Hematological, Biochemical Effects, and Self-reported Symptoms in Pesticide Retailers

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Objective: This study evaluates the effects of exposure to pesticides on the health of pesticide retailers. Methods: The study population comprised 83 male pesticide retailers and 98 controls. Serum butyrylcholinesterase levels and complete blood analysis were performed in a certified laboratory and each subject completed a structured questionnaire. Results: Butyrylcholinesterase activity and hematological parameters such as hemoglobin and hematocrit were significantly lower in pesticide retailers than in control subjects. In contrast, platelet counts as well as hepatic parameters such as glutamic-pyruvate transaminase and gamma-glutamyl transpeptidase activities were higher in pesticide retailers. Furthermore, pesticide retailers experienced burning sensations in the skin more frequently than controls. Conclusions: These preliminary results suggest the importance of evaluating further toxicological biomarkers in these populations.

Even though the exposure of humans to pesticides constitutes a major public health hazard, these compounds are still used worldwide. In Mexico, there are concerns about the health effects of pesticide exposure, as over 50,000 tons of active ingredient pesticides are produced in the country. The use of pesticides in agriculture is extensive, and it is widely used as a biomarker of acute or chronic exposure to these pesticides. In addition, it has been reported that serum BuChE activity is a slightly more sensitive indicator of mixed pesticide exposure than red blood cell acetylcholinesterase activity.

Most studies in the literature regarding the chronic effects of pesticides have focused on the development of cancer in workers exposed to pesticides. However, there are other health outcomes related to pesticide exposure, including effects in diverse systems such as the immune, nervous, endocrine, and reproductive systems.

There are few epidemiological studies regarding the effects of pesticides on enzymes related to liver function, or on hematological and biochemical parameters in individuals occupationally exposed to these compounds.

To our knowledge, no studies have evaluated the acute and chronic effects of pesticides in retail workers who are potentially exposed to pesticides. Thus, the aim of this study was to evaluate the health status of pesticide retailers by evaluating serum BuChE, self-reported symptoms, enzymatic activities related to liver function, and other blood parameters.

MATERIALS AND METHODS

A cross-sectional study was conducted in individuals working in establishments that sell pesticides in the state of Nayarit, an important agricultural region in Mexico. A total of 83 male pesticide retailers and 98 nonexposed subjects (not involved in the sale of pesticides) agreed to participate and completed a detailed questionnaire that gathered information concerning anthropometric characteristics, lifestyle, adverse health symptoms, personal protective equipment used, and exposure to pesticides. A fairly comprehensive range of symptoms related to pesticide exposure was included in the questionnaire. The symptom occurrence was evaluated within the time frame since the participants had begun to work in the pesticide establishment.

Information concerning trademark and frequency of pesticide sales in 2007 and 2008 was provided by the manager of each establishment. All protocols were reviewed and approved by the human subjects institutional review board, and all individuals signed an informed consent form.

The control group included male workers and students from the Autonomous University of Nayarit, who were invited to participate by way of posters, pamphlets, and personal communication. Only control individuals who reported no past history of pesticide exposure and no diagnoses of diseases such as liver disease, malnutrition, chronic alcoholism, diabetes, depression, hypertension, or asthma were selected. Furthermore, the control group and pesticide retailers had similar anthropometric characteristics (Table 1).

Sampling

Pesticide retailers' samples were taken during 2008 and control samples in 2008 to 2009. Samples were collected and processed directly in clinical laboratories. Blood samples were obtained from...