Lifestyle and behavioral changes during nationwide lockdown in India—A cross-sectional analysis

Vishwambhar Singh[1], Pankaja Raghav[3], Garima Singh[3], Pritish Baskaran T. B[3], Anil Bishnoi[4], Vedangi Gautam[5], Ashvanee Kumar Chaudhary[1], Ashutosh Kumar[2], Sagar Kumar[2], Suraj Sahu[2]

[1]Department of Otorhinolaryngology, [2]MBBS Student, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, [3]Department of Community Medicine and Family Medicine, AIIMS, Jodhpur, Rajasthan, [4]Departments of Forensic Medicine and Toxicology and [5]Community Medicine, Dr. Sampurnanand Medical College (SNMC), Jodhpur, Rajasthan, India

ABSTRACT

Introduction: After almost two months of reporting the first case of the novel coronavirus disease (COVID-19) in the country, the nationwide lockdown in India was initiated on 24th of March 2020, to curtail the spread of the SARS-CoV-2 infection in the country. While this lockdown had been in place for almost 3 months, the people of the nation have experienced changes in their routine lives in a wide range of activities, including personal behaviours. This study was conducted to identify the impacts that the lockdown had on the lifestyle and behavioural aspects of Indians during the lockdown. **Methods:** It was a cross sectional study, conducted by online survey. Data collection was done for the period of 3 months. **Results:** The study found that a huge number of participants had significant changes in their diet, sleep, bowel habits and also their personal traits. Also, the lockdown had improved interpersonal relationships and helped people explore their hobbies or even acquire a new skill (about 25% of the participants). More than 90% of the participants perceived decrease in air pollution and a majority reported increase in personal hygiene (74.2%), perceived decrease in crime rates (67.3%) as benefits of lockdown. **Conclusions:** It would be recommended to include variables to screen for mental health issues among the general population.

Keywords: COVID-19, nationwide Lockdown, behavioural and lifestyle changes

Introduction

The nationwide lockdown in India was announced on 24th of March, 2020, to curtail the spread of the SARS-CoV-2 infection in the country. Following a 14-h voluntary public curfew (*Janta curfew*) on 22nd March, series of regulations were enforced in the country's COVID-19 affected regions. Uninhibited spread of the virus led to extension of the lockdown to four phases, spanning for almost 3 months. During this period, the people of the nation have experienced changes in their routine lives in a wide range of activities, including personal behaviors.

Phased re-opening of areas outside the Containment Zones began from the month of June 2020.[1] The Ministry of Home Affairs began releasing the "Unlock Guidelines" at the end of every month since May 2020, to guide the States in re-opening of institutions, amenities, places of religious interest, and hospitality services. The Phase I re-opening included resumption of activities in places of religious interest, hospitality services, and shopping malls, while educational institutions were planned to be reopened in Phase II. Though Phase II was planned in the month of July, 2020, an SOP

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for the voluntary re-opening of schools from classes 9 to 12 were given by the MHA only in the month of September, 2020. The final phase (Phase III) of unlocking, which included international air travel, metro rail, amenities such as cinema halls, entertainment parks, auditoriums, gymnasiums and congregations or assemblies, depended on the assessment of situation following the resumption of activities in the two phases. However, the ultimatum to "unlock" rested with the respective State Governments. While a majority of the States have resumed activities in almost all the sectors, some States like Maharashtra and Kerala have imposed restrictions again, for activities and travel, considering a spike in the number of cases and deaths.[2] Therefore, there has also been a variability in the resumption of activities among the Indian population, furthering the heterogeneity in the routine lives of the individuals across the nation.

This study was conducted to identify the lifestyle and behavioral changes of Indians during the nationwide lockdown and to explore the perception of individuals towards various aspects of the COVID-19 pandemic and lockdown.

Material and Methods

It was a cross-sectional study in which a structured questionnaire was created using the Google Forms and was circulated via social media (WhatsApp, Facebook) to individuals and groups and also, the link to the survey form was shared through text messages and personal mails to known personal and professional contacts. There was no restriction placed for inclusion based on any criteria. The data collection was carried out for a period of 3 months from the subjects who voluntarily chose to participate in the survey.

The primary outcome was to identify changes in the lifestyle and behavioral aspects of the individual across the nation during this lockdown. Since the questionnaire was circulated via online platform and the data collection was time-bound, all the participants who responded to the online questionnaire were enrolled in the study. All the data were statistically analyzed to identify if there were significant changes in lifestyle and behavioral patterns of the sample population.

Results

The results of the study are compiled under four headings
- Sociodemographic details of the participants
- Self-reported status of medical problems
- Behavioral and lifestyle changes observed during the lockdown
- Perception toward the COVID-19 pandemic and the lockdown

Sociodemographic details of the participants

A total of 1,251 individuals across the nation participated in the online survey. The data was tested for normality using the *Shapiro–Wilk test* and it was observed that it was not normally distributed. The median age of the participants in the study was 26 years (19 years - IQR) (Mean ± SD = 31.71 ± 13.5 years)

Table 1 describes the sociodemographic details of participants. Majority of the participants were males (883, 70.5%). More than half of the participants (735, 58.8%) belonged in the age group of 18–30 years. One-third participants were students from streams other than medical sciences (419, 33.5%). Also, it can be observed that almost three-quarter participants (887, 70.9%) are at present occupied by "work from home."

Self-reported status of medical problems

Questions on self-reported status of non-communicable diseases (diabetes and hypertension) were asked among the participants and the following results were obtained. Also, the participants were asked to report on gastro-intestinal and respiratory symptoms experienced.

Table 2 shows the distribution of self-reported hypertension and diabetes mellitus among the participants. About 10% of the individuals (132, 10.6%) were suffering from hypertension while only 5% (65, 5.2%) of the participants were diagnosed

Table 1: Socio-demographic variables of participants

	Frequency (*n*)	Percentage
Age (*n*=1251)		
<18 years	7	0.5
18-30 years	735	58.8
31-50 years	361	28.9
51-65 years	124	9.9
>65 years	24	1.9
Gender (*n*=1251)		
Male	883	70.5
Female	368	29.5
Occupation (*n*=1251)		
Medical students (UG and PG)	199	15.9
Students from other streams	419	33.5
Doctors	313	25.0
Professionals from other streams	290	23.2
Retired	20	1.6
Homemaker	10	0.8
"Work from Home" - in the present scenario*	887	70.9

*Among all participants (*n*=1251) who responded to the survey

Table 2: Self-reported status of medical problems among the participants

Variable	Frequency (*n*)	Percentage
Non-communicable diseases		
Hypertension	132	10.6
Diabetes mellitus	65	5.2
Symptoms (gastrointestinal and respiratory)		
Constipation	96	7.8
Heartburns	94	7.5
Diarrhoea	39	3.1
Respiratory symptoms	93	7.4

with diabetes mellitus. A small percentage of participants also reported an increase in gastro-intestinal symptoms such as constipation (7.8%), heartburns (7.5%), and diarrhea (3.1%) and also respiratory symptoms (7.4%)

As observed from Figure 1, difference in blood pressure measurements among participants (*n* = 177) before and during the lockdown was not significant.

As observed from Figure 2, difference in random blood sugar levels among participants (*n* = 100) before and during the lockdown was not significant.

Behavioral and lifestyle changes observed during lockdown

The following tables and description illustrate various personal behavioral and lifestyle changes experienced by individuals during the lockdown through a series of questions.

Table 3: Sleep cycle before and during the lockdown (*n*=1245)

	During Lockdown		Total	Mc Nemar's Chi square	P
	Irregular	Regular			
Before Lockdown					
Irregular	101	77	178	145.823	<0.001
Regular	318	749	1067		
Total	419	826	1245		

Table 4: Sleep duration before and during the lockdown (*n*=1251)

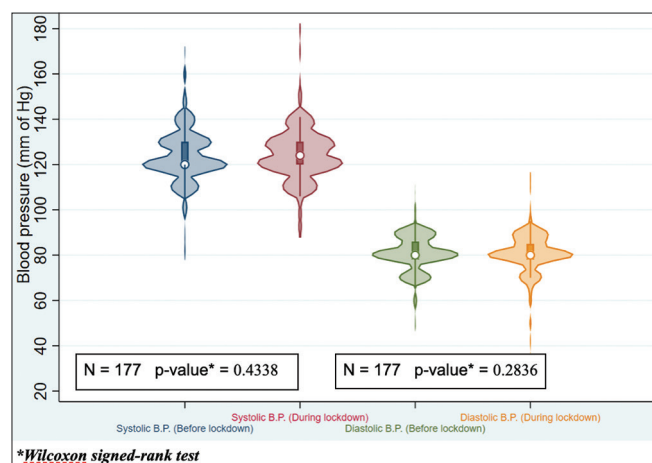| Sleep duration (n=1250)	Before Lockdown		During Lockdown		P
	Frequency	Percentage	Frequency	Percentage	
<6 h	183	14.6	101	8.1	<0.001*
6-8 h	923	73.8	594	47.5	
8-10 h	131	10.5	465	37.2	
>10 h	13	1.1	90	7.2	

*Wilcoxon signed rank test

i. Sleep pattern and duration
The lockdown has significantly altered the pattern of sleep cycle among the individuals which is evident from the Table 3. One-fourth participants (318, 25.4%) reported worsening of their sleep cycle, whereas 77 participants (6.2%) reported improvement in their sleep cycle.

As evident from the Table 4, the sleep duration among majority of the individuals has significantly increased during the lockdown as compared to the duration of sleep before lockdown.

ii. Changes related to diet, alcohol use or smoking, and BMI
As is mentioned in the Table 5, more than half the participants (653, 52.2%) had changes in their food intake with more than one-third (472, 37.7%) experiencing an increased intake. On the other hand, two-third participants (763, 61.0%) had no change in their BMI. It is observed that among 90% of the respondents (*n* = 477), there has been no change in the behavior related to alcohol use and smoking, but only about 3% of the respondents reported an increased use during the lockdown.

Table 6 depicts the changes in the bowel habits before and during the lockdown, which was found to be statistically significant with deterioration in about 8% of the participants (103, 8.2%) and improvement in about 3% (42, 3.4%).

Among the physiological changes in the body during lockdown, a statistically significant number of the participants reported changes in their pattern of sleep cycle, and bowel habits during the lockdown (*P* value < 0.001)

iii. Changes in personal attributes and daily activities during the lockdown
Figure 3 depicts changes in personal attributes and daily activities among the participants. Among the changes in personal attributes reported by the individuals, a majority expressed an increase in laziness (758, 60.6%) followed by irritation (444, 35.5%) during the lockdown.
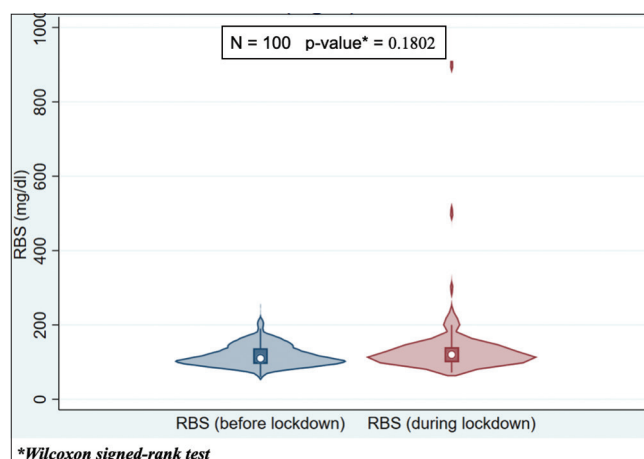

Figure 1: Distribution of Blood Pressure values before and during the lockdown

Figure 2: Distribution of RBS values before and during the lockdown

## Table 5: Changes in food intake and BMI during the lockdown

Variable	Frequency (n)	Percentage
Effect on food intake during lockdown (*n*=1251)		
Remains same	598	47.8
Decreased	181	14.5
Increased	472	37.7
Change in BMI during lockdown (*n*=1251)		
Remains same	763	61.0
Decreased	173	13.8
Increased	315	25.2
Effect on alcohol and smoking status during the lockdown (*n*=477)		
Remains same	431	90.4
Decreased	32	6.7
Increased	14	2.9

Table 6: Bowel habits before and during the lockdown (n=1245)

	During lockdown		Total	Mc Nemar's Chi square	P
	Irregular	Regular			
Before lockdown					
Irregular	91	42	133	25.66	<0.001
Regular	103	1009	1112		
Total	194	1051	1245		

Table 7: Impact of lockdown on interpersonal relationships

Variable (n=1251)	Frequency (n)	Percentage
Increased incidence of domestic violence		
In your family	44	3.5
In neighbouring	68	5.5
Both (family and neighbourhood)	13	1.0
Not observed	1126	90.0
Personal relationship with family members		
Better than earlier	507	40.5
No change	670	53.6
Family fights	74	5.9
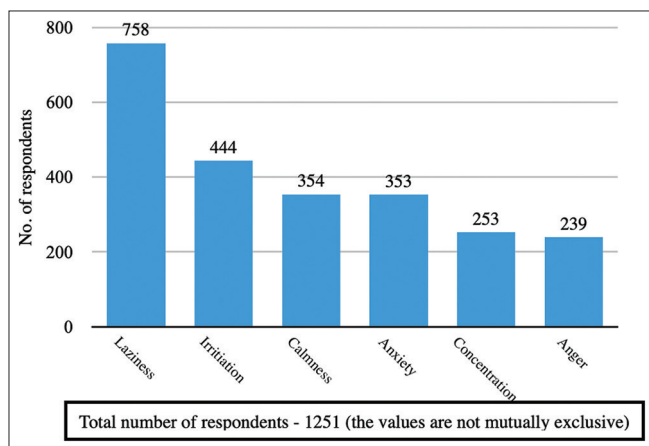
The bar chart in Figure 4 describes the activities that the participants had increasingly spent time on during the lockdown. A majority of the participants reported increased amount of time spent on mobile phones (946, 75.6%) and televisions (530, 42.4%) during the lockdown.

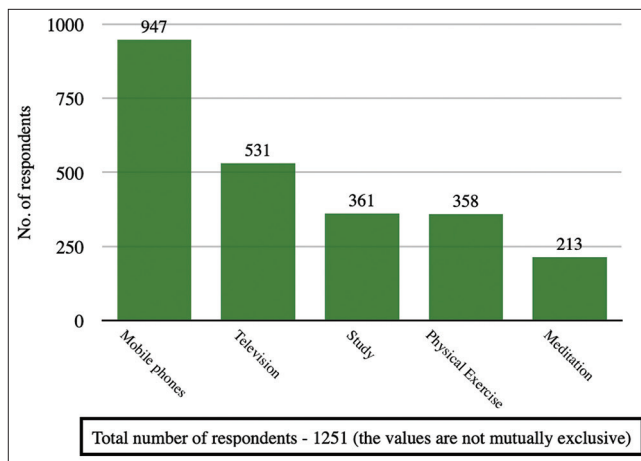*iv. Impact of lockdown on interpersonal relationships*
Although one-tenth participants (125, 10%) reported an increase in domestic violence in family or neighborhood or both, two-fifths (507, 40.5%) reported an improved familial relationship compared to the pre-lockdown times. A paltry subset of the participants (74, 5.9%) experienced an increase in fights or arguments among family members, as clearly depicted in the Table 7.

Perception toward the COVID-19 pandemic and the lockdown

The participants of the study were questioned on various aspects related to the COVID-19 pandemic to perceive their awareness regarding the disease, the control measures, the steps taken by the government. Also, the study tried to explore the perceived pros and cons of the nationwide lockdown.

Figure 5 describes the perceptions of the individuals toward COVID-19. More than 90% of the participants (1191, 95.2%) were aware of signs and symptoms of the COVID-19 disease, while only about two-third participants (817, 65.3%) had known or heard the term "pandemic" before COVID-19. The study also revealed that more than four-fifths (1028, 82.2%) of the participants were satisfied with the current steps taken by the government to mitigate the COVID-19 pandemic situation, while a meagre 3% were not aware of the same. Around two-third participants (856, 68.4%) also reported to have been affected by the spread of fake news related to COVID-19 on social networking platforms such as Facebook, Twitter, or WhatsApp.

The "almost 3 month" lockdown inculcated opinions and views among the individuals, which this study explored by a series of

Figure 3: Number of respondents who experienced an increase in certain behavioral factors during the lockdown

Figure 4: Activities that the participants had increasingly spent time during the lockdown

questions. The participants were asked to report on the perceived benefits of the lockdown, acquisition of a new skill and changes in the monthly expenditure during the lockdown. The findings are summarized in the table below [Table 8]

Among the perceived benefits of the lockdown, more than 90% perceived a decrease in air pollution, as is observed from the Table 8. Also, participants perceived decrease in crime rates and use of alcohol or drugs. On a positive note, people believed that the lockdown had relieved them from stressful jobs (593, 47.4%) and junk foods (972, 77.7%), and also increase in personal hygiene (928, 74.2%). Also, cooking was the skill that almost half the participants (576, 46%) opted during the lockdown, followed by an increased in writing, meditation, and drawing or painting. It can also be seen that almost half the participants (557, 44.5%) have cut down on their monthly expenditures, while a few (162, 13%) have reported an increase in the expenditures.
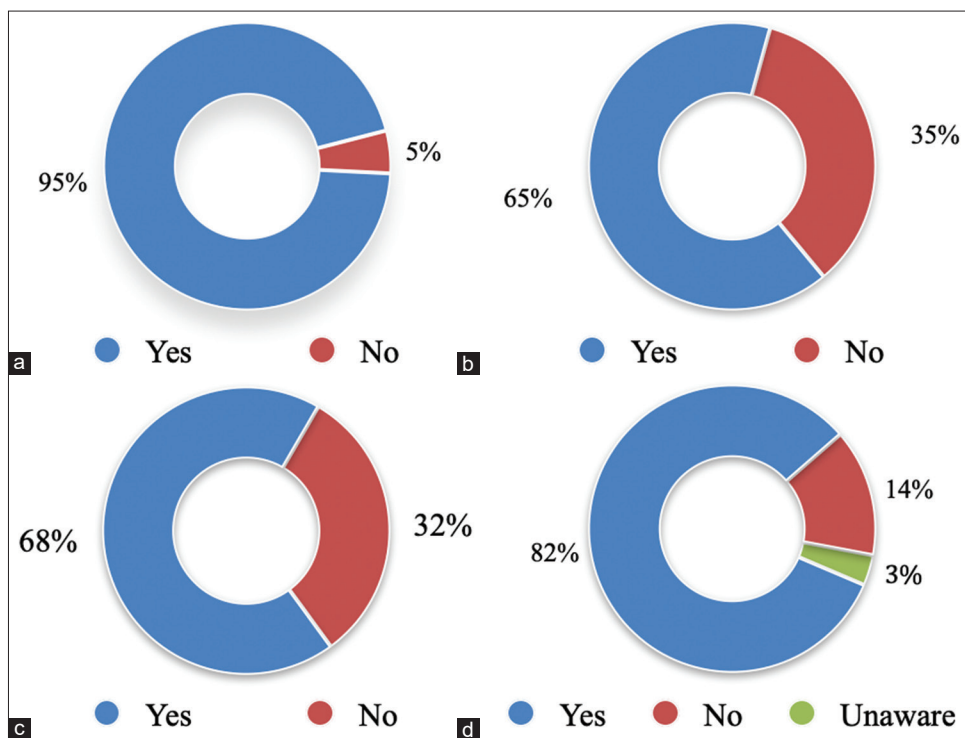
Discussion

The present cross-sectional study with a sample size of 1,251 participants (70.5% were males) across the nation was conducted as an online survey to study the behavioral and lifestyle changes during lockdown using a semi-structured questionnaire created in Google forms. The age group of majority of the participants in the study were between the 2nd and 3rd decade. As most of the internet users in India are in this age group, it is not surprising to have observed this majority in the study. Similar distribution of age groups were found in other studies too, which were conducted through online surveys[3] By occupation, more than three-fourth participants were students or doctors. This could be due to the fact that the survey was initiated and distributed by the medical students, not to forget the predominant age group in the study (18—30 years age group). As expected, by the demographically young profile of the participants, most of the participants had no history of diabetes and hypertension or any other gastrointestinal or respiratory symptoms. Such

Table 8: Self-reported benefits of the lockdown

Variable (*n*=1251)	Frequency (*n*)	Percentage
Perceived benefits of the lockdown		
Perceived decrease in air pollution	1157	92.5
Relief from junk food	972	77.7
Increase in personal hygiene	928	74.2
Perceived decrease in crime rates	842	67.3
Perceived decrease in alcohol and drug abuse	690	55.2
Relief from stressful job	593	47.4
Acquisition of a new skill		
Cooking	576	46.0
Writing	181	14.5
Meditation	269	21.5
Drawing and painting	91	7.3
Changes in the monthly expenditure		
Remains same	532	42.5
Decreased	557	44.5
Increased	162	13.0

The values are not mutually exclusive

Figure 5: Pie chart showing (a) awareness of signs and symptoms of COVID-19 among participants (b) awareness of the term 'pandemic' before COVID-19 among participants (c) participants affected by the spread of fake news about COVID-19 (d) participants' satisfaction with government measures to control COVID-19

symptoms and chronic illness were reported by only a few of the participants. A statistically significant change in the blood sugar values during the lockdown was documented in our study, though only a few participants reported the same. Some studies which were conducted in India such as Ghosal S *et al.* and Khader MA *et al.*[4] have reported different results with significant difference in the blood sugar values during lockdown.

Our study identified a significant improvement in the pattern as well as duration of sleep among the participants, which is similar to the findings by Renzo DL *et al.,*[5] but in contradiction to the findings of the study by Cancello R *et al.*[6] The probable reasons for a difference in findings can be attributed to the differences in the sociodemographic details of the participants between the two studies.

In our study, it was found that a predominant number of participants reported changes in their food intake during lockdown predominantly on the higher side. Similar reports have been found in studies done by Renzo LD *et al.*[5] in Italy. The study conducted by Chopra S *et al.*[3] and Ruiz-Roso MB *et al.*[7] also reported a decrease among participants in the consumption of fast food, which was reported as a perceived benefit of the lockdown in our present study. Our study reports a significant improvement in the bowel habits during the lockdown, which can be due to the preference for healthy home-cooked foods and also the non-availability of junk or unhealthy foods from outside, during the lockdown.

While a substantial increase in use of alcohol and smoking has been demonstrated in studies by Cancello R *et al.,*[6] and Stanton R *et al.,*[8] our current study shows increased alcohol use and smoking only among a meagre 3% of the participants. This discordance in findings can be because of the fact that the government had imposed a full lockdown of all shops, except the essential services, thereby making it difficult for the people to procure alcoholic beverages or tobacco products. One another reason could also be because of irregular income of people during the lockdown, thereby making these products unaffordable. The government had also imposed upon these products an additional taxation, making it costlier than usual.

Lockdown measures and mobility restrictions were found to be effective to control the spread of COVID-19, but from an individual's perspective, it had some harmful consequences too, as majority of the participants reported an increase in their BMI, which could be because of increase in their food intake during lockdown, exacerbated by decrease in their physical activity considering the mobility restriction during lockdown and the scenario of "work from home" which was reported by 70.9% of participants in our present study. Most of the studies done worldwide [Ruiz-Roso MB *et al.*[7] and Ingram J *et al.*[9]] and in India [Chopra S *et al.*[3]] have concluded with similar findings.

The present study has also brought an insight into the changes in personal attributes during the lockdown. Overall, 60.6% of

individuals reported increase in laziness followed by increase in irritation, anxiety and anger, which is in concordance with the findings of a similar study by He M *et al.*[10] and Chopra S *et al.*[3] Psychological symptoms (stress, anxiety, depression) have been shown to rise in lockdown in the study conducted by *Ozamiz-Etxebarria et al., 2020*[11]

On a positive note, the lockdown has increased the family time, thereby contributing to an improved familial relationship during the lockdown than before, as reported by the participants. Also, most of the participants reported that their financial expenditure decreased during lockdown, which could be due to the closure of the markets and restaurants and unavailability of other amenities which might 'burn a hole' in the pockets of an earning individual. It has also been reported by almost half the participants that the lockdown has cut down their monthly expenditures.

The proportion of people spending their leisure time in the mobile phones (75.6%) and televisions (42.4%) have also increased, which is more than the increase screen time (49%) reported in a similar study done in Poland by *Gornicka M et al.*[12] Increase in screen time was also reported by study conducted by Chopra S *et al.*[3] But at the same time, the lockdown has given a chance for the individuals to explore their hobbies such as drawing or painting or to acquire a new skill that could be productive such as cooking.

There has been an increase in various lifestyle and behavioral factors among individuals, such as sleep duration with irregular pattern, alcohol and tobacco usage, food intake and BMI. Also, self-reported increase in laziness, screen-time and irritation implies that a sedentary and stressful lifestyle is on the rise. Despite being just behavioral changes, these factors are also proven risk factors for non-communicable diseases like diabetes and hypertension. Thus, in the fight against an infectious disease, the rise in risk factors for the NCDs have come as a collateral damage. These findings emphasise the need to incorporate strategies and strengthen services by primary care physicians to keep the rise of NCDs under check, along with the activities undertaken for control of COVID-19.

Conclusion

The study having been conducted through an online survey, warrants to take into consideration the selection bias as evidently seen by the sex ratio and age profile of the participants (most of them were males, with the age group of 18–30 years.). Also, as the variables assessed in the study were self-reported, response and recall bias cannot be overlooked. The study has not explored the mental health issues that could also have probably had an effect on these lifestyles and behavioral changes during the lockdown. Hence, in the future studies, it would be recommended to include variables to screen for mental health issues among the general population.

Conflicts of interest

There are no conflicts of interest.

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