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Prevalence of Children and Adolescents with Asymptomatic Covid-19 and its Implications in Pediatrics and General Medicine

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Review Article

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Abstract

The coronavirus disease (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) poses different challenges to pediatricians and general practitioners (GPs) in the care of children and adolescents around the world. These are clearly susceptible to infection and can develop serious complications; although many experience mild or unrecognized disease, and remain asymptomatic. However, only a small number of children have been included in previous studies focused on the kinetics of asymptomatic SARS-CoV-2 spread. Furthermore, the data on the prevalence of SARS-CoV-2 in asymptomatic children and adolescents are highly variable and difficult to interpret, the most real rates possibly being between 20-50%, which are correlated with those of the local community. Asymptomatic children and adolescents are a potential source of contagion, possibly initiating many of the COVID-19 outbreaks. Without a vaccine or effective treatment, stopping the transmission of SARS-CoV-2 remains the only defense. But, the position of pediatricians and GPs is more complex. Preventing contagion and interrupting the transmission process is a priority, and focus of testing programs should be expanded to include people who do not have COVID-19 symptoms, especially all children and adolescents with household contacts. Public health interventions aimed at children and adolescents are precise, but this population is potentially more vulnerable to its negative effects than to infection by the virus itself. Pediatricians and GPs must practice in a biopsychosocial, proactive, holistic, and culturally competent manner to address the needs of children and adolescents. The potential role of children in transmitting disease in the community needs to be further elucidated, including possible important epidemiological roles in enhancing the spread of infection through communities and / or increasing herd immunity. Great care must be taken that "sanitary remedies" (non-pharmacological public health, vaccination when available, pharmacological treatment, etc.) on the population of children and adolescents, although justified, are not worse than the disease.

Keywords: COVID-19; SARS-CoV-2; Asymptomatic infections; Epidemiological characteristic

Abbreviations: SARS-Cov-2: Severe Acute Respiratory Syndrome Coronavirus 2; GPs: General Practitioners.

Introduction

The coronavirus disease (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1] poses different challenges to the care of children and adolescents around the world. A seroprevalence of antibodies to SARS-CoV-2 in children (3 to 16 years) of 7% to 8% has been reported [2]. In the US, as of March 25, 2021, 3,405,638 total cases of COVID-19 were reported in children, with children accounting for 13.4% of all cases (3,405,638 / 25,446. 361). At this time, it appears that severe illness due to COVID-19 is rare among children; The majority of reported SARS-CoV-2 cases have been in adults (over 18 years of age), but it is important to note that children (0 to 18 years of age) have been protected at home and in daycare centers; and schools were closed for most of the pandemic. Children were initially reported to be either asymptomatic or have mild symptoms, but the CDC update on August 14, 2020, added that children are still at risk of developing severe illness and complications from COVID-19 [3]. Additionally, in the US, as of March 25, 2021, after a steady decline in cases over the past 2 months, another slight increase in cases was reported [4].

Unusually for a respiratory viral infection, children and adolescents have a much lower risk of COVID-19 than any other age group [5]. Data from several affected countries have corroborated that children are clearly susceptible to infection and may develop severe primary and secondary inflammatory complications unique to infection, including childhood multisystem inflammatory syndrome. School-age children and adolescents may be a potential source of contagion in the SARS-CoV-2 pandemic, although most experience mild or unrecognized illness, and remain asymptomatic [6-8]. In this scenario, this article, which is a personal view, based on an unsystematic or opportunistic search for information and the author's experience is intended to reflect and underline the different challenges that pediatricians and general practitioners have to face in relation to children and adolescents with SARS-CoV-2, but asymptomatic

Methods

For the literature review, a pragmatic approach was used that was based on a non-systematic or opportunistic narrative review considered the bibliographic references of selected articles and opportunistic searches on the Internet. This article should be understood as a personal view, based on the author's experience and the literature review as described above.

Discussion

Evidence from contact tracing studies suggests that children and adolescents are less susceptible to SARS-CoV-2 infection than adults; however, community seroprevalence studies suggest that infection rates are similar to those of older age groups [2]. Only half of children and adolescents with antibodies to SARS-CoV-2 have experienced symptoms. The frequency of children carrying asymptomatic SARS-CoV-2 infection has been suggested to be higher than among adults. It is also suggested that asymptomatic children enhance viral spread. In this way, this population can play important epidemiological functions by enhancing the spread of infection through communities and/or increasing herd immunity [5]. Children don't get as sick from the coronavirus as adults. Children produced higher levels of two cytokines, or immune system proteins, than adults [9].

Children are generally more frequently exposed to other coronaviruses, such as those that cause common colds. This could explain the prevalence of these IgG antibodies in your blood [10]. Children are a source of the spread of the coronavirus. Children under the age of five carry the same amount of coronavirus, if not more, in their nose and throat as older children or adults [11,12]. One study warns that although children with COVID-19 are not as likely to become as seriously ill as adults, as asymptomatic carriers or carriers with few symptoms, they can spread the infection and carry the virus home [6,13]. However, only a small number of children have been included in previous studies focused on the kinetics of viral shedding in the context of symptomatic or asymptomatic SARS-CoV-2 infection. There are no studies that have consistently focused on the frequency of asymptomatic infection in children or the duration of symptoms and viral shedding in both asymptomatic and symptomatic children [14]. On the other hand, the samples studied are sometimes opportunistic or refer to certain special areas, such as before scheduled surgery [15].

Furthermore, the concept of "children and adolescents" is blurred and different studies use variable definitions: sometimes it is taken from 0-22 years, other times from 3-18 years, or younger than 19 years, under 18 years, under 15 years, etc. The immune system undergoes significant changes from birth to adulthood, and the immune system of younger children is different from that of older children, who have an immune system similar to that of adults. The facts of there are fewer pediatric cases of COVID-19 and a general tendency to report data by grouping the age range from 0 to 18 years or up to 22 years, without separating the age groups, pose limitations to fully understand the differences in the severity of the disease among the younger age groups [3]. COVID-19 disease is actually much less severe in those patients who had documented endemic coronavirus infections. Children are

more prone to common cold coronavirus infections, which perhaps explains why they may harbor such antibodies and why they suffer from less severe COVID-19 symptoms or are asymptomatic [16,17].

It is not surprising, in these circumstances, that the prevalence figures for SARS-CoV-2 in asymptomatic children and adolescents are highly variable and difficult to interpret. In this way, in one study, more than 99% of the minors did not show symptoms or these were not very important [18]. In another study, 93% of positive children were asymptomatic [19]. In a study conducted in the United Kingdom, up to 50% of infected children did not develop symptoms [20]. Other authors report that the proportion of asymptomatic cases was higher among children >=19 years (24%) compared to adults 20 to 64 years of age (15%), and 65 years of age and older (20%) [21]. In another, researchers found that there 22% of children were asymptomatic for the entire observation period [22]. Available reports on children from China and suggest that asymptomatic children could be 15% of SARS-CoV-2 positive individuals [23]. In a small retrospective cohort study in Spain, the prevalence of asymptomatic PCR-positive COVID-19 cases was 23%. However, despite the fact that the mean age of all asymptomatic cases was a young age (mean age of 33.9 years in asymptomatic patients vs. 43.9 years in symptomatic patients), this prevalence of asymptomatic patients increased in children and adolescents <=22 years to 26% [24]. In another study, the prevalence of asymptomatic pediatric infection was estimated at 5.9% [25]. In any case, it appears that the prevalence of asymptomatic infections in children correlates with the global incidence of COVID-19 in the local population [15].

Young people without symptoms have been hypothesized to initiate much of the COVID-19 outbreaks [26]. Thus, children and young adults are the key demographic factors in the spread of the virus and are more likely to transmit the virus to someone their age [27]. Thus, in the second wave, the increase in cases is particularly "alarming" among young adults, who are driving the spread of the pandemic [28]. Accepting that children and adolescents are infected in the same frequency as adults, and that they are more frequently asymptomatic than adults, these implies that children and adolescents play a major role in the spread of SARS-CoV-2. Adolescents are more likely to participate in risky health practices related to COVID-19. Compliance with infection control measures is a key factor in mitigating the spread of the disease [29].

The risk of an asymptomatic person transmitting the virus to others in their household is about a quarter of the risk of transmitting from symptomatic person [30]. But, although there is a lower risk of transmission from asymptomatic people, they could still pose a significant risk to public health because they are more likely to be in the community than isolated at home. The actual public health burden of this massive group of 'asymptomatic' interacting in the community suggests that a considerable part of transmission events stem from asymptomatic transmissions [31].

Thus, asymptomatic children and adolescents are a population to which public health interventions should preferably be directed. But, children are potentially more vulnerable to the effects of public health responses to mitigate the spread of SARS-CoV-2 than to infection by the virus itself [32-37]. Public health measures should continue, to some extent, until scientists find an effective treatment or vaccine, and possibly also for a certain time afterwards, including:

- Masking (a model suggests that universal mask wearing could save more than 100,000 US lives in the next 4 months)
- Physical distancing
- And limiting meetings are expected (a simulation modelling reveals that timing of social distancing measures has major effects on number of COVID-19 cases), [38,39].

But, orders to stay at home have caused children to experience the loss of in-person education, group activities and social connections. COVID-19 may not be as deadly in children and adolescents as it is in adults, but it causes a lot of psychological distress in this age group. Adolescents experience acute and chronic stress due to parental anxiety, disruption of daily routines, increased family violence, and home confinement with little or no access to peers, teachers, or physical activity [40]. In addition to the social, emotional, and nutritional impacts on children, there have been reports of dramatic declines in vaccine administration [41,42].

Without a vaccine or effective treatment, stopping the transmission of SARS-CoV-2 remains the only defence against COVID-19. Epidemiology can offer us information based on scientific principles, which can be expressed mathematically. The conclusion is obvious: focus on reducing transmission. But, the position of pediatricians and GPs is more complex [43-46]. It should be taken into account that health depends on many factors, which can belong to many other scientific disciplines in addition to medicine, from physics to socioeconomics. The expert physician must balance all these aspects with a focus on comprehensive proposals for curative, preventive and health promoting efforts. Clinicians must integrate multicausality to account for many different needs, demands, and risks at the same time [47].

Pediatricians and GPs have to adjust their interventions to all these aspects, and thus apparently less relevant

elements in an epidemic can gain relevance in the pediatrician and GP's office. Prevalence rate of children and adolescents with positive tests but no symptoms, who can infect others, confirms the assumption that intervention must take place before symptoms appear. It is therefore a priority to prevent contagion and interrupt the transmission process immediately after contact with the virus: Wear a mask in public, wash your hands regularly, stay home when sick and keep a physical distance and avoid meeting with people outside of your home (with a limitation of the number of people in public meetings). In the words of the Swedish Prime Minister, "Don't go to gyms, don't go to libraries, and don't host dinners. Cancel" [48].

The role of asymptomatic children and adolescents in family contacts is noteworthy, but the potential role played by older school-age children in the transmission of the virus is also important [49]. In addition, with open schools and some preventive measures implemented, an increase in general seroprevalence in children has been documented during a period of moderate to high transmission of SARS-CoV-2 in the community, adding uncertainty about the influence of the new variants of SARS-CoV-2 [50]. However, pediatrician and GP need to understand the combined effects between different patient diseases, the interactions of biological, physical, emotional, cognitive and intellectual challenges, the financial aspects of the family, and also the effects of pollution of air and climate change, the interaction between nature, culture and health, and sustainable development. In other words, there is no single clinical-epidemiological tool in the pediatrician and GP's office: a complete understanding of preventive, curative and health promotion options is needed for decision-making at the individual, family and community level.

Pediatricians and GPs must practice in a biopsychosocial, proactive, holistic, and culturally competent manner to address the needs of children and adolescents. For example, the pediatrician and GP may know the local frequency of endemic coronavirus respiratory infections, which could be a protective factor against SARS-CoV-2, since COVID-19 disease is actually much less severe in those patients who have documented endemic coronavirus infections. In other words, personalized and contextualized efforts are needed to improve the levels of knowledge, attitudes and practices among adolescents. Raising awareness and promoting positive attitudes is essential to change adolescent health practices. In addition, the unwanted side effects of the interventions (for example, excess morbidity and even mortality), the additional long-term burden of COVID-19 in the sick, the asymptomatic and their families, the possible presentation with seasonality and the comorbidities with influenza and other infections in children and adolescents, etc., should be monitored.

An effective vaccine is essential to prevent further morbidity and mortality, but it must be remembered that the efficacy of the vaccine does not always predict the effectiveness of the vaccine, that is, the protection attributable to a vaccine administered non-randomly under field conditions; for example, the efficacy of rotavirus vaccines in children in low- and middle-income settings was lower than the efficacy observed in children in high-income countries [51]. In other words, the task of pediatricians and GPs can favour a multi-level biopsychosocial approach that involves fighting the pandemic at the local level based on the epidemiological situation of the area, person-centered, and contextualized [52].

Conclusion

The claims that children have no role in the SARS-CoV-2 infection process are certainly not correct. It has been hypothesized that young people without symptoms initiate much of the COVID-19 outbreaks. Children and young adults are the key demographic factors in the spread of the virus and who are most likely to transmit the virus to someone their age. Current data, although partial and sometimes confusing, possibly indicate prevalence rates of children and adolescents with SARS-CoV-2 asymptomatic between 20-50%, which correlates with those of the local community. Being an asymptomatic COVID-19 patient vs. symptomatic is associated with being younger and possibly having had more exposure to known contacts, mainly family and social. Suspecting and diagnosing COVID-19 in children based on their symptoms without epidemiologic information and virus testing is very challenging. Without a vaccine or effective treatment, stopping the transmission of SARS-CoV-2 remains the only defense against COVID-19. But, the position of pediatricians and GPs is more complex. It is a priority to prevent contagion and interrupt the transmission process. The focus of testing programs for SARS-CoV-2 should be expanded to include people who do not have COVID-19 symptoms, especially all children and adolescents with household contacts. But it also should be highlighted the potential role older school-age children play in transmitting the virus.

In addition, pediatrician and GP need to understand the combined effects between different illnesses of the patient, the biological, physical, emotional, cognitive and intellectual interactions, the economic aspects of the family, etc. Public health interventions aimed at children and adolescents are precise, but this population is potentially more vulnerable to its negative effects than to infection by the virus itself. Pediatricians and GPs must practice in a biopsychosocial, proactive, holistic, and culturally competent manner to address the needs of children and adolescents.

The potential role of children in transmitting disease in the community needs to be further elucidated. Furthermore, the frequency of children carrying asymptomatic SARS-CoV-2 infection has been suggested to be higher than among adults. It is also suggested that asymptomatic children enhance viral spread. Thus, this population can play important epidemiological roles by enhancing the spread of infection through communities and/or increasing herd immunity. We need more data to paint a clearer picture of the risk of transmission that children pose, both for adults and for others. This information will help determine the best way to proceed. Much care must be taken that health remedies (public health, vaccination when available, and pharmacological...) on the population of children and adolescents, although justified, are not worse than the disease.

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