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Research Article

Assessment of Medication Adherence among Diabetic and Hypertensive Patients Visiting an Urban Health Centre Affiliated with a Tertiary Care Hospital during Lockdown Imposed due to COVID-19 Pandemic

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A B S T R A C T

Introduction: COVID-19 is a major health crisis, which led to a nationwide lockdown. The combined effect of the COVID-19 pandemic and lockdown impacted patients suffering from non-communicable diseases.

Aims: To assess medication compliance among diabetic and hypertensive patients during lockdown due to COVID-19 and to find out the association between factors affecting compliance during lockdown due to COVID-19.

Method: All patients registered at an urban health training centre for treatment of diabetes, hypertension or both. The study was a facility-based cross-sectional study, done at an Urban Health Training Centre (UHTC), affiliated with VMMC & Safdarjung Hospital, New Delhi. 145 patients were taking treatment for diabetes mellitus, hypertension, or both for six months or more, at UHTC before the commencement of lockdown. Data were collected using a structured questionnaire. Patients were contacted telephonically. Data were analysed for frequency and percentage, and the relationship was assessed using chi-square test/ Fisher's exact test.

Results: Majority of participants were male (51%) and had BMI in the range of normal to overweight (44% and 43.1% respectively). Loss of job was reported by 73% of participants and majority of participants were earning INR 6001 to 10000 before lockdown. The main reason for noncompliance was financial. Sex, migration, and source of medication were significantly related to medication compliance.

Conclusions: Though most patients were compliant, the main reason for non-compliance was financial and related to migration.

Keywords: COVID-19, Medication Compliance, Non-communicable Disease, Diabetes, Hypertension, Lockdown

Introduction

Coronavirus illness 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), may be a major health crisis. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic, and it's become one of the deadliest pandemics within the last century. The burden of COVID-19 extends way on the far side of contagion. COVID-19 affects the complete health system through its direct result as a disease, as well as its ability to change the general mortality and burden of disease through its impact on non-communicable diseases.[1] Non-communicable diseases (NCDs) include diseases like cardiovascular diseases, cancer, polygenic disease, chronic respiratory illnesses, and cancers. NCDs contribute to around 68% of all deaths globally and 60% of all deaths in India.[2]

Coronavirus disease 2019 (COVID-19) is extremely contagious, has substantial fatal outcomes, and may cause large social and economic disruption. The chances of developing severe and even fatal illnesses are more among individuals over sixty years and other people with underlying comorbidities like high blood pressure, diabetes, chronic respiratory illness, and cancer. These diseases are also the major causes of death and disability. In several low-resource settings, which have health system incapacities and are already overburdened by the double burden of communicable and contagious diseases, resource redeployment to manage COVID-19 will further reduce the focus on non-communicable diseases.[3] COVID-19 pandemic is the most significant international public health event of the current century. Pre-existing NCDs, older age, and male gender are the features related to severe and fatal diseases. It has been found to be difficult to manage NCDs with a COVID-19 infection. India shares a major load of NCDs and hence is at a high risk of ill health and complications because of COVID-19.[4]

On 24 March 2020, the Govt. of India ordered a nationwide lockdown was lifted in phases, limiting the movement of the 130-crore population as a caution against the COVID-19 pandemic. The lockdown was placed once the number of confirmed positive coronavirus cases in India was about 500.[5] The patients suffering from NCDs were confined within their homes, and a massive exodus of migrant population, several of whom were having pre-existing NCDs, had no access to medication which increased the danger for complications, whereas the adherence to treatment among patients with NCDs is already terribly low in India.[6,7] The combined effect of the COVID-19 pandemic and lockdown remains to be seen on patients suffering from non-communicable diseases. The present study was planned to assess the treatment compliance among diabetic and hypertensive patients and factors affecting the compliance among patients visiting an urban health centre affiliated with a tertiary care hospital during the lockdown imposed due to the COVID-19 pandemic.

Aims and Objectives

- To assess the medication compliance among diabetic and hypertensive patients registered at the NCD clinic during lockdown due to COVID-19
- To identify factors affecting compliance during lockdown due to COVID-19 among the study population

Subjects and Method

Study Design: Facility-based, cross-sectional study.

Study Setting: The present study was conducted at UHTC, affiliated with a tertiary care hospital.

Study Population: All patients registered at the urban health centre for treatment of diabetes and hypertension or both.

Inclusion Criteria

The patients were registered at UHTC for at least six months before the commencement of lockdown for treatment of diabetes and hypertension and who consented to participate in the study.

Sample Size: Total enumeration of patients satisfying the inclusion criteria was done. A total of 116 patients participated in the study.

Study Tool: A preformed, semi-structured, telephonically administered questionnaire was used for data collection.

Data Collection

At UHTC, a record of all the registered patients for non-communicable diseases is being maintained. The duration of treatment before the lockdown was taken from the data maintained at the UHTC. The patients registered at UHTC at least six months before the commencement of lockdown were included in the study. The researcher contacted the patients telephonically, based on records available at UHTC. Data were collected from March 2021 to April 2021.

Data collection was completed within one month from the date of commencement.

Study Variables

Data was collected on the following: demographic variables, diagnosis, treatment taken before commencement of lockdown, treatment compliance (using structured interview), monitoring of blood pressure and blood glucose, healthcare sought during lockdown, migration, loss of livelihood, and monthly income before lockdown. To avoid recall bias, verification of information given by the participants was done with a reliable and trustworthy source such as a spouse/ son/ daughter/ close relative.

Analysis: The data was entered, and analysis was done using Microsoft Office Excel sheet. The difference between

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proportions was evaluated using chi-square test/ Fisher's exact test using SPSS version-21.

Ethics: Approval from the Institutional Ethics Committee and permission from the administrative authorities was obtained. Telephonic voluntary informed consent was obtained from all participants after explaining the purpose of the study.

Results

A total of 120 patients were found to be registered for more than 6 months at the NCD clinic before the commencement of the lockdown on 23rd March 2020. The researchers could collect data from 116 patients.

Table 1 depicts the socio-demographic profile of the participants.

Table 1.Socio-demographic Profile of the Study Participants (N = 116)

S. No.	Characteristics	Frequency	Percentage
1.	**Gender**		
	Male	60	51.7
	Female	56	48.3
2.	**Age groups (years)**		
	≤ 30	4	3.4
	31-40	26	22.6
	41-50	45	38.8
	51-60	30	25.9
	≥ 61	11	9.5
3.	**Illness**		
	Both diabetes and hypertension	35	30.2
	Diabetes	40	34.5
	Hypertension	41	35.3
4.	**BMI**		
	Underweight	2	1.7
	Normal	51	44.0
	Overweight	50	43.1
	Obese	13	11.2
5.	**Income before lockdown (INR per month)**		
	≤ 6000	7	6.0
	6001 to 10000	52	44.8
	10001 to 15000	36	31.0
	15001 to 20000	11	9.5
	> 20000	10	8.6
6.	**Whether earning during lockdown**		
	Yes	31	26.7
	No	85	73.3
7.	**Migration status**		
	Non-residents who stayed in Delhi	16	13.8
	Non-residents who migrated to hometown/ village	49	42.2
	Residents	51	44.0

Table 1 shows the demographic characteristics of the study subjects. 116 patients participated in the study of which majority were male (51.7%). Of the total participants, majority were in the age group of 41 to 50 years (38.8%) followed by 51 to 60 years (25.9%), 31 to 40 years (22.6%), 61 years and above (9.5%) and patients below 30 years (3.4%). In the morbidity profile, most of the patients had hypertension (35.3%) followed by diabetes (34.5%) and patients having both diabetes and hypertension (30.2%). Majority of the subjects were in the normal range of BMI (44%).

Before the lockdown was imposed, majority of the patients were earning INR 6,001-10,000 per month (44.8%). During lockdown, majority of the respondents did not have any job (73.3%). Most of the study subjects were residents of Delhi (44%). Most of the non-residents had migrated to their hometowns (42.2%) and a few had stayed (13.8%).

Table 2.Medication Compliance among the Study Population during Lockdown (N = 116)

S. No.	Variables	Frequency	Percentage
1.	**Number of medicines prescribed for diabetes mellitus**		
	One	13	16.9
	Two	33	42.85
	Three	31	40.25
2.	**Number of medicines prescribed for hypertension**		
	One	51	68.0
	Two	21	28.0
	Three	03	4.0
3.	**Was the treatment taken for the entire period of lockdown?**		
	Yes	69	59.5
	No	47	40.5

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4.	**If no, number of days for which treatment was taken (N = 47)**		
	Entire period (not taken)	15	31.91
	≤ 15	13	27.65
	15-30	12	25.53
	31-45	04	8.51
	> 45	03	6.38
	Total	47	100.0
5.	**Reason for non-compliance (N = 47)**		
	Financial	40	85.10
	Non-availability	07	14.90

Table 2 shows that majority of the diabetic patients were taking two medicines for treatment (42.85%), followed by patients taking 3 medicines (40.25%) and those taking one medicine (16.9%). Majority of the hypertensive patients were taking one medicine (68%), followed by patients taking two medicines (28%) and those taking three medicines (4%). Treatment was taken for the entire period by majority of the patients (59.5%). Among the non-compliant patients, majority did not take treatment for the entire period of lockdown (31.91%). The reason stated by patients for non-compliance was mainly financial (85.1%) followed by non-availability of medicine (14.9%).

Data presented in Table 3 show that majority of the patients who were able to monitor their blood pressure and blood glucose relied on private doctors and neighbours respectively, and those who visited dispensaries & private doctors reported that the facility for monitoring was closed due to COVID-19 and only medicines were dispensed from those facilities.

Table 4 shows that the variables like age group, job during lockdown, income before lockdown, blood sugar monitoring, and BMI were not statistically significant with medication compliance at 0.05 level of significance. On the other hand, variables like source of medication, blood pressure monitoring, gender, and migration of the study participants were found to be statistically significant with medication compliance.

Table 3.Monitoring of Blood Pressure and Blood Sugar among the Study Population

Variables		Frequency	Percentage
Blood pressure monitoring (n = 76)	Yes	24	31.6
	No	52	68.4
Place of monitoring	Home/ neighbour	3	12.5
	Private doctor	12	50.0
	Medical store	7	29.1
	Mohalla clinic	2	8.3
	Total	24	100.0
Frequency per month	Once	10	41.6
	Twice	5	20.8
	Thrice	4	16.6
	Four or more	5	20.8
	Total	24	100.0
Blood sugar monitoring (n = 75)	Yes	18	24.0
	No	57	76.0
Place of monitoring	Home/ neighbour	9	50.0
	Private doctor	4	22.22
	Medical store	2	11.12
	Mohalla clinic	3	16.66
	Total	18	100.0
Frequency per month	Once	9	44.4
	Twice	4	16.7
	Thrice	2	27.8
	Four or more	2	11.1
	Total	18	100.0

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Table 4.Association between Medication Compliance and Selected Demographic Variables (N = 116)

Variables	Medication Compliance		Test	P value
	Compliant n (%)	Non-compliant n (%)		
Age group (years)				
≤ 30	3 (2.5)	1 (0.9)	Fisher exact	0.3428
31-40	16 (13.8)	9 (7.8)		
41-50	29 (25.0)	16 (13.8)		
51-60	14 (12.0)	16 (13.8)		
≥ 61	5 (4.3)	7 (6.0)		
Gender				
Male (n = 60)	42 (70.0)	18 (30.0)	χ^2	0.0100*
Female (n = 56)	26 (46.0)	30 (54.0)		
Job during lockdown				
Yes (n = 30)	21 (70.0)	9 (30.0)	χ^2	0.1729
No (n = 86)	48 (55.9)	38 (44.1)		
Income before lockdown (INR per month)				
≤ 6000 (n = 7)	3 (42.9)	4 (57.1)	Fisher exact	0.4199
6001 to 10000 (n = 51)	27 (52.9)	24 (47.1)		
10001 to 15000 (n = 36)	25 (69.4)	11 (30.6)		
15001 to 20000 (n = 12)	8 (66.7)	4 (33.3)		
> 20000 (n = 10)	7 (70.0)	3 (30.0)		
Migration				
Residents (n = 51)	42 (82.0)	9 (18.0)	χ^2	0.0001*
Non-residents who stayed (n = 16)	10 (62.5)	6 (37.5)		
Non-residents who went home (n = 49)	20 (40.8)	29 (59.2)		
Source of medication				
Government-dispensary (n = 30)	23 (76.7)	7 (23.3)	Fisher exact	0.0000*
Private doctor (n = 3)	3 (100.0)	0 (0.0)		
Medical store (n = 49)	36 (73.5)	13 (26.5)		
Others (n = 26)	0 (0.0)	26 (100.0)		
Blood pressure monitoring				
Yes (n = 24)	21 (87.5)	3 (12.5)	Fisher exact	0.0043*
No (n = 52)	29 (55.76)	23 (44.24)		
Blood sugar monitoring				
Yes (n = 18)	12 (66.7)	6 (33.3)	χ^2	0.2956
No (n = 57)	30 (52.63)	27 (47.37)		

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BMI				
Underweight (n = 2)	1 (50.0)	31 (65.95)	Fisher exact	0.7000
Normal (n = 53)	29 (54.71)	8 (57.14)		
Overweight (n = 47)	1 (50.0)	16 (34.05)		
Obese (n = 14)	24 (45.29)	6 (42.86)		

'Others' included community health workers and relatives. *Significant at 0.05 level of significance.

Data presented in Table 5 show that the relationship between blood pressure monitoring and selected demographic variables like age group, gender, job during lockdown, income before lockdown, migration, and BMI was found to be statistically not significant at 0.05 level of significance.

Table 6 shows that the relationship between blood sugar monitoring and selected demographic variables like age group, gender, job during lockdown, income before lockdown, migration & BMI as computed using χ^2 test was found to be statistically not significant at 0.05 level of significance.

Table 5.Association between Blood Pressure Monitoring and Selected Demographic Variables (N = 76)

Variables	Blood Pressure Monitoring		Test	P value
	Monitored n (%)	Not Monitored n (%)		
Age group (years)				
≤ 30	0 (0.0)	0 (0.0)	Fisher exact	0.464
31-40	1 (9.1)	10 (90.9)		
41-50	9 (32.14)	19 (67.86)		
51-60	9 (47.37)	10 (52.63)		
≥ 61	5 (27.8)	13 (72.2)		
Gender				
Male	12 (30.77)	27 (69.23)	χ^2	0.981
Female	12 (32.43)	25 (67.57)		
Job during lockdown				
Yes	4 (18.2)	18 (81.8)	Fisher exact	0.196
No	20 (37.04)	34 (62.96)		
Income before lockdown (INR per month)				
≤ 6000	1 (12.5)	7 (87.5)	Fisher exact	0.496
6001 to 10000	9 (29.03)	22 (70.97)		
10001 to 15000	10 (41.7)	14 (58.3)		
15001 to 20000	2 (40.0)	3 (60.0)		
≥ 20001	2 (25.0)	6 (75.0)		
Migration				
Residents	9 (29.03)	22 (70.97)	Fisher exact	0.098
Non-residents who stayed	1 (14.3)	6 (85.7)		
Non-residents who went home	9 (28.12)	23 (71.88)		
BMI				
Underweight	0 (0.0)	1 (100.0)	Fisher exact	0.761
Normal	9 (27.27)	24 (72.73)		
Overweight	12 (37.5)	20 (62.5)		
Obese	3 (30.0)	7 (70.0)		

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Table 6.Association between Blood Sugar Monitoring and Selected Demographic Variables (N = 76)

Variables	Blood Sugar Monitoring		Test	P value
	Monitored n (%)	Not monitored for the entire period n (%)		
Age group (years)				
≤ 30	1 (100.0)	0 (0.0)	Fisher exact	0.441
31-40	2 (18.18)	9 (81.82)		
41-50	4 (16.67)	20 (83.33)		
51-60	5 (25.0)	15 (75.0)		
> 60	6 (31.58)	13 (68.42)		
Gender				
Male	10 (27.78)	26 (72.22)	χ^2	0.423
Female	8 (20.51)	31 (79.49)		
Job during lockdown				
Yes	5 (27.78)	13 (72.22)	Fisher exact	0.614
No	13 (22.81)	44 (77.19)		
Income before lockdown (INR per month)				
< 6000	0 (0.0)	6 (100.0)	Fisher exact	0.404
6001 to 10000	7 (21.88)	25 (78.12)		
10001 to 15000	9 (32.14)	19 (67.86)		
15001 to 20000	1 (20.0)	4 (80.0)		
> 20000	1 (25.0)	3 (75.0)		
Migration				
Residents	11 (34.38)	21 (65.62)	Fisher exact	0.389
Non-residents who stayed	0 (0.0)	8 (100.0)		
Non-residents who went home	6 (18.75)	26 (81.25)		
BMI				
Underweight	0 (0.0)	1 (100.0)	Fisher exact	0.650
Normal	9 (24.32)	28 (75.68)		
Overweight	7 (25.93)	20 (74.07)		
Obese	2 (20.0)	8 (80.0)		

Figure 1 depicts the amount of money spent on medication for hypertension and/ or diabetes mellitus. The average money spent on medication was between INR 501 and 1000.

Figure 2 depicts the source of medication during lockdown. Majority of patients got medications from medical stores (60%), followed by government dispensaries (30%), mohalla clinics (6%), and private doctors (4%).

Figure 3 shows medical care sought for clinical symptoms during lockdown. Only 14% of patients sought medical care sought for clinical symptoms during lockdown.

Figure 4 shows the health facility visited by study subjects during lockdown. Majority of patients (69%) visited government health facilities to seek medical care, followed by private hospitals (19%) and others (12%).

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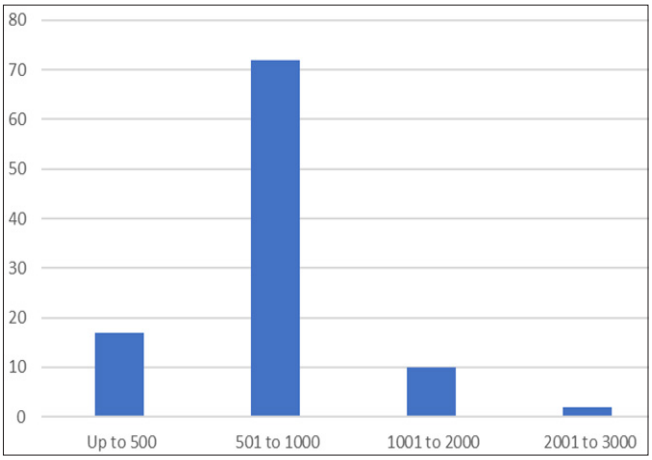

Figure 1.Money Spent on NCD Medication during Lockdown (N = 101)

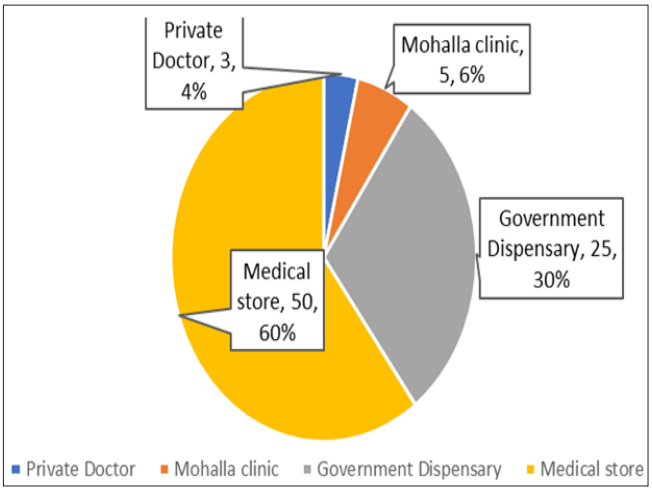

Figure 2.Source of NCD Medication during Lockdown (N = 83)

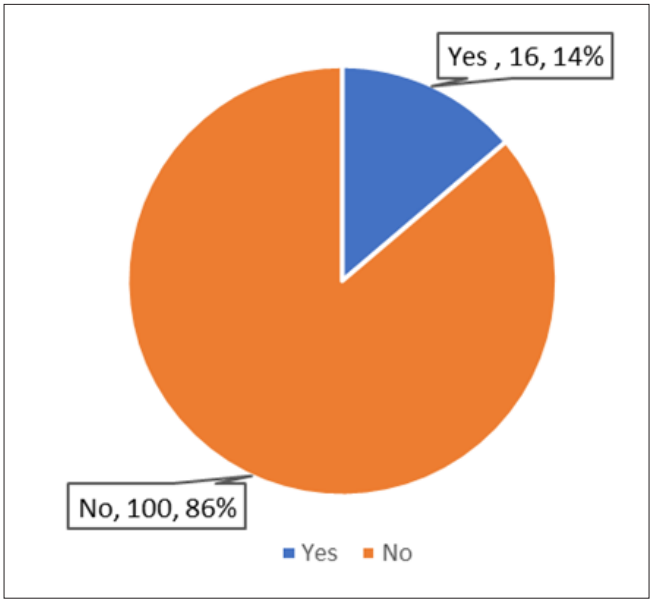

Figure 3.Medical Care sought for Clinical Symptoms during Lockdown (N = 116)

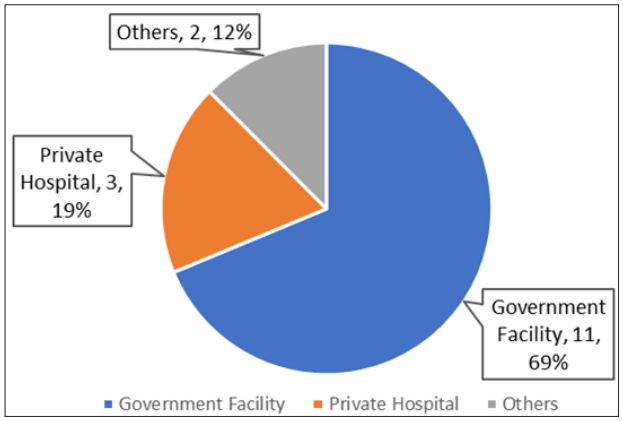

Figure 4.Health Facility Visited by Study Subjects during Lockdown (N = 16)

*Others include medical stores and quacks.

Discussion

Declaration of the COVID-19 pandemic and subsequent announcements of lockdown by the government adversely impacted the health of the people all over the world. The worst affected groups were the lower and middle-income populations around the world as all the available health resources were directed towards containing and managing the pandemic. The priority given to management of the pandemic diluted the focus on the regularity of monitoring the NCD patients. Since there is a possibility of another wave, there is a need for better preparation. The present study was planned keeping this purpose in mind.

While conceptualising the present study, we hypothesised that lockdown would impact treatment compliance and monitoring among patients receiving treatment for diabetes mellitus and hypertension. We observed that majority of patients managed to take treatment for the entire period of lockdown, still, the drug compliance of a large chunk, i.e., 40.5%, was compromised during the lockdown and of these non-compliant patients, almost one-third (31.91%) did not take treatment for the entire period of lockdown. Majority were able to adhere to treatment for only less than 15 and 30 days (27.65% and 25.53% respectively). The main reasons cited by patients for the inability to maintain medication compliance were financial followed by unavailability of medication due to lockdown.

Regular monitoring of blood pressure (BP) and blood sugar (BS) is an essential component in the management of NCDs. This aspect was compromised even more seriously during the lockdown. Less than one-third (31.6%) of hypertensive patients could manage to monitor their BP and less than one-fourth (24%) of the diabetics were able to monitor blood sugar levels during the period. These drugs and monitoring had been offered free of cost at the NCD clinic at the UHTC until the lockdown.

Among the few who could monitor their BP, half used

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the facility at a private clinic or at medical stores (29.1%). A small number (12.5%) were lucky to have the facility available at home or with a neighbour. Among one-fourth of diabetics who could monitor their BS, half had the facility at their own homes or that of a neighbour. Some (22.22%) could get it done at private clinics. A few could check at a medical store or at a mohalla clinic (16.66%). The benefit of having a BP and BS monitoring facility at home can be appreciated here. The contribution of private clinics and medical stores cannot be ignored. The participation of government dispensaries, some of which remained open seems to be limited to dispensing medication only as no association between BP or BS monitoring was seen with the source of NCD treatment. Similar findings were also reported in a study by Singh K et al and Kendzerska T et al.[4,5]

Studies in India and Africa have revealed the main reason for non-adherence to be the inability to procure drugs due to the imposition of lockdown and the inability of majority of patients to monitor their blood pressure and/ or glucose due to the same reason.[6,7]

Though the findings of the present study are not consistent with a study done by Bharali I et al. which shows that patients suffering from diabetes were regularly taking their medication and majority of them took extra care of health during the lockdown, this contradiction may be explained by the fact that many patients in that study were residents, whereas a majority of the participants in the current study were migrants who were in Delhi for their livelihood. The residents were more compliant with medication as compared to the migrants.[8] Some reports have revealed that people were on the roads without money and access to health services which affected the routine medication and monitoring in case of chronic and non-communicable diseases.[9]

In this study, most of the patients who were able to monitor their blood pressure and blood glucose relied on neighbours and medical shops, those who visited dispensaries and private doctors reported that the facility of monitoring was closed and only medicines were dispensed from these facilities.

The compromise in monitoring of blood pressure and blood sugar was similar across genders, migration status, and earnings during the lockdown. It can be observed here that the patients who were trying to monitor their BP were likely to be drug compliant too. This brings out a need for wider availability of monitoring facilities for NCD patients, which they can depend upon even during lockdowns.

Only a small percentage (14%) of participants sought health services for any clinical symptom during the lockdown. Other studies also reported a 31.01% to 70% drop in health-seeking behaviours of patients.[9,10] This could be due to the fear of contracting COVID-19 during hospital visits and the fear of becoming a source of infection for other members of the family. A study done in the state of Orrisa showed that the majority of patients were unable to undergo routine investigations and monitoring and did not have access to pharmacy, as patients faced trouble in getting doctor's appointments as well as emergency treatment during the lockdown. Fear of contracting COVID was also reported.[11]

In a study by Verma M et al., although a significant improvement in medication adherence was found, there was a reduction in the frequency of monitoring in one-fifth of the patients, which is similar to the findings of the present study.[12]

Migration and source of medication were significant factors which impacted compliance among study participants, as migration and lockdown both adversely impacted access to medicines and healthcare for people.

The relationship of treatment compliance with the source of medication was found to be highly statistically significant. People who got medication from government dispensaries were less compliant in comparison to the people taking medicines from private clinics but the number of patients attending private clinics was very small.

The relationship of gender with treatment compliance was statistically significant and male participants were more adherent to treatment than females, which may be due to various gender-specific economic and socio-cultural reasons which give more importance to the health of male counterparts than female.[13]

Limitations

This study was conducted on a sample of patients visiting a single urban healthcare centre, so the results may not be representative of the entire population. Since participants were contacted telephonically, the possibility of recall bias remains even as the researchers tried to verify the information from reliable sources like close relatives and spouses of participants. As the data were collected telephonically, researchers were not able to evaluate the blood sugar and blood pressure of participants which may have been indicative of treatment compliance during the lockdown.

Conclusion

Medication adherence among patients suffering from diabetes mellitus, hypertension or both was considerably affected by the imposition of lockdown due to the COVID-19 pandemic. BP and BS monitoring were even more compromised. Health-seeking behaviour for other diseases was also adversely impacted. Migration, source of medication, and gender were significant factors impacting the adherence to medication during the lockdown, whereas

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monitoring of BP and BS was compromised across all variables.

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Conflict of Interest: None

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