Tobacco Cessation Program among Cab Drivers in Mumbai, India: An Intervventional Study

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Abstract

Background: Tobacco epidemic is one of the biggest public health threats, killing nearly seven million people annually. With implementation of smoke-free public places legislation, cabs in India are smoke free. However, large majority of cab drivers are addicted to tobacco. Aims: The objectives were to measure cab drivers' knowledge, attitude, and practices about tobacco pre and post intervention, educate them regarding hazards of tobacco and need for smoke-free cabs, perform oral cancer screening, and provide assistance to quit tobacco. Subjects and Methods: This interventional study among cab drivers was conducted in Mumbai during 2015–2018. Different cab unions in Mumbai were contacted and 400 cab drivers were enrolled and interviewed. They were offered health education, oral cancer screening, and tobacco cessation assistance at regular intervals for 1 year. Results: About 63.8% of cab drivers used tobacco, mainly in smokeless forms. Almost 94.1% intended to quit, 66.3% had made previous quit attempts, and 69.8% expressed the need of assistance for quitting. One hundred and twelve cab drivers were diagnosed with oral precancers and one with oral carcinoma. About 49.4% of cab drivers quit tobacco and 46.7% reduced tobacco consumption at the end of 1 year. According to multivariate logistic regression analysis, Muslim cab drivers were less likely to quit tobacco as compared to Hindus. Conclusion: Adherence to smoke-free laws plays a significant role in reducing exposure of cab drivers to secondhand smoke. This program demonstrates the successful implementation of tobacco cessation program that could be replicated among other workforces.

Keywords: Cab drivers, oral cancer screening, smokeless tobacco, tobacco cessation

Introduction

The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing annually nearly seven million people globally. Among these, around 800,000 are nonsmokers dying from breathing secondhand smoke.[1] The toll may increase to 8 million annually by 2030. More than 80% of these preventable deaths will be in low- and middle-income countries.[2]

Tobacco use and secondhand smoke are the main risk factors for a number of chronic diseases, including cancers and lung and cardiovascular diseases. Smoke-free laws protect health of nonsmokers, are popular, do not harm business, and encourage smokers to quit.[3]

The Ministry of Health and Family Welfare, Government of India, implemented the rules of “Prohibition of smoking in public places” with effect from October 2, 2008, under the COTPA 2003 Regulation.[4,5] Accordingly, commercial vehicles used to transport members of the public are smoke free. The Transport Department, in June 2011, made it compulsory for the cabs to display at least one “No-smoking” sign in a prominent position in the vehicle.

There are around 55,000 taxicabs in Mumbai. Cab drivers are exposed to secondhand smoke from customers. In addition, many cab drivers are themselves addicted to smoking and/or use of smokeless tobacco because of odd working hours, colleagues using tobacco, etc. Since tobacco is highly addictive, cab drivers using tobacco need help in quitting.

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It is equally important to raise the awareness among cab drivers regarding the hazards of tobacco and significance of smoke-free legislation. Hence, the current trial was initiated with objectives to study the knowledge, attitudes, and practices (KAP) regarding tobacco among cab drivers in Mumbai before and after the intervention, to educate them regarding hazards of tobacco and the need for smoke-free cabs, to conduct oral cancer screening, and provide tobacco cessation counseling and follow-up over 1 year.

Subjects and Methods

This is a single-arm interventional trial conducted during 2015–2018. A nonprobability convenient sampling technique was used to enroll 400 cab drivers in the study. Initially, different taxi unions in Mumbai were identified and meetings were held with some taxi unions leaders and representatives. The project was explained and their support was garnered. Medical social workers (MSWs) went to different taxi stands and explained the study to cab drivers. Those willing to participate signed an informed consent form. In this manner, 400 cab drivers in Mumbai were enrolled; MSWs conducted personal interviews with the help of well-structured questionnaire to collect information about their KAP regarding tobacco. The cab drivers were then given detailed health education regarding the hazards of tobacco and the importance of smoke-free cabs. All cab drivers were invited to participate in oral cancer screening, conducted by trained primary health workers by the method of oral visual inspection (OVI). Cab drivers with screen-positive results on OVI were referred to the preventive oncology screening clinic at the nodal hospital and were offered entire diagnosis and management at highly subsidized rates. At the nodal hospital, they underwent OVI by the medical officer and were managed and followed up according to the hospital protocol [Supplementary Figure 1].

Among the 400 cab drivers, 255 had a history of tobacco use. They were registered for tobacco cessation and underwent the first session of tobacco cessation counseling at the camp site. They were then referred to the tobacco cessation clinic at the nodal hospital and followed every three monthly with different methods of tobacco cessation over a year. Behavioral therapy was the primary modality of tobacco cessation used and it comprised focus group discussions and individual one-to-one counseling [Supplementary Figure 2]. Pharmacotherapy in the form of bupropion was restricted to those with withdrawal symptoms and those who were keen to quit but were unable to do so without support. The noncompliers for tobacco cessation were followed up at the respective taxi stands. After a year, all 400 cab drivers were again interviewed to collect information about postintervention KAP regarding tobacco. Questions used to collect information are represented in the form of a bar graph [Figure 1]. Data were entered and analyzed using SPSS (IBM SPSS Statistics, Version 25.0, Armonk, NY, USA: IBM Corp.). Qualitative data were expressed in percentages and 95% confidence intervals (CI). Predictors of tobacco habit and quitting tobacco were analyzed using univariate and multivariate logistic regression analyses by estimating odds ratios and their 95% CI. P < 0.05 was considered statistically significant. The present study was approved by the Institutional Ethics Committee of Nodal Hospital on December 03, 2014, and registered with the clinical trial registry (# NCT0235463) prior to initiation.

Results

Among the 400 cab drivers enrolled, 255 (63.8%) were tobacco users. Majority (85.1%) tobacco users consumed smokeless forms. The average age at initiation of smoking was earlier (25.9 years [10–47]) as compared to smokeless tobacco (29.75 years [10–56]). The sociodemographic characteristics of tobacco user and nonuser cab drivers is shown in Table 1. The main reasons for initiation of tobacco were curiosity, imitating family members or friends using tobacco, and peer pressure. Major reasons for continuing tobacco use were just for time pass, not being able to quit, to remain alert, and to relieve stress. Fagerstrom severity score was collected for both smoking and smokeless users. Percentage value of smoking ([score/12] × 100) and smokeless severity score ([score/16] × 100) was calculated and the maximum percentage score among them was considered. Cronbach’s alpha of smoking and smokeless Fagerstrom Severity Score scale was 0.58 and 0.46, respectively. Multivariate logistic regression analysis [Supplementary Table 1] was performed to identify the predictors of being a tobacco user or nonuser. Accordingly, cab drivers who were well educated (graduates and above) and who did not consume alcohol were less likely to be tobacco users.

In this study, eight factors were used to assess knowledge and three to assess attitude. Practice was assessed using tobacco cessation stages (i.e. precontemplation, contemplation, preparation, action, maintenance, and relapse). Action and maintenance stages were compiled as cessation. Figure 1 shows a comparison of pre- and postintervention KAP of cab drivers. It shows that cab drivers had good knowledge regarding tobacco being harmful, that it causes cancer, awareness regarding laws banning smoking in public places, and realized the importance of smoke-free laws both in pre- and postintervention period, while their knowledge regarding other harmful effects of tobacco, including respiratory diseases, cardiac diseases, and stroke, and regarding harmful chemicals present in smoke was very poor in the preintervention period and increased considerably in postintervention period.

Tobacco users were enrolled in tobacco cessation programs and followed up every three monthly. With each round of intervention, tobacco users passed through different stages of cessation. This is depicted in Figure 2. Initially, 94.1% of tobacco users reported their willingness to quit and 66.3% gave a history of previous quit attempts. About 69.8% of tobacco-using cab drivers expressed the need of assistance for quitting tobacco.
Five cab drivers substituted to other forms of tobacco while attempting to quit. Four cab drivers quit for some time but had a relapse later. At the end of 1-year follow-up for each cab driver, a tobacco quit rate of 49.4% (95% CI: 43.1–55.7) was achieved. In addition, 46.7% (95% CI: 40.4–53.0) of cab drivers reduced their tobacco consumption. According to multivariate logistic regression analysis [Supplementary Table 2], only religion influenced tobacco quitting. Cab drivers who were Hindu were more likely to quit smoking (odds ratio: 3.1, 95% CI: 1.4–6.8). Table 1 shows the distribution of sociodemographic characteristics among tobacco users and nonusers of cab drivers.

| Variables                   | Categories                      | Tobacco users (255), n (%) | Tobacco nonusers (145), n (%) |
|-----------------------------|---------------------------------|----------------------------|-------------------------------|
| Age groups (years)          | ≤30                             | 33 (54.1)                  | 28 (45.9)                     |
|                             | 31-40                           | 122 (68.5)                 | 56 (31.5)                     |
|                             | 41-50                           | 65 (60.7)                  | 42 (39.3)                     |
|                             | >50                             | 35 (64.8)                  | 19 (35.2)                     |
| Mean (SD)                   |                                 | 38.93 (8.60)               | 39.59 (8.88)                  |
| Marital status              | Married                         | 244 (64.0)                 | 137 (36.0)                    |
|                             | Unmarried                       | 11 (57.9)                  | 8 (42.1)                      |
| Education                   | Illiterate                      | 9 (64.3)                   | 5 (35.7)                      |
|                             | Literate without formal education| 16 (76.2)                  | 5 (23.8)                      |
|                             | Primary/secondary               | 190 (66.0)                 | 98 (34.0)                     |
|                             | Higher secondary                | 37 (60.7)                  | 24 (39.3)                     |
|                             | Graduate and above              | 3 (18.7)                   | 13 (81.3)                     |
| Religion                    | Hindu                           | 211 (63.0)                 | 124 (37.0)                    |
|                             | Muslim                          | 44 (67.7)                  | 21 (32.3)                     |
| Average monthly income (Rs.)| <10,000                         | 53 (68.8)                  | 24 (31.2)                     |
|                             | 10,000-19,000                   | 195 (62.3)                 | 118 (37.7)                    |
|                             | >19,000                         | 7 (70.0)                   | 3 (30.0)                      |
| Accommodation status        | Family                          | 218 (63.0)                 | 128 (37.0)                    |
|                             | Bachelor accommodation with other peers | 36 (69.2) | 16 (30.8)                  |
|                             | Relatives                       | 1 (50.0)                   | 1 (50.0)                      |
| Alcohol consumption         | Daily drinking                  | 14 (100.0)                 | 0 (0.0)                       |
|                             | Regular drinking (≥3 times/week) | 60 (80.0)                  | 15 (20.0)                     |
|                             | Social drinking (<3 times/week) | 54 (71.0)                  | 22 (29.0)                     |
|                             | Nondrinker                      | 127 (54.0)                 | 108 (46.0)                    |

SD: Standard deviation

Figure 1: Comparison of pre and post intervention knowledge and attitude about tobacco use among cab drivers.
drivers with Muslim religion were less likely to quit tobacco as compared to Hindus.

Among the 400 cab drivers examined by OVI, 112 (28.0%, 95% CI: 23.7–32.7) cab drivers were diagnosed with oral precancerous lesions and one cab driver with invasive oral carcinoma. The distribution of oral precancerous lesions is as follows: 93 leukoplakia, 13 erythroplakia, 4 erythroleukoplakia, 29 with submucus fibrosis, and three suspicious ulcer. Thirty cab drivers were diagnosed with multiple oral precancers. All these cab drivers with precancers and cancer were managed at the nodal hospital.

Discussion

Mumbai cab drivers have much higher tobacco use (63.8%) as compared to national (42.4%) and state-level usage (35.5%) among men. However, Bengaluru cab drivers had even higher tobacco usage (70.9%). About 85% of tobacco users in the present study used smokeless tobacco. Khaini was used by 48% of tobacco-using cab drivers in Mumbai. About 55% of Bengaluru cab drivers consumed smokeless tobacco, mainly gutka, khaini, and zarda. According to GATS 2 survey, smokeless tobacco use among men in India is 29.6% and in Maharashtra is 31.7%. GATS Maharashtra survey also shows khaini and gutka to be the two most common tobacco products in Maharashtra, with 15.5% adults using khaini and 8.6% adults using gutka. Cigarette smoking was the second most common form used by 18% of cab drivers using tobacco in this study. In Maharashtra, only 6% of men smoke.

In the present study, the mean age at initiation of smoking tobacco was 26 years and of smokeless tobacco was 30 years. This was much higher than the national and state average. This indicates that many cab drivers initiate the habit after starting their job as cab drivers because of peer pressure or imitating their colleagues. In Maharashtra, the mean age at initiation of tobacco use has decreased from 18.5 years in GATS 1 to 17.4 years in GATS 2. The mean age at initiation of smoking and smokeless tobacco was 18.9 and 18.8 years among daily users in India. Reasons for initiation and continuation of tobacco use among cab drivers were similar in both Mumbai and Bengaluru. Influence of family members using tobacco has been identified as a reason for initiation of tobacco habit by some earlier studies also.

Multivariate analysis indicates higher education among cab drivers and being a nonuser of alcohol to be predictors of being a tobacco nonuser. Some other survey articles by Agrawal et al. and Palipudi et al. have also demonstrated the relation between lesser education and tobacco use.

Assessment of baseline knowledge of cab drivers shows that they were aware of tobacco being harmful and it causing cancer. Their knowledge regarding other harmful effects of tobacco and regarding harmful chemicals present in the smoke was very poor. Similar findings were seen in a survey of Vietnamese adults and in Mangalore study. In the present study, participants’ knowledge improved after health awareness program. Similar findings are also noted in other studies, suggesting that a well-conducted health awareness program can increase knowledge and assist in quitting the habit.

In the present study, 94% of tobacco users wanted to quit tobacco and 66% had made previous quit attempts. According to the CDC in 2015, 68% of adult smokers in the US wanted to quit and 55.4% had made a past-year quit attempt. As per data from a longitudinal cohort of smokers from Canada, many smokers may take 30 or more quit attempts to be successful. In this study, 70% of tobacco-using cab drivers expressed the need of assistance for quitting, though none had used any such assistance prior to the current program. The CDC data show that 31.2% of tobacco users had used cessation counseling and/or medication when trying to quit. In our study, five cab drivers substituted to other forms of tobacco and four cab drivers had a relapse later while attempting to quit. A study among US National shows that 38% of smokers had tried an alternative tobacco product, most frequently e-cigarettes, in an attempt to quit. However, data did not support the use of
alternative products while quitting tobacco. Substitution to other smokeless products and few relapses during follow-up have been recorded in earlier studies in India.

At the end of 1 year, 49.4% of cab drivers quit tobacco and 46.7% reduced their tobacco consumption, in this study. Tobacco quit rate of 40% was noted in a chemical industry in India, while varying results were obtained with different tobacco cessation interventions in a study among call center employees. In a community-based tobacco cessation program among women in Mumbai, a quit rate of 33.5% was achieved. In the US, as of 2015, 59.1% of adults who had ever smoked had quit.

In our study, cab drivers with Muslim religion were less likely to quit tobacco as compared to others. A cessation program among women noted that women with higher age groups and those consuming tobacco on multiple occasions were less likely to quit. Female gender was the most important predictive factor for quitting tobacco among the BPO employees.

In the present study, 28% of the 400 cab drivers examined had oral precancerous lesions and one cab driver was diagnosed with invasive oral carcinoma. In the Bengaluru study and study conducted in rural India for industrial employees, the number of precancers diagnosed was comparatively less than the present study. Warkakulasuriya et al. have concluded that conducting oral screening with OVI is effective and feasible at the workplace.

**Conclusion**

High tobacco usage and high prevalence of oral precancers were seen among cab drivers. Awareness among cab drivers with respect to hazards of tobacco and smoke-free laws improved after participation in health education program. To conclude, a well-designed tobacco cessation program with intensive and effective tobacco cessation counseling and follow-ups can lead to good tobacco quit rates among the cab drivers.

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**Conflicts of interest**

There are no conflicts of interest.

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Supplementary Figure 1: Methodology

Meeting with the cab drivers & union leaders to ensure their support and participation

Cab drivers were explained about the program & invited to participate. Informed consent was obtained

400 cab drivers were enrolled

First Visit: Pre-Intervention (n=400)
1. Collected information about their Knowledge, Attitudes and Practices (KAP) regarding tobacco
2. Health Education Program

400 Cab drivers were invited to participate in oral cancer screening, conducted by trained Primary Health Workers (PHWs) by the method of Oral Visual Inspection (OVI)

Screen Positive
- Referred to Preventive Oncology screening clinic of Nodal Hospital
- Diagnostic investigations were conducted at Nodal Hospital
- Confirmed Positive
  - Treatment at Nodal Hospital
- Confirmed Negative
  - Regular follow up

Screen Negative
- No referral required

Last Visit: Post Intervention Knowledge, Attitude and Practices (n=400) regarding tobacco was collected after one year of enrollment. Assessment of KAP of the cab drivers, their perception regarding implementation of law and rate of oral pre cancers detected

Supplementary Figure 2: Tabaco User

255 tobacco users were offered interventions in the form of behavioral therapy

After pre-intervention session, four interventions were provided every three monthly for duration of one year and quit rates were assessed. Participation in each follow-up intervention is as shown below

Second Intervention (n=239)
Duration - After 3 months

Third Intervention (n=241)
Duration - After 6 months

Fourth Intervention (n=246)
Duration - After 9 months

Post-Intervention (n=246)
Duration - After 12 months
| Variables                  | Categories                  | Tobacco users (255), \( n \), % | Tobacco nonusers (145), \( n \), % | Univariate analysis | Multivariate analysis |
|----------------------------|-----------------------------|---------------------------------|-----------------------------------|---------------------|-----------------------|
|                           |                             | OR                              | 95% CI                           | \( P \)             | OR                    | 95% CI                | \( P \)             |
| Age groups (years)         | ≤30                         | 33 (13.0)                       | 28 (19.3)                        | 1                   |                       |                      |                    |
|                           | 31-40                       | 122 (47.8)                      | 56 (38.6)                        | 1.85                | 1.02-3.35             | 0.043                |
|                           | 41-50                       | 65 (25.5)                       | 42 (29.0)                        | 1.31                | 0.70-2.48             | 0.401                |
|                           | >50                         | 35 (13.7)                       | 19 (13.1)                        | 1.56                | 0.74-3.32             | 0.244                |
| Mean (SD)                 |                             | 39.26 (8.73)                    | 38.94 (9.13)                     |                     |                       |                      |                    |
| Marital status            | Married                     | 244 (95.7)                      | 137 (94.5)                       | 1                   |                       |                      |                    |
|                           | Unmarried                   | 11 (4.3)                        | 8 (5.5)                          | 0.77                | 0.30-1.97             | 0.587                |
| Education                 | Illiterate                  | 9 (3.5)                         | 5 (3.4)                          | 1                   | 1                     |                      |                    |
|                           | Literate without formal     | 16 (6.3)                        | 5 (3.4)                          | 1.78                | 0.40-7.84             | 0.447                | 0.36-7.86 | 0.503 |
|                           | education                  |                                 |                                 |                     |                       |                      |                    |
|                           | Primary/secondary           | 190 (74.5)                      | 98 (67.6)                        | 1.08                | 0.35-3.30             | 0.897                | 0.95     | 0.30-0.931 |
|                           | Higher secondary            | 37 (14.5)                       | 24 (16.6)                        | 0.86                | 0.26-2.87             | 0.802                | 0.82     | 0.23-0.86 |
|                           | Graduate and above          | 3 (1.2)                         | 13 (9.0)                         | 0.13                | 0.02-0.68             | 0.016                | 0.13     | 0.02-0.71 |
|                           |                             |                                 |                                 |                     |                       |                      |                    |
| Religion                  | Hindu                       | 211 (82.7)                      | 124 (85.5)                       | 1                   |                       |                      |                    |
|                           | Muslim                      | 44 (17.3)                       | 21 (14.5)                        | 1.23                | 0.70-2.17             | 0.471                |                     |
| Average monthly income (Rs.) | <10,000                  | 53 (20.8)                       | 24 (16.6)                        | 1                   |                       |                      |                    |
|                           | 10,000-19,000               | 195 (76.5)                      | 118 (81.4)                       | 0.75                | 0.44-1.28             | 0.287                |                     |
|                           | >19,000                     | 7 (2.7)                         | 3 (2.0)                          | 1.06                | 0.25-4.44             | 0.940                |                     |
| Accommodation status      | Family                      | 218 (85.5)                      | 128 (88.3)                       | 1                   |                       |                      |                    |
|                           | Bachelor accommodation with other peers | 36 (14.1) | 16 (11.0) | 1.32 | 0.70-2.48 | 0.385 |                     |
|                           | Relatives                   | 1 (0.4)                         | 1 (0.7)                          | 0.59                | 0.04-9.47             | 0.707                |                     |
| Alcohol consumption       | Daily drinking              | 14 (5.5)                        | 0                                | 1                   | 1                     |                      |                    |
|                           | Regular drinking (≥3 times/week) | 60 (23.5) | 15 (10.3) | 1 | | | |
|                           | Social drinking (<3 times/week) | 54 (21.2) | 22 (15.2) | 0.61 | 0.29-1.30 | 0.203 | 0.60 | 0.28-1.29 | 0.189 |
|                           | Nondrinker                  | 127 (49.8)                      | 108 (74.5)                       | 0.29                | 0.16-0.55             | 0.000                | 0.29     | 0.16-0.56 |

SD: Standard deviation, CI: Confidence interval, OR: Odds ratio
**Supplementary Table 2: Multivariate logistic regression analysis showing predictors of quitting tobacco**

| Variables                      | Categories       | Tobacco quitters (126), n (%) | Tobacco nonquitters (129), n (%) | Univariate analysis | Multivariate analysis |
|--------------------------------|-------------------|-------------------------------|-----------------------------------|---------------------|-----------------------|
|                                |                   |                               |                                   | OR                  | 95% CI                | P         |
|                                |                   |                               |                                   | P                   | OR                    | 95% CI    | P         |
| Age groups (years)             | ≤30               | 18 (14.3)                     | 15 (11.6)                         | 1                   | 1                     | 1         |
|                                | 31-40             | 60 (47.6)                     | 62 (48.0)                         | 0.81                | 0.37-1.74             | 0.585     |
|                                | 41-50             | 31 (24.6)                     | 34 (26.4)                         | 0.76                | 0.33-1.76             | 0.522     |
|                                | >50               | 17 (13.5)                     | 18 (14.0)                         | 0.79                | 0.30-2.04             | 0.622     |
|                                | Mean (SD)         | 38.93 (8.60)                  | 39.59 (8.88)                      |                     |                       |           |
| Marital status                 | Married           | 121 (96.0)                    | 123 (95.3)                        | 1                   |                       |           |
|                                | Unmarried         | 5 (4.0)                       | 6 (4.7)                           | 0.85                | 0.25-2.85             | 0.789     |
| Education                      | Illiterate        | 3 (2.4)                       | 6 (4.6)                           | 1                   |                       |           |
|                                | Literate without formal education | 3 (2.4)                     | 13 (10.1)                         | 0.46                | 0.71-2.99             | 0.418     |
|                                | Primary/secondary | 94 (74.6)                     | 96 (74.4)                         | 1.9                 | 0.48-8.06             | 0.352     |
|                                | Higher secondary  | 23 (18.2)                     | 14 (10.9)                         | 3.2                 | 0.71-15.3             | 0.129     |
|                                | Graduate and above | 3 (2.4)                      | 0                                 |                     |                       |           |
| Religion                       | Hindu             | 112 (88.9)                    | 99 (76.7)                         | 1                   |                       |           |
|                                | Muslim            | 14 (11.1)                     | 30 (23.3)                         | 0.41                | 0.21-0.82             | 0.013     |
|                                | Previous quit attempts | Yes                      | 82 (65.1)                        | 87 (67.4)           | 1                     | 1         |
|                                |                   | 43 (34.1)                     | 42 (32.6)                         | 1.09                | 0.64-1.83             | 0.756     |
|                                | No                | 1 (0.8)                       | -                                 |                     | -                     |           |
| Fagerstrom severity score      | ≤10               | 7 (5.6)                       | 4 (3.1)                           | 1                   |                       |           |
|                                | 11-20             | 7 (5.6)                       | 2 (1.5)                           | 2                   | 0.27-14.70            | 0.496     |
|                                | 21-30             | 14 (11.1)                     | 6 (4.6)                           | 1.33                | 0.28-6.33             | 0.717     |
|                                | 31-70             | 98 (77.7)                     | 115 (89.2)                        | 0.49                | 0.14-1.71             | 0.262     |
|                                | >70               | -                             | 2 (1.6)                           |                     |                       |           |

SD: Standard deviation, CI: Confidence interval, OR: Odds ratio