Awareness of pesticide residues in foodstuff among people in Taif region, Kingdom of Saudi Arabia

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Pesticides which are chemicals used to increase the productivity of plants which are used later on as feed for animals, have been intensively used by farmers, the misuse of these chemicals can result in their presence in foodstuff of humans, people must be aware of this problem which can lead to serious health problems to humans, the current study measures the awareness of people in Taif region, Kingdom of Saudi Arabia towards this problem. 27% of the samples under study do not know that pesticides are harmful when consumed through contaminated vegetables and fruits. 23% of the samples do not know that such chemicals could be transferred to our kitchens through contaminated vegetables and fruits.

Key words: Pesticides, foodstuff, contaminated vegetables.

INTRODUCTION

Farmers around the world use pesticides as a preventive means against the possibility of a devastating crop loss from pests and diseases. In Taif, Kingdom of Saudi Arabia, which is known for its agricultural products, pesticides have been employed in agriculture not only to control and eradicate crop pests but also in the public health sector for disease vector control. Nevertheless, there has been a rapid increase in the quantity and use of pesticides in agriculture over the past ten years (Hodgson, 2003).

Pesticides are used to enhance and stabilize crop yield, protect the nutritional integrity of food, facilitate storage to assure year-round supplies, and provide attractive and appealing food products, farmers and growers have changed the way they produce crops. Among which, the use of pesticides and other chemicals has become a common agricultural practice (Crentsil et al., 2011). The World Health Organization (WHO, 2005) and United Nations Environmental Program have estimated one to five million cases of pesticide poisoning among agricultural workers each year with about 20,000 fatalities, mostly reported from developing countries (Nabil et al., 2012).

Pesticides are playing a pivotal role in meeting the food, cotton fiber and tobacco demand of escalating population and control of vector-borne diseases. However, most of the applied pesticides get dispersed in the environment and affects the health of un-protected agricultural and industrial workers. The three major routes of entry for pesticides include contamination of the skin, mouth and the nose. The public health issue of pesticide exposure is further complicated by the presence of impurities in so-called, inert-ingredients such as solvents, wetting agents and emulsifiers (Hashmi and Dilshad, 2011; Bo Hou and Linhai, 2010).

The threat of pesticide residues not only depends on the quality and specificity of pesticides, but also on farmers' awareness of pesticide residues and their behavior in applying these pesticides (Li et al., 2007; Zhou, 2007). Pesticides are suspected of producing adverse health effects based on their structural similarity to proven toxicants. Exposure to pesticides is one of the most important risks among farmers in developing countries (Shalaby et al., 2012). Exposure to pesticides is of great interest in order to identify the hazards of pesticide use and the establishment of safe methods of pesticide handling. This is because pesticide misuse in various sectors of the agriculture often has been associated with health problems and environmental contamination worldwide (Remor et al., 2009). Misuse of highly toxic pesticides, coupled with a weak or a totally absent legislative framework in the use of pesticides, is one of the major reasons for the high incidence of pesticide poisoning in developing countries (Atreya,
In general, knowledge of the main determinants of pesticide exposure in developing countries is often poor and also exposure situations may differ among countries (Shalaby et al., 2012). Pesticides, especially the organochlorine and organophosphate tend to persist in the environment, causing several types of damages including lowering of biodiversity, soil contamination, and water contamination. Once released into the environment, pesticides tend to build up in the fatty tissues of living organisms, causing serious harm to the health of species and a potential loss of bio-diversity. Excessive use of persisting pesticides in the fields also have caused damaging effect on ground surface and underground (Lama, 2008).

MATERIALS AND METHODS

Study area

Al Taif is the third city of Saudi Arabia. It covers about 540 km², of which 18.2 km² is rural area. It lies between 2200 and 2500 m above sea level. In Al Taif, there is one municipal abattoir where cattle, sheep, goats and camels are slaughtered and animals for slaughter come from different regions of the western province in Saudi Arabia. The main purposes of the Al Taif abattoir are processing of one or several classes of livestock into fresh meat for human consumption, hygienic processing and storage of meat and edible by-products. (Hayajneh et al., 2014).

Sampling method

The method employed to select the respondents was a simple random sampling method. Respondents were selected during questionnaire administration in different parts of the town and peasant associations around the town. During the questionnaire administration, any member of the households who was willing to participate in the interview was taken as a sampling unit.

Study methodology

A semi-structured questionnaire was pretested and used for the face-to-face interview to evaluate the perception of the community about pesticides, the possible presence of such chemicals in food, possible hazards associated with their contamination of food, methods to reduce or eliminate such chemicals. Arabic language was used for the interview. On average, 25 min were spent with each respondent.

Data management and analysis

The data collected was properly coded and entered into an excel spreadsheet, which was later on entered into SPSS version 17, which was used to analyze the results.

RESULTS AND DISCUSSION

Recent studies have reported serious health hazards to humans and environment because of overuse and misuse of toxic pesticides but still, studies are not enough to explain many health disorders due to ingestion of residue from food. Increased health awareness has led to higher consumption of vegetables, meat and dairy products in the diet. The availability of vegetable per capita/year is higher in Asia than other continent (Ganry, 2005).

Different studies have reported the presence of toxic residue in vegetables, milk and meat products which cause serious acute (short exposure, 24 h/less) and chronic (long exposure) health hazards depending on exposure length. Higher contamination (63.38% out of 325 samples) in bovine milk has been reported in India (Nag and Raikwar, 2008). Similar findings for dairy products (milk, cheese, labaneh, yogurt, butter) have been reported in Jordan (Salem et al., 2009). Pesticides used in agriculture reach aquatic body and finally reach to humans through food web which have high affinity for testis androgen receptors causing dysfunction of reproductive system (Singh et al, 2008), increase association with Parkinson disease, type 2 diabetes (Son et al., 2011) and malarial infection (through depletion of liver reserves of vitamin-A) (Stuetz et al., 2006).

In this study 73% of the samples questioned believe that the presence of these chemicals (pesticides) is harmful and know that these chemicals can reach their bodies through consuming foods contaminated with these chemicals (Table 1). 27% of the samples tested have no knowledge that these chemicals (pesticides) can be transferred to their bodies through consuming fruits and vegetables contaminated with pesticides (Table 2). People with a university degree are more aware of the pesticide problem than the other groups with a lower education level in the study (Table 2).

Table 3 shows that a great proportion of the samples under study (41%) have no knowledge about the health risks associated with the presence of these chemicals in foodstuff as indicated In Table 4 it can be concluded that 36% have no knowledge of how to eliminate this problem, 4% think that these pesticides can be removed from foodstuff by cleaning which indicates that there must be a program to educate the public of the dangers of such serious issues.

In order to protect the consumers against the biological, chemical, and environmental contamination of food, the food safety should encompass the control over all stages of food production, processing and distribution of foods. There is need of development of the ability to follow the movement of food through specified stages of production, processing and distribution.

There should be a coordinating team of public private partnership for close monitoring of appropriate use of pesticides at the field level (Lama, 2008). In Table 5 it is clear that there is a missing link between the authorities
Table 1. Presence of pesticides in food.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Is the presence of these drugs harmful</th>
<th>Do you know that pesticide residues can be transferred to humans through consuming food products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No idea</td>
<td>Yes</td>
</tr>
<tr>
<td>male</td>
<td>13</td>
<td>65</td>
</tr>
<tr>
<td>female</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>73</td>
</tr>
</tbody>
</table>

P<0.05.

Table 2. Products transferring pesticide residues.

<table>
<thead>
<tr>
<th>Education</th>
<th>No Knowledge</th>
<th>1 product</th>
<th>2 products</th>
<th>3 products</th>
<th>leaf vegetables</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Secondary</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>High school</td>
<td>10</td>
<td>6</td>
<td>14</td>
<td>9</td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>University level</td>
<td>17</td>
<td>0</td>
<td>12</td>
<td>13</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>8</td>
<td>37</td>
<td>25</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

P<0.005, products (tomatoes, vegetables, cucumber, vegetables, fruits, dates, bananas, beans).

Table 3. Consequences of the presence of these drugs in food.

<table>
<thead>
<tr>
<th>gender</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>32</td>
<td>5</td>
<td>28</td>
<td>3</td>
<td>10</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>female</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>5</td>
<td>28</td>
<td>9</td>
<td>11</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

P<0.005, A: No knowledge, B: Toxicity, C: Tumors, D: Environmental pollution, E: Diseases, F: Digestive disorders, G: Genetic changes.

Table 4. How to eliminate this problem.

<table>
<thead>
<tr>
<th>Education level</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Secondary</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>High school</td>
<td>18</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>University level</td>
<td>18</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>8</td>
<td>11</td>
<td>3</td>
<td>19</td>
<td>11</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

P<0.005, A: no Knowledge, B: Education, C: Education and guiding of farmers, D: Reporting to the authority, E: Monitoring, F: Reduce or stop use, G: Cleaning, H: Alternative methods (organic agriculture).

Table 5. Responsibility of the problem.

<table>
<thead>
<tr>
<th>Education level</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>primary</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>secondary</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>high school</td>
<td>22</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>42</td>
</tr>
<tr>
<td>university level</td>
<td>18</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>31</td>
<td>3</td>
<td>3</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

Who is responsible: A: Do not know, B: Ministry of agriculture, C: everyone, D: Ministry of health, E: Government, P<0.05.
and the public, more focus should be done to educate and help the consumers understand the dangers hidden behind the delicious good looking fruits and vegetables in our markets.

Conclusion

A regular training /workshop about the use and safety measures of pesticide should be given to farmers, retailers, distributors and all the pesticide workers. Multimedia awareness activities in local language should be massively conducted.

REFERENCES


National food safety systems in the Near East. p. 5.


National food safety systems in the Near East. p. 5.


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