



## EFFECTIVENESS OF COMMUNITY HEALTH NURSE DELIVERED INTERVENTIONS FOR SMOKING CESSATION IN MAPPEDU VILLAGE, TIRUVALLUR DISTRICT, TAMIL NADU- CLUSTER RANDOMIZED TRIAL

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### Abstract

**Introduction:** Smoking cessation is difficult, but it is possible with community and individual interventions. Counseling for quitting smoking is still lacking. The Indian government extended the role of community health nurses (CHNs) in 2013 to encourage healthy living choices including home based counseling to stop or quit smoking in a community. The aim is to find out the effectiveness of the CHNs delivered intervention for smoking cessation.

**Materials and method:** Text messages were selected based on the scientifically proven facts. The selected participants were randomly divided into two groups where one group of participants received daily whatsapp text messages and counseling by the community health nurse on daily basis (group-1, n=81) while the other group of participants received the whatsapp text messages daily and counseling for three times a week (group-2, n=81). This was followed for 4 weeks to evaluate the reduction in carbon monoxide level among two groups. Descriptive statistics and chi square test was used for age and educational groups. To compare the values of carbon monoxide levels between the groups, Mann Whitney U test was employed.

**Results:** A high statistically significant difference was found between the groups after intervention with  $15.20 \pm 5.15$  as their mean where p value is 0.002 ( $p < 0.05$ ) with 95% CI.

**Conclusion:** Daily counseling by a community nurse along with daily whatsapp text messages is more effective than the community nurse delivering the counseling thrice a week with daily whatsapp text messages.

**Key words:** Text messages, Smoking, Community Health Nurse

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## 1. Introduction

The majority of teenagers who smoke would really like to stop and also have made a significant effort to achieve this goal in recent years (67% of females and 56% of males), but most of these attempts are made on their own and are ineffective<sup>1</sup>. The male and female who tried to quit smoking had a success rate of 13.0% and 11.5%<sup>23</sup>.

Just a 4.3% absolute reduction in smoking cessation rates was observed as a result in one meta-analysis which consisted of sixty-four adolescent tobacco-cessation programmes. Consequently, it is in need of efficient and practical treatment methods (4). In 2004, the World Health Organization (WHO) predicted that 58.8 million deaths would occur worldwide, of which 5.4 million would be related to tobacco use. In 2025, there will be 1.5 to 1.9 billion smokers worldwide (5). The WHO declared that the use of the tobacco pandemic constitutes one of the world's most serious public health risks (6). Cigarette exposure was measured using a variety of procedures, including the cotinine which is considered as the elementary metabolite of nicotine assays in human excretions, blood, breath carbon monoxide analysis (BCO), and self addressing of tobacco use. Assessment of cotinine in nonpregnant people is observed as the most prominent and authentic marker of smoking tobacco and ETS exposure (7). The BCO analyzer, on the other hand, is a quick, noninvasive, well known and inexpensive method to evaluate smoking and ETS status, which is suited for the measurement of smoking status in a wide range of clinical practice, along with prenatal clinics. Even though giving up smoking is difficult, it is still possible with community and individual interventions (8).

Individual-level interventions have really been slow to catch up in low- and middle-income countries (LMICs) (9)(10). While high-income countries have significantly incorporated all types of intercession to curtail smoking rates, where low-income countries have struggled to do so. Counseling for cessation of smoking is still lacking (11)(12). In a country like India the probable readiness to quit smoking rates will increase by communication through channels. In India, community health nurses (CHNs) offered the health care services for the patients for the management of maternal, communicable, and premature birth and other medical conditions. (13). In the year 2013, government of India extended the CHNs duty to encourage healthy lifestyle preferences, such as by motivating them to quit smoking, based on counseling sessions home to home (14). Regrettably, due to a massive lack of training and support, including the inevitable

difficulties of behavior change, most CHNs feel poorly prepared and overburdened, necessitating additional outside assistance (15). In 2015, the government launched the tobacco Cessation Programme, which is a statewide mobile health intervention that sends text messages to people who smoke and would like to quit (15,16). Despite the reality that nearly 2 million people have signed up for the programme, the overwhelming number of them believe that personal counseling is needed as an extra effort for smoking cessation (17). Motivational interviewing (MI) is a patient-oriented communication approach that has been shown to reduce smoking rates significantly in people who are not ready to quit and to people with less desire to quit and who are resistant to cessation programmes (18)(19). MI has been demonstrated to be successful in motivating people of all ages to quit smoking (20). Even though it is primarily used by skilled smoking cessation counselors in high-income countries (21), it has recently been discovered to be of great potential in low- and middle-income countries when used by a person who has received some training to deliver healthcare services but is not a health professional. Amidst the success rate of MI in the cessation of smoking, it has never been studied in India. Although it can be seen that combining the use of CHNs and text messaging has the potential to boost the cessation of smoking rates in LMICs, there is no evidence to back this up. Our team has extensive knowledge and research experience that has translate into high quality publications<sup>4-13</sup>. To fill this scientific proof shortfall, we aimed to evaluate the effectiveness of the CHNs delivered intervention for smoking cessation and we stated the null hypothesis as, there is no significant difference between the people who receive daily counseling from CHN along with WhatsApp text messages and people who receive CHN counseling three times a week along with WhatsApp text messages.

## 2. Materials and methods

Study design: Cluster Randomized Trial

Study setting: Mappedu village, Thiruvallur

Study duration: 4 weeks

Study population: Smokers aged from 18 to 65

Calculation of sample size: We estimated the sample size by a previous study done by Vittal Hejjaji et al., by G\* Power Software Version 3.1.9.4 (Franz Faul, Universitat Kiel, Germany). Power of 0.95 and  $P \leq 0.05$  and sample size arrived were 162.

Ethical clearance: The study's detailed protocol was drafted and submitted to the Institutional Review

Board (Saveetha Review Board, Saveetha Dental College, SIMATS) for scrutiny. The trial was started after obtaining the Ethical clearance from the institution.

**Eligibility criteria:**

**Inclusion criteria:** People aged 18 to 65 years old who are smoking with or without any known history of systemic illness, who consented for their participation are the inclusion of the study. Participant who has a mobile phone with whatsapp facility.

**Exclusion criteria:** Bed ridden patients and who are not willing to participate in the study

Mtext for tobacco cessation

Text messages were selected based on the scientifically proven facts (benefits, harms and easy to withdraw the use of tobacco) of tobacco which are converted into Whatsapp text messages and sent through whatsapp application to the participants. A community nurse posted in the Mappedu village was selected, trained for giving anti tobacco counseling to the study participants. The training to the community nurse was given by the investigator in an efficient way.

The selected participants were randomly divided into two groups where one group of participants received daily whatsapp text messages and counseling by the community health nurse on daily basis (group-1, n=81) while the other group of participants received the whatsapp text messages daily and counseling for three times a week (group-2, n=81).

**Carbon Monoxide level evaluation:**

To assess the carbon monoxide level in the participants, a carbon monoxide breath analyser (piCO Smokerlyzer) was used. Carbon monoxide evaluation is an instant, non-invasive, efficient and flexible means of validating the smoking status. Carbon monoxide level was evaluated at baseline and at four weeks of intervention to assess the change in carbon monoxide level among two groups.

Statistical analysis

The collected data were transferred to SPSS software version 23 (IBM SPSS statistics). Kolmogorov- Smirnov normality test indicated the non normal distribution of data. Descriptive statistics were employed for both the categories groups with age and education. Therefore, the Mann Whitney U test was performed for the between group comparison. With 95% CI,  $p > 0.05$  was statistically significant. Kruskal-Wallis test was used to analyze the difference in carbon monoxide values between the groups categorized by age and education. Wilcoxon test analyzed the difference in before and after intervention mean

carbon monoxide values among different age groups and educational qualification.

**3. Results**

During the study period, 162 participants were divided into two groups: one group received daily whatsapp text messages and counseling from the community health nurse on a daily basis (group-1, n=81), while the other group received daily whatsapp text messages and counseling three times a week (group-2, n=81). This was followed for four weeks to assess the difference in carbon monoxide levels between the two groups.

The mean carbon monoxide levels of different groups were given in table 1. The mean carbon monoxide level of group 1 after intervention is  $13.77 \pm 3.67$  showing a significant difference than the mean carbon monoxide level of group 2 after intervention. Table 2 and 3 shows the mean carbon monoxide levels of different age groups and educational category of both groups. There is a high statistically significant difference found between the groups after intervention with  $15.20 \pm 5.15$  as their mean where p value is 0.002 ( $p < 0.05$ ) (Table 4). These results indicated that the people who are receiving the counseling daily with daily whatsapp text messages showed significant reduction in smoking cessation rates since the carbon monoxide levels are reduced after the 4 weeks follow ups.

**4. Discussion**

In this study we evaluated the effectiveness of intervention undertaken to quit smoking which involves a community health nurse who is trained to deliver counseling anti-tobacco counseling and whatsapp text messages framed according to an individual's readiness to quit in a cluster randomized trial. The result showed that 8th to 12th grade had the highest smoking rates. The relatively large proportion of participants who quit smoking after receiving an optimal dose of the combined intervention suggests that a greater amount of support provided through CHW and text messages may be an effective solution to improve smoking cessation rates in India. However, the potential effectiveness of this finding is limited by the willingness of participants to receive the intervention at high doses.

According to vittal hejaji et al the younger and educated people who participated in the study had higher levels of smoking cessation rate. In contrast, our study results showed that participants above 50 years of age and 8th to 12th grade level of educated participants showed higher rates of smoking<sup>14</sup>. At the end of 12-months, there were equal and high

abstinence rates in boys was 13.9% and girls with 16.6% in counseling groups. In the information control group, the cessation rate in boys was 13.2% and in girls it was 15.5%. Surpassing the average abstinence rate in the recently conducted meta-analysis (9%). Only male participants were included in the study and showed significant reduction in smoking rate at the end of 4th week<sup>15</sup>. The result of the study where counseling as an intervention showed that the reduction in the number of cigarettes smoked at the end of 3rd month without any difference in the gender. Similar results were found in our study where significant reduction was seen among the participants. Similarly, the majority of the studies<sup>16,17</sup> generally excluded people who are not ready or motivated to quit smoking. But we demonstrate that the CHN model of delivering the counseling and motivational interviewing can be a potential solution to motivate individuals in quitting smoking.

Bittencourt and Scarinci et al., concluded their study as,<sup>18</sup> And hence our study concludes that community nurses delivering the anti tobacco counseling daily with daily text messages showed significant reduction in the smoking rates than the thrice a week counseling.

#### Limitation and future scope

The first limitation of the study is that it focused only on those who smoke cigarettes and bidis, and did not consider the smokeless form of tobacco users. Secondly, since the community health nurse was a female, only male participants were included in the study, which may act as a confounding factor of the study that can alter our final results. Third, Generalizability is limited since the study was conducted only in the single village. Fourth, 4-week followup is one of the major limitations of the study. Our team has extensive knowledge and research experience that has translated into high quality publications (27-36). The future scope should limit the limitation of the current study with larger sample size and community health nurse support in multiple regions.

#### 5. Conclusion

In conclusion, the community nurse delivering the counseling with daily text messages through whatsapp is more effective than the community nurse delivering the counseling thrice a week with daily text messages. However, the differences are statistically significant among two groups, larger sample size and follow up is needed in the future study for higher evidence.

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**Tables**

Table 1. Mean carbon monoxide levels of each group

Variables	Mean ± SD
Group 1 (Before intervention)	19.32±3.75
Group 1 (After intervention)	13.77±3.67
Group 2 (Before intervention)	19.87±4.6
Group 2 (After intervention)	17.50±4.75

Table 2. Mean Carbon monoxide levels among the different age groups

Variables	Daily counseling (Group 1)		P Value	Thrice a week counseling (Group 2)		P Value
	Before intervention	After intervention		Before intervention	After intervention	
18-25 years	19.12±4.12	14.12±3.52	0.011	17.75±4.39	15.62±3.62	0.008

26-35 years	18.36±2.98	12.64±3.33	0.000	19.89±4.63	17.42±4.80	0.000
36-50 years	18.77±4.11	14.88±4.11	0.011	20.33±5.17	20.85±4.55	0.011
Above 50 years	23.21±3.66	16.92±1.97	0.001	18.11±5.10	18.50±5.03	0.001
	0.002	0.001		0.428	0.559	

Table 3. Mean Carbon monoxide levels among the different educational groups

variables	Daily counseling		P Value	Thrice a week counseling		P Value
	Before intervention	After intervention		Before intervention	After intervention	
Below 8th grade	17.60±5.85	13.60±4.27	0.002	21.40±5.36	19.20±5.89	0.04
8th to 12th grade	20.75±3.97	15.41±2.88	0.000	20.29±4.98	18.04±5.40	0.000
Diploma holder	20.17±3.79	15.76±2.94	0.000	19.41±4.51	17±3.95	0.001
Graduate	18.17±2.84	11.71±3.41	0.000	19.60±4.50	17.14±4.52	0.000
	0.026	0.000		0.893	0.866	

Table 4 Between group comparison of the participants

Variables	Mean±SD	Mean rank	P Value
Carbon monoxide levels Before intervention in both groups (group1 vs group 2)	19.24±4.71	84.33&78.67	0.441
Carbon monoxide levels after intervention in both groups (group 1 vs group 2)	15.20±5.15	70.41 & 92.59	0.002

p>0.05 as statistically significant