

Effects of Pesticides on Human Health: A Review Study

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Abstract: Pesticides are meant to kill pest, but many pesticides can also pose risks to health. A pesticide is a chemical or biological agent such as a virus, bacteria, antimicrobial agents or disinfectant that deters, incapacitates and kills pests. It is commonly used to eliminate or control variety of agricultural pests that can damage crops and livestock and reduce farm productivity. Pesticides have proved to be a boon for the farmers as well as people all around the world by increasing agricultural yield. To determine risks, one must consider both the toxicity and hazard of the pesticide and the likelihood of exposure. A low level of exposure to a very toxic pesticide may be no more dangerous than a high level of exposure to a relatively low toxicity pesticide. The health effects of pesticides depend on the type of pesticide, some chemicals such as the organophosphates and carbamates affect the nervous system, while others may irritate the skin or eyes. Some pesticides may be cancer causing but others can affect the hormone or endocrine system in the body. The label of product contains specific instructions which should be followed to prevent toxicity caused by pesticides. As widely used agricultural chemicals, pesticides are leading cause of air, water and soil pollution. They are also significant risk factor for various human diseases as well as long-lasting effect on environment.

Key Words: pesticides, health effects, environment, agricultural practices.

1. INTRODUCTION:

Pesticides represent widely used chemical substances in agriculture to increase yield and quality by controlling pests and pest-related diseases. The widespread use of pesticides is a major cause of air, water and soil pollution. Because of inherent toxicity and widespread use, pesticides are considered as a significant risk factor and serious threat to human health and environment. Several studies frequently show associations between pesticides exposure and their health effects. Children are the most vulnerable group because of age related potential pesticide exposure risk due to their small body mass [1]. Pesticides are the only toxic substances released intentionally into our environment to kill harmful organism. This includes substances that kill weeds (herbicides), insects (insecticides), fungus (fungicides), rodents (rodenticides) and others. Pesticides are used in schools, parks and public lands. Pesticides are sprayed on agricultural fields and wood lots. Pesticides can be found in air, food, soil, water and even in the breast milk. Because people use pesticides to kill, prevent, repel or in some way adversely affect some living pests, the pesticides by nature are toxic and cause serious ill effects on health. Even the least-toxic products and those that are natural or organic, can cause health problems if someone is exposed to enough amounts of these pesticides [2, 3].

2. PESTICIDES AND ITS HEALTH EFFECTS:

Pesticides have been linked to a wide variety of human health hazards varying from short-term effects such as headaches and nausea to chronic abnormalities like cancer, in reproductive and endocrine system respectively. Pesticides can cause different types of cancer in humans most prevalent forms include leukemia, non-Hodgkin's lymphoma, brain, bone, breast, ovarian, prostate, testicular and liver cancers. Acute conditions such as nerve, skin and eye irritation, headaches, dizziness, nausea, fatigue, and systemic poisoning can sometimes be dramatic and occasionally fatal. Chronic health effects may occur years after even minimal exposure to pesticides in the environment or from pesticide residues which are ingested through food and water [4]. Study conducted by researchers found a six fold increase in risk factor for autism spectrum disorders for children of women who are exposed to chlorine pesticides. another study published found that children who live in homes where their parents use pesticides are twice as likely to develop brain cancer versus those that live in residences in which no pesticides are used. There is also evidence that exposure to pesticides effects the endocrine system causing changes with the complex regulation of hormones, the reproductive system and embryonic development. Endocrine abnormalities can lead to infertility, birth defects and developmental defects in offspring including hormonal imbalance and incomplete sexual development, impaired brain development and behavioral disorders. eg ddt, lindane, atrazine, carbonyl, parathion are some of known endocrine disrupting chemicals present in large quantities in environment. A multiple chemical sensitivity is a medical condition characterized by body's inability to tolerate relatively low exposure to chemicals and condition is referred to as environmental illness, which is triggered by exposure to certain chemicals or

environmental pollutants. A study shows that DDT was the most popular and effective pesticide to help people combat unwanted organisms and gain dramatic improvement in agriculture. DDT is the lead cause of many kinds of cancer, acute and persistent injury to the nervous system, lung damage, and injury to the reproductive organs, dysfunction of the immune system, endocrine system and birth defects in human beings [5]. Organophosphate pesticides have increased in application because of less persistent nature and harmful for environment than organochlorine pesticides also associated with acute health problems, such as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin and eye problems. There have been many studies intending to establish cancer – pesticides association. Organophosphate pesticides used in the vegetables get deposit into human body causing cancer gradually [6]. The variety of these symptoms can be dizzying, including cardiovascular problems, depression to muscles and joint pains [7, 8]. It has been reported that farmers do not use the safety masks, gloves and other protective gears during the spraying of pesticides which results into the access of pesticides in the blood stream through inhalation or through dermal exposure that can adversely affect their eyes, skin and the respiratory system. the 18 months exposed spray farmers reported maximum acute signs and symptoms like burning of eyes (18.42%), blurred vision (23.68%), skin redness/itching (50%), excessive sweating/shortness of breath (34.2%), dry sore throat (21.05%) and burning of nose (28.9%). there is need for creating more awareness among the farm sprayers and authorities in implementing and ensuring the use of protective gear while handling pesticides [9].

3. GENERAL SYMPTOMS OF PESTICIDE POISONING :

Some health effects from pesticide exposure may occur immediately, some symptoms may occur several hours after exposure and other effects may not be noticed for years e.g. cancer. People come into contact with pesticides in many ways, including when pesticides are used in and around homes and gardens, used on pets or on the food eaten while working with pesticides that is used in communities or environment. The risk of health problems depends not only on pesticide ingredients, but also on the amount of exposure to the product. In addition, most vulnerable groups to the effects of pesticides are children, pregnant and lactating women and sick or aging populations [4].

MILD POISONING

Mild symptoms of pesticides poisoning may be irritation of the nose, throat, eyes or skin, headache, dizziness, loss of appetite, thirst, nausea, diarrhoea, sweating, weakness, fatigue, restlessness, nervousness, changes in mood and insomnia.

MODERATE POISONING

Moderate symptoms include like vomiting, excessive salivation, coughing, feeling of constriction in throat and chest, abdominal cramps, blurring of vision, rapid pulse, excessive perspiration, profound weakness, trembling and muscular in-coordination and delirium.

SEVERE POISONING

In this category, symptoms include inability to breathe, extra phlegm or mucous in the airways, small or pinpoint pupils, chemical burns on the skin, increased rate of breathing, loss of reflexes, uncontrollable muscular twitching, unconsciousness and death.

Some symptoms of pesticides exposure may go away as soon as the exposure stops and others may take some time to go away. For people exposed to pesticides on a regular basis, long-term health effects are a concern. Women who are pregnant or breast-feeding should check with their doctors before working with pesticides as some pesticides may be harmful to the fetus (unborn baby) or to breast-fed infants [10].

4. EFFECT OF PESTICIDE EXPOSURE ON REPRODUCTIVE HEALTH :

Matching pesticide data and medical records a study reported that pregnant women living within nine miles of farms where pesticides are sprayed have an increased risk of losing an unborn baby to birth defects. Parallel to these results it has been found positive relationship between pesticide and under age 5 mortality rate [1]. Effects of occupational exposure on the reproductive system of men and women may cause alterations in sex hormone levels, diminished libido and potency, menstrual disorders like early menopause, delayed menarche, ovarian dysfunction and impairment of semen quality and reduced male / female fertility. Toxic exposures can causes direct cell damage in the developing sperm and eggs. Maternal exposure during pregnancy may disturb fetal development by either directly or indirectly interfering with maternal, placental, or fetal membrane functions. Toxic exposures can induce many wide-ranging effects e.g. fetal death, intrauterine growth retardation, preterm birth, birth defect, postnatal death, disturbances in cognitive development and changes in immunological sensitivity or childhood cancer. The mother's exposure at work to chemicals may also cause contamination of breast milk. Exposure to pesticides may also increase the risk of birth defects, miscarriage or fetal death [11]

5. EFFECT OF PESTICIDE EXPOSURE ON CARDIOVASCULAR SYSTEM

Cardiovascular diseases (CVD) are the main cause of death worldwide. Along with other medical risk factors, environmental pollutants should also be considered as important risk factors for cvd. Dyslipidemia, hypertension, diabetes mellitus and unhealthy lifestyle such as smoking, sedentary lifestyle and high cholesterol dietary intake have been highlighted as established predictors of cardiovascular disease [12]. The epidemiologic evidence supports an association of pesticide exposure with cardiovascular disease (CVD) and cerebrovascular disease. There were eight studies that showed the long-term effects of chronic low dose exposure to pesticides. Three of them shows that the association of pesticide exposure and myocardial infarction [13, 14]. Overall, there was no significant association or little evidence of increased risk of MI mortality or nonfatal MI with the occupational use of pesticides [15].

6. EFFECT OF PESTICIDE EXPOSURE ON RESPIRATORY SYSTEM:

It was reported that there is an important risk of lung cancer among women exposed to pesticides at work. A positive link has also been found between pesticides exposure and breast or prostate cancers. An additional risk of lung cancer was stated among vineyard workers exposed to arsenic-based pesticides. Pesticides exposure may be a risk factor for asthma among agricultural workers [16]. A recent review of the literature on the link between asthma and exposure to pesticides focused on studies of the path physiological mechanisms. According to this study, the main mechanism lies in the neurogenic inflammation induced by contact with pesticides in agricultural populations. In the case of asthma induced by organophosphates, the problem seems to be a dysfunction in muscarinic M2 receptors, which are normally used to limit the release of acetylcholine esterase by parasympathetic fibers [17]. Allergic asthma was associated with pesticide use on crops (grassland and vineyard) and pesticide poisoning, no allergic asthma was associated with pesticide use on beets [18] and chronic bronchitis was associated with pesticide poisoning for those without healthcare [19]. Occupational exposure to pesticides occurs directly during manufacture of the product, during transport, storage, during preparation and spreading by the user, but also during re-entry into treated fields, harvest and equipment cleaning. In agriculture, most pesticides enter the body dermally, followed by respiratory and oral routes. Pesticide inhalation mainly occurs during fumigation, mixture preparation or application in closed environments (greenhouses and manufacturing plants). Occupational exposure of farmers, farm workers and pesticide manufacturing industry workers might be the most significant along with para-occupational and residential exposure [20, 21].

7. CONCLUSION:

Pesticides are intended to kill organisms that cause disease and threaten public health, control insects, fungus and weeds that damage crops, control pests that damage homes and structures which are vital to public safety. Pesticides have been reported to cause several adverse health effects which depend on the extent and duration of exposure. Side effects of pesticides vary from mild allergies, rashes, breathing difficulties, neurotoxicity, reproductive abnormalities to deadly chronic diseases like cancer. Children are at greater risk from exposure to pesticides because of their small size than adults and effected in womb too due to maternal exposure. Pesticide exposure increases risk to human health across a range of exposure situations and vulnerable populations. This review suggests that pesticide exposure is associated with increased risk of cardiovascular and cerebrovascular mortality.

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