

The Effect of Behavioural Modification Therapy on Tobacco Cessation among Patients Visiting a Dental Institution in Bangalore – A Pragmatic Study

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ABSTRACT

Background: Tobacco use results in over 6 million deaths throughout the world annually. It is anticipated that by 2020, 13.3% of deaths in India will be directly related to tobacco usage, up from 1.4% in 1990. Massive initiatives that could help people quit smoking have been implemented over time.

Materials and Methods: A total of 60 current tobacco users participated in the study. The Fagerstrom Nicotine Dependence scale was used to assess the extent of addiction to smoking and smokeless tobacco, and a carbon monoxide (CO) breath analyzer was used to detect carbon monoxide levels in smokers. The extent of addiction was evaluated at the beginning and at 10th, 30th, 3 months and 6 months of follow-up.

Results: Participant's average addiction level on the Fagerstrom scale was 3.7 (CI = (2.6 to 4.7) for smokers at baseline, which was reduced to 2.2, CI = (1.3 to 3.1) at the end of treatment ($p < .0001$) and 5.4 CI = (4.5 to 6.2) for participants using smokeless tobacco at baseline, which was reduced to 2.4, CI = (1.8 to 3.1) at the end of treatment ($p < .0001$). Based on behavioural modification therapy (BMT) there was a significant reduction in addiction and CO levels from the baseline to 6 months of follow-up.

Discussion: By using BMT and well planned follow-up, people in both groups were able to minimize their tobacco use, and the majority of participants had a favorable attitude towards the tobacco cessation program.

Keywords: Behavioural therapy, Tobacco dependence, Tobacco cessation counselling, Public health intervention.

INTRODUCTION

Ten years earlier than non-smokers, tobacco users are predicted to pass away.¹ The most common preventable cause of non-communicable diseases and fatalities is smoking. Over 7 million of the 8 million deaths that occur annually worldwide are specifically attributable to tobacco usage.² In India, there are 26.7 crore persons aged 15 and over who use any type of tobacco, or 28.6% of the population, according to the GATS study (2016–17).³ Due to the widespread use of several smoking products and smokeless tobacco varieties, India's tobacco problems are extremely complicated. 3.2 crore adults smoke both tobacco products.³⁻⁵ Smokeless tobacco (SLT) products are widely used in nations like India and Bangladesh, which account for 232 of the 248 million SLT consumers globally.⁶ In this context, clinical tobacco cessation counselling is one of the most significant and affordable preventive interventions that a medical or dental doctor can provide.⁷ Behavioural therapies are successful in helping people stop using SLT, according to a comprehensive assessment of SLT cessation strategies from both high-income and low-income countries.⁸ An exceptionally cost-effective method of conserving life and lowering poor health has been demonstrated by smoking cessation therapies, both brief and intense.⁹ The most prevalent and easily accessible interventions right now are self-help books,

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brief counselling, individual behavioural counselling, group behaviour therapy programmes, and telephone counselling. Both rural and urban areas of India utilise mobile phones extensively.⁸ According to an analysis of 26 smoking cessation trials, automated text messaging interventions were more successful than the bare minimum of assistance for quitting, and text messaging coupled to other smoking cessation interventions was more successful than other separate smoking cessation interventions.¹⁰ The primary service offered by quit lines is behavioural counselling, which assists callers in creat-

ing and implementing a plan to give up tobacco use. The focus of smoke cessation interventions has been on attempts to give up. Interventions including stimuli control techniques, social skills training, relapse prevention training, psychoeducation, brief interventions like 5A's, and motivational techniques have been successful in environments that cater to people with mental illnesses and tobacco use.¹¹⁻¹² In this study, we present data from an intense outpatient programme for treating tobacco dependency, using behavioural modification therapy, or BMT, which is provided to those who have previously struggled with tobacco dependence. We aimed to assess the addiction level in tobacco users and carbon monoxide (CO) level in smokers. The intervention involved up to 24 weeks of individual behavioural counselling support. We hypothesized that at the end of the treatment, tobacco addiction and CO levels will reduce as well as the prediction of quitting tobacco through specific BMT.

MATERIALS AND METHODS

Study Design:

This pragmatic study used the Fagerstroms Test for Nicotine Dependence (FTND) to evaluate the degree of addiction in smokers and smokeless tobacco users. A carbon monoxide (CO) breath analyzer was used to monitor carbon monoxide (CO) levels in smokers.

Sample Size:

The sample size was estimated using the G Power software v. 3.1.9.4 [(Franz Faul, Universität Kiel, Germany). Considering the effect size to be measured (d_z) at 50%, the power of the study at 95%, and the alpha error at 5%, the sample size needed was 54. Anticipating 10% attrition during the follow-up period, the sample size was inflated to 60 subjects. Further, the samples were subdivided based on the form of tobacco use into 2 groups [Smoke and Smokeless], which comprised 30 subjects each.

Study Sample:

This pragmatic study was carried out, among the individuals attending the tobacco cessation clinic of the Department of the Public Health Dentistry, Rajarajeswari Dental College and Hospital (RRDCH) Bangalore. Participants include individuals who gave informed consent to participate in the study, patients aged between 18-80yrs, patients using smoking and smokeless tobacco for more than 6 months, and patients using tobacco more than 3 times per day, patients who have not undergone any behavioural counselling in the past four weeks before the baseline examination. Participants who did not give informed consent to participate in the study, pregnant or lactating females, patients undergoing nicotine replacement therapy, and those who were undergoing antibiotic or anti-inflammatory therapy or on medication for any underlying systemic disorders were excluded.

The personal details of each patient were then collected (age, sex, educational level, employment), as variables relating to tobacco consumption (presence of disease related to tobacco consumption, number of cigarettes or smokeless tobacco used per day, age when the patient started using tobacco, years of using tobacco). Then the stage of change, according to the five stages of change described by Prochaska DiClemente¹³ pre-contemplative, contemplative, action, maintenance, and

relapse was determined. The degree of nicotine dependency was assessed by Fagerstrom's test.¹⁴ Each patient was given a set of questions, and a certain score was obtained, which varied on a scale from 0–10. A degree of slight dependency was considered when the score varied from 0 to 3 points; moderate dependency from 4 to 6 points; and severe dependency from 7 points or over. In all patients, the level of carbon monoxide in the exhaled air at the start of the study was measured using a micro-smokerlyzer carbon monoxide (CO) monitor¹⁵ (Bedfont Technical Instruments Ltd).

Modes of Interventions:

Out of 60 participants, 30 were smoking tobacco and 30 were using smokeless tobacco. Everyone received behavioural therapy on tobacco cessations which included brief advice/minimal clinical interventions, individual behavioural counselling like Nicotine Fading, and telephonic follow-up. After assessing each of them separately. The baseline data contained socioeconomic profile, daily tobacco use pattern, nicotine addiction level [(assessed using Fagerstroms Test for Nicotine Dependence (FTND)], oral health status and history of dental treatment. For each patient, the principal investigator delivered the Behavioural Modification Therapy (BMT) for 20 minutes.. This program aimed at changing tobacco cessation through monitoring of thought, skill building, interpersonal contact, and mood. Almost half of the session was loyal to the discussion of tobacco cessation issues. The most common situation that the study participants identified as triggering craving or prompting use were regularly discussed in each session. Cigarette smoking often arose from boredom or fear of experiencing nicotine withdrawal symptoms during a meeting. A quit date for both smoking and smokeless tobacco users was set between the first and third BMT session. Then our study discussed various models including the 5A's and 5R's and a key aspect of the significance of motivation, barriers, and benefits of quitting and relapse, pros, and cons of nicotine fading, merits of telephonic follow-up, efficaciousness and quit attempts. These interventions furnished support and hope, learning educational and coping skills to the participants. All the techniques were reinforced at the follow-up intervals of 10 days, 30 days, 3 months, and 6 months.

This study was received and approved by Institutional Ethical Committee, (RRDCH/IEC21/69) and the study procedure was explained to the patients, and written informed consent was obtained.

RESULTS

Inferential Statistics like Student paired t-tests was used to compare the mean FND scores between baseline and each post-intervention period. Independent Student t test was used to compare the mean FND scores between 2 groups at baseline and each post-intervention period. Repeated measures of ANOVA followed by Bonferroni's post hoc analysis was used to compare the mean FND scores [in both smokers and smokeless group] and CO levels among smokers between different time intervals. MedCalc® Statistical Software version 20.110 (MedCalc Software Ltd, Ostend, Belgium. A critical p-value of 0.05 was regarded as significant.

The present study was done among 60 current tobacco users. 41% of the patients used both the forms of tobacco. The



mean age group of tobacco users was 39 ± 4. Overall, 16.5% of females and 83.3% of males participated in this study. SML included 24% of females and 74% of males and only males were

enrolled in ST. 10 (17%) participants who did not complete follow-up assessments were excluded from the study. There was a significant difference between program completers and non-

Table 1: Comparison of Mean FTND among Smoking and Smokeless users:

Pair		N	Paired differences			
			Mean	SD	95% CI	P value
ST Addiction level Baseline	SLT Addiction level Baseline	25	1.6800	3.5204	0.2268 to 3.1332	0.0253*
ST Addiction level 10th day	SLT Addiction level 10th day	25	1.0000	3.4761	-0.4349 to 2.4349	0.1632
ST Addiction level 30th day	SLT Addiction level 30th day	25	0.5200	3.1107	-0.7640 to 1.8040	0.4115
ST Addiction level 3 months	SLT Addiction level 3 month	25	0.4800	2.9172	-0.7242 to 1.6842	0.4188
SM Addiction level 6 months	SLT Addiction level 6 month	25	0.2400	2.9760	-0.9884 to 1.4684	0.6904

ST = Smoking Tobacco, SLT = Smokeless Tobacco.

*P < 0.05 was considered a statistically significant

There was a significant reduction in the mean MFTND score seen in the participants who participated in the behavioural modification therapy. (Table 2)

Table 2: Comparison of MFTND score in Smokeless tobacco.

Factors	Mean Difference	P value*	95% CI
SLT Addiction level Baseline - SLT Addiction level 10 th day	1.320	0.0012**	0.433 to 2.207
SLT Addiction level Baseline - SLT Addiction level 30 th day	2.120	<0.0001***	1.015 to 3.225
SLT Addiction level Baseline - SLT Addiction level 3 month	2.560	<0.0001***	1.473 to 3.647
SLT Addiction level Baseline - SLT Addiction level 6 month	2.920	<0.0001***	1.737 to 4.103

*P < 0.05 was considered statistically significant

**P < 0.001 was considered statistically significant

*** P < 0.0001 was considered statistically significant

when compared from baseline to 10th day of smoking tobacco users, the mean value of FTND was 0.64 (p = 0.393) which was not statistically significant, at the periodic interval of 30th day 0.96 (p= 0.0356), 3rd month 1.36 (p= 0.0024) and 6th month 1.48 (p= 0.0005) which was statistically significant. (Table 3)

Table 3: Comparison of FTND score in Smoking tobacco.

Factors		Mean difference	P value	95% CI
ST Addiction level Baseline	ST Addiction level 10 th day	0.640	0.3938	-0.268 to 1.548
	ST Addiction level 30 th day	0.960	0.0356*	0.0418 to 1.878
	ST Addiction level 3 months	1.360	0.0024**	0.385 to 2.335
	ST Addiction level 6 months	1.480	0.0005**	0.551 to 2.409

*P < 0.05 was considered statistically significant.

**P < 0.001 was considered statistically significant.



completers in motivation to quit smoking, tobacco consumed per day, or nicotine-dependence scores. There was a significant difference between smoking and smokeless tobacco addiction level at baseline when compared to further follow-up days and months (Table 1). However, high CO levels were significantly more for non-completers at baseline when compared to completers.

Smoking tobacco tended to be underestimated by the Fagerstroms Test for Nicotine Dependence with respect to the carbon monoxide breath analyzer. There was a minimal reduction of CO ppm mean value from baseline to 10 days and 30 days 0.4 and 1.1 respectively which was not statistically significant. While evaluating the reduction of CO level from baseline to 3 months and 6 months, the mean value was 1.8 and 2.1 respectively, which was statistically significant ($p=0.0089$ and 0.0036). There was a statistically significant mean difference between the FTND score for smoking and Carbon monoxide ppm from baseline to follow-ups (Figure 1).

DISCUSSION

Our study evaluated the effectiveness of tobacco dependence treatment programs for those who also struggle with substance abuse. A patient’s willingness to receive oral health and wellness messages from the dentist each time they visit ensures that the patient has the drive to stop smoking. Serving patients at our dental practice is our duty as dentists. A quick intervention technique (or strategy in counselling) known as the 5A’s is used to direct the practitioner when providing tobacco cessation counselling. This procedure can work well and just needs five to fifteen minutes.¹⁶ At 24 weeks after the completion of the study, we discovered that tobacco users who finished BMT had considerably higher abstinence rates than those who did not.

In our study, 83% of participants had completed their cessation program, which was higher, when compared to 43% in a study conducted by Khara and Okoli et al and 49.1% in a study conducted by Piplani et al at the end of 6 months.

Individual behavioural counselling entails scheduled in-person consultations with an expert in smoking cessation. Individual behavioural counselling may also offer tips on how to cut back before quitting, which entails gradually lowering cigarette consumption before giving up altogether.²⁴ About 85% were at contemplation stage in a study conducted by to Kumar et al.²³ which was similar to our study, where 80% of the participants in were extremely motivated to stop smoking.

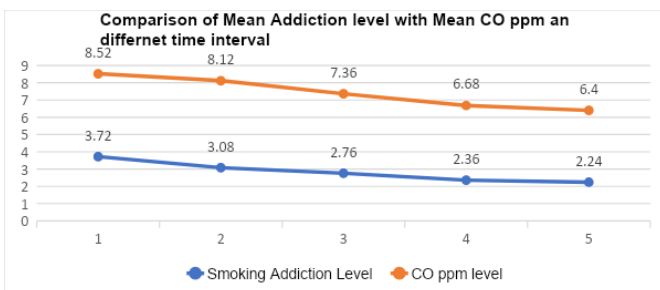


Fig. 1: Graphical assessment of comparison of Mean addiction level of smoking tobacco and Mean carbon monoxide ppm from baseline to periodic intervals.

The WHO and the Centres for Disease Control and Prevention have recommended that behavioural counselling should be used in the treatment of smoking.¹² In our study, there was a strong trend for post-treatment tobacco abstinence in programme completers, who were 16% more likely to be tobacco-free than Prochaska JJ et al.¹⁹ at 6 months and Cooney N. L et al.²⁰ at 6 months.

Fiore M C et al [21] and Gill et al²², showed a 17% abstinence rate for non-alcoholic smokers receiving nicotine patch therapy, and 9.1% of participants in the six-month intensive treatment condition were proven to be abstinent which was similar to our study.

By the end of six months, 16% had managed to quit smoking and Piplani et al²⁹ showed 18.9% of smokers had quit smoking which was similar to our study, and Croucher R²⁶ showed that 63% of participants achieved continuous abstinence for 4 weeks after quitting smokeless tobacco.

According to a veteran’s guide to quitting smoking, three cigarettes continually offer the same amount of nicotine as holding an average-sized dip in your mouth for 30 minutes. Two cans of cigarettes each week provide the same amount of nicotine as one to one and a half packs of cigarettes per day for smokers.²⁵

According to the present study, tobacco dependence treatment for individuals with tobacco cessation rate ranged from 21.6% at 10 days follow up to 8.3% at 6 months which was slightly lower than Baca et al¹⁸, where 23.6% at 7 weeks and 4.7% at 6 months follow up.

The results of the Cochrane review on individual behavioural therapy for quitting smoking showed that interventions provided outside of typical professional settings by smoking cessation counsellors or health educators were effective in helping smokers stop.²⁶

In the present study overall, 41% of study participants had reduced tobacco consumption at the end of 6 months. In terms of reducing tobacco to any level, it was observed that nearly 28% and 72% were unable to change their tobacco status when compared to a study conducted by Jayakrishnan R et al²⁷ where 17.7% of study participants in the intervention area had reduced smoking by more than 50% at the end of 12 months and 21.3% had reduced smoking to any level in the intervention area and 72.2%, were unable to change their smoking status in the control area.

Brief advice is not a part of the primary healthcare system in India. “The parties should use existing infrastructure, in both health care and other settings, to ensure that all tobacco users are identified and provided with at least brief advice,” the recently concluded Conference of the Parties to the WHO Framework Convention on Tobacco Control (FCTC)²³.

In our study, we additionally demonstrated that the 10-day point prevalence reduction was 31% in smoking and 41% in smokeless tobacco towards the end of BMT, at 3 months (23% in smoking and 28% in smokeless) and at 6 months (22% in smoking and 24% in smokeless) respectively when compared to Webb MS et al [28]. Furthermore, we showed that after the conclusion of behavioural therapy, the 7-day point prevalence abstinence (PPA) was essentially higher in the CBT condition than in the BHE condition (51% vs 27%), at 3 months (34% vs 20%), and 6 months (31% vs 14%).

In our study, motivation to quit smoking was very high



among the study participants, quit rates (continuous abstinence) were moderate, and smokers had difficulty in quitting even though they were highly motivated.

The strength of our study is that smokers with mild to moderate nicotine dependence were chosen for the therapies since there was enough data to support the effectiveness of BMT in both light and moderate smokers. The individuals in this study typically had superior general health, which limits the generalizability of the findings. Furthermore all trial participants received thorough BMT treatment, which is unmatched in settings providing general dental health care.

Self-report were alone used to determine continuous abstinence due to lack of biochemical confirmation of self-reported abstinence for smokeless tobacco users, difficulty in obtaining follow-up data after treatment completion, limited sample size, and brief follow-up period were the limitations of this study.

CONCLUSION

Our study findings showed that it was possible to carry out screening and BMT for tobacco users in tertiary care hospitals. Priority should be given to expanding tobacco cessation services to rural areas in developing nations like India, where many tobacco cessation clinics are located in urban areas. As a result, low-cost effective interventions like BMT are especially crucial when working with a vulnerable population.

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