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Original Article

Community Section

Impact of Enforcing Lockdown in Spread of COVID-19 Infection in Central India: An Observational Study

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ABSTRACT

Introduction: The lockdown was implemented nationally for six weeks, followed by another two weeks of graded lockdown in districts in India as a means to prevent spread of infection. During this period, there was restriction of movement of residents except for those engaged in providing essential services.

Aim: To find out socio-demographic profile of patients along with the impact of lockdown and spread of Coronavirus-19 (COVID-19) infection post-lockdown.

Materials and Methods: A prospective observational study conducted in Bairagarh, a suburban area of Bhopal. The study was conducted for three months i.e. from 9th April 2020 to 9th July 2020. A contact tracing questionnaire was used for data collection. The data was collected by actual visiting the patient's address. The data collected was compiled and analysed using Microsoft Excel 2020. The patients were instructed to inform the data collector of any post-viral symptoms after 15 days of diagnosis to find out any post-viral complaints. Percentages and proportions were derived using Epi info-7.0.

Results: During the study period of three months, in total 90 patients were interviewed. Almost 85.5% cases were found post-lockdown. Most common age group to be involved was 31-45 years. Males were more commonly infected. Only 14.44% patients who worked during lockdown were infected. Almost 26.6% patients were involved in cloth merchandise business which was closed during lockdown and had a sudden upsurge in business during unlock. In total 47.7% patients were asymptomatic when tested. Relative Risk (RR) of acquiring infection post-lockdown was 1.13. Doubling rate of infection among study population during lockdown was found to be 14.05 days compared to 5.35 days post-lockdown. Almost 80% patients did not have any post-viral symptoms. The most common symptom seen was nose block.

Conclusion: The lockdown was found to be effective strategy in controlling spread of COVID-19 infection as post-lockdown there was sudden increase in number positive cases.

Keywords: Doubling time, Post-viral complications, Relative risk

INTRODUCTION

Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), a novel coronavirus/COVID-19 outbreak was declared as a global public health emergency by the World Health Organisation (WHO) on 30th January, 2020 and later as pandemic [1]. India reported the first case of COVID-19 on 30th January, 2020 in Kerala [2]. Since, then the number of cases continued rising. In India, as per Ministry of Health and Family Welfare (MoHFW), till 1st March 2021 the situation of COVID-19 is as follows 1,68,627 active cases with 1,07,86,457 discharged patients and 1,57,157 deaths with case fatality rate of 1.41% [3].

In countries like India with diverse geography, dense population, developing infrastructure, vivid socio-cultural spectrum, evolving public health service across the nation poses a bigger challenge to handle COVID-19 outbreak. Taking these factors into consideration and protecting widespread infection, Indian Government took a rapid decision of nationwide lockdown which is considered as the globally most tough and strict measure to prevent the country's entry into phase three which is a community transmission mode [4].

To assess evidence pertaining to health economic impact of COVID-19 management, in context to low and middle income countries using Susceptible-Exposed-Infectious-Recovered (SEIR) model [4]. It was concluded that in the event of a lockdown for eight weeks, the peak of the epidemic shifts by 34-76 days, and the number of cases at the end at the eighth week of lockdown, the number of cases reduces by 69% to 97% with varying effectiveness of lockdown. As expected that stringent control of population movement by enforcing a lockdown delays onset of sudden surge in number of cases, hence gives a time for health system to initiate containment measures. It also reinforces the public health system response in testing of symptomatic cases and to screen their contacts prior to deterioration of their condition. It appears to be effective appropriate means to reduce sudden surge in number of cases [5]. At present, the overall volume of infected numbers in India is definitely less compared to population of other countries due to timely announcement of lockdown and considerable efforts by Indian authorities to impose stringent lockdown [2].

The Prime Minister of India also announced a nationwide lockdown on 24th March 2020 as a measure towards reducing transmission. Hence, as infection control strategy the strict lockdown was imposed nationwide for six weeks, which was followed by another two weeks of graded lockdown in districts on the basis of their risk assessment [5]. In India, currently till middle of July 2020 there were 856,062 positive cases with 96% recovery rate and 22,762 i.e., 4% deaths [6].

The present study was planned in a suburban area of Bhopal (Bairagarh). This area is commercial hub of wholesale and retail marketing of textile and readymade garments. This market was totally closed during lockdown. There are no major offices or places in this area catering to essential or emergency service. During the lockdown, there was restriction of movement of residents to rest of the part of city. Hence, it could be assumed that a large population of residents were prevented from exposure to corona hotspot due to its geographical location as this is located outside main Bhopal city. During the lockdown, only essential activities were operational

in this area and rest of the commercial activities were banned, this led to limited exposure to residents. The place received a surge in buyer's post-lockdown. The goods from market is received from corona hotspots in the country like Indore (Madhya Pradesh) and Surat (Gujarat) etc., and were disseminated to rest of the state as part of business establishments. Most of the personnel involved in these commercial activities reside in same area. Hence, this study was aimed to identify socio-demographic profile of patients in area, along with their probable source of infection and post-COVID-19 symptoms if any suffered after 15 days of testing positive and discharge from health facility.

MATERIALS AND METHODS

An observational study was conducted from 9th April 2020 to 9th July 2020. All COVID-19 positive patients residing in Bairagarh area during this duration were included in study. The patients were tested by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) in various laboratories in Bhopal district. A cumulative list of all positive cases were provided to District health authorities by Integrated Disease Control Programme (IDSP) [7], from which the patients of Bairagarh area were isolated for study. A non randomised inclusive sampling technique was used for selecting study subject. An Institutional Ethics Committee approval was obtained (IEC-35596-600/MC/IEC/2020).

Inclusion and Exclusion criteria: All the patients testing positive during study period and residing in Bairagarh were included and no patients were excluded.

A National Centre for Disease control (NCDC) approved proforma was used for data collection. Informed consent was taken from each participant of study and in case of minors consent was taken from parent(s) [8].

The proforma contained household and socio-demographic details along with list of high and low risk contacts. An enquiry regarding probable source of infection was also taken. All the patients were traced in community with the help of district authorities and the data was collected by visiting the place of resident of patients. This was part of contact tracing activity conducted by administration. Patients were informed regarding the medical rehabilitation. All the contacts were counselled regarding COVID-19 preventive measures, social distancing norms and motivated for testing. Patients were instructed to inform data collectors regarding any post-viral complications after 14 days of diagnosis.

Relative Risk (RR) as ratio of the infection occurring in the exposed group i.e., high risk contacts of COVID-19 positive patients versus the risk of acquiring infection in low risk contacts was calculated.

Doubling time was calculated using following formula:

The number of days for which total confirmed cases became double was calculated as follows [6].

$$\frac{T \text{ days}}{\log_2(\text{Total Cases until Day } (X+T)) - \log_2(\text{Total Cases until Day } (X))}$$

T is total number of days observed, X is number of cases on first day of observation.

In this, the doubling time was separately calculated for period of lockdown i.e., for lockdown period number of confirmed cases from 9th April on which first case was confirmed and number of cases till 31st May 2020. Similarly, the doubling time was calculated for period of phasic unlock i.e., from 1st June to 30th June 2020. The study was continued till 9th July 2020, as a part of district administration contact tracing activity, during this period the area of study was completely unlocked and commercially functional and there was no restriction of movement of population.

STATISTICAL ANALYSIS

The data collected was compiled using Microsoft Excel 2020. The line listing of all the contacts were provided to district authorities for sampling of contacts in subsequent days as early as possible as a part of COVID-19 containment activity. The data collected were shared with district health and administrative authorities. Due confidentiality was maintained in data collection, assimilation and dissemination. The data was analysed and means, percentages and proportions were derived using MS Excel-2020 and Epi info 7.0.

RESULTS

In total 90 cases were found during study period. The age of participants ranged from 7 months to 70 years (Mean age-42.71±16.08 years) [Table/Fig-1]. It was found that 14.44% acquired infection while working during lockdown. Average family size in area was 6.29±3.34 persons. Average positive family members were 2.06±1.39 persons. Almost 66.05% patients had multiple COVID-19 contacts.

Variables	N	%
Age in years		
0-15	5	5.55
16-30	14	15.56
31-45	32	35.56
46-60	20	22.22
Above 61 years	19	21.11
Sex		
Male	53	58.89
Female	37	41.11
Occupation		
Housewife	24	26.67
No work during lockdown	39	43.33
Worked during lockdown	13	14.44
Student/Infant	13	14.44
Online job	1	1.11
Distribution of cases based on Pre-testing symptoms		
Asymptomatic	43	47.78
Symptomatic	47	52.22

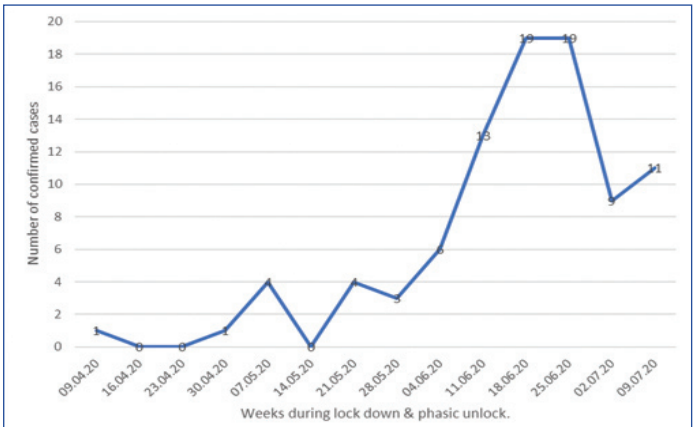
[Table/Fig-1]: Characteristics of cases (N=90).

A huge surge was seen in cases (85.5%) post-lockdown period. There is RR of 1.13 of acquiring COVID infection post-lockdown. Also, 26.6% cases were associated with cloth merchandise as 10% cloth shop owners/workers and 16% of their family, contacts were COVID-19 positive post-lockdown. In total 70% patients can recall probable source of infection [Table/Fig-2]. Most of the cases had no post COVID-19 symptoms. Doubling rate of infection among study population during pre-lockdown was found to be 14.05 days compared to 5.35 days post-lockdown [Table/Fig-3]. In total three deaths were reported.

Variables	N	%
No. of total COVID positive family members other than the index patient of family		
0	19	21.11
1	20	22.22
2	27	30
3	8	8.89
4	11	12.22
5	5	5.56

Distribution of patients on the basis of probable source of infection		
Unknown	27	30
Healthcare facility acquired	4	4.44
At place of work	17	18.89
Family, friends, neighbours	39	43.33
Due to travel	2	2.22
Jamat attendee	1	1.11
Distribution of symptoms on the basis of post COVID-19 symptoms after 14 days of diagnosis		
Asymptomatic	72	80.00
Nose block	7	7.78
Weakness	3	3.33
Fever	1	1.11
Bitter mouth	1	1.11
Death	3	3.33
Untraceable	3	3.33

[Table/Fig-2]: Distribution of patients (N=90).



[Table/Fig-3]: Weekly distribution of cases.

DISCUSSION

This study found a sudden increase in number of COVID-19 positive cases post-lockdown. This was similar to observations by Atalan A that the lockdown, has been observed to prevent the COVID-19 pandemic. It helped in significantly reducing the spread of the virus [9]. As per the guidelines of lockdown as stated by Ministry of Home affairs that restricted movement of population [10], there was limited risk of acquiring infection. Hence, a large number of patients were protected till lockdown lasted. Only 14.44% patients were infected during lockdown.

In the current study, 85.56% patients were tested positive for COVID-19 during unlock phase. This sudden rise in number of cases are similar to as stated by Paul A et al., that attempt to understand and estimate the possible epidemic burden during the unlock phase by using a modified SEIR model [11]. It was seen that 78.9% of those infected were under 60 years of age. Males clearly out numbered females as they were involved in commercial activities. After unlock phase the cases started rising gradually as expected.

The area of study has population involved in business activities especially pertaining to cloth merchandise. Most of the cases lived in joint families with other relatives living close by. Hence, their interaction post-lockdown resulted in large number of cases amongst contacts post unlock. Also, post-lockdown doubling time of infection reduced considerably which is likely to be more exposure to asymptomatic infected persons in post-lockdown period.

Maximum number of cases was seen from 11th to 26th June 2020, this was likely due to laxation in lockdown norms. Also, due to onset of monsoon many persons developed fever with cough/coryza that increased rate of voluntary COVID testing. As 52.22% cases were symptomatic hence, opted for voluntary testing. Rest of the asymptomatic ones were likely to be contacts of other COVID-19 positives and were tested as per protocol followed by district health authorities. They are potential source of infection as meta-analysed by Yanes-Lane M et al., [12].

In total, 70% patients could recall the probable cause of acquiring infection. Most common post-viral complication seen was nose blocks which required further evaluation. This finding was different from Carfi A et al., which stated that most common post-viral complication was cough, fever and dyspnoea [13]. The three deceased person were above 65 years of age and succumbed to coronary and cerebral vascular disease. No respiratory complications were reported in any of them. They were diagnosed to be COVID-19 infected after they were brought to hospital for treatment of their morbid condition.

Limitation(s)

In total, three patients could not be traced after discharge from hospital.

CONCLUSION(S)

A large majority of COVID-19 patients were asymptomatic when they were tested. There is a considerable risk of acquiring infection post-lockdown. Therefore, strict imposition of lockdown was helpful in containing infection in study area.

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