ORIGINAL ARTICLE

Factors associated with the occurrence of COVID-19 in the pediatric population in hospital settings: a case-control study

Fatores associados à ocorrência da COVID-19 na população pediátrica no contexto hospitalar: estudo caso-controle

Factores asociados a la aparición de COVID-19 en la población pediátrica en el ámbito hospitalario: un estudio de casos y controles

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ABSTRACT

Objective: To analyze factors associated with the occurrence of COVID-19 in the pediatric population in hospital settings. **Method:** This was a paired case-control study conducted with medical records of children under 14 years of age. The pediatric population with a positive COVID-19 test was considered a case, and the pediatric population with a negative COVID-19 test was considered a control. For each case, a control was used, totaling 486 medical records. Descriptive analysis, bivariate analysis, and logistic regression were performed. **Results:** The variables associated with the occurrence of COVID-19 were brown, black, yellow, and indigenous children, emergency room and Intensive Care Unit admission, use of mask and oxygen catheter, antimicrobials, and corticosteroids. Fever, anorexia, non-eupneic respiratory pattern with saturation between 90% and 95%, cough, runny nose, and comorbidities were associated with the outcome. **Conclusion:** Advances by providing information on factors associated with COVID-19 in the hospitalized population under 14 years of age, including place of hospitalization, anorexia, runny nose, comorbidity, and corticosteroid use.

DESCRIPTORS

Child; Hospitalization; COVID-19; Pandemics; Case-Control Studies.

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INTRODUCTION

COVID-19 was discovered in 2019, whose etiological agent is SARS-CoV-2, and presented high transmissibility with spread on a global scale, leading the World Health Organization to declare the COVID-19 pandemic in March 2020[1].

COVID-19 spreads rapidly from person to person, either through direct contact or through exposure to small droplets of infected secretions on surfaces[2]. In the pediatric context, children of all ages can contract the disease, as demonstrated in a multicenter cohort that assessed 582 children with COVID-19, in which it was found that the most affected age group is 10 to 18 years old[3].

Clinical and epidemiological characteristics are constantly changing, and the presentation of COVID-19 symptoms in children can be broad and varied, and may be asymptomatic or symptomatic, in addition to presenting severe cases such as severe acute respiratory distress[4].

In a systematic literature review, it was observed that of the 342 children who tested positive for COVID-19, 51 were asymptomatic[5]. Data obtained in Wuhan, China, at the beginning of the pandemic, indicate that, of the 171 hospitalized children, with an average age between 6 and 7 years old and who tested positive for COVID-19, 27 were asymptomatic[6]. However, it is possible to see that the manifestations of the disease act differently in adults and children, and are often similar to other respiratory viruses, presenting a common clinical presentation, with fever, cough, and headache[7]. Furthermore, in a scoping review, the presence of gastrointestinal symptoms presented by the pediatric population with COVID-19 was identified[8].

The scarcity of data on related conditions, symptoms, and COVID-19 in children under 14 years of age indicates gaps that need to be filled[9]. This study should help in understanding the variability of the disease and contribute to nursing performance, which plays a prominent role in disease prevention and care.

Therefore, early identification of symptoms in children is necessary, as there are many factors involved that can favor contagion and worsening of the disease, in addition to reducing transmission of the virus[8]. Therefore, the question is: what are the factors associated with the occurrence of COVID-19 in the pediatric population in hospital settings?

This study aimed to analyze the factors associated with the occurrence of COVID-19 in the pediatric population in hospital settings.

METHOD

Study Design

This is a paired case-control study, described according to the STrengthening the Reporting of OBservational studies in Epidemiology tool.

Study Site

The study was conducted in the pediatric emergency department, Intensive Care Unit (ICU), and pediatric inpatient unit of a public university hospital (UH) located in the northern region of the state of Paraná, Brazil. The institution is a reference for COVID-19 treatment. This study considered the emergency room, ward, and pediatric ICU as admission locations, given the need to keep children hospitalized in these locations due to demand. COVID-19 was confirmed at the child's hospitalization location.

Population

The study population included (n = 486) medical records of pediatric patients, under 14 years of age, treated at the UH and who were admitted to the hospital between June 2020 and December 2022. This period was understood as the peak of the COVID-19 pandemic in Brazil, and for pediatric hospitalizations, the study hospital considers the neonatal population from 0 to 28 days, and the child population, from 29 days to 14 years.

Selection Criteria and Sample Definition

The pediatric population with positive COVID-19 was considered a case. The control group consisted of the pediatric population with symptoms but who tested negative for COVID-19. A control group was performed for each case[10], resulting in 243 cases and 243 controls, totaling 486 medical records/patients. Therefore, all cases of pediatric patients positive for COVID-19 during the period under investigation were used, eliminating the need for sample size calculation. To pair the samples between cases and controls, data affinity between individuals was used, taking into account characteristics but not those under investigation. Thus, to define the control group in reference to the case group, sex and age variables were observed, seeking similarity between the populations.

Children who did not have confirmatory laboratory tests for COVID-19 were excluded. To identify the sample, two spreadsheets provided by the hospital's health surveillance unit were used: the first is a spreadsheet of patients with a positive COVID-19 test; and the second is a spreadsheet of patients with a negative COVID-19 test. Figure 1 presents the flowchart for selecting medical records/patients and presents case and control groups, considering inclusion and exclusion criteria.

Study Variables

The outcome variable was COVID-19. Positivity was confirmed by reverse transcription-PCR, followed by polymerase chain reaction, antigen, serology, and rapid immunoglobulin G and M serology tests, which were recorded in patients' medical records and on the COVID-19 spreadsheet.

Exposure variables were sex, age, race/ethnicity, city of origin, hospital admission, place of admission, length of stay, ventilatory support, antimicrobial use, and corticosteroid use. Variables related to signs and symptoms were fever, anorexia, reflux, nausea, vomiting, diarrhea, intestinal bleeding, abdominal pain, respiratory pattern, oxygen saturation, cough, runny nose, and comorbidities. The variables analyzed in this study were supported by previous studies[5,11,12].

Data Collection

Demographic, clinical, and symptom-related information was extracted from patients' medical records and entered into two separate electronic spreadsheets. Data collection took place
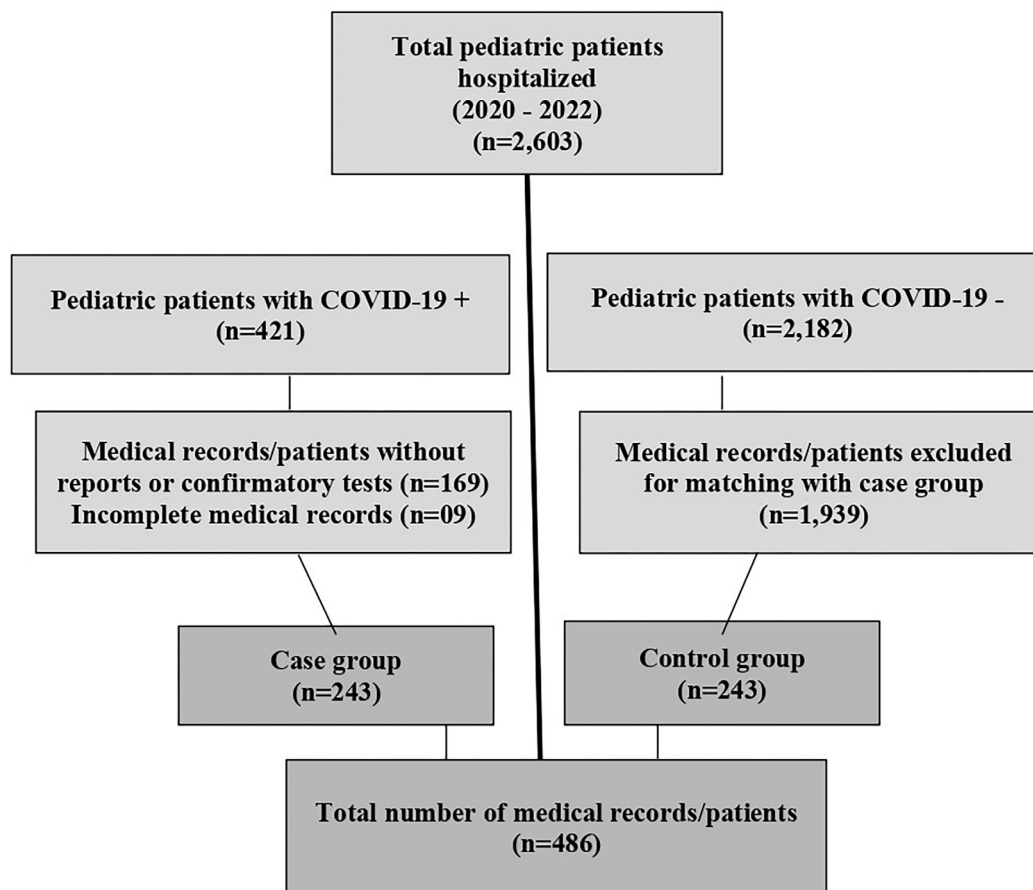
Figure 1 – Selection of medical records/patients for the study. Londrina, PR, Brazil, 2023.

between April 10, 2023, and May 24, 2023, using Medview®, the hospital's electronic medical record system.

DATA ANALYSIS

Data were analyzed using the Statistical Package for the Social Sciences version 26.0. Descriptive analysis included a study sample description, with an emphasis on demographic and clinical characteristics. The absolute and relative frequencies of the variables of interest were measured. Bivariate and multivariate analyses were used to assess the association between the outcome and exposure variables.

In bivariate analysis, Pearson's chi-square test was applied, and variables with alpha < 0.20, the recommended cut-off point for exploratory analyses of associated factors, were selected for the next stage. Unadjusted Odds Ratios (ORs) and their 95% Confidence Intervals (95%CIs) were calculated.

Multiple models were obtained using binary logistic regression using the backward method, i.e., the order in which exposure variables were removed from the model was determined by the highest significance value. Variables with alpha < 0.05 remained in the model. Adjusted ORs and their 95%CIs were calculated. Goodness-of-fit was measured using the Hosmer-Lesmeshow test, in which a higher p-value indicates a better fit. An alpha < 0.05 was considered statistically significant.

ETHICAL ASPECTS

The study was approved by the Research Ethics Committee of a public educational institution, under Certificate of Presentation for Ethical Consideration 31528920.9.0000.5231 and Opinion 4.415.191. There was no direct contact with patients; therefore, the use of an Informed Consent Form was waived.

RESULTS

The sample consisted of 486 medical records/patients, of which 243 were confirmed COVID-19 cases and 243 were controls. It was found that 61.3% of children, regardless of the group, were male, under 10 years of age (74.5% case and 77% control), and white (60.9% case and 70.9% control), and were referred from other hospital services (85.6% case and 86.4% control). Regarding the place of hospitalization, children with COVID-19 were hospitalized mainly in the emergency room (47.7%), while those in the control group were mostly in the pediatric ward (66.3%). The median length of hospital stay was three days for cases and one day for controls.

Concerning ventilatory support, 74.5% of children with COVID-19 did not require any device, while in the control group, this percentage was 53.9%. Regarding the use of antimicrobials and corticosteroids, both were more frequent in the control group, administered to 70.4% and 82.7% of children, respectively. Among COVID-19 cases, the use of these medications

was lower, with 49.8% of children receiving antimicrobials and 48.1% receiving corticosteroids.

The most prevalent symptoms were fever (60.1% case and 65.8% control), cough (73.3% case and 55.1% control), and runny nose (56.4% case and 74.5% control). Anorexia was more frequent in the case group (56.4%) than in the control group (36.6%). Chronic lung diseases and prematurity were the most common comorbidities (Table 1).

In bivariate analysis, some variables showed a statistically significant association with the occurrence of COVID-19. Children classified as brown, black, yellow, or indigenous were 1.55 times more likely to be diagnosed with COVID-19 than white children (OR = 1.55; 95%CI: 1.1–2.27; p = 0.022). Being admitted to the emergency room almost fourfold increased the chance of COVID-19, compared to pediatric hospitalization (OR = 3.83; 95%CI: 2.52–5.83; p < 0.001). The use of an

Table 1 – Demographic and clinical characterization of the hospitalized pediatric population (n = 486) – Londrina, PR, Brazil, 2023.

Variables	Case n (%)	Control n (%)
Sex		
Female	94 (38.7)	94 (38.7)
Male	149 (61.3)	149 (61.3)
Age		
< 10 years	181 (74.5)	187 (77.0)
≥ 10 years	62 (25.5)	56 (23.0)
Median (IQR)	3.00 (9.00)	4.00 (8.00)
Minimum-Maximum	0–14	0–14
Race/color		
White	148 (60.9)	172 (70.9)
Brown, black, yellow, indigenous	95 (39.1)	71 (29.1)
Hospital admission		
Referenced	208 (85.6)	210 (86.4)
Spontaneous search	35 (14.4)	33 (13.6)
Place of hospitalization		
Emergency room	116 (47.7)	46 (18.9)
Intensive Care Unit	21 (8.7)	36 (18.8)
Pediatric inpatient care	106 (43.6)	161 (66.3)
Length of hospital stay (days)		
≥ 7 days	29 (11.9)	30 (12.3)
< 7 days	214 (88.1)	213 (87.7)
Median (IQR)	3.00 (3.00)	1.00 (3.00)
Minimum-Maximum	1–35	1–30
Ventilatory support		
Mask	8 (3.3)	25 (10.3)
Catheter	35 (14.4)	65 (26.7)
Orotracheal intubation	19 (7.8)	22 (9.1)
None	181 (74.5)	131 (53.9)
Antimicrobial use		
Yes	121 (49.8)	171 (70.4)
No	122 (50.2)	72 (29.6)

...continuation

Variables	Case n (%)	Control n (%)
Use of corticosteroids		
Yes	117 (48.1)	201 (82.7)
No	126 (51.9)	42 (17.3)
Presence of fever		
Yes	146 (60.1)	160 (65.8)
No	97 (39.9)	83 (34.2)
Anorexia		
Yes	137 (56.4)	89 (36.6)
No	106 (43.6)	154 (63.4)
Gastric reflux		
Yes	4 (1.6)	6 (2.5)
No	239 (98.4)	237 (97.5)
Nausea		
Yes	25 (10.3)	21 (8.6)
No	218 (89.7)	222 (91.4)
Vomiting		
Yes	58 (23.9)	46 (18.9)
No	185 (76.1)	197 (81.1)
Diarrhea		
Yes	35 (14.4)	38 (15.6)
No	208 (85.6)	205 (84.4)
Intestinal bleeding		
Yes	8 (3.3)	8 (3.3)
No	235 (96.7)	235 (96.7)
Abdominal pain		
Yes	44 (18.1)	28 (11.5)
No	199 (81.9)	215 (85.5)
Breathing pattern		
Dyspneic	110 (45.3)	67 (27.6)
Tachypneic	9 (3.7)	17 (7.0)
Eupneic	124 (51.0)	159 (65.4)
Oxygen saturation		
< 90%	20 (8.2)	22 (9.1)
90 to 95%	97 (39.9)	59 (24.3)
> 95%	126 (51.9)	162 (66.6)
Cough		
Yes	178 (73.3)	134 (55.1)
No	65 (26.7)	109 (44.9)
Runny nose		
Yes	137 (56.4)	181 (74.5)
No	106 (43.6)	62 (25.5)
Comorbidities		
Prematurity	14 (5.8)	20 (8.2)
Chronic lung disease	35 (14.4)	14 (5.8)
Hypoxic-ischemic encephalopathy	10 (4.1)	2 (0.8)
Endocrine diseases	13 (5.3)	2 (0.8)
Obesity	2 (0.8)	3 (1.2)
No comorbidities	169 (69.6)	202 (83.2)

Legend: IQR – interquartile range.

oxygen mask (OR = 0.23), catheter (OR = 0.38), antimicrobials (OR = 0.42), and corticosteroids (OR = 0.19) was associated with a lower chance of being diagnosed with COVID-19, all with p < 0.001 (Table 2).

Regarding signs and symptoms, children with COVID-19 were more likely to have fever (OR = 1.90; 95%CI: 1.31–2.76; p = 0.001) and anorexia (OR = 2.24; 95%CI: 1.55–3.22; p < 0.001) than the control group. On the other hand, symptoms such as runny nose (OR = 0.44), cough (OR = 0.52), and non-eupneic respiratory pattern (OR = 0.45) were more associated with the control group. The presence of comorbidities was also more common among the control group (32.9% case and 14.4% control; OR = 0.34; p < 0.001), suggesting a lower association with COVID-19 (Table 3).

In multivariate analysis, some variables remained associated with COVID-19 diagnosis in the pediatric population. Children hospitalized in the emergency room were 2.78 times more likely to have COVID-19 (95%CI: 1.33–5.84; p = 0.007), and those in the ICU were 2.52 times more likely (95%CI: 1.54–4.16; p < 0.001), compared to pediatric hospitalization.

The use of corticosteroids increased the chance of COVID-19 by 3.37 times (95%CI: 2.05–5.53; p < 0.001), and

Table 2 – Associations between demographic and clinical factors and the occurrence of COVID-19 in the hospitalized pediatric population (n = 486) – Londrina, PR, Brazil, 2023.

Variables	COVID-19		p-value*	Unadjusted OR (95%CI)
	Case n (%)	Control n (%)		
Age				
< 10 years	181 (74.5)	187 (77.0)	0.526	0.87 (0.57–1.32)
≥ 10 years	62 (25.5)	56 (23.0)		
Median (IQR)	3 (8.00)			
Minimum-Maximum	0–14			
Sex				
Female	94 (38.7)	94 (38.7)	1.00	1.00 (0.69–1.44)
Male	149 (61.3)	149 (61.3)		
Race/color				
White	148 (60.9)	172 (70.8)		
Brown, black, yellow, indigenous	95 (39.1)	71 (29.2)	0.022	1.55 (1.1–2.27)
Hospital admission				
Referenced	209 (86.0)	209 (86.0)	1.00	1.00 (0.77–1.29)
Spontaneous search	34 (14.0)	34 (14.0)		
Place of hospitalization				
Emergency room	116 (47.7)	46 (18.9)	<0.001	3.83 (2.52–5.83)
Intensive Care Unit	21 (8.6)	36 (14.8)	0.688	0.89 (0.49–1.60)
Pediatric inpatient care	106 (43.7)	161 (66.3)		
Length of hospital stay (days)				
≥ 7 days	29 (11.9)	30 (12.3)	0.890	1.04 (0.60–1.79)
< 7 days	214 (88.1)	213 (87.7)		
Median (IQR)	2 (3.00)			
Minimum-Maximum	1–35			
Ventilatory support				
Mask	8 (3.3)	25 (10.3)	<0.001	0.23 (0.10–0.53)
Catheter	35 (14.4)	65 (26.7)	<0.001	0.38 (0.24–0.62)
Tube	19 (7.8)	22 (9.1)	0.078	0.62 (0.32–1.20)
Ambient air	181 (74.5)	131 (53.9)		
Antimicrobial use				
Yes	121 (49.8)	171 (70.4)	<0.001	0.42 (0.28–0.61)
No	122 (50.2)	72 (29.6)		
Corticosteroid use				
Yes	117 (48.1)	201 (82.7)	<0.001	0.19 (0.13–0.24)
No	126 (51.9)	42 (17.3)		

Legend: *Pearson's chi-square test; OR - Odds Ratio; 95%CI - 95% Confidence Interval; IQR - interquartile range.

Table 3 – Associations between signs and symptoms associated with the occurrence of COVID-19 in the hospitalized pediatric population (n = 486) – Londrina, PR, Brazil, 2023.

Variables	COVID-19		p-value*	Unadjusted OR (95%CI)
	Case n (%)	Control n (%)		
Presence of fever				
Yes	171 (70.4)	135 (55.6)	0.001	1.90 (1.31–2.76)
No	72 (29.6)	108 (44.4)		
Anorexia				
Yes	137 (56.4)	89 (36.6)	<0.001	2.24 (1.55–3.22)
No	106 (43.6)	154 (63.4)		
Gastric reflux				
Yes	5 (2.1)	5 (2.1)	1.00	1.00 (0.29–3.50)
No	238 (97.9)	238 (97.9)		
Nausea				
Yes	25 (10.3)	21 (8.6)	0.535	1.21 (0.66–2.23)
No	218 (89.7)	222 (91.4)		
Vomiting				
Yes	48 (19.8)	56 (23.0)	0.376	0.82 (0.53–1.27)
No	195 (80.2)	187 (77.0)		
Diarrhea				
Yes	41 (16.9)	32 (13.2)	0.253	1.34 (0.81–2.21)
No	202 (83.1)	211 (86.8)		
Intestinal bleeding				
Yes	7 (2.9)	9 (3.7)	0.611	0.77 (0.28–2.10)
No	236 (97.1)	234 (96.3)		
Abdominal pain				
Yes	42 (17.3)	30 (12.3)	0.125	1.48 (0.89–2.46)
No	201 (82.7)	213 (87.7)		
Breathing pattern				
Non-eupneic	78 (32.1)	125 (51.4)	<0.001	0.45 (0.31–0.64)
Eupneic	165 (67.9)	118 (48.6)		
Oxygen saturation				
< 90%	21 (8.6)	21 (8.6)	0.309	0.71 (0.37–1.37)
90 to 95%	54 (22.2)	102 (42.0)	<0.001	0.38 (0.25–0.57)
> 95%	168 (69.1)	120 (49.4)		
Cough				
Yes	138 (56.8)	174 (71.6)	0.001	0.52 (0.36–0.76)
No	105 (43.2)	69 (28.4)		
Runny nose				
Yes	137 (56.4)	181 (74.5)	<0.001	0.44 (0.30–0.65)
No	106 (43.6)	62 (25.5)		
Comorbidities				
Yes	35 (14.4)	80 (32.9)	<0.001	0.34 (0.22–0.52)
No	208 (85.6)	163 (67.1)		

Legend: *Pearson's chi-square test; OR - Odds Ratio; 95%CI - 95% Confidence Interval; IQR - interquartile range.

the presence of runny nose, by 2.25 times (95%CI: 1.43–3.54; p < 0.001). Having comorbidities was also associated with the outcome (OR = 1.86; 95%CI: 1.12–3.10; p = 0.015). Anorexia, although significant in bivariate analysis, showed an inverse association in the regression, reducing the chance of COVID-19 (OR = 0.32; 95%CI: 0.21–0.49; p < 0.001) (Table 4).

DISCUSSION

This study provided evidence on predisposing factors and associations with the occurrence of COVID-19 in the hospitalized pediatric population. Among the indicators used in multivariate analysis, location of hospitalization (emergency

Table 4 – Logistic regression of demographic, clinical, and sign and symptom variables associated with the occurrence of COVID-19 in the hospitalized pediatric population (n = 486) – Londrina, PR, Brazil, 2023.

Variables	Adjusted OR	95%CI	p-value‡
Place of hospitalization			
Emergency room	2.78	1.33–5.84	0.007
Intensive Care Unit	2.52	1.54–4.16	0.000
Pediatric inpatient care	1.00		
Use of corticosteroids			
Yes	3.37	2.05–5.53	<0.001
No	1.00		
Anorexia			
Yes	0.32	0.21–0.49	<0.001
No			
Runny nose			
Yes	2.25	1.43–3.54	<0.001
No			
Comorbidities			
Yes	1.86	1.12–3.10	0.015
No			

Legend: OR – Odds Ratio; 95%CI – 95% Confidence Interval; ‡Pearson's chi-square test.

room or ICU), corticosteroid use, runny nose, and comorbidities were the most strongly associated with the chance of children contracting COVID-19.

Analysis of results identified that, regardless of the group, there was a higher incidence of COVID-19 in male children. Early research in Wuhan, China, at the beginning of the pandemic, validated this finding, and evidence suggests that male patients tend to have a higher incidence of the disease and, when compared to female patients, are more likely to die or develop severe forms of the disease[6,13].

Among children diagnosed with COVID-19, 74.5% were under 10 years of age. This data supports a study that presents a retrospective analysis of SARS-CoV-2 infections involving 2,135 patients, with a median age of 7 years, making this population susceptible to infection by the virus[14].

The location of hospitalization stood out as a relevant factor, as children admitted to the emergency room were 2.78 times more likely to be diagnosed with COVID-19, while those admitted to the ICU were 2.52 times more likely, compared to those admitted to a pediatric ward. These findings may be related to the initial clinical profile of patients, the higher turnover and overcrowding of beds in these units, and the greater exposure to symptomatic patients, especially at the beginning of the pandemic, when personal protective equipment was scarce and protocols were still being developed[15].

The median length of hospital stay was two days, a result close to that found in the literature[16]. The longer the length of hospital stay, the greater the risks for patients due to exposure to infectious agents during hospitalization. Since the pediatric population has the right to companions, their families are also exposed to contracting diseases and, likewise, spreading them[17].

The pediatric patient profile is diverse and inherent to the stages of development, and there are some common characteristics regarding hospital care demands to be assigned. This data can be of great relevance in assisting with hospital routines and reorganization of pediatric services, when necessary, along with information on patients' clinical aspects[16].

It is important to note that 64.2% of hospitalized children did not use ventilatory support. Studies emphasize the need for discussion about the use of ventilatory support to prevent future harm and increased hospitalizations[18]. It is known that children are susceptible to developing respiratory tract infections due to their anatomical, physiological and immunological qualities, and when the use of ventilatory support is necessary, the ventilatory weaning process comprises 40% of length of hospitalization[19].

The use of antimicrobials and corticosteroids was widely used in the children studied. In this sample, the analysis indicated that children who used antimicrobials were 58% less likely to develop COVID-19. This use may be justified by the attempt to prevent respiratory tract infections, since, at the beginning of the pandemic, knowledge about the virus was limited, and in the case of respiratory infections, there is the possibility of mixed infection or secondary bacterial infection[20]. Another explanation is the empirical coverage for possible superinfection in the respiratory tract that is acquired in a hospital[21].

Corticosteroid use was also associated with a higher risk of COVID-19, with a 3.37-fold increase in the chance of diagnosis compared to controls. However, corticosteroid use is often used in respiratory tract infections due to its anti-inflammatory effect, reduction of viral replication, and regulation of angiotensin-converting enzyme 2 gene expression[22].

In this regard, assessing the description of the signs and symptoms of the pediatric population observed in the study made it possible to verify that the presence of fever was associated with a 90% increase in the chance of a COVID-19 diagnosis. Fever was present in most children in the case group, being one of the most common complaints in children's clinics and hospitals[23], in addition to being an isolated sign reported in approximately 20 to 30% of pediatric consultations. Furthermore, cough was observed in both groups, which is in line with the study that also highlighted cough as the main symptom identified in 83% of children[24].

Symptoms of cough, runny nose, non-eupneic breathing pattern, and oxygen saturation of 90 to 95% were inversely associated with a diagnosis of COVID-19, being associated with a lower chance of this outcome occurring in the study population. Overall, in most cases of flu-like illness, cough and runny nose were identified as the initial symptoms, considered classic symptoms of airborne infections, and may be followed by other symptoms. Therefore, medications are widely used due to the discomfort they cause and the short-term impact on quality of life[25].

Another important factor identified was the presence of comorbidities, which increased the chance of COVID-19 by 1.86 times. Children with preexisting medical conditions, such as chronic lung disease or a history of prematurity, may be more susceptible to infection and have a less favorable clinical outcome. According to The International Study of Asthma and Allergies in Childhood, a validated and standardized

international protocol that supports studies on asthma and allergic diseases, Brazil has a high prevalence of lung diseases, especially asthma and allergic rhinitis[26].

Prematurity still impacts newborn morbidity and mortality and has permanent consequences for child development. In Brazil, from 2011 to 2021, approximately 31,625,722 live births were reported; of these, 3,503,085 were premature, accounting for a prevalence of 11%[27]. These consequences affect children's future, representing a risk factor for those exposed to respiratory viral pathogens. However, our findings reveal that 76.3% of children had no other related illnesses. However, the presence of comorbidities was associated with an 86% increased risk of COVID-19. A possible explanation is that having comorbidities increases the chance of developing an unfavorable prognosis[15].

Among children diagnosed with COVID-19, there was a higher frequency of individuals who self-identified as brown, black, yellow, or indigenous compared to white children. The analysis revealed that these children were 55% more likely to be included in the case group, indicating a statistically significant association between race/color and the occurrence of COVID-19 in the study population. A case-control study and a systematic review with meta-analysis report that racial and ethnic groups (Black, Latino, and Hispanic) are disproportionately affected, possibly due to economic factors, inequalities, and similar health conditions[14].

The use of an oxygen mask and nasal cannula was more frequently associated with the control group. These findings suggest that the use of these ventilatory supports may be related to respiratory conditions of other etiologies. Nasal cannula is one of the most effective non-invasive therapy methods due to its ability to prevent aerosolization and cross-contamination, in addition to being comfortable[28]. When ventilatory support is provided, there is a reduction in the body's effort, aiding in patients' improvement and restoring normal oxygen levels necessary for health[29].

The results showed that the location of admission (emergency room or ICU), the presence of comorbidities, corticosteroid use, and a runny nose remained significantly associated with a COVID-19 diagnosis. Children admitted to the emergency room were 2.78 times more likely to be diagnosed, those admitted to the ICU were 2.52 times more likely, and those who used corticosteroids were 3.37 times more likely. Furthermore, the presence of a runny nose was associated with a 2.25-fold increase in the chance of being included in the case group. These findings highlight the complexity of healthcare for children affected by COVID-19 and reinforce the need to expand prevention strategies, early diagnosis, and specific therapeutic care for this population group.

Limitations of this study include its retrospective nature, which precluded direct observation of children, and the fact that it was conducted at a single teaching hospital, which may limit the generalizability of results. Another limitation is the lack of blinding of the control group patients by the principal investigator and incomplete information in the database, leading to inconsistency and, consequently, data exclusion.

CONCLUSION

Among the factors associated with the occurrence of COVID-19 in hospitalized children under 14, the location of admission (emergency room or ICU), corticosteroid use, having a runny nose, and comorbidities were the most strongly associated with disease diagnosis. The results of this study advance knowledge by providing important information on the signs and symptoms presented by children during hospitalization for COVID-19, as well as the factors associated with these occurrences.

DATA AVAILABILITY

The complete dataset supporting the findings of this study is available within the article itself.

RESUMO

Objetivo: Analisar os fatores associados à ocorrência da COVID-19 na população pediátrica no contexto hospitalar. **Método:** Trata-se de estudo caso-controle pareado, realizado com prontuários de crianças menores de 14 anos. Considerou-se caso a população pediátrica com teste positivo para COVID-19, e controle, a população pediátrica negativa para COVID-19. Para cada caso, utilizou-se um controle, totalizando 486 prontuários. Realizaram-se análise descritiva, análise bivariada e regressão logística. **Resultados:** As variáveis associadas à ocorrência da COVID-19 foram crianças pardas, pretas, amarelas e indígenas, internamento em pronto-socorro e Unidade de Terapia Intensiva, uso de máscara e cateter de oxigênio, antimicrobiano, e corticoide. Febre, anorexia, padrão respiratório não eupneico com saturação entre 90% e 95%, presença de tosse, coriza, e ter comorbidade tiveram associação com o desfecho. **Conclusão:** Avança ao fornecer informações sobre os fatores associados à COVID-19 na população menor de 14 anos hospitalizada, sendo esses o local de internação, anorexia, coriza, comorbidade e uso de corticoide.

DESCRITORES

Criança; Hospitalização; COVID-19; Pandemias; Estudos de Casos e Controles.

RESUMEN

Objetivo: Analizar los factores asociados a la incidencia de COVID-19 en la población pediátrica en un entorno hospitalario. **Método:** Estudio de casos y controles pareados, realizado con historias clínicas de niños menores de 14 años. Se consideró como población caso a la población pediátrica con resultado positivo para COVID-19, y como población control a la población pediátrica con resultado negativo para COVID-19. Por cada caso, se utilizó un control, totalizando 486 historias clínicas. Se realizaron análisis descriptivo, análisis bivariado y regresión logística. **Resultados:** Las variables asociadas con la ocurrencia de COVID-19 fueron: niños de raza mixta, negros, asiáticos e indígenas, ingreso a urgencias y unidad de cuidados intensivos, uso de mascarilla y catéter de oxígeno, antimicrobianos, y corticosteroides. Fiebre, anorexia, patrón respiratorio no eupneico con saturación entre 90% y 95%, tos, rinorrea y comorbilidad se asociaron con el desenlace. **Conclusión:** Este estudio avanza al proporcionar información sobre los factores asociados con COVID-19 en la población hospitalizada menor de 14 años, incluyendo el lugar de hospitalización, anorexia, rinorrea, comorbilidad y uso de corticosteroides.

DESCRIPTORES

Niño; Hospitalización; COVID-19; Pandemias; Estudios de Casos y Controles.

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