RESEARCH ARTICLE

Development of a Health Education Modification Program Regarding Liver Flukes and Cholangiocarcinoma in High Risk Areas of Nakhon Ratchasima Province Using Self-Efficacy and Motivation Theory

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Abstract

A quasi-experimental study was conducted to develop a health education modification program based on self-efficacy and motivation regarding liver flukes and cholangiocarcinoma development in Keang Sanam Nang district, Nakhon Ratchasima province, Thailand. A total of 36 individuals were invited to participate in the program and were screened for population at risk of liver fluke infection and cholangiocarcinoma using SUT-OV-001 and SUT-CCA-001. Development of health education modification program regarding liver fluke and cholangiocarcinoma prevention included 3 steps: (1) preparation, (2) health education program, and (3) follow-up and evaluation. The study was implemented for 10 weeks. Pre-and-post-test knowledge was measured with questionnaires, Kuder-Richardson-20: KR-20 = 0.718,and Cronbach's Alpha Coefficient = 0.724 and 0.716 for percection and outcome expectation questionnaires. Paired and independent t-tests were applied for data analysis. The majority of the participants were female (55.6%), aged between ≤50 and 60 years old (36.1%), married (86.1%), education level of primary school (63.9%), agricultural occupation (80.6%), and income <4,000 Baht (44.4%). The results revealed that after the health education program, the experimental group had a mean score of knowledge, perception, and outcome expectation regarding liver fluke and cholangiocarcinoma prevention significantly higher than before participation and in the control group. In conclusion, this successful health education modification program for liver fluke and cholangiocarcinoma, therefore may useful for further work behavior modification in other epidemic areas.

Keywords: Health education modification program - self-efficacy - motivation - liver fluke - Thailand

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Introduction

Opisthorchis viverrini is a caused of cholangiocarcinoma that remain a major public health problem in Thailand (Kaewpitoon et al., 2008b; Sripa et al., 2010; Sitthithaworn et al., 2012; Kaewpitoon et al., 2015). *O. viverrini* is endemic among human populations in northeast and north Thailand, where the most common raw fish is frequently consumed (Sadun 1955; Harinasuta and Vajrasthira 1960; Wykoff et al., 1965; Preuksaraj et al., 1982). A nationwide survey in Thailand was reported and found that the prevalent was 5.1%. The highest of prevalent was found in the northeast (9.2%) and followed by the north region (5.2%). Nakhon Ratchasima province is the one of problem with this disease (Wongsaroj et al., 2014). Previous study, *O. viverrini* infection in Nakahon Ratchasima province has been reported, a total of 1,168 stool samples were obtained from 516 males and 652 females, 2.48% were infected with *O. viverrini* (Kaewpitoon et al., 2012). Districts are located near Chaiyaphum, Khon Kaen, Surin, and Buriram province, have been reported that are the risk areas *O. viverrini* (Kaewpitoon et al., 2015). Some people are still flavor consume raw or under cooked cyprinoid fish.

Behavior on prevention and control of liver fluke infection are essential for decreasing the disease. Previously studied indicated that knowledge, attitude, and practice related to liver fluke infection in rural communities (Kaewpitoon et al., 2007). Raw attitudes, wetland cultures, life-cycles: socio-cultural dynamics relating to *O. viverrini* in the Mekong Basin (Grundy-Warr

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et al., 2012). Inadequate knowledge, misbeliefs, and social and cultural mores were important factors leading to the maintenance of risk behaviors. Moreover, unhygienic defecation and insufficient diagnosis and treatment were found to facilitate *O. viverrini* transmission. Precise and regular health education and promotion targeting the main risk factor, Koi pla consumption, improving diagnosis and treatment, and promoting hygienic defecation should be used in the prevention and control program (Suwannahitatorn et al., 2013). Viriyavipart et al (2015) reveals that knowledge, perception, and behavior about food consumption related to the prevention *O. viverrini* among people in upper northeastern Thailand, this study indicates that people did not know the appropriated cooking to kill the causative agent. Many people are still eating raw fish and raw fermented fish dish. Lifestyle modification is needed to improve particularly risk behavior, knowledge, perception, and practice regarding liver fluke. Improvement of high knowledge, perception, and practice regarding diseases, depend on varieties of health education. Boom (1971), Becker and Maiman (1975), and Janz and Becker (1984) indicated that the success behavior modification should be used many methods and continuous intervention.

According a serious data on liver fluke in the epidemic areas, therefore, this study aimed to develop health education modification program based on self-efficacy and motivation theory regarding liver fluke and cholangiocarcinoma in Keang Sanam Nang district, Nakhon Ratchasima province, Thailand. The health education program may useful and effective toward liver fluke prevention and control in the epidemic communities.

Materials and Methods

A quasi-Experimental study was approved by the human research ethics committees of Suranaree University of Technology, 2015 (EC-58-64). The study was performed during September 2015 to April 2016 in Keang Sanam Nang district, Nakhon Ratchasima province, northeastern Thailand. Of 36 participants were assigned to 2 groups; 18 participants were experimental group and received health education programs, meanwhile 18 participants were a control group that without the same health education program. Health education program was applied based on self-efficacy and motivation theory for health behavioral modification regarding liver fluke. Development of health education modification program regarding liver fluke and cholangiocarcinoma prevention included 3 steps containing (1) preparation: meeting and corporation with district health officers and village leader, screening of the population at risk for liver fluke and cholangiocarcinoma by using SUT-OV-001 and SUT-CCA-001, respectively, high risk people was invited to be a participant, (2) health education program: **Week 1**: introduction of health education, relationship activity, health education by using VDO clip, poster, pamphlet, and lecture about liver fluke, sharing experience by participants; i have risk to liver fluke infection, and then conlusion (this week was contributed their knowledge, perceive to susceptibility and severity to liver fluke infection), **Week 2**: relationship activity, role model (patients share their experience), station based learning; station 1: all about liver fluke and cholangiocarcinoma (give them knowledge regarding general knowledge on the epidemiology, morphology, life cycle, transmission, sign and symptoms, pathogenesis, related diseases, diagnosis, treatment, prevention and control of liver fluke), station 2: Quiz with liver fluke and cholangiocarcinoma (perceive susceptibility via question and answer), station 3: card game based (perceive severity via game based learning), and station 4: amazing candy (expectation of self efficacy to liver fluke prevention), conclusion, **Week 3**: relationship activity, brainstorming about food safety, cooking cyprinoid fish activity, conculsion, **Week 4**: role play about communication of susceptibility and severity of liver fluke and cholangiocarcinoma, benefits and perceived barriers to prevention of liver fluke and cholangiocarcinoma, mind map of liver fluke and cholangiocarcinoma prevention, guideline to prevention, and **Week 5-10**; motivating support from village health volunteers, head village, and public health officer. (3) Followed up and evaluation: the followed-up by all supporters, and then giving certificates for participants that participated program and did not eat raw fish. The study was implemented for 10 weeks. Pre-and-post-test was measured with questionnaires.

A predesigned questionnaire containing 4 parts included (1) demographic characteristics; gender, age, marital status, education, occupation, and income, (2) knowledge, (3) perceive; susceptibility, severity, benefit and barrier, and (4) outcome expectation regarding liver fluke and cholangiocarcinoma prevention and control. Each questionnaire was analyzed and interpreted for their parts. Evaluation of knowledge was calculated and analyzed according to Bloom (1971). Knowledge with 20 questions, answer correct=1, incorrect=0, and interpreted to high level; ≥16 points, moderate level; 12-15 points, 0-11 points; low level. Perceive and practice level were calculated and analyzed according to Best (1977). Perceive with 15 questions; 3 choice (agree, not sure, dis-agree): positive question=3,2,1, negative question=1,2,3, and interpreted to high level; 39-45 points, moderate level; 32-38 points, and low level; 0-31 points. Evaluation of outcome expectation level with 15 questions; 3 choice (agree, not sure, dis-agree): positive question=3,2,1, negative question=1,2,3, and interpreted to high level; 39-45 points, moderate level; 32-38 points, and low level; 0-31 points. The questionnaires were analyzed a content validity by 3 experts, and then tryout in closely neighbor communities for reliability test. The questionnaires has reliability value according to knowledge part with Kuder-Richardson-20: KR-20 = 0.718, perceive and outcome expectation with Cronbach's Alpha Coefficient = 0.724 and 0.716. Descriptive and analytical statistical data were analyzed with SPSS software. Fisher's exact test and chi-square test were used for analyzed the mean different of demographic data. Paired t- test was used for analyzed the mean different of within group before and after participated health education program, Independent t- test was used for analyzed the mean different of between group before and after participated program. The statistical

significance level of .05 and 95% confidence interval were employed for data analyzed.

Results

The majorities of participants were female (55.56%), age between ≤50 and 51-60 years old (36.11%), married (86.11%), graduated level of primary school (63.89%), agriculture (80.56%), and income <4,000 Baht (44.44%) (Table 1). Before experiment, participants had moderate level of knowledge, perceive, and outcome expectation to *O. viverrini*, in the experiment and control group. However, after experiment, experiment group had a high level of knowledge, perceive, and outcome expectation to *O. viverrini* prevention. Meanwhile, control group had a moderate level of knowledge, perceive, and outcome expectation to *O. viverrini* prevention (Table 1).

The results reveal that after the participated health education program, experimental group had a mean score of knowledge higher than before participated (mean difference=3.67, t=2.829, 95%CI=1.932, 6.401, p-value=0.012), and control group (mean difference=3.17, t=2.418, 95%CI=1.985, 2.651, p-value=0.015) with a statistically significant.

The mean score of perceived susceptibility, severity, benefits, and barriers to opisthorchiasis prevention, was higher in the after (mean different=5.61, t=3.009, 95% CI=1.676, 9.546, p-value=0.08) more than before the experiment and control group (mean different=5.03, t=3.812, 95% CI=1.880, 3.880, p-value=0.007) with statistically significant.

The mean score of outcome expectation to opisthorchiasis prevention was higher in the after (mean different=5.83, t=2.446, 95% CI=1.802, 10.865, p-value=0.026) more than before the experiment, and control group (mean difference=5.33, t=3.925, 95%CI=1.282, 2.837, p-value=0.031) with statistically significant. All data was shown in Table 2 and 3.

Discussion

Liver fluke infection caused by *O. viverrini* remains a major public health problem in Thailand particularly Northeastern and Northern region (Kaewpitoon et

Table 1. Demographical Characteristics of Experimental and Control Group

Demographical Characteristic	Experiment (n=18)		Control (n=18)		Fisher's exact test or Chi-square test	P-value
	No.	%	No.	%		
Gender					1.800	0.180
Male	6	33.30	10	55.60		
Female	12	66.70	8	44.40		
Age (year old)					2.315	0.404
≤50	8	4.40	5	27.80		
51 – 60	7	38.90	6	33.30		
≥61	3	16.70	7	38.90		
Marital status					1.092	1.000
Single	2	11.10	5	11.10		
Married	15	83.30	16	88.90		
Widowed	1	5.60	0	0.00		
Education					3.061	0.460
Primary School	9	50.00	14	77.80		
Junior Secondary School	3	16.70	1	5.60		
High School	4	22.20	2	11.10		
Undergraduate	2	11.10	1	5.60		
Occupation					2.585	0.590
Agriculture	13	72.20	16	88.90		
Employee	3	16.70	2	11.10		
Government Officer	2	11.10	0	0.00		
Income (Thai Baht)					0.717	0.910
< 4,000 Baht	7	38.90	9	50.00		
4,000 - 8,000 Baht	5	27.80	5	27.80		
> 8,000 Bath	6	33.30	4	22.20		

Table 2. Compared Mean Scored of Knowledge, Perceive, and Practice Regarding Liver Fluke, within Group of the Experimental and Control Groups

Knowledge, Perceive, Expectation	Before	After	Mean difference	t	95% CI	p-value
	Mean±SD	Mean±SD				
Experimental group (18)						
Knowledge	13.72 ± 1.10	17.39 ± 1.14	3.67	2.829	1.932, 6.401	0.012
Perceive	35.33±2.32	40.94±1.56	5.61	3.009	1.676, 9.546	0.008
Outcome Expectation	37.06 ± 1.67	42.89 ± 1.24	5.83	2.446	1.802, 10.865	0.026
Control group (18)						
Knowledge	13.66 ± 1.12	14.28 ± 1.12	0.50	0.887	-0.371, 5.371	0.913
Perceive	35.33±2.32	35.91 ± 1.21	0.58	0.446	-0.813, 1.621	0.441
Outcome Expectation	37.11 ± 1.60	37.61 ± 1.71	0.50	0.459	-1.165, 6.387	0.163

Table 3. Compared Mean Scored of Knowledge, Perceive, and Practice Regarding Liver Fluke, Between Group of the Experimental and Control Groups

Knowledge, Perceive, Expectation	n	đ	SD	Mean difference	t	95% CI	p-value
Knowledge							
Experimental group	18	3.67	0.57	3.17	2.418	1.985, 2.651	0.015
Control group	18	0.50	0.54				
Perceive							
Experimental group	18	5.61	0.64	5.03	3.812	1.880, 3.880	0.007
Control group	18	0.58	0.79				
Outcome Expectation							
Experimental group	18	5.83	0.75	5.33	3.925	1.282, 2.837	0.031
Control group	18	0.50	1.01				

Figure 1. Step I: Preparation

Figure 2. Step 2: Health Education

Figure 3. Step 3: Follow up and Evaluation

al., 2008b; Sitthithaworn et al., 2012; Kaewpitoon et al., 2015f). The *O.viverrini* infection is associated with hepatobiliary diseases including hepatomegaly, cholangitis, cholecystitis, and gallstones (Harinasuta and Vajrasthira 1960; Thamavit et al., 1978; Harinasuta et al., 1984). Recently, *O. viverrini* has been classified as Type 1 carcinogens by the International Agency for Research on Cancer, World Health Organization (WHO) (IARC, 1994). Mortality rate of liver cancer has been reported and found that Nakhon Ratchasima province has 13.67-16.2 per 100,000 populations. Eradication of the fluke and identification of high-risk populations are urgently needed (Sripa et al., 2010). Development of a community-based approach to opisthorchiasis control has been recommended (Duangsong et al., 2013). Toward integrated opisthorchiasis control in northeast Thailand: the Lawa project was showed to be the best model (Sripa et al., 2015). Community-based health education and communication model development for opisthorchiasis prevention has been also implemented in a high-risk area, Khon Kaen Province, Thailand (Promthet et al., 2015).

Here we reported that after the participated health education program, experimental group had a mean score of knowledge higher than before participated and control group. Presently, development of health education modification program regarding *O. viverrini* and cholangiocarcinoma prevention included 3 steps containing (1) preparation; formal and informal contraction and screening of the population at risk, (2) health education program; based on self-efficacy and motivation theory, and (3) followed up and evaluation. This result is similar to previous study indicated that the effectiveness of health education program based on self-efficacy and social support in Tha Tum district, Surin province, Thailand was a successful for liver fluke avoidance (Kaewpitoon et al 2016). However, recent study has some point different mainly health education modification program is contained **Week 1**: introduction, relationship activity,

health education by using VDO clip, poster, pamphlet, and lecture, sharing experience. All activities were implemented for contributed their knowledge, perceive to susceptibility and severity to liver fluke infection, **Week 2**: relationship activity, role model with patients shared their experience, station based learning. All activities were implented for updated their knowledge, expectation of self efficacy to liver fluke and cholangiocarinoma prevention, **Week 3**: relationship activity, brainstorming and practicum cooking cyprinoid fish. This week was convinced participants enjoyed, teamwork, and created about food safety by themselves, **Week 4**: role play, mind map, and guideline by themselves to liver fluke and cholangiocarcinoma prevention, **Week 5-10**; motivating support from village health volunteers, head village, and public health officer. The mean score of perceived susceptibility, severity, benefits, and barriers to liver fluke and cholangiocarcinoma prevention, was higher in the after more than before the experiment and control group with statistically significant. Previous study indicated that knowledge, attitude, and practice related to liver fluke infection in the northeastern Thailand (Kaewpitoon et al., 2007). In addition, Suwannahitatorn et al (2013) indicated that inadequate knowledge, misbeliefs, and social and cultural mores were important factors leading to the maintenance of risk behaviors. Moreover, unhygienic defecation and insufficient diagnosis and treatment were found to facilitate *O. viverrini* transmission. Discussion and sharing of the perceived susceptibility and perceived severity of liver fluke and cholangiocarcinoma, perceived benefits and perceived barriers to prevention of liver fluke and cholangiocarcinoma, effecting their improve perception. Boom (1971) suggested the success of behavioral modification should be composed varieties activities. We set up the followed up team for motivating support containing village health volunteers, head village, and public health officer, and work on for 10 weeks. The result indicates that the mean score of outcome expectation to liver fluke and cholangiocarcinoma prevention was higher in the after more than before the experiment, and control group with statistically significant. This success result is similar to various study mainly Becker and Maiman (1975), Janz and Becker (1984), and House and Kahn (1985).

This health education program is success to health behavior modification in the rural communities therefore it may useful for further work behavior modification in the other epidemic areas.

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