

Original Research Article

A training model for the community healthcare volunteers' knowledge on periodontal disease and birth outcome

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ABSTRACT

Background: Indonesian community healthcare volunteers and pregnant women have not received sufficient special training; they lack knowledge about periodontal disease risks during pregnancy and childbirth. The purpose of this research was to increase community healthcare volunteers' knowledge about periodontal disease, which is a risk during pregnancy and childbirth.

Methods: The 9 step theory based training model included stages from problem identification to evaluation that would be incorporated into dental and oral health education programs at public health centers. A quantitative pre-experiment with one subject group compared pre-test and post-test designs. Dentists provided 9-step training to 53 community healthcare volunteers at a health center, East Jakarta. Fifty pregnant women were then given similar training by the community healthcare volunteers.

Results: The result was an increase in knowledge among community healthcare volunteers and pregnant women ($\alpha=0.05$; $p=0.000$ with the Wilcoxon test). No significant difference was observed on educational aids between flipchart and puzzle cards in increasing knowledge among community healthcare volunteers ($p=0.969$ with an independent t-test) and pregnant women ($p=0.359$ with the Mann-Whitney test).

Conclusions: The 9-step theory-based training model was found to be effective in increasing knowledge among community healthcare volunteers. Flipchart and puzzle cards were equally effective in increasing knowledge among community healthcare volunteers and pregnant women.

Keywords: 9 step theory, Childbirth, Community healthcare volunteers, Periodontal disease, Training model

INTRODUCTION

Health human resources is defined by the World Health Organisation as people engaged in actions whose primary intent is to enhance health. Health education is consciously constructed opportunities for learning that involve some form of communication designed to improve health literacy, including improving knowledge and developing life skills conducive to individual and community health.¹ Ministry of Health Republic of Indonesia stipulates that the public is given an

opportunity to participate individually and in an organized manner in implementing health efforts. The community dental health efforts program is an effort to support the Republic of Indonesia's Medium-Term Health Sector Development Plan 2020–2024 to reduce infant mortality and place empower the community as subjects.² According to the 2018 DKI Jakarta Provincial Sub-District Health Office's profile data, there were 183 cases of low-birth-weight (LBW) babies in the East Jakarta area. Most trained active community healthcare volunteers in the East Jakarta area have never received special knowledge on periodontal health and the risks

associated with pregnancy and childbirth.³ Lawrence Green's theory states that the level of human health behavior is influenced by two main factors: namely, behavioral causes and non-behavioral causes. Behavioral factors are formed by predisposing factors, enabling factors, and reinforcing factors. Knowledge is one of the elements among the predisposing factors that contribute to changes in health behavior.⁴ Community healthcare volunteers, as an integral component of the health workforce for healthcare development, are also expected by Indonesian government to assist people in adopting healthy lifestyle behaviors. Community healthcare volunteers' social spirit can play an important role in building the community's capacity to participate in such measures.⁵ One way to foster community participation is through persuasion and education. Education and training involve a series of activities to increase individual or group knowledge about carrying out their duties. The training model provides an overall picture of what steps must be taken in the cycle of planning, implementation, and evaluation stages.⁶ Among the models that have been developed are the 9-step theory- released by the center for international education (CIE) at the University of Massachusetts. The stages of the 9-step model program start with identifying needs, an initial assessment and preparation of subject matter and media aids for tutors or facilitators, and determining the next stage of participation before a final assessment of participants.^{7,8} Educational aids offer different intensities in assisting the acquisition of student's perceptions. Edgar Dale divided educational aids' intensity levels into a cone in the theory of "Dale's cone of experience".⁹ Visual and verbal displays can increase stored messages from 20% to 50% of their hearing and sight.¹⁰ The use of cards, such as puzzles, is preferred by educator because the interested response among learning participants is higher when receiving such information compared to textbook media, which is more boring.^{11,12} Cleeren used hand-drawn sketches and animation in two groups of subjects with the same level of periodontal knowledge, and in general, knowledge acceptance through more attractive visual media was found to receive a quicker response among participants in order to gain an understanding of the instructed material.¹³ Pregnant women are in the high-risk group in cases of oral and dental disease.¹⁴ Various physical and physiological changes to the oral cavity can occur during gestation in response to the body's preparation for fetal development and childbirth.¹⁴

Periodontitis is an independent risk factor for preterm birth.¹⁵ Women with periodontitis are statistically at 3.2 times higher risk to deliver a child with low weight, and at 3.4 times higher risk to deliver preterm, compared to women without periodontitis.¹⁶ There is a significant association between chronic periodontal disease and preterm low birth weight infants.¹⁷ Another study, found that an observable relationship was noticed between periodontitis and gestational age, and a positive correlation was found with respect to preterm birth and periodontitis.¹⁸ The purpose of this research was to

increase knowledge among community healthcare volunteers and pregnant women about periodontal problems that can pose a risk during pregnancy and childbirth.

METHODS

The research design used involved pre-experimental quantitative research with a one-group comparison of the study's pre-test and post-test designs. Measurements of participants' knowledge were obtained before the study's intervention (pre-test) and after the study's intervention (post-test), without a control group. The subjects of this study were selected using a non probability total sampling technique. The population comprised community healthcare volunteers at a health center in East Jakarta. These community healthcare volunteers had active volunteer status at the time of their participation. The number of samples obtained comprised a total of 53 registered volunteers with trained and active status in the health center. The study's selection of pregnant women was conducted at the health center, according to the study's inclusion criteria, until the total number of pregnant participants reached 50 people. The study's education program is divided into two outline stages: namely, the stage of developing a training module for community healthcare volunteers and the stage of determining educational media's effectiveness for pregnant women taught by community healthcare volunteers (Table 1). The study began by collecting survey data to assess volunteers' initial knowledge. This assessment used a validated questionnaire adapted from international journals.^{13,19} The series of modules prepared in this study comprised a facilitator's guide, a healthcare volunteers' pocketbook, and educational aids media (flipchart and puzzle cards). These modules were the main activity in the study's training sessions. The study's pocketbook and training module involved three main subjects: general knowledge of oral health, gingivitis, and periodontitis. These three main subjects were further divided into eight sub-subjects at a home group that oversaw three focus groups (Figure 1). Both media's illustrations were depicted simply included the same contents as the healthcare volunteers' pocketbook. Tables, graphs, and charts were depicted simply to emphasize particular messages. The media's drawings were created by an illustrator in accordance with the concept and direction of the researcher, paying attention to the "VISUALS" principle (visible, interesting, simple, useful, accurate, legitimate, structured).⁹

RESULTS

This result showed an increase in knowledge as a result of the process of educating community healthcare volunteers, based on the proposed module's guidelines. Five community healthcare volunteers were excluded as research subjects, falling under the exclusion category because they only attended one training session or did not follow the study's education process through to its completion.

Table 1: Stages of research in the 9-step theory-based training model.

Stage	Step	Step of training	9-step theory
Stage I: development of community healthcare volunteers training module	1	Community healthcare volunteers survey	Identifying
	2	Survey analysis	Formulating the general goals and specific objectives
	3	Preparation of community healthcare volunteers questionnaire	Pre test-post test
	4	Preparation module	Arranging a sequence of practice activities, developing learning materials.
	5	Training community healthcare volunteers	Training trainers
	6	Result analysis	Conducting an initial assessment of the trainees
Stage II: determinate the effectiveness of pregnant women education by community healthcare volunteers	7	Pregnant women education by community healthcare volunteers	Carrying out a training program
	8	Pregnant women evaluation	Conducting a final assessment of the trainees
	9	Educational aids evaluation	Provide feedback

Table 2: Bivariate analysis between characteristics of the study participants on knowledge enhancement.

Participants characteristics	N (%)	Participants with score difference \geq mean/median N (%)	P value
Community healthcare volunteers (N=48)			
Education			
Elementary junior high school	1 (2.1)	0 (0)	1.000
Senior high school bachelor degree	47 (97.9)	17 (36.2)	
Age group* (years)			
36-45 (Late adult)	20 (41.6)	6 (12.5)	0.148
46-55 (Early elderly)	19 (39.6)	12 (25)	
56-65 (Late elderly)	8 (16.7)	3 (6.25)	
> 65 (Seniors)	1 (2.1)	0 (0)	
Education aids media			
Flipchart	24 (50)	9 (18,75)	0.383
Puzzle cards	24 (50)	12 (25)	
Pregnant women (N=44)			
Education			
Elementary- junior high school	22 (50)	8 (33.3)	0.538
Senior high school-bachelor degree	22 (50)	9 (37.5)	
Age group* (years)			
17-25 (Late youth)	13 (29.5)	6 (13.63)	0.177
26-35 (Early adult)	27 (61.4)	8 (18.18)	
36-45 (Late adult)	4 (9.1)	3 (6.82)	
Occupation			
Housewife	32 (72.7)	14 (31.81)	1.000
Non housewife	12 (27.3)	3 (6.82)	
Education aids media			
Flipchart	22 (50)	7 (15.9)	0.353
Puzzle cards	22 (50)	10 (22.72)	

* Indonesian national health system.²³

Table 3 : Change in knowledge of participants after 9-step theory-based training model.

Parametrs	Median (Min.-Max.)	
	Community healthcare volunteers (N=48; p= 0.00*)	Pregnant women (N=44; p= 0.000*)
Change in knowledge after 9-step theory based training model		
Pre-test score	23 (14-27)	23 (16-29)
Post-test score	28 (16-30)	28 (23-30)
Effectiveness test of educational aids media group on the difference of post test-pre test		
	Mean (SD)	
	Community healthcare volunteers (N=24; p= 0.967**)	Pregnant women (N=22; p= 0.359***)
Score increase - flipchart	4.46 (3.451)	5.77 (6.110)
Score increase - puzzle cards	4.50 (3.551)	6.14 (3.895)
Difference in pre test-post test score in knowledge improvement analysis of community healthcare volunteers		
	Mean (SD)	
	Community healthcare volunteers (N=48; p= 0.892**)	
Education ≤senior high school	4.46 (3.715)	
Education >senior high school	4.57 (1.397)	

*Wilcoxon test, **Independent t-test, ***Mann Whitney test

Of the 53 volunteers invited to participate, 48 were present, and all met the study’s inclusion requirements for measurement.

The 10 community healthcare volunteers who had attended the study’s two-stage education process (education with pocketbooks and educational aids for media training) with the highest post-test scores were then selected to educate the study’s pregnant women participants.

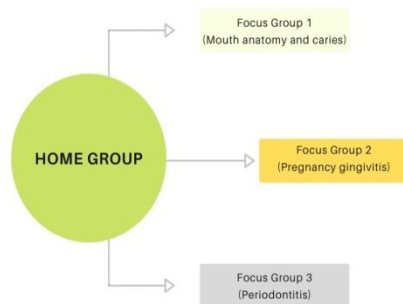


Figure 1: Topic groups of training module.

The pregnant women respondents who received this education were divided into two groups. The first group comprised the pregnant women who had received the highest scores after completing education with five healthcare volunteers via flipchart training, and the second group comprised the pregnant women who had received the highest scores after completing education with five healthcare volunteers via puzzle cards. Of the total 50 pregnant participants, six did not meet the study’s inclusion requirements because they did not take the post-test after receiving this education. The healthcare volunteers who had been trained using flipchart media

experienced more improvement in their knowledge than the volunteers who were trained using puzzle cards, but this difference did not have a significant p-value; p=0.383 (Table 2). Among the volunteers who experienced significant knowledge improvements, 36.2% had received a high-school or bachelor’s-degree education. One volunteer who had received only a junior-high-school education did not experience much of an increase in knowledge through this study’s training.

No significant relationship was observed between education, work, and educational media groups among the pregnant women respondents (p>0.05). Large increases in knowledge were mostly found among pregnant women in the flipchart media group, but the related significance=1.000 indicates no significant difference between the two groups of pregnant women. Meanwhile, a significance value of 0.000 indicated a statistically significant increase in the post-test scores for periodontal disease risk in pregnancy and childbirth problems after education with the study’s module. Knowledge values were measured from the increase in post-test values versus pre-test values using 30 questions, based on the module’s content. The highest score achieved was 30 correct answers. The pregnant women groups also experienced increased knowledge values. Significant differences were observed at Sig. = 0.000. The highest score for the pregnant women who received education from healthcare volunteers was 28 correct answers out of 30 total answers (Table 3). A categorical comparative analysis was used to compare measurements for the two education groups; that is, flip-charts versus puzzle cards. In an independent parametric t-test, the resultant Sig. value was 0.967. The significance>0.05 result indicated no significant difference between the use of flipchart and puzzle cards in education about periodontal health during pregnancy among community healthcare volunteers. The Mann-Whitney non-parametric test results were significance=0.359 (>0.05), which

indicated no significant difference between the use of flipchart and puzzle cards in increasing knowledge among pregnant women. Significance=0.892 indicated no significant difference between of community healthcare volunteers' education levels and increased knowledge.

DISCUSSION

An increase in knowledge was observed among community healthcare volunteers and pregnant women. This result aligns with our research hypothesis, which expected different levels of health knowledge about periodontal disease as a risk during pregnancy and childbirth problems after training via the study's modules. The study's initial research survey was conducted to identify problems among healthcare volunteers in the health center area. Research surveys are useful for obtaining factual information from a group in making plans and decisions. The 15 question topics with the highest number of wrong answers were used as the input material for the training modules, which were compiled into facilitator guides, healthcare volunteers' pocketbooks, and educational aids media content. In interviews, the healthcare volunteers generally admitted that they did not think severe chronic periodontitis could stimulate contractions during pregnancy, thus risking the birth of a premature baby. This ignorance has become a general opinion among the public, who believe oral and dental disease are mild cases that cannot endanger lives or even result in infant death. This lack of knowledge and access to information causes limited knowledge about the dangers of unhealthy behavior and a lack of sufficient motivation to adopt healthy behaviors.²⁰

In step 4 of our 9-step theory based training model, the module became a learning tool in written form that was systematically arranged, containing learning materials, methods, and learning objectives based on indicators of competency achievement, as well as self-instructional and educational goals for evaluation. The principle of using modules also involves more favorable factors. The use of presentation material guidelines in the module for facilitators was expected to result in more directed and systematic learning compared to teaching without a module package. Teaching with modules formulates more detailed instructional goals and caters to education recipients' needs because of increased participation in the learning process.²¹ This finding is consistent with the results of our study, which reported our training module's significant effectiveness in increasing knowledge among community healthcare volunteers about the risk of periodontal disease during pregnancy and birth. In our module package, we developed a pocketbook as a volunteer guide so that volunteers could repeat their training materials from their first day training. The difference observed between healthcare volunteers' post-test and pre-test training scores showed changes in knowledge, based on volunteers' ability to capture information or the progress of the teaching process. Our results found no significant difference between progress

levels in training volunteers of high-school-and-below educations and volunteers with higher education (diploma 3, associate's degree). In adult education (andragogy), the adult learning approach involves special characteristics that focus especially on enhancing life experiences. As people with extensive experience, adults have the skills and abilities necessary to solve life problems independently. People's exposure to information from various mass media and online social media can constitute part of their initial knowledge. Adult learning orientations are not only limited to obtaining a diploma; readiness to learn is determined less by academic coercion and biological development than by the demands of a developmental task necessary to perform a social role.⁶

Self-experience factors and external environments can affect individual knowledge levels outside formal education settings. Learning has also been defined as a set of cognitive processes that change the nature of environmental stimulation, passing information processing into new capabilities.²² The learning phase responds better to occasions that reinforce stimulation. The advantages of flipchart media include similarities with the advantages of puzzle cards; for example, they do not require electricity, their materials and manufacture are relatively economical, they provide concise and practical information, they are suitable media for indoor or outdoor needs, and they are easy to carry anywhere. Flipchart offer a particular facility to help remind tutors of basic messages.¹⁰ The large picture on a flipchart is intended so that pregnant women can remember information more visually. For healthcare volunteers, the hidden menu in the study's flipchart media was very helpful in the outreach process to help the community in carrying out their duties. However, the puzzle cards were more attractive during their learning because they involve a role for pregnant women in guessing the correct pictures. Image visualization and small-scale group membership (one group of only five people) were determined to offer the same characteristic factors for the effectiveness tests of these two media. The results of the training developed in this study can serve as a reference for health education planning in preventive dentistry programs. Increasing knowledge can be a motivating factor for long-term behavior changes. This finding is consistent with Lawrence Green's theory, which includes knowledge as a predisposing factor in determining changes to human behavior.⁴

CONCLUSION

This study's 9 step theory based training model effectively increases knowledge among community healthcare volunteers and pregnant women about periodontal disease as a risk during pregnancy and childbirth. Flipchart and puzzle cards are significantly effective in increasing knowledge among community healthcare volunteers and pregnant women about periodontal disease as a risk during pregnancy and

childbirth. Flipchart and puzzle cards are equally effective in increasing knowledge among community healthcare volunteers at the up-to-senior-high-school and above-senior-high-school education levels. Flipchart and puzzle cards are equally effective in increasing knowledge among community healthcare volunteers in the late adult category (36-45 years old). Flipchart and puzzle cards are equally effective in increasing knowledge among pregnant women in the early adulthood category (26-35 years old). Flipchart and puzzle cards are equally effective in increasing knowledge among community healthcare volunteers, working pregnant women, and housewives. Further research is needed to compare effectiveness and efficiency between 9-step model training and conventional model training.

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