

An Internet-based study on the impact of COVID-19 pandemic-related lockdown on migraine in India

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Objectives: To assess the impact of lockdown during the COVID-19 pandemic on migraine patients in India on disease activity, healthcare accessibility, and quality of life (QoL).

Materials & Methods: This internet-based survey study using a structured questionnaire was conducted from 27th April to 31st July 2020. Previous physician-diagnosed migraine patients or those fulfilling any two of three clinical features (limitation of activities for >1 day, associated nausea or vomiting, and photophobia or phonophobia) were diagnosed as migraine patients. QoL was captured using a Likert scale and determinants of poor QoL were identified by logistic regression.

Results: A total of 4078 persons completed the full survey out of which 984 (24.1%) had migraine (mean age 35.3 ±11.2). Compared to pre-lockdown, 51.3% of migraineurs reported worsening of their headaches in terms of increased attack frequency (95.6%), increased headache days (95%), increased attack duration (89.9%) and increased headache severity (88.1%). The worsening was attributed to anxiety due to the pandemic (79.7%), inability or difficulty to access healthcare (48.4%) and migraine medicines (48.9%), and financial worries (60.9%). 26.8% of migraineurs reported poor QoL compared to 7.37% of non-migraineurs [$p < 0.0001$]. Migraine affected QoL in 61.4% of migraineurs. The predictors of poor QoL on logistic regression included worsening migraine during the lockdown (AOR 4.150; CI 2.704- 6.369) and difficulty accessing migraine medicines (AOR 4.549; CI 3.041- 6.805). Employment as an essential COVID-19 worker (AOR 0.623; CI 0.409- 0.950) protected against poor QoL.

Conclusions: COVID-19 pandemic-related lockdown greatly impacted migraine patients in India which significantly reduced their QoL.

KEYWORDS

access to health care, COVID-19, lockdown, migraine, preventive treatment, quality of life

1 | INTRODUCTION

SARS CoV-2 emerged as a new pathogen for severe acute respiratory syndrome in Wuhan, China during December 2019. This virus then spread rapidly throughout the world. WHO declared novel

coronavirus disease 19 (COVID-19) due to SARS CoV-2 as a pandemic on March 11, 2020. India, like many other countries in the world, has been greatly impacted by the COVID-19 pandemic. The Government of India declared its first nationwide lockdown as a preventive measure against the COVID-19 pandemic from March 25,

2020 to May 31, 2020.¹ India had one of the strictest lockdowns in the world during this period. Subsequently, the lockdown restrictions were partially eased at the start of every month, from June 1, 2020 with a gradual unlocking process and restricted containment zones in various parts of the country.

Many chronic medical conditions have been greatly impacted due to lockdown during the COVID-19 pandemic.^{2,3} Migraine, a highly disabling chronic neurological disorder, is also likely to be impacted as well. This could be due to multiple reasons such as increased anxiety, fear of contracting the COVID-19 infection, difficulty in accessing health care and medications, and financial worries as a result of economic slowdown.⁴ Contrarily, amelioration of some of the stressors like everyday travel to work, spending more time with family, and flexibility of planning and scheduling the work from home (especially for persons living in cities) might have contributed to decreasing migraine attacks.^{5,6}

It has been estimated that approximately 14.7% of the world's population suffer from migraine.⁷ In India, however, a recent epidemiological study has shown a higher 1-year prevalence of 25%.⁸ The impact of the COVID-19 pandemic and subsequent lockdown on patients with migraine has been documented in various parts of the world.^{4-6,9-11} Various countries in the world have tried to cope up with this situation by providing health care using telemedicine which has been strongly advocated.^{12,13} The impact of the lockdown and the coping strategies adopted by the migraineurs in India is not known. We, therefore, aimed to assess the impact of lockdown on Indian migraine patients during the COVID-19 pandemic in terms of change in the disease activity, accessibility to health care, and whether migraine affected their quality of life (QoL) through an Internet-based survey, as the physical survey was not possible due to lockdown as well as pandemic fears.

2 | METHODS

We recruited participants aged 18 years and above from April 27, 2020 to July 31, 2020 using a specifically designed questionnaire for this Internet-based survey study. The online survey open access link was shared through various social media platforms such as SMS, WhatsApp application, and E-mails with doctors, neurological associations (local and national), patient groups, nursing groups, and the general public for dissemination. The survey was undertaken in two languages, namely Hindi and English, and consisted of 50 questions. The English version was launched on April 27, 2020 whereas the Hindi version was launched on May 5, 2020. No personally identifiable information was collected and the survey was totally anonymous. The study was approved by the Ethics Committee of G B Pant Institute of Post-graduate Medical Education and Research, New Delhi, India. The study follows the tenants of the Declaration of Helsinki.

The questionnaire was divided into five sections (Appendix S1). The demographic section asked questions on age, gender, occupation, marital status, habitation, the region in India, and status as

an essential care worker for COVID-19 (doctor/nurse/paramedic/press/police/defense). Section 2 was for screening for migraine and a diagnosis of migraine was made if the participants confirmed that they suffer from recurrent headaches and additionally fulfilled either of the following criteria: (a) those who reported that they have already been diagnosed as suffering from migraine by a physician previously; (b) Those with recurrent headache who had any two of these limitation of activities for a day or more, nausea or vomiting during the headache, and photophobia or phonophobia.¹⁴ Rest of the participants who did not complain of recurrent headaches or fulfill the criteria for diagnosis of migraine were considered as participants without migraine and were asked only one more question regarding their QoL during the past month. Section 3 comprised of questions on characteristics of migraine-like migraine days/month, duration, severity, and use of acute and prophylactic medications for migraine before the COVID-19 pandemic and lockdown. In the fourth section, the participants were asked about the impact of the COVID-19 pandemic and lockdown on their migraine headaches in terms of the above parameters of disease activity and the reasons for the changes if any. In the fifth section, the participants were asked questions regarding the impact of the COVID-19 pandemic and lockdown on their ability to access health care and medications, the reasons for difficulty for such access if any; management of headache episode during the lockdown; their QoL during this period and if their headaches affected their QoL. Participants without migraine were asked only one more question after section 2 regarding their QoL during the past month. QoL was captured using a Likert scale (very good/good/average/bad/very bad).

The primary outcome measure was the impact of COVID-19 pandemic and lockdown on qualitative changes in attack frequency, headache days/last month, headache attack duration, and severity. Secondary outcome measure included QoL during the past 1 month that was compared between participants with and without migraine.

Demographic characteristics were summarized using descriptive statistics. Categorical data were summarized as frequencies and percentages. Continuous data were summarized as means. Post hoc, the 5 response Likert scale for QoL was converted into two categories namely "good" (which included very good/good/average responses) and "poor" (which included bad/very bad responses) for comparison. The categorical variables were compared using the chi-square test (with Yates correction) and OR, upper and lower CI, and *p* values were estimated. Continuous variables were compared using an independent sample Student *t*-test. For assessing the determinants of QoL, initially, univariate analysis was done by comparing the independent variables with QoL as the dependent variable. All statistically significant variables were then entered into the multivariate logistic regression model to explore the factors that were independently associated with poor QoL. The level of significance was set at $p < .05$. Data were analyzed using SPSS statistical software version 21. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions. Only the parameters detailing the impact of lockdown on migraine headaches, accessibility to

health care, and quality of life are analyzed in this paper. The rest of the data will be presented in a separate paper later.

3 | RESULTS

A total of 5694 persons registered for the survey, of which 4078 completed the full survey. 2109 participants responded in Hindi and 3585 responded in English. Of those who completed the survey, 1473 participants complained of recurrent headaches and 2605 participants did not have recurrent headaches. Nine hundred eighty-four participants (24.1% of all respondents and 66.8% of those with recurrent headache) were diagnosed with migraine and 489 had other headaches (not identified by the questionnaire). Among the migraineurs, 819 (83.2%) participants were diagnosed with migraine by physicians and 165 (16.8%) participants were diagnosed by self-reported symptom complex. Among the latter group, 144 had limitation of activities for a day or more with their headaches, 111 had nausea or vomiting during the headache, and 125 had photophobia or phonophobia.

Among the migraineurs, 347 were males (35.30%) as compared to 68.8% males among 3094 participants without migraine. The mean age of the participants with and without migraine was 35.32 ± 11.16 and 32.51 ± 11.44 years, respectively. Overall, the study participants represented a wide range of occupations, regions of the country (though predominantly from North India) with a dominance of people residing in a metropolitan city. The demographic details of the participants have been depicted in Table 1.

Before the lockdown, the mean number of migraine days per month in participants with migraine was 7.24 ± 5.84 (median = 5; range = 0.5–30). Almost all the participants (98.4%) were aware of the COVID-19 pandemic.

During the lockdown, 505 (51.3%) participants reported worsening of their migraine, whereas 106 (10.8%) were unsure. Among those who reported worsening, increased attack frequency, headache days, headache attack duration, and headache severity were reported by 483 (95.64%), 480 (95.05%), 454 (89.90%), and 445 (88.12%) participants, respectively. The majority of these migraineurs (430; 85.1%) felt that the worsening of their headache was related to the lockdown. The reasons cited were anxiety because of the spreading COVID-19 pandemic by 343 (79.77%), financial worries/fear of loss of job/less salary by 262 (60.94%), inability to go out for relaxation by 223 (51.6%), and inability to access healthcare by 210 (48.84%). 193 (44.88%) migraine participants had difficulty or were unable to get acute/preventive medications because of lockdown that led to worsening of their headaches (Table 2).

Among the migraineurs, only 278 (28.25%) had access to a doctor for their headache during the lockdown through personal visits (40.6%), telephone/mobile (53.6%), chatbox (10.8%), SMS (9.3%), videoconferencing (6.8%), and via email (2.9%). Most of them (86%) were however satisfied with remote consultation. The reasons cited by participants for not being able to access their doctors were inability to contact the doctor (5.9%), closure of clinic (4.5%), the doctor

not providing a consultation without a personal visit (1.3%), lack of transport (50.3%), and fear of contracting the disease in a doctor's clinic (38%).

On the issue of access to medications for migraine (both preventive and acute relief) during the lockdown, 505 (51.3%) participants stated that there was no interruption in the access at any point of time, 416 (42.28%) could access with some difficulty. 63 (6.4%) participants did not have access to medications forcing them to use other alternatives remedies—60.3% took rest and slept during their headaches, 31.3% used balm/oil, and 36.5% used other household remedies. During the lockdown period, 446 (47.36%) participants had at least one episode of severe headache that did not resolve with usual medications and lasted for days (Table 3).

A comparison of the quality of life during the previous month showed significant ($p < .0001$) differences between those with migraine and those without—very good (9.04% vs. 19.72%), good (26.8% vs. 38.04%), average (37.3% vs. 34.9%), bad (24.2% vs. 5.6%), and very bad (2.6% vs. 1.71%) (Figure 1). A total of 604 (61.39%) participants with migraine opined that their migraine affected their quality of life (QOL) during the past 1 month (Figure 2).

The determinants of poor QoL by univariate analysis were female sex, married status, those who were employed, and those with a monthly headache frequency of ≥ 15 days (pre-lockdown), those who were using a preventive medication, those who reported worsening of their migraine, and those who had difficulty or did not have access to doctors and medications during the lockdown. Those employed in essential COVID-19 duties had good QoL (Table 4). The predictors of poor QoL on logistic regression included worsening of migraine during the lockdown (AOR 4.150; CI 2.704–6.369) and the difficulty in accessing migraine medicines (AOR 4.549; CI 3.041–6.805). Employment as essential COVID-19 worker (AOR 0.623; CI 0.409–0.950) protected against poor QoL (Table 4).

4 | DISCUSSION

This Internet-based survey study found that the COVID-19 pandemic-related lockdown negatively impacted Indian migraine patients. Indian migraineurs had worsening of their migraine in terms of frequency, headache days, severity, and duration. A comparison of the QoL during the previous month before the survey showed significant differences between those with migraine and those without. Also, 61% of the migraineurs reported that their headaches had an impact on their QoL.

Our prevalence of migraine (24%) among the participants matches well with that found in a population-based study conducted in Karnataka (25.2%).⁸ The majority of the migraineurs (83%) who participated in the survey were previously diagnosed by physicians. The mean age of migraineurs was 35.32 ± 11.16 years and the female to male ratio was 1.83. The baseline pre-lockdown headache characteristics showed a high disease burden in terms of migraine frequency (median 5 days per month) and headache severity (moderate to severe in 93.8%). These estimates are consistent with

TABLE 1 Demographic details of the participants

Demographic parameters	Participants with migraine headache (n = 984)	Participants without migraine headache (n = 3094)
Age (mean ± SD)	35.32 ± 11.16	32.51 ± 11.44
Gender		
Male	347 (35.30%)	2128 (68.8%)
Female	635 (64.50%)	956 (30.9%)
Others	2 (0.20%)	10 (0.3%)
Occupation		
Student	152 (15.45%)	524 (16.94%)
Employed in government	161 (16.36%)	626 (20.23%)
Employed in private sector	236 (23.98%)	1228 (39.69%)
Self employed	124 (12.60%)	392 (12.67%)
Non employed	303 (30.79%)	272 (8.79%)
Retired	08 (0.81%)	52 (1.68%)
Marital status		
Single	244 (24.8%)	1030 (33.29%)
Married	533 (54.17%)	1188 (38.40%)
Widower/widow	16 (1.63%)	75 (2.42%)
Divorced	191 (19.41%)	801 (25.89%)
Parts of country		
Northern India	783 (79.57%)	2387 (77.15%)
Eastern India	35 (3.56%)	111 (3.59%)
Western India	84 (8.54%)	297 (9.60%)
Southern India	59 (6.00%)	215 (6.95%)
Central India	23 (2.34%)	84 (2.71%)
Habitation		
Village	104 (10.57%)	359 (11.60%)
Small City	218 (22.15%)	954 (30.83%)
Metropolitan City	662 (67.28%)	1781 (57.56%)
Essential Covid-19 worker		
Yes	281 (28.56%)	647 (20.91%)
No	703 (71.44%)	2447 (79.09%)

Karnataka study from South India that reported the prevalence of migraine was highest between 26 and 45 years of age, the female to male ratio was 1.82, 38% of migraineurs had >3 days of migraine per month and 96.7% had “quite bad” or “very bad” headache intensity.¹⁵ These results, therefore, indicate that the survey, though suffering from biases inherent in an Internet-based survey has provided valid estimates.

During the lockdown, migraine reportedly worsened in 51% of the participants while 11% were unsure. Similar to our study, another web-based study by Al-Hashel et al.⁴ showed that in comparison with the pre-pandemic period, 59.6% of migraineurs reported an increase in migraine frequency, and 64.1% reported an increase in severity. Contrarily, few studies from Netherlands and Italy have shown opposite results. One e-diary-based study from a tertiary headache care center found significant improvement of headache in terms of attack frequency, acute medication use, and overall well-being for an initial 2 months after the lockdown as compared to the

pre-lockdown period.⁵ The authors attributed this improvement to combining effects of several factors like fewer work-related stresses, ability to take rest during headache attack, work from home, and luxury to choose how to organize one's time. These results might not be comparable to the migraine patients from the general population. Similarly, another web-based study in pediatric and adolescent patients also found significant improvement of migraine which was attributed to decrease school, sports, and examination-related stresses.¹¹ This study however found a mild increase of headache in those patients who developed increased anxiety during the lockdown. Another interview-based study of migraine patients included in the Italian headache registry also found mild improvement in headache frequency, intensity, and acute medication use.⁶ Two more studies from Italy have also shown similar results.^{9,10} However, a recent study in an Italian cohort showed that prolongation of the pandemic worsened migraine evolution during the second wave of the pandemic.¹⁶ It is important to note that our survey population

TABLE 2 Impact of COVID-19-related lockdown on migraine headache

Question	Response	n (%)
1. Has your migraine worsened after the lockdown? (n = 984)	Yes	505 (51.32%)
	No	373 (37.91%)
	Not sure	106 (10.77%)
Among those who said "yes" (n = 505)		
Have your headaches become more frequent in terms of attack frequency after the lockdown?	Yes	483 (95.64%)
	No	22 (4.36%)
Have your headaches become more frequent in terms of headache days per month after the lockdown?	Yes	480 (95.05%)
	No	25 (4.95%)
Has your headache attack duration become more after the lockdown?	Yes	454 (89.90%)
	No	51 (10.10%)
Have your headaches become more severe after the lockdown?	Yes	445 (88.12%)
	No	60 (11.88%)
2. Do you feel the worsening of your headaches is related to lockdown?	Yes	430 (85.15%)
	No	29 (5.74%)
	Not sure	46 (9.11%)
Among those who said "yes"		
3. What do you think is the most likely reason(s) is/ are for the worsening of your headaches during lockdown? (n = 430)		
Anxiety because of COVID-19 pandemic and spread of infection	Yes	343 (79.77%)
	No	87 (20.23%)
Inability to go out for relaxation	Yes	223 (51.60%)
	No	207 (48.14%)
Inability to access healthcare (doctors, hospitals, etc)	Yes	210 (48.84%)
	No	220 (51.16%)
No able to get acute/preventive medication because of lockdown	Yes	193 (44.88%)
	No	237 (55.12%)
Increased household work	Yes	84 (19.54%)
	No	346 (80.46%)
Financial worries/fear of loss of job/less salary	Yes	262 (60.94%)
	No	168 (39.06%)
4. Overall how much worsening in your headaches occurred after the lockdown? (n = 984)	0%	144 (14.63%)
	25%	183 (18.60%)
	50%	426 (43.29%)
	75%	124 (12.60%)
	100%	15 (1.52%)
	Not sure	92 (9.35%)
5. Do you think your headaches affected your quality of life during past 1 month? (n = 984)	Very likely	163 (16.57%)
	Likely	441 (44.82%)
	Not sure	185 (18.80%)
	Unlikely	195 (19.82%)

differed from the Western population in two major aspects namely, access to health care and being in an occupation that enables working from home. A universal multi-payer healthcare model supported by public and private health insurances and by public and private hospitals is operational in India. However, significant gaps exist between provision, utilization, and attainment of healthcare access.¹⁷ These

gaps further worsened during the lockdown and unlike Western countries, alternative provisions for non-COVID chronic medical disorders such as migraine were inadequate. Further, only 25% of Indian workers are regular wage workers in the formal or informal sector who would have the ability to cope with the stringent lockdown imposed and be able to work from home.¹⁸ Additionally, a large

TABLE 3 Access to health care and medicines for migraine during lockdown

Question and response	n (%)
Were you able to access your doctor for your headache? (n = 984)	
Yes	278 (28.25%)
No	706 (71.75%)
If yes—how did you get access to your doctor? (n = 278)	
Personal visit	113 (40.65%)
Telephonically (landline/mobile)	149 (53.60%)
Chat box	30 (10.80%)
SMS	26 (9.35%)
Teleconferencing	19 (6.83%)
Email	8 (2.88%)
If the consultation was provided by means other than personal visit, were you satisfied? (n = 165)	
Yes	142 (86.06%)
No	23 (13.93%)
What were the reasons for not able to access your doctor? (n = 706)	
Doctor was not contactable	42 (5.95%)
Clinic was closed	32 (4.53%)
Doctor was contactable but he was not providing consultation without personal visit	9 (1.27%)
Did not go because transport was not available because of lockdown	355 (50.28%)
Did not go because I was afraid of COVID patients at clinic/hospital	268 (37.96%)
Were you able to get your preventive and medications for acute relief of migraine during the lockdown? (n = 984)	
Yes-always	505 (51.32%)
Sometimes with difficulty	416 (42.28%)
No	63 (6.40%)
If you were not able to get medication, what did you do for relief of headaches? (n = 63)	
Take rest & sleep it over	38 (60.32%)
Used balm/oil	21 (33.33%)
Used other household remedies	23 (36.51%)
During the lockdown period, did you have a severe headache that did not resolve with your usual medication and lasted for days (n = 984)	
Yes	466 (47.36%)
No	518 (52.64%)
If yes, how difficult was it for you to get rescue treatment for your unresponsive severe headache? (n = 466)	
Very difficult	86 (18.45%)
Somewhat difficult	333 (71.46%)
Not difficult	47 (10.09%)

(Continues)

TABLE 3 (Continued)

Question and response	n (%)
During such an unresponsive severe headache were you able to contact/consult your doctor? (n = 466)	
Yes	328 (70.39%)
No	138 (29.61%)
Were you satisfied with the consultation provided by the doctor for your unresponsive headache? (n = 328)	
Yes	295 (89.94%)
No	33 (10.06%)

proportion of the workforce had financial worries in the form of salary cuts or job loss. Indeed, 61% of the migraineurs in our survey identified financial worries as a possible reason for worsening their headaches. The important factors responsible for the worsening of migraine as reported by participants were anxiety related to a pandemic, inability to access doctors and medications, financial insecurity, lack of relaxation, and increased household work. Inability to access health care and medications emerged as an important cause for worsening of migraine headaches as a large number of migraine patients did not have access to doctors (72%) and had difficulty or inability to get medications (49%) for managing their migraine during the lockdown. A recent global study showed that since the onset of the COVID-19 pandemic, 50% of the patients with chronic diseases failed to receive their regular medical care and medications.¹⁹ The Kuwait study also showed that more than 60% of surveyed patients failed to communicate with their neurologists during the lockdown.⁴

There are multiple reasons for this non-accessibility. Despite enforcing a very strict lockdown over a period of more than 3 months from late March to June 2020, India had to face the onslaught of the COVID-19 pandemic and the recorded second largest number of cases in the world. During this time, a large number of Government, as well as private healthcare facilities, were converted into exclusive COVID care facilities thereby severely limiting the non-COVID healthcare delivery. Besides this, most of the doctor's clinics were either closed or inaccessible because of a lack of transport facilities during the lockdown period. A large number of Indian patients were dependent on government hospital-supplied medicines that became inaccessible for them because of lockdown and thus resulted in non-compliance, financial burden, and additional stress.

The finding that the migraineurs who were able to access health care facilities through telemedicine services were mostly satisfied (86%) with the consultation provided provides a way out of this situation for the future. Previous studies have shown that teleconsultation can provide equal satisfaction to non-acute headache patients when compared to face-to-face consultations.^{20,21} Utility of telemedicine in chronic neurological diseases has been advocated by the American Academy of Neurology.²² Despite the Indian Space research organization's (ISRO's) telemedicine networks which started in 2000 and the involvement of a few private hospitals and centers over the years, the geographic reach and utilization of telemedicine

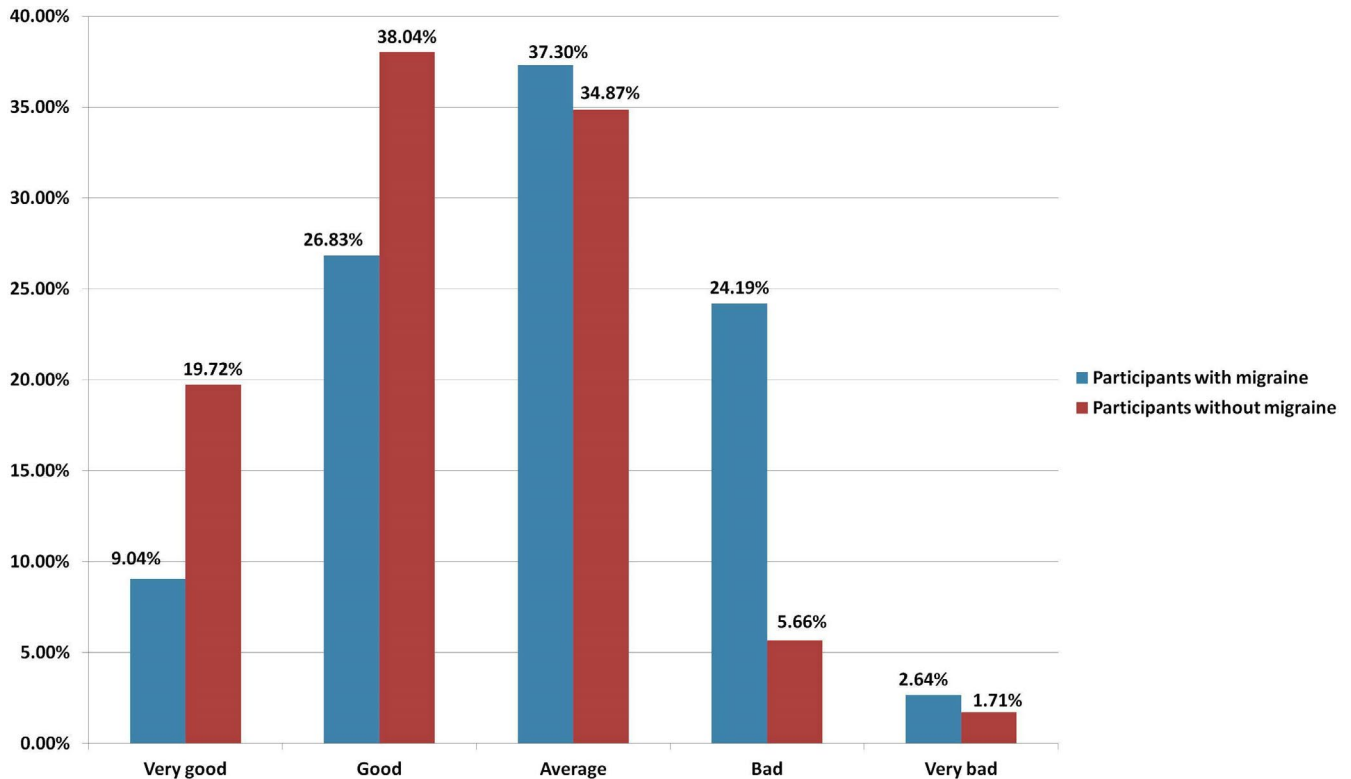


FIGURE 1 Quality of life during lockdown

Did your headaches affect your quality of life during past 1 month?

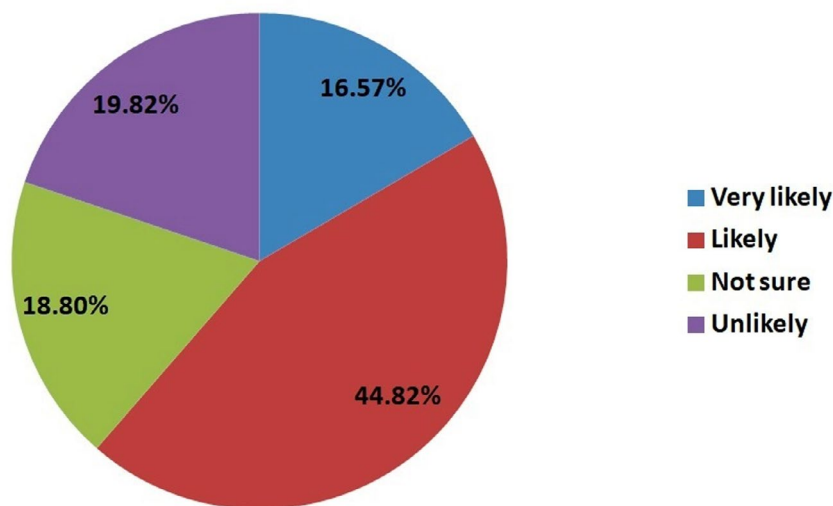


FIGURE 2 Impact of headache on quality of life

in India are limited.²³ Telemedicine was unfamiliar to most of the patients as well as doctors in India. The pandemic provided the required boost to the development and expansion of telemedicine in India.²³ India is in a good position to use this opportunity as it has got one of the largest numbers of smartphones (502.2 million)²⁴ and Internet users (451 million).²⁵ However, there are issues related to the validity of telephonic prescriptions, and the problems of getting access to medicines still remain.

The second important factor for the worsening of migraine was stress related to the pandemic itself. In India, the lockdown was declared 2 weeks after the declaration of the COVID-19 pandemic with very little advance notice and by that time the deadliest nature of the disease and negative impact of lockdown in other countries were well known by wide traditional media publicity and social media platforms. The "COVID-19 infodemic" has been shown to trigger acute stress, anxiety, and depression.^{26,27} These conditions are also known

TABLE 4 Predictors of poor quality of life (QoL) in migraineurs during lockdown

Variables	Poor quality of life during lockdown (n = 264)	Good quality of life during lockdown (n = 720)	Crude OR (95% CI)	p value for crude OR	Adjusted OR (95% CI) ^a	p value for adjusted OR
Age						
<40 years	198 (28.05%)	508 (71.95%)	1.252 (0.908–1.727)	.170059	–	–
≥40 years	66 (23.74%)	212 (76.26%)				
Sex						
Male	72 (20.75%)	275 (79.25%)	1.655 (1.214–2.257)	.001748	0.954 (0.649–1.403)	.813
Female	192 (30.24%)	443 (69.76%)				
Habitation						
Village/small city	75 (23.29%)	247 (76.71%)	0.760 (0.558–1.035)	.080702	1.265 (0.877–1.826)	.209
Large city	189 (28.55%)	473 (71.45%)				
Marriage status						
Married	170 (31.89%)	363 (68.11%)	1.779 (1.329–2.380)	.000097	0.807 (0.556–1.170)	.258
Not married	94 (20.84%)	357 (79.16%)				
Employment status						
Employed	161 (34.77%)	302 (65.23%)	2.164 (1.622–2.886)	<.0001	0.862 (0.594–1.253)	.437
Not employed	103 (19.77%)	418 (80.23%)				
Essential care worker for COVID-19						
Yes	42 (14.95%)	239 (85.05%)	0.381 (0.264–0.548)	<.0001	0.623 (0.409–0.950)	.028
No	222 (31.58%)	481 (68.42%)				
Pre-lockdown average monthly migraine frequency						
Up to 14 days	216 (24.69%)	369 (75.31%)	0.417 (0.227–0.667)	.000017	0.818 (0.516–1.296)	.392
≥15 days	48 (44.04%)	61 (55.96%)				
Pre-lockdown migraine severity						
Mild	10 (16.39%)	51 (83.61%)	0.516 (0.258–1.033)	.058	0.806 (0.365–1.780)	.593
Moderate/severe	254 (27.52%)	669 (72.48%)				
Preventive medication use						
Yes	194 (34.09%)	375 (65.91%)	2.550 (1.870–3.476)	<.0001	0.851 (0.560–1.294)	.451
No	70 (16.87%)	345 (83.13%)				

(Continues)

TABLE 4 (Continued)

Variables	Poor quality of life during lockdown (n = 264)	Good quality of life during lockdown (n = 720)	Crude OR (95% CI)	p value for crude OR	Adjusted OR (95% CI) ^a	p value for adjusted OR
Migraine worsened during lockdown						
Yes	216 (42.77%)	289 (57.23%)	6.711 (4.746–9.490)	<.0001	4.150 (2.704–6.369)	<.0001
No	48 (10.02%)	431 (89.98%)				
Difficulty to access to doctor during lockdown						
Yes	234 (33.14%)	472 (66.86%)	4.098 (2.720–6.175)	<.0001	1.588 (0.972–2.594)	.065
No	30 (10.79%)	248 (89.21%)				
Difficulty to access to acute/preventive migraine drugs during lockdown						
Yes	216 (45.09%)	263 (54.91%)	7.819 (5.523–11.070)	<.0001	4.549 (3.041–6.805)	<.0001
No	48 (9.50%)	457 (90.50%)				

^aFor the variables with p value between 0.05 and 0.1 on univariate analysis, logistic regression was done for predicting poor QoL.

to make migraine worse.^{28,29} Additionally, the COVID-19 pandemic itself has been shown to cause deterioration of mental health globally in people suffering from chronic conditions.³⁰ In particular, increased stress, anxiety, and depression have been documented during COVID-19 by many studies including a meta-analysis.^{31–34} Indian studies have also reported some major mental health issues like stress, anxiety, depression, insomnia, denial, anger, and fear.^{35,36} It is therefore not surprising that this onslaught of stress and mental illnesses might have contributed to the worsening of migraine. In one study assessing the health, psychosocial, and economic impacts of the COVID-19 pandemic on people with chronic conditions in India, 83% of participants reported difficulty accessing health care, 17% faced difficulties accessing medicines, 59% reported a loss of income, and 38% lost jobs.³⁷

Quality of life has a wide range of contexts. In our study, although we captured responses with an open-ended question about QoL during last month, we primarily focussed on health-related, and more specifically migraine-related QoL. As compared to non-migraine participants, a statistically significant number of migraineurs had a poor QoL. More importantly, 61% of the migraineurs reported that migraine affected their QoL during the lockdown. Our study also showed that migraineurs who reported worsening of migraine and those who could not access (or had difficulty accessing) their migraine medications had a poor QoL during this period. It is also pertinent to note that 47% of migraineurs had at least one severe non-resolving headache during the lockdown of which 90% had difficulty in procuring rescue treatment. These episodes of non-resolving migraine headaches and poor accessibility to rescue drugs might have additionally contributed to bad QoL during the

lockdown. It has been shown by previous studies that a greater frequency of headache attacks in migraine patients (as happened in our patients during the lockdown) results in significantly greater levels of disability and reduced health-related quality of life.^{38,39}

A significant number of participants (29%) with migraine were working as essential COVID-19 workers during this time. This may be because migraine is more common among health care professionals (than in the general population)⁴⁰ who constituted the bulk of the essential COVID-19 workforce. It is possible that the essential COVID-19 workers although stressed had better access to health care and therefore were able to tackle their migraines better. They were also more likely to be aware of the COVID-19 appropriate behaviors and were motivated and dedicated to their work as a group. In a recent study, it was found that although individual factors, notably, anxiety over the disease and personal identity did impact QoL, group-based or social identification of individuals also impacted their QoL. In fact, the study found that the effect of group identities (family, religious group, and nation) is above that of personal or individual factors in predicting QoL.⁴¹ During the COVID-19 pandemic and lockdown, social and moral responsibilities were a major empowering force for the essential care workers and one study from India actually documented that although initial stress levels were very high among the workers, positive cognitive reappraisal with adaptive strategies helped the team to collectively cope with the situation effectively.⁴²

There are a few limitations of our study. As is true for any Internet-based study, there is a possibility of selection bias, especially related to access to the Internet and digital literacy. A higher number of participants from Northern Indian states (80%) and from

major urban metropolitan cities (67%) also indicate a selection bias. We did not capture how many migraineurs actually contracted COVID-19 before they undertook the survey which might have a bearing on their migraine burden and QoL. Although we identified stress as an important contributor to the worsening of migraine, we did not measure it. Finally, we did not estimate the magnitude of medication overuse as a potential cause of migraine worsening during this period.

Despite these few limitations, we believe that our survey clearly showed that the COVID-19 pandemic and lockdown affected Indian migraine patients adversely with resultant poor QoL. We, therefore, suggest that telemedicine be encouraged for wider accessibility to doctors and medications. The professional bodies, organizations of doctors, health authorities, and advocacy groups should advise the government for reframing laws, regulations, coding, and reimbursement options for teleconsultation and online access to headache medicines. Migraine patients should be taught about neurobehavioral approaches including yoga and meditation which can be practiced at home to decrease stress and thereby improve headaches. Such an approach has yielded positive results in European studies during the lockdown.⁴³ The essential COVID-19 workers with migraine need to be identified and provided with a simplified advisory regarding how to manage and lessen their migraine burden during pandemic times.¹² A combined and holistic approach shall be useful.

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CONFLICT OF INTEREST

No conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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