

THE EFFICACY OF LIVER FLUKE AND CHOLANGIOCARCINOMA PREVENTION LEARNING MODULES FOR ELEMENTARY SCHOOL, KHON KAEN PROVINCE

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Received: March 10, 2021; Revised: March 15, 2021; Accepted: March 15, 2021

Abstract

This quasi-experimental research aimed to study the efficacy of liver fluke and cholangiocarcinoma prevention learning modules for elementary school in Khon Kaen Province, Thailand. The sample was selected from students grades 4-6 students in elementary school, 137 students were in experimental groups and 92 students were in the control group. The 14 weeks learning modules included 1) Teaching liver fluke and cholangiocarcinoma prevention knowledge by teachers. 2) Create a learning platform for liver fluke and cholangiocarcinoma knowledge via mobile phone. 3) Assignment the student to survey their family and 5 neighborhood menu for a week and then discussed in the classroom about the risk food for decision making. 4) Report and surveillance of sewage trucks in the community once a week and summarized results together for community self-management. 5) Home visit by the teacher and health personnel team for social support. Collect data by using questionnaire and stool examination in all students by Modified Kato kazt. Data analysis by descriptive statistics and analytic statistics by Paired t-test, Independent Sample t-test with statistical significance level at .05. After 14 week intervention, the experimental group was more knowledge, awareness, and behavioral modifications for liver fluke prevention with statistically significant (p -value <0.001). The results of stool examination in both groups found the prevalence of liver fluke infection was lower than the previous two groups.

Keywords: Liver fluke and cholangiocarcinoma prevention, learning modules, behavioral modifications

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Introduction

Opisthorchiasis is a major helminth infection problem in southeast Asian countries and is associated with cholangiocarcinoma (CCA) (WHO, 1995). In the northeast Thailand, incidence of infection was between 4.6 percent and 60.8 percent (Sithithaworn *et al.*, 2012). The prevalence and severity are also associated with the incidence of cholangiocarcinoma (Sriamporn *et al.*, 2004).

Opisthorchiasis is caused by the consumption of raw white flakes fish with the larvae in contagious stages and treated with praziquantel. However, having been treated but not affect to prevent re-infection (Sirisinha *et al.*, 1983). As a result, If people still have a habit of eating raw fish regularly, Repeated infections of liver fluke occur at any time. This group is more likely to develop CCA in 20-30 years (Sripa and Pairojkul, 2008). The Ministry of Public Health has taken steps to address the problem of opisthorchiasis since 1987. There has been an ongoing campaign and control of opisthorchiasis (Jongsuksuntigul and Imsomboon, 2003). Although the use of praziquantel effects can help to reduce the rate of infection. However, it was found that in many outbreak areas, there was also repeated infection after treatment (Saowakontha *et al.*, 2000). According to the survey, Prevalence of opisthorchiasis in Thailand by the year 1957, 1991, 1996, 2001, 2009, 2014 found that Prevalence rates were likely to decline. From 62.9% to 15.2%, 11.8%, 9.6%, 22%, 8.7% respectively but still high to achieve the target. (Wongsaroj *et al.*, 2009; Bureau of General Communicable Diseases, 2015) by the survey in 16 villages (2006-2008) in Nam Chi River Basin in Chonabot, Manja Kiri Ban Phai and Ban Had district, Khon Kaen Province by Khon Kaen University research team found that the prevalence of opisthorchiasis was 44%. The highest prevalence rate was 74%. The youngest age was only 4 years (Khon Kaen University *et al.*, 2011) correlated with (Wongsaroj *et al.*, 2009) reported a 7-month-old infant with opisthorchiasis. Major risk factors of opisthorchiasis in Northeast Thailand were the behavior and culture of life of consuming raw or uncooked fish, especially in the Northeast (Sornmani *et al.*, 1973; Rangsin *et al.*, 2009). For a long time, many stakeholders have struggled to resolve this problem issue (Wongsaroj *et al.*, 2009; Khon Kaen University, 2011). In the past, the operations have been modified from proactive from active mobile team to passive response but still lack of holistic integration of action plan towards the community. Promoting and engaging and self-reliance roles on a personal level and family in Community also has a limitation (Ministry of Public

Health *et al.*, 2012). So one strategy is behavior modification by creating a new generation norm and culture not to eat raw fish for sustainable prevention in the community. Attitudes or feelings of thought can affect the actions and must be done from childhood (Havighurst, 1952). The two perceptions including the readiness to commit behavior and the assessment of the benefits can encourage students to modify their behavior to prevent disease (Maiman and Becker, 1974; Franziska *et al.*, 2014) communicate health education to students using animation in China schools inconsistent with ThongnaMuang (2012) found that the experimental group had more risk perception and practice for opisthorchiasis and CCA prevention than the control group with statistically significant (P-value<0.001). Office of Disease Prevention and Control 7th, Khon Kaen Province, Office of primary education area, Khon Kaen University, Provincial Public Health office in the 7th Health Area had developed the opisthorchiasis and CCA prevention learning modules for the elementary school in 7th health area in line with the strengthening strategy and expanding coverage of preventive measures both domestically and the Mekong Basin (Bureau of General Communicable Diseases, 2015). In the present study, researchers sought to study the efficacy of opisthorchiasis and CCA prevention learning modules in elementary school in the issue of 1) the average and differences score of behavioral, prevention and practice of opisthorchiasis and CCA prevention compare between the experimental and control groups before and after the intervention 2) Prevalence of opisthorchiasis of the group studied before and after the operation.

Materials and Methods

The quasi-experimental study was designed as a two-group study measured before and after the experiment. The experimental group was given a program 14 weeks as prescribed by the research team, while the control group was taught as usual (Figure 1).

O₁, O₃ refers to data collection before the intervention.

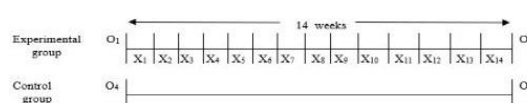


Figure 1. Shows study

O₂, O₄ refers to data collection after intervention.

Both the experimental and control groups using the questionnaire, which include: General information, knowledge, awareness, and behavior in disease prevention and stool examination before and after the study.

X refers to a 10 h course of intervention using opisthorchiasis and CCA prevention learning modules in grades 4-6.

Population and Samples: The schools were selected from schools located in the district where the prevalence rate of opisthorchiasis was higher than 10% in 2016 and close to the river. There were 229 students studied grade 4-6 in both experimental and control school during the second semester of the academic year 2017. 137 students from Nong Paen School located in Nongpan subdistrict, Mancha Khiri District, and Nong Ko School located in Nongko subdistrict, Kranuan District were the experimental schools. 92 students from Nong Hua Don Phan Chart School located in Nongpan subdistrict, Mancha Khiri District, and Sa Kut School located in Muangwan subdistrict, Nam Phong District were the control schools.

The exclusion criteria were: 1) Students relocated or died. 2) Less than 50% of students participated in the program. 3) Students got a serious illness during the research period.

Research Instruments

1. Intervention program consisted of

1.1 opisthorchiasis and CCA prevention learning modules by applying the theory of health beliefs and social support to modify risk behavior against the occurrence of liver fluke.

1.2 Learning platform for liver fluke and CCA knowledge via mobile phone

1.3 Work assignment for students to explore the menu of their own family and 5 neighbor's family for 1 week and then sharing the kind of risk food in the classroom.

1.4 Report and surveillance of sewage truck in the community once a week and summarized results together for community self-management.

1.5 Home visit by the teacher and health personnel team for social support

2. Data collection using a 4-part questionnaire including 1) Demographic features 2) Liver fluke and CCA knowledge test 3) Risk awareness, severity awareness, perceive of benefits and obstacles 4) Behavior in the prevention of liver fluke and bile duct cancer. The questionnaire was tested for content validity by 3 experts (0.7 by KR-20). The reliability tested by Cronbach Alpha Coefficient was 0.7.

3. Stool collect from all students for *Opisthorchis viverrini* (Ov.) egg and other helminth egg examination (Modified Kato Katz) before and after intervention in both group by medical technician.

The process of the study: The research was conducted after permission from the provincial health office and the director of all schools in the study. The director and teachers together planned the course. The teaching program was arranged in the intervention group 50 min once a week for 16 weeks from June 2017 to September 2017 Stool examination was performed in both groups before and after the study, in cases of helminth eggs detected, all were treated by medication. Data were collected by questionnaire.

Intervention

Week 1: Introduction for the objective of the study and The role of teachers and parents to support the students. The researcher summarized the learning modules and instruction of the Image, audiovisual, Poster, Reference Book, Work Sheet were used for the teaching media

Week 2: Set up a study plan for each level (Table 1).

Week 3: Create a learning platform for liver Opisthorchiasis and CCA knowledge via mobile phone.

Week 4-6: Assignment the student to survey their family and 5 Neighborhood menu for a week and then discussed in the classroom about the risk food for decision making.

Week 7-9: Report and surveillance of sewage truck in the community once a week and summarized results together for community self-management.

Week 10-12: Home visit by the teacher and health personnel team for social support.

Week 13-14: Discussion together in class and summarized the lesson learned from activities in the community.

After 15-16 weeks, data were collected by questionnaire, and stool examination was performed in both groups.

Data Analysis: Descriptive statistics and analytic statistics by Paired t-test, Independent Sample t-test with statistical significance level at 0.05.

Results and Discussion

There were 229 students enrolled in the study. 137 were an experimental group and 92 were a control group. The age was between 12 and 15 years old

Table 1. Shows study plan of Opisthorchiasis and CCA prevention learning

level	Modules	Number of hours
Grade 4	X: Community problems with Opisthorchiasis and CCA	2
	X: Risk of Opisthorchiasis and CCA	1
	X: Cycle of Opisthorchiasis and CCA	2
	X: How to prevent Opisthorchiasis and CCA	1
	X: Disease caused by Opisthorchiasis and CCA	1
	X: Hygienic consumption habits	1
	X: Apply in everyday life and disseminate to the community.	2
Grade 5	X: Opisthorchiasis and Cholangiocarcinoma	4
	X: How to prevent Opisthorchiasis and CCA	1
	X: Hygienic consumption habits and how to behave according to national law	1
	X: Cholangiocarcinoma	3
	X: How to prevent CCA	1
Grade 6	X: Opisthorchiasis and Cholangiocarcinoma	2
	X: Environments affecting Opisthorchiasis and CCA	2
	X: Risk of Opisthorchiasis and CCA	1
	X: Prevention of Opisthorchiasis and CCA	2
	X: Hygienic consumption habits	1
	X: National Health Practice	1
	X: Immunization for Families, Communities, and Society	1
		1

Table 2. Average knowledge, awareness and practice score before and after the intervention

Knowledge, Awareness, Practice	Before		After		Mean Diff.	95% CI	p-value
	Mean	S.D	Mean	S.D			
Intervention group (n = 137)							
Knowledge of Ov. and CCA	7.89	2.92	12.34	2.53	-4.44	-5.05 to -3.82	< 0.001
Risk awareness	1.99	0.34	2.40	0.30	-0.41	-0.49 to -0.34	< 0.001
Severity awareness	2.09	0.42	2.42	0.32	-0.33	-0.42 to -0.25	< 0.001
Perceived of benefits	2.26	0.44	2.53	0.33	-0.27	-0.36 to -0.18	< 0.001
Perceived of obstacles	2.18	0.48	2.50	0.36	-0.32	-0.42to-0.22	< 0.001
Practice	19.56	2.18	24.41	2.02	-4.85	-5.31to-4.38	< 0.001
Control group (n=92)							
Knowledge of Ov. and CCA	7.43	2.83	7.90	2.81	-0.47	-1.21 to 0.27	0.213
Risk awareness	1.94	0.34	1.87	0.36	0.07	-0.01 to 0.14	0.061
Severity awareness	1.99	0.43	1.98	0.35	0.02	-0.06 to 0.10	0.631
Perceived of benefits	2.18	0.46	2.15	0.41	0.03	-0.5 to 0.11	0.471
Perceived of obstacles	2.10	0.49	2.16	0.47	-0.06	-0.16 to 0.05	0.278
Practice	19.10	2.16	19.52	2.25	-0.42	-0.83 to -0.02	0.041

Footnote: paired t-test

(mean 13 years). All students in both groups lived with their parents. Most parents were agriculturists and 47.4 % and 28.3% of the experimental group and control group lived near the river.

The average knowledge score of awareness and practice for liver fluke prevention in the intervention group were different with statistically significant (p-value <0.001) but no difference in the control group before and after the study (Table 2).

After the intervention, the experimental group had an average score of knowledge, awareness, and practice more than the control group with a statistically significant at 0.05 (p-value < 0.001) (Table 3).

According to the results of stool examination in both groups, before intervention performed, Ov. were found 1.15 % and 2.17 % in the experimental group and control group respectively. After the study, there were 0% of Ov. found in both groups (Table 4).

Teacher satisfaction for teaching arrangement was very high in both content and lesson

introduction, presentation, enhancement for understanding, and evaluation (Table 5).

The Opithorchiasis and CCA prevention learning modules for elementary schools encourage students to learn and solve the health problem issue by themselves. The students learned about Opithorchiasis and CCA through the process of learning from school through teaching activities to community context. The students can describe the cycle of liver fluke and sharing knowledge with their parents and classmates. The teachers encouraged and facilitated the learning process and interaction to exchange students' opinions contributed to new knowledge. (Duffy and Cunningham, 1996). According to the concept of the Ministry of Education to encourage the primary school to the concept of Moderate Class, More Knowledge to provide students opportunities for creative knowledge to develop essential life

skills for their good life quality according to the 21- century learner's standards (National Health Commission, 2015).

Table 3. Shows average knowledge and practice score before and after intervention between groups before and after the intervention

Knowledge, Awareness, Practice	N	Mean	S.D	Mean-diff	95 % CI	p-value
Before						
Knowledge of Ov. and CCA						
Experimental Group	137	7.87	2.92	0.46	-0.30 to 1.23	>0.05
Control Group	92	7.43	2.83			
Risk awareness						
Experimental Group	137	1.99	0.34	0.05	-0.04 to 0.14	0.280
Control Group	92	1.94	0.34			
Severity awareness						
Experimental Group	137	2.09	0.42	0.09	-0.02 to 0.20	0.109
Control Group	92	2.00	0.43			
Perceived benefits						
Experimental Group	137	2.26	0.44	0.08	-0.04 to 0.20	0.172
Control Group	92	2.18	0.46			
Perceived obstacles						
Experimental Group	137	2.18	0.48	0.08	-0.05 to 0.20	0.250
Control Group	92	2.10	0.49			
Practice						
Experimental Group	137	20.64	2.34	0.60	-0.02 to 1.22	0.056
Control Group	92	20.03	2.29			
After						
Knowledge of Ov. and CCA						
Experimental Group	137	12.34	2.53	4.43	3.73 to 5.14	< 0.001
Control Group	92	7.90	2.81			
Risk awareness						
Experimental Group	137	2.40	0.30	0.53	0.45 to 0.62	< 0.001
Control Group	92	1.87	0.36			
Severity awareness						
Experimental Group	137	2.42	0.32	0.45	0.36 to 0.53	< 0.001
Control Group	92	1.98	0.35			
Perceived benefits						
Experimental Group	137	2.53	0.33	0.38	0.28 to 0.48	< 0.001
Control Group	92	2.15	0.41			
Perceived obstacles						
Experimental Group	137	2.50	0.36	0.34	0.23 to 0.45	< 0.001
Control Group	92	2.16	0.47			
Practice						
Experimental Group	137	26.20	2.05	5.66	5.07 to 6.25	< 0.001
Control Group	92	20.53	2.42			

Table 4. Shows the number of helminth and liver fluke in both experimental and control group

Group	N	Before				After			
		Other helminths		Ov.		Other helminths		Ov.	
		N	%	N	%	N	%	N	%
Experimental	173	2	1.15	2	1.15	1	0.57	0	0
Control	92	3	3.26	2	2.17	1	1.08	0	0

Table 5. Shows teacher satisfaction for teaching arrangement

Teacher satisfaction for teaching arrangements	N	Mean±SD	level
1. Content Aspects	30	2.82±0.33	high
2. General of the class content	30	2.74±0.32	high
3. Introduction to lessons	30	2.60±0.46	high
4. Presentation format	30	2.83±0.3	high
5. Understanding Enhancement	30	2.60±0.48	high
6. Lesson evaluation	30	2.81±0.34	high
Total	30	2.75±0.24	high

According to the result of this study, after the intervention, the experimental group had average knowledge, awareness, and practice score for liver fluke prevention higher than the control group with statistically significant at 0.05 level ($p < 0.001$). The various media used for teaching such as slide presentations, video, flips chart, group work, and

sharing knowledge. Learning process by doing their role, through activities (Bloom, 1971) and social support from the community helps individuals behavior (House and Kahn, 1985; Franziska *et al.*, 2014) reported the result of the study in 1718 students from 38 schools after health education program by cartoon media, the rate of helminth

infection decreased and the knowledge and awareness increased. ThongnaMuang (2012) studied the effectiveness of the health education program by applying the theory of health beliefs with social support to modify the behavior of liver fluke and bile duct cancer in elementary school found that the experimental group had perception and practice for liver fluke and bile duct cancer the prevention higher than the control group with statistically significant ($p < 0.001$). Social value and create awareness for liver fluke and bile duct cancer should be implemented in school via learning modules to achieve the strategic goal for the prevalence of opisthorchiasis to less than 1% by the year 2025 (Bureau of General Communicable Diseases, 2015). For the result of stool examination before the intervention was performed, there were 1.15 % in the experimental group, 2.17 % in the control group found OV. After the study, there were 0% of OV found in both. This might be caused by medication treatment in all students who found helminth eggs for the first time.

The key success factors were 1) School administrators support the plan along with local context and consistent with The Ampornpan Theeranup's education report (Theranaute, 2005) found that clear leadership policies affect the response. 2) Communication of relevant persons such as health personnel and educational supervisor 3) Coordination between teachers and local health personnel. The collaboration from those involved in solving the problem and the collaborative of all sectors in the community and stakeholders were unlike in the past. According to the 7th National Health Assembly Network 2014 conceptual framework (National Health Commission, 2015) to encourage the Basic Education Commission office to take the role with the relevant authorities for include the Opisthorchiasis and CCA prevention learning modules in elementary school learning program. The research team has expanded operations to risk areas in 27 Provinces Thailand.

Conclusions

Schools in the area with a high prevalence of opisthorchiasis should arrange the learning module of liver fluke and cholangiocarcinoma prevention for students particularly beginning at elementary level.

Acknowledgment

Gratefully acknowledge Prof. Dr. Paiboon Sithithavorn and Dr. Thitima Wongsaraj for valuable advice on

this research and thank you to the National Health Security Office for the budget in this study.

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