



Pesticide Contamination in Potable Water and its Health Effects on Pregnant Women

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ABSTRACT

Pesticides are the chemical used for the protection of crops from the pests. pesticides have significant effect on agricultural economic by increasing the production as well as yield and also inhibit the vector-borne diseases, but the excess and an inadequate use generate unfavorable conditions for environment and produce pollution (water, air and soil). Pesticide pollution in water bodies is one of the major issues. Pesticides through water easily get involved in food chain. Pesticide contamination in water and its effect on pregnant women is discussed in the given review.

1) INTRODUCTION

Pesticides are defined as chemical substances, which are employed to kill pests. Pests are the organisms which deteriorate the quality of the crops in the field some time it damages all the standing crop. In this manner it also affects the economy adversely. Thus, the chemicals used to regulate the pest population are considered as the pesticides. Some pesticides are naturally derived, such as plant extracts, while most are man-made chemicals. The extensive use of anthropogenic pesticides began in the 1940s when production rapidly grew and spread throughout the world. Pesticides are credited as part of the "green revolution" in India which raised agricultural productivity and yields. The pesticides are characterized as Herbicides, Insecticides, Fungicides, Rodenticides, Molluscicides, Nematocides, in order to control weeds and pests in crops. In Indian scenario the concentration of pesticides residue was observed higher in Yamuna river Delhi, Ganga river at Bhagalpur and Allahabad [1]. Kanchana et. al., [2] in their study of pesticide residues at Mysore city India, reported that concentration of pesticide residue found higher than USEPA specifies upper limit of 0.6 µg/l for phthalates in water. Yadav et al., [3] discuss the health impact of persistent organic pesticides, in India and its neighbouring countries and found that the concentrations of pesticide are higher. Modern agricultural practices need pesticide to fulfil the food demand of increasing population which results in contamination of the environment. In India, after the introduction of Green revolution there is increasing of crop production was noted up to 100% whereas, there is only 20% of land use is increase for the crop production. Pesticides play an important role in achieving the maximum crop production but maximum usage and accumulation of pesticide residues is highly harmful to aquatic and another ecosystem.

2) PESTICIDE CONTAMINATION IN WATER

Pesticides are used at the crop lands and mix with the irrigation water which in turn leach through the soil or flow to the

nearest water reservoir and degrade the natural water properties. During monsoon season enrichment of agriculture compound (fertilizers and pesticide) was noted dense [4] Water is essential for life, it is impossible for living being to survive without it. The major part of water on earth is marine water, which cannot be used of humans without processing. Water arise from ground water is chiefly used for the portable purpose. Pesticides are often used in lawns and sceneries, playgrounds, parks, homes, schools' gardens, fields and farms. The pesticides then overflow or get mixed into surface water or pass through soil by leaching into groundwater. The pesticide contaminated water makes its way through drains, get mixed into water bodies. Pesticides pollutes drinking water can lead to cancer, reproductive system failures, birth problems, genetic disorder to unborn babies and pregnant women, nervous and immune system disorders [5]. Water is the most important factor for feasible agriculture as it plays an important role in sustainability of all life forms. Also, through direct contact pesticides can get into our body in several ways, through breathing, ingest them by eating, or they penetrate through our skin.

4) ACUTE TOXICITY

Acute toxicity is the ability of a substance to cause harmful effects which develop rapidly following exposure, i.e. few hours or a day [6]. There is a great range in the toxicity of pesticides to humans. The relative hazard of a pesticide is dependent upon the toxicity of the pesticide, the dose and the length of time exposed. Human exposure to pesticide may lead to acute pesticide poisoning resulting in fatigue, headaches and body aches, skin uneasiness, skin rashes, poor concentration, weakness, circulatory problems, unsteadiness, nausea, vomiting, excessive sweating, impaired vision, shivering, panic attacks, cramps, etc., and in severe cases it leads to coma and death [7].

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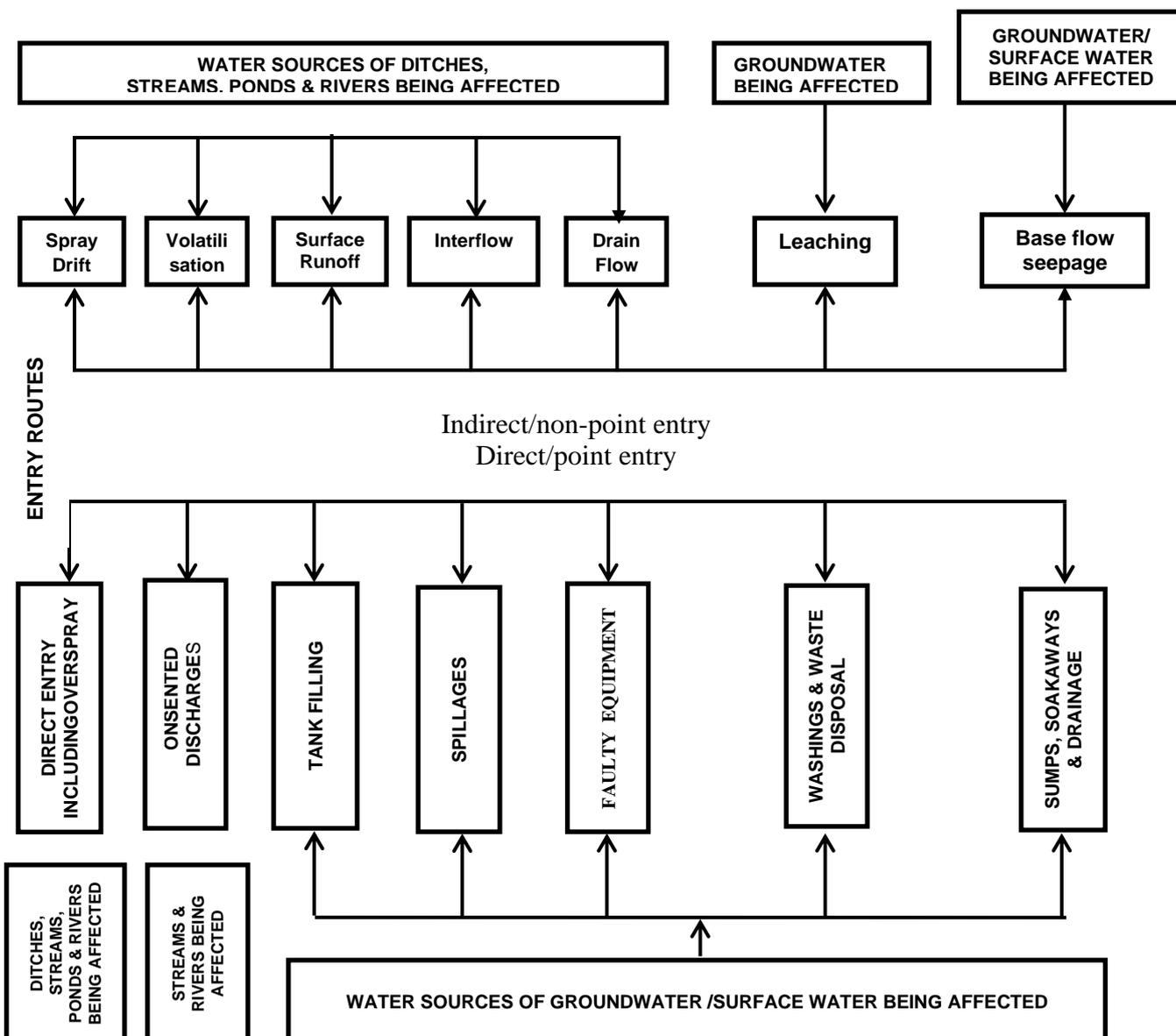


Figure 1 A model showing pesticides entering waters via diffuse and point pathway

Source: [5]

3) HEALTH EFFECTS OF PESTICIDES

Table 1 Commonly Used Pesticides and their Health Effect

Pesticides	Common Use	Health Effects
2,4-D	Lawns	Cancer, Endocrine disruption, Reproductive effects, Neurotoxicity, Kidney/liver damage, Sensitizer/Irritant, Birth/Developmental defects
Dicamba	Lawns/Farms	Reproductive effects , Neurotoxicity, Kidney/Liver damage, Sensitizer/Irritant, Birth/Developmental defects
Fipronil	Indoor/Out door Baits, Pet care	Cancer, Endocrine disruption, Neurotoxicity, Kidney /liver damage, Sensitizer/Irritant
Glyphosate	Lawns/Outdoor/Farms	Cancer, Reproductive effects, Neurotoxicity, Kidney/Liver damage, Sensitizer/Irritant
Permethrin	Mosquitoes/headlice/ Garden	Cancer , Endocrine disruption , Reproductive effects , Neurotoxicity , Kidney/Liver damage , Sensitizer/Irritant

Source- [6]

5) CHRONIC HEALTH EFFECTS

Chronic toxicity is the ability of a substance to cause adverse health effects resulting from long-term exposure to a substance. Continue consumption of pesticide contaminated water can pose severe health threats to regular contact person. Long-term pesticide exposure was found to be associated with increased abnormality of nerve conductions, especially in sensory nerves. It also affects a wide range of health indicators based on blood tests and decrease the tibial nerve compound muscle action potential amplitudes and acute illness if the exposure is over a longer period, even if the quantities taken up are comparatively small [8]. Pesticides that are commonly used today have been classified on the basis of animal testing as possibly carcinogenic for humans.

6) HEALTH EFFECTS OF PESTICIDES ON PREGNANT WOMENS AND CHILDRENS

All pesticides have some level of toxicity and have some risk during pregnancy. The risk depends on the toxicity level of the pesticide ingredients and how much of the pesticide exposed to the pregnant women [9]. Pesticide exposure during pregnancy has an increased chance of childhood cancer to the new born. Researchers have accepted that pesticides in maternal blood can cross the placenta and produce fatal exposures [10]. During pregnancy, the baby's brain, nervous system, and organs are developing rapidly and are more sensitive to the toxic effects of pesticides. That's why, it is important to minimize exposure to pesticides during pregnancy [11]. The prenatal exposure to organo chlorine pesticides is related with a range of harmful consequences [9], skin contact, inhalation and food chain are the main routes for the retention of pesticides into the human body. Pesticide exposure increases the risk of some non-cancer health effects i.e. neurologic, reproductive, and genotoxic effects. Pregnant women's are more prone to pesticides and its consequence are altered growth, low birth weight, foetus death and other reproductive problems can cause due to the pesticide exposure [12]. Developmental diseases, such as birth defects, growth restriction, functional alterations and preterm delivery, account for more than 25% infant mortality rate [11]. Outcomes of pesticide exposure during pregnancy were preterm birth, hypertension or preeclampsia [13]. Miscarriage, delayed growth of foetus, birth defects and increased risk for certain illnesses in the new born [14]. Although the amount, timing and length of pesticide exposure mark the impact in some cases even low levels of exposure can put the foetus at risk [15]. Due to differences in physiology behaviour, children are more influenced to environmental threat than adult. Children have negative effects of pesticides because of developmental, dietary, and physiologic factors. Exposure occurs through ingestion, inhalation, or dermal contact. Accidental ingestion by children may be at a remarkably higher dose than an adult because of the greater intake of food or fluids per pound of body weight. Children show frequent hand-to-mouth activity, and this is an important source of increased exposure in comparison with adults [16]. A generous amount of observational epidemiological data determines a link between pesticide exposure and childhood cancer, however, the evidence includes studies that found no combination between childhood cancers and pesticides or few combinations that cannot be ruled out as a chance finding. Overall, the existing literature shows an association of

pesticides with leukaemia, brain tumour, and neurobehavioral effects [17].

7) CONCLUSION

Pesticides are widely and commonly used for controlling pests in agricultural practices due to its easily availability and low cost. Pesticides have contaminated almost of our environment mostly ground water through the leaching process of agriculture residue worldwide, Pesticide cause significant risks to the environment and non-target organisms especially pregnant women and their new fetus. It is necessary to reduce the use of pesticide in agricultural practices as were as their household use and encourage the people for its best alternative uses. To decrease over revelation of population from extensive environmental contamination by pesticide residue, to control the applications and current agricultural, industrial, and household, environment and in the foods [18].

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