Published online in http://ijam.co.in ISSN No: 0976-5921

International Journal of Ayurvedic Medicine, Vol 12 (4), 967-974

Readability and Suitability Assessment of university students Educational Materials in Preventing Smoking

Research Article

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Abstract

Background: Educational materials are frequently used by health care providers to inform university students and young people about smoking and the health risks of smoking. However, little attention has been paid to the readability and suitability of these educational materials. Objectives: The study aimed to determine the readability and suitability of educational materials in preventing smoking for university students. Methods: Multiple instructional materials and books were used for the design and preparation of educational materials and were then tailored to the target group. Readability was measured by using the readability assessment of materials (RAM); and suitability was determined by the suitability assessment of materials (SAM) that considers characteristics such as content, graphics, layout/topography, and cultural appropriateness. Twenty reviewers, including 15 students and 5 health specialists scored the educational materials. Results: The mean readability score _ standard deviation(SD) of the educational materials was 8±1.6, 9±1.5 and 10±1.7, for the booklet, the pamphlet of the skill of saying no, smoking pamphlet and quitting it , respectively, which were increased to 15±1.4, 16 ±1.7and 17±0.8, after tailoring the content. The average SAM scores before and after tailoring the content were 45% for the booklet, which was increased to 88% and 75% for the pamphlet of the skill of saying no, which was increased to 93% and 79%for the smoking pamphlet and quitting it ,which was increased to 95%.The increase in all scores was significant ($p< 0.01$).The final tailored educational material was rated "superior media" on the SAM ratings. Conclusions: Given that most of the printed materials are suitable for people with higher education levels, health providers are strongly advised to prepare simple and understandable education materials that may increase the likelihood of consumer perception and recall.

Key Words: Smoking, Students, Prevention, Readability, Suitability, Education Materials.

Introduction

Inadequate health literacy is an independent risk factor for poor health outcomes, including higher hospital admission rates (1), medication nonadherence (2), lower use of preventative services (3), and mortality(4, 5) Health literacy is defined as the degree to which individuals obtain, process, and understand basic health information and services needed to make appropriate decisions about their own health (6). Studies have shown that more than one third of adults have inadequate proficiency in health literacy tasks(7). Health literacy is essential to promote healthy individuals and communities (8). Low health literacy has a significant negative impact on both the health care system and individual health (9). Printed and web-based educational resources are often used to supplement and reinforce information provided by clinicians. New standards are being established to enhance the quality of patient education materials, such as recommendations to write educational materials at a sixth-grade reading level (10). Primary sources of health information are physicians and health professionals, but for reasons such as lack of time, large numbers of clients, high medical costs and poor communication skills, these specialists are not always able to meet patients' information needs(8, 11). Education can vary depending on the climatic conditions of each region and the temporal and spatial variables. The cultural and political conditions of the society have a great impact on the difference in educational content (12). The transmission of educational messages to learners is done through the use of educational media, which are an integral part of the educational process(13). One way to increase health literacy is to prepare appropriate educational material and tailor it to the target group (14). Much of this

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information is forgotten, when only oral information is provided. Thus health workers are encouraged to provide written educational material to people to reinforce and supplement information that has been provided orally (15). A small number of published evaluations are designed to assess the appropriateness of written health education materials(15) . The benefits and importance of providing adolescences with education are widely confirmed. Educational material is frequently used by health workers and have advantages such as portability and consistency (16). The most common evaluations are Flash, Goning, Close, Suitability (SAM) and Readability (RAM) (17, 18). Readability and suitability are tools used to evaluate appropriateness of written information. Readability refers to the reading difficulty of a resource and uses word and sentence length to determine a score. Focusing on readability, however, is not enough for improving comprehension. Suitability measures how well the material can be understood and accepted by the reader(19, 20). Readability is the ease by which a reader can understand a written text. The SAM instrument is a validated method for evaluating written health-related educational materials. It is used to evaluate printed materials in terms of categories and factors known to enhance people's understanding of printed material(21). The instrument used to assess the appropriateness of written material are readability and suitability. Readability refers to the easiness or difficulty of reading an educational medium. However, readability alone is not enough for improving perception. Suitability offers a systematic method to objectively assess the suitability of health information materials for a particular audience in a short time (22). Smoking is mentioned as the first preventable cause of death in the world (23). The prevalence of smoking as a starting point for the use of other addictive substances is of particular importance (24). Smoking alone is the most important risk factor for preventable disease and an important cause of premature death (25). Cigarettes contain more than 4,000 carcinogenic and mutagenic toxins (26). It is estimated that 8.4 million people will die from smoking in 2020 (27). Currently, death in 87% of lung cancers and 82% of deaths due to obstructive pulmonary diseases are due to smoking. In addition, smoking has an effect on the cardiovascular system and 21% of deaths are due to coronary artery disease and 18% of deaths are due to heart disease(28). Smoking not only makes the smoker sick, but people who live around a smoker-risk encouraging the body to another person so that it is estimated that more than 30% of lung cancer(25). In the United States, a study on the effectiveness of smoking cessation programs showed that the most important reasons for starting smoking include the influence of friends, peer pressure, and other environmental factors. On the other hand, factors that prevent smoking cessation include lack of insurance coverage, lack of awareness of the existence of smoking cessation centers and lack of support groups(29). Another study in the United States found that smoking, habituation to smoking, relaxation, and enjoyment of smoking are among the most important reasons for continuing to smoke (30). Reasons to continue smoking are different from reasons to start smoking, because it is usually formed with motives such as curiosity, hobby, imitation or compliments of friends(31). Smoking is one of the important factors in adolescent and young adult population, causing numerous problems, such as cough and respiratory and cardiovascular diseases, as well as, physical compatibility and lung growth makes it difficult (32). The study of smoking among students is particularly important because smoking students useful indicator of smoking by young people and the other can play a role in increasing or reducing the prevalence of smoking in society (33). Despite this importance, little research has been done on smoking in Islamic countries, including Iran. In a study conducted in the United States, the prevalence of smoking was 26% in men and 3.6% in women(34). Given the tendency of some Youth to Smoking, it is necessary to use educational material to educate them about the harms of Smoking and its usage. For all target groups, written educational material for health issue will be useful, if it is understood by the recipient (35, 36) Though, little attention has been paid to the readability and suitability of these educational materials for University students.

Objectives

The aim of this study was to determine the readability and suitability of university students' educational materials in preventing smoking and quitting smoking.

Methods

Study Design and Population

This study was conducted in 2021 in Yazd, located in central Iran. The Participants enrolled in this study were 15 university students (5 students of each university including medical sciences, Yazd University and Azad University) and 5 health experts. In order to select 15 students, three universities that were previously randomly selected as the target group of the intervention were randomly selected and according to the prevalence of covid 19 and the absence of students in universities, after obtaining Their contact number and email, media evaluation checklist were emailed to them. In this study, the educational materials included for the booklet, the pamphlet of saying no, the pamphlet of smoking and quitting. In order to evaluate the appropriateness of the prepared educational materials, readable and appropriate tools were used.

The readability of the material was assessed by the "readability assessment of materials" (RAM) and suitability was accessed through the "suitability assessment materials" (SAM). Initially, the educational materials were evaluated technically by the experts. Then, according to their points of view, the necessary changes were made and the materials were tailored according to the target group. Tailored material was then returned to the target group and the suitability and readability were assessed again.

Readability Assessment of Materials (RAM)

RAM assesses the difficulty of reading an educational medium in three parts, which are having a specialized content (range of scores 0-6), misspelling (range of scores 0-6), and typographical mistakes (range of scores 0-6). The range of scores in media readability assessment is from 0 to 18 and the acceptable score is more than 10 (37).

Suitability Assessment of Materials (SAM)

Suitability was measured using the Suitability Assessment of Materials (SAM) created by Doak et al(38). The SAM is a systematic tool to assess printed health-related educational resources in a short amount of time. The SAM has been validated(39) and successfully used in prior studies of other printed health information(40, 41) The SAM consists of 6 evaluation criteria: content (e.g., "behavior information to help solve their problem"), literacy demand (e.g., "common, explicit words are used"), graphics (e.g., "simple, adult-appropriate, line drawings/sketches are used"), layout and typography (e.g., "type size is at least 12 point, no ALL CAPS for long headers or running text"), learning stimulation and motivation (e.g., "complex topics are subdivided into small parts so that readers may experience small successes in understanding or problem solving"), and cultural appropriateness (e.g., "images and examples present the culture in positive ways").

Two readers were trained in the SAM scoring techniques. Each reviewer scored all study materials and was blinded to the source of the material. The mean SAM scores were used in the analysis. The SAM consists of 22 items grouped under six factors, namely content, literacy demands, graphics, layout and typography, learning stimulation and motivation, and cultural appropriateness. Each of the 22items is rated in terms of the degree to which it meets set criteria, on an ordinal scale of 0,1, 2, and not applicable, where 0 = inadequate, 1 = adequate, and 2 = superior(10). Scores are summed to yield an overall raw score for the material. This is converted to a percentage of the possible total score for that material, with 70%–100% being considered to be superior material, 40%–69% adequate material, and 0%–39% not suitable material (42, 43).

Statistical Analysis

The Kolmogorov-Smirnov (KS) test was used to check the normality of quantitative variables and showed that the data had a normal distribution. The collected data were analyzed by SPSS software version 16. Descriptive statistics were reported for all variables. The mean score of SAM and RAM before and after tailoring was compared using paired t-tests. The level of significance in the tests was considered less than 0.05.

Results

Of the 20 participants in the study, 15 in this study were 15 university students (5 students from each university including medical sciences, Yazd University and Azad University). Were selected, randomly selected the mean age of students was 21.87±5.09. Participants were 53% girls and 46.7% boys, and 5 students were randomly selected from each university. Also, 5 health specialists with PhD degrees were selected (of which 3 were health education specialists, 1 was an epidemiologist and 1 was a health information management specialist). Their mean age was 45.6± 9.07. (Table 1)

Table 1. Demographic characteristics of participants

Variable			N	Mean	S.D
Students	Age		15	21.87	5.09
	Gender	Girl	8	53.3	
		Boy	7	46.7	
	Marital status	Single	10	66.7	
		Married	3	20.0	
		divorced	2	13.3	
	University	Medical Sciences university	5	33.3	
		Yazd university	5	33.3	
		Islamic Azad university	5	33.3	
	Field of Study	Medical	5	33.3	
		Nursing	5	33.3	
		Physics	5	33.3	
Health specialist	Age		5	45.6	9.07
	Gender	Female	1	20	
		Man	4	80	
	Education rate	PhD	5	100	
	Field of Study	Health Education	3	60	
		Epidemiology	1	20	
		Health Information Management	1	20	

The mean readability score _ standard deviation (SD) of the educational materials were 8±1.6, 9 ± 1.5 and 10±1.7, for the booklet, the pamphlet of the skill of saying no, smoking pamphlet and quitting it , which were increased to 15 ± 1.4, 16 ± 1.7and 17 ± 0.8, after tailoring the content. (Table 2**)**

Table 2. Mean Score of the "Readability Assessment of Materials" Before and After Tailoring

Readability Score	Materials		
	Booklet	**The pamphlet of the skill of saying no**	**Smoking pamphlet and quitting it**
Before	8±1.6	9 ± 1.5	10±1.7
After	15 ± 1.4	16 ± 1.7	17 ± 0.8

The average SAM scores before and after tailoring the content were 45% for the booklet, which was increased to 88%. The increase in score was significant ($p < 0.001$). Those findings showed the final educational material was "superior media" on the SAM ratings (Table 3).

Table 3. Results of the Assessment the booklet SAM Score Check List Before and After Tailoring

SAM Item and Description	Score Before Tailoring	Score After Tailoring	p-value
1- Content			
a. Purpose is evident	1.00 ± 0.55	2 ± 00	
b. Content about behavior	0.70 ± 0.65	2 ± 0.0	
c. Scope is limited	0.80 ± 0.61	2 ± 0.0	
d. Summary or review included	1.00 ± 0.47	1.60 ± 0.50	
2- Literacy demand			
a. Reading grade level	0.65 ± 0.48	1.65 ± 0.48	
b. Writing style, active voice	0.60 ± 0.61	1.65 ± 0.48	
c. Vocabulary uses common words	1.00 ± 0.55	1.70 ± 0.47	
d. Context is given first	1.00 ± 0.55	1.80 ± 0.45	
e. Learning aids via "road signs"	0.50 ± 0.55	1.50 ± 0.51	
3- Graphics			
a. Cover graphic shows purpose	1.00 ± 0.56	2 ± 0.0	
b. Type of graphics	1.00 ± 0.71	2 ± 0.0	
c. Relevance of illustrations	1.00 ± 0.64	1.50 ± 0.52	<0.001
d. List, tables, etc. explained	1.00 ± 0.72	1.50 ± 0.52	
e. Captions used for graphics	1.50 ± 0.57	2 ± 0.0	
4- Layout and typography			
a. Layout factors	1.00 ± 0.55	1.70 ± 0.50	
b. Typography	0.80 ± 0.44	1.60 ± 0.51	
c. Subheads (chunking) used	0.90 ± 0.48	1.80 ± 0.36	
5-Learning stimulation, motivation			
a. Interaction used	1.00 ± 0.60	1.60 ± 0.50	
b. Behaviors are modeled and specific	1.00 ± 0.60	1.80 ± 0.36	
c. Motivation-self-efficacy	1.20 ± 0.58	1.80 ± 0.44	
6- Cultural appropriateness			
a. Match in logic, language, experience	0.95 ± 0.51	2 ± 0.0	
b. Cultural image and examples	0.80 ± 0.44	2 ± 0.0	
Total score earned by SAM	**20**	**39**	
Percentage points earned by SAM	**45**	**88**	

The average SAM score for the pamphlet of the skill of saying no was 75%, which significantly increased to 93% after tailoring the content. The increase in score was significant ($p < 0.01$). Those findings showed the final educational material was "superior media" on the SAM ratings (Table 4).

Table 4. Results of the Assessment the pamphlet of the skill of saying no SAM Score Check List Before and After Tailoring

SAM Item and Description	Score Before Tailoring	Score After Tailoring	p-value
1- Content			0.01
a. Purpose is evident	2 ± 0.0	2 ± 0.0	
b. Content about behavior	2 ± 0.0	2 ± 0.0	
c. Scope is limited	2 ± 0.0	2 ± 0.0	
d. Summary or review included	2 ± 0.0	2 ± 0.0	
2- Literacy demand			
a. Reading grade level	2 ± 0.0	2 ± 0.0	
b. Writing style, active voice	2 ± 0.0	2 ± 0.0	
c. Vocabulary uses common words	2 ± 0.0	2 ± 0.0	
d. Context is given first	0.50 ± 0.55	2 ± 0.0	
e. Learning aids via “road signs”	1.00 ± 0.72	2 ± 0.0	
3- Graphics			
a. Cover graphic shows purpose	0.0 ± 0.0	1.50 ± 0.42	
b. Type of graphics	1.00 ± 0.60	2 ± 0.0	
c. Relevance of illustrations	2 ± 0.0	2 ± 0.0	
d. List, tables, etc. explained	0.0 ± 0	1.00 ± 0.40	
e. Captions used for graphics	2 ± 0.0	2 ± 0.0	
4- Layout and typography			
a. Layout factors	1.00 ± 0.60	2 ± 0.0	
b. Typography	1.00 ± 0.60	1.5 ± 0.45	
c. Subheads (chunking) used	2 ± 0.0	2 ± 0.0	
5- Learning stimulation, motivation			
a. Interaction used	2 ± 0.0	2 ± 0.0	
b. Behaviors are modeled and specific	1.00 ± 0.60	1.50 ± 0.42	
c. Motivation-self-efficacy	1.50 ± 0.70	2 ± 0.0	
6- Cultural appropriateness			
a. Match in logic, language, experience	2 ± 0.0	2 ± 0.0	
b. Cultural image and examples	2 ± 0.0	2 ± 0.0	
Total score earned by SAM	**33**	**41**	
Percentage points earned by SAM	**75**	**93**	

The average SAM score for the smoking pamphlet and quitting it was 79%, which significantly increased to 95% after tailoring the content .The increase in score was significant ($p< 0.001$). Those findings showed the final educational material was “superior media” on the SAM ratings (Table 5).

Table 5: Results of the Assessment the smoking pamphlet and quitting it SAM Score Check List Before and After Tailoring

SAM Item and Description	Score Before the Tailoring	Score After the Tailoring	P Value
Content -1			<0.001
a. Purpose is evident	2 ± 0.0	2 ± 0.0	
b. Content about behavior	1.50 ± 0.32	2 ± 0.0	
c. Scope is limited	2 ± 0.0	2 ± 0.0	
d. Summary or review included	1.00 ± 0.25	1.20 ± 0.53	
2- Literacy demand			
a. Reading grade level	1.50 ± 0.78	2 ± 0.0	
b. Writing style, active voice	1.00 ± 0.65	1.80 ± 0.34	
c. Vocabulary uses common words	1.50 ± 0.65	2 ± 0.0	
d. Context is given first	1.00 ± 0.60	2 ± 0.0	
e. Learning aids via “road signs	1.00 ± 0.80	2 ± 0.0	
3- Graphics			
a. Cover graphic shows purpose	1.50 ± 0.60	2 ± 0.0	
b. Type of graphics	2 ± 0.0	2 ± 0.0	
c. Relevance of illustrations	2 ± 0.0	2 ± 0.0	

d. List, tables, etc. explained	1.00 ± 0.75	2 ± 0.0	
e. Captions used for graphics	2 ± 0.0	2 ± 0.0	
4- Layout and typography			
a. Layout factors	2 ± 0.0	2 ± 0.0	
b. Typography	1.50 ± 0.65	2 ± 0.0	
c. Subheads (chunking) used	1.00± 0.55	2 ± 0.0	
5- Learning stimulation, motivation			
a. Interaction used	2 ± 0.0	2 ± 0.0	
b. Behaviors are modeled and specific	2 ± 0.0	2 ± 0.0	
c. Motivation-self-efficacy	1.50 ± 0.72	2 ± 0.0	
6- Cultural appropriateness			
a. Match in logic, language, experience	2 ± 0.0	2 ± 0.0	
b. Cultural image and examples	2 ± 0.0	2 ± 0.0	
Total score earned by SAM	**35**	**42**	
Percentage points earned by SAM	**79**	**95**	Superior media

Discussion

Educators must choose the best and most effective type of media and educational methods that suit the needs and level of learners. Standard training material is one of the important factors in better and more effective training. The present study aimed to determine the readability and suitability of some of some prepared university students educational materials in smoking prevention.

In this study, the fit analysis showed that Suitability Assessment of Materials (SAM) in the skill pamphlet of saying no, smoking pamphlet and quitting , was in the excellent range before sewing and reached a high range after sewing, but the booklet was in the appropriate range before sewing and after sewing It was in the range of excellent media. This finding is consistent with the results of a study by Sadeghi et al. In Iran on the readability and appropriateness of adolescents' educational materials in preventing hookah smoking(44). Also in the study of Morouti et al. In Iran on Readability and Suitability Assessment of Educational Materials in Promoting the Quality of Life for Postmenopausal Women (45). Hoffmann et al.'s study in Australia about assessing the suitability of written stroke material was in line with our findings and showed printed material enhance people's understanding (15). Finnie et al. in a systematic review showed only two of the seven Cancer Education Print and Web-based material were suitable(46). This finding is consistent with results from the Okuhara et al. study in Japan about the educational material on cancer screening announcements in municipal newspapers(47) and Rhee et al. in the USA about the educational material about rheumatic diseases(22). also in Weintraub et al study titled an evaluation of the written education materials for patients with prostate cancer, the mean overall SAM rating was "adequate." (41).

Readability Assessment of Materials (RAM), Before and after sewing, smoking pamphlet and quitting it ,was in the acceptable range, while the booklet and the skill pamphlet of saying no, before sewing was not in the acceptable range, which increased after sewing; In these studies, education material was written at a high readability level and had an effect on the target group.However, the results of Walsh and Volsko in the USA about the readability assessment of internet-based consumer health information(48). Is not consistent with this study and the educational material assessed in their study did not have proper readability and were in the category of "difficult" media. The mean readability level of materials in Eames et al. study titled The Suitability of Written Education Materials for Stroke Survivors and Their Carers was (grade 9) higher than participants' mean reading ability (grade 7–8) (49). while the mean score of readability of the smoking pamphlet and quitting it , in this study was acceptable (>10) that is not consistent with Eames's study but This finding is consistent with results from the Sadeghi et al study(44). Also This finding is consistent in the study of Morovati et al(45). Finnie et al. in a systematic review showed only two of the seven Cancer Education Print and Web-based materials were suitable(46).

Thus modifying written educational material and tailoring them according to the target audience is important for facilitating learning and recall of the information. Readability refers to the ease of comprehension of printed material with respect to its writing style (50).and suitability assessment can be used to evaluate printed materials against factors known to enhance people's understanding of printed materials(43).

A limitation of this study was the small sample of participants (n=20) which may not be representative of All university students and their problems. Proper planning should be done for the production and distribution of educational media in accordance with the readability and suitability standards. Also, health educators who prepare education materials should be trained for this goal.

Conclusion

The content and design of written education material should be evaluated before using them the value of the SAM is that it can be used to identify specific elements that should be modified before education materials provided to the target group. The findings indicated that the printed materials were well-matched after evaluation by the RAM and the SAM

checklist and they were in accordance with the characteristics of the university students Compliance with these recommendations may increase the likelihood of consumer comprehension.

Ethics approval and consent to participate

Ethical approval for this study has been obtained by the ethics committee affiliated with Shahid Sadoughi University of Medical Sciences, Yazd, Iran (IR.SSU.SPH.REC.1399.174). Registration of this randomized control trial has been completed with the Iranian Registry of Clinical Trials, IRCT20200908048656N1.

Acknowledgments

The authors would like to thank the research deputy of Shahid Sadoughi University of Medical Sciences, which financially supported this research and all of the individuals who participated in this study.

Conflict of Interests

The authors declare that they have no conflict of interest.

Funding/Support

Research deputy of Shahid Sadoughi University of Medical Sciences.

Patient Consent

The aim of the study was explained to the participants and written informed consent was obtained from the participants

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