhaled corticosteroid use and asthma attacks in the last year. **Conclusion**: The prevalence of diagnosed asthma in the sample was 22.94%, higher than in Belo Horizonte and Brazil. However, the prevalence of active asthma was 12.84%, lower than in other studies. Spirometry was underutilized, with 90% of patients lacking requests and/or records in the medical records. The analysis of epidemiology and treatment quality was hindered by the lack of information and standardization in medical records, compromising patient diagnosis and treatment.

Keywords: Asthma; Child; Therapeutics.

INTRODUCTION

Asthma is a heterogeneous disease characterized by chronic inflammation of the airways. It is defined by the history of respiratory symptoms (wheezing, shortness of breath, cough, and chest tightness) that vary over time in terms of occurrence, frequency, and intensity, together with a variable limitation of expiratory flow. It is a disease with a multifactorial cause and, for a child to develop it, there must be a genetic predisposition, in addition to exposure to various environmental stimuli.[1] Furthermore, it is the most common chronic inflammatory disease of childhood and the main cause of morbidity in this population.[2,3]

The prevalence of asthma in the world varies between 1 and 18%.[1] In children and adolescents, the global prevalence is approximately 14%[4], with an increasing trend in developing countries.[5,6,7]

In Brazil, according to data from the International Study of Asthma and Allergies in Childhood (ISAAC), the average prevalence of asthma symptoms is 24.4% for children and 19.9% for adolescents, one of the high-

est among the countries surveyed.[8] A study carried out later with more Brazilian centers, using the same ISAAC questionnaires, found an average prevalence of asthma of 24.3% for children and 19% for adolescents. This research also found a prevalence of asthma symptoms of 17.8% among adolescents in Belo Horizonte.[9]

The disease represents a serious public health problem due to the costs to the health system and the interference in the daily activities of the patient and their family, both through emergency care and hospitalizations.[10,11,12] It is also worth highlighting that in the young population, asthma causes damage to mental health and productivity at school and work, which is evidenced by absenteeism and presenteeism.[12] Furthermore, asthmatic children tend to leave school early and have lower academic performance.[13]

Asthma management has made important advances, but environmental and socioeconomic aspects remain a public health problem in Brazil.[3] Furthermore, asthma can manifest clinically in different ways, which can make the diagnosis and treatment challenging.[10]

The present study aims to investigate the prevalence of asthma in a general pediatrics outpatient clinic and outline the epidemiological profile and treatment profile of the children and adolescents treated.

METHODS

Study design

This is a cross-sectional, retrospective observational study conducted through the analysis of electronic medical records of children and adolescents aged 6 to 18 years treated at a general pediatrics university outpatient clinic in Belo Horizonte from July 2020 to July 2022.

Sample

Children and adolescents aged 6 to 18 were treated at a general pediatrics university outpatient clinic from July 2020 to July 2022.

Instruments and procedures:

The study included the electronic medical records of all children and adolescents aged 6 to 18 treated at a general pediatrics university outpatient clinic in Belo Horizonte from July 2020 to July 2022 to collect data from participants identified with asthma.

Data collection from asthmatic participants took place using a questionnaire prepared by the authors of this study. The questionnaire developed evaluated six general areas: 1) Personal and demographic data, 2) pregnancy and family history, 3) asthma diagnosis, 4) asthma treatment, 5) comorbidities, 6) clinical control of asthma, and 7) clinical control of asthma according to the 2023 Global Initiative for Asthma (GINA) report.

The tool proposed by GINA to assess symptom control in asthmatic patients uses the following questions: in the last four weeks, has the patient presented 1) daytime asthma symptoms more than twice a week, 2) nocturnal awakenings due to asthma, 3) use of short-acting bronchodilators on demand more than twice a week and 4) some limitation of physical activity due to asthma. If there are no positive responses, asthma is well-controlled. If one or two responses are positive, it is partially controlled. And if three or four answers are positive, it is considered not controlled.

Before starting the research, the researchers contacted the participants and their guardians by telephone through the contact recorded in the medical records, requesting the signature of the Free and Informed Consent Form and the Free and Informed Assent Form, which, after acceptance, were sent online by email or via the WhatsApp application.

The study was submitted to the institution's Research Ethics Committee according to CAAE 62602722.0.0000.5134. Data collection was carried out according to measures aimed at guaranteeing medical confidentiality and patient safety. Ethical principles were respected and are following Resolution 466/12, of the National Health Council.

Statistical analysis:

After collecting information through the electronic medical records system, the data were compiled and analyzed using descriptive statistics, to characterize the sample, using simple frequencies and percentage frequencies for qualitative variables. The median and interquartile distance were used to evaluate the variability of the data set and characterize the quantitative variables. Using inferential statistics, non-parametric tests were used to measure the degree of association between the variables present in the study with the chi-square test and Fisher's exact test.

RESULTS

Among the 218 medical records of children and adolescents evaluated, 119 (55%) were male, with an average of 12 years of age.

Of the patients, 50 (22.94%) reported having asthma, the average age was 10.5 years, with 27 (54%) males. The majority (30%) lived in the northeast region of Belo Horizonte.

Table 1 describes the characteristics of patients with a clinical diagnosis of asthma.

Table 1: Characteristics of the population with a clinical diagnosis of asthma

Characteristics	N = 50
Age	10.50* (9.00, 13.00)**
Sex	
Masculine	27 (54%)
Exposure to secondhand smoke during pregnancy	
Yes	1 (2.0%)
Uninformed	49 (98%)
Prematurity	
Yes	5 (10%)
No	16 (32%)
Uninformed	29 (58%)
Parental history of asthma	
Yes	11 (22%)
No	17 (34%)
Uninformed	22 (44%)
Spirometry	
Yes	5 (10%)
No	6 (12%)
Uninformed	39 (78%)
Functional diagnosis of asthma	
Yes	2 (4.0%)
No	3 (6.0%)
Uninformed	45 (90%)
Use of inhaled corticosteroids	
Yes	23 (46%)
No	26 (52%)
Uninformed	1 (2.0%)
Adequate (reported) adherence to inhaled corticosteroids	
Yes	5 (10%)
No	5 (10%)
Uninformed	40 (80%)
Comorbidities	
Yes	41 (82%)
No	7 (14%)
Uninformed	2 (4.0%)
Allergic rhinitis	
No	23 (46%)
Yes	27 (54%)

Atopic dermatitis	
No	37 (74%)
Yes	13 (26%)
Obesity	
No	45 (90%)
Yes	5 (10%)

*Average
** Standard deviation

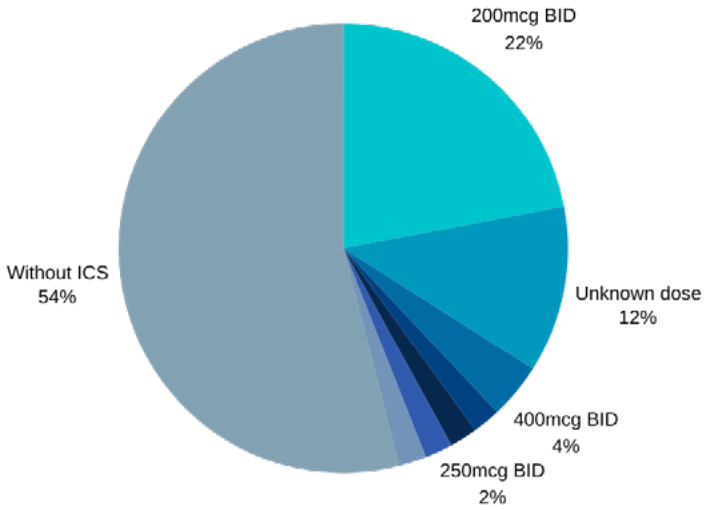
Tobacco consumption during pregnancy was reported in 1 (2%) patient, while this information was not recorded in 49 (98%) medical records. Premature birth occurred in 5 (10%) patients, with 16 (32%) cases of full-term birth, and this information was not recorded in 29 (58%) medical records.

Regarding family history, 11 (22%) patients had a parental report of asthma, 17 (34%) stated that they did not have first-degree relatives with asthma and there was no such information in 22 (44%) medical records.

Regarding spirometry, only 5 (10%) patients had the test recorded in their medical records, with 2 (4%) receiving a functional diagnosis of asthma, while 3 (6%) did not have asthma confirmed by the test.

In the medical records, among patients with asthma, the prescription for continuous use of inhaled corticosteroids (ICS) was recorded in 23 (46%) cases, while 26 (52%) cases did not have this medication prescribed, and in 1 (2%) if this information was not available. All patients using IC used beclomethasone and the majority (22%) used 400 mcg/day. Figure 1 shows the proportion of patients reporting ICS use and the doses used.

Figure 1: Use of inhaled corticosteroids (beclomethasone) among asthmatic patients and doses used



Among the asthmatic patients, 31 (62%) had records in their medical records referring to the use of salbutamol and 1 (2%) to the use of fenoterol in case of asthma exacerbation. Furthermore, 3 (6%) were registered as daily users of antileukotriene.

Only 5 (10%) records reported adequate adherence to asthma medication, 5 (10%) reported that adherence was inadequate and 40 (80%) had no record whatsoever regarding adherence to prescribed pharmacological therapy.

Regarding the use of other medications, 28 (56%) patients did not use any, 11 (22%) used nasal budesonide and 6 (12%) used loratadine occasionally.

Regarding comorbidities, 41 (82%) participants had some comorbidity in addition to asthma. Of the 50 asthmatic patients, 27 (54%) reported allergic rhinitis, 13 (26%) atopic dermatitis and 5 (10%) obesity. Other comorbidities observed in lower prevalence were: Oppositional defiant disorder 4 (8%), global neuropsychomotor development delay 3 (6%), and attention deficit hyperactivity disorder 2 (4%).

Asthma symptom control was analyzed using the tool proposed by GINA, which assesses the patient's symptoms over the last 4 weeks. However, only 12 (24%) patients had these questions adequately recorded in the electronic medical records. Of these, 8 (16%) were well-controlled, 2 (4%) were partially controlled and 2 (4%) were uncontrolled.

Considering the limitations of this form of assessment, as many medical records did not have the GINA symptom control tool, more information was sought for a more comprehensive analysis of the clinical control of the disease. Thus, 28 patients (56% of patients with asthma) reported an episode of asthma attacks in the last 12 months, 10 (20%) denied attacks during this period and 12 (24%) did not have this information recorded.

Table 2 shows the correlation between the variable "adequate adherence" and the variables related to clinical asthma control.

Table 3 shows the correlation between the use of inhaled corticosteroids and variables related to clinical asthma control.

Table 2: Correlation between adequate adherence to prescribed medication and clinical asthma control

Adequate (reported) medication adherence

Characteristics	Total, N = 50	Yes, N = 5	No, N = 5	Not available, N = 40	p-value
Daytime asthma symptoms > 2x/week					**0.020**
Yes	3 (6.0%)	0 (0%)	1 (2.0%)	2 (4.0%)	
No	11 (22%)	4 (8.0%)	0 (0%)	7 (14%)	
No information	36 (72%)	1 (2.0%)	4 (8.0%)	31 (62%)	
Nighttime awakenings due to asthma					**0.030**
Yes	4 (8.0%)	0 (0%)	1 (2.0%)	3 (6.0%)	
No	12 (24%)	4 (8.0%)	1 (2.0%)	7 (14%)	
No information	34 (68%)	1 (2.0%)	3 (6.0%)	30 (60%)	
Need for beta-agonist >2x/week					0.10
Yes	5 (10%)	0 (0%)	1 (2.0%)	4 (8.0%)	
No	14 (28%)	4 (8.0%)	1 (2.0%)	9 (18%)	

Characteristics	Total, N = 50	Yes, N = 5	No, N = 5	Not available, N = 40	p-value
No information	31 (62%)	1 (2.0%)	3 (6.0%)	27 (54%)	
Some activity limitation due to asthma					**0.050**
Yes	6 (12%)	0 (0%)	1 (2.0%)	5 (10%)	
No	12 (24%)	4 (8.0%)	1 (2.0%)	7 (14%)	
No information	32 (64%)	1 (2.0%)	3 (6.0%)	28 (56%)	
Had a crisis in the last 12 months					0.5
Yes	28 (56%)	4 (8.0%)	4 (8.0%)	20 (40%)	
No	10 (20%)	1 (2.0%)	0 (0%)	9 (18%)	
No information	12 (24%)	0 (0%)	1 (2.0%)	11 (22%)	
Number of crises in the last 12 months					0.052
0	5 (38%)	1 (7.7%)	0 (0%)	4 (31%)	
1	2 (15%)	1 (7.7%)	0 (0%)	1 (7.7%)	
two	1 (7.7%)	1 (7.7%)	0 (0%)	0 (0%)	
3	2 (15%)	0 (0%)	0 (0%)	2 (15%)	
5	2 (15%)	0 (0%)	2 (15%)	0 (0%)	
12	1 (7.7%)	0 (0%)	1 (7.7%)	0 (0%)	
Asthma control					**0.010**
Well controlled	8 (16%)	4 (8.0%)	0 (0%)	4 (8.0%)	
Partially controlled	2 (4.0%)	0 (0%)	1 (2.0%)	1 (2.0%)	
Not controlled	2 (4.0%)	0 (0%)	0 (0%)	2 (4.0%)	
No information	38 (76%)	1 (2.0%)	4 (8.0%)	33 (66%)	

Table 3: Correlation between use of inhaled corticosteroids and clinical control of asthma

Use of inhaled corticosteroids

Characteristics	Total, N = 50	Yes, N = 23	No, N = 26	Not available, N = 1	p-value
Daytime symptoms > 2x/week					0.11
Yes	3 (6.0%)	3 (6.0%)	0 (0%)	0 (0%)	
No	11 (22%)	7 (14%)	4 (8.0%)	0 (0%)	
No information	36 (72%)	13 (26%)	22 (44%)	1 (2.0%)	
Nighttime awakenings due to asthma					0.2
Yes	4 (8.0%)	3 (6.0%)	1 (2.0%)	0 (0%)	
No	12 (24%)	8 (16%)	4 (8.0%)	0 (0%)	
No information	34 (68%)	12 (24%)	21 (42%)	1 (2.0%)	

Characteristics	Total, N = 50	Yes, N = 23	No, N = 26	Not available, N = 1	p-value
Need for beta-agonist >2x/week					0.4
Yes	5 (10%)	4 (8.0%)	1 (2.0%)	0 (0%)	
No	14 (28%)	7 (14%)	7 (14%)	0 (0%)	
No information	31 (62%)	12 (24%)	18 (36%)	1 (2.0%)	
Some activity limitation due to asthma					0.6
Yes	6 (12%)	4 (8.0%)	2 (4.0%)	0 (0%)	
No	12 (24%)	7 (14%)	5 (10%)	0 (0%)	
No information	32 (64%)	12 (24%)	19 (38%)	1 (2.0%)	
Had a crisis in the last 12 months					**0.002**
Yes	28 (56%)	19 (38%)	9 (18%)	0 (0%)	
No	10 (20%)	1 (2.0%)	8 (16%)	1 (2.0%)	
No information	12 (24%)	3 (6.0%)	9 (18%)	0 (0%)	
Number of crises in the last 12 months					**0.021**
0	5 (38%)	0 (0%)	5 (38%)	0 (0%)	
1	2 (15%)	1 (7.7%)	1 (7.7%)	0 (0%)	
two	1 (7.7%)	1 (7.7%)	0 (0%)	0 (0%)	
3	2 (15%)	1 (7.7%)	1 (7.7%)	0 (0%)	
5	2 (15%)	2 (15%)	0 (0%)	0 (0%)	
12	1 (7.7%)	1 (7.7%)	0 (0%)	0 (0%)	
Asthma control					0.2
Well controlled	8 (16%)	5 (10%)	3 (6.0%)	0 (0%)	
Partially controlled	2 (4.0%)	2 (4.0%)	0 (0%)	0 (0%)	
Not controlled	2 (4.0%)	2 (4.0%)	0 (0%)	0 (0%)	
No information	38 (76%)	14 (28%)	23 (46%)	1 (2.0%)	

DISCUSSION

Asthma is the most common chronic non-communicable disease of childhood and the main cause of morbidity in this population.[2,3] It is estimated that asthma causes more than a thousand deaths per day around the world[3]. A Brazilian study found a mortality rate of 1.21 per 100,000 inhabitants in 2012 in the country. According to this research, which used data from the Department of Informatics of the Unified Health System (DATASUS), the annual average of asthma-related deaths in the country, between 1980 and 2012, was 2,339.[14] Another study showed 5,014 deaths due to asthma in children and adolescents between 1996 and 2015 in the country, with a temporal trend of

reducing mortality in these age groups.[15] Although relatively uncommon, deaths from asthma are considered unacceptable events, given the treatable nature of the disease.[16]

To compare the prevalence of asthma between countries, the International Study of Asthma and Allergies in Childhood (ISAAC) was carried out in a three-phase, multicenter, cross-sectional study. This study involved several countries and analyzed children aged 6 and 7 and adolescents aged 13 to 14. Phase III repeated the phase I research 5-10 years after the first data collection, to verify the epidemiological trends of this disease over time.[4,8]

In ISAAC, asthma symptoms were verified based on positive responses to the written question: "Have you (or your child) had wheezing or whistling in the chest in the last 12 months?". Asthma diagnosis, on the other hand, considered positive responses to the question: "Have you (or your child) ever had asthma in your life?" Such prevalences were assigned as "active asthma" and "diagnosed asthma", respectively.

Among children, the global prevalence of asthma considered active (asthmatics with symptoms) is 11.6%, and of diagnosed asthma (report of asthma at some point in life) is 10.8%. Among adolescents, the global prevalence of active asthma was 13.7%, and of diagnosed asthma was 13.8%, being very similar.[4]

In Brazil, the prevalence of active asthma was 24.4% for children and 19.9% for adolescents, one of the highest among the countries surveyed.[8] This and other subsequent studies found a prevalence of diagnosed asthma among Brazilian adolescents of 8.7 - 14.7%.[9,17,18] Such research also observed a prevalence of active asthma of 9.1 - 24.3% for children and 11 - 19% for adolescents.[3,9,17,18] Furthermore, there was a prevalence of asthma symptoms of 17.8 - 19.8% among adolescents in Belo Horizonte.[9,19]

In the present study, there were 50 (22.94%) patients with a clinical diagnosis of asthma and 28 (12.84%) patients with episodes of asthma exacerbation in the last 12 months (active asthma).

It is important to highlight some limitations between our study and others. Firstly, our study analyzed all children served between the ages of 6 and 18, with an average of 12 years of age. Furthermore, the prevalence of asthma symptoms was analyzed only among children who already had a clinical diagnosis of asthma reported in their medical records, which may be the reason for the lower prevalence of active asthma. In other studies, children without a medical diagnosis may have reported wheezing in the last 12 months, increasing the percentage of participants with active asthma.

The functional diagnosis of asthma is performed using spirometry. In the analyzed sample, there were only 2 (4%) patients with a functional diagnosis of asthma, while in 3 (6%) suspected patients the disease was not confirmed by the exam. The other 45 (90%) participants did not have the exam requested and/or recorded in their medical records. This may indicate a gap in medical knowledge about access to spirometry, offered by the municipal health department to children from 6 years of age. Furthermore, it may suggest a medical error, since many professionals do not rely on objective functional diagnosis but rather on clinical diagnosis, carried out by other professionals and/or reported by patients, as well as on their own clinical experience. This confirms the trend of spirometry underuse in developing countries observed in other studies.[20] Although signs and symptoms are important for diagnosis, confirmation through spirometry is essential to avoid unnecessary treatments, as well as the opportunity to diagnose other diseases.[1] For example, in a Canadian study that reevaluated patients diagnosed with asthma by a doctor, it was observed

that in 2% of cases, there was, in fact, a serious cardiorespiratory disease.[21]

The lack of a functional diagnosis may also have impacted the other factors analyzed in our study since it is impossible to accurately interpret data regarding the treatment of patients without a functional diagnosis. Among participants who reported their age at diagnosis of asthma, the average age was 3.27 years. This fact is relevant, after all, access to lung function in preschoolers and infants is very difficult, which corroborates the lack of functional diagnosis at diagnosis. Furthermore, wheezing is usually transient in the first years of life and can have different etiologies in addition to asthma, such as pneumonia, bronchospasm, and bronchiolitis.[22] During the first two years of life, there is a greater occurrence of transient wheezing due to narrow airways, greater vulnerability to viral infections, and passive exposure to maternal smoking. This situation tends to improve from 2-3 years of age.[23] A prospective study that observed 826 children aged 3 to 6 years found that most wheezing infants have transitory conditions, with almost 60% of wheezers up to 3 years old showing improvement at 6 years old.[24]

However, the present study demonstrated that during medical care for children over 5 years of age and adolescents, the request for spirometry was also minimal. This highlights a care failure that can impact the patient's clinical management.

Asthma symptom control was analyzed using the GINA criteria, which evaluates the patient's symptoms over the last 4 weeks. However, only 12 (24%) patients had these questions adequately recorded in the electronic medical records. Among the patients classified as well-controlled, five used inhaled corticosteroids and three did not use them. Although 40 (80%) patients did not have a record of treatment adherence, it was found that asthma symptoms in the last four weeks were lower in patients who reported adequate adherence to medication.

On the other hand, of the 28 patients who stated that they had experienced an episode of asthma exacerbation in the last year, 19 (67.86%) used IC, and 9 (32.14%) did not use it. Thus, there was an association between the use of IC and the presence of asthma attacks in the last year.

This association is not expected, considering that low-dose ICS maintenance therapy is highly effective in reducing asthma symptoms, exacerbations, hospitalizations, and death.[1,20,25] However, it is known that adherence to regular use of inhaled corticosteroids is low in the community, and the isolated use of the bronchodilator in case of crisis increases the risk of exacerbations.[1,26] As adherence to ICS is very important for controlling the disease and this data was not recorded and/or checked in 80%, there is an important gap in the clinical management of patients in the present study. Medical guidance on the importance of adherence and recording this information in medical records can help better control the disease.[27]

In addition to the inappropriate use of medications and poor adherence to treatment, another explanation for this finding is the low number of functional diagnoses. It is possible, therefore, that the diagnosis of asthma was overestimated in our sample. Furthermore, the possibility of controlled mild asthma without the need for medication should be considered, meaning that patients who do not use IC or require a rescue bronchodilator naturally have fewer episodes of asthma exacerbation.

It is also essential to highlight that the lack of standardization of medical records made it difficult to analyze symptom control, as well as the epidemiological and treatment profile of patients. Many essential data for the diagnosis and monitoring of an asthmatic child

were not present in the electronic medical records. In 98% of the records there was no information about exposure to tobacco during pregnancy, 58% did not mention whether the patient was born full-term or prematurely, 44% did not contain information about family history of asthma, 78% did not report the age of diagnosis of the disease, 80% did not record adherence to prescribed medication, 76% did not apply the GINA criteria to assess symptom control and 24% did not even report whether episodes of asthma exacerbation had occurred in the last year.

Adequate outpatient treatment of asthma proposed by GINA depends on adequate control of the patient's symptoms, comorbidities, and socio-environmental factors related to asthma. Therefore, the standardization of patient guidance and the description of the most important aspects of the disease in the medical record are fundamental and, when they are not present or addressed during a medical consultation, treatment can be jeopardized. This is even more crucial in the context of a university outpatient clinic since it is common for different students to evaluate the patient at each consultation. Therefore, for the patient to have adequate management of their disease, it is essential to standardize guidelines and medical records that allow different professionals to understand the situation and provide the best possible treatment.

CONCLUSION

The prevalence of asthma diagnosed by clinical criteria in the sample was 22.94%, while the prevalence of active asthma was 12.84%. These data corroborate the importance of this disease in the Brazilian scenario and explain the need for good monitoring of asthmatic patients, especially considering that asthma is the main cause of morbidity in childhood and, when uncontrolled, can lead to death. Among the difficulties in adequately treating asthmatics, the low number of functional diagnoses and the lack of standardization and information in medical records stand out.

The lack of information essentially compromises not only the analysis of symptom control but also the understanding of the epidemiological profile and the individual treatment plan. Taking the "steps" recommended by GINA to adjust medication based on symptom control requires a solid foundation of consistent and accessible data. Especially in a university setting, where different students may be involved in patient assessment, standardization of medical records becomes even more crucial. Therefore, it is imperative to establish efficient regularization of medical records to ensure that each asthmatic patient receives adequate monitoring and treatment, regardless of the health professional who cares for them. This not only improves patient-centered care but also provides the information needed to conduct research and understand your asthma.

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