

ORIGINAL ARTICLE



Update on COVID-19 in the pediatric population at University Hospital of Oran. A retrospective study

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ABSTRACT

Introduction. The spread of the novel coronavirus SARS-CoV-2, discovered in China in January 2020, led to a pandemic in Algeria as early as February. Children and adolescents under the age of 18 were much more rarely affected than adults and account for 1-5% of all cases described to date. Initially, the morbidity concerning the child remained low, the pediatric forms of the disease were most often familial, moderate (fever, cough, asthenia), even sometimes asymptomatic, death was an extremely rare event. The purpose of this article is to describe the pediatric specificities of covid 19 viral infection concerning children. **Methods.** A study was conducted from 1st March to 30th December 2020 at the University Hospital of Oran (EHUO). We used the clinical records using a pre-established questionnaire. Descriptive statistical analysis was performed to determine frequencies and percentages. **Results.** 302 children were admitted with a mean age of 8.04 ± 0.2 years old. Children were most often asymptomatic and very few of them had presented a mild form; all were admitted with their parents, in different hospital departments welcoming COVID patients. PCR was positive in 40% of cases. A multisystemic inflammatory syndrome during post COVID 19 was noted among three patients. **Conclusion.** Access to quality medical care during the pandemic was facilitated by the organization of a COVID-19 emergency triage unit in the crèche of our establishment. Children represented only a small percentage of cases of acute SARS-CoV-2 infection and were generally asymptomatic, or had mild to moderate symptoms.

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1. INTRODUCTION

The spread of the novel coronavirus SARS-CoV-2, discovered in China in January 2020, led to a pandemic in Algeria as early as February. Children and adolescents under the age of 18 were much more rarely affected than adults and account for 1-5% of all cases described to date [1].

At first morbidity for the child remained low, pediatric forms of the disease are most often familial [2]. Moderate forms (fever, cough, were prevalent, even asymptomatic, death was an extremely rare event. The aim of our study was to describe the pediatric specificities of covid 19 viral infection concerning

patients who were admitted at the University Hospital of Oran (EHUO) .

2. PATIENTS AND METHODS

Design: this was a descriptive retrospective study conducted during the period from 1st March to 30th December 2020

Setting: it was conducted at the University Hospital of Oran (EHUO). This survey took place in the triage unit (children's nursery) dedicated specifically to COVID 19, which was located far from the hospital structures and received all symptomatic or asymptomatic adults with COVID, as well as children who consulted for influenza-like symptoms during pandemic. General practitioners and specialists from the EHUO took it in turns to work in this unit to receive this type of patients.

The structural organization of the COVID 19 unit included a triage area, a shock room, 2 short-stay hospital units with 16 beds, 4 consultation cubicles, an extendable seated waiting area, 1 delocalized blood analysis laboratory and a delocalized radiology room.

Participants in the study: Each participant (adults and children) was tested for SARS-CoV-2 infection by real-time polymerase chain reaction (PCR) using nasopharyngeal specimens, and then were admitted depending on the severity of the illness, either in the crèche unit or in certain departments that dealt with COVID-19 pathology.

Inclusion criteria: we included all children under the age of 17 years old who consulted for proven or underknown symptomatology of COVID 19.

Exclusion criteria: children infected with the influenza virus and bronchiolitis in infants

Sample size determination and sampling technique: all consecutively admitted children with COVID-19 during ten months of follow-up period were included in the study. During this interval, a total of 326 children with COVID-19 were admitted to the center. 15 incomplete clinical records were excluded from the study because of the lack of laboratory workup (C-reactive protein (CRP), blood count) and in 9 patients PCR with Sarcov2 could not be done due the lack of informed consent from guardians or parents. Finally, 302 children who fulfilled the eligibility criteria were included in the final analysis.

Data collection: we analyzed the clinical records using a pre-established operating sheet that grouped the following parameters: socio-demographic parameters, characteristics of the professions, development of COVID-19 symptoms among family and children, underlying medical conditions and symptom characterization (presence of fever, cough, rhinorrhea, shortness of breath, among others).

Nasal, nasopharyngeal, oropharyngeal swab, nasotracheal, or blood samples tested positive for 2019-nCoV/SARS-CoV-2 nucleic acid by using real-time reverse-transcriptase polymerase chain reaction assay (RT-PCR). Chest imaging in symptomatic patients, ± echocardiography if cardiac symptomatology. Laboratory parameters included those for white blood cells, hemoglobin, lymphocyte count, CRP, CK-MB, D-Dimer, AST, ALT, urea, creatinine, LDH, ± ferritin

Definition of clinical forms in children:

Asymptomatic form: It is Infection that is detected during the screening or as part of the tracing, without any symptoms.

Mild form: is Fever - fatigue and/or upper respiratory tract involvement. No signs of lower respiratory tract infection: normal respiratory rate, no dyspnea, normal pulmonary auscultation, normal transcutaneous oxygen saturation (SpO₂), no radiological damage (if imaging was performed).

Moderate form: one Symptoms related to damage to the lower respiratory tract, and / or Decreased food intake (need for nutritional support), possible abnormalities related to COVID-19 on chest X-ray or chest ultrasound. SpO₂ greater than or equal to 92% in ambient air.

Severe form [3]: The criteria for rapid respiratory rate are as follows: ≥ 60 times/min for less than 2 months old; ≥ 50 times/min for 2–12 months old, ≥ 40 times/min for 1–5 years old, ≥ 30 times/min for > 5 years old (after ruling out the effects of fever and crying). With the aggravation of the disease, respiratory distress, nasal flaring, suprasternal, intercostal and subcostal retractions, grunting and cyanosis may occur.

Critical form: Paediatric Acute Respiratory Distress Syndrome (PARDS) and/or Multi-organ failure (>2 organs) related to sepsis and/or Shock and/or Coma [4].

Statistical analysis: data analysis was done using using Microsoft Office Word 2007 then conversion on the software SPSS version 20 (SPSS Inc. Chicago, IL, USA). Quantitative variables that followed a normal distribution were described on average and those of abnormal distribution on a median. Pearson's chi-square test was used for the comparison of qualitative variables and the Yates test if any took place. For numbers less than 5, we used Fisher's test. The differences observed were considered significant for a p < 0.05 with a confidence interval of 95%.

Ethical considerations: The confidentiality and anonymity of the participants was respected. informed consent is signed by the parents or guardians for all admissions of children. Data analysis and processing were anonymous and confidential. The research protocol of the present study was approved by the institutional health Algerian Instruction : Numéro 10-DGSSRH du 22 Avril 2020, relative to the management of cases of COVID-19 in the child.

3. RESULTS

Among the 8897 outpatients stopped on December 30th, 2020. 302 children had been the subject of the study, with an incidence of 3.39%. Children were aged between 1 month and 15 years (extreme 4 days-16 years), 52.8% of them were girls.

The average age of the children was 8.04 ± 0.2 years. The distribution of cases among those under 16 years old was as follows: 5% were aged 0-1 years, 16% were 2-4 years, 25% were 5-9 years, 23% were 10-13 years old and 31% were 14-16 years old (Figure 1).

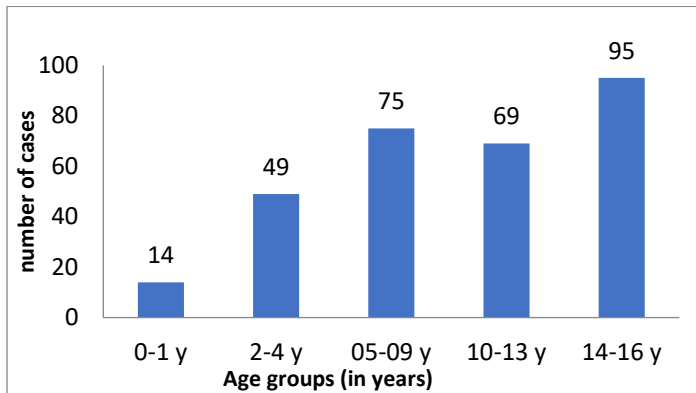


Figure 1. Graphical distribution by age group in the participants pediatric population.

Clinical outcomes and diagnostic assessment

During the consultation, there were very few clinical signs: 17 patients (5,6 %) had cough, rhinorrhea, 39 children (12,9 %) were febrile (Temperature between $37.9 - 38.5^\circ$) with nasal obstruction, 15 (4,96%) children complained about digestive pain, diarrhea with loss of smell. 8 (2,64%) children were dyspneic and had an $SPIO_2$ between 94 and 96% with a pulmonary focus at auscultation reinforced by foci of pulmonary condensation on the chest x-ray. The bacteriological result found; a positive SARS-CoV-2 PCR at 40% of children and anegative at 52%, distributed as follows (Figure 2).

Among the explorations, we found that chest imaging was most often normal; besides ALT levels and myocardial enzymes achieved for symptomatic patients were not significantly abnormal. Cardiovascular, hepatic and renal functions were almost always normal except for 2 patients. Likewise, blood tests were little disturbed (normal or temporarily deregulated reactive C protein, the median WBC ranged from 6 to $9.45 \times 10^9 /L$. A total of 15 out of 302 patients (4,96%) with biological results had a lymphocyte count of $< 1.5 \times 10^9 /L$).

Therapeutic intervention and outcome (table 1) :The median length of symptomatic disease was 7 days, with a minimum of 2 and a maximum of 14 days. Children with little symptoms having a febrile viral infection of the upper respiratory tract with a PCR

SARCOV 2 positive were treated with antibiotics like amoxicillin or azithromycin depending on age. Antipyretic treatment was delivered according to the health protocol (Instruction-N-10-DGSSRH-DU-22-Avril-2020-Relative-to-the-management-of-cases-Covid-19-in-the-child-).

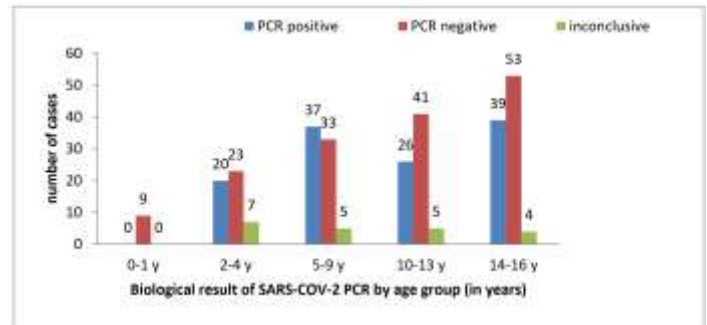


Figure 2. Biological result of SARS-CoV-2 PCR in the participants pediatric population.

All the children had evolved well and recovered after 7-10 days of treatment. A 7-year-old patient was admitted at the EHU Oran pediatric intensive care unit because of a Pediatric multisystemic inflammatory syndrome associated with Covid-19 (PMIS-C). The SARCOV 2 antigen test was positive. The child was intubated, ventilated, treated with inotropic support for 3 days at 2 g/kg intravenous immunoglobulins and 50 mg/kg acetylsalicylic acid. Evolution was favorable at the end of the 7th day of the hospitalization.

Two other children were hospitalized with PIMS-C complicating cardio-renal disease which required inotropes vasopressors and volume loading, intravenous infusion of immunoglobulins, corticosteroid therapy supplemented if necessary by pericardial drainage and replacement renal therapy (1 case). These children fully recovered within a week, some of them later developed coronary artery dilation or aneurysm.

4. DISCUSSION

Since the beginning of the pandemic, our hospital structure seriously treated it, sorting also was done at the level of the covid unit specially arranged during the pandemic. Children were admitted in the services hosting the pathology COVID 19 with their parents (contact subjects or proven subjects). The source of contamination of the child was most often intra-family. Several studies reported that a high proportion of pediatric cases had a history of exposure to an adult case in the family or to another adult [2].

Data from different countries confirmed the lower frequency of covid infection in children and its lower severity in other terms The infection was most often mild responsible for unseemly specific clinical signs. [5-8]. In one series, some children

nevertheless had gastrointestinal symptoms (abdominal pain nausea, vomiting and diarrhea) [8] Across all ages, a meta-analysis estimated that diarrhea affected just over 10% of patients (2 to 50% of cases depending on the studies) before, during or after respiratory symptoms [9].

Table 1. Therapeutic intervention and outcome in symptomatic children

| N cases (%) | symptoms | Admission service | treatment | outcome |
|-------------|--|---------------------|---|--|
| 39 (12,9) | fever et /ou headache | Médical | antipyretic type prodafalgan | favorable outcome on average over 4 days |
| 8(2,6) | slight dyspnea, Cough, Rhinorrhea | Pneumology | nasal oxygen, amoxicillin or azithromycin rehydration | Favorable on average over 5 D |
| 17(5,6) | Vomits/nausea, diarrhea | médical | VE | Favorable on average over 2 D |
| 1(0,3) | PIMS | Intensive care unit | MA, IS, IV IG, NSAi, CS | Favorable after the 7th day |
| 2(0,6) | PIMS-C complicating cardio-renal disease | Intensive care unit | IV IG, VE, PD(2 cases), RRT(1 case) | Fully recovered within a week |

MA :mechanical ventilation ; IS : inotropic support ;IV Ig : intravenous immunoglobulin ; NSAi: non-steroidal anti-inflammatory drugs ; CS :Corticosteroids ; VE: volume loading ; PD :pericardial drainage RRT :replacement renal therapy

During our study in the pediatric population, we found on biochemical examination: few disturbed blood tests (normal or temporarily deregulated C-reactive protein; liver and kidney functions were almost always normal, unlike what was observed in their sick parents or grandparents. Neutrophil polynucleosis and lymphopenia was common in 6% of symptomatic patients.

The SARS-CoV-2virus test by PCR was performed in young infants and children, 40% of them were positive. There was no significant difference between clinical symptomatology and PCR outcome (p=0.0045).

A large retrospective study of 171 patients under the age of 16 years of age, diagnosed by RT-PCR on nasopharyngeal swab, found a median age of 6.7 years. The Contamination was at 90% intra-familial. Lymphopenia (3.5%) appeared to be less common than in adults. 65% of patients developed radiological pneumonitis, in the form of frosted glass images, 7% of whom had no clinical signs. Fifteen percent of patients had no clinical signs or radiographic abnormalities [10]. In this study, the chest scan was not indicated, even if hospital management was considered during the 1st wave of the pandemic, the children did not presented any severe form of Covid pathology.

Symptomatic or non-symptomatic children were placed in isolation-quarantine in the hospital, with their parents in the various departments. This forced confinement of children, the closure of schools, had consequences in terms of reduced physical activity. In some departments children had experienced major emotional and relational disturbances involving psychologists from the EHU Oran.

Severe and critical forms were rare in the literature. No critical forms during hospitalization were noted. Chinese and Italian epidemiological data on thousands of cases initially reported very few ICU admissions and no deaths. Since then, rare additional cases of pediatric deaths were reported, including fewer than 10 children, a priori with associated comorbidities. Among infected children, young aged has were described as a risk factor for severity. [1, 11-17]. In this study, children did not exhibit comorbidity during admission. In Algeria, there were no published case series relating to the admissions of them and the prognosis of these children to intensive care.

Nevertheless, in Europe and the United States, after the pandemic, the appearance of a potentially serious disease was declared in children who tested positive for Covid-19. It was an inflammatory disease called "multi-inflammatory syndrome in children" (MIS-C) by the US health authorities [18]. It resembles disease, and is nicknamed Kawasaki-like, or PIMS (pediatric multisystemic inflammatory syndrome) [19].

Given the epidemiological context, the clinician should discuss the diagnosis of MIS-C with persistent fever without a clinical focus and any fever associated with an alteration in general condition that coincided with recent exposure to SARS-CoV-2 should be suspected of MIS-C. Three children were hospitalized in pediatric intensive care unit at EHU Oran, for a post-covid multisystemic inflammatory syndrome (PIMS) that had evolved favorably.

Limitations of the study:

This work has some limitations to the generalization of deductions including the retrospective and documentary aspect of data collection likely to lose necessary information that did not appear in the files.

Single-center study, the results should be generalized across the whole of Algeria, thus contributing to the preliminary publication of the report.

5. CONCLUSION

Access to quality medical care during the pandemic was facilitated by the organization of a COVID 19 emergency triage unit in the creche of the Oran university hospital. Adult and child patients consulted for flu-like symptoms were triaged for diagnosis and then treated according to the severity of the symptoms Children account for only a small percentage of acute SARS-CoV-2 cases and, in general, they were asymptomatic, or they experienced mild to moderate symptoms such as fever, dry cough and fatigue, as well as abdominal pain and diarrhea in some cases. The infected children were infected by an adult in their entourage.

The severity and mortality rate of infection in young children was lower than in adults. An acute inflammatory disease that has a temporal link to COVID-19 in a few pediatric patients had been

described in the literature. Nevertheless, pathology was still unknown with unexpected repercussions in children; hence the interest in broadening the range of publications in order to compare our results with other learned societies in order to identify a better approach in the pediatric population.

Our recommendations:

We wish we Set up a “Covid CHILD” network to enable the coordination of a survey with all Algerian Pediatric intensive care unit cases in the first 48 hours of the patient's admission to intensive care with follow-up on Day 7 in order to know the clinical evolution of the child, and to send the information to Algerian Public Health, to the Ministry so that the latter takes the most appropriate measures to take, where appropriate, health measures or additional surveillance means in all intensive care units.

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Competing interests: The authors declare that they have no competing interest.

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