การป้องกันตนเองจากสารเคมีทางการเกษตร

Self-Prevention from Agriculturally Chemical Substance

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บทคัดย่อ

การวิจัยกึ่งทดลองนี้มีวัตถุประสงค์เพื่อเปรียบเทียบคะแนนเฉลี่ยระหว่างกันและหลังทดลองของความรู้ในการป้องกันตนเองจากสารเคมีทางการเกษตร สิ่งแวดล้อมศึกษา พฤติกรรมการป้องกันตนเอง และผลสัมฤทธิ์การอบรม กลุ่มตัวอย่างเป็นนักเรียนระดับมัธยมศึกษาตอนต้นจำนวน 32 คนของโรงเรียนบ้านหนองโนอีดำ อำเภอเมือง จังหวัดมหาสารคาม ในภาคตะวันออกเฉียงเหนือประเทศไทย โดยใช้เทคนิคการสุ่มอย่างเฉพาะเจาะจง วิธีวิจัยใช้การประเมินสามด้านเพื่อประเมินการมีส่วนร่วม และการประเมินสี่ด้านเพื่อประเมินการแสดงบทบาทสมมุติการเป็นวิทยากร ใช้การวิเคราะห์ความแตกต่างของคะแนนเฉลี่ยด้วย Paired t-test และ One-way ANOVA ก่อนและหลังจากการวิจัยเชิงปฏิบัติการอย่างมีส่วนร่วมแบบพาอิก ผลการวิจัยพบว่า คะแนนเฉลี่ยความรู้ในการป้องกันตนเองจากสารเคมีทางการเกษตร สิ่งแวดล้อมศึกษา และพฤติกรรมการป้องกันตนเอง และผลสัมฤทธิ์การอบรมสูงกว่าก่อนอบรมอย่างมีนัยสำคัญทางสถิติที่ระดับ 0.01 สำหรับในสถานการณ์ปัจจุบันและอนาคต คะแนนเฉลี่ยมีความแตกต่างกันอย่างไม่มีนัยสำคัญทางสถิติ นอกจากนี้การประเมินสี่ด้านพบว่าคะแนนเฉลี่ยมีความแตกต่างกันอย่างไม่มีนัยสำคัญทางสถิติ

คำสำคัญ: การป้องกันตนเองจากสารเคมีทางการเกษตร, นักเรียนระดับมัธยมศึกษาตอนต้น

Abstract

This quasi-experimental research has objective to compare the mean scores between pretest and posttest of self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior and training achievement. Research was conducted with 32 secondary school students of Ban Nong No I Dam School, Muang District, Maha Sarakham Province in the Northeastern region of Thailand. They were gathered by purposive sampling technique based on criteria of willing and commitment to participate through the entire research process. Three Dimensional Evaluations were employed for exterminating the participation and Four Dimensional Evaluations were used for trainer role play evaluation. Paired t-test and One-way ANOVA was used to examine the mean scores difference. After Participation-Appreciation-Influence-Control (PAIC) operated, the results discovered that the mean scores of posttest of self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior and training achievement were higher than pretest with statistical significance ($p < 0.01$ for all aspects). In present and future situations illustrated that mean scores were different with no statistical significance ($p > 0.05$ and $p > 0.05$). Additionally Four Dimensional Evaluation, the mean scores were different with no statistical significance ($p > 0.05$).

Keywords: self-prevent from agriculturally chemical substance**,** secondary school student

Introduction

In Northeastern region of Thailand, majority of local peoples are agriculturists. Even though, they have different plant cultivation, particularly at present, they are changing to cultivate for economic purpose, therefore they need to heavily use pesticides in different types. This might be a major impact to their health, natural resources, and environment if the user lacked of knowledge and understanding, awareness, positive attitude and skill to use pesticide appropriately. However, Thailand is agricultural country, therefore, it is unavoidable to use pesticides in terms of chemical substance. Even though about three decades, the governmental and private sectors try to promote to use the natural pesticide made of herbs and plants but most of them have trapped with the convenience and believes of the strong effect of chemical substance because it is obviously seen from its action of killing germs and rodents. However, there were reporting from Division of Epidemiology, Ministry of Public Health informed the result of surveillance the disease caused by occupation and environment (passive policy) during B.E. 2546-2552 without included committed suicide cause with pesticide, it reported that there were 459 cases that can be classified as pesticide toxic with 349 cases and other household chemical product with 110 cases. Moreover, report informed that there was people getting pesticide poisoning while working and accident by classifying into 3 groups as poison from insecticide 181 cases with 51.8 percents, herbicide 143 cases with 41.0 percents and rodenticide 25 cases with 7.2 percents. The insecticide toxic effect was reported by causing with organophosphates with 91 case, carbamate with 6 case, pyretoid with 2 cases. The herbicide toxic effect was classified to cause by paraquat with 34 cases, gyposate with 22 cases, and other with 87 cases (Siripanich, et al, 2011).

According to United States law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant (U.S. Environmental Protect Agency, 2013). Presently, pesticide chemical substance has caused the impact among global agriculturist in all country whether developed countries, developing countries and least developed countries. It impacts environment, ecosystem, and people health and surrounded people who contact it. The danger will rely on the types and amount of chemical substance but its serious impact frequently takes place in developing and least developed countries (Kishi M, Ladou J, 2001). Type of chemical substance has used at highest rate is herbicide chemical substance; subsequences are insecticide, fungicide, and plant prevention disease chemical respectively. Beside these 3 groups, there is using various type but they are lesser used (World Health Organization, 2010).

The assessment was made by Expert committee of Pesticides Utilization of WHO, it was discovered that 500,000 people got poison from pesticide across the world and had mortality rate with 1-10 percents. However, it relies on the condition of treatment. The data might be lower than the actual circumstances because the data firstly composed from only 19 developed countries but it did not include agricultural countries. Most of agricultural countries are developing countries and the least developed countries that still lack of data record of patient or impact of chemical utilization. Subsequently, WHO tried to gather

and analysis, therefore it was discovered that nearly 99.00 percents of patients were died due to pesticide poison were in agricultural countries which are developing and least developed countries. For this reason, it was named for acute poison of pesticide as "New third world's disease" (Ramathibodi Poison Center, 2012; Charoensong, et al., 2011). The Economic and Social Commission of Asia and the Pacific (ESCAP) during 1983, assessed the pesticide poison receiver might be reached to 2 million per year and the mortality rate might be up to 40,000 persons per year. Afterward in 1986, the environmental Organization of United Nations reported on pesticide poison receiver that estimated by WHO there were 1 million people unintentionally got pesticide poison and mortality rate about 0.5-2 percents. Some academic people evaluated that if one used data of poison receiver of Sri Lanka which is developing and agricultural country as foundation for computation, it can be predicted that there are 2,900,000 peoples per year received toxic and the mortality rate was 220,000 peoples (Ramathibodi Poison Center, 2012).

From different reports, it might be concluded that Asia Continent, the peoples were got acute poison highest with 44.3 percents, America Continent with 42.6 percents, Europe Continent with 10.0 percents, Africa Continent with 2.8 percents, Australia and Oceania with 0.3 percents. It is obvious seen that Europe Continent was the first continent that has used pesticide but the majority of poisoning is happening in Asia Continent and America Continent. The group of pesticides have caused the poison are substance type of organochlorines with 12.6 percents, organophosphates with 3.4 percents, arsenic with 6.1 percents, and zinc phosphide with 0.9 percents (Bureau of Occupational and Environmental Diseases, 2009). Moreover, in 2000, International Labour Organization anticipated that each year the patients with acute poisoning from pesticide were up to 1.1 million over the world. 20,000 cases unintentionally got poison, therefore every cause was summarized, and numbers of patients with acute poisoning from pesticide were up to 2.9 million over the world. The deaths of patients with 220,000 cases per year were caused by pesticide (Tungkijthavorn, 2006).

The basic concept of environmental education aims people to realize the interrelationship among all living creatures but human is accepted as most smart and clever creature on this planet. Human have developed an economic system using a technology which has consumed enormous resources. This has brought speedy environmental alteration and waste accumulation in the environment. It is worldwide recognized by majority of scientists that human activities are the significance of environmental destruction and cause of global warming. Therefore our generations have obligations to decrease environmental impacts in all aspects covered air, water, soil and noise to serve the needs of future generations by preserving environmental quality in order to meet the good life quality. Therefore, it needs essential policy and plan to reach the goals of environmental education that are firstly, to foster awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas; secondly, to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and thirdly to create new patterns of behavior of individuals,

groups and society as a whole toward the environment with responsibility (United States National Academy of Sciences, 2008, National Research Council of USA., 2010; UNESCO, 1978; Thiengkamol, 2011e; Thiengkamol, 2011i; Thiengkamol, 2011j; Thiengkamol, 2012a; Thiengkamol, 2012c; Thiengkamol, 2012d; Thiengkamol, 2012e; Thiengkamol, 2012f; Thiengkamol, 2012h; Thiengkamol, 2012i).

However, the rate of pesticide poisoning is still high, therefore the student who is a member of agricultural families, particularly, the secondary school students needs to be gain more knowledge of self-prevent from agriculturally chemical substance, particularly pesticide including awareness raising, attitude adjusting and behavior by using the Participation-Appreciation-Influence-Control (PAIC) training technique. PAIC process can be implemented o train them to have proper self-prevention behavior from pesticide based on the environmental education concepts to inspire and sensitize them to take responsibility as trainer to transfer knowledge to their families and communities to have suitable performance for pesticide use to accomplish sustainable development. However of Ban Nong No I Dam School is secondary school in Maha Sarakham Province locates in the Northeastern region of Thailand that has vast area for cultivation diverse kind of plants. Therefore, it is excellent occasion to train secondary school student to be trainer and education for knowledge transferring in terms of self-prevention from agriculturally chemical substance by using actual practice in daily living (Thiengkamol, 2010b; Thiengkamol, 2011a; Thiengkamol, 2011e; Thiengkamol, 2011h; Thiengkamol, 2011i; Thiengkamol, 2012e; Thiengkamol, 2012a; Thiengkamol, 2012b; Chomputawat, 2013; Mongkonsin et al., 2013a).

Objective

The objective was to compare the mean scores between pretest and posttest of self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior.

Methodology

The research design was implemented in steps by step as the followings:

1) The handbook of self-prevention behavior was constructed for secondary school students of Ban Nong No I Dam School, Muang District, Maha Sarakham Province in the Northeastern region of Thailand. Its content included self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior (Ramathibodi Poison Center, 2012; Charoensong, et al., 2011; Tungkijthavorn, 2006; Siripanich, et al, 2011; InWent-DSE-ZEL, 2002; Thiengkamol, 2009c; Thiengkamol, 2011a; Thiengkamol, 2012a).

2) The research instrument contained questionnaire and evaluation forms. The questionnaire was used for examining participant on self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior. The reliability of questionnaire was 0.947.

3) The evaluation forms of Three Dimensions and Four Dimensions were constructed to evaluate the participant practice during PAIC implemented.

4) Participant of 32 secondary school students of Ban Nong No I Dam School. They would be recruited according to the setting criteria (willingness, time, devotion, commitment, and public mind).

5) Participant 32 secondary school students of Ban Nong No I Dam School were used to examine the training results of self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior, and training achievement. The PAIC was used to train participant with organized procedure. The focus group discussion integratied with brain storming and Training of Trainer (TOT) were implemented (Langly, 1998, Weiss, 1993; Sproull, 1988; InWent-DSE-ZEL., 2002; Thiengkamol, 2012a; Thiengkamol, 2012b). The Three Dimensional Evaluation (TDE) was used to determine the congruence of three aspects evaluation regarding Self-evaluation, Friend-evaluation, and Facilitator-evaluation for training participation. The Four Dimensional Evaluation (FDE) was used for trainer role play evaluation (Thiengkamol, 2011a; Thiengkamol, 2011g; Thiengkamol, 2011h; Thiengkamol, 2011e).

6) Paired t-test and One-way ANOVA was used for data analysis to determine the mean scores difference.

Results

The results of this research were as the followings**.**

4.1General Characteristics of Sample Group

The sample group of this study was 32 secondary school students of Ban Nong No I Dam School, Muang District, Maha Sarakham Province in Northeastern region of Thailand in the year of 2013. The sample was secondary school students who were selected to be trained as trainer on knowledge self-prevention knowledge from agriculturally chemical substance, environmental education, and self-prevention behavior. Most of them were female with 21 (65.63%), paid respect to Buddhism with 32 (100%), had age between 13-15 years old with mean of 14.22 years old, had education level at secondary school level 2 with 17 (53.13%), and had family characteristics with nuclear family with 21 (65.63%) as illustrated in table 1.

Table 1

Demographic Characteristics of Secondary School Students

Characteristics	Secondary School Students	
	Frequency	Percent
Sex		
Male	11	34.37
Female	21	65.63
Religion Respect		
Buddhism	32	100.00

Characteristics	Secondary School Students	
	Frequency	Percent
Age Between 13-15 years, Mean=14.22 years		
Education Level Secondary School Level 1 Secondary School Level 2 Secondary School Level 3	 4 17 11	 12.50 53.13 34.37
Family Characteristics Nuclear Family Extended Family	 21 11	 65.63 34.37
Total	40	100.00

4.2. Results of Pretest and Posttest with PAIC technique

PAIC technique was trained for 32 secondary school students about self-prevention knowledge from agriculturally chemical substance, environmental education, and self-prevention behavior. The research results discovered that before and after PAIC training process implemented, the mean scores of posttest of training results on self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior and training achievement were higher than pretest with statistical significance ($p< 0.01$, $p< 0.01$, $p< 0.01$, and $p< 0.01$), as illustrated in table 2.

Table 2

Pretest and Posttest of Sample Group of Secondary School Students

Training Issues	Posttest		Pretest		t	p
	$\overline{X}$	S.D.	$\overline{X}$	S.D.		
Knowledge of Self-Prevention	9.16	0.92	7.19	1.20	9.46	0.00**
Environmental Education	22.22	4.36	16.15	5.02	6.26	0.00**
Self-Prevention Behavior	27.44	3.48	22.03	4.89	6.69	0.00**
Training Achievement	58.81	5.95	45.38	7.23	10.58	0.00**

** Significant Level at 0.01

4.3 Results of Three Dimensional Evaluations for Participation in Present Situation

Three Dimensional Evaluation was employed for determination the participation of 32 secondary

school students in three aspects evaluation in present situation, Self-evaluation, Friend-evaluation, and Facilitator-evaluation by using One-way ANOVA Analysis in order to examine the mean score differences of three groups. The results of One-way ANOVA illustrated that there were different mean scores among Self- evaluation, Friend evaluation and Facilitator evaluation about participation in training process with no statistical significance ($p>0.05$) as illustrated in table 3.

Table 3

Three Dimension Evaluation of Sample Group for Participation in Present Situation

Source of Variation	Sum of squares	df	Mean Square	F	Sig.
Between Groups	0.34	2	0.17	1.30	0.277
Within Groups	11.98	93	0.13		
Total	12.32	95			

* Significant Level at 0.05

4.4 Results of Three Dimensional Evaluations for Participation in Future Situation

Three Dimensional Evaluations were employed for determination the perceptions of 32 secondary school students in three aspects evaluation in future situation, Self-evaluation, Friend-evaluation, and Facilitator-evaluation by using One-way ANOVA Analysis in order to examine the mean score differences of three groups. The results of One-way ANOVA illustrated that there were different mean scores about participation in training process with no statistical significance ($p>0.05$) as illustrated in table 4.

Table 4

Three Dimension Evaluation of Sample Group for Participation in Future Situation

Source of Variation	Sum of squares	df	Mean Square	F	Sig.
Between Groups	0.03	2	0.02	0.22	0.802
Within Groups	6.32	93	0.07		
Total	6.35	95			

* Significant Level at 0.05

4.5 Results of Four Dimensional Evaluations for Trainer Role Play

Four Dimensional Evaluations were employed for determination the trainer role play in four aspects evaluation of Trainer self-evaluation, Trainer friend evaluation, Audience evaluation and Expert trainer evaluation by using One-way ANOVA Analysis in order to examine the mean score differences of four groups. The results of One-way ANOVA illustrated that there were different mean scores about trainer role play during PAIC with no statistical significance ($p>0.05$) as illustrated in table 5.

Table 5

Results of Four Dimensional Evaluations for Trainer Role Play

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.07	3	0.02	0.71	0.546
Within Groups	5.60	170	0.03		
Total	5.67	173			

* Significant Level at 0.05

Discussions

The results illustrated that the secondary school student participants had self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior after participating in the PAIC training process. These were congruent to a variety of studies of Thiengkamol, (2010b, 2011g, 2011h, 2012a, 2012b) and her colleagues (Mongkonsin, et al., 2013a; Pusdorn et al., 2013; Moolmanee et al., 2013; Chaisena et al., 2013; Saisunantharom, 2013; Chomputawat, 2013; Kotchakote, 2013). It might be clarified that the secondary school student of Ban Nong No I Dam School after trained with PAIC training technique are able to gather more self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior after training with PAIC technique through actual practicing behavior in their daily life activities in their homes on self-prevention knowledge from agriculturally chemical substance, environmental education, self-prevention behavior. The findings are also congruent to the results of different studies of Thiengkamol, and Thiengkamol colleagues (2010b, 2011b,2011c, 2011a, 2011g, 2011h, 2011i, 2011j, 2012a, 2012b) and researches of Saisunanthararom, 2013; Mongkonsin, et al., 2013a; Moolmanee et al., 2013; Chaisena et al., 2013; Chomputawat, 2013 that the participation is capable to practice whether on different topics include environmental conservation, self-health care, self-prevention, and other issues, therefore, the secondary school students of Ban Nong No I Dam School gain more knowledge of self-prevention from agriculturally chemical substance and moreover they are capable to transfer their knowledge to their families and their communities as well.

The results of TDE of 32 participants were employed for determination of the congruence of three aspects evaluation, Self-evaluation, Friend-evaluation, and Facilitator-evaluation. The mean scores three aspects were difference among three aspects in present and future situations ($p>0.05$ and $p>0.05$). These results are congruent studies of Sukwat et al., 2012; Sukserm et al., 2012; Ruboon et al., 2012b; Charoensilpa et al., 2012a; Wattanasaroch et al., 2012). This might be indicated that secondary school student participants who live in rural area and majority of their families have the occupation of agriculture and often use the agriculturally chemical substance, therefore, they must pay more attention to use it with realization of its

toxicity and plan to carefully use it for their better health by preventing themselves from chemical toxicity. However, these students are able to correctly evaluate on participation of self-evaluation and friend-evaluation with being similar to facilitator evaluation, therefore their mean scores are not different. In addition, FDE was used to evaluate the trainer role play of secondary school student participants; it was discovered that the mean scores of Trainer-self evaluation, Trainer-friend evaluation, Audience evaluation, and Expert trainer evaluation were no statistically significant at level of 0.05. It is obviously seen that they understand the content of knowledge of self-prevention from agriculturally chemical substance and have proper behavior of self-prevention so they are able to act as trainer appropriately. However, the result of training was congruent to several studies of Thiengkamol, (2005a, 2010b, 2011g, 2011h, 2012a, 2012b) and researches of Thiengkamol colleagues such as Sukwat et al., 2012; Sukserm et al., 2012; Ruboon et al., 2012b; Charoensilpa et al., 2012a; Wattanasaroch et al., 2012.

Additionally, it was discovered that PAIC training is successful for training with combination of brain storming process to develop a shared vision, action plan and projects in different issues of training for example urban community food security management, environment and natural resource conservation, elderly health care, dust self-prevention, and environmental conservation of food stand entrepreneur including other issues such as environmental conservation of agriculturist, biodiversity conservation, environmental conservation of disability student, environmental education tourism and holistic tourism management (Thiengkamol, 2010b; Thiengkamol, 2011a; Thiengkamol, 2011g; Thiengkamol, 2011h; Thiengkamol, 2012a; Thiengkamol, 2012b; Phinnarach et al., 2012b; Moolmanee et al., 2013; Chaisena et al., 2013; Chomputawat, 2013; Saisunanthararom, 2013; Ngarmsang, et al., 2012a; Sangsan-anan, et al., 2012b).

Consequently, the results of training achievement was congruent to several studies of Thiengkamol, (2010b, 2011g, 2011h, 2012a, 2012b), and Thiengkamol colleagues regarding on Gonggool, et al., 2012a; Morrasri, et al., 2012a; Phinnarach, et al., 2012b; Ngarmsang, et al., 2012a; Sangsan-anan, et al., 2012b; Chaisena et al., 2013; Mongkonsin, et al., 2013a; Moolmanee et al., 2013; Pusdorn et al., 2013; Saisunantharom 2013. This model of self-prevention from agriculturally chemical substance can be integrated in other contexts and different target groups by reproducing its implementation to construct the chemical substance prevent model through trainer development for environmental knowledge transferring for school and community in other provinces of the country.

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