Research article

Web based and conventional classroom based anti -tobacco awareness programs: A comparative studyPoornima Radhakrishnan¹, Maji Jose², Shruti D. Nayak³, Reuben Abraham Jacob⁴¹Oral Pathologist, ²Professor and Head, ³Reader, ⁴Junior Research Fellow,¹Dr. Poornima's Multi-Speciality Dental Clinic Labor Junction, Moothakunnam (PO), Kerala-683516 India^{2,3,4}Department of Oral Pathology and Microbiology, Yenepoya Dental College, Yenepoya (Deemed to be) University, Mangalore, Karnataka India

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Corresponding author: **Maji Jose**. Email- majiajoyin@yahoo.co.in**ABSTRACT**

Introduction and Aim: The technology enhanced education programs are efficient than traditional passive learning methodologies with respect to learning gains and knowledge retention, thereby reinforcing positive habits in students of all ages. The present study was designed to develop a computer assisted digital educational program on ill effects of tobacco and to assess the impact of this methodology over traditional classroom based anti-tobacco awareness program.

Materials and Methods: Two types of anti-tobacco awareness programs namely, computer assisted and conventional teaching, were administered to school children of teen age and successively knowledge retention, the attitude and behaviour towards tobacco were assessed through a structured questionnaire. Assessment was done on two occasions: subsequent to the training program (Phase I), six months after the program (Phase II). The results were compared using independent 't' test and paired 't' test. $P < 0.05$ was considered statistically significant.

Results: The students who received the computer-assisted training had a significantly higher cognitive learning outcome, both short term and long term and presented a significantly more positive attitude towards tobacco prevention ($p < 0.05$). However, no significant difference was noted in behaviour. Different parameters within Group 1 and 2, in phase I and phase II remained without significant difference ($p > 0.05$). A very strong positive correlation between knowledge and attitude was noted among participants of computer-assisted program.

Conclusion: Computer assisted anti-tobacco awareness program is better in terms of short term and long term knowledge retention in comparison to conventional classroom based learning program. Also long-term knowledge retention seems to have increased the concern about tobacco, which would have modified their behaviour towards engaging in protective practices.

Keywords: Computer-assisted instruction; tobacco; health knowledge; attitudes; practice.

INTRODUCTION

Two-third population of oral cancer victims reside in developing countries and the highest incidence rates have been observed in the Indian sub-continent (1). The use of tobacco (in any available form) has been considered to be the major risk factor for oral cancer and associated health complications. It has been reported that, the incidence of oral cancer in smokers is five to nine times greater than non-smokers associating the extent of tobacco use and cancer pathogenesis (2). In India, the most susceptible time for the initiation of tobacco use has been considered to be during adolescence and early adulthood (15-24) years. It has been estimated that more than five million Indian children below 15 years of age are current tobacco users (3). Children are implementing several policies and programs at the national and international level to prevent the tobacco use. According to a recent statistics, only 3-5% of the tobacco users succeeded in quitting the habit of tobacco smoking, despite a majority of them wishes to quit the same (4) which could be due to

addiction. These reports signify the need of improvement in preventive strategies for tobacco use in children.

The most effective approach to reduce tobacco use is to educate the potential users regarding the deleterious effects of tobacco and associated diseases such as oral cancer. The school-based anti-tobacco awareness strategies have been proven to be effective in reducing smoking prevalence, minimizing smoking initiation and smoking intentions (5,6). However, impressive educational approaches to the present day children, by exploiting their advanced knowledge and acceptability of electronic devices such as computers and mobile phones technologies, can be more effective. Making the best use of these devices for educating and motivating the children, offer more promising opportunities than the traditional teaching methods. Hence, the digital s may be more viable tool in the education processes especially in creating anti-tobacco awareness (7).

The computer assisted digital learning techniques have not gained much publicity in anti-tobacco

awareness program and the effectiveness of this learning technique is largely unknown. However, proper techniques and computer-based programs are warranted to implement for developing computer based learning techniques to give awareness and to motivate the children to quit tobacco use. Based on this background, the present study aimed to develop a custom-made digital educational program and to examine its effectiveness in educating the children regarding the ill effects of tobacco.

Methods

Design and development of computer assisted educational program: The program was developed by a software engineer using JavaScript. It consisted of two sections; 1. information related to the adverse effect of tobacco use which was intended to impart knowledge and awareness. This was programmed in the form of questionnaire, and reasoning followed by explanation of correct answers. Changing screen backgrounds and music were also incorporated to reduce distraction. 2. Test for self-assessment, based on the learning material incorporated in part 1, which included six multiple choice single answer type questions on ill effects of tobacco. This was programmed in such a way that the correct answer to a question leads to next question, while wrong answer leads to the explanation of correct answer. The program is available in the following links [<http://antitobaccocampaign.wixsite.com/anti-tobacco-campaign>, <http://antitobaccocampaign.wixsite.com/antitobacco-test>].

Recruitment of participants

The study commenced after obtaining approval from institutional ethics committee and permission from the school authority. One hundred and twenty students between the age group of 12–15 years from six selected educational institutions of Dakshina Kannada district, Karnataka, India were recruited for the study. An attempt was made to include representative proportions of both genders, in the groups. Only the students who had basic working knowledge on computer were included as participants. Differently abled children, who were unable to work on computer and those who had no basic proficiency in English language and computer were excluded from the study.

Procedure

Twenty students selected from each school were randomly divided into two groups; Group-A participated in the computer assisted awareness program and Group-B participated in traditional class room lecturing method. Computer assisted awareness program of one hour duration was conducted in the school computer lab. The first 30 minutes were dedicated to learn the facts by using the program and next 30 minutes for self-evaluation. Students in Group-B attended the awareness program in a class room conducted by an expert through traditional lecturing method of one hour duration, assisted by PowerPoint presentation. Student participation was ensured through continuous interaction by asking questions and encouraging them to clarify their doubts, as in conventional class room learning.

Fig. 1: Flow chart showing methodology adopted for comparing the efficacy of two types of anti-tobacco awareness programs **Graph 1:** Comparison within the two in Phase 1 and Phase 2

Questionnaire and data collection

Data collection was done with the help of a questionnaire. Questionnaire contained three sections: a: Demographic data, b: General information on tobacco use, c: questions to assess knowledge, attitude and behaviour, with each section having 15, 15 and 10 questions respectively. Knowledge component included 15 questions to assess the knowledge on 15 different facts related to tobacco use and with maximum score of 15. Five point scale system was used for attitude: 5 = strongly disagree, 4 = disagree, 3 = not sure (neutral response), 2 = agree, 1 = strongly agree. The highest possible score in this section was 75 and the lowest was 15. Higher attitude scores represent more positive attitude to avoid tobacco use. Similarly three point scale was used for behaviour: 1 = never, 2 = seldom, 3 = mostly; with higher scores represented better practice in supporting anti-tobacco activities, and highest being 30 and lowest 10. Total score was calculated for knowledge, attitude and behaviour. Comparative analyses were performed between the groups to determine the effectiveness of two different education techniques used.

Both the groups were given the questionnaire shortly after the completion of their education program (Phase I) in order to test the knowledge gain and short term retention of knowledge, their attitude and behaviour to tobacco. The same questionnaire was administered to the same set of students after a time gap of 6 months (Phase II), to assess effect on the long term knowledge retention. This data collection was done in classroom settings and all student participants were assured of anonymity and confidentiality.

Statistical analysis

The results obtained from the Phase 1 and Phase 2 of the study were expressed as Mean $\pm$ SD. Statistical analysis was conducted by employing using Independent-*t* test and paired *t* test using the statistical analysis software SPSS15. The level of significant was set at $P < 0.05$. Pearson's product-moment correlation was also done, to analyse the correlation between knowledge, attitude and behaviour in each phase among the groups.

RESULTS

General information

Out of 120 participants, 118(98.33%) never used or even tried any form of tobacco. However, two male students tried cigarette at the age of 11 and 12 years respectively. Friend or relatives introduced Cigarette to them. One among them is continuing the smoking habit. Close family members or relatives of 57 participants' use tobacco in some form. All the participants were aware of harmful effect of tobacco and 105 of them had already attended anti-tobacco awareness programs. Information about ill effects of tobacco, were obtained from multiple sources such as teachers (51%), parents (75%), advertisements (75%) friends (13%) and other sources (5%). Interestingly both participants who have tried cigarette were well aware of harmful effects of the same and none of close family members of the student who is current tobacco user consumes any form of tobacco.

Assessment of knowledge on ill effects of tobacco

While assessing the knowledge component, immediately after the educational program (Phase I), the participants of web based program showed very high level of knowledge with score ranging from 09 to 15 with an average score of 13.37 ± 2.70 out of maximum score of 15. It is interesting to note that 43% of them obtained 100% score. The knowledge

scores of Group-B was 12.38 ± 2.14 and only 18.33% of them got 100% score in knowledge component in contrast to 43% of Group A. Short term knowledge was significantly higher in Group-A compared to Group-B students ($P < 0.05$). Average knowledge scores recorded, 6 months after administration of educational programs (phase II), were 13.80 and 11.63 respectively for Group-A and B participants. Long-term knowledge retention was significantly higher among participants of Group-A compared to Group-B ($P < 0.001$). Relatively good knowledge retention is observed among Group-A participants indicated by fairly identical knowledge score even in Phase I and II. However, a tendency towards drain in knowledge was noted among participants of Group B; though the difference was not statistically significant ($P > 0.05$). Furthermore, only 3% of Group-B participants could score 100%, in Phase II, while 55% of Group-B participants could score 100%.

Assessment of attitude towards tobacco

In terms of attitude, the average score in phase I was 69.05 ± 7.09 and 65.98 ± 6.23 in Group-A and B respectively. Participants of Group-A presented a significantly more positive attitude towards tobacco prevention compared to Group-B ($P < 0.05$). In Phase II, attitude scores were considerably higher in both groups (70.38 and 68.37) than that of phase I; however, the difference was not significant, among the Group-A participants ($p > 0.05$). Group-B participants presented a significantly higher attitude score ($P < 0.05$).

Assessment of behaviour towards tobacco

Scores obtained with regard to behaviour were 26.78 ± 4.00 , 26.17 ± 3.72 respectively, for Group-A and B shortly after the anti-tobacco education program. In Phase II, scores in both groups remained relatively same with values 26.57 and 26.07. Behaviour towards tobacco prevention did not show significant difference within the groups in different phases and between the groups ($p > 0.05$). (Table 1 and Graph 1)

Correlation between knowledge, attitude and behaviour

Pearson's product-moment correlation test revealed a very strong positive relation between knowledge and attitude was noted among Group-A participants in phase I, while there was only a negligible relation between behaviour and knowledge and a weak positive relation between behaviour and attitude. Group-B participants in phase I showed a moderate positive relationship between knowledge and attitude and a weak positive relationship between knowledge and behaviour and between behaviour and attitude. A moderate positive relationship between knowledge and attitude and between behaviour and knowledge was noted in phase II in both groups. On the

contrary, in Group A, there was a strong positive relationship between behaviour and attitude while Group-B showed a weak positive relationship between the same parameters.

DISCUSSION

Major focus of the present study was to examine the empirical evidence to support effectiveness of animations for educating adolescent school children regarding the ill effects of tobacco. For this purpose a computer assisted based anti-tobacco awareness program was provided to adolescent children and the long term and short term retention of knowledge, attitude and behaviour towards tobacco were assessed.

Through the general information questionnaire, it was observed that friends or other elders introduced two of the participants to tobacco at very young age as low as 11 and 12 years respectively. One of them continues to smoke cigarette despite knowing the harmful effects of tobacco. This observation emphasizes the need for conducting regular awareness programs in schools and warrants improvising our efforts in the learning technique to efficiently impart scientific knowledge regarding the ill effects of tobacco. The attitude or concerns developed regarding an issue is directly proportional to the degree of awareness created, which in turn modifies the behaviour. Hence, by creating greater awareness/ knowledge in children regarding the ill effects of tobacco, their concern regarding the same would be improved, which would develop a positive attitude towards prevention of tobacco. This may, eventually modify the behaviour, increasing the possibility of refraining from tobacco, rather engaging in protective practices. Therefore, periodic anti-tobacco awareness programs in the schools could be an effective method to create awareness, thereby minimize tobacco use.

In the present study, the students who attended web based, computer assisted anti-tobacco awareness program demonstrated good knowledge regarding the ill effects of tobacco. Also, the students who received the computer assisted training had a significantly higher cognitive learning outcome, both short term and long term, when compared with the students who learned the same information with traditional class room teaching methodology. More than 50% of the students in computer assisted training group were able to retain 100% of knowledge they acquired in the education program even after 6 months. However, only 3% of the traditional learning group were obtained 100% score in knowledge questions indicating knowledge drain in due course of time. This suggests that the computer based e-learning promises a higher level of motivation of learners, due to the presentation of the contents in an interactive, rule-based and competitive way. Computer based learning encourages critical thinking and reasoning

and are more efficient to retain knowledge in the long run (8). As the students were participating in computer based learning program they also had an opportunity to go back at every point to clarify their doubts and reinforce the knowledge they acquired. This would have further favoured the long-term learning outcome. To the best of our knowledge, there are limited studies available in the literature dealing with the effectiveness of computer assisted anti-tobacco awareness program. However, medical education using computer assisted learning method, showed potential benefits with respect to learning gains and knowledge retention, and reinforcing positive habits in students of all ages, when compared to traditional learning methods(8). Several researchers and educational experts tried similar approaches to improve the knowledge regarding health-related issues and were reported to be effective (8-15).

Both the study groups showed a positive attitude towards tobacco prevention immediately after the learning program and retained the same even in second phase. As with knowledge component, participants of computer assisted learning program presented a significantly more positive attitude compared to conventional class room group. This is interpreted as positive correlation between knowledge and attitude. Interestingly in Phase II, participants of both the groups exhibited considerably higher attitude scores. This indicates that both the educational programmes on tobacco encouraged the students to contemplate and reflect on their acquired knowledge and created positive attitude towards the prevention of tobacco.

This study also attempted to understand the relationships among knowledge of ill effects of tobacco, attitude toward tobacco, and preventive behaviour against tobacco. In regards to behaviour towards tobacco prevention, both the groups obtained relatively similar score on both phases of the study. A strong positive correlation between knowledge and attitude was documented among participants of computer assisted program while the traditional class room teaching group showed a moderate correlation which could be related to the creative thinking and reasoning generated by the digital learning . Remarkably weak correlation between knowledge and behaviour and between behaviour and attitude was observed between both the groups. Interestingly, our findings are consistent with previously reported studies, which examined the effectiveness of informational campaigns in influencing health behaviour. The reports indicate that the correlations between information level and behaviour or between attitude and behaviour are generally positive though low (16).

In Phase II, positive relationship between behaviour and knowledge, knowledge and attitude were

documented. However, strong positive relationship between behaviour and attitude were observed among participants of computer assisted program while only weak positive relationship between behaviour and attitude among those who participated in traditional teaching program. This suggests that the animation based group relation between attitude and behaviour changed from weak to very strong in due course. The long term knowledge retention on ill effects of tobacco facilitated by the computer assisted education program created a strong conviction that tobacco use affects the functioning of human body and cause many diseases including oral cancer(2). The animation based education encouraged critical thinking and reasoning to promote a behavioural change.

The findings from this study highlight the general understanding that, education creates knowledge or awareness regarding tobacco use and this awareness/knowledge has shaped the attitude towards the same. However, attitude need not always predict the behaviour and cognitive and affective components of attitudes are not necessarily expressed in behaviour. Behaviour of a person depends on multiple factors including environmental factors, culture, and situations and environmental factors have highest influence on behaviour of a person. Therefore, consistent, periodic awareness programs on ill effects of tobacco are warranted to create strong conviction regarding the deleterious effects associated with tobacco use. The conviction created may bring behavioural change in children so that they refrain from tobacco use. These findings suggest that education alone is ineffective and education programs associated with interventions requires modifications to encourage population-wide behaviour change (16).

Though developing a web based educational program requires involvement of experts which can be expensive, once developed it is easy to administer and better accepted by the present generation as learning happens, while independently by means of the program. This method also can be used for regular follow up, subsequent to a conventional class room teaching by an expert, to reduce the manpower requirement for regular reinforcement.

Limitations

The study has few limitations. The data regarding the knowledge, attitude and behaviour of the students, before conducting educational programs were unavailable. The pre-existed knowledge base acquired through various sources hurdled to bestow the entire credit to the learning programs. The study represents a localized population and the socioeconomic status of the students was not considered the. Also, further studies are recommended on long term and motivational effect of the animation based anti-tobacco awareness

program with larger sample size and including participants from diverse socioeconomic background.

CONCLUSION

The observations of this study endorse that awareness programs in the school is an effective measure to alert about harmful effect of tobacco and it should start as early as 10 years. It is effective in both traditional classroom teaching or computer assisted programs. However, computer assisted e-learning promises an efficient long-term cognitive learning outcome.

CONFLICT OF INTEREST

Authors declare no conflicts of interest.

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