

Covid-19 and Routine Vaccination Programme: Did it Affect Badly?

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Authors' contributions

This work was carried out in collaboration among all authors. Author JA designed data collection tools, monitored data collection for the whole study period, wrote statistical analysis plan, analysed data, and drafted and revised the paper. Author AK analysed the data, drafted and revised the paper.

Author MAH analysed the data and drafted and revised the paper. Author RM wrote the statistical analysis plan, monitored data collection for the whole study and revised the draft paper. Author AK designed data collection tools, monitored data collection for the whole study, analysed the data, and drafted and revised the paper. All authors read and approved the final manuscript.

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ABSTRACT

Background: The impact of COVID-19 on general health care delivery systems has been huge including the immunization services. Several measures were taken by most of the government all over the world to prevent the spread of infection such as lockdown, wearing masks, social distancing, etc. People have suffered a lot during the pandemic, not only due to the burden of the disease but have also faced difficulties in other domains of life. One of the important concerns is the interruption of routine immunization services. The consequences of interrupted immunization services may be life-threatening, as chances of outbreaks of vaccine-preventable diseases (VPD) in susceptible children could be high.

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Aim: To find out delay in routine immunization services during covid-19 and also to determine the factors associated with delay in immunization.

Materials and Methods: This study was a cross-sectional hospital-based observational study at Career Institute Of Medical Sciences And Hospital, Lucknow, India. We collected the vaccination record after lockdown from Well-Baby Clinic and telephonically from the parents, starting from 1st June 2020 till 31st December 2020. We checked the records of vaccination of infants to find out delay in the vaccinations, as per the National Immunization Schedule. The records of a total of 265 infants were enrolled. Out of which, 33 did not fit the inclusion criteria and therefore were excluded from this study.

Results: Findings of our study pointed that there was significant delay in routine immunization among infants. The factors responsible for delay in different vaccination observed in this study were, Phobia of COVID-19- 20%, lockdown- 22%, interruption of routine health services-15%, social myths-8%, poor transport facility- 10%, illness of child- 8%, did not notice- 3% and multiple factors- 13%.

Conclusion: COVID -19 pandemic has affected the routine immunization services that results in delay of different vaccines at different ages which may lead to outbreak of vaccine preventable diseases, so it is need of the hour to intervene at the earliest to prevent such outbreaks among children.

Keywords: COVID-19; vaccination delay; routine-immunization.

1. INTRODUCTION

COVID-19's first case in India was reported on 30th January 2020. As a preventive measure Government of India observed 14 hours voluntary Janta curfew (Public Curfew) on 22nd March. A compulsory lockdown came into force from 24th March to 31st May 2020. During this pandemic, people faced severe interruption of routine public services including general health services. So, in the era of the COVID-19 pandemic, the world is facing complex situations in all domains, including disruption of routine immunization services. The consequences of interrupted immunization services may be disastrous as chances of outbreaks of vaccine-preventable diseases (VPD) in susceptible children could be high. In Chicago in 1993-1994, a significant outbreak was reported in which 52 % were young infants, who were yet to complete the normal vaccination schedule, out of which 20% of the cases resulted from failure to provide vaccination on time [1]. Immunization activities should be prioritized and protected for continuity to the greatest extent possible during times of severe disruption to continue service delivery [2]. In India, the Expanded Programme on Immunization (EPI) was launched in 1978 mainly in the urban areas for immunizing children upto 1 year of age. In 1985, the program was renamed as the Universal Immunization Program (UIP) focusing mainly on infants and pregnant mothers. The measles vaccine was included in the program in 1990 and the program had been expanded to spread across the country. The

Ministry of Health and Family Welfare, Government of India, launched Mission Indradhanush in December 2014 to achieve more than 90% full immunization coverage in the country by the year 2020 with a vision that it will eventually close immunity gaps and strengthen immunization coverage. In the present study, we studied the delay in different vaccinations and the factors responsible for delay in vaccinations in the COVID-19 pandemic. Although there is no standard definition of delay in vaccinations, we took 1 month (31 days) delay from the scheduled date as the delay in vaccinations, which is similar to what was defined by Lumen et al. [3].

2. METHODS

This study was a cross-sectional hospital-based observational study at Career Institute of Medical Sciences and Hospital, Lucknow, India. We collected the vaccination record after lockdown from the Well-Baby Clinic and telephonically from the parents starting from 1st June 2020 till 31st December 2020. We checked the records of vaccination of infants to find out delay in the vaccination, as per the National Immunization Schedule. The records of a total of 265 infants were enrolled. Out of all, 33 did not fit the inclusion criteria and therefore were excluded from this study. Out of 232, 88 were new and the rest were old or follow-up infants. A prior informed consent was taken from the parents, and a self-designed questionnaire was asked. The study was approved by the ethical committee of the college.

A questionnaire was prepared which included demographic data like age, sex, type of dwelling-urban/rural, socio-economic class assessed according to the Modified Kuppuswamy Scale 2019, feeding patterns in under 6 months & above 6 months, weight and length were also recorded, vaccination gap in different vaccines were checked while matching with the allotted time period in accordance to the National Immunization Schedule. This vaccination gap was checked amongst Inborn and Outborn patients. The questionnaire also included various factors behind the delay in vaccination amongst the participants which they felt was the main reason.

2.1 Inclusion Criteria

1. All the infants who were enrolled in our pediatrics OPD for vaccination, who had

been advised for consequent vaccination before lockdown but missed the vaccination for more than 4 weeks (n=144).

2. The new infants (The infants who visited our OPD for the first time) who were not initially enrolled in our vaccination OPD and came for the first time with delay in vaccination for more than 4 weeks (n=88).

2.2 Exclusion Criteria

1. All infants, new or old follow-up were excluded from the study who were administered vaccination on time either from our center or from outside (n=13).
2. Those infants were also excluded from this study who did not produce the vaccination documentation (n=20).

Table 1. National immunization schedule up to infancy

Vaccine	Due Age
BCG	At birth or as early as possible
Hepatitis	At birth or early as possible within 24 hours
OPV-0	At birth or as early as possible within 15 days
OPV 1,2&3	At 6 weeks, 10 weeks & 14 weeks
Pentavalent 1,2&3 (Diphtheria + Tetanus + Hepatitis B + HiB)	At 6 weeks, 10 weeks & 14 weeks
Fractional IPV	At 6 weeks & 14 weeks
Rotavirus 1,2&3	At 6 weeks, 10 weeks & 14 weeks
Pneumococcal Conjugate Vaccine	At 6 weeks & 14 weeks, at 9 completed months
Measles/Rubella	At 9 completed months -12 months
Japanese Encephalitis	At 9 months-12months

3. RESULTS

Table 2. Demographic profile (N=232)

Profile	n	%
Age in days (MEAN±SD)	126 ±69	
Male	143	67
Female	89	33
Rural	120	52
Urban	112	48
Low socioeconomic	160	69
Average socioeconomic	40	17
Higher socioeconomic	32	14
Feeding pattern under six months (n=208)		
Exclusive breast feeding	76	36.5
Top feeding (Formula milk)	101	48.5
Top feeding(animal milk)	31	15
Bottle feeding	109	47
Unhygienic feeding(top)	77	37
Diluted milk	17	8
Use of sugar	7	3

Profile	n	%
Feeding pattern above 6months(n=24)		
Adequate complementary feeding	9	37.5
Inadequate complementary feeding	11	46
Delayed Complementary feeding	4	17
Weight(kg) \pm SD 5.4 \pm 1.2		
Length(cm) \pm SD 57 \pm 5.4		

Table 3. The delay (vaccination gap) in different vaccines in pandemic time (n=232)

Vaccines	Inborn /Old follow-up (n=144)		Outborn/New (n=88)		n	Delays (days) \pm SD
		delays		delays		
BCG,OPV O(all out born)	0	-	26	9.6 \pm 6	26(11%)	9.6 \pm 6
Penta 1 ST +OPV+PCV1ST+FIPV	43	38.5 \pm 4.6	19	42 \pm 6.6	62(27%)	39.5 \pm 5.5
Penta 2 ND +OPV2nd+Rota 1 st	44	44 \pm 8.3	17	44 \pm 9	61(26%)	39 \pm 5.3
Penta 3 RD +OPV+FIPV+Rota 3 rd	39	42 \pm 5.6	20	39 \pm 4.9	59(25%)	41 \pm 5.5
MR+PCV3rd+JE-I	18	49 \pm 9.1	06	42 \pm 10.49	24(10%)	48 \pm 9.7
Total	144	42 \pm 7.6	88	32 \pm 16.11	232	38.5 \pm 12.68

Table 4. Factors responsible for delay in routine vaccination (N=232)

Factors	Numbers of respondents	Percentage
Phobia of Covid 19	47	20%
Lockdown	52	22%
Interruption of routine health services	34	15%
Social myths (e.g vaccination is harmful in pandemic)	18	8%
Poor transport facility	23	10%
Illness of child	19	8%
Did not notice	8	3%
Multiple factors	31	13%

Table 5. Modified kuppuswamy scale 2019- categorizing various socio-economic status

S. No.	Updated Monthly Family Income in Rupees (2012)	Updated Monthly Family Income in Rupees (2018)	Updated Monthly Family Income in Rupees (2019)	Score
1.	\geq 30,375	\geq 126,360	\geq 78,063	12
2.	15,188-30,374	63,182-126,359	39,033-78,062	10
3.	11,362-15,187	47,266-63,181	29,200-39,032	6
4.	7594-11,361	31,591-47,265	19,516-29,199	4
5.	4556-7593	18,953-31,590	11,708-19,515	3
6.	1521-4555	6327-18,952	3,908-11,707	2
7.	\leq 1520	\leq 6326	\leq 3,907	1

Table 6. Kuppuswamy’s socio-economic status scale 2019

S. No.	Score	Socioeconomic Class
1.	26-29	Upper (I)
2.	16-25	Upper Middle (II)
3.	11-15	Lower Middle (III)
4.	5-10	Upper Lower (IV)
5.	< 5	Lower (V)

Low socioeconomic status consists of Lower and Upper Lower class whereas Average socioeconomic status consists of Upper Middle and Lower Middle while Higher socioeconomic status consists of Upper class depending upon the category score.

The various feeding pattern under six months consists of:-

1. Exclusive Breastfeeding- It is defined as no other food or drink, not even water, except breast milk for 6 months of life.
2. Top feeding- It means feeding the infant other than breastmilk i.e. using either formulae milk or cow milk for 6 months of life.
3. Bottle feeding- It means practice of feeding the baby via a bottle.
4. Unhygienic feeding (top)- Practice of top feeding in an unhygienic way.
5. Diluted milk- Practice of diluting either cow milk or formulae milk with water in an unproportionate way.
6. Use of sugar- Practice of adding sugar to milk which is strongly unrecommended.

The definitions of various factors responsible for delay in vaccination:-

1. Phobia of covid- The fear created by Covid pandemic in mindset of people.
2. Social Myths- Misconceptions like vaccinations are harmful during Covid 19 Pandemic.
3. Did not notice- Those who forgot about the vaccination schedule meant to be provided on time.

A total of 232 children were included in the study, out of which 67% were male and 33% were female. The children who belonged to rural area were 52% and 48 % were from urban area. The children who belonged to low, average, and high socioeconomic class were 69%, 17%, and 14% respectively. Out of all, 208 children were under 6 months and 24 were above six months of age.144 children were inborn or old follow-up

and the rest 88 children were an outborn or new case. The average weight was 5.4±1.2 kg and the average length was 57±5.4 cm. The average delay in vaccinations for BCG, OPV -0 & first dose hepatitis –B was 9.6±6 days’. The delay in the first, second, and third dose of pentavalent, observed was 39.5±5.5, 39±5.3 & 41±5.5 days respectively. The average delay reported for MR, PCV –III & JE-I was 48±9.7 days. The average delay for all vaccines under one year of age was 38±12.68. The factors responsible for delay in different vaccination observed in this study were, Phobia of COVID-19- 20%, lockdown- 22%, interruption of routine health services-15%, social myths-8%, poor transport facility- 10%, illness of child- 8%, did not notice- 3% and multiple factors - 13%.

4. DISCUSSION

In the era of COVID-19, the challenges faced by health care systems are many. One of the complex situation is the interruption of routine immunization services, which may pose children at risk of an outbreak of vaccine preventable diseases. The WHO and UNICEF had warned of a decline in vaccinations during COVID-19 [4]. WHO has released a set of guiding principles on 26th March 2020 for immunization activities during the pandemic. The recommendations include temporary suspension of mass vaccination campaigns, considering routine immunization services and VPD surveillance after careful risk-benefit analysis by the authorities in the respective regions [5]. WHO’s strategic advisory group of experts on Immunization, on March 30th also recommended the continuation of routine immunization services wherever possible, despite the cessation of vaccination campaigns [6]. The study conducted in Auckland, New Zealand, observed that the odds ratio for developing pertussis in an outbreak during 1995–1997 was increased 4.5-fold because there was a delay in receiving any of the three doses of DTaP. [7] Study conducted by Abbas K et al. [9] showed similar results. Also in Pakistan, study conducted by Rana M et al[10] showed similar results. In India in 2021, study

conducted by Shet A et al. [11] also showed results similar to our study. The finding of our study pointed that there was severe interruption of vaccination services in COVID-19 era.

5. CONCLUSION

COVID -19 pandemic has affected the routine immunization services that results in delay of different vaccines at different ages which may lead to outbreak of the vaccine preventable disease, so it is need of the hour to intervene at earliest to prevent such outbreaks among children. Although the finding of our study pointed that there was significant delay in the vaccination during Covid-19 pandemic but similar more studies will be needed with larger sample size. In order to close the reported vaccination, gap the Government should come up with plan to strengthen the catch-up vaccination throughout the country and a proper education of the community regarding such vaccination programme can be done through various campaigns and promotions.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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