The Effects of Preparedness Related to Prevention and Control of Zoonotic Diseases on Knowledge and Practice of Village Health Volunteers

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Abstract

Recent emerging infectious diseases affecting humans are often zoonotic diseases. These diseases can be avoided by health preventive behaviors. The objective of this two group pretest-posttest Quasi-experimental research was to evaluate the effects of a preparedness related to the prevention and control of *Streptococcus suis* infection and liver fluke-associated cholangiocarcinoma, based on communication for development which suggested by UNICEF (2009) on knowledge and practice among village health volunteers.The population was village health volunteers living in a sub-district of Chiang Mai Province, Northern Thailand. Purposive sampling was used in this study. One hundred and seventy persons participated in this study. There were 77, and 93 participants in the experimental group from NongKhwai municipal district of Hang Dong district, and control group from Chumphu municipal district of Saraphi district, respectively. The experimental subjects participated in the preparedness program. The control subjects were provided health information and service by the public health personnel. After of the study, the knowledge scores of the experimental subjects were significantly higher (t=-5.425, $P < 0.05$) than those at before of the study, whereas the scores of the control subjects did not differ. The knowledge different scores of the experimental subjects were higher significantly than those of the control subjects (t=2.807, $P< 0.005$).The practice different scores were also higher significantly than those of the control subjects (U=2989.500, Z-value=1.852, $P<.05$).

This preparedness based on communication for development can be applied in other village health volunteers for prevention and control of Streptococcus suis infection and liver cancer caused by liver flukes. Nurses and public health personnel should encourage enhancing knowledge and competency of village health volunteers to reduce zoonotic diseases in the communities.

Keywords : Preparedness, Prevention and Control of Zoonotic Disease, Knowledge, Practice, Village Health Volunteers, Communication for Development

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ผลของการเตรียมพร้อมเกี่ยวกับการป้องกันและควบคุมโรคติดต่อจากสัตว์สู่คน ต่อความรู้และการปฏิบัติของอาสาสมัครสาธารณสุขประจำหมู่บ้าน

พัชราภรณ์ อารีย์*, วีระพร ศุทธากรณ์**, อะเคื้อ อุณหเลขกะ***, พิมพาภรณ์ กลั่นกลิ่น**

บทคัดย่อ

โรคติดเชื้อระบาดใหม่ทีมีผลกระทบต่อมนุษย์ที่พบบ่อยคือโรคติดต่อจากสัตว์สู่คน โรคนี้สามารถหลีกเลี่ยงได้โดยการมีพฤติกรรมสุขภาพด้านการป้องกัน วัตถุประสงค์ของงานวิจัยแบบกึ่งทดลองชนิดสองกลุ่มวัดก่อนและหลังครั้งนี้เพื่อ ประเมินผลของการเตรียมพร้อมเกี่ยวกับการป้องกันและควบคุมโรคติดเชื้อสเตรปโตคอกคัส ซูอิส และโรคมะเร็งท่อน้ำดีที่เกิดจากพยาธิใบไม้ในตับโดยมีการสื่อสารเพื่อการพัฒนาเป็นฐานที่แนะนำโดยยูนิเซฟ (2009) ต่อความรู้และการปฏิบัติของอาสาสมัครสาธารณสุขประจำหมู่บ้าน ประชากรคือ อาสาสมัครสาธารณสุขประจำหมู่บ้านที่อาศัยอยู่ในอำเภอหนึ่งของจังหวัดเชียงใหม่ ในภาคเหนือของประเทศไทย ในการศึกษานี้มีการสุ่มตัวอย่างแบบเจาะจง กลุ่มตัวอย่างที่เข้าร่วมการศึกษาครั้งนี้มีจำนวน 170 รายโดย 77 และ 93 รายเข้าร่วมการวิจัยในกลุ่มทดลองซึ่งมาจากเทศบาลตำบลหนองควาย อำเภอหางดง และกลุ่มควบคุมซึ่งมาจากเทศบาลตำบลชมภู อำเภอสารภี ตามลำดับ กลุ่มทดลองได้รับโปรแกรมการเตรียมพร้อมและกลุ่มควบคุมได้รับข้อมูลและบริการด้านสุขภาพจากบุคลากรสาธารณสุข ภายหลังได้เข้าร่วมการศึกษาแล้วคะแนนความรู้ของกลุ่มทดลองสูงกว่าคะแนนก่อนเข้าร่วมโครงการอย่างมีนัยสำคัญทางสถิติที่ .05 (ค่าที=5.425)ในขณะที่คะแนนของกลุ่มควบคุมไม่มีความแตกต่างกัน ความต่างของคะแนนความรู้ของกลุ่มทดลองสูงกว่าความต่างของคะแนนความรู้ของกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติที่ .005(ค่าที=2.807) ความต่างของคะแนนการปฏิบัติก็สูงกว่าความต่างของคะแนนการปฏิบัติของกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติที่ .05 (ค่าซี=1.852)

การเตรียมพร้อมตามแนวคิดการสื่อสารเพื่อพัฒนาเป็นฐานครั้งนี้สามารถนำไปประยุกต์ใช้กับอาสาสมัครสาธารณสุขประจำหมู่บ้านอื่นๆ เพื่อป้องกันและควบคุมโรคติดเชื้อสเตรปโตคอกคัส ซูอิส และโรคมะเร็งท่อน้ำดีที่เกิดจากพยาธิใบไม้ในตับ พยาบาลและเจ้าหน้าที่สาธารณสุขควรกระตุ้นให้เพิ่มความรู้และสรรถนะของอาสาสมัครสาธารณสุขประจำหมู่บ้านในการลดโรคติดต่อจากสัตว์สู่คนในชุมชนต่างๆ ได้

คำสำคัญ : การเตรียมพร้อม, ป้องกันและควบคุมโรคติดต่อจากสัตว์สู่คน, ความรู้, การปฏิบัติ, อาสาสมัครสาธารณสุขประจำหมู่บ้าน, การสื่อสารเพื่อพัฒนา

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Introduction

Approximately 60% of all human pathogens are zoonotic (Department of Livestock Development, 2012). Zoonotic diseases have a variety of transmission mechanisms, some of which may be direct, being transmitted via vectors such as food, water, and the environment (Moonarmart, 2012; Ratanakorn, 2012; Wongphruksasoong, 2012). *Streptococcus suis* infection in humans, and liver fluke-associated cholangiocarcinoma (CCA) disease are classified as directly transmitted zoonotic diseases.*Streptococcus suis* infection in humans, and liver fluke-associated CCA disease are common diseases in the Northern part of Thailand (Sripa & Pairojkul, 2008).The case fatality rate from *S. suis* infection was 16.1% in Phayao province, whereas the national public health statistics during the period 2011-2013 was 6.46 % (Wongkumma, HinJoy, & Choomkhasian, 2014). *The* important risk factors of *this* infection were a history of exposure to contaminated pigs or pork or pig-related occupations, and a history of eating high-risk foods such as uncooked pork or raw pig blood (Huong et al., 2014). For liver fluke-associated CCA disease, the prevalence of this disease in Thailand averaged 9.6 % (Sripa et al., 2011). The risk factors include the consumption of raw freshwater fish (Songserm et al., 2010).

Most *of Streptococcus suis* infection and liver fluke-associated CCA disease can be avoided by understanding the risks and following individual preventive behaviors such as ensuring food safety (Agromisia, 2008). The implementation of an intensive preventive program may also reduce incidence rates of these diseases in endemic areas. Also for individual and/or public education to change the negative health behaviors of someone, printed pamphlets alone will not suffices (Marshall, Owen, & Bauman, 2004). There is an abundance of literature summarizing the effectiveness of using digital media and social media for public health interventions and communications (Newbold & Campos, 2011). Therefore, information and communication technology use can be beneficial in a health education environment if introduced and used properly (Satterfield, 2015). Technology is also an efficient support tool that enriches the quality of health education by delivering content through multi-modalities (Lee, Park, Whyte, & Jeong, 2013). These beneficial technologies may help to increase awareness and recall of public health messages, and motivate subjects (Marshall, Owen, & Bauman, 2004).

The communication for development (C4D) is one of the suitable guidelines or concepts for changing negative health behaviors, suggested by UNICEF in A.D. 2009 (Scandlen, 2009).C4D is a systematic, planned and evidence-based process to promote positive and measurable individual health-related behaviors that is an integral part of program development, policy advocacy, and humanitarian work. C4D objectives are accomplished through a combination of three main strategies: advocacy, social mobilization, and behavior and social change communication. Thus C4D may be a very powerful communication strategy for motivating and teaching techniques for behavioral development in the context of a community. Based on C4D, the negative behavior change

of a target population (Primary group) is influenced by several people around them (Secondary group) such as family members, friends, health personnel, and neighbors. Also community leaders (Tertiary group) such as the mayor, councilors, village headman, and village health volunteer headman are influences on the persons in the secondary group. Therefore, the preparedness program related to the prevention and control of zoonotic diseases was developed.

For the implementation stage of the program, village health volunteers (VHVs) were key individuals in the communities. The upshot is that strengthening the capabilities of the VHVs can potentially have a significant impact on the health of communities. This study was designed to evaluate the effects of the preparedness program related to the prevention and control of *Streptococcus suis* infection and liver fluke-associated CCA disease on the knowledge and practice of VHVs in village communities. The results of the study are guided for improving the capabilities of VHVs and improving the health of people in communities related to the prevention and control of zoonotic diseases (PCZD).

Objectives

1. To compare the different scores (score at after participation minus scores at before participation) of knowledge and practice between the experimental subjects and the control subjects.

2. To compare the scores of knowledge and practice between before and after participation in the experimental subjects and the control subjects.

Definition of terms

Preparedness related to prevention and control of zoonotic diseases is a set of activities to motivate and teach techniques for prevention and control of *Streptococcus suis* infection and liver fluke-associated CCA disease, based on communication for development, suggested by UNICEF in A.D. 2009.

Knowledge is the understanding gained through learning, training, experience or study about prevention and control of *Streptococcus suis* infection and liver fluke-associated CCA disease, assessed by the questionnaire that developed by researchers.

Practice is the performance in involving the prevention and control of *Streptococcus suis* infection and liver fluke-associated CCA disease, assessed by the questionnaire that developed by researchers.

Village health volunteers are the persons, responsible for co-ordination and strengthening of health networks; planning and arrangement of health activities in communities including health promotion and health problem solving; taking leadership roles on health and social issues; conducting campaigns in communities to promote the concept of active responsibility to oneself, the community, society and the environment;

and promoting and supporting sustainable development. VHVs are also the core front line group helping to prevent and control of diseases.

Communication for development is the suitable guideline or concept for changing negative health behaviors, suggested by UNICEF in A.D. 2009

Zoonotic diseases are diseases of animals that can be transferred to people**.**

The framework of the study

The framework of the study is shown in **Figure 1.**

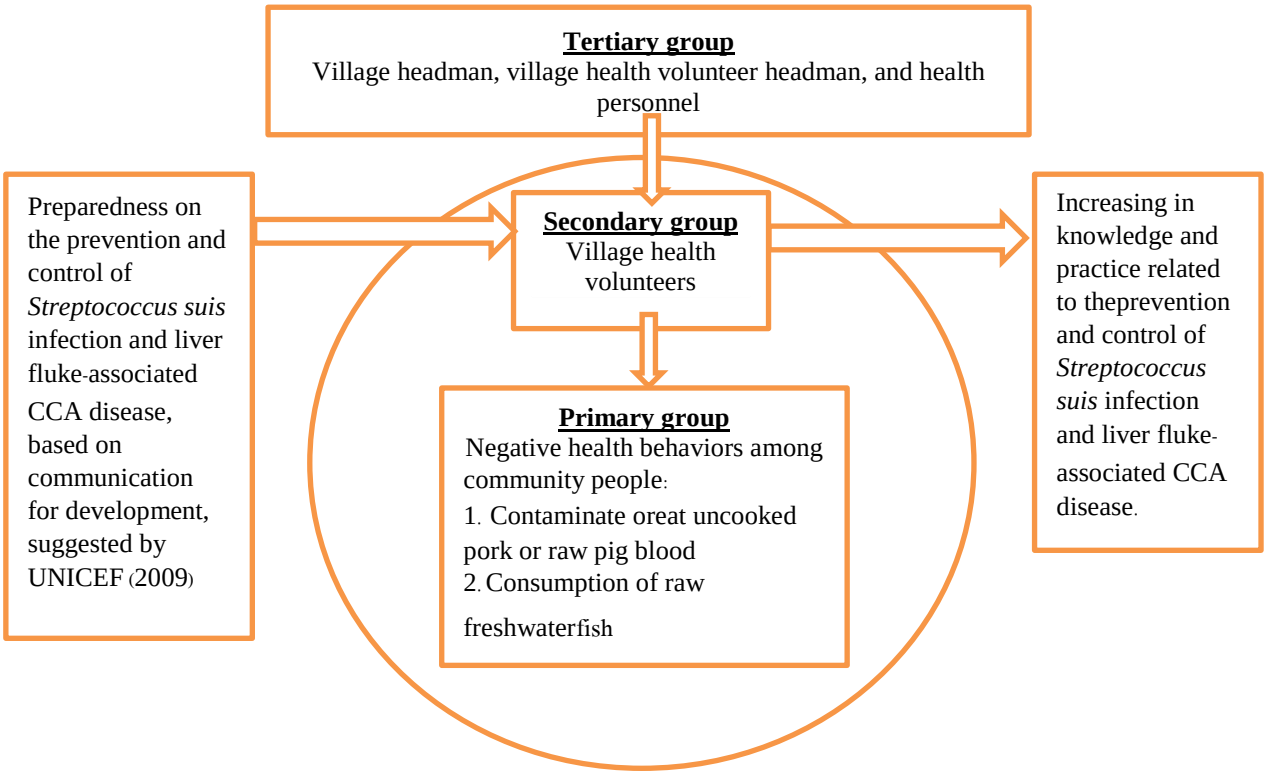

Figure 1. The framework of the study

Methods

Research design

A pretest-posttest quasi-experimental study with non-equivalent control group was used.

Population and sample

The target population of this study was village health volunteers living in a sub-district of Chiang Mai Province, Northern Thailand. Subjects were selected by the following inclusion criteria: 1) actively working, 2) living in the sub-district, 3) more than 19 years old, 4) male or female, and 5) willing to participate in this study. Purposive sampling was used in this study. One hundred and seventy persons participated in this study, and they were divided into an experimental group and a control group according to their living area.There were 77, and 93 participants, based on effect size (.5), level of significance

(.05), and power (.8),in the experimental and control groups, respectively. A consent form was signed by all subjects. NongKhwai, Hang Dong district was the geographic region for the experimental group, and Chumphu, Saraphi district for the control group.The experimental subjects participated in the activities for PCZD, given by the researchers in the community.The control subjects were provided health information and service by public health personnel and village health volunteers, working in their living area.

Ethical considerations

The study was approved by the Research Ethics Review Committee of the Faculty of Nursing, Chiang Mai University (EXP: 123-2013) and health agencies involved. The research conforms to the provisions of the Declaration of Helsinki in 1995 (as revised in Edinburgh 2000.To maintain ethical considerations, all participants were informed clearly about the objectives of the study, study procedure, report of findings, and benefit of joining the study. They were told they would be able to withdraw from the study at any time. Confidentiality and anonymity was assured to subjects through the consent form. All the information obtained from subjects was used for the purpose of this study.

The preparedness related to PCZD

The preparedness related to PCZD was developed for VHVs, participated in the study. Participatory learning approach was used, composing of 4 stages, that is,

Stage 1: Information provision to the subjects, included information about situation of *Streptococcus suis* infection, and liver fluke-associated CCA in Thailand, and the prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease.

Stage 2: The informed objectives of the sessions, and assessing feasibility, benefits, barriers, beliefs, and group norms and feelings about the recommended behaviors for prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease were done to the subjects.

Stage 3: Implementation, The subjects were participated in small group participation, small group discussion, and presentation related to prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease.In addition, educational materials, composed of slogan messages, spot messages, poster, folk songs, popular song, brochures, and leaflets, produced based on communication for development concept by researchers were provided for all.

Stage 4: The activity evaluation was done by question and answer session.

Data collection and instruments

Instruments were divided into 2 types: instruments for operating research and instruments for collecting data. Instruments for operating research were the booklet on the prevention and control on zoonotic disease transmission, the slogan messages, poster, folk song, and popular song and spot messages on “Do not eat raw meat and fish”, brochures, and leaflets. Instruments for collecting data used in this study consisted of the demographic

data form, and questionnaires for knowledge and practice of *Streptococcus suis* infection and liver fluke-associated CCA disease.

The content validity and reliability of instruments

1. Content validity of the booklet on the prevention and control on zoonotic transmission was validated by five expert panel reviewers .

2. The knowledge of *Streptococcus suis* infection and liver fluke-associated CCA disease questionnaire, a multiple-choice test, was developed by the researchers .This test consists of 15 items .The subjects must select the best answer out of four choices .A correct answer earns 1 point . So scores of the test run from a minimum of 0 to a maximum of 15 . The content validity of this questionnaire was validated by 5 expert panel reviewers .KR-20 was calculated to determine internal consistency of the knowledge questionnaire in 10 village health volunteers, who were similar to the sample.The internal consistency of the total scale of knowledge was 0.80 .

3. The practice of prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease questionnaire was developed by the researchers .The practice scale consists of 20 items .Subject responded on a four-point scale, ranging from 1“ =never”, 2“ =seldom”, 3“ =sometime”, and 4“ =regular .”Each item was given a weighted score of 1 to 4 from “never ”to “regular ”for positive questions, and of 4 to 1 from “never ”to “regular ”for negative questions .Scores on the practice questionnaire range from a minimum of 20 to a maximum of 80 .The higher score indicates better practice in *Streptococcus suis* infection, and liver fluke-associated CCA disease prevention.The content validity of this questionnaire was validated by 5 expert panel reviewers .The reliability of the practice questionnaire was tested in 10 village health volunteers who were similar to the sample .Cronbach’s alpha coefficient was calculated to determine internal consistency.The internal consistency reliability coefficient was 0.80 .

Data analysis

The demographic data were analyzed by using descriptive statistics. A normal distribution was found for the scores of knowledge and practice, and knowledge difference scores. The practice difference scores were not normal distribution. To test the different scores (score at after participation minus scores at before participation) of knowledge and practice between the experimental subjects and the control subjects, independent t-test and Mann Whitney U test were used, respectively. The means of knowledge and practice scores between before and after participation in the experimental subjects and the control subjects were compared by using dependent t-test.

Results

The mean age (±SD) of the experimental and the control subjects were 52.74±9.76 and 53.11±7.35 years, respectively, and there was no significant difference (t=-.272, p value=.786). The range of age of the experimental and the control subjects were 25-72 and 20-72 years, respectively.At the beginning of the study, there were no significant differences in the other general characteristics (sex, religion, education, marital status, and occupation) (Table 1).

Table 1. Characteristics of the subjects according to study group.

Characteristics	Experimental group		Control group		Fisher/χ^2	*Sig. (2 tailed)*
	n	%	n	%		
Sex						
Male	14	8.2	10	5.9	1.917	.166
Female	63	37.1	83	48.8		
Marital status						
Single	7	4.1	12	7.1	6.782	.079
Married	59	34.7	56	32.9		
Widow	9	5.3	15	8.8		
Separated	2	1.2	10	5.9		
Religion						
Buddhist	77	100.0	93	100.0	0	1
Education						
Lower than secondary school	63	37.1	80	47.0	.557	.455
Secondary school and higher	14	8.2	13	7.7		
Occupation						
Certainty income	12	7.1	17	10.0	.282	.868
Government officials	0	0.0	3	1.8		
Private practice	9	5.3	9	5.3		
Company’s employee	3	1.8	5	2.9		
Uncertainty income	60	35.3	71	41.8		
General employee	42	24.7	50	29.4		
Business (small)	9	5.3	21	12.4		
Farmer	9	5.3	0	0		
House keeper	5	2.9	5	2.9		

Table 2. The knowledge and the practice scores of the subjects according to study group and period of the study

Variables	Period of Study		t- value	Sig.(1 tailed)
	Before	After		
Experimental group				
Knowledge	39.33±4.41	42.53±3.46	-5.425	.001
Practice	49.38±6.19	51.33±7.37	-1.796	.380
Control group				
Knowledge	39.00±5.54	39.73±4.74	-1.113	.134
Practice	51.05±6.27	50.95±5.33	.110	.456

After participation the program, the knowledge scores of the experimental subjects was higher significantly (t=-5.425, *P < 0.05*) than those at before participation the program, whereas the scores of the control subjects were not different (Table 2). To compare before and after participation the program, the practice scores of the experimental subjects trended to increase, but these were not significant.The practice scores of the control subjects were also not different (Table 2).

Table 3. The knowledge difference scores (between before and after program participation) of the subjects according to the study group

Study group	n	Mean difference scores±SD	t- value	Sig.(1 tailed)
Experimental group	77	3.194±5.676	2.807	.003
Control group	93	0.727±5.732		

The knowledge different scores (between before and after participation the program) of the experimental subjects was higher significantly (t=2.807, *P< 0.005*) than those of the control subjects (Table 3).

Table 4. The practice difference scores (between before and after program participation)of the subjects according to the study group

Study group	n	Mean rank	U	Z- value	Sig.(1 tailed)
Experimental group	77	91.85	2989.500	1.852	.032
Control group	93	77.82			

The practice different scores of the experimental subjects was higher significantly were also different significantly (U=2989.500, Z-value=1.852, *P<.05*) than those of the control subject (Table 4).

Discussion

Eating high-risk foods such as uncooked pork or raw pig blood is risk factor of *Streptococcus suis* infection caused of hearing loss, and the consumption of raw fresh water fish is risk factor of liver fluke-associated cholangiocarcinoma, common diseases in the Northern part of Thailand.The consumption of raw pork and/or pig's blood was found in 62.5 percent of patients admitted at a tertiary care hospital in Northern Thailand (Navacharoenet al., 2009). A well-known and popular recipe, was an important risk factor for this infection, was "*larb*" or "*lu*", which consists of undercooked pork, pig blood or undercooked internal organs of pigs (Wongkumma, HinJoy, & Choomkhasian, 2014; Takeuchi et al., 2012).Liver fluke infection, caused by *Opisthorchisviverrini (OV),* induces chronic inflammation leading to oxidative DNA damage of the infected biliary epithelium and malignant transformation (Sripa et al., 2011).For prevention and control of these diseases, food safety control and reduced consumption should be strengthened, especially for raw pork products (Takeuchiet al., 2012), and raw freshwater fish (Shin et al., 2010; Songserm et al.,2010; Sripa&Pairojkul, 2008).Health behavior risk factors are divided into three types (Vleet, 2011). The first is potential/possible risk factors for individuals (hosts) such as knowledge, perception, and life experience. The second is agent factors that cause diseases, e.g., bacteria and viruses. The third is environmental factors, which are divided into two levels, a microsystem level which involves the health practices of family members, and a mesosystem level, which deals with the health behaviors of relatives, friends, and neighbors. Moreover, the stages of change, based on the transtheoretical model, are composed of precontemplation, contemplation, preparation, action, and maintenance, and also to change negative health behaviors, health personnel should provide the opportunity for clients to have information at or before the contemplation stage (Prochaska & DiClemente, 2012; Prochaska, DiClemente, & Norcross, 2013; The Habits Lab, 2012). From the above reasons, the C4D was fit to develop a set of activities for prevention and control zoonotic diseases, and the village health volunteers (VHVs) were key persons in community and being core front line group helping to prevent and control of diseases. Therefore, the improvement in knowledge and capacities of VHVs was essential.

After activity participation in this study, the knowledge scores of the VHV participants in the experimental group was significantly higher than those at before the activity participation (Table 2).The difference scores in knowledge and practice related to prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease of the experimental group were also significantly higher than those of the control group (Table 3 and 4).

So overall, after the VHVs participated in this study, they can improved their knowledge and practice in the prevention and control of zoonotic diseases. Moreover, the results of this study showed that education with communication materials, composed of

a booklet on the control and prevention on zoonotic transmission, the messages, media, folk songs, and string songs on “Do not eat raw meat and fish” were effective. Several studies showed the beneficial mechanism of cue to action such as education and communication materials. A strategy to initiate changes in health behavior could be to create cues to action through personal experiences in the context of a specific health behavior or to establish contact with people when they were experiencing new life circumstances (Lucette, Meillier, Lundb, & Kok, 1997).Park (2011) found cues to action were significantly associated with behavioral intention for weight reduction for all female middle school students in Korea, and for the overweight group, cues to action were also the most significant variable. De Jesus (2013) also indicated that quantity of media-based health information is positively associated with health decision-making and medical advice-seeking behavior. In a context where physician-patient dynamics are increasingly shifting from a passive patient role model to a more active patient role model, media-based health information can serve as an influential cue to action, prompting individuals to make certain health-related decisions and to seek more health advice and information from a health provider. Moreover, Fredriksen-Goldsen, et al (2011) found the role of family members in supporting four key components (access, knowledge, motivation, and proximal cue to action) to enhance medication adherence among patients living with HIV in China.

Finally, the activity participation can improve the knowledge and capacities/practices of village health volunteers. These village health volunteers could provide health service confidentially particularly in prevention and control of zoonotic diseases transmission for the people who have high risk for zoonotic disease infection.

Recommendations for utilization of this study

1. A activity participation appears feasible and appropriate for working with village health volunteers. It also might have an application in prevention and control of Streptococcus suis infection, and liver fluke-associated CCA disease for other populations. The results of this study show the benefit of the activity participation when village health volunteers deliver well-planned intervention support activity participation.

2. Municipal and local governments should set up a plan to enhance competency of VHVs in Streptococcus suis infection and liver cancer caused from liver flukes for the people in their community.

3. Nurses and health personnel should contribute and encourage to enhance competency of village health volunteers in Streptococcus suis infection and liver cancer caused from liver fluke for the people in their community.

Recommendations for future research

Because the food consumption was reevaluated in 3 months, some eating behaviors still not be changed, so the research should be done more than 3 months. The attitude or perception on prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease should be also evaluated.

Conclusion

The implementation of a activity participation was related to an improvement in the knowledge and practice in prevention and control of *Streptococcus suis* infection, and liver fluke-associated CCA disease among VHVs. This activity participation can be used to improve knowledge and capacities/practices among the VHVs, which is an important factor to be taken into account by nurses.

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