

Appearance Related Intervention for Smoking Cessation among University Students-Randomized Controlled Trial

Pandya Visha S^{1*}, Sampath Naganandini², Mahuli Amit V³, Yadav Roma⁴, Kapadiya Jahanvi¹, Singh Satyendra¹ and Pankaj Chaudhary⁵

¹Post Graduate, Department of Public Health Dentistry, NIMS Dental College and Hospital, Jaipur, Rajasthan, India

²Professor and Head, Department of Public Health Dentistry, NIMS Dental College and Hospital, Jaipur, Rajasthan, India

³Associate Professor, Department of Public Health Dentistry, RIMS Dental Institute, Ranchi, Jharkhand, India

⁴MDS (Public Health Dentistry), Private Practitioner, Gurgaon, India

⁵Reader, Department of Public Health Dentistry, NIMS Dental College and Hospital, Jaipur, Rajasthan, India

***Corresponding Author:** Pandya Visha S, Department of Public Health Dentistry, NIMS Dental College and Hospital, NIMS University, Shobha Nagar, Delhi Jaipur Highway, Jaipur, Rajasthan, India.

Received: July 15, 2021

Published: August 07, 2021

© All rights are reserved by **Pandya Visha S, et al.**

Abstract

Aim: To assess the efficacy of appearance related smoking intervention as a motivational trigger for smoking cessation among university students.

Objectives: To sensitize the student smokers to quit smoking using the photoaging intervention app and to assess the efficacy of smoking cessation intervention by comparing successful quitting (assessed by Fagerström score) between the intervention and control groups.

Methods: The present study is a randomized controlled trial that was carried out among a sample of 156 students having the habit of smoking, who were randomly allocated into intervention and control group. The study was conducted over a period of one year in the Tobacco Cessation Centre (TCC) of a private Dental College and Hospital, Jaipur from October 2018 to September 2019. Both the groups were given behavioral counseling, along with this Smokerface application was used in the intervention group. The groups were assessed at the 3rd and 6th month's intervals. Objective validation was done using the Cotinine test. Data was analyzed using SPSS (19) software.

Results: The highest reduction was seen in the intervention group. 84.61% of participants of the intervention group and 67.94% of participants of the Control group had quit smoking upon objective validation by Cotinine analysis. These findings were found to be statistically significant.

Conclusion: The effective usage of the smartphone application along with the usage of behavioral counseling techniques has great potential in contributing as a useful tool for smoking cessation efforts among young adults.

Keywords: Tobacco; Smoking; Tobacco Cessation; Smartphone Apps; Behavior Change Techniques

Introduction

Tobacco smoking causes premature death or morbidity. It places a drain on national resources. Consequently, health professionals, governments and various organizations stress the importance of smoking cessation and a decrease in exposure to tobacco smoking [1]. India is one of the most diverse countries in the world. It has a marked regional variation in lifestyles with major causes of death. Among adults, the leading causes of death are cardiovascular, respiratory diseases like tuberculosis or neoplastic diseases. Death rates from these diseases can be increased by smoking [2]. There is a high prevalence of tobacco use reported in school-going adolescents aged 13 - 15 years. The majority of deaths caused in India by smoking occur in the prime working age group of 15 - 59 years [3]. The data suggested by GYTS 2009 reveals that 14.6% of students aged 13 - 15-year-old are using tobacco in India [4]. Most smokers initiate the habit of smoking during their early adolescence. They assume that smoking relieves tension and makes it appealing to them, and in the future, the complications associated with cardiovascular disorders, lung cancer, and respiratory disorders are too far to be fathomed [5]. An encouraging way for reaching young adults is the use of digital mobile technology with smoking cessation interventions as they are the largest users of technology [6,7]. The mobile phone applications (apps) combines the advantages of a computer and an internet-based smoking cessation interventions [8]. Multimedia formats like static, interactive-rich text, pictures, audio and video can be hosted by various smoking cessation mobile phone applications and can get more content when there is an internet connection without any user effort [9]. The best ways to tackle the public health threat of the tobacco epidemic is the application of mHealth intervention in quitting smoking [10]. The potential of a personalized, computer-generated facial photoaging software to prompt quit attempts of smoking in young adults was explored in many studies and have found the facial photoaging interventions to have some impact [1,5,11-14].

Our concern in this study were the young university students compared to elderly patients as they are younger, more self-conscious about skin aging and esthetics, they are highly motivated to quit smoking, are more cigarette dependent, have regular internet access, and often search for online smoking cessation, counseling and support. This way of providing smoking cessation assistance to young adolescents is unique and can be utilised in tobacco cessation cells [15]. The cornerstones of health promotion are engaging in healthy activities and having simple access to quality information [16]. This study investigates the effects of an age appearance

intervention on university student's smoking cognitions and behaviour using a RCT. It is encouraging to note that supplementing usual care with an appearance-related smoking intervention produced an increase in smoking cessation and a decrease in dependence of nicotine and self-admitted smoking.

However, no studies till date have assessed the effectiveness and efficacy of a structured smoking cessation intervention targeted directly over young people. The economic analysis signifies that such personalized smoking cessation intervention is economical and cost-effective. It easily targets young smokers who are at adverse risk of serious effects of smoking; if they continue long-term smoking. This study also states direct implications for clinicians and policymakers.

Methods

Participants

The present study is a randomized controlled trial. The study was conducted over a period of one year in the Tobacco Cessation Centre (TCC) of a private Dental College and Hospital, Jaipur from October 2018 to September 2019 including the pilot study period and patient selection. All university students were screened for the habit of smoking and were referred to the Tobacco Cessation Centre of a private Dental College and Hospital. Students fulfilling the exclusion and inclusion criteria formed the sample population (intervention group and control group). University students having the habit of smoking and have given consent formed the inclusion criteria whereas those not available for follow-up at 1 month and those who are using nicotine replacement therapy (NRT) or taking oral drugs for nicotine dependence formed the exclusion criteria. From the study population, the sample population was selected of 156 students then they were randomly allocated to Intervention and Control group (78 students in each group) after considering the Inclusion and Exclusion criteria. Randomization was performed using a Table of Random numbers. (Source: Random.org) [17]. The participants were not aware of which group they will be allocated to before participating in the study.

Prior to the start of the study, participation information sheet was distributed. Voluntary written informed consent was obtained from the subjects participating in the study after explaining to them the purpose of the study. The students had an option to withdraw from the study at any stage. To check the feasibility of the study, we carried out a pilot study amongst 10% of the desired population. The participants in the pilot study were also included in the main study as there were no changes in the study protocol.

Apparatus/materials

The study proforma consisted of four-part questionnaire. The first part of the questionnaire included the following demographic items: age, gender, education, marital status, address, contact no. and email. The second part of the questionnaire included variables related to the type of tobacco products used, current smoking status, amount of tobacco smoked, expenditure used on tobacco, reasons for initiating the habit, number and duration of past quit attempts, reasons for previous attempts to quit, barriers in quitting and reasons for quitting the habit. The third part of the questionnaire included the Body Dysmorphic Disorder Questionnaire (BDDQ). This questionnaire consisted of questions concerning attitudes toward personal looks and appearance, the impact of smoking on beauty and opinions about hazards related to smoking. The fourth part of the questionnaire included the Fagerström Smoking Dependence Scale (score from 0-10). This will assess the degree of nicotine dependence.

The second part of the questionnaire was administered at the 3rd and 6th month follow-up. The participants were analysed for their quitting status and quit attempts. The Fagerström Scale was measured again in both intervention and control groups. Participants in the intervention group were asked if they perceived the aging images realistic, shocking, and whether it motivated them in quitting smoking. At 1st month follow up: The pamphlet showing the benefits of quitting over time was given to the participants. At the 3rd month follow up: Pamphlets showing triggers for tobacco use, a Menu of behavioral methods, Risks of smoking and Rewards of smoking were given to the participants.

The 'Smokerface' application: The intervention group was photoaged digitally with the use of the 'Smokerface' application. This free smartphone app enables the user to take a self-portrait (i.e. a selfie). It photoages the user's face into an animated future smoker's face (i.e. after 1, 3, 6, 9, 12, 15 years of smoking one pack a day) and compares the image with the animated future face as a non-smoker explaining the ill effects of smoking [18].

The COT rapid test cassette: The COT Rapid Test Cassette: It is a rapid urine screening test which can be carried out without any instrument being used. This test uses a monoclonal antibody to specifically detect elevated cotinine levels in urine. If cotinine levels in urine exceed 200 ng/mL, it indicates the presence of cotinine in urine [19]. When two lines appear, one in the control line region and one in the test region, the test is negative. The test is positive,

when one line appears in the control line region and the test is invalid, when one line appears in the test line region.

Procedure

All students of the study population had completed a baseline tool (questionnaire, modified fagerstrom scale and BDDQ). They were diagnosed with nicotine dependency and they received motivation to quit using various behavioral techniques. A thorough visit to the Tobacco Cessation Clinic was done explaining all the charts, posters and models. They were also asked to set a quit date within 2 weeks.

At 1st month follow-up, the participants were divided into intervention and control groups. Their quit date was checked. They further received a pamphlet listing the benefits of quitting over time. By using Prochaska and Diclemente stages of readiness to change, the patient's score will be assessed. Based on this scale and scores, the patient will further receive the motivation to quit. Both the groups were motivated using the above technique. The participants in the intervention group also received the same measures but were additionally sensitized using the 'Smokerface' application. Participants in the intervention group were asked if they considered the aging images to be realistic or shocking and whether the images motivated them in quitting smoking.

At the 3rd month follow up, the participant's progress was reviewed and analysed and they had also received advice for the problems they had encountered. They also received a pamphlet listing Triggers for tobacco use, a Menu of behavioral methods for coping up with their cravings and triggers and a pamphlet showing the Risks and Rewards of smoking. At the 3rd month follow-up visits, the participants had filled the follow-up questionnaires. The follow up questionnaire was given separately for both the Intervention and the Control group. The Modified Fagerström Smoking Dependence Scale (score from 0 - 10) was assessed again.

At the 6th month follow up, the participant's progress was reviewed and reinforcement was done. If participants stated that they had quit smoking, they were asked to undertake a COT Urine test to validate their non-smoking status (Figure 1).

Results

Statistical analysis was done with SPSS (version 19) USA. Statistical tests employed for the obtained data in our study were One-way Analysis of Variance (ANOVA) test was used for multiple group comparisons followed by Tukey post hoc for group wise comparisons.

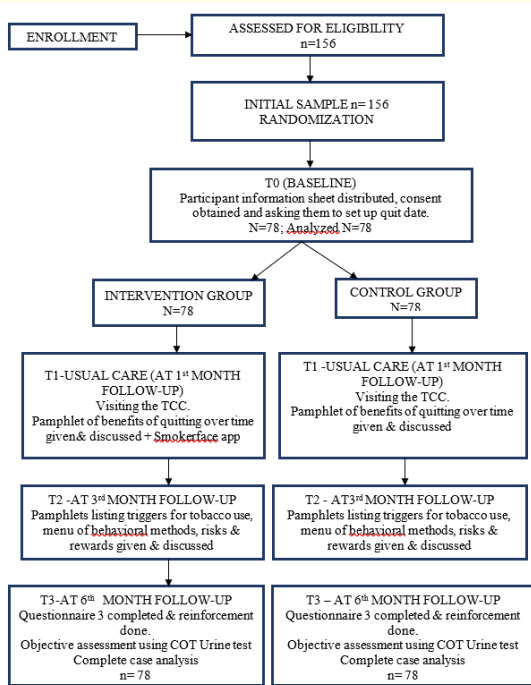


Figure 1: Flowchart showing randomization and study procedures for both groups.

The majority of the study students of both the intervention (75.64%) and control group (78.20%) were in the age group of 20 - 25 years. 61.53% of the intervention group were males whereas females were higher in the control group (52.56%). Also, the females were higher in our study as compared to males, since females were more conscious about esthetics and health concerns compared to males. Among the total population of 156 study students, Dental students were higher both in the intervention (58.97%) and control (61.53%) group followed by Medical students of intervention group (20.51%). Majority of students in the intervention (76.9%) and control group (65.4%) consumed cigarettes followed by a combination of Cigarettes, E-cigarettes, Waterpipe, Cigar and Marijuana. 37.2% of students of intervention group were ready to quit on their first visit and 37.2% of students of control group had planned to quit in the next 1 week after their first visit. 55.1% of students of the intervention group and 43.6% of the control group stated health as one of the important reason to quit smoking. 19.2% of students of both the intervention and control group stated their worryingness for looks.

59.0% of students of the intervention group and 61.5% of students of the Control group were in Low-Moderate dependence scores based on modified fagerstrom scale for nicotine dependence (Figure 2).

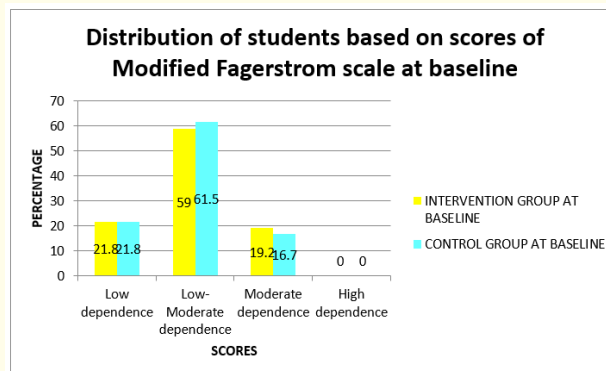


Figure 2: Distribution of students based on scores of modified fagerstorm scale at baseline.

80.8% of students of the intervention group and 8.97% students of the control group had quit smoking at 3 months follow-up (Figure 3).

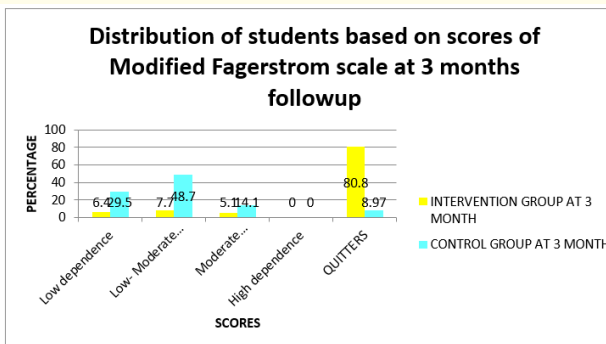


Figure 3: Distribution of students based on scores of modified fagerstorm scale at 3 months followup.

87.2% of students of the intervention and 71.8% of students of the control group had quit smoking whereas 7.7% of students of the intervention and 21.8% of students of the Control group were in the Low dependence group as per Modified fagerstrom scale for Nicotine dependence (Figure 4).

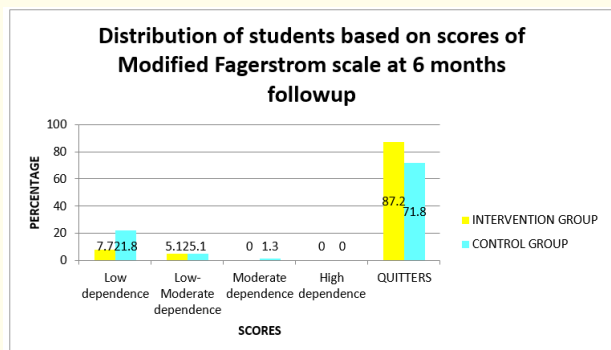


Figure 4: Distribution of students based on scores of modified fagerstorm scale at 6 months followup.

84.6% of students of the intervention group and 67.9% students of the control group had successfully quit smoking and were validated on objective analysis by cotinine test.

Discussion

The development of the suggested mobile phone application and its successive evaluation of the effectiveness in our population has the potential in contributing as a helpful tool in smoking cessation among young adolescents [20,21].

A finest and promising new direction in engaging and reaching young masses of adults for smoking cessation interventions is the use of smartphone applications. In particular, photoaging smartphone applications have never been checked for its effect on the prevalence of teenage smoking. The photoaging interventions have also been found in increasing the quit rates of young adult smokers [22,23]. The 'Smokerface' intervention is easily and freely accessible online, is easy to implement, has low cost, is independent of external health educators and can be added to existing health programs [14].

A recent randomized controlled trial was performed by Burford., *et al.* and was published in the Journal of Medical Internet Research. Photoaging desktop programs were used, which altered the image to predict future appearance. With the aid of this photoaging application, it suggested an increased quit rate of 21 percent in a study of young adults 18 - 30 years old [24]. In our present study, Majority of the participants were females compared to males. Female adolescents' have been influenced by cigarette commercials in the media. It is therefore critical to establish a smoking preven-

tion programme that uses a gender-specific approach to improve female adolescents' smoking media literacy [25]. A high percentage of students agreed that cigarette smoking is harmful to beauty. 94.9% of students found the photoaging images very realistic and 97.4% of students found the photoaging images shocking. 93.6% of students also stated that the images motivated them to quit. 35.9% of students were confident that they could resist smoking in the future. Hence, photoaging images proved to be an effective trigger for sensitizing young students.

In our study at baseline, 59.0% of students of the intervention group and 61.5% of students of the Control group were in Low-Moderate dependence scores based on the modified Fagerstrom scale for nicotine dependence. 80.8% of students of the intervention group and 8.97% students of the Control group had quit smoking at 3 months followup. 6.4% of students of the Intervention group and 29.5% of students of the Control group were scored as low dependence. 87.2% of students of the Intervention and 71.8% of students of the Control group had quit smoking at 6 months followup whereas 7.7% of students of the Intervention and 21.8% students of the Control group were in the Low dependence group as per the modified Fagerstrom scale for Nicotine dependence. There was a highly statistically significant difference in the intervention group when intergroup comparisons were done at baseline, 3 months and 6 months (p-value= 0.000). There was a highly statistically significant difference in the control group when intergroup comparisons were done at baseline, 3 months and 6 months. (p-value = 0.000). The mean rank in the intervention group was 72.12 when intergroup comparisons of scores of modified Fagerstorm scales were done at 6 months. The p-value was statistically insignificant. (p-value = .011). The mean rank in the control group was 84.88 when intergroup comparisons of scores of modified Fagerstorm scales were done at 6 months. The p-value was statistically insignificant. (p-value = .011). 84.6% of students of the intervention group and 67.9% of students of the Control group had successfully quit smoking and were validated on objective analysis by cotinine test.

Valdivieso., *et al.* recently stated a high interest in quitting smoking among young adolescents (67%) who were persistent smokers and who frequently encountered difficulty in maintaining abstinence despite repeated quit attempts [16]. One recent RCT examined the effect of an evidence-informed decision-aid app. It measured continuous abstinence at 1, 3 and 6 months. The sample size consisted of adults aged 18 years and older having the motivation to quit tobacco smoking [6]. Similarly, in our study, younger

students were selected that is because young adolescents have the highest attempt rates in quitting which declines with age. This indicates that young adults are a great audience for assisting in smoking cessation. Also, morbidity and mortality rates related to smoking are reduced when quitting is done before the age of 40 years. Hence, young adults form a priority for smoking cessation efforts [18].

The Modified Fagerstrom scale was used as a study tool in our study as this modified version assesses the nicotine dependence level among adolescents [26]. It is a standard instrument for determining intensity of physical addiction due to nicotine. This test offers an ordinal indicator of cigarette-related nicotine dependency. It includes six elements that measures the amount of cigarettes consumed, the desire to use, and dependency. The findings were similar to the study of Baskerville et al. Secondary measures included assessing nicotine dependence with the use of 2-item Heaviness of Smoking Index (HSI) from the Fagerstrom Test for Nicotine Dependence.

The objective validation by the students for quitting smoking was assessed by cotinine urine analysis. Cotinine, a toxic alkaloid and an inactive metabolite, is the first-stage metabolite of nicotine. It stimulates the autonomic ganglia and CNS in humans. Its elimination in the profile is more stable as compared to that of nicotine which is largely urine pH-dependent [14]. Hence, cotinine is regarded as a superior biological marker for determining the use of nicotine.

Conclusion

The effective usage of the smartphone application along with the usage of behavioral counseling techniques has great potential in contributing as a useful tool for smoking cessation efforts among young adults.

Limitations of the Study

The study participants selected in the study covered a range of participants from various courses of a private university. However, because of the kind of intervention that is its open character, the participants and researcher could not be blinded to the study group. Both patients and health care professionals will know that they are involved in the intervention, which might create a bias. Also, the 'Smokerface' application used in the intervention is easily available online. The participants in the control group could have also accessed it. The second limitation is that there may be possible contamination between the groups. Also, the tool used for objec-

tive validation in our study was COT rapid test cassette. This assay provides only a qualitative, preliminary analytical result. To obtain a confirmatory result, a secondary analytical method (gas chromatography, mass spectrometry) must always be used. The strength of the present study is that it is one of the first studies attempting to consolidate the effectiveness and efficacy of smartphone applications for smoking cessation using an RCT. It sensitized the student smokers to quit smoking using the 'Smokerface' application and assessed the efficacy of smoking cessation intervention by comparing successful quitting (assessed by Fagerström score) between the intervention and control groups.

Recommendations

The economic analysis signifies that the smoking cessation intervention is cheap and cost-effective and it can be easily adopted. It is targeted towards young smokers who are at notable risk of adverse effects of smoking. Although evidence on smartphone apps have not yet reached the maturity in addressing gaps of generalizability, it has supported future evidence on content design consideration and quality reporting guidelines. The present research suggests some areas for future research. These will develop our understanding of making such intervention maximally effective.

Financial Support

Nil.

Conflicts of Interest

Nil.

Bibliography

1. Burford O., et al. "Internet-based photoaging within Australian pharmacies to promote smoking cessation: randomized controlled trial". *Journal of Medical Internet Research* 15.3 (2013): 64.
2. Jha P., et al. "A nationally representative case-control study of smoking and death in India". *New England Journal of Medicine* (2008).
3. Singh A and Ladusingh L. "Prevalence and determinants of tobacco use in India: Evidence from recent global adult tobacco survey data". *PloS one* 9.12 (2014): e114073.
4. Gajalakshmi V and Kanimozhi CV. "A survey of 24,000 students aged 13-15 years in India: Global Youth Tobacco Survey 2006 and 2009". *Tobacco Use Insights* 3 (2010): 1179173X1000300001.

5. Weiss C., *et al.* "Aging images as a motivational trigger for smoking cessation in young women". *International Journal of Environmental Research and Public Health* 7.9 (2010): 3499-3512.
6. Baskerville NB., *et al.* "Effect of a mobile phone intervention on quitting smoking in a young adult population of smokers: randomized controlled trial study protocol". *JMIR Research Protocols* 4.1 (2015): e10.
7. Marzo RR., *et al.* "Educating school students and gauging their perception about the harmful effects of smoking using a "Facial-Ageing App (mobile application):" An experience from Malaysia". *Journal of Education and Health Promotion* (2019): 8.
8. Ubhi HK., *et al.* "A mobile app to aid smoking cessation: preliminary evaluation of SmokeFree28". *Journal of Medical Internet Research* 17.1 (2015): e17.
9. BinDhim NF., *et al.* "Who uses smoking cessation apps? A feasibility study across three countries via smartphones". *JMIR mHealth and uHealth* 2.1 (2014): e4.
10. Regmi K., *et al.* "Effectiveness of mobile apps for smoking cessation: a review". *TobPrev Cessation* 3.4 (2017): 1-1.
11. Hysert PE., *et al.* "At Face Value": age progression software provides personalised demonstration of the effects of smoking on appearance". *Tobacco Control* 12.2 (2003): 238.
12. Grogan S., *et al.* "Women smokers' experiences of an age-appearance anti-smoking intervention: A qualitative study". *British Journal of Health Psychology* 16.4 (2011): 675-689.
13. Grogan S., *et al.* "A randomized controlled trial of an appearance-related smoking intervention". *Health Psychology* 30.6 (2011): 805.
14. Brinker TJ., *et al.* "A skin cancer prevention facial-aging mobile app for secondary schools in Brazil: appearance-focused interventional study". *JMIR mHealth and uHealth* 6.3 (2018): e60.
15. Marzo RR., *et al.* "The Awareness on Smoking Health Warning and Its Impact AmongMuar Community". *South American Journal of Public Health* 4 (2016): 12-16.
16. Jnaneswar A., *et al.* "Software intervention in smoking cessation among engineering students in Bhubaneswar city: A randomized controlled trial". *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive and Social Medicine* 45.4 (2020): 534.
17. True random number generator (2019).
18. Smokerface application (2019).
19. Insert P. "One Step Cotinine Test Device Package Insert.
20. Valdivieso-López E., *et al.* "Efficacy of a mobile application for smoking cessation in young people: study protocol for a clustered, randomized trial". *BMC Public Health* 13.1 (2013): 704.
21. Uribe-Madrigal RD., *et al.* "Secondary school students' perceptions of a mobile application design for smoking prevention". *Tobacco Prevention and Cessation* (2021): 7.
22. Brinker TJ., *et al.* "Photoaging smartphone app promoting poster campaign to reduce smoking prevalence in secondary schools: the Smokerface Randomized Trial: design and baseline characteristics". *BMJ open* 6.11 (2016): e014288.
23. Bernardes-Souza B., *et al.* "Facial-aging mobile apps for smoking prevention in secondary schools in Brazil: appearance-focused interventional study". *JMIR Public Health and Surveillance* 4.3 (2018): e10234.
24. Brinker TJ and Seeger W. "Photoaging mobile apps: a novel opportunity for smoking cessation". *Journal of Medical Internet Research* 17.7 (2015): e186.
25. Kim S. "Using Intervention Mapping to Develop a Media Literacy-Based Smoking Prevention Program for Female Adolescents". *International Journal of Environmental Research and Public Health* 18.12 (2021): 6305.
26. Heatherton TF., *et al.* "The Fagerström test for nicotine dependence: a revision of the Fagerstrom Tolerance Questionnaire". *British Journal of Addiction* 86.9 (1991): 1119-1127.

Volume 5 Issue 9 September 2021

© All rights are reserved by Pandya Visha S., et al.