Journal of Pharmaceutical Research International

33(60B): 3085-3089, 2021; Article no.JPRI.81324
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Farmers' Exposure to Pesticides –A Review

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i60B34981

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/81324

Review Article

Received 21 October 2021
Accepted 25 December 2021
Published 27 December 2021

ABSTRACT

When applying synthetic pesticides to crops, it is essential to use them sparingly to avoid complete crop damage. Many studies have found that the use of pesticides by farmers is associated with higher levels of pesticide exposure than that experienced by the general population. Whenever pesticides are sprayed on crops, the primary targets of the poisons are the farmers who are sprayed. On the other hand, farmers may come into touch with pesticides that are not directly relevant to their field of work. According to the American Chemical Society, handling pesticides or coming into close contact with chemical residues can be particularly hazardous for persons exposed to these chemicals on a regular basis. The possibility of making an inaccurate judgment call while dealing with this type of contact exists. A wide variety of routes, including the lungs and skin, regularly introduce pesticides into the body. Regular pesticide handling exposes the face and hands to a high level of pesticide exposure, which is why it is vital to wear protective equipment when handling pesticides. According to the Environmental Protection Agency, farmers can decrease their exposure to pesticides by wearing personal protective equipment (PPE) during all steps of the pesticide handling process. Using personal protective equipment (PPE) can assist farmers in reducing their pesticide consumption (PPE).
Drift, agricultural labor, and direct spray contact, to mention a few terms, are used to characterize the scenario in this context.

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Keywords: Agricultural task; weedicides; contact; occupational hazard.

1. INTRODUCTION

1.1 A Summary of the Most Significant Points

Environmental pollution has been a source of heated debate for quite some time, and with good cause.

The term "agricultural chemical agents" refers to compounds or substances used in agricultural and public health programmes to protect plants against pesticides, weeds, and illnesses and protect people from diseases caused by mediators such as malaria, dengue fever, and schizophrenia. In some cases, these compounds or substances are also referred to as "agricultural chemicals." Other than farming areas, such as public parks and sports fields, the usage of these goods, including their improvement and maintenance, may be beneficial in some instances. These chemicals are also utilised in less well-known applications such as eradicating or preventing the existence of undesired species, which are not widely known. Among other things, pet shampoos [1,2], construction materials, and boat flooring are examples of the applications for this substance [3]. According to the World Health Organization, chemicals and other foreign compounds in the air that has the potential to harm human health, such as pesticides and other foreign substances, can have an immediate impact on human health. While the presence of other pollutants builds up over time in the environment and the person, the existence of these pollutants might cause illness years after the initial exposure. There is the potential for many pesticides to build up in the body, resulting in long-term and chronic harm to humans and animals. One possible explanation is that people are exposed to pesticides on an ongoing basis due to avariousthings such as their way of life, their employment, their dietary choices, and their smoking habits. Identifying the precise ramifications of a disease is a challenging undertaking in and of itself. It is important to demonstrate a causal relationship between exposure and illness [4]. Governments must rely on chemicals to achieve economic growth and development objectives. On the other hand, their incorrect and indiscriminate usage may be detrimental to human health and the environment [2,3,5]. Many people are exposed to pesticides as a result of their employment, due to the widespread availability of pesticides [2,3,5]. When it comes to pesticide residues in food and drinking water and pesticides in the environment, the general public's diet is more likely to be discovered than when it comes to the diet of members of the scientific community [6]. Pesticide exposure is higher in the agricultural industry than in the general population, with farmers and trained pesticide applicators being the most vulnerable groups.

An extensive amount of investigation into the effects of weedkiller exposure has been conducted. The vast majority of studies are conducted on agricultural workers who are registered pesticide applicators rather than the general public. It is considered that pesticide exposure among agricultural workers is rare and that the vast majority of farmers are not directly exposed to potentially hazardous chemicals, contrary to what was previously thought. toxicity of pesticides, and the potential for harm caused by them (dangers).

When discussing the safety of pesticides, the terms "pesticide toxicity" and "pesticide risk" are sometimes used interchangeably. Material toxicity is a term used to describe the essentially harmful properties of a substance. It can be characterized in the following ways: [7]. In every case, regardless of the drug's toxicity, the risk (or hazard) is determined by the possibility of the exhibition while the item is in operation. If we are talking about pesticide safety and protection, the phrases toxicology and risk are two terms distinct from one another. When a chemical is studied in isolation, the intrinsic potential for harm associated with the molecule is referred to as "toxicity" [7]. To measure the risk (or riskiness) connected with a given chemical (or its riskiness), just the possibility of being exposed to that chemical (or its riskiness) may be considered, not the toxicity of the substance. It is the ability of a chemical to produce sickness or death that is discussed in toxicology; on the other hand, risk is the likelihood that a chemical's interaction with other chemicals would result in illness or death as a result of that interaction in risk. A variety of methods are used to assess pesticide hazard levels, including testing to determine the toxicity of a component and the amount and kind of exposure [8,9].

When the factors of toxicity and exposure are combined, there is a significant cause for

concern. Misusing weedicides might result in serious health consequences for the user's family and friends. Pesticides produce internal organ or system damage in the case of poisoning, whereas external irritants are the source of injury in the case of abrasion. Acute pesticide exposure can cause mild skin irritation and other allergic reactions in some persons, while others may have severe skin irritation and other allergic reactions. On the other hand, others may experience severe headaches and dizziness as a result of long-term pesticide exposure. Several pesticides, such as organic phosphates such as organic phosphate, have the potential to have lethal consequences; as a result, it is critical to assess the hazards associated with these chemicals. There are three main kinds of toxicity associated with pesticide exposure in humans: the type of exposure, the route of exposure, and the body system that has been affected by the chemical [10-12].

2. THE TOXICITY OF A CHEMICAL IS CLASSIFIED ACCORDING TO THE METHOD BY WHICH THE MATERIAL WAS EXPOSED

It is possible to categorize pesticide-related toxicities into three groups based on the amount of time spent being exposed to a pesticide and the frequency with which toxicity symptoms reveal themselves. Toxicities caused by pesticides in humans can be classified into three groups based on the amount of time that an individual has been exposed to a substance and the onset of symptoms: Because of the acute poisoning that might follow from exposure to a single dose of pesticide after receiving it, an agricultural worker will experience acute poisoning. It is defined as a skin contact event that occurs within a short time when it comes to acute skin exposure events, whereas it is defined as a toxic skin event that occurs within a short period when it comes to an acute skin toxic event. In contrast to acute oral disclosure, acute inhalation disclosure refers to administering the same dose of pesticide through the mouth as an acute oral disclosure. Acute toxic effects occur within 24 hours of contact with a toxicant or chemical and are distinguished from chronic toxic effects (also known as acute toxic effects). Some active substances, even in tiny doses, can be lethal when consumed in large quantities. It is possible to evaluate the acute toxicity by carefully reading the warnings given on the product label.

3. DEPENDING ON THE METHOD OF ENTRY, THE 4TH CLASSIFICATION OF TOXIC SUBSTANCES IS USED

Humans are most commonly exposed to pesticides through the skin, the mouth (swallowing), and the lungs, which are all common entry points for pesticides. Pesticides are more likely to enter the body if they are solid, liquid, or gaseous rather than if they are not solid-liquid or gaseous [8]. While solid materials are less likely than liquids and gases to enter the respiratory system, liquids and gases are more likely than solid materials to do so. When pesticide solids are small enough and remain on the skin for an extended period, they may be able to enter the body in the same way as liquids or gaseous substances do. When it comes to the general public, pesticide poisoning that is transferred through the skin is the most common distribution mode [7]. While handling a pesticide, the pesticide may be absorbed through the skin due to splattering or spitting on the skin (mixing, loading, or disposal). A significant amount of residue may be exposed to the skin, with the risk that some residues will be absorbed into the skin. Various elements influ pesticide absorption via the skin, including the toxicity of the pesticide and the length of time the skin has been exposed to it, the chemical makeup of the pesticide, and the area where it has been sprayed,ence among others [9]. In contrast to liquid pesticides, powder, dust, and granular insecticides do not contaminate the skin or other tissues of the human body, as opposed to liquid pesticides that do so.

If you compare organic solvent and oil-based pesticides to dry pesticides, organic solvent and oil-based pesticides are absorbed into the body more quickly. For example, the high concentration of potentially dangerous substances found in emulsifiable concentrates makes it easier for the chemicals present in the solution to be absorbed via the skin, resulting in increased toxicity. Pesticide absorption is more likely to occur in some parts of the body than it is in other parts of the body in specific situations. Oral pesticide use can have significant health consequences, including disease, injury, and death, for those who do so. Pesticide consumption should be avoided at all costs [7]. It is possible for individuals who do not wash their hands before eating or smoking to unintentionally swallow these poisons, which can lead to oral illnesses if they are not sufficiently cleansed.

In rural parts of developing countries, pesticide poisoning deaths increase, exacerbating the problem of suicides in these areas, which is prevalent in these areas. Among other things, pesticide residues can be found in various foods, including prepared meals, light meals, and animal feed. Also important to remember is that cleaning with soap and water alone will not altogether remove the residue [4]. There are very few instances where safety regulations are not adhered to to the letter of the law. However, safeguards vastly underestimate the underlying health risk, particularly in the case of simultaneous exposure to two or more real-world chemicals that, in real-world conditions, may have synergistic effects on one another. There is a risk that something similar to this will happen again in the future. According to the researchers, the presence of pesticides in human breast milk samples has sparked concerns about the risk of prenatal exposure and the health of future generations as a result of the findings.

Inhaling pesticides can have significant health repercussions, including damage to the nose, throat, and lungs, among other things. Pesticides should never be inhaled. It is more likely that pesticides will be inhaled when this method is employed since pesticides are easily absorbed when this method is utilized. Consider using a respirator and wearing respiratory protection when working or playing if you have difficulty breathing.

If pesticides contact the eyes, they can cause immediate eye injury, blindness, or even death if the eyes are not protected. If the chemical comes into contact with the eyes, it can be fatal. When working with potentially hazardous substances, you always recommend that you use eye protection to preserve your vision. In the event of contact with diluted sprays or dust, the use of eye protection is recommended as a precautionary measure in the event of contact. Because the minuscule particles are so massive and heavy, they pose a significant threat to the eyes' optic nerve health. When particle treatments are carried out with power tools, particles can bounce off plants and cause injury or poisoning to the applicator's eyes or hands due to the bouncing (e.g. eyes).

Consequently, if the pesticide comes into contact with one's eyes, one must immediately put on protective goggles to avoid further damage.

4. REDUCING THE NUMBER OF PESTICIDES TO WHICH PEOPLE ARE EXPOSED

If you have not pesticide-resistant plants, it may be possible to replace them with plants that require fewer pesticides under specific circumstances.

It is critical to move to alternative farming practices that are less reliant on pesticides to keep pesticide exposure to a bare minimum. Alternative agricultural practices are becoming increasingly popular among people. The environmental plant protection measures that are already in place may need to be emphasized even more to achieve this goal. Cropping systems can be made more productive by optimizing the use of natural processes, boosting the creation of antagonists, enhancing system diversity, and encouraging the reuse of internal resources, among other strategies. Non-chemical pheromones can improve disease and pest control, organic matter management, and agricultural tillage tactics, to mention a few potential applications. The implementation of these technologies can also aid in the improvement of other aspects of crop development, such as the ability of crops to retain a healthy state, which increases their resistance to disease and pest infestation. Tactics used to increase resistance include selecting plants that are better able to fend off weeds or diseases, such as those that are more resistant to late blight, and boosting the attack or damage thresholds of sensitive plants among other things [11-12].

5. OUT OF EVERY 100 CASES INVOLVE THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) (PPE)

PPE (personal protective equipment) is available to pesticide workers in various configurations to keep their skin exposed to pesticides and other chemicals while on the job (PPE). Gloves, boots, helmets, long-sleeved shirts, and chemical-resistant coveralls are just a few examples of the sorts of personal protection equipment that workers frequently wear in the workplace. It is ultimately decided by the toxicity of the pesticide used, the environmental conditions under which it is employed, and the personal preferences of farm employees that they choose to use as personal protection equipment (PPE) on their farms. Personal protective equipment such as gloves and shoes are essential (PPE) when it comes to the vast majority of pesticide

chemicals. Individual protective equipment (PPE) should be worn when dealing with highly hazardous pesticides to ensure that you are only exposed to the minimum amount of toxic substances.

6. CONCLUSION

As per Environmental Protection Agency, farmers can decrease their exposure to pesticides by wearing personal protective equipment (PPE) during all steps of the pesticide handling process. Using personal protective equipment (PPE) can assist farmers in reducing their pesticide consumption (PPE).

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/81324