



Pulmonary Medicine

A COMPARATIVE STUDY OF VACCINATION TREND DURING THE PANDEMIC COVID-19 AT IMMUNIZATION CLINIC OF TERTIARY CARE HOSPITAL, AJMER

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(ABSTRACT) **Background:** Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has caused a pandemic corona virus disease 2019. The complete clinical picture regarding COVID-19 is not fully understood. Due to this pandemic, various aspects of public health are affected such as routine immunization, hospital visit, etc. especially during the lockdown period. **Aims And Objective:** The aim and objective is to study the effect of lockdown on vaccination coverage at immunization clinic of J. L. N. Medical College, Ajmer, Rajasthan. **Material And Methods:** It was a retrospective analytical study conducted in the Immunization Clinic, Tertiary Care Hospital, Ajmer, Rajasthan. The study period was March 22, 2020 to June 30, 2020 and compared with number of beneficiaries in same duration of year 2018 and 2019. **Results:** During lockdown period, our study concluded that number of all vaccines administered were lower in April (2576) and May (2589) as compared to June (2919) in the year 2020. Total number of deliveries decreased in March, April, May and June of 2020 as compared to March, April, May and June of 2018 and 2019 but vaccination at the time of birth was not so much affected and reached up to 97%. This study shows that vaccination during antenatal visit in March, April, May and June 2020 is also reduced as compare to March, April, May and June of 2018 and 2019. **Conclusion:** There has been significant reduction in number of beneficiaries to the immunization clinic for routine immunization during March, April, May and June in period of lockdown. Reduction has been more in April and May of year 2020 compare to June 2020 due to lack of public transport, fear of COVID-19 infection and peaking of cases in various zones during these months.

KEYWORDS : COVID-19, Vaccination, Lockdown, Immunization, RI

INTRODUCTION

Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has caused a Pandemic since its discovery in a wholesale food market in Wuhan city, China, in late December 2019.⁽¹⁾ The first confirmed case of the corona virus infection in India was reported on 30 January 2020 in the state of Kerala.⁽²⁾ India stands as the second worst affected nation (after the United States of America).⁽³⁾ Nationwide 21 day lockdown, announced on March 24, 2020 in the country. Lockdown restrictions had shown to increase the doubling time of the virus in other countries.^(4,5) On 14 April, Ministry of Home Affairs extended the nationwide lockdown until 3 May, with a conditional relaxations after 20 April for the regions where the spread had been contained or was minimal.⁽⁶⁾ On 1 May, the Ministry of Home Affairs extended the nationwide lockdown further by two weeks until 17 May. The Government divided all the districts into three zones based on the spread of the virus—green, red and orange.⁽⁷⁾ On 17 May, the lockdown was further extended till 31 May by the Ministry of Home Affairs.⁽⁸⁾ Vaccines have substantially improved health and reduced mortality, particularly among children.⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾

Due to SARS-CoV-2 disease and as well as its management in the form of nationwide lockdown has an impact on various aspects of public health including immunization. According to The World Health Organization in the world over at least 80 million children under the age of one year are at risk of diseases like diphtheria, measles and polio during lockdown as COVID-19 outbreak disrupted routine vaccination programme. Several states had stopped the routine immunization, and the disruption may have led to over 15 lakh children missing vaccination completely or partially.⁽¹²⁾ Also during the lockdown, there were unprecedented disruptions in vaccine campaigns, and delivery of services for common childhood illnesses has been witnessed. Many care givers were unable to bring their children for care due to transportation disruptions and fear of contracting the disease while visiting a health facility. These disruptions could result in significant increases in preventable child mortality across the globe.⁽¹³⁾ The obstructing of routine immunization in children against vaccine-preventable diseases (VPDs) like diphtheria, pertussis, tetanus, measles, and polio during lockdown has

triggered concern about possible resurgence of VPDs.⁽¹⁴⁾ There are missing of vaccine dose in the lockdown which indicates that how our health systems were affected in the lockdown, thus a major impact on the outcomes on childhood survival. The vaccines we presently give for the diseases like diphtheria, tetanus, measles and polio were reduced during lockdown which brings back home the greatest fear we had regarding impact of COVID-19 on the health systems. Though birth vaccination (OPV, Hepatitis B and BCG) has been done at institutional centers, but subsequent doses could not be administered as per schedule partially or completely during lockdown owing to inaccessibility of health care due to many direct or indirect factors. Many states of India stopped immunization activities for a short period of time. Activities continued without interruption in Rajasthan especially at tertiary care centers. Third supply chain of vaccines might be affected because there were travel restriction and export-import restriction. No official data are available on, impacts of lockdown on immunization coverage in India. The aim of the study was to study the impact of lockdown on vaccination coverage at tertiary care centers, where the caregivers reach the immunization clinic under the department of Community Medicine, Tertiary Care Hospital, Ajmer (Rajasthan).

MATERIAL AND METHOD

It was a retrospective analytical study conducted in the Immunization Clinic, Tertiary Care Hospital, Ajmer, Rajasthan. The study period was March 22, 2020 to June 30, 2020 and compared with number of beneficiaries in same duration of year 2018 and 2019. The area was under lockdown during this period. All children attending immunization clinic aged 0 days to 5 years in this period of the year 2018, 2019 and 2020 were included in the study. Immunization data of these children were collected from the immunization clinic records along with their demography and results were tabulated. The National Immunization Schedule was followed for vaccination.⁽¹⁵⁾ Data are recorded in the MS-excel and analysis are carried out in terms of frequency, Chi-square are calculated based on R-software version 3.6.2 and P-value less than 0.05 is significant.

RESULT

Table 1: Birth Vaccination trend during the lockdown and Unlock period

Vaccines	March 2018	March 2019	March 2020	Trend (2018-2020)	Trend (2019-2020)
BCG	370	394	359	2.97% (↓)	8.88% (↓)
OPV-0	361	388	349	3.32% (↓)	10.05% (↓)

Hep. B	334	357	326	2.40% (↓)	8.68% (↓)
Vaccines	April 2018	April 2019	April 2020	Trend (2018-2020)	Trend (2019-2020)
BCG	1082	1135	831	23.20% (↓)	26.78% (↓)
OPV-0	1043	1120	811	22.24% (↓)	27.59% (↓)
Hep. B	962	1030	760	21.00% (↓)	26.21% (↓)
Vaccines	May 2018	May 2019	May 2020	Trend (2018-2020)	Trend (2019-2020)
BCG	1223	1228	862	29.52% (↓)	29.80% (↓)
OPV-0	1173	1206	812	30.78% (↓)	32.67% (↓)
Hep. B	1086	1025	736	32.23% (↓)	28.20% (↓)
Vaccines	June 2018	June 2019	June 2020	Trend (2018-2020)	Trend (2019-2020)
BCG	1231	1329	918	25.43% (↓)	30.93% (↓)
OPV-0	1192	1313	885	25.76% (↓)	32.60% (↓)
Hep. B	1120	1196	796	28.93% (↓)	33.44% (↓)

* Data of March month is taken from 22-31 March 2020 as lockdown is started on 22 March 2020.

This study shows that during the lockdown period the number of all vaccines administration were lower in April (2576) and May (2589) as compared to June (2919) in the year 2020. This can be due to strict lockdown policies by the government in April and May as compared to

June. Lack of public transport and fear of contracting covid-19 infection in general population may be the reason for this decline. The area where immunization clinic located was under the containment zone from 21 March, 2020 till June 30, 2020 so vaccination trend during the lockdown period (from 21 March, 2020 till June 30, 2020) as compare to unlock period (same duration of year 2018 and 2019) also reduced. (Table 1)

Table 2: Vaccination trend during the lockdown and Unlock period upto children age one year after birth vaccine					
Vaccines	March 2018	March 2019	March 2020	Trend (2018-2020)	Trend (2019-2020)
Penta-I/RVV-I/OPV-I/fIPV-I/PCV-I	39	24	7	82.05% (↓)	70.83% (↓)
Penta-II/RVV-II/OPV-II	30	25	3	90.00% (↓)	88.00% (↓)
Penta-III/RVV-III/OPV-III/fIPV-II/PCV-II	12	10	2	83.33% (↓)	80.00% (↓)
MR-I/Vit. A1	25	22	1	96.00% (↓)	95.45% (↓)
PCV Booster	-	5	0	-	100.00% (↓)
Vaccines	April 2018	April 2019	April 2020	Trend (2018-2020)	Trend (2019-2020)
Penta-I/RVV-I/OPV-I/fIPV-I/PCV-I	94	79	64	31.91% (↓)	18.99% (↓)
Penta-II/RVV-II/OPV-II	94	72	43	54.26% (↓)	40.28% (↓)
Penta-III/RVV-III/OPV-III/fIPV-II/PCV-II	84	24	12	85.71% (↓)	50.00% (↓)
MR-I/Vit. A1	90	68	23	74.44% (↓)	66.18% (↓)
PCV Booster	-	15	5	-	66.67% (↓)
Vaccines	May 2018	May 2019	May 2020	Trend (2018-2020)	Trend (2019-2020)
Penta-I/RVV-I/OPV-I/fIPV-I/PCV-I	76	61	55	27.63% (↓)	9.84% (↓)
Penta-II/RVV-II/OPV-II	93	72	32	65.59% (↓)	55.56% (↓)
Penta-III/RVV-III/OPV-III/fIPV-II/PCV-II	90	22	7	92.22% (↓)	68.18% (↓)
MR-I/Vit. A1	107	84	30	71.96% (↓)	64.29% (↓)
PCV Booster	-	12	3	-	75.00% (↓)
Vaccines	June 2018	June 2019	June 2020	Trend (2018-2020)	Trend (2019-2020)
Penta-I/RVV-I/OPV-I/fIPV-I/PCV-I	73	77	50	31.51% (↓)	35.06% (↓)
Penta-II/RVV-II/OPV-II	64	56	52	18.75% (↓)	7.14% (↓)
Penta-III/RVV-III/OPV-III/fIPV-II/PCV-II	52	46	29	44.23% (↓)	36.96% (↓)
MR-I/Vit. A1	118	93	61	48.31% (↓)	34.41% (↓)
PCV Booster	-	26	16	-	38.46% (↓)

Table 3: Vaccination trend during the lockdown and Unlock period for the children age 1-5 year					
Vaccines	March 2018	March 2019	March 2020	Trend (2018-2020)	Trend (2019-2020)
MR-2	43	25	0	100.00%(↓)	100.00%(↓)
Vit. A2	79	32	1	98.73%(↓)	96.88%(↓)
OPV Booster/	49	27	0	100.00%(↓)	100.00%(↓)
DPT Booster-I	49	27	0	100.00%(↓)	100.00%(↓)
DPT Booster-II	23	16	0	100.00%(↓)	100.00%(↓)
Vaccines	April 2018	April 2019	April 2020	Trend (2018-2020)	Trend (2019-2020)
MR-2	99	101	14	85.86%(↓)	86.14%(↓)
Vit. A2	175	162	17	90.29%(↓)	89.51%(↓)
OPV Booster/	99	61	13	86.87%(↓)	78.69%(↓)
DPT Booster-I	100	102	13	87.00%(↓)	87.25%(↓)
DPT Booster-II	47	45	5	89.36%(↓)	88.89%(↓)
Vaccines	May 2018	May 2019	May 2020	Trend (2018-2020)	Trend (2019-2020)
MR-2	100	96	22	78.00%(↓)	77.08%(↓)
Vit. A2	187	96	22	88.24%(↓)	77.08%(↓)
OPV Booster/	101	97	21	79.21%(↓)	78.35%(↓)
DPT Booster-I	102	99	21	79.41%(↓)	78.79%(↓)
DPT Booster-II	58	72	12	79.31%(↓)	83.33%(↓)
Vaccines	June 2018	June 2019	June 2020	Trend (2018-2020)	Trend (2019-2020)
MR-2	95	97	51	46.32%(↓)	47.42%(↓)
Vit. A2	198	102	60	69.70%(↓)	41.18%(↓)
OPV Booster/	93	46	33	64.52%(↓)	28.26%(↓)
DPT Booster-I	95	102	51	46.32%(↓)	50.00%(↓)
DPT Booster-II	92	79	55	40.22%(↓)	30.38%(↓)

This study shows vaccination trend during the lockdown and Unlock period up to children age one year after birth and vaccination trend

during the lockdown and Unlock period for the children age 1-5 year is decreased. (Table 2)(Table 3)

Table 4: Vaccines distribution based on total deliveries, BCG vs first dose of pentavalent

Month & Year	March 2018		March 2019		March 2020	
	n	%	n	%	n	%
Total deliveries	486		514		402	
BCG	370	76.13%	394	76.65%	359	89.30%
Penta 1	39	10.54%	24	6.09%	7	1.95%
Month & Year	April 2018		April 2019		April 2020	
Total deliveries	1152		1215		951	
BCG	1082	93.92%	1135	93.42%	831	87.38%
Penta 1	94	8.69%	79	6.96%	64	7.70%
Month & Year	May 2018		May 2019		May 2020	
Total deliveries	1303		1338		1062	
BCG	1233	94.63%	1228	91.78%	862	81.17%
Penta 1	76	6.16%	61	4.97%	55	6.38%
Month & Year	June 2018		June 2019		June 2020	
Total deliveries	1301		1409		948	
BCG	1231	94.62%	1329	94.32%	918	96.84%
Penta 1	73	5.93%	77	5.79%	50	5.45%

This study shows that total number of deliveries decreased in March, April, May and June 2020 compared to March, April, May and June of 2018 and 2019, (Table 4) vaccination at the time of birth was accordingly to the number of deliveries which was up to 97%. (Table 2) This study shows that antenatal vaccination during March, April, May and June 2020 is also reduced as compare to March, April, May and June of 2018 and 2019. (Table 5)

Table 5: Antenatal vaccination before and during COVID-19 study

Month & Year	TT-1	TT-2	TT Booster
March 2018	35	30	16
March 2019	78	51	18
March 2020	60	46	20
April 2018	126	91	42
April 2019	80	60	20
April 2020	78	52	13
May 2018	120	112	41
May 2019	109	77	24
May 2020	53	28	9
June 2018	83	56	24
June 2019	57	45	30
June 2020	75	38	28

This study shows that there is no significant difference in birth vaccine between the period of lockdown and same duration of period of unlock. (Significant value $p < 0.05$) but in case of all vaccine for the month of march 2018 and march 2020 chi square value is 17.8320 and P-value is 0.0013 so, there is a significant decrease in march 2020 compared to march 2018. For the month of march 2019 and march 2020 chi square value for all vaccine is 16.4350 and p value is 0.0025 so, there is a significant decrease in march 2020 compared to march 2019. For the month of April 2018 and April 2020 chi square value for all vaccine is 59.1080 and p value is < 0.0001 so, there is a significant decrease in April 2020 compared to April 2018. For the month of April 2019 and April 2020 chi square value for all vaccine is 61.0950 and p value is < 0.0001 so there is significant decrease in vaccination for all vaccine in April 2020 compared to April 2019.

For the month of May 2018 and may 2020 chi square value for all vaccine is 46.6640 and p value is < 0.0001 so there is significant decrease in vaccination for all vaccine in May 2020 compared to May 2018. For the month of May 2019 and May 2020 chi square value for all vaccine is 40.570 and p value is < 0.0001 so there is a significant decrease in vaccination for all vaccine in May 2020 compared to May 2019. For the month of June 2018 and June 2020 chi square value for all vaccine is 6.1859 and p value is 0.185 so there is no significant difference in vaccination for all vaccine in June 2020 compared to June 2018. For the month of June 2019 and June 2020 chi square value for all vaccine is 12.2490 and p value is 0.0156 so there is a significant decrease in vaccination for all vaccine is June 2020 compared to June 2019. Therefore this study shows a significant decrease in case of vaccination for all vaccine between the period of lockdown and same duration of period of unlock. Overall vaccination coverage was less during the whole lockdown period compared to same period of year 2018 and 2019. (Table 6)

Table 6: Vaccination association between before and after COVID-19 period

Month	Duration	Birth Vaccines		Vaccines	
		Chi square value	p-value	Chi square value	p-value
March	2018-2020	0.0079	0.9960 (NS)	17.832	0.0013 (S)
	2019-2020	0.0241	0.9880 (NS)	16.435	0.0025 (S)
April	2018-2020	0.1783	0.9147 (NS)	59.108	< 0.0001 (S)
	2019-2020	0.0815	0.9601 (NS)	61.095	< 0.0001 (S)
May	2018-2020	0.3613	0.8347 (NS)	46.664	< 0.0001 (S)
	2019-2020	0.9853	0.6110 (NS)	40.572	< 0.0001 (S)
June	2018-2020	0.682	0.7111 (NS)	6.1859	0.1857 (NS)
	2019-2020	0.3685	0.8317 (NS)	12.249	0.156

DISCUSSION

Number of beneficiaries in immunization clinic decreased which is mostly due to lack of public transport, fear of COVID -19 infection, also fear in health workers for another impending health crisis. This study shows that during lockdown period number of all vaccines administered were lower compared to same duration of unlock of year 2018 and 2019. Similar finding is also done by **Patel et al.**⁽¹⁶⁾ where decrement in the number of all vaccines during the lockdown period. Number of deliveries also decreased during the period of lockdown compared to same duration of period of unlock, and accordingly vaccination at the time of birth was up to 97% in period of lockdown. But our results contradicts the result from **Patel et al.**⁽¹⁶⁾ where it was observed that birth vaccination remains same as the number of deliveries. The birth vaccination percentage was not affected because most of the neonates are given birth vaccination when mother is admitted for deliveries. Overall vaccination coverage was less during period of lockdown compared to same duration of period of unlock This may be due to fear of COVID -19 exposures in general population also less facilities of public transport for coming to tertiary care centers, preference for home deliveries or nearest private nursing home may be another reason for less number of deliveries.. This study also shows that during lockdown period number of all vaccines administered were lower in April 2020 and May 2020 which is similar to study done by **Dhamania et al.**⁽¹⁷⁾ This may be due to strict lockdown policies by government during April and May month of year 2020 as compared to June. Therefore, this study shows that effect of lockdown on vaccination coverage has been significant for vaccination at 6 weeks onwards. There was no interruption in supply chain of vaccine throughout the lockdown period and all vaccines were freely available for all, also services for routine immunization were not disturbed and it was possible to cope with vaccination during this pandemic with proper team approach, proper IPC measures and participation of health care workers,.

CONCLUSION

There has been a significant reduction in number of beneficiaries to the immunization clinic for routine vaccination during period of lockdown (from 21 March, 2020 till 30 June, 2020) as compare to period of unlock-1 as well as same duration of year 2018 and 2019. Reduction has been more in April and May of year 2020 compare to June 2020, which was due to strict lockdown policies during this period. A special vaccination drive is required to cover up for all the vaccination lapse in community.

Clinical Significance

There has been a significant effect of lockdown on routine immunization of children. An intensified vaccination drive is required to cover up vaccination lapse.

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