Effects of insecticide exposure prevention program on exposure and Blood cholinesterase levels of farmers

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Area which highly used of insecticide and the number of patient with insecticide poisoning in Thailand
Factors affecting insecticide exposure

Inappropriate mix of insecticide at mixing stage

Inappropriate application method

Long term duration and frequency of application

Inappropriate use of personal protective equipment

Coble et. al., (2010)
Many farmers have knowledge but lack of awareness.

Mostly previous studies conducted prevention insecticide programs at individual level with no community participation. An integration at both individual and community levels is limited.

Previous studies test effects of prevention insecticide programs using reactive paper with low reliability.

Current policy “The farmer health clinic” in Primary Care Unit (PCU) focuses on education programs.
Research Framework

**Structure**
- Characteristics of individual, family and community
- Leadership
- Stakeholder
- Community resources
- Health team
- Policy
- Cultural environment

**Process**
RAMA Model (12 weeks)
- Raising community awareness
- Aiming at targeted health outcome
- Mobilizing change and innovation
- Assuring synergy

**Outcome**
- Insecticide exposure level
- Blood cholinesterase level
Research Hypotheses

1. After the program, the experimental group has less level on insecticide exposure and higher level of blood cholinesterase than those before the program.

2. After the program, the experimental group has less level on insecticide exposure and higher level of blood cholinesterase than control group.
Research Methodology

Quasi – Experimental Research

Two-group pretest-posttest Design
Sample

**Target population** = Radish farmers exposed to Organophosphate and Carbamate in Thailand

**Sample** = Radish farmers exposed to Organophosphate and Carbamate in western Thailand

**Control group** : 24 farmers in Ratchaburi Province

**Experimental group** : 25 farmers in Prachuabkirikhan Province
Sampling and Sample size

- Purposive sampling.
- Sample size determined, based on Power Analysis (Cohen, 1977), using G*Power
  - effect size .8 (Somboon, 2011)
  - power 80%, obtaining a sample of 21 per group
  - Approximately 20% were added, getting the final sample of 25 per group.
**Instruments for screening**

The farmers’ insecticide exposure screening questionnaire

**Instruments for data collection**

The farmers’ insecticide exposure assessment questionnaire

Scientific equipment included Cobas 6000 (C501) for measurement of blood cholinesterase in the laboratory
The 12-week Insecticide Exposure Prevention Program

- Raising awareness
- Aiming at targeted health outcome
- Mobilizing change and innovation
- Assuring synergy
radish farmers qualified and authorized participants.

Experimental group
- completing insecticide exposure assessment questionnaire
- blood test for cholinesterase

Control group

Raising awareness
week 1
Raising awareness at individual and family levels
Interpretation of results of risk and severity
Group process
week 2
Raising awareness at community awareness
Group discussion
Aiming at targeted health outcome
week 3
community participation

Receiving a guide book for farmers and routine care
Data collection phase (cont.)

Mobilizing change and innovation
  week 4 Group process
Assuring synergy
  week 6 Implement the plan of the community
  Home visits by the healthcare team
  week 7 Assessing the outcomes and reflecting on problems community participation solving
  week 8 -10 Implement the plan of the community, Home visits by the healthcare team
  week 11 Taking insecticide exposure assessment questionnaire and taking venous blood to blood cholinesterase in the laboratory
  week 12 Assessing the outcomes
Community participation
Raising community awareness

week 1 individual and family awareness
Raising community awareness

week 2 community awareness
Aiming at targeted outcome

week 3 community participation
Mobilizing change and innovation

week 4 Group process
Innovation for environment
Assuring synergy

week 5-6 follow targeted health observed by health team.
Assuring synergy

week 7 problem solving through community participation
Assuring synergy

week 8 - 10 follow up with targeted health observed by health team
Assuring synergy

week 11 Response to insecticide exposure questionnaire and blood cholinesterase test.
Assuring synergy

week 12 community participation and evaluation.
Data analysis

1. Descriptive statistics
2. Chi-square test and Fisher’s Exact test
3. Mann-Whitney test
4. Paired t – test
5. Independent t – test
## Results

Part 1: Levels of insecticide exposure and blood cholinesterase of farmers in the experimental group before and after the program

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental group (n = 25)</th>
<th>Control group (n = 24)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>insecticide exposure</td>
<td>38.52</td>
<td>4.29</td>
</tr>
<tr>
<td>blood cholinesterase</td>
<td>7.01</td>
<td>2.35</td>
</tr>
<tr>
<td>control group (n = 24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>insecticide exposure</td>
<td>40.83</td>
<td>3.19</td>
</tr>
<tr>
<td>blood cholinesterase</td>
<td>7.16</td>
<td>2.03</td>
</tr>
</tbody>
</table>
Part 2: Levels of insecticide exposure and blood cholinesterase of farmers in the experimental group and the control group before and after the program

Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>difference score of insecticide exposure</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference</td>
<td>S.D.</td>
<td></td>
</tr>
<tr>
<td>experimental group (n =25)</td>
<td>9.72</td>
<td>4.45</td>
<td>6.612</td>
</tr>
<tr>
<td>control group (n =24)</td>
<td>2.63</td>
<td>2.86</td>
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</table>
Table 3. Comparison of the mean blood cholinesterase between experimental and control groups. (n = 49)

<table>
<thead>
<tr>
<th>Variable</th>
<th>experimental group (n = 25)</th>
<th>control group (n = 24)</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
<td></td>
</tr>
<tr>
<td>Blood cholinesterase</td>
<td>7.01</td>
<td>2.35</td>
<td>7.16</td>
<td>2.03</td>
</tr>
<tr>
<td>Before</td>
<td>6.59</td>
<td>2.60</td>
<td>7.46</td>
<td>1.90</td>
</tr>
</tbody>
</table>
Conclusion

After the program, the level of insecticide exposure in the experimental group was lower than the control group with statistical significance \((p < .001)\).

After the program, Blood cholinesterase level of farmers in the experimental group were not different from those before the program with statistical significance \((p > .05)\).

After the program, Blood cholinesterase level of farmers in the experimental group and the control group were not different with statistical significance \((p > .05)\).
Recommendations

For nursing practices

Community nurse practitioners could apply the RAMA Model to devise a proactive nursing practice guideline for provision of care at the farmers’ health clinic.
Further research should be undertaken with farmers who started their farming cycle at the same time to better control the duration, frequency, and amount of insecticide exposure. Research should be carried out to follow up the long-term outcomes of the insecticide exposure prevention program to ensure sustainability.
THANK YOU
FOR YOUR KIND ATTENTION