Motivational Impact of Smoking Cessation Methods on Affluent Smokers and Their Readiness to Quit Using Conventional and Virtual Reality Enabled Educational Methods.

Safia Rahman*, Chaithra V

Department of Public Health Dentistry, Bangalore Institute of Dental Sciences, Rajiv Gandhi University of Health Sciences

*Corresponding Author: Safia Rahman, Department of Public Health Dentistry, Bangalore Institute of Dental Sciences, Rajiv Gandhi University of Health Sciences.

Abstract

Introduction

Tobacco cessation significantly reduces the risk of dying from tobacco-related diseases. Virtual reality is one such communication platform that encourages self-development and learning among its users and can be used to reinforce tobacco cessation.

Objective:

To compare behavior change using VAS and MTSS among smokers through Conventional and Virtual Reality-enabled education methods for tobacco cessation.

Material and Methods:

The present study was conducted among 40 smokers visiting the Tobacco Cessation Centre of Bangalore Institute of Dental Sciences and Hospital for the first time, where the participants were motivated through conventional educational methods. After a week, the participants were recalled, and the VR-enabled education and motivation method was used to reinforce smoking cessation. The participants were individually asked to rate the preferred educational method using the Visual Analogue Scale, and the change in behavior toward readiness to quit was assessed using the Motivation to Stop Scale after every session.

Results:

The virtual reality-enabled educational method was the most preferred method among smokers, with mean VAS scores of 5.63±2.49 and higher readiness to quit, with a mean MTSS score of 4.85±2.11, which was statistically significant (p=0.001) when compared to the conventional education method.

Conclusion:

Virtual reality-enabled education methods can act as a communication platform and self-motivating method to bring about positive behavior change toward readiness to quit Smoking among smokers during a tobacco cessation program.

Keywords: Virtual reality; education; tobacco cessation; smoking

Introduction

The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing more than 8 million people a year, including around 1.2 million deaths from exposure to second-hand smoke. [1] In 2003, WHO Member States unanimously adopted the WHO Framework Convention on Tobacco Control (WHO FCTC). In force since 2005, it currently has 182 Parties covering more than 90% of the world's population. In 2007, WHO introduced a practical, cost-effective way to scale up the implementation of the main demand reduction provisions of the WHO FCTC on the ground: MPOWER. Which stands for M- monitor tobacco use and prevention policies, Protect people from tobacco use, Offer help to quit tobacco use, W-warn about the dangers of tobacco use, E-enforce bans on tobacco advertising, promotion and sponsorship, R-Raise taxes on tobacco.

Warnings could be involved in reducing the burden of traditional cigarette use because they reflect the risks that affect well-being and are more likely to boost motivation to quit Smoking. [2] Central psychological factors related to smoking cessation are the motivation to finish and the perceptions of the health risks of Smoking. According to models of well-being, behavior change, e.g., the Theory of Planned Behavior. [3] and the Transtheoretical Model, [4] motivation to quit directly increases determination to quit, facilitates cessation attempts, and increases successful smoking cessation rates. However, smokers may not have the intent to leave due to obstacles. Thus, smoking cessation strategies are needed to increase willingness to stop smoking traditional cigarettes and to encourage smoking cessation abstinence [5] or tobacco harm reduction. [6] Virtual reality

is a communication platform that enables self-development and learning among its users and can be used to reinforce tobacco cessation. Virtual reality (VR) could be a constructive approach to strengthen and motivate smokers to quit. Studies have demonstrated that using virtual reality can help improve quitting rates among smokers.

Hence, this study aims to compare behavior change using the Visual Analogue Scale and Motivation to Stop Scale among smokers through Conventional and Virtual Reality education methods for tobacco cessation.

Objectives:

• To assess and compare the most preferred method of motivation for smoking cessation between conventional and virtual reality-based educational techniques among smokers visiting the OPD of our institute using a Visual Analogue Scale

• To assess and compare the readiness to quit Smoking when motivated by conventional and virtual reality-based, educational techniques among smokers visiting the OPD of our institute using the Motivation to Stop Scale.

Materials and Methods

The study proposal was submitted for approval, and clearance was obtained from the institutional ethical review board. This study was a Quasi-experimental trial conducted using the Visual Analogue Scale (VAS) and Motivation to Stop Scale (MTSS) among smokers visiting

our institution. The study lasted two weeks, between the last week of May to mid-June 2022.

Participants aged between 18 and 50 years old and willing to participate in the study were considered. The study was conducted among 40 smokers visiting the Tobacco Cessation Centre of our institute for the first time. Demographic details, personal history of tobacco use, and intention to quit Smoking were recorded. Exhaled breath CO (eBCO) levels were recorded using a pico-smokerlyser. Conventional educational materials were used to motivate the participants; similarly, a week later, they were recalled, and VR-enabled education and motivation technique was reinforced for smoking cessation. A pre-selected video on tobacco cessation was played using a smartphone. The participants were asked to rate the effectiveness of the educational method using VAS and the readiness to quit using MTSS after both sessions.

Results

Table 1 shows the demographic details.

The mean age of the participants was 35.05 ± 10.54, with 30 (75%) males and 10 (25%) female smokers. Distribution of education qualification showed that 6 (15%) were high schoolers, diploma holders, and professionals, and the majority of them were graduates, 20 (50%) and 2 (5%) were postgraduate degree holders.

Table 1: Demographic details

Variable	Category	Mean±SD/ n(%)
Age	--	35.05 ± 10.54
Gender	Male	30 (75%)
	Female	10 (25%)
Education	Highschool	6 (15%)
	Intermediate/Diploma	6 (15%)
	Graduate	20 (50%)
	Post-graduate	2 (5%)
	Professional	6 (15%)

Table 2 shows the Details of smoking and eBCO levels.

The mean number of cigarettes smoked per day was 7.40±7.49, with a minimum number of 1 and a maximum of 30.

The mean years of Smoking was 12.37±11.32 with the minimum number of years being 2 and the maximum is 42.

The mean eBCO levels were 14.85±8.89 with a minimum being 6 and a maximum being 35.

Table 2: Details of smoking and SpCO levels

Variable	Mean	SD	Minimum	Maximum
No of cigarettes per day	7.40	7.49	1	30
Year of smoking	12.37	11.32	2	42
SpCO levels	14.85	8.89	6	35

Table 3 shows the attempts made by the smokers to quit.

29 (72.5%) previously attempted to quit Smoking, and 11 (27.5%) did not try; 30 (75%) of the participants were ready to quit Smoking, whereas 10 (25%) were not.

Table 3: Details of quitting

Variable	Category	n (%)
Previous cessation attempt	Yes	29 (72.5%)
	No	11 (27.5%)
Readiness to quit	Yes	30 (75%)
	No	10 (25%)

Table 4 shows a Comparison of preferred educational and motivational methods by the patients.

The conventional education and motivation method had a mean of 3.63± 1.39 and a median of 4.00 (3.00 - 5.00), whereas the Virtual Reality enabled education and motivation method had a mean of 5.63 ± 2.49 and a median of 6.00 (3.50 – 7.75). There was a statistically significant difference ($p=0.001$) between the preferred methods, with participants preferring the Virtual Reality-enabled education and motivation method.

Table 4: Comparison of preferred method by the patients

Method	Mean (SD)	Median	p value
E	3.63 (1.39)	4.00 (3.00 - 5.00)	0.001*
VR	5.63 (2.49)	6.00 (3.50 – 7.75)	

Mann-whitney test; * indicates significant difference at $p \leq 0.05$

Table 5 shows a Comparison of the motivation to stop Scale between the two methods.

The conventional education and motivation method had a mean of 2.70 ±1.11 and a median of 3.00 (2.00 – 4.00), whereas the Virtual Reality enabled education and motivation method had a mean of 4.85± 2.11 and a median of 5.00 (3.50 – 6.50). There was a statistically significant difference ($p=0.001$) in comparison of motivation to stop Scale between the conventional education and virtual reality education methods, with the virtual reality-enabled way being more effective.

Discussion

One of the biggest obstacles to smoking cessation is cigarette craving, which translates into low cigarette smoking cessation rates and more excellent relapse rates (the relapse rate measures the success of the intervention that treats cigarette smokers). In the present study, it was found that using the virtual reality-enabled method to modify behavior to facilitate smoking cessation when compared to the use of conventional education methods was more effective ($P= 0.001$). The participants preferred the Virtual reality-enabled method to traditional education methods ($P=0.001$).

Using the Transtheoretical model of the change of Prochaska et al. [7,8], The main objective was to observe in smokers the passage from a phase of "pre-contemplation" to one of "determination," a critical moment in which the subjects experience an ambivalence towards their behavior, weighing the pros and cons of continuing to smoke on the one hand and the pros and cons of change from the other. [9] The present study is similar to a survey by Pasquale Caponnetto et al. in 2019, where 40 participants meeting the eligibility criteria were part of the study. Similarly, the demographic details were recorded.

The carbon monoxide levels increase with the increase in number of days smoked during the past 30 days. Vancelik et al. [10] Ouedraogo et al. [11] and Cunnington [12] found that the mean eBCO levels of regular, occasional and nonsmokers were 7.23±1.5, 4.0±2.1, 2.5±2.4ppm respectively. This is relatively higher in the present study and shows that using a breath analysis device gives more accurate data regarding tobacco use. Measurement of eBCO is cheaper, easier to apply, does not require a particular technical background, and may provide an immediate, non-invasive method to assess recent smoking status and be used for accurate assessment of tobacco use.

Pasquale Caponnetto et al. [13] 2019 conducted a study of 40 participants where three different stimuli were compared -A packet of cigarettes containing shocking images, a Film showing the pulmonary effects of Smoking, and VR. They found a statistically significant difference ($p<0.0001$) between VR and conventional video education, which was very similar to the present study, where there was a statistically significant difference ($p<0.0001$) between traditional and VR-enabled education models. There, virtual reality could be more potent in motivating patients to quit Smoking than other visual antismoking-related stimuli.

Emilio Goldenhersch et al. 2020 [14] estimated the adherence of smokers and the outcome of smoking cessation using VR. They found that the treatment group had significantly higher motivation to quit ($P=0.004$). Using Virtual Reality Exposure Therapy has proven to reduce craving and smoking behavior with similar effectiveness as standalone cognitive behavior therapy. This study was identical to the present study as it helped in behavior modification.

Sandra SC et al. 2021 [15], in a systematic review, the search yielded

304 articles, of which five were selected, and 4 were considered for quality assessment. All four studies suggested that when the intervention was given through virtual reality, the adherence to smoking cessation was high. In the present study, the motivation to quit was higher in VR- enabled intervention than in the conventional methods, similar to theresults seen in this review.

The present study had a few limitations, the study population was small. As there were no follow-ups beyond the regular sessions, it was impossible to assess the long-term impact. A randomized controlled trial study design was not possible due to the study population being smokers visiting the tobacco cessation center of the institution.

Conclusion

As public health practitioners, we have the responsibility to urge people to quit Smoking. Arranging for augmented and virtual reality experiences for smokers through mobile applications and virtual reality headsets in the future can help improve smoking cessation and

adherence to it compared to conventional pamphlets/models for health education. Policies to make the relevant software freely available and accessible can make it easier.

We can use virtual reality to quit smoking among light-to-moderate smokers who may benefit at a very early stage. Promoting cigarette cessation through conventional techniques may take longer to achieve commitment among those who wish to quit. In contrast, virtual reality and augmented reality create an interest in smoking cessation.

Conflict of Interest: This was a self-funded study. There was no financial support.

This was original research. Informed consent was taken from the participants. This study gives us an opportunity to make tobacco cessation more acceptable to smokers. Smoking is a pandemic that needs to be addressed at the community level. This journal aims to reach out to the larger community. Hence, this journal was chosen to share the article.

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