


Comparison Between Pediatric Patients With and Without Close Contact With COVID-19 in a Brazilian City During SARS-CoV-2 Pandemics

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Abstract

Objective: To analyze clinical differences between a pediatric population with and without confirmed positive close contact for the new coronavirus, to establish the symptoms that define a population currently served in a children's emergency room for which polymerase chain reaction (PCR) collection for SARS-COV-2 is performed, and thus, make clinical and laboratory screening more reliable and applicable in medical routine.

Method: Cross-sectional study that characterized 128 children (0-17 years old) who collected PCR for SARS-COV-2 when seen in an emergency room at a private hospital between March and June 2020. Data were collected from the electronic medical record of the researched hospital.

Results: Patients positive for close contact with COVID-19 had more diarrhea ($P = .03$) and less fever ($P = .003$) and coughing ($P = .03$). There was no statistically significant difference between the 2 groups on gender distribution, age, isolation of other etiologic agents, chest x-ray abnormalities, or the need for hospitalization. SARS-Cov-2 PCR showed a higher positivity among patients on the close contact positive group ($P < .001$).

Conclusion: As seen in previous research, positive SARS-CoV-2 tests are not required for the pediatric population to be diagnosed with the new coronavirus. Diarrhea should be included in those related to a high suspicion of potential SARS-CoV-2 infection, prompting nasopharyngeal PCR collection. However, fever and cough are unspecific symptoms for SARS-CoV-2 infection and should not be considered as warning signs for parents and, more importantly, for pediatricians to collect screening examinations.

Keywords

coronavirus, children, close contact

Introduction

The 2019 novel coronavirus (COVID-19) is now a worldwide disease.^{1,2} Children tend to present with a less severe clinical course and a relatively small mortality.³⁻⁵ Known numbers of infected children tend to be higher than those notified, due to the inherent difficulties of diagnosis in those populations, especially in patients with few symptoms.^{6,7} Most commonly described symptoms include cough and fever^{4,8} as seen in Chinese case series, with a large number of asymptomatic children, diagnosed because of triage of close contacts with adult patients who had severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-positive naso/oropharyngeal polymerase chain reaction (PCR).

The analysis of potential differences between symptomatic populations with and without confirmed close contact with SARS-CoV-2-positive individuals may be important to establish populational vigilance strategies.

Methods

Our group performed a cross-sectional study of all pediatric patients (0-17 years of age) seen in a private

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hospital in the Pediatric Emergency Department (PED) on which SARS-CoV-2 naso/oropharyngeal PCR samples were collected, from March to June 2020. Department's recommendations for collecting SARS-CoV-2 PCR samples included the presence respiratory symptoms and/or any clinical symptoms without other potential or clear etiologies to justify them and close/household contact to suspicious cases.

The definition of close contact was taken from the CDC (Centers for Disease Control and Prevention) which describes someone who was less than 6 feet away from a laboratory-confirmed or clinically diagnosed infected person for a cumulative total of 15 minutes or more in a 24 hours period.⁹ It is noteworthy that the severity of symptoms was not evaluated.

Data were obtained from medical records, including demographic data, symptoms, presence/absence of chest x-ray abnormalities, results of SARS-CoV-2 PCR, results of other viral/etiologic tests (respiratory viral panel, rapid throat step test, blood cultures, urine cultures), need for hospitalization, and close contact with COVID-19 status.¹⁰

The symptoms investigated were fever (defined as greater than 38°C),¹¹ cough, coryza, odynophagia, anosmia, dyspnea, myalgia, headache, diarrhea (defined as the passage of 3 or more loose or liquid stools per day or more frequent passage than is normal for the individual),¹² and nausea/vomiting.

Ethical committee approval was previously obtained (#31247120.1.0000.5461). Written consent was waived due to the retrospective nature of the research. When data on close contacts were not clearly available on hospital records, a phone call to the parents or responsible was performed. In this situation, following ethical committee recommendations, written consent was obtained by e-mail, to avoid trips to the hospital during the pandemics.

Clinical data were analyzed in terms of frequency, mean, and median when applicable. Patients with and without close contact with confirmed cases of COVID-19 were compared. For continuous variables, Mann-Whitney test was used. For categorical data, Fisher exact test was used. Type 1 error defined for the study was 0.05. The statistical software used was STATA14 (StataCorp). The source of funding for this study was the researchers' own resources.

Results

A total of 128 patients who were seen in a private hospital in the PED from March to June 2020 were included in the study. General population characteristics are shown in Table 1.

Table 1. General Characteristics of the Study Population.

General characteristics	n = 128
Gender (M/F)	67 (52.3%)/61 (47.7%)
Age, mo	63.5 (26-150.5)
Symptoms	7 asymptomatic patients (5.4%)
Fever	78 (64.4%)
Cough	67 (55.3%)
Coryza	53 (43.8%)
Odynophagia	30 (24.8%)
Anosmia	1 (0.8%)
Dyspnea	28 (23.1%)
Myalgia	16 (13.2%)
Headache	24 (19.8%)
Diarrhea	20 (16.5%)
Nausea/Vomiting	16 (13.2%)
Positive for COVID-19	48 (37.5%)
close contacts	
Chest x-rays	65 performed (53.7%)
Chest x-ray abnormalities	35 (53.8%)
Other agents isolated	21 (17.3%) ^a
Hospitalization	23 (17.9%)
Positive SARS COV-2 PCR	16 (12.5%)
Time since symptoms onset	3 (1.5-5)

Abbreviation: PCR, polymerase chain reaction.

Data in median (interquartile range) or absolute number (%) when applicable.

^aSeventy-two other etiologic tests performed.

A slight preponderance of male patients is observed (52.6% male). The most prevalent symptoms were fever (64.4%), cough (43.8%), and coryza (43.8%).

In the study data sample, it is observed that 7 children collected the SARS-CoV-2 PCR test with negative results even though they were asymptomatic only because they had close contacts positive for the coronavirus. This fact can be explained by the data being taken from a period where very little was known about the virus and its transmissibility, and thus, PCR tests were collected in the assumption that a possible screening of infected people could be done even in asymptomatic children.

Of all the children who had the test collected for coronavirus, only 23 children (17.9%) were admitted to the hospital because they met admission criteria, the rest were released after medical screening and symptomatic medication prescription.

Seventy-two patients performed other etiologic tests (59.5%) including Respiratory Virus Panel (molecular and immunofluorescence based), cultures (blood, urine, and oropharynx), and oropharynx Streptococcus A test. Twenty-one of these patients (17.3%) were positive for other infectious agents, including Respiratory Syncytial Virus, Influenza (A/B), and Parainfluenza-3.

Table 2. Comparison Between Patients With and Without Close Contact With COVID-19 Individuals.

Characteristics	Close contact		P
	Positive (n = 48)	Negative (n = 80)	
Gender (M/F)	22 (45.8%)/26 (54.1%)	45 (56.2%)/35 (43.8%)	.25
Age, mo	39.5 (19-85)	59.5 (22.5-136.5)	.13
Symptoms			
Fever	19 (46.3%)	59 (73.7%)	.003*
Coughing	17 (41.4%)	50 (63.5%)	.03*
Coryza	19 (46.3%)	34 (42.5%)	.69
Odynophagia	7 (17.7%)	23 (28.7%)	.16
Dyspnea	7 (17.7%)	21 (26.2%)	.25
Myalgia	5 (12.2%)	11 (13.7%)	.81
Headache	11 (26.8%)	13 (16.2%)	.16
Diarrhea	11 (26.8%)	9 (11.2%)	.03*
Nausea/Vomiting	5 (12.2%)	11 (13.7%)	.81
Chest x-ray abnormalities	9 (47.3%)	26 (55.3%)	.56
Other agents isolated	3 (27.2%)	18 (29.5%)	.88
Hospitalization	5 (10.4%)	18 (22.5%)	.08
Positive SARS-CoV-2 PCR*	14 (29.1%)	2 (2.5%)	<.001
Time since symptoms onset	3 (2-4)	3 (1-5)	.47

Abbreviation: PCR, polymerase chain reaction.

Data in median (interquartile range) or absolute number (%) when applicable.

* $P < .05$.

Chest x-rays were performed in 65 patients (53.7%), with 35 (53.8%) of which showing some abnormality (atelectasis, interstitial infiltrate, or condensation). A total of 16 patients (12.5%) had positive SARS-CoV-2 PCRs. Median time to COVID-19 test result was 3 days (interquartile range [IQR]: 1.5-5).

Comparison between patients with and without close contact with COVID-19 individuals is shown in Table 2.

There was no statistically significant difference between the 2 groups on gender distribution, age, isolation of other etiologic agents, chest x-ray abnormalities, or the need for hospitalization. Patients positive for close contact with COVID-19 had proportionally more diarrhea (26.8% vs 11.2%— $P = .03$) and less fever (43.3% vs 73.7%— $P = .003$) and coughing (41.4% vs 63.5%— $P = .03$). Time from symptoms onset to testing for SARS-CoV-2 was not different between the groups.

SARS-Cov-2 PCR showed a higher positivity among patients on the close contact positive group (29.1% vs 2.5%— $P < .001$).

A secondary analysis of the 16 patients with positive SARS-CoV-2 naso/oropharyngeal PCR (12.5% positivity in the study population) compared with PCR-negative patients showed no difference on age (64 months [IQR: 32.5-158.5] vs 60 months [IQR: 25-145], $P = .66$) or gender distribution. All PCR-positive patients showed at least one of the symptoms listed above, with statistically more headache (46.7% vs 16.2%, $P = .01$). There were

no differences on the incidence of chest x-ray abnormalities or on the isolation of other etiologic agents. The most prevalent symptoms of the PCR-positive population were fever (62.5%), coryza (43.7%), and headache (43.7%). No patients on the PCR-positive group needed hospitalization (100% mild cases).

Discussion

This study performed the clinical characterization of pediatric patients on their admission to a general Brazilian hospital's emergency department, where SARS-CoV-2 PCR tests were performed during the pandemic period. This study's objective was to determine the clinical differences between pediatric patients with and without close contact with confirmed cases of COVID-19.^{13,14}

There is enormous difficulty in diagnosing children with coronavirus infection due to some factors, one of them being the fact that they contract less serious diseases than adults, which despite unclear causes, probably occurs due to different immune responses from adults, a fact that makes children less investigated.¹⁵ In relation to transmission, children apparently have lower rates, as seen in a review article published by the University of Oxford, which points to greater vulnerability of home transmission only for spouses and the elderly in relation to other family members,¹⁶ often

causing children's symptoms to be devalued by their caregivers.¹⁷

It is observed that there are few data in the literature that make associations between the severity of the disease in children and the incidence of transmission by close contact, possibly because children have milder conditions as discussed above, so these situations were also not researched and addressed in this study.

Fever and cough incidences, similar to the described in previous studies,^{3,5,7} are 2 of the most common but unspecific symptoms for SARS-CoV-2 infection. The high level of parental concern for those symptoms in the context of the pandemics may lead to an intense search for emergency services and a high need to perform viral testing, the SARS-CoV-2 nasopharyngeal reverse-transcription polymerase chain reaction included. The overlap of symptomatology between COVID-19 and other respiratory viral illnesses can make differential diagnosis extremely challenging. As stated by Safadi¹³ in a recent editorial for *Jornal de Pediatria*, comparisons with influenza infection in children show that SARS-CoV-2 infection has a higher percentage of asymptomatic or oligosymptomatic cases. As children can represent a potential reservoir for the disease, knowledge of potential clinical characteristics to determine the necessity of testing is essential for future clinical and isolation protocols.

Gastrointestinal symptoms are reported as associated with COVID-19 in pediatric patients.^{18,19} Our study is in accordance with these findings, showing that 26.8% of patients admitted to PED with a history of close contact with known COVID-19-positive patients. Taking these observations into account, diarrhea symptoms should be included in those related to a high suspicion of potential SARS-CoV-2 infection, prompting nasopharyngeal PCR collection.

Due to the low prevalence of positive PCR tests in the pediatric population,^{7,20} determination of potential clinical differences between patients with and without confirmed close/household contact with COVID-19 may be important to determine follow-up and vigilance protocols.

The small sample size, the cross-sectional retrospective nature of the study and the collection of data at the beginning of the pandemic are some of its limitations. It is worth mentioning that during the last 2 years, there have been several discoveries about the disease caused by the novel coronavirus, including the emergence of new mutations and variants, and the advent of a specific vaccine, which can modify the patients' clinical manifestations, making larger and prospective studies still necessary with new data collections to confirm the findings.

As the transmission of SARS-CoV-2 spreads to our community, physicians must be aware of potentially atypical manifestations and symptoms related to COVID-19.⁵ Given the importance of close contact with known cases for the infection and low positivity of tests in children, the development of clinical protocols for risk stratification, follow-up, and diagnosis must be guided by the best available evidence.

Author Contributions

IMCP: Had access to all the data in the study and takes full responsibility for the integrity of the data and the accuracy of the data analysis; concept and design; acquisition, analysis or interpretation of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content.

ACH: Contributed to critical revision of the manuscript for important intellectual content; administrative, technical, or material support; supervision.

RLAF: Contributed to critical revision of the manuscript for important intellectual content; administrative, technical, or material support; supervision.

FNG: Contributed to critical revision of the manuscript for important intellectual content; administrative, technical, or material support; supervision.

EEL-M: Contributed to critical revision of the manuscript for important intellectual content.

ML: Contributed to concept and design; acquisition, analysis or interpretation of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content; statistical analysis; supervision.

Declaration of Conflicting Interests


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