

The impact of pandemic of COVID-19 on routine immunization: A cross-sectional study in tertiary care centre at Pune

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Abstract

Background: Due to COVID-19 pandemic there was implementation of preventive measures like lockdown, mobility restriction and fear had an impact on routine immunization of children. There are significantly increases the susceptibility window for vaccine preventable diseases due to delayed vaccination in under five children. The objective of study is to know the trend of routine immunization of previous five year and to assess the impact of COVID-19 pandemic on routine immunization of children of age group up to 7 years at tertiary care hospital at Pune.

Methods: A hospital-based cross-sectional study was conducted in a tertiary care hospital of Pune city from the month of January 2017 to December 2021. All the data of immunization from age group 0 to 7 years present at tertiary care center Pune, was compared and analysed. Data is expressed as numbers and percentages and means. Chi-square test was used to compare observed results with expected results.

Results: In year 2020, there was a declining trend of all vaccines among children compared to previous 3 years. In year 2019, 2020, 2021, number of children vaccinated are 6547, 4052, and 5062 respectively. Out of this 1078(16%), 1089(26.9%), 1165(23%) children had delayed vaccination in year 2019, 2020, 2021 respectively. There was highly significant increase in delayed vaccination of children in COVID-19 period.

Conclusion: The routine immunization of children was decreased and delayed due to COVID-19 pandemic. This is an alarming finding to prevent reappearance of new epidemics of vaccine preventable diseases. Actions should be taken to avoid delayed routine immunization in future.

Keywords: COVID-19, First wave, second wave, routine immunization

Introduction

The World Health Organization (WHO) declared a pandemic due to the high contagion rate of COVID-19 disease^[1, 2]. One of the consequences of the pandemic is its impact on the delivery of important health services, including immunizations. One reason is that healthcare services was overburdened and directed to other priorities, and a second factor is that because of social distancing recommendations, parents are not bringing their children to hospitals. India is progressing well towards the sustainable development goal of bringing under five mortality rate 25/1000 live births^[3]. But now, missing out essential vaccines could lead to resurgence of potentially fatal childhood diseases. Urban areas are also having severely hampered health care delivery services during pandemic. On the basis of WHO guidelines, MoHFW issued a 'Guidance Note' on April 14, 2020 on continuation of essential services^[4]. Immunization is one of the most cost-effective interventions to prevent the suffering from vaccine-preventable diseases (VPDs), which contribute in reducing mortality and morbidity in under five children^[5]. India has the highest number children in world i.e. (Approximately 10 million) which are not vaccinated on time in the world^[6]. It is very important to take vaccination on time. There are significantly increases the susceptibility window for vaccine preventable diseases due to delayed vaccination in under five children^[7-9]. The objective of study is to know the trend of routine immunization of previous five year and to assess the impact of COVID-19 pandemic on routine immunization of children of age group up to 7 years at tertiary care hospital at Pune. Recently there was measles outbreak in Mumbai⁷.

Materials and Methods

A hospital-based cross-sectional study was conducted in a tertiary care hospital of Pune city of Maharashtra during the study period of January 2017 to December 2021. Ethics committee permission has been taken from B. J. Medical College, Pune, Maharashtra. The data of all children from age group 0 to 7 years who was vaccinated from period of January 2017 to December 2021 present at tertiary care center, Pune was collected from data and analysed. We compared the data from the delayed vaccination for the period of January to December of the last three years 2019, 2020 and 2021. The year 2019 considered as pre-covid and 2020 covid period and applied chi square test. We count the child as delayed vaccinated according to definition of delayed vaccination of NIS of India. The WHO defines vaccination delay as a delay period of >28 days from the minimum recommended age. However, considering the potential overestimation of the age of the child by up to 7 days in the available records, delayed vaccination for each vaccine was operationally defined as the administration of the scheduled vaccine dose after ≥ 36 days of the minimum recommended age as per the NIS of India^[10].

Statistical analysis: The collected data entered into MS-Excel sheet and analysed it. Categorical data expressed in frequency and proportions and normal continuous data as mean. Delayed vaccination rates were calculated both using the operational definition. A p-value <0.05 was considered as statistically significant.

Results

Under the Universal Immunization Programme, Government of India is providing vaccine to prevent seven vaccine preventable diseases i.e., Diphtheria, Pertussis, Tetanus, Polio, Measles, Severe Childhood Tuberculosis and Hepatitis B, Haemophilus Influenza type B and Diarrhoea.

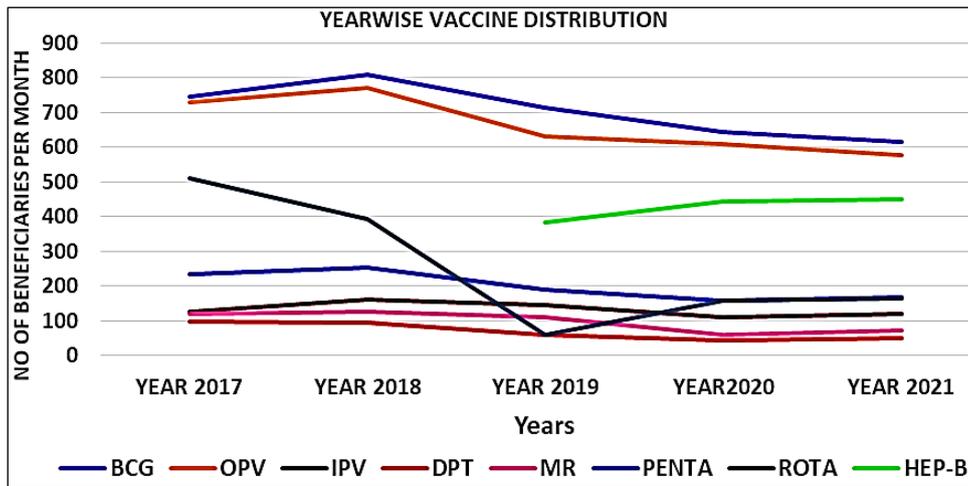


Fig 1: Year wise trend of all Vaccines Immunization Coverage

As Fig -1 showed that the trend of BCG is increasing from year 2017 to 2018, followed by decrease in year 2019, 2020 and 2021. The trend of OPV is increasing from year 2017 to 2018, followed by decrease in year 2019, 2020 and 2021. The trend of IPV is increasing from year 2017 to 2018, followed by slight decrease in year 2019 due to unavailability of vaccine at hospital and again start increasing in years 2020, 2021. The trend of Penta is increasing from year 2017 to 2018, followed by same in year 2019 and decreased in years 2020 and increased in year 2021. The trend of DPT beneficiaries were increases in 2018 and then the beneficiaries decreased in 2019 followed by a greater number of beneficiaries decreased in year 2020 then start increasing 2021. The trend of MR vaccination shows that a greater number beneficiaries decreased in 2020 then start increasing year 2021. The trend of ROTA vaccination in year 2019 then appeared increased and in year 2020 and 2021 it was stationary. The trend of Hep-B beneficiaries started in year 2019 and the increased in year 2020 and year 2021.

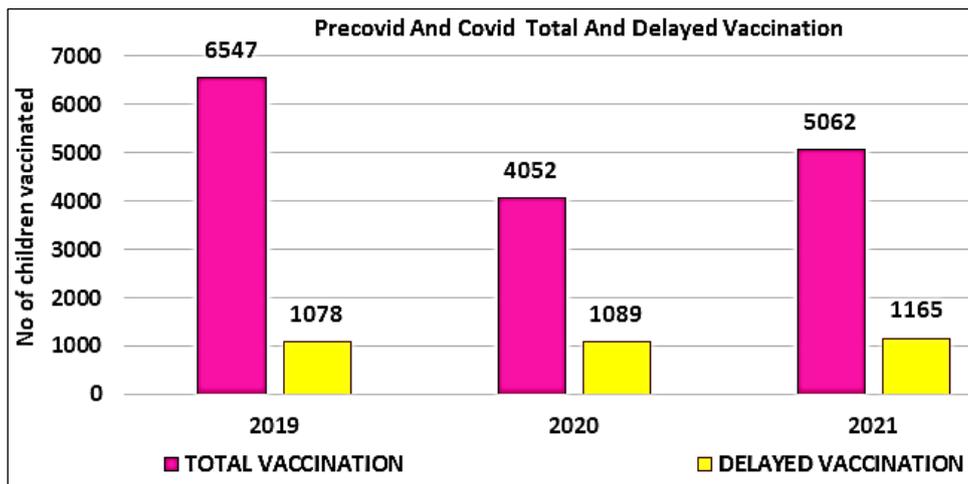


Fig 2: Pre COVID and COVID Total and Delayed Vaccination

As Fig-2 showed that in year 2019, 2020, 2021, number of children vaccinated are 6547, 4052, 5062 respectively. Out of this, 1078(16%), 1089(26.9%), 1165(23%) children had delayed vaccination in year 2019, 2020, 2021 respectively.

Table 1: Distribution of beneficiary's delayed and non-delayed vaccination

	Delayed vaccinated children	Non-delayed vaccinated children	Total children	X ² -value p-value
Pre-COVID (2019)	1078	5469	6547	X ² =292.3 d.f. =1 p = 0.00001
COVID (2020)	1089	2963	4052	
Total	2167	8432	10599	

As Table 1 shows that comparison between 2019 pre-Covid period and COVID (2020). This study observed highly significantly increase delayed vaccination of children in covid period. As decreased no of hospital deliveries due to fear of covid 19 because patients were admitted in covid care center at tertiary care hospital Pune. So, there was decreased in no of deliveries in hospital. This leads to decrease in number of birth vaccination i.e., BCG, OPV, HEP-B compare to previous three years. Beside that total no of children vaccinated at 6, 10, 14 weeks and at 9months, 1 and ½ year, at completion of 5 year with the vaccine Penta, IPV, MR, DPT also decreased. In year 2019, 6547 children get vaccinated, in 2020 only 4052 about 39.1% less than pre covid year, in year 2021 only 5062 children get vaccinated about 22.6% less than pre year. The number of beneficiaries were vaccinated out of them many get vaccinated delayed. In year 2019 children vaccinated were 6547 out of 1078 delayed vaccinated [16.5%]. in year 2020 total children vaccinated were 4052 out of 1089 were delayed vaccinated [26.9%] in year 2021 total children vaccinated are 5062 out of 1165 delayed vaccinated [23%]. The chi square test and p-value found significant. This shows that the non-delayed vaccination in covid period significantly decreased.

Discussion

In India, first case of COVID-19 was found on 30th January 2020 in Kerala. In Maharashtra first case was found on 9th March 2020 in Pune. On 25th March 2020 the Government of India declared a nationwide lockdown for 21 days, then extended to 31st May 2020. Limitation on COVID movement of entire population of India was done as a preventive measure against COVID -19 pandemic. In case of hospital deliveries as baby is in hospital only, so number of birth vaccination doses are not much affected during this period. But other vaccination at age of 6 weeks, 10 weeks, 14 weeks were decreased or delayed.

In India since 2015, increase in immunization coverage, but the problem of delayed vaccination still present though there is decline in prevalence during same period [8]. The phenomenon of increase in vaccination coverage along with increase in proportion of delayed vaccination coverage in children in India [9]. The phenomenon of increase in vaccination coverage along with increase in proportion of delayed vaccination coverage is seen in children in India [9]. Chandir S *et al.* noted that, there was a 52.5% decline in the daily average total number of vaccinations administered during lockdown compared to baseline [11]. In our study, we also found such decline in total immunization of children during COVID-19 pandemic period. Sow A *et al.* noted the vaccination administered in the sixth week in April, the number of doses was 36 in 2018, 29 in 2019 and 15 in 2020, i.e., a 50% drop compared to March. In July the number of doses administered was 40 in 2018, 35 in 2019 and 15 in 2020, a reduction of 42% compared to 2019 [12]. This study also showed that there was decreased vaccination due to COVID-19. Andurkar S *et al.* noted that 16.31% children experience delay for the vaccination and 83.69% children received vaccine within the recommended time. This study was done before COVID-19 pandemic at tertiary care hospital Aurangabad in 2019 [13]. In our study, pre covid period delayed vaccinated children was 16.5% about same as above study. But delayed immunized children was 26.9% in year 2020 and in year 2021 that was 23%. This shows that the prevalence of delayed immunized children in covid period was

increased. A study by Yadav K *et al.* noted that children for delayed vaccination ranged from 15.9% (95% CI 15.4-16.3) for OPV booster to 83.5% (95% CI 83.1-83.9) for OPV-3^[9]. Kiely M *et al.* noted that overall, 72.5% of all 2-year-old children with an incomplete status by 24 months were attributable with a vaccine delay, of which 16.1%^[14]. In our study, we found same 16.5% delayed immunized children in pre-covid year 2019 followed by increased in delayed immunized children about 26.9% in covid pandemic period.

Conclusion

The routine immunization of children gets disturbed and delayed by COVID-19 pandemic. In country with limited resources like India preventive measures for pandemic resulted in ignorance towards children's routine immunization. This is an alarming finding to prevent reappearance of new epidemics due to vaccine preventable diseases which may lead to high mortality and morbidity in under five children.

Limitations

Variables like socioeconomic status, religion and migration history that are known to be associated with delayed vaccination were absent in the records. Health system-related factors including vaccine stock-outs contributing to delayed vaccination were significantly applicable in our study settings. The data were collected from a single-site that limits the generalizability of the study findings.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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