

COVID-19 Vaccine And Problematics In Children: A Literature Review

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Abstract : Efforts made in many countries to stop the COVID-19 pandemic include vaccinations. However, public skepticism about vaccines is a pressing issue for health authorities. With the COVID-19 vaccine available, there is little information available about public acceptance and attitudes towards the COVID-19 vaccine. The purpose of this review is to discuss the prospects of the SARS-CoV-2 vaccine and its problematics for the pediatric population, including the problems, challenges and strategies for receiving vaccines in children aged 5-11 years.

Keywords: COVID-19, SARS-CoV-2 vaccine, problems, challenges and strategies

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I. Introduction

The Coronavirus Disease 2019 (COVID-19) has spread globally and become a serious pandemic [1]. The widespread COVID-19 transmission continues to have a heavy toll on individuals, families and communities around the world. Life on Earth is changing to adapt to the peril, while many countries are experiencing economic recession, and traditional social, economic and public health safety nets are under unprecedented pressure [2]. The ongoing COVID-19 (as of 20 January 2022) has caused 5,584,394 million deaths worldwide and 144,192 deaths in Indonesia [3]. Approaches to managing the pandemic have relied on non-pharmaceutical interventions (NPI), such as social distancing, wearing masks, washing hands, and contact tracing. This approach can be effective in reducing the damage caused by COVID-19, but this effort is only successful if it is widely implemented. Unfortunately, the people in many countries, including Indonesia, generally ignore these precautions. Currently, many countries, including Indonesia, have implemented mass vaccinations for adults and are in the process of implementing it in children. It is presently not known how effective the vaccine is in children or how long the vaccine-induced immunity will last in the body. On the other hand, it is important to plan for a fair allocation of all available vaccines, including for children and adolescents. This equitable approach is done to ensure that all communities are protected and there are no gaps that can worsen health due to the effects of COVID-19 [4].

The COVID-19 pandemic has the potential to be severe and spread to certain groups of children such as those with nutritional disorders, high family stress, and lack of contact with parents [5]. To achieve high COVID-19 vaccine coverage, it is necessary to pay attention to vaccine supply, access, and minimize public doubts regarding vaccines. Good communication and support of vaccine providers and the community are absolutely imperative for the success of these vaccinations programs [6].

The application for a vaccine use permit in Indonesia, namely through the Food and Drug Supervisory Agency (BPOM) who issues the vaccine distribution permits, must have complete and interim analysis data for phase 3 clinical trials to demonstrate the efficacy and safety of the vaccine. Vaccine efficacy is demonstrated based on efficacy data and immunogenicity measurements. Then, BPOM also conducts vaccine quality testing by evaluating vaccine quality data, which includes supervision from raw materials, manufacturing processes to finished vaccine products in accordance with internationally accepted vaccine quality assessment standards. The evaluation process for the issuance of emergency use authorization (EUA) is conducted by BPOM together with the National Committee for Drug Assessment consisting of experts in the fields of pharmacology, pharmaceutical technology and clinicians, as well as a team of experts in the field of immunology and vaccines who are members of the Indonesian Technical Advisory Group on Immunization

(ITAGI) [7]. The Government of the Republic of Indonesia continues to intensify the COVID-19 vaccination programs and schedules to achieve communal or 'herd' immunity. The government's vaccination target is 208,265,720 Indonesians. In the 1st vaccination effort on January 23, 2022, the cumulative total of the 1st vaccination reached 181,131,333 people, while on the 2nd vaccination it reached 124,080,794 people and on the 3rd vaccination, it reached 1,366,115 people. [8].

Modeling data suggest that vaccinating children aged 5-11 years can reduce the transmission of SARS-CoV-2 across the population. The estimated impact on the effective reproductive rate on the overall population is a decrease of 11% (range: 8-15%, depending on the vaccine uptake parameters: 30-70%) for the EU/EEA country average. This is comparable to the effect of some non-pharmaceutical interventions. The impact of vaccinating children is weaker for countries with low uptake of the adult vaccine and stronger for countries with high uptake among adults [9]. Data on the safety of COVID-19 vaccines in children aged 5-11 years are currently limited, and the extent of innate immunity in unvaccinated children and their duration is currently unknown and likely heterogeneous across populations. A top priority for COVID-19 vaccination campaigns seeking to reduce COVID-19-related morbidity and mortality remains to increase vaccine uptake in the eligible adult population [9].

In this review, we discuss the SARS-CoV-2 vaccine and its problematics for the pediatric population including issues, challenges and strategies including the potential impact on vaccine acceptance in children aged 5-11 years. It is hoped that with the implementation of comprehensive vaccination, including for children, these continued efforts can be the key to solving the complex problems of the COVID-19 pandemic.

II. Methods

We reviewed publications related to the COVID-19 vaccine and problematics in children regarding COVID-19 vaccine issues, challenges, and strategies. This review describes why it is necessary to vaccinate children aged 5-11 years, the vaccine problems in children aged 5-11 years found in the community, the challenges of vaccination in children aged 5-11 years globally, and the strategic efforts to succeed in the implementation of vaccination programs in children 5-11 years

III. Why is it necessary to vaccinate children aged 5-11 years?

Data on the safety of COVID-19 vaccines in children aged 5-11 years are currently limited, and the extent of innate immunity in unvaccinated children and their duration is not known and likely heterogeneous across populations. Morbidity and mortality data on SARS-CoV-2 infection are lower in children and adolescents, since children are significantly less susceptible to infection [10]. However, there are reports that show symptoms of COVID-19 disease can be severe and cause death in children and adolescents. In January 2022, the Ministry of Health of the Republic of Indonesia reported that nearly 260,000 cases of children and adolescents with COVID-19 had been reported in Indonesia (4.28 million of all cases), with more than 52,555 hospitalizations and more than 1,800 deaths [11].

Generally, vaccination efforts in adults have a much greater potential direct benefit than vaccinating children. However, there are important factors that need attention and should be considered. Recognizing that vaccines have direct health benefits, it should be borne in mind that the main public health goal of vaccination programs is the generation of herd immunity. Many reports indicate that infected children and adolescents can infect other children and adults [12–15]. To protect society as a whole, including older adults, and to reduce transmission of the SARS-CoV-2 virus, it may be especially important to vaccinate children and adolescents. Another supporting factor is that the vaccination infrastructure for children and adolescents is already available both in Indonesia, so that this structure of scheduled vaccines provides an opportunity to integrate the SARS-CoV-2 vaccine into existing vaccination programs.

The Directorate General of Drug and Food Control Center of the Ministry of Health of the Republic of Indonesia, the National Committee for Drug Assessment, the Indonesian Technical Advisory Group on Immunization (ITAGI) and the COVID-19 task force are aware that all those who work as teachers and staff in schools and school children who are currently working outside the home area population susceptible to transmission so that this group is expected to maintain social functions and receive priority access to the SARS-CoV-2 vaccine. Accordingly, the vaccinations of children and adolescents (school students) remain a high priority, and this step is expected to be part of protecting teachers and staff working in schools [4,16,17].

IV. Vaccination problems in children aged 5-11 years

Obtaining an emergency use authorization (EUA) vaccine license and developing medical recommendations for minors is a longer process than vaccines for adults, and obtaining these recommendations is a more complicated process. Another issue is that vaccine trials focus on safety and efficacy in reducing

vaccine recipient morbidity and mortality. The primary goal of vaccinating children and adolescents is the reduction of transmission of SARS-CoV-2 to older adults, while determining the impact of the vaccine on transmission. Socialization of the benefits of vaccines can expand public confidence. The decline in public trust and public perspectives on vaccine research and vaccinations had started before the COVID-19 pandemic [18–20]. The transmission of SARS-CoV-2 and deaths from COVID-19, as well as the politicization of the implementation of community vaccinations will add to the complexity of implementing vaccines in children. Vaccination of children and adolescents is a problem because many people have adopted a skeptical perspective on vaccine and vaccination research, which is based on medical mistrust, and systemic misinformation gleaned from social media information widely used by young people [21].

Research in Jordan showed 37.4% of the population could receive the vaccination program, while 36.3% did not agree and 26.3% were neutral to receive the COVID-19 vaccine [22]. Acceptance of the COVID-19 vaccine is greatly influenced by the effectiveness of the vaccine to be received. Encouraging the public to receive low-effectiveness vaccines is a complicating factor in the success of the vaccination program [23].

V. Challenges of vaccinations for children aged 5-11 years

One of the challenges in efforts to control COVID-19 is the application of non-pharmaceutical interventions (NPI) which are applied inconsistently and have become politically polarized in their implementations [24]. This also happened to the SARS CoV-2 vaccination program. Previous research has shown that people with conservative views have lower intentions to get vaccines than people with more informed views [25,26]. National and local strategies are needed to overcome attitudinal barriers to the application of vaccines in children 5-11 years. To build trust in vaccinating children in the community, the government needs to understand the factors that will affect the acceptance of the COVID-19 vaccine and design an appropriate strategy together with the community to optimize the absorption of the vaccine strategies for children [27]. The government needs to implement a community-based national strategy to promote understanding and acceptance, through the use of technology to encourage 100% participation in all vaccination programs, not only those for COVID-19 [28,29].

Effective two-way communication about the SARS-CoV-2 vaccine for children and adolescents is important to maintain trust and acceptance in the community. This is necessary for the success of the vaccination program during the COVID-19 pandemic for children and adolescents [30–32]. Failure to adequately explain the usefulness of the SARS-CoV-2 vaccine may result in increased public doubt about vaccinations in general. Communication methods related to vaccination programs need to be routinely evaluated including the delivery of vaccination safety even if there is limited potential effectiveness. Recent research has found an increase in parents' desire to vaccinate their children against influenza due to the COVID-19 pandemic [33]. However, public health promoters need to remain vigilant about the potential for widespread public skepticism about vaccination of SARS-CoV-2 for children and adolescents. In addition, without clear communication about the usefulness of the vaccine (or level of effectiveness) and duration of protection, there are potential risks from the vaccine being administered. That is, if behavioral/social mitigation efforts (NPI) are substantially decreased due to reduced concerns about infection after being vaccinated or the vaccine has only low efficacy and uptake, then the presence of a vaccine could have the dire consequences of increasing SARS-CoV-2 infection rates.

Similarly, the availability of vaccines can also result in schools and public authorities early lifting NPI restrictions or reducing enforcement of the policy, and again potentially leading to continued outbreaks of infection. The desires to return to a pre-COVID-19 lifestyle or to reduce the socio-cultural and developmental impact of BOPs suggest that risk compensation may be an issue with the SARS-CoV-2 vaccine. Therefore, it is important for public health authorities and health professionals from now on to communicate with the general public about possible behavioral mitigation strategies that will continue to be needed even after obtaining the SARS-CoV-2 vaccine.

VI. Vaccination strategies in children 5-11 years

Children aged 5-11 years who are at severe risk of COVID-19 should be considered a priority group for vaccination against COVID-19, as in any other age group. A top priority for COVID-19 vaccination campaigns seeking to reduce COVID-19-related morbidity and mortality remains to increase vaccine uptake in the eligible adult population. Before making policy decisions about vaccinating children against COVID-19, the potential harms and benefits including direct and indirect effects on health and well-being should be considered in conjunction with vaccine use and the epidemiology specialists in each country [9].

For a successful vaccination program in children there can be transparent dialogue and community involvement about the potential for further disease spread by respecting people's emotions and concerns, with adequate

management of public expectations regarding the timing and scale of vaccination. Meanwhile, the public policies need to be coordinated and decentralized with tools that support dialogue and reach diverse communities with messages that are attractive, visual and multilingual to mobilize local communities. Vaccine distribution should build on existing immunization programs such as in primary care units, while the general public needs to be empowered to find and report misinformation, with more accountability and punishing of individuals or groups who spread misinformation [34]. According to a pulmonology specialist, (Danchin *et al.*, 2020), when talking to parents about a COVID-19 vaccine for their child, emphasize safety, recommend talking to a family doctor, and taking advantage of social connections.

VII. Conclusions

To increase parental participation in enrolling their children in the COVID-19 vaccination program, socialization and an affective and convincing communication approach are needed in conveying the safety and effectiveness of the COVID-19 vaccine. A safe and effective vaccine for children is available with a tolerable (low) risk level. Maintaining public confidence in the safety and effectiveness of vaccines is fundamentally important and if this factor is ignored it can have a wide impact on vaccine acceptance in parents/community to voluntarily vaccinate their children.

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Conflict of Interest

All authors confirm there are no conflicts of interest related to this manuscript.

Author's Contribution

Conceptualization: M, WSAU; validation, research, resources, data analysis, and writing: WSH, LK and RY; review and editing: M, WSH and RY. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Not applicable.

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