Original Article

Impact of COVID-19 Pandemic and National Lockdown on Hospital Attendance of Various Infectious Disease Patients at an Apex Infectious Disease Hospital of Eastern India

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Abstract

Aim: To find out variation in hospital attendance and admission for various infectious diseases (IDs) during the national lockdown as compared to prelockdown era. **Materials and Methods:** This observational descriptive cross-sectional study was conducted at a state-level ID hospital in West Bengal. Data related to the turnout of ID patients at the hospital outpatient department and indoor admission during the lockdown and unlock phases of 2020 were collected by review of hospital records and compared with the pre-COVID period of 2019. Collected data were entered into an MS Excel sheet, and analysis was performed by SPSS 20.0. **Results:** Since April 2020, inpatient and outpatient turnout has gone far below the similar months of 2019. Outpatient consultation, indoor admission, anti-rabies clinic attendance, and childhood immunization against vaccine-preventable diseases had decreased significantly by 66.9%, 84.3%, 87%, and 85.2%, respectively, during lockdown (April–June 2020) compared to January–March 2020. Dramatic reduction noticed in hospital admission of diarrhea (93%), measles (96.5%), chicken pox (99.2%), acute respiratory illness (93.9%), diphtheria (66.7%), rabies (66.6%), and typhoid (98.2%) patients; while no cases of tetanus, swine flu, meningococcal meningitis, and mumps were admitted during lockdown period. **Conclusion:** It is evidenced that measures put in place by the government to curb COVID-19 spread disrupted other ID patient attendance at hospitals. Stigma and fear of contracting COVID-19 during hospital visits and unavailability of transport due to lockdown could be the main reason for reduced attendance.

Keywords: COVID-19, infectious diseases, lockdown, outpatient department attendance, pandemic

Introduction

COVID-19 was declared a pandemic on March 11 by WHO. For containing the spread of the virus, authorities in many countries had responded by implementing travel restrictions, lockdowns, sealing inter-state/inter-country borders, and workplace hazard controls by minimizing attendance and facility closures.[1] On the evening of March 24, 2020, the Government of India declared a nationwide lockdown. It limited the movement of the entire 1.38 billion population except for emergency services. All transports (air, rail, and road) were suspended along with strict checkpoints on state borders.[2]

In the health sector, regular outpatient services were suspended, inpatient services severely curtailed and elective surgeries deferred. Mainly emergency health care services continued to function; to utilize our existing health infrastructure and workforce to manage the COVID-19

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pandemic. Many hospital units and wards were ordered to close and converted into COVID isolation or SARI surveillance wards, and many health staff were quarantined due to incidental unprotected exposure to COVID patients. As a result, patients faced great difficulty to contact their doctors; many of them could not manage to reach a tertiary health facility easily due to restricted public transport and escalated cost of travel. Along with this, added social stigma associated with hospitals and health staff involved in treating COVID patients; fear of being tested for COVID on admission prevents people from visiting hospitals.[3]

On the other hand, behavioral changes: cessation of all outdoor activities, strict physical distancing, hand hygiene practices, and mandatory wearing of face masks which helped to limit the transmission rate of COVID-19; might also have considerable positive impacts in reducing the transmission of other infectious diseases (IDs), especially which spread via respiratory droplets, infected hands or food. It is necessary to measure the impact of COVID control measures so far adopted on the incidence of other IDs as depicted by outpatient department (OPD) attendance and hospitalization rate. Admission statistics from IDs hospitals regularly may serve as the best source in this regard.

In this context, the present study was undertaken in a tertiary care ID hospital (ID and Beliaghata General Hospital, Kolkata) of West Bengal to assess the effect of the COVID-19 pandemic, nation-wide lockdown, and phased manner unlocking of services in subsequent months on hospital patient attendance and admission.

Materials and Methods

This observational descriptive cross-sectional study was conducted during April–December 2020 in a state-level referral ID hospital in Kolkata metropolitan city, which is the capital of India's West Bengal state, catering to a population of around 14.9 million in 2020.

After obtaining necessary permission from the Institutional Ethics Committee (Memo No: IDBGH/Ethics/4162 approved on July 26, 2021); month-wise hospital attendance and admission data regarding IDs for the year 2019 was collected from the hospital record section. Similar data of the pre-lockdown period, lockdown phase, and unlocking period for the year 2020 were obtained from daily census and integrated disease surveillance program data of this hospital regarding patient attendance at the OPD, inpatient department, anti-rabies clinic (ARC) and immunization clinic for routine immunization of children against vaccine-preventable diseases (VPDs) under universal immunization program (UIP). The impact of COVID-19-induced lockdown on OPD attendance and indoor admission of other non-COVID IDs was compared during prelockdown and phased unlocking timelines.

Data were divided into four quarters according to the time frame:

a. January 1–March 31, 2020: depicting the inflow of patients for 3 months before implementation of the lockdown.
b. April 1–June 30, 2020: representing inflow for 3 months during the lockdown.
c. July 1–September 30, 2020: representing inflow for the first 3 months of unlock phases
d. October 1–December 31, 2020: representing inflow for the next 3 months of unlock phases.

The admission trend of a similar period from the previous year (2019) was compared with the present scenario for change in disease frequency as well as seasonal variation if any.

Data from January 1, 2020, to March 30, 2020 (1st quarter) were added as (a). It was representative of the hospital's services before the effect of the COVID-19 pandemic. The data from April 1, 2020, to June 30, 2020 (2nd quarter), was added as (b). It was representative of the impact of the lockdown on hospital services. The reduction in patient inflow (%decline) was calculated as: (a–b)/a × 100. Similarly, the 3rd and 4th of 2020 quarters were compared to (a) to calculate %decline. Quarterly data of 2020 were also compared with the same quarter time frame of 2019, %decline was calculated in an above-described manner.

All non-COVID ID cases, which were regularly being consulted or admitted in this hospital, were included for the study purpose, namely respiratory illnesses (swine-flu, measles, chicken pox, mumps, meningitis, diphtheria, acute respiratory illness [ARI]), vector-borne diseases (dengue, malaria), enteric diseases (diarrhea, typhoid), tetanus, rabies, etc., It is also the state nodal center for managing animal bite cases, that's why we also consider the attendance of bite victims at ARC for postexposure prophylaxis against rabies.

As routine immunization of children under the UIP schedule plays an important part in preventing many VPDs of infectious etiology among children, so attendance of beneficiary children at hospitals' immunization clinics was also considered for our study purpose.

Case definitions of studied IDs:[4]

- Swine-flu: Influenza A (H1N1) 2009 virus infection
- Suspected case: a person with acute febrile respiratory illness (fever >38°C) with onset (a) within 7 days of close contact with a person who is a confirmed case of influenza A (H1N1) 2009 virus infection, or; (b) within 7 days of travel to areas where there are one or more confirmed cases, or (c) resides in a community where there are one or more confirmed influenza A (H1N1) 2009 cases
- Probable case: a person with an acute febrile respiratory illness who: (1) is positive for influenza A, but unsubtypable for H1 and H3 by influenza reverse transcription polymerase chain reaction (PCR) or reagents used to detect seasonal influenza virus infection, or; is positive for influenza A by an influenza rapid test or an influenza immune-fluorescence assay and meets criteria for a suspected case, or; (3) individual with a clinically

compatible illness who died of an unexplained ARI who is considered to be epidemiologically linked to a probable or confirmed case

- Confirmed case: A person with an acute febrile respiratory illness with laboratory-confirmed influenza A (H1N1) 2009 virus infection at the WHO-approved laboratory by one or more of the following tests:
  a. Real-time PCR
  b. Viral culture
  c. Four-fold rise in influenza A (H1N1) virus-specific neutralizing antibodies.

The data were extracted in a case record form and entered into an MS Excel sheet, and analysis was performed using SPSS (IBM SPSS 20.0 version; IBM Corp, Armonk, NY, USA). Categorical variables were expressed as absolute numbers and proportions; presented with graphs (line diagrams). The Chi-square test was used to assess the association of categorical variables; $P < 0.05$ was considered statistically significant.

Results

The present study revealed a great decline in OPD attendance, indoor admission and ARC attendance by 66.9%, 84.3%, and 87%, respectively, during 3 months of lockdown time (April–June 2020) with respect to the pre-lockdown quarter period (January–March 2020) at this ID hospital. There was 85.2% reduction in beneficiaries attending the immunization clinic for childhood routine immunization under UIP during April–June 2020 compared to January–March 2020 [Table 1].

Quarterly admission data of 2019 in this hospital was used as a baseline for comparison of ID cases admitted during lockdown and unlocking period. Dramatic reduction was found in hospital admission of diarrhea patients (93%) as well as the hospitalization of measles (96.5%), chicken pox (99.2%), diphtheria (66.7%), and ARI (93.9%) cases during the lockdown period (April–June 2020) compared to the similar period of 2019. Similar declining trend continued during unlocking also; with respect to 2019, the lower quarterly admission rate of measles (94.6%, 100%), chicken-pox (94.9%, 97.6%), diphtheria (80%, 75%) cases was noticed for 1st and 2nd quarter of unlocking. No cases of swine flu, meningococcal meningitis, and mumps were admitted during lockdown and unlocking period. No tetanus patient was admitted during lockdown and 72.8% reduction of tetanus cases during the 1st phase of unlocking. Rabies case admission was declined by 66.6% during lockdown; while remaining 63.5% and 30% lower during 1st and 2nd quarters of unlock. Significant reduction of malaria (95.9%), dengue (100%), and typhoid fever (98.2%) cases were also observed during the pandemic and lockdown period [Table 2].

Month-wise hospital admission trend of various IDs was compared for 2019 and 2020 to observe the effect of seasonal variation on disease occurrence [Figure 1]. Admission trend of diarrhea patients showed a rapid decline after February 2020, but did not show upsurge in cases during April and

Table 1: Department wise decline in hospital patient attendance during lockdown period and unlocking phases compared to prelockdown period in 2020

Department	Gender	Prelock down January 01, 2020-March 31, 2020	Lockdown period		χ^2, df	Unlock phase		Unlock phase	
			April 01, 2020-June 30, 2020	Percentage decline		July 01, 2020-September 30, 2020	Percentage decline	October. 01, 2020-December. 31, 20	Percentage decline
OPD	Male	11,642	4335	62.8	91.008, <0.05	4761	59.1	6,109	47.5
	Female	11,444	3308	71.1		3733	67.4	6,005	47.5
	Total	23,086	7643	66.9		8494	63.2	12,114	47.5
Admission	Male	4438	810	81.7	35.509, <0.05	886	80.0	1,758	60.4
	Female	3392	423	87.5		546	83.9	1,106	67.4
	Total	7830	1233	84.3		1432	81.7	2,864	63.4
ARC	Male	4069	747	81.6	150.368, <0.05	808	81.6	1,695	58.3
	Female	4520	370	91.8		484	89.3	1,066	76.4
	Total	8589	1117	87.0		1292	84.96	2,761	67.9
Immunization clinic	Total	549	81	85.2		194	64.7	209	61.9

OPD: Outpatient department, ARC: Anti-rabies clinic

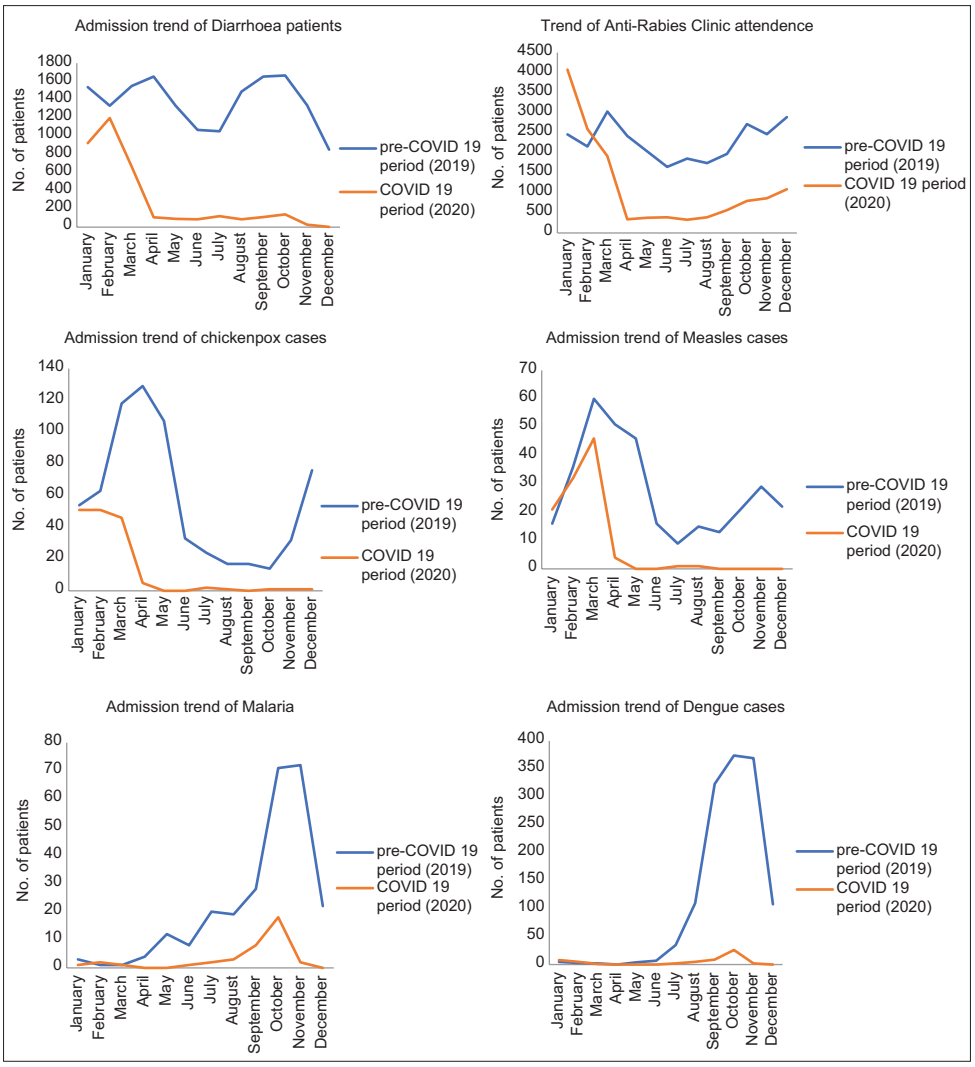

Figure 1: Comparison between trend of hospital admission of different infectious disease patients during pre-COVID period (2019), COVID-19 lockdown and unlock phases of 2020 versus corresponding time interval in the previous year

September–October month unlike in 2019. Attendance of animal bite victims at ARC declined hugely after the onset of COVID-19 in 2020 as compared huge burden of 2019; found to be lowest in April 2020, probably due to the lockdown-imposed cessation of outdoor activities and lack of transport facilities. Admission of measles and chicken-pox cases were negligible after April'2020 and remained so till December. Although malaria and dengue patients' admission hugely decreased in 2020 compared to the previous year, but slight seasonal peak during October 2020 was noticed, like 2019.

Data on the overall outpatient attendance of ID cases showed a peak in October–November 2019; maintained an average flow until March 2020, when the first COVID-19 case was reported in West Bengal [Figure 2]. In April 2020, there was a decrease in the number of outpatient visits by 56% compared to April 2019. A slight increase in outpatient attendance was observed in July; this could be due to the following factors: a decline in initial fear of patients to visit hospitals to access medical facilities reduction of a curfew due to unlocking measures. The next upsurge in OPD visits was noted in October–November 2020 [Figure 2].

The patient admission trend during January–March 2020 was almost identical to the similar period of 2019. However, there was a decline of 85% in April 2020 when compared to April 2019, in which 2727 inpatients attended. The number of inpatients remained affected till September'2020, then showed a slight upward trend [Figure 3].

Discussion

During the time of the COVID pandemic, the Indian economy faced a phased removal of restrictions.[5]

The present study found that during the lockdown period, daily OPD volume had decreased by 66.9%, a similar finding was observed by Babu *et al*.[6] and Prasad *et al*.[3]

Admission of various ID patients reduced by 83.0% during the lockdown period compared to a similar time frame in

Table 2: Quarterly admission rate of different infectious diseases before and during lockdown and unlock phases of year 2020 in comparison to similar time frame of 2019

Communicable diseases	Gender	January–March			April–June			July–September			November–December			Total annual admission		
		2019	2020	Percentage decline	2019	2020	Percentage decline	2019	2020	Percentage decline	2019	2020	Percentage decline	2019	2020	Perdecline, *P*
Diarrhea	Male	1093	855	21.8	1340	107	92.0	1546	145	90.6	1395	63	95.5	5374	1170	78.2
	Female	3326	1930	42.0	2714	175	93.6	2649	168	93.7	2459	106	95.7	11148	2379	78.7
	Total	4419	2785	37	4054	282	93	4195	313	92.6	3854	169	95.7	16522	3549	78.5, >0.05
Diphtheria	Male	5	6	−20	1	1	0	4	1	75	3	2	33.3	13	10	23.1
	Female	13	6	54	5	1	80	11	2	82	13	2	84.7	42	11	73.8
	Total	18	12	33	6	2	66.7	15	3	80	16	4	75	55	21	61.8, >0.05
Chicken-pox	Male	112	67	40.2	145	3	98	32	2	93.8	34	2	94.2	323	74	77.1
	Female	123	81	34.2	124	2	99.4	26	1	96.2	88	1	98.9	361	85	76.5
	Total	235	148	37	269	5	99.2	58	3	94.9	122	3	97.6	684	159	76.8, >0.05
Measles	Male	40	42	−5	40	1	97.5	15	0	100	28	0	100	123	43	65
	Female	72	57	20.9	73	3	95.9	22	2	91	44	0	100	211	62	70.6
	Total	112	99	11.6	113	4	96.5	37	2	94.6	72	0	100	334	105	68.6, >0.05
ARI	Male	9	13	−44.4	10	3	70	18	0	100	14	0	100	51	16	68.6
	Female	27	27	0	39	0	100	39	4	89.8	40	4	90	145	35	75.9
	Total	36	40	−11.1	49	3	93.9	57	4	93	54	4	92.6	196	51	74
Swine-flu	Male	54	12	77.8	15	0	100	3	0	100	0	0	0	72	12	83.3
	Female	56	13	76.8	16	0	100	2	0	100	1	0	100	75	13	82.7
	Total	110	25	77.3	31	0	100	5	0	100	1	0	100	147	25	83, >0.05
Mumps	Male	11	6	45.5	20	0	100	10	0	100	11	0	100	52	6	88.5
	Female	20	14	30	39	0	100	14	0	100	10	0	100	83	14	83.1
	Total	31	20	35.5	59	0	100	24	0	100	21	0	100	135	20	85.2, >0.05
Rabies	Male	6	3	50	7	2	97.2	5	2	60	4	3	25	22	10	54.5
	Female	5	5	0	2	1	50	3	1	66.6	6	4	33.3	16	11	31.3
	Total	11	8	27.3	9	3	66.6	8	3	63.5	10	7	30	38	21	44.7, >0.05
Tetanus	Male	2	1	50	1	0	100	5	0	100	2	2	0	10	3	70
	Female	3	3	0	3	0	100	6	3	50	2	1	50	14	7	50
	Total	5	4	20	4	0	100	11	3	72.8	4	3	25	24	10	58.3, >0.05
Malaria	Male	2	3	−50	15	1	93.4	46	12	74	116	16	86.2	179	32	82.1
	Female	3	1	66.6	9	0	100	21	1	95.3	49	4	91.8	82	6	92.7
	Total	5	4	20	24	1	95.9	67	13	80.6	165	20	87.9	261	38	85.4, >0.05
Dengue	Male	3	8	−166.7	6	0	100	237	9	96.2	506	18	96.5	752	35	95.3
	Female	7	6	14.3	5	0	100	231	7	97	345	10	97.1	588	23	96.1
	Total	10	14	−40	11	0	100	468	16	96.6	851	28	67	1340	58	95.7, >0.05
Typhoid	Male	9	7	22.3	4	2	50	20	1	95	18	0	100	51	10	80.4
	Female	3	1	66.6	7	0	100	19	0	100	12	1	91.7	41	2	95.1
	Total	12	8	33.3	11	2	98.2	39	1	97.5	30	1	96.7	92	12	87, >0.05
Meningo-coccal meningitis	Male	2	1	50	1	0	100	2	0	100	0	0	0	5	1	80
	Female	1	1	0	2	0	100	0	0	0	1	0	100	4	1	75
	Total	3	2	33.3	3	0	100	2	0	100	1	0	100	9	2	77.8, >0.05

ARI: Acute respiratory illness

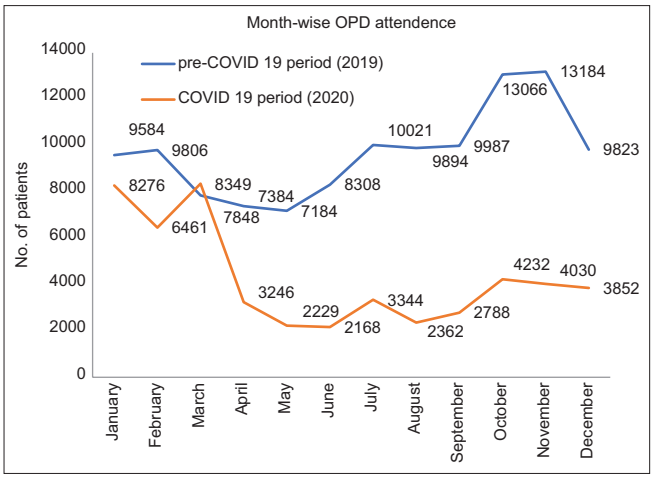

Figure 2: Line diagram showing month-wise OPD attendance during pre-COVID period (2019) and COVID period (2020). OPD: Outpatient department

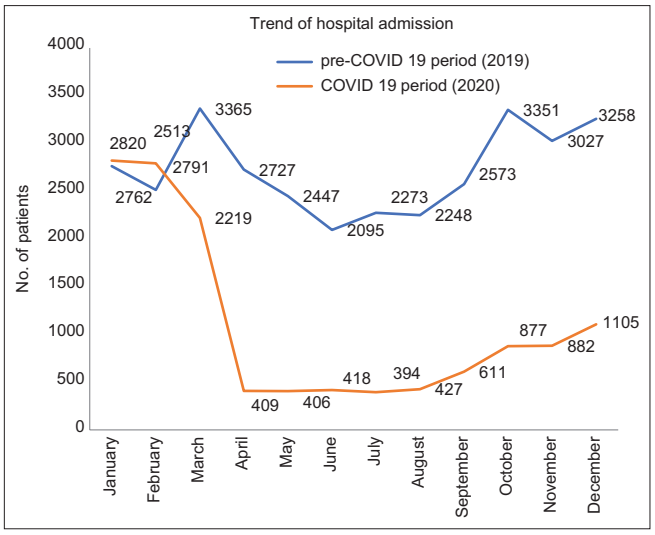

Figure 3: Line diagram showing month-wise hospital admission trend during pre-COVID period (2019) and COVID period (2020)

2019. The study conducted in the UK by Callan *et al*. also showed that 52% reduction in surgical patients during the pandemic.[7] Sarkar *et al*.[8] found 87.3% and 69.6% reduction in Gynaecology and antenatal OPD patients in West Bengal. A similar finding was revealed by Boonpiraks *et al*.,[9] Bodilsen *et al*.[10] and Shah *et al*.[11] reported that hospital admission rates for cancer, cardiovascular and respiratory conditions (excluding COVID-19) fell by 34.2% in England, 20.9% in Scotland, and 24.7% in Wales. Similar picture was depicted by Kalanj *et al*.[12] in Croattia, Kruizinga *et al*.[13] in the Netherlands and Meher *et al*.[14] in Odisha.

Gender difference was noted in OPD attendance of ID cases in the present study. Our finding was comparable with the findings of Babu *et al*.[6] Probably, because of the higher proportion of females could not manage time to visit the hospital for their ailments as they remained involved with their household work. Majority of the housing societies had banned the entry of domestic helpers during the pandemic, which led to the additional burden of household responsibilities on females.

There was 85.2% reduction in immunization clinic attendees. The same was revealed by Gera *et al*. in North India,[2] Khan *et al*. in New Delhi,[15] and Agrawal *et al*. in Meerut.[16] The online survey conducted by Nair *et al*. showed 77.5% of the stand-alone private practitioners had closed their practices; begun telephonic/e-mail/video consultations or consultations over social media applications since the lockdown imposed.[17]

Animal bite victims during the lockdown phase had declined. A similar downward trend was noticed by Satapathy *et al*.[18] in Odisha and Saleem *et al*.[19] in Srinagar. On the contrary, Tulloch *et al*., in a study conducted in pediatric emergency departments in the UK, found a threefold increase in dog bite attendance during COVID-19.[20]

Our study found a decline in the recorded incidence of air-borne diseases, whereas in Italy, chickenpox reduced by 1/5th, whereas no cases of measles, scarlet fever, rubella, and pertussis were registered in 2020.[21] This might be attributed to the beneficial effects of wide-scale preventive measures adopted to combat COVID-19 infection. Venter *et al*. reported that lockdown events have reduced air pollution levels by 20% across 27 countries, which resulted in a substantial reduction in pediatric asthma cases.[22] Birkmeyer *et al*.[23] revealed that hospital admissions in the US fell dramatically for pneumonia (44%), and chronic obstructive pulmonary disease/asthma (40%). Meher *et al*.[14] found 76.5% and 86.2% reduction in hospitalization due to ARI and asthma, respectively, in Odisha. Similar findings were obtained by Gupta *et al*. and Haklai *et al*.[24,25]

There might be chances of health-care access bias as several ID cases could not report to health facilities due to various factors: fear of contracting COVID-19 with hospital visits, apprehension of being tested for COVID-19 on admission or any major investigation, unavailability of public transport facility and escalated cost of travel in a hired vehicle, lack of money due to loss of a job or compelled absenteeism, unawareness about possible grave consequences of untreated IDs, etc.

The present study was done and its conclusion was derived based on the hospital data limited to a single ID hospital situated in a metropolitan city and probably the care-seeking behavior was even more badly hit in remote areas. Hence, the findings of the present study cannot be generalized in other hospital settings though COVID-19 and lockdown affected patient attendance at almost all healthcare setups. Data on the utilization of telemedicine consultation services during the study period were not considered. Combined patient inflow data of several hospitals during COVID-19 might be able to give a more wholesome picture.

Conclusion

The COVID-19 pandemic had a significant repercussion on health-care facilities all over the world. As the battle with

COVID-19 is expected to continue for a long time; the health sector must be prepared by capacity building to cater not only to the ongoing pandemic but also to deal with its after-effects of expected patient surge as lockdown caused difficulty for the public in accessing proper medical services. Large unmet needs for health services would cause challenges in the foreseeable future.

Ethical code

IDBGH/Ethics/4162, dated Jul 26, 2021.

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Conflicts of interest

There are no conflicts of interest.

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