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### **Covid-19 and Tobacco Cessation**

Lessons from India

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**Title:** COVID-19 and Tobacco Cessation: Lessons from India

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## **Abstract**

**Background:** The Government of India prohibited the sale of tobacco products during COVID-19 lockdown to prevent its spread. This study assessed the tobacco cessation behaviour and its predictors among adult tobacco users during the initial COVID-19 lockdown period in India.

**Methods:** A cross-sectional study was conducted with 801 adult tobacco users (smoking and smokeless) in two urban metropolitan cities of India over two months (July-August 2020). The study assessed complete *tobacco cessation* during the lockdown period and *quit attempts*. Logistic and negative binomial regression models were used to study correlates of tobacco cessation and quit attempts respectively.

**Findings:** Out of the total sample, 90 (11.3%) tobacco users reported that they had quit using tobacco after the lockdown. Overall, a median of two quit attempts (IQR 0-6) were made by the tobacco users. Participants with good knowledge on health harms of tobacco use and COVID-19 were significantly more likely to quit tobacco use [OR 2.2 (95% CI 1.2-4.0)], and reported more quit attempts [IRR 5.7 (95% CI 2.8-11.8)] vs. those with poor knowledge. Participants with access to tobacco products were less likely to quit tobacco use vs. those with no access [OR 0.3 (95% CI 0.2-0.5)].

**Conclusion:** Access restrictions and correct knowledge on health harms of tobacco use and COVID-19 can play an important role in creating a conducive environment for tobacco cessation among users.

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**Keywords:** COVID-19, cessation, tobacco, smoking, India.

**Word count:** 3060

## Background

The advent of the COVID-19 pandemic has presented us with unprecedented challenges for the 21<sup>st</sup> century besides huge mortalities.<sup>1</sup> While there is still lack of definitive evidence to substantiate the risk of COVID-19 infection among the tobacco users,<sup>2</sup> they are at an increased risk of associated adverse outcomes (e.g. death and severity of COVID-19).<sup>3</sup> Recent evidence suggests a higher likelihood of progression of COVID-19 complications, including mortality (OR 1.91, 95% CI: 1.4-2.6) among smokers.<sup>4</sup> The act of tobacco smoking involves frequent contact between fingers and the mouth and hence, can potentially increase the risk of COVID-19 infection.<sup>5</sup> The use of smokeless tobacco (SLT) products such as gutkha, khaini, zarda, and paan (betel quid with tobacco) induce salivation and hence, increased spitting, which may spread the SARS-Cov-2 virus.<sup>6</sup>

Stringent tobacco control measures have been enforced by some countries to prevent COVID-19. Several countries from the Eastern Mediterranean Region banned the use of waterpipe in indoor and outdoor public places.<sup>7</sup> Bangladesh suspended the production, supply, marketing, and sale of all kinds of tobacco products;<sup>8</sup> Botswana banned the import and sale of cigarettes and other related products;<sup>9</sup> South Africa restricted the sale of cigarettes, snuff, hookah pipes and e-cigarettes to combat the risks posed by use of tobacco products during the pandemic.<sup>10</sup> The COVID-19 pandemic provided an opportunity to study the impact of environment on tobacco consumption habits of the users. A web-based survey in the United States, conducted during the pandemic showed that 22.9% respondents attempted to quit cigarettes to reduce risk of harm from COVID-19, and that a third of the respondents reported an increase in motivation to quit tobacco during the pandemic period.<sup>11</sup>

India enforced a nationwide lockdown on March 24, 2020 to prevent the spread of COVID-19.<sup>12</sup> At the beginning of the lockdown, different state governments issued warnings, and advisories against tobacco use, and about its interwoven relationship with COVID-19. Subsequently, the Indian Council of Medical Research (ICMR),<sup>13</sup> and the Ministry of Health and Family Welfare (MoHFW), Government of India (GoI) each issued advisories to prohibit the use and spitting of tobacco.<sup>14,15</sup> Many states in India also announced the respective bans on tobacco use under the troupe of the Indian Penal Code 1890, Cigarettes and Other Tobacco Products Act 2003 and the Epidemic Diseases Act 1897.<sup>16</sup> The Ministry of Home Affairs, GoI prohibited the sale and use of gutkha, and other tobacco products as well in the country.<sup>17</sup> This created a conducive environment nationwide for tobacco control.

Previous evidence suggests that tobacco control policies such as restricting the availability or access to tobacco products limit tobacco use.<sup>18,19</sup> A study by Narotam et al. with 650 participants enrolled in a tobacco cessation

counselling programme before the lockdown has reported the positive impact of public health measures on tobacco use behaviour.<sup>20</sup> However, the study included participants already motivated and enrolled for cessation, and did not assess the predictors of cessation and quit attempts among the tobacco users. In this study, we aimed to assess tobacco cessation behaviours, and identify predictors of tobacco cessation and quit attempts among adult tobacco users during the late COVID-19 lockdown period in India.

## **Methodology**

### ***Study design, setting and participants***

A cross-sectional study was conducted in two urban metropolitan cities of India, Delhi, and Chennai over two months (July-August 2020). Assuming a large (over 1 million) target population, 50% outcome factor in the population, 5% margin of error and 95% confidence level, the minimum required sample size was estimated as  $384 \approx 400$  in general population. Therefore, a total sample size of 800 participants (~400 from each city) was estimated using open source epidemiological statistics (OpenEpi).<sup>21</sup> A list of participants from an existing cohort (CARRS- Centre for cArdiometabolic Risk Reduction in South-Asia),<sup>22</sup> with a history of any form of tobacco use was prepared and then the participants were invited to participate in the study. Participants over 20 years of age (irrespective of their sex), using any form of tobacco, well versed with English, Hindi or Tamil language, and those who agreed to provide consent were enrolled in the study. Tobacco users who had recently quit using tobacco (past 3 months from the date of survey – i.e. after the lockdown) or have used tobacco in any form during past one month were also included in the study. Participants who were suffering from any severe illness, institutionalized, unable to respond the survey, and not willing to provide or record verbal consent were excluded from the study.

The objectives of the study were explained to the study participants, and after obtaining informed consent, a telephonic questionnaire was administered to them. Prior ethics approval for research involving human subjects for this study was obtained from the Centre for Chronic Disease Control's Institutional Ethics Committee (Reference #CCDC\_IEC\_04\_2018).

### ***Study tool***

The survey questionnaire was adapted from the STOP survey<sup>23</sup> for India, and translated to the context of smoking, and smokeless tobacco use in India. The survey tool has previously been used in a longitudinal study in Pakistan to capture, and compare the tobacco use behaviour among the users, before and during COVID-19.<sup>23</sup> The survey was translated into regional languages i.e. Hindi (for Delhi participants), and Tamil (for Chennai participants). The questions on socio-demographic variables, knowledge of participants on adverse effects of

tobacco use during COVID-19; intentions to quit tobacco, number of quit attempts; and knowledge of tobacco control policies implemented in India during the lockdown period were included in the survey. The questionnaire was piloted on a subset of 20 respondents (from each city) and then was adapted as required before administering it to the sample population. A brief description of the study variables is provided in the supplementary file (Table S1).

### ***Data collection and management***

Following the norms of social distancing, the questionnaire was administered telephonically. A standardized protocol was used for data collection. Informed consent was sought from eligible participants. The verbal consent was audio-recorded following the recent Indian Council of Medical Research's revised guidelines for obtaining consent for the biomedical and health research during COVID-19 pandemic.<sup>24</sup> The questionnaire was then administered in the language preferred by the participant (English, Hindi or Tamil).

### ***Data analysis***

We present descriptive statistics as frequencies and percentages. The primary outcomes of the study were 'Cessation' and 'Quit attempts'. Participants were asked the question, "*What best describes you?*" and those marking the option – "*I have stopped using tobacco*" were categorized as 1 for cessation (otherwise, 0). Participants were further asked the question- "*How many attempts to stop tobacco use, have you made in the last 6 months?*", and the answers were recorded as an integer. The "Quit attempts" was treated as discrete (count) data.

Univariate associations were analysed using Fisher's exact/Chi-square test as appropriate for categorical variables while the count variables were analysed using Mann-Whitney/Wilcoxon test and Kruskal Wallis test as appropriate. A p-value of less than 0.05 was considered significant. Cross-tabulations between various socio-demographic characteristics (gender, city, age, education, employment status), Knowledge (Knowledge on health harms of tobacco use and COVID-19; Knowledge on legislative decisions (taken by government on tobacco sales and consumption during national lockdown), and access to tobacco products during the lockdown were studied. The questions on Knowledge were aggregated and thereafter, scored unanimously. The correct responses were marked as 1 and incorrect as 0. The maximum score for Knowledge on health harms and knowledge on legislative decisions was 5 and minimum score was 0. The aggregate scores were further categorized as Poor (Mean – 1SD), Average (Mean-1 SD to Mean+1 SD), and Good (Mean+1 SD).<sup>25</sup>

Due to the over-dispersion in the number of '*quit attempts*', its associations with various independent variables were studied using negative binomial regression model,<sup>26</sup> whereas, logistic regression model was used to study

the association of independent variables with 'Cessation'. The results of negative binomial regression models and logistic regression models are given in IRR (Incidence risk ratio), OR (Odds Ratio) and 95% CI respectively. Variables with p-value of up to 0.15 in the univariate analysis were retained in the multivariate models.<sup>27</sup> Data was analysed using STATA v.13.1 (StataCorp, LP, Texas).

## **Results:**

### ***Study participant characteristics:***

A total of 801 tobacco users participated in the survey out of which, 444 (55.4%) were from Delhi while 357 (44.6%) were from Chennai (**Table 1**). Since, the survey was conducted telephonically, a disposition table<sup>28</sup> is used to explain the response rates. The gross response rate for the study was 48.4%, basic response rate was 85.3% and response rate calculated using the CASRO Estimator was 60.9%. The detailed disposition table, and response rate calculations are provided in supplementary file (Tables S2 and S3). Out of the total sample, 305 (38.1%) were current cigarette smokers, 195 (24.3%) were bidi smokers and 324 (40.4%) were SLT users. There were 90 (11.3%) tobacco users who reported to have stopped using tobacco at the time of survey after the lockdown measures were introduced. Overall, a median of 2 quit attempts (IQR 0-6) were made by the tobacco users over past 6 months. The mean scores (SD) for Knowledge on health harms and Knowledge about legislative decisions amongst entire population were reported as 2.1 (1.9) and 2.7 (2.1), respectively. The majority of participants (90.1%) were males. Nearly 56.3% of all participants belonged to 45-64 years age group, followed by 31.6% in 25-44 years and 12.1% to 65 years and above. More than half of the participants were educated either up to high school (39.4%) and intermediary school (31.1%). Around 81.1% of the participants were employed while, rest were students (10.9%), housewives (3.6%), retired (2%) or unemployed (2.2%) (**Table1**).

**Table 1: Socio-demographic characteristics of the study population (N=801):**

| Socio-demographic characteristics | n (%)      |
|-----------------------------------|------------|
| <b>City (801)</b>                 |            |
| Delhi                             | 444(55.4)  |
| Chennai                           | 357(44.6)  |
| <b>Sex (801)</b>                  |            |
| Males                             | 722 (90.1) |
| Females                           | 79(9.9)    |
| <b>Age (in years) (801)</b>       |            |
| 25-44                             | 253 (31.6) |
| 45-64                             | 451 (56.3) |
| 65 and above                      | 97(12.1)   |
| <b>Education (801)</b>            |            |
| Illiterate                        | 80 (9.9)   |
| Professional Degree/Post Graduate | 17(2.1)    |
| Graduate (B.A/B.Sc/B.Com/Diploma) | 75(9.4)    |
| Secondary School /Intermediary    | 249(31.1)  |
| High school (class V to IX)       | 316(39.4)  |
| Primary School (up to Class IV)   | 64(7.9)    |
| <b>Employment Status (801)</b>    |            |
| Employed                          | 650(81.1)  |
| Student                           | 88(10.9)   |
| Housewife                         | 29(3.6)    |
| Retired                           | 16(2.0)    |
| Unemployed                        | 18(2.2)    |
| Current Cigarette Smokers (801)   | 305(38.1)  |
| Current Bidi Smokers (798)*       | 195(24.3)  |
| Current SLT users (800)**         | 324(40.4)  |

\*3 missing responses for Current Bidi Smokers, \*\*1 missing response for Current SLT users

### *Univariate association of Cessation and quit attempts with socio-demographic variables*

Cessation as well quit attempts were significantly higher amongst the females (cessation 21.5%, and quit attempts 6.5 (IQR 2-20)) as compared to the males (cessation 10.2%, and quit attempts 2 (IQR 0-5)). The percentage of participants who quit was higher in Chennai (15.4%) compared to Delhi (7.9%). However, the median quit attempts in past 6 months were higher in Delhi (2 (IQR 0-7)) as compared to Chennai (1 (IQR 0-4)). Cessation as well as quit attempts were predominantly higher amongst housewives (27.6%, and 12.5 (IQR 7.5-30) respectively) in comparison to students, employed or retired participants **Table 2**.

**Table 2: Univariate association of Cessation and Quit attempts with sociodemographic characteristics**

| Variables                              | Cessation**<br>N (%) | p-value       | Quit attempts***<br>Median(p25, p75) | p-value           |
|--|----------------------|---------------|--------------------------------------|-------------------|
| <b>Overall</b>                         | 90 (11.3)            |               | 2(0,6)                               |                   |
| <b>Gender</b>                          |                      | <b>0.002*</b> |                                      | <b>0.001&amp;</b> |
| Male (718)                             | 73(10.2)             |               | 2(0,5)                               |                   |
| Female (79)                            | 17(21.5)             |               | 6.5(2,20)                            |                   |
| <b>City</b>                            |                      | <b>0.001*</b> |                                      | <b>0.024&amp;</b> |
| Chennai (357)                          | 55(15.4)             |               | 1(0,4)                               |                   |
| Delhi (440)                            | 35(7.9)              |               | 2(0,7)                               |                   |
| <b>Age (in years)</b>                  |                      | 0.818         |                                      | 0.107             |
| 25-44(253)                             | 26(10.3)             |               | 2(0,7)                               |                   |
| 45-64(447)                             | 53(11.9)             |               | 1(0,5)                               |                   |
| 65 and above(97)                       | 11 (11.3)            |               | 5(0,4)                               |                   |
| <b>Education</b>                       |                      | 0.162         |                                      | 0.531             |
| Illiterate (80)                        | 7(8.7)               |               | 1(0,10)                              |                   |
| Professional Degree/Post Graduate (16) | 5(31.2)              |               | 4(2,10)                              |                   |
| Graduate (74)                          | 7(9.5)               |               | 2(0,7)                               |                   |
| Secondary /Intermediary schools(248)   | 26(10.5)             |               |                                      |                   |
| High school (315)                      | 39(12.4)             |               | 2(0,5)                               |                   |
| Primary schools(64)                    | 6(9.4)               |               | 0(0,2)                               |                   |
| <b>Employment status</b>               |                      | 0.102         |                                      | <b>0.020^</b>     |
| Employed (648)                         | 68(10.5)             |               | 2(0,5.5)                             |                   |
| Student (86)                           | 10(11.6)             |               | 2(0,6.5)                             |                   |
| Housewife (29)                         | 8(27.6)              |               | 12.5(7.5,30)                         |                   |
| Retired (16)                           | 2(12.5)              |               | 1(0,2)                               |                   |
| Unemployed (18)                        | 2 (11.3)             |               | 1(0,3)                               |                   |

\* p value <0.05 using chi square

§ p value <0.05 using unpaired ttest

& p value <0.05 using Mann Whitney Wilcoxon Test

^ p value <0.05 using Kruskal-Wallis H test

\*\* 4 missing responses for cessation. \*\*\*Total 329 responses for quit attempts

### *Univariate association of cessation and quit attempts with knowledge and access*

In univariate analysis, cessation was higher in people with no access to tobacco products during the COVID-19 lockdown compared to those with access (19.0% versus 7.8 %). Quit attempts were higher among the daily Bidi smokers in comparison to occasional smokers (2 (IQR 0-7) versus 0 (IQR 0-3)). Whereas, in the case of SLT users the quit attempts were higher in occasional SLT users (2 (IQR 0-10)) in comparison to daily users (1 (IQR 0-4)). The quit attempts were predominantly higher in people with good knowledge (4 (IQR 0-16)) on health harms of tobacco use during COVID-19 in comparison to participants with average (1 (IQR 0-4)), and poor knowledge (0 (IQR 0-3)). Similarly, the quit attempts were also higher amongst the participants with good

knowledge (2 (IQR 0-7)) on legislative decisions in comparison to participants with either average (1 (IQR 0-5)) or poor knowledge (0 (IQR 0-3)) **Table 3.**

**Table 3: Univariate association of Cessation and Quit attempts with knowledge and accessibility of tobacco products**

|   | <b>Cessation **</b><br>N (%) | <b>p-value</b> | <b>Quit attempts ***</b><br><b>Median</b><br><b>(p25,p75)</b> | <b>p-value</b>           |
|---|------------------------------|----------------|---|--------------------------|
| <b>Overall</b>                            | 90 (11.3)                    |                | 2(0,6)  |                          |
| <b>Cigarette smoking</b>                  |                              |                |   |                          |
| Current daily Cigarette smokers (220)     | NA                           |                | 1(0,5)  | 0.107                    |
| Current occasional smokers (85)           | NA                           |                | 1(0,5)  |                          |
| Non smokers (496)                         | NA                           |                | 2(0,7)  |                          |
| <b>Bidi smokers</b>                       |                              |                |   | <b>0.002<sup>^</sup></b> |
| Current Daily bidi smokers (167)          | NA                           |                | 2(0,7)  |                          |
| Current occasional bidi smokers (28)      | NA                           |                | 0(0,3)  |                          |
| Non smokers (603)                         |                              |                | 0(0,10)   |                          |
| <b>SLT users</b>                          |                              |                |   | <b>0.000<sup>^</sup></b> |
| Current SLT daily users (266)             | NA                           |                | 1(0,4)  |                          |
| Current occasional SLT users (58)         | NA                           |                | 2(0,10)   |                          |
| Non-users (476)                           |                              |                | 5(1,60)   |                          |
| <b>Knowledge on Health Harms</b>          |                              |                |   |                          |
| Poor (267)                                | 41(15.4)                     | <b>0.000*</b>  | 0(0,3)  | <b>0.000<sup>^</sup></b> |
| Average (298)                             | 16(5.4)                      |                | 1(0,4)  |                          |
| Good (232)                                | 33(14.2)                     |                | 4(0,16)   |                          |
| <b>Knowledge on legislative decisions</b> |                              |                |   |                          |
| Poor (231)                                | 45(19.5)                     | <b>0.000*</b>  | 0(0,3)  | <b>0.018<sup>^</sup></b> |
| Average (280)                             | 25(8.9)                      |                | 1(0,5)  |                          |
| Good (286)                                | 20(6.9)                      |                | 2(0,7)  |                          |
| <b>Accessibility of tobacco products</b>  |                              |                |   |                          |
|   |                              | <b>0.000*</b>  |   | 0.649                    |
| Yes (550)                                 | 43(7.8)                      |                | 2(0,6)  |                          |
| No(47)                                    | 47(19.0)                     |                | 1(0,4)  |                          |

<sup>\*</sup>p value <0.05 using fisher's chi exact test

<sup>\*\*</sup>p value <0.05 using unpaired ttest

\*\*\*p value<0.05 using fishers's exact  
 §p value<0.05 using one way ANNOVA  
 ^p value<0.05 using Kruskal-Wallis H test  
 \*\* 4 missing responses for cessation. \*\*\*\*Total 329 responses for quit attempts

### *Correlates of cessation and quit attempts*

In order to further determine the correlates significantly associated with cessation and quit attempts, logistic regression and negative binomial regression models were used, respectively. **Table 4** shows the adjusted Odds Ratio (OR)/Incidence Risk Ratio (IRR) and Confidence Interval (95% CI) for Cessation and Quit attempts. The final regression models included 797 and 328 participants for cessation and quit attempts, respectively, with complete cases across all variables. The participants with good knowledge about health harms of COVID and tobacco use were significantly more likely to opt for cessation as compared to participants with poor knowledge (OR 2.2, 95% CI 1.2-4.0). Whereas, participants with average knowledge were 50% less likely to cease tobacco use (OR 0.5, CI 0.3-0.9). Participants with good and average knowledge on legislative decisions were 60%, and 50% less likely to cease tobacco use in comparison to those with poor knowledge on legislative decisions (OR 0.4, 95% CI 0.2-0.9, and OR 0.5, 95% CI (0.3-0.9) respectively). Apparently, participants with access to tobacco products were 70% less likely to cease tobacco use (OR 0.3, 95% CI 0.2-0.5) compared to those having access to tobacco.

Quit attempts were significantly more likely to occur amongst people with average (IRR 1.9, 95% CI 1.0-3.4), and good knowledge (IRR 5.7, CI 2.8-11.8) on health harms of tobacco use and COVID-19 compared to participants with poor knowledge. However, no significant associations for quit attempts were observed among participants with average or good knowledge on legislative decisions.

**Table 4: Correlates of Cessation and Quit attempts**

|                                 | Cessation OR(95%CI)*<br>n=797 | Quit attempts (IRR 95%CI)#<br>n=328 |
|---------------------------------|-------------------------------|-------------------------------------|
| <b>Gender</b>                   |                               |                                     |
| Male                            | Ref                           | REF                                 |
| Female                          | 1.3(0.5-3.1)                  | 1.9(0.5-6.7)                        |
| <b>City</b>                     |                               |                                     |
| Chennai                         | Ref                           | REF                                 |
| Delhi                           | 0.6(0.3-1.1)                  | 0.6(0.3-1.1)                        |
| <b>Age (in years)</b>           |                               |                                     |
| 25-44                           | NA                            | REF                                 |
| 45-64                           | NA                            | 0.9(0.6-1.5)                        |
| 65 and above                    | NA                            | 0.7(0.2-2.1)                        |
| <b>Employment status</b>        |                               |                                     |
| Employed                        | Ref                           | Ref                                 |
| Student                         | 1.0(0.4-2.4)                  | 1.1(0.3-3.5)                        |
| Housewife                       | 1.9(0.6-6.1)                  | 0.9(0.2-5.4)                        |
| Retired                         | 1.5(0.3-7.0)                  | 0.2(0.0-1.0)                        |
| Unemployed                      | 0.8(0.1-3.9)                  | 0.3(0.1-2.0)                        |
| <b>Cigarette smokers</b>        |                               |                                     |
| Non users                       | NA                            | REF                                 |
| Current daily Cigarette smokers | NA                            | 0.7(0.3-1.8)                        |

|  |                     |                      |
|--|---------------------|----------------------|
| Current occasional smokers                                   | NA                  | 0.7(0.3-1.6)         |
| <b>Bidi smokers</b>  |                     |                      |
| Non users  | NA                  | REF                  |
| Current Daily bidi smokers                                   | NA                  | <b>0.2(0.1-0.6)</b>  |
| Current occasional bidi smokers                              | NA                  | 0.7(0.2-2.2)         |
| <b>SLT users</b>   |                     |                      |
| Non-users  | NA                  | REF                  |
| Current SLT daily users                                      | NA                  | 0.7(0.2-1.7)         |
| Current occasional SLT users                                 | NA                  | 1.4(0.4-4.5)         |
| <b>Knowledge on Health harms of tobacco use and COVID-19</b> |                     |                      |
| Poor   | <b>Ref</b>          | <b>REF</b>           |
| Average  | <b>0.5(0.3-1.0)</b> | <b>1.9(1.0-3.4)</b>  |
| Good   | <b>2.2(1.2-4.0)</b> | <b>5.7(2.8-11.8)</b> |
| <b>Knowledge on legislative decisions</b>                    |                     |                      |
| Poor   | <b>Ref</b>          | REF                  |
| Average  | <b>0.5(0.3-0.9)</b> | 1.5(0.8-2.9)         |
| Good   | <b>0.4(0.2-0.9)</b> | 1.6(0.7-3.6)         |
| <b>Overall access</b>  |                     |                      |
| No   | <b>Ref</b>          | NA                   |
| Yes  | <b>0.3(0.2-0.5)</b> | NA                   |

\*Estimates derived using logistic regression. Variables with p-values<0.15 were in univariate analysis were included in the regression models.

#Estimates derived using negative binomial regression model. Variables with p-values<0.15 were in univariate analysis were included in the regression models.

## DISCUSSION

The COVID-19 pandemic is believed to have provided an impetus for the promotion of tobacco control strategies nationally as well globally.<sup>29,30</sup> The tobacco control policies implemented to address the spread of COVID-19 provided an opportunity for tobacco cessation among users which included restricting access to tobacco products.<sup>31</sup> In our study, 11.3% of the tobacco users stopped using tobacco during the lockdown. On an average, two quit attempts were made by the tobacco users during the past three months. The percentage of people who ceased tobacco use was much lower as compared to the percentage reported in the previous study (51%) conducted by Gupte et al.<sup>20</sup> However, this may be attributed to the fact that the sample in the previous study comprised of individuals already enrolled in a tobacco cessation programme, who would be motivated to quit tobacco use. On the contrary, some studies from other countries have also reported increased smoking due to the high levels of stress and boredom across the users during the pandemic.<sup>32,33</sup>

The existing evidence suggests low levels of knowledge on health harms of tobacco use and COVID-19.<sup>34,35</sup> The present study has also reported low levels of knowledge on health harms of tobacco use during COVID-19 among the study participants. Despite this, the results suggest that participants with good knowledge regarding the health harms of tobacco use and COVID-19 were more likely to cease tobacco use and make attempts to quit in comparison to those with poor knowledge. These findings, are consistent with those of a previous study conducted in India,<sup>20</sup> and indicate that good knowledge of the health harms of tobacco use and COVID-19 could discourage tobacco use among existing users. Moreover, good knowledge regarding the legislative decisions also seemed to motivate tobacco cessation among the users. Technology has played a vital role in enabling us perform our routine and professional activities during the pandemic.<sup>36</sup> Hence, cessation efforts (creating awareness on tobacco use during COVID-19 and cessation services), via use of digital media (television, internet and social media can prove to be useful.<sup>37,38</sup> Information Communication and Technology (ICT) can definitely help in propelling and strengthening the tobacco control policies.<sup>39</sup> Informative advertising (health harms of tobacco use during COVID-19, knowledge about National Quitline and m-cessation services) in vernacular languages, can further motivate the users to cease the use of tobacco.<sup>29</sup> These advertisements should further be integrated comprehensively with other commonly used digital applications or social media websites to create awareness among the users.<sup>29</sup>

In the present study, cessation was more prevalent among the tobacco users with no access to tobacco products (19.0%) and cessation was 70% less likely to take place among those reporting access to tobacco products.

National lockdown in the early months of the Covid-19 pandemic curbed access to tobacco products and could have encouraged abstinence from tobacco among existing users. Tobacco quitting is often associated with high relapse rate<sup>40,41</sup> and there are high chances that the users who reported to have ceased tobacco use during this period might relapse after lifting the restrictions. Implementing non-price based tobacco control policies (tobacco use restrictions in working places, restriction on access to tobacco products, etc.) are considered to be highly cost-effective measures.<sup>42</sup> Therefore, the ban on sale of tobacco products and spitting in public places and designating them as an offence with huge penalties for violations should be considered a public health strategy both, to overcome the COVID-19 pandemic and for tobacco control in India.<sup>43,44</sup> This is also justified, as the COVID-19 pandemic is far from over yet. The restrictions laid down by the government, limiting the access to tobacco products, should also be monitored closely. Restricting access to tobacco products requires a multi-sectoral regulatory policies and a whole of society approach so that users can be supported to quit and fresh uptake can be prevented.

The pandemic provides us a conducive environment to implement the tobacco endgame strategies in order to nip the production as well consumption of the tobacco products. Implementing demand-reduction strategies<sup>45</sup> such as ban on tobacco use and spitting in public places; and raising awareness against harms of tobacco use during COVID-19 can further strengthen the tobacco control policies. Similarly, supply side curtailing<sup>45</sup> by limiting the access to tobacco products can further help us to address the both the COVID-19 pandemic and tobacco epidemic. Therefore, lessons from this experience can be transferred to align population and individual level interventions, including drawing on national level change to encourage greater participation in tobacco cessation programs. Perhaps, such sustained efforts can help us to reduce tobacco use substantially, and thereon eliminate the tobacco use in future as well.

### **Strengths and limitations:**

This was an existing cohort <sup>22</sup>that was followed up during the COVID-19 pandemic to assess the impact of COVID-19 restrictions on tobacco use cessation and quit attempts. A previous research studied the tobacco cessation behavior across motivated tobacco users during Covid-19 lockdown.<sup>20</sup> The participants in this study were not motivated and hence their behavior can be attributed to the pandemic only. We attempted to study cessation and quit attempts among tobacco users during COVID-19 crisis but there are limitations to this study. ‘Cessation’ is generally abstinence from tobacco use for a minimum period of 6-12 months. However, since this

was a rapid study conducted over two months (during the initial COVID lockdown period in India), patients reporting to have stopped using tobacco completely since the lockdown started were considered to have quit tobacco. The number of quit attempts were reported for over 6 months, while the survey was conducted in months of July and August, so it can include few attempts made prior that as well. We present estimates based on a single study conducted in two large Indian cities (Delhi and Chennai). Further, the cohort was limited to urban areas of the country and does not include the tobacco users aged less than 20 years. Therefore, the findings of the study cannot be generalized to all the tobacco users in the country. Thus, we suggest large population based inter-state studies to further evaluate the effects of restrictions in access to tobacco products on tobacco use cessation.

**Conclusion:**

Upstream measures enforced by the Government of India to reduce access to tobacco products during the nationwide Covid-19 lockdown led to the creation of an enabling environment for existing tobacco users to quit. This highlights an opportunity to align communicable and non-communicable disease responses during a public health crisis that could provide lessons for future tobacco control efforts. The m-cessation, quitline and cessation services in person should be provided proactively during this opportune time to encompass more people and enable them to overcome their addiction.

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