

Review the impacts of pesticides on the environmental health and human Health

Saphia Al Aitte

Community Health Department, Health and Medical Technical College ,Southern Technical University, Basra –Iraq

Abstract: The aquatic environment is affected by pesticides toxins through the drainage irrigation water contamination with pesticides .The affects the water quality and becomes an unsuitable environment for aquatic organisms to live .Those workers in the fields of plant and environment protection from agricultural pestes and disease-carrying insects are exposed to the hazards of phosphorous and chlorinated pesticides , where the health of farmers who work in pesticide spraying is affected including breathing ,loss of memory and blood variables , in addition to its effect on pregnant and fetuses .

Key word: pesticides, occupational health, pregnant, farmers, organ phosphorus

1. INTRODUCTION

pesticide: Any single chemical substance or any mixture of a group of substances whose purpose is to prevent, eliminate or reduce the incidence of any pest, including disease vectors to humans, animals, or plants, or those that lead to harm during production. Food, agricultural products and fodder, or during their manufacture, transportation, storage and marketing. A pesticide also means any chemical used to regulate plant growth, to drop its leaves, to dry it, to lighten the heavy load of fruit trees, or to prevent fruits from falling before full maturity. The pesticide is an chemicals substance that works to combat agricultural pests and diseases , as it is widely used in combating the most common pests, as well as control of microbes , rodents, fungi and parasites(, and also used in homes to kill harmful insects such as oenophiles , mosquitoes and bed bugs, thus the benefit of pesticides lies in the reduction of starvation. [1],The technological development contributed to the revitalization of agricultural and the search for abundance of production in the shortage of food as results of increase in population growth and the protection of food quality and the urgent need for the spread of diseases transmitted by insects and rodent , it confirmed by scientific development in the discovery and manufactured of many chemicals and a decrease in mortality sickness cases was noted [2])It is worth noting that the benefits of pesticide are not continue without harm , caution must be taken with regard to human and animal health and the environment.as for their harm , lie the toxicity . [3]When man discovered chemical pesticides one after the other, his discoveries were the result of necessity. Need as it is said is the mother of invention, and the hope was that these pesticides would be a solution to a problem that plagued him, which is the problem of pests of all kinds and their different families, and it did not occur to him at the time that this amazing solution in its initial results would become One day, a stand-alone problem that needs to be solved. There is no doubt that the discovery and use of pesticides later was necessary to confront the threat of pests that have emerged and whose damage has intensified over the years on dense crops, the speed of transportation, the large number of commercial exchanges and the accompanying

transmission of these pests to new environments, as well as a result of the massive expansion of the cultivated areas, and the succession of cultivation. The crops themselves are in a specific land. Rather, the damage caused by pests goes beyond human food, needs and livestock to reach itself, due to its transmission of epidemics and dangerous diseases. The use of chemical pesticides has been able to achieve impressive results in stopping many diseases, by eliminating their causes and stopping their flow or spread in many places in the world such as typhus, malaria, scabies and many others. The reality was not the size of the hopes [4]. It is important for all of us to know that no pesticide is completely free from danger to humans and the environment. Rather, danger is a common factor between the various types of pesticides, no matter how diverse their chemical groups, or their physical characteristics, or their trade names and common names, or their multiple areas of use, except the degree of risk remains a relative matter, intensifying in some and decreasing in others, but it does not disappear in any case.

Classification of pesticides

Pesticides are classified according to the origin of their preparation into two main categories.

- 1- Chemical pesticides, including organic and inorganic pesticides.
- 2- Bio-pesticides extracted from natural origins, including microbial pesticides, other pesticides extracted from animals and plant origin

Classification according to the manners of the affecting pests, pesticides is divided in two types: -Non – Systematic pesticides, which are that, remain on the surface of the treated plant and don't penetrate its tissues and work to protect it from infection upon contact with the target pest. Systematic pesticides, which are effectively penetrate the plant tissues and move through the plant vessels, which kill pests that feed on the juice. Others decompose after a period of time and disappear their effect of the few are transformed into compounds that are more toxic to the pest by the action on enzyme [5] [6]

Classification by degree of toxicity

Toxicity of pesticides means the damage or harmful effect that a certain substance causes on the body of a living organism. and depends on the period of exposure to the dose, Where the short –term exposure is called of acute of exposure or acute effects that takes a short time and also the acute effects is called the ability of substance toxicity to cause damage in a short –period to human and animals ..The exposure period is also considered measure of the poison to which human exposed. The LD50 measurement is tasted statically as it kills 50% of experimental animals and the depend on what entered from the pesticide through sure the food chain to digestion and others, .As far from chronic exposure, it is called long term of exposure, which pressed as sub –lethal effects are the results of bioaccumulation, as it includes the study of tissue changes, the reproduction system and the blood parameters with the phenomenon of due to the presences of Magnification [7], thus and this what many authors wrote about. It is divided into three levels according to the number of times of exposure and the period of exposure to acute toxicity. Under the chronic toxic acute, the human being is considered the first victim of the pollution of the environment and food with pesticides because they It affects the central and reproductive nervous system and causes severe disruption in the development of fetuses and birth defects. It affects the work of the endocrine glands and the metabolism of vertebrate sex hormones, just as the chronic exposure, [8]

Physical forms of pesticides

Often the active substances cannot be used independently and directly in the field or anywhere else to eliminate the pests spread in it, so, through the manufacturing stages of the pesticide, other substances are added to this active substance, which are often inert and

chemically free, as mentioned above, in order to obtain In a simplified physical form that is easy to circulate in practical application and direct use, this physical state in which the pesticide appears is called the “Pesticide Formulation”[9]Note that the formula of the pesticide or its physical state in which it appears and should be manufactured, depends on the toxicity of the active ingredient and the degree of its impact, according to which the carrier medium - chemically inert - is added to the active substance, as well as some organic solvents to ensure the dissolution of the active substance and obtaining a consistency The pesticide is homogeneous, and other factors may be added that help raise the degree of effectiveness of the pesticide, and maintain the stability of its physical form for the longest possible period of time.[10]

For Solid Formulation

The pesticide in this formula is in the form of a powder (powder) or granules intended for use according to methods that depend on the nature of the pesticides. Composition, based on the state of the active substance as follows: [11]

Solid active substance.

In this case, the solid active ingredient is mixed with other chemically inert materials, which represent its carrier medium to produce the final formulation of the pesticide.

Liquid active ingredient.

In this case, the spray of the liquid active substance is passed according to a special technology over the inert materials until the degree of saturation, which is in the form of solid granules to form the medium carrying the active substance, to obtain a final, various solid formula for the pesticide. [12]as follows:

Wetable Powder Formulation

The carrier in this case is water so that the pesticides form a suspended solution in the aqueous medium. -[13]

Granulated Formulation

The active substance in this case is carried on small granules with diameters ranging between (0.3 - 1.5 mm) provided that they are slow to dissolve in water, to be used without dilution, especially during the control of pests located in easily accessible places such as the axils of the leaves. [14] , and the leaves wrapped on Some of them (such as corn and reeds), are also used to combat soil insects, by adding them to the soil around plants where they are absorbed through the roots of the plant and spread with the plant juice to eliminate the targeted pests on the plant

Effect on water

As a result of the wrong and improper use of pesticides in the water, in addition to the presence the pollutants, which in turn help increase the risk of pollution of the water environment , as it becomes unsuitable for the living of aquatic organisms [15] . Pesticides can reach the bodies of many living organisms are accumulate in the bodies of fishes that contain fatty tissues , and then reach food chain Pesticides are characterized by their solubility , so this factor is considered to water and dissolution it . Moreover, pesticides are mobility and movement , which causes pollution of surface and ground water sources [16]

Pesticides Residues in food

Most pesticides accumulate in the tissues of fruits and vegetables and also accumulate on the outside surface and drinking water , indicated [17] in her study on pesticide residues ,the identified residues were identified as belonging to 24 types of pesticides 8 Fungicides, 5 Insecticides, 1 Herbicide, 1 Growth Regulator, 3 a attractants and 2 Substances Chemical

intermediates and 4 multi-effect pesticides, including 16 types not registered in Iraq. Some samples contained more than one type of pesticide. The results showed that there is one Ten samples contained residues of two pesticides and six samples contained residues of three pesticides or more. [18] showed a total of 230 pesticides residues in 8496 samples of leafy vegetables belonging to 61 different pesticides, of which 118 exceeded the Korean ample. Lowed while primidone and dimethomorph were identified as the most available pesticides. [19]found the presence of pesticides residues in 25 vegetable samples. Therefore several studies have examined pesticides residues in food reported by[20;21;22;23] Effects on human Health

Memory Lack:

Decrease ability pay attention and poor of bedding addition continues forgetfulness for workers in the production and storage of pesticides, who are exposed during work in factory and farms where exposure is constantly , where increase in current years the phenomenon of repeated forgetfulness and memory lack may lead to Alzheimer disease therefore [24], indicated to exposure for Organophosphorus pesticides and Organochlorines was found to effect the enzyme acetylcholine esterase], which is responsible for the nervous connection and transmission for the nerve impulses in the central nervous system . In other study [25] confirmed that exposure to herbicides and insecticides , which works to weaken the activities of energy structure mitochondria in the cells organs , also works to impede the access of oxygen to the metabolic process , thus works on the emergence of Alzheimer disease due to the lack of oxygen to the cerebral blood vessels .

Pregnant women:

Pesticide is severe damage to pregnant woman as depend on the type of pesticides, period of exposure and the degree of toxicity. Pregnant woman are effected by pesticides by working in the fields and farms also exposure during the spraying of pesticides in home and home garden to eliminate harmful insects, so it is negative impact on the fetus is affected [2 6]. The fetus is more than mother affected because it is in the process of growth and the formation its body organs it takes pollutants through the placenta, and this was confirmed by [2 7 ;28 '29] he also referred that there is relationship between exposure to pesticides and abortion, and it may appear on fetuses such as liver problems and consolidation after birth [30]

The effects of pesticides on children:

Children are characterized by the rapid absorption of pesticides into bodies through the wrong and unthoughtful use of pesticides in children is greater than in adults , and adults get rid of pesticides faster than children [31], as a effects the nervous system as a result of inhaling pesticides particle's .. [32] Keep children away from the place during the spraying process of toxic compounds , as they can cause harm to children , harm nerve damage and effecting movement and attention .The more pesticides are inhaled causing serious diseases, including cancer ,damage of brain cells In one of the studies to examine the level of intelligence , where , [33] indicates that children who live near farms that use pesticides on their agricultural crops or in their homes have a low compared to children who live in a clean environment .

Blood Parameters changes:

Workers In farms, fields, laboratories, manufacture of pesticides and dealing with them during spraying to eliminate insects that transmit diseases pastes and agricultural pests are exposed to pathological damage related to blood parameters . These pesticides and their damages are transmuted to human through inhalation, skin and ingesting. The senses of

smells is one of the affecting by arrival pesticide to the repertory system and its effect on the process of breathing and carry the oxygen through the R.B.C and due to the lack of oxygen to the respiratory bronchioles , so the ability of red blood cells to carry oxygen decreases , and this in turn decreases hemoglobin and platelets [34] indicated in his study about to blood and biochemistry parameters of workers exposed to organophosphorus pesticide spraying , a significant decrease in the values of red and white blood cells and Hb was found , as well as a decrease in cholinesterase activity . [35] Also confirmed in his study on workers exposed to carbamates pesticides, decrease in R.B.C and W.B.C was observed . In another study by and [36]; 37] he referred to the chronic exposure to pesticide toxicity due to the use of pesticides workers in unsafe and causing occupational damage .Farmers where decrease in blood values was found in addition to a decrease in uric acid , as chronic exposure changes in biochemical and hematological values .

Conclusion

Pesticides are chemical compounds that have benefits if used correctly , the dangers of these pesticides , so the results are not good and harmful, their harms are dangers to the environment and human health, especially those working in this fields , as their harms exceed the accumulation that occurs in tissues and fetal deformities, etc. , For this , the optimal use reduces or limits

REFERENCES

- [1]]Muyesaier Tudi 1,2, Huada Daniel Ruan 2,3, LiWang 1,4,* , Jia Lyu 1,5, Ross Sadler 2, Des Connell 6, Cordia Chu 2 and Dung Tri Phung 2, Agriculture Development, Pesticide Application and Its Impact on the Environment Int. J. Environ. Res. Public Health 2021, 18, 1112,
- [2] Hayden KM, Norton MC, Darcey D, Ostbye T, P Zandi JCS, et al. (2010) Occupational exposure to pesticides increases the risk of incident AD: The cache county study. Neurology 74: 1524-1530.
- [3] Asghar U*, Malik MF and Javed A. Pesticide Exposure and Human Health: A Review . J Ecosys Ecograph 2016, S5
- [4] Aktar,W.; Sengupta, D.; Chowdhury, A. Impact of pesticides use in agriculture: Their benefits and hazards. Interdiscip. Toxicol. 2009, 2, 1–12.
- [5] Raheem, S. S. (2017). Mycoremediation of carbendazim and oxymatrine pesticides by soil fungi. M.Sc. Thesis. College of Science, University of Basrah .130 pp.
- [6] Francisco Sánchez-Bayo, Henk A. Tennekes and Koichi Goka . Impact of Systemic Insecticides on Organisms and Ecosystems <http://dx.doi.org/10.5772/52831>
- [7] Na Wang and Rongbin Yu . Accumulation levels and characteristics of some pesticides in human adipose tissue samples from Southeast china . Chemosphere , vole , 84, Issue 7,August 2011pages 964-971.
- [8] WHO. World Health Organization (2018). Pesticide residues in food <https://www.who.int/ar/news-room/fact-sheets/detail/pesticideresidues-in-food>
- [9] Knowles A. 2008 Recent developments of safer formulations of agrochemicals. Environmentalist 28 (1): 35-44.
- [10] 10.Dipak Kumar Hazra. Recent Advancement in Pesticide Formulations for User and Environment Friendly Pest Management . International Journal of Research & Review (www.gkpublication.in) 35 Vol.2; Issue: 2; February 2015.
- [11] CARLISLE B. RATHBURN, JR. INSECTICIDE FORMULATIONS-TYPES AND USES: A REVIEW.. J. Am. Mosq. Control Assoc. Vor-. 1, No. I 1985 .

- [12]. Frederick .Fishel. Pesticides formulations <https://edis.ifas.ufl.edu> 2019.
- [13] Zakaria Al-Qodaah, Reyad Shawabkah. Production and characterization of granular activated from activated sludge..Brazilian Journal of chemical eEngineering .26(1). 127-136 . 2009 .
- [14]. Shuang-yuan Cheng, Ze-quan Liu and Qiang Zhang* Studies of factors influencing the disintegration performance of pesticide water dispersible granules Journal of Pesticide Science Vol. 40, No. 4, 1–9 (2015) .
- [15] Muhammad Syafrudin 1 , Risky Ayu Kristanti 2 , Adhi Yuniarto 3 , Tony Hadibarata 4,* , Jongtae Rhee 1, Pesticides in Drinking Water—A Review Int J Environ Res Public Health. 2021 Jan; 18(2): 468...
- [16].Cumhur AYDINALP1, M. Monica PORCA2 THE EFFECTS OF PESTICIDES IN WATER RESOURCES Journal of Central
- [17] Al-Sultan, N..A .Obaid .2021. Diagnosis of some pesticides residues in some types of vegetables and fruits in local markets of Basrah. A thesis of the College of Science - Department of Ecology, University of Basrah.
- [18] Park, D.W., Kim, K.G., Choi, E.A., Kang, G.R., Kim, T.S., Yang, Y.S., Moon, S. J., Ha, D.R., Kim, E.S. and Cho, B.S. (2016). Pesticide residues in leafy vegetables stalk and stem vegetables from South Korea: a long term study on safety and health risk assessment. Food Additives and contaminants: Part A, 33(1): 105-118..
- [19]/Hossain, S., Chowdhury, M. A. Z., Alam, M.M., Islam, N., Rashid, M.H. and Jahan, I. (2015). Determination of pesticide residues in brinjal, cucumber and tomato using gas chromatography and massspectrophotometry (GC-MS). Bios. J. Org, 1(1): 1-16...
- [20] Al-Antary, T. M., Alawi, M. A., Said, M., and Haddad, N. (2018). Pesticides residues in agricultural crops in middle governorates of Jordan in 2013 and 2014. Fresenius environmental bulletin, 27(8): 5348-5354..
- [21].Asghar U*, Malik MF and Javed A. Pesticide Exposure and Human Health: A Review . J Ecosys Ecograph 2016, S5.
- [22].Bempah, C. K., and Donkor, A. K. (2011). Pesticide residues in fruits at the market level in Accra Metropolis, Ghana, a preliminary study. Environmental monitoring and assessment, 175(1-4): 551-561..
- [23] Xiao, C. L., and Boal, R. J. (2009). Residual activity of fludioxonil and pyrimethanil against *Penicillium expansum* on apple fruit. PlantDisease, 93(10): 1003-1008..
- [24] Dandan Yan1, Yunjian Zhang2, Liegang Liu3 & Hong Yan1 2016 Pesticide exposure and risk of Alzheimer's disease: a systematic review and meta-analysis .nature.com/scientific reports. www.nature.com/scientificreports.
- [12].JintanaS,SmingK,KrongtongY,ThanyachaiS. Cholinesterase activity pesticide exposure and health I mpact a population exposed to organophosphate .Int.Arch Occup Environmental Health ,2009.Jul.82(7):833-42..
- [25].Tingting Chen , Jieqiong Tan , Zhengqing Wan, Yongyi Zou , Henok Kessete Afewerky Zhuohua Zhang and Tongmei Zhang . Effects of Commonly Used Pesticides in China on the Mitochondria and Ubiquitin-Proteasome System in Parkinson's Disease. Int. J. Mol. Sci. 2017, 18, 250.
- [26] Chalupka, S., & Chalupka, A. N. (2010). The impact of environmental and occupational exposures on reproductive health. Journal of Obstetric, Gynecologic, and Neonatal Nursing, 39(1), 84-100. doi:10.1111/j.1552-6909.2009.01091.
- [27].Ki-Hyun Kima, □, Ehsanul Kabir b, Shamin Ara Jahan c Exposure to pesticides and the associated human health effects. Science of the Total Environment <http://dx.doi.org/10.1016/j.scitotenv.2016.09.009> .

- [28]. Wohlfahrt-Veje, C.; Andersen, H.R.; Jensen, T.K.; Grandjean, P.; Skakkebaek, N.E.; Main, K.M.. Smaller genitals at school age in boys whose mothers were exposed to non-persistent pesticides in early pregnancy. *Int J Androl.* 35:265-272; 2012a.
- [30] Aleksandra Fucic 1,*, Radu C. Duca 2,3 , Karen S. Galea 4 , Tihana Maric 5, Kelly Garcia 6, Michael S. Bloom 6 , Helle R. Andersen 7 and John E. Vena 8 Reproductive Health Risks Associated with Occupational and Environmental Exposure to Pesticides. *Int. J. Environ. Res. Public Health* 2021, 18, 6576.
- [31]. Andersen, Helle R., Fróði Debes, Christine Wohlfahrt-Veje, Katsuyuki Murata, and Philippe Grandjean. 2015. "Occupational Pesticide Exposure in Early Pregnancy Associated with Sex-Specific Neurobehavioral Deficits in the Children at School Age." Published Version 0.1016/j.ntt.2014.10.006 Citable link <http://nrs.harvard.edu/urn-3:HUL.InstRepos:37221748>
- [32] Kofman, O., Berger, A., Massarwa, A., Friedman, A., & Jaffar, A. A. (2006). Motor inhibition and learning impairments in school-aged children following exposure to organophosphate pesticides in infancy. *Pediatric Research*, 60(1), 88-92. doi:10.1203/01.
- [33]. Eskenazi B, Bradman A, Castorina R 1999 Exposures of children to organophosphate pesticides and their potential adverse health effects. *Environ Health Persp* 107:409–419.
- [34]. K. Rastogi, Vipul. K. Singh, C. Kesavachandran Jyoti, M.K.J. Siddiqi, N. Mathur, R.S. Bharti. Monitoring of plasma butyrylcholinesterase activity and hematological parameters in pesticide sprayers. *Indian Journal of Occupational Environmental Medicine*, 2008, volume 12, Issue 1.
- [35]. Sandra C. Cortés-Iza, Alba I. Rodríguez y Edgar Prieto-Suarez. Assessment of hematological parameters in workers exposed to organophosphorus pesticides, carbamates and pyrethroids in Cundinamarca 2016-2017.
- [36] Ambaliou Sanni and Fabrice Cazier. Influence of Pesticide on Biochemical and Hematological Parameters in Beninese Vegetable Farmers, *Journal of Biology and Life Science*, 2018, Vol. 9, No. 1
- [37]. Avinash Shivaji Gaikwad, Panjakumar Karunamoorthy, Shridhar Jagannath Kondhalkar, Mala Ambikapathy and Ravichandran Beerappa Assessment of hematological, biochemical effects and genotoxicity among pesticide sprayers in grape garden. *Journal of Occupational Medicine and Toxicology* (2015) 10:11.
- [38] Ara, A. ., Al Faria, L. ., Rani, R. ., & Mahbubur Rahman, A. . (2021). Diversity of Angiosperm Taxa in Char Khidirpur Area of Rajshahi, Bangladesh. *Journal of Scientific Research in Medical and Biological Sciences*, 2(3), 51-66. <https://doi.org/10.47631/jsrmb.v2i3.266>