

What is the Relationship Between Repeated Pesticide Exposure and Neurological Disease in Adult Farmers?

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Background

- ❖ In 2007, the U.S. accounted for 32% of the world's total pesticide expenditures; 38% herbicides, 39% insecticides, 15% fungicides, and 25% pesticides (Grube, Donaldson, Kiely, & Wu, 2011).
- ❖ During 2006-2007, the U.S. produced over 9.8 billion pounds domestic pesticide, 1.6 billion imports, 2.1 billion exports (Grube, et al, 2011).
- ❖ An estimated 25 million agricultural workers worldwide suffer unintentional pesticide poisoning yearly (Alavanja, 2010).
- ❖ Pesticide exposure enters the body dermally, orally, or by inhalation or respiration (Ogg, Hygnstrom, Bauer, & Hansen, 2012).
- ❖ Exposure can be acute or chronic.
- ❖ In 2010, the poison control center received 91,940 reported pesticide exposures (Ogg, et al, 2012).
- ❖ Pesticide exposure accounts for 6% of adult accidental poisonings (Ogg, et al, 2012).



Objective

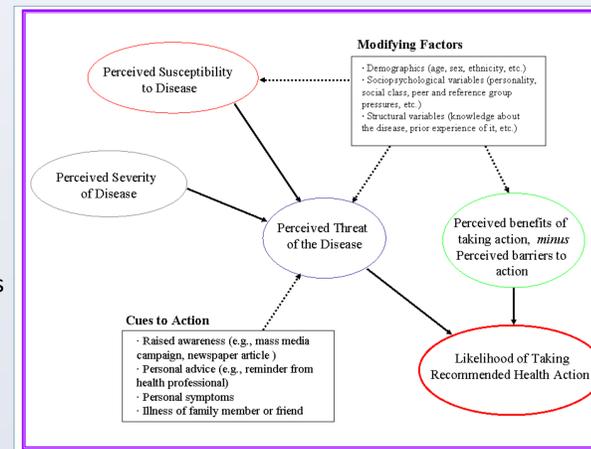
This integrative literature review aims to:

Determine if there is a relationship between repeated pesticide exposure and the development of neurological diseases in adult farmers.



Method

- ❖ Ganong's method (1987) was implemented for the integrative literature review.
- ❖ Research articles were obtained from the OVID database.
- ❖ A literature research was conducted using the key words: *pesticides, farmers, exposure, neurological, farmworkers, and organophosphate.*
- ❖ Inclusion criteria: Research articles, published in English, limited to United States, and peer reviewed journal.
- ❖ Exclusion criteria: Non-research articles, not in English, outside the United States, and non-peer reviewed journal.
- ❖ Total of seven articles meet the criteria.
- ❖ The Health Belief Model was applied (Rosenstock, 1974):
 - ❖ Perceived susceptibility – exposure to pesticides
 - ❖ Perceived severity – neurological disease
 - ❖ Perceived benefits – healthy, safe
 - ❖ Perceived barriers – cost, time, knowledge
 - ❖ Cues to action – use of Personal Protective Equipment (PPE) to prevent the development of neurological diseases



Synthesis of Literature

Authors	Findings	Limitations
Beseler et al. (2003)	<ul style="list-style-type: none"> • Pesticide poisoning decreases concentration causing irritability and reduced good safety practices; especially with the handling of livestock. 	<ul style="list-style-type: none"> • Undetermined if farmers were exposed to pesticide due to poor safety practices or if the exposure to pesticide lead to poor safety practices.
Hayden et al. (2010)	<ul style="list-style-type: none"> • Cox proportional hazard models shows an increased risk for dementia. • Organophosphate/organochlorines exposure increases the risk of Alzheimer disease. 	<ul style="list-style-type: none"> • Reliability of the self-reporting. • Exposure chemicals may have been misclassified.
Horowitz et al. (1999)	<ul style="list-style-type: none"> • Reduced sensation in the lower extremities. 	<ul style="list-style-type: none"> • Inaccurate screening techniques for peripheral neurologic deficits. • Small size of the study.
Jamal et al. (2002)	<ul style="list-style-type: none"> • Among farmers who dipped sheep, 18% reported neuropathy compared to .5% of the general population. 	<ul style="list-style-type: none"> • Limited amount of participants for the study.
Pilkington et al. (2001)	<ul style="list-style-type: none"> • 19% of sheep dippers reported neurological symptoms compared to 11% of farmers and 5% of ceramic workers. 	<ul style="list-style-type: none"> • Limited amount of participants for the study.
Solomon et al. (2007)	<ul style="list-style-type: none"> • Famers who use sheep dip & pesticide handlers have more neurological symptoms. 	<ul style="list-style-type: none"> • Low response rate to questionnaire. • Error in the recall of past exposures and/or specific chemicals.
Sunwook et al. (2016)	<ul style="list-style-type: none"> • Exposure affects somatosensory, vestibular systems, and central processing of sensory information for postural control. 	<ul style="list-style-type: none"> • Level of exposure limited to self-reporting. • No control group.

Nursing Implications

Implication for Practice:

- Farmers should be made aware of the health effects and outcomes of pesticide exposure.
- NPs and RNs should know about pesticide exposure risk.

Implication for Education:

- Farmers should learn about proper PPE use & handling of pesticides.

Implication for Policy:

- Require farmer training & certification in order to purchase pesticides.

Implication for Research:

- Further research needed with larger sample sizes.

Take Action



Prevent Exposure

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