Pesticides' Detrimental Consequences on Human Health

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ABSTRACT

Despite the fact that pesticides are being created. using extremely stringent regulatory processes to operate with relative certainty and with the least possible adverse effects on the health and even environmental concerns health worries exist emerged. linked to exposure to in the workplace pesticides in addition food as well as drinking water residues. Pesticides are frequently used on the job by pest control technicians, exterminators of household pests, and Farmers in outdoor fields and greenhouses. Majority of Pesticides are ingested by humans through pesticide-contaminated drinks and nutriment, but there is also a possibility of substantial exposure in or close to the home. Many of the negative environmental effects (exudations, spills, spray drift water, soil, air pollution, and adverse non-target the consequences for wildlife, fish, crops, and other life forms) occurred after application. Pesticide toxicity, dosages used, adsorption to soil colloids, general weather situations following implementation,and pesticide persistence in the environment .As a result, the risk assessment of pesticide consequences for health or the environment is dependent on the duration and level of exposure, the type of pesticide used in terms of environmental traits, including toxic effect and consistency.Pesticides are commonly used in areas. Furthermore, the quantity of requirements and methods of application used to analyze the harmful pesticides' impact on public health influence hazard assessments, as will already approved pesticide characterization and In the coming years, novel methods will be developed. It may have an impact on the authorization. As a result, new tools or techniques that are more reliable than existing ones are required to anticipate potential pesticide dangers and minimize their negative consequences for public health. In meantime, other pesticide low complex systems reliant growth of pesticides of novel compounds new mechanisms involved and enhanced range of protection, well as the conversion of pesticide preparations only just in use to safer formulations are all currently underway. Improvement (eg microcapsule suspension)). It can reduce the harmful effects of agriculture, especially the toxicity of pesticides. Furthermore, exposure to pesticidal compounds and potential environmental impacts are reduced by using proper and kept up with spray instruments and taking all appropriate safety measures at all times when managing pesticides. It is easily treatable. As a result of the need for Pesticides are employed for prevention strategies and food hygiene to manage pests and will most likely be used in the future. Most pesticides have the potential to be harmful to humans, with serious health complexities. There seems to be indication that parental exposure is also beneficial as childhood or adolescent exposure, may increase the risk in the big scheme of things. Pesticide exposure has been connected to many human diseases, including asthma, bronchitis, infertility, birth defects, Alzheimer's, Parkinson's, diabetes, overweight, autism, and behavioral problems,as well as pulmonary illnesses, Body part diseases and system breakdowns, NHL leukaemia, central nervous system tumours, and cancers of the mammary, colorectal, lung, prostate, gastric, hepatocellular carcinoma, and urothelial carcinoma are all increased by pesticide exposure.

Key words – pesticide toxicity; pesticide safety; risk assessment, pesticides, human diseases, cancer.

I. INTRODUCTION.

The pesticidal compounds is there any material which is employed to fend off pests, completely eliminate, or repel pests preventing harm from occurring. Any living creature is a pest that poses a serious threat to mankind through disease transmission, property damage, or competition for food. A pesticide may include an miticide, weed killer, molluscicide, insect repellents, pest and growth regulator, depending on the type of parasite. Insects, rodents, fungi, bacteria,and weeds are examples of pests.

Agriculture is the most significant pesticide consumer accounting for more than 85 percent of worldwide production in order to chemically regulate innumerable pests.Also pesticides are employed in public health initiatives to be in control of noxious plants (such as grass and weeds) and vector-producing diseases (such as dengue and malaria) in outdoor spaces, playgrounds, and courtyards. They also aid in the prevention or reduction of germs, algae and fungi, growth in paint, carpets, electrical equipment, paper, cardboard, and food packaging materials.

In modern agriculture, chemicals are used to significantly raise crop productivity. Because of an increase in the concentration of these chemicals, utilised fertiliser encourage pesticides employed to boost growth prevent pests are no longer productive. Every year, there are millions of cases of pesticide poisoning in the environment.

Pesticide use has advantages, such as the additional economic potential for food production and a decrease in vector-borne diseases. However, the Farmers' subpar agricultural methods, in conjunction with the widespread use of pesticides, It is a fallacy to believe that "if a little is decent, greater amounts will be best."Inadequate harvesting wait times have also contributed to significant environmental pollution. India actually generates the first and most insecticides in Asia and is the world's 12th-largest pesticide consumer. Pesticide distribution use in India differs from that of the rest of the global use. As shown in Figure 1, insecticides account for 76% of pesticides used in India, especially in comparison to 44% globally.

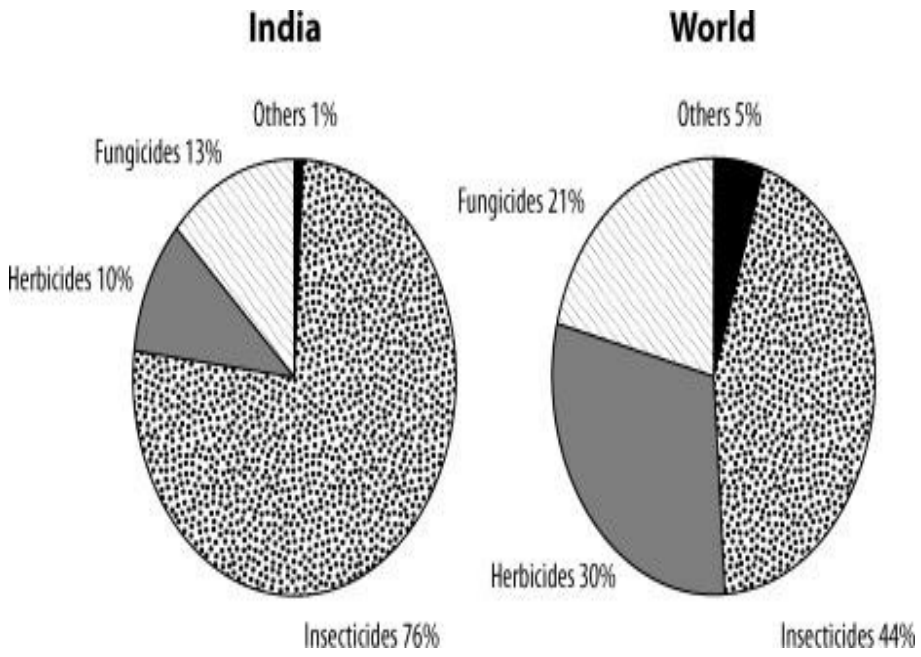

Figure :1 In India, insecticides account for 76% of pesticide use, compared to 44% worldwide.

Pesticide use is objectionable due to the negative consequences. “Rachel Carson's” text "Silent Spring," published in 1962, elucidated the detrimental consequences of DDT, which was supposed to contribute to its ban on agricultural use. Similar to how other hazardous substances were prohibited in subsequent years by the Environmental Defense Fund (EDF), the EPA (ethylene dibromide). It was strictly prohibited due to its cancerous and genetic mutation properties in 1983 characteristics. Pesticide By eradicating harmless insects, mammals, and other organisms from the environment, fishes, and attempting to change their genetic makeup by introducing resistance into them against these insecticides, the remaining remnants are hazardous and last for a very long time (pest). Pesticidal compounds are linked to major health problems, including exposure of farmers working in treated fields or mixing and applying pesticides, as well as substances in the water and food for the general public. Several accidental poisonings have been caused as a result of activities, and even regular pesticide application can pose significant short- and long-term health consequences to farmers while somehow harming the environment. Farmers in developing countries face significant exposure dangers as a consequence of the use of hazardous pesticides that are inconsistently decided to apply, poorly maintained, prohibited, or restricted in other countries, totally and utterly improper spraying apparatus, poor storage procedures, and the frequent reusing materials of old insecticide. Continuous pesticide exposure continues to pose a health risk, particularly in agricultural workplace environments. The majority of pesticides have high levels of toxicity by design because they are intended to eradicate specific species, trying to pose considerable danger. In this context, the application of pesticides has caused significant concern regarding not only the potential effects on fragile ecosystems and species but also the implications for human health.

According to the WHO, approximately a million people worldwide suffer from acute poisoning caused by pesticide exposure. Annual incidence rates range from 0.4 to 1.9 percent. According to evidence from the preceding two centuries about Exposure to pesticide residues and health, several pesticides start causing neurological disorders as well as chronic and progressive diseases, some affect prenatal development and result in malformations at birth, and some are human carcinogens. Over the last three decades, the careless use and handling of pesticides used in agriculture fields has resulted in serious human health issues in so many countries.

Pesticides are ingested by humans in a variety of ways, and the intensity of these exposures varies, contributing to the differences in their effects. Pesticide concentrations vary between many farmers, fruit and vegetable vendors, pesticide industry employees, those transporting these dangerous chemicals, and consumers. Pesticide exposure is linked to a wide range of diseases, like” Hodgkin's disease (HD)”, “non-disease Hodgkin's Parkinson's” , respiratory illness, endocrine disruption, and reproductive issues. Furthermore, pesticides are thought to contribute to human diseases, such as the link between glyphosate and breast cancer.

II.HISTORY

Human societies have worked to cultivate and preserve their food resources using the most effective and quick methods possible since the dawn of civilization. A practical example is how they grew both nutritious and poisonous plants in the same area because the poisonous plants served as a barrier to insect control. During this time, sulphur was utilised. Here are the initials insect infestation techniques used for millennia. Later, one of the oldest writings still in existence, the Ebers papyrus, which describes some techniques for removing insects from food, was discovered. Traditional Chinese medicine also makes use of antiquated sulfides. It's also important to note that Homer mentions using chemicals to get rid of insects in his epic poem "Odysseus," which was written around the same time. Around 1500, mercury and arsenic were first used as "para-pesticides."These substances are utilized it till the advent pesticides (“1940” and later), first as for damage of food stocks since WWII and then as ensuring the time for the cultivation of daily food items. It is crucial to remember that countless scientists are emphasized throughout this time

the pesticides can have detrimental effect on the health of people once utilised for a long time. For example, massive increase in lymphoma patients is still being openly discussed today. Figure 2 depicts the transformation of pesticides over time.

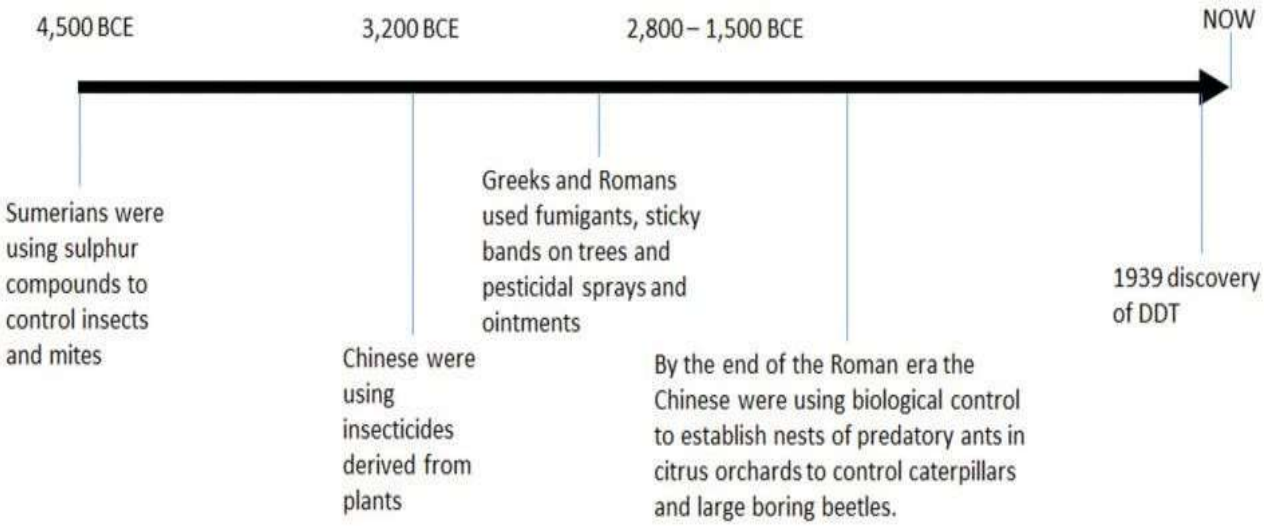

Figure 2: History of pesticides

III. CLASSIFICATION OF PESTICIDES

Pesticides, fungicides, herbicides, garden chemicals, disinfectants for the home, and rodenticides are all examples of pesticides that are used to get rid of and prevent pests. The physical and chemical attributes of these insecticides differ from one another. It is thus admirable to categorize them considering their characteristics and conduct research on their specific areas. Pesticidal compounds are made from chemical compounds that are not exist in environment. These were classified into various groups , basis of their intended use. Drum currently recommends three commonly used pesticide classification systems (1980).

Modes of entry are the mechanisms by which pesticides enter or come into contact with the intent.These include repellents, fumigants, stomach poisons, systemic poisons, and contact poisons.

A. Systemic pesticides

Pesticides known as systemic pesticides enter tissues that have not been treated after being absorbed by plants or animals. The body can be accessed by untreated leaf, stem, or root parts by systemic herbicide plants. These have the power to eliminate weeds with only a light spray. They are capable of traveling through the plant vascular system and into plant tissues to exterminate particular parasites.They are mostly used in preventative maintenance with animal life like fleas, lice, and warble grubs. Pesticide transport can be unidirectional or bidirectional in plant tissues. While some pesticides may only migrate vertically in plants, others may only migrate in one direction, either up or down. When used in roots area ,it will spread across the entire plant. In addition, several pesticides are thought to be locally systemic, going to spread only a short distance from the point of contact within a plant. Glyphosate and 2, 4-Dichlorophenoxyacetic acid are two examples of systemic pesticides (2, 4-D). With the introduction of soluble organophosphorus chemicals ,were first developed in the early 1950s. They were successful in eliminating burrowing larvae and sucking pests in several cases. Crops, with the primary benefit of trying to transfer to all plant tissues. In the 1960s, the subsequent temic carbamates were sysaldicarb and carbofuran. The vast majority of widely utilised insecticides for agriculture around different areas, along with most insects, are members of the suicidal groups. “Philippines” and Vietnam, where twenty two and seventeen percent of agrochemicals, respectively, are classified as "very dangerous" or WHO class I, organophosphorous are now widely used pesticides. In the 1980s and 1990s, a small class of medications known as parasitic insect growth regulators was developed. Chemicals that outperform their forefathers in terms of selectivity. Since 1990, cartap, in most wealthy countries, fipronil and neonicotinoids have been replacing heretofore dangerous pesticides in both developed and developing countries.

B. Contactonly (Non-Systemic) Pesticides

Contact pesticides are another name for non-systemic pesticides because they act once the desired pests appear into attach. Involvement with the pest is required for effectiveness. Pests absorb pesticides through their skin when touched, resulting in poisoned death. Even though insecticides may not always enter in to tissues, they donot carried by the capillary system of a plant. Paraquat and diquat dibromide are two such examples. These pesticide is any formulation that is applied directly to the foliage, flowers, buds, stems, branches, roots or seeds of plantlike systemic pesticides, these pesticides can be quickly purged or exhausted from plant roots before obtaining little to no residue. Because it makes the plants edible such kind of pesticide is commonly employed in hydroponics.

Because Contactonly (Non-Systemic) Pesticides are less dangerous than systemic pesticides, they are even more commonly

used in home gardens. They are frequently classified as organic pesticides. Botanists say it's very essential to use self protective measures while handling contactonly pesticides because the are capable of causing skin problems. Systemic pesticides, as opposed to contactonly (Non-Systemic) Pesticides, affect the plant from within, making it unfit for human ingestion. They are used on different vegetations while non-systemic products are used on edible plants such as cannabis, and so on. They have also been shown to negatively impact plant pollen, which can be extremely harmful to pollinators. Non-systemic pesticides can be purchased at a garden centre or made at home. Systemic products, on the other hand, are generally only obtainable to be used in both commercial and agricultural horticulture. Insecticides, both systemic and non-systemic are lethal or have sub-lethal effects on pollinators. As shown in Table 1, the differences are more about where and when the insecticide is present in or on plant tissue and how this affects exposure.

Table 1: Difference between systemic and non systemic insecticides

Systemic	Non-Systemic
• May contaminate pollen, nectar, and leaf tissue from the inside (or from the outside when foliar applications are used)	• May contaminate pollen, nectar, and leaf tissue from the outside only
• Often present in plant tissue at lower, steadier concentrations than surface residues, thus there is a potential for prolonged chronic exposure	• Surface residues present at highest levels immediately after spray but concentrations can decline quickly
• Application during any season may present a toxic concern for pollinators due to prolonged uptake	• Bloom-time applications or applications when pollinators are present are of particular concern

C.Stomach toxicants and stomach poisoning

The insecticide which causes stomach poisoning needs to enter the pest's body through its mouth and poisons it when it is digested non-systemical stomach poisons are ingested by bugs after they consume the insecticide sprayed on them, as well as the systemic and other components. Furthermore, stomach toxins can enter insects' mouths and digestive systems, which are taken up by the body of the insect. This is more appropriate, particularly for vectors. The toxin will be consumed by mosquito or black fly larvae. if microbes or their byproducts are added to water as a control measure. These insecticides work by killing the midgut (or stomach) larvae of the vector.

Stomach pollutants are a type of pesticide that enters the target pest's body through feeding and then passes through the digestive system. The pest will consume the poison or have it absorbed into its body in some other way, and the poison will eventually kill the pest. As stomach toxicants, various active ingredients such as malathion, Bacillus thurigiensis (Bt), boric acid, borates, and others are used. Stomach poisons are also available in a variety of formulations, including liquids, dust, gel baits, and granules. Stomach toxicants work after the target pest consumes them.If the stomach toxicant comes in liquid or dust form, they are usually applied in areas pests come across during their normal travels and will curiously feed upon it. When sto mach toxicants comes in bait or granule form, they often are mixed with a food ingredient that the pest is attracted by (such as sweets, proteins and oils) to entice the pest to readily consume it. Once eaten, the poison travels through the digestive system and begins to effect the pest, harming it's insides until it ceases to function and drops dead.

D.Fumigants

Which act or they might just destroy the pests are designed to control by vaporising them. These herbvaporizingt toxic fumes when used. The trachea of these pests allows vaporised insecticides to evaporizedr bodies. (respiratory) poisoning through spiracles results in death. A few of one‘s useful substances when wrapped under large stress,liquids convert to gases . Volatile liquids are another type of active substance. when preserved in a standard container and not pressure-formulated To eliminate pests from stored products, fruits and vegetables are fumigated. each grain They are also efficient in decreasing soil pests. These when introduced to soil, produce gaseous substance which controls soil pests and can disrupt plant growth.production of crops Hydrogen cyanide, naphthalene, and other fumigants are commonly used to treat stored products or nursery stock.Methyl bromide and nicotine Soil fumigants such as methyl bromide, dichloropropane, propylene oxide, dibromochlorpropane, organophosphate insecticides, and chloropicrin are commonly used as nematocides.

E. Repellents

Repellents don't kill yet are adequately tacky to get bugs far from treated regions/items. They likewise slow down bug's capacity to find crops. There are different dynamic fixings in bug anti-agents enlisted in collaboration with the Environmental Protection Agency (EPA). DEET, picaridin, IR3535, and lemon eucalyptus oil are among the ingredients alluded to in this reality sheet as normal bug anti-agents. The CDC suggests using items one of these EPA enlisted fixings. They can be applied to human skin and some can utilized on dress. They come as showers, wipes, or creams. Oil of lime eucalyptus and IR3535 are substances that occur naturally but are man-made fixings. They are both considered biopesticides because they are linked to natural substances. Oil of lemon eucalyptus (OLE) is also known by its synthetic name, p-menthane-3,8-diol (PMD). The methods of the section, which are shown in Table 2, describe how pesticides interact with or enter the objective.

Table 2: Pesticide classes depending on access method

SI.No	Type of pesticide	Description	Examples
1	Systemic Pesticides	These are either animals or plants absorb and transferred to untreated tissue are examples of this type.	2,4-D, glyphosate
2	Contact pesticides	When pests come into contact with it, it acts on them.	Paraquat, diquat
3	Stomach poisons	Poison reaches the body of the pest through oral route.	Malathion
4	Fumigants	It acts or may kill by generating the target pest	Phosphine
5	Repellents	Not poisonous, they are unpleasant enough to maintain pests at bay the handled region .Those that also were make it difficult for pests to locate crops.	Methiocarb

IV. Pesticides are classified according to how they work and which pest organisms they kill.

Pesticides are classified by the living being of the objective irritation and are given novel names that address their movement. These pesticides' gathering names are got from the latin word cide, whichthat signifies "to kill or executione that are added as a post fix to the related vermin na me .Not, all pesticides have "cide" toward the end. a few pesticides are furthermore classified in light of their capabilities. Models incorporate development. bother development controllers that either advance or repress the development of nuisances; defoliants that plant passes on to tumble off; desiccants, which speed up the drying of plants that might be gathered precisely or that kill and dry out bugs; bug repulse lents bothers away; attractants that draw bugs, commonly to a snare; and Chemosterilants are synthetic compounds that kill bugs. Table 3: Pesticide characterization by target bugs

Also, certain pesticides are successful against more than one kind of bug and can be arranged under more than one pesticide class. Acaricide, bug spray, and herbicide are potential arrangements for the widely utilized aldicarb in Florida citrus indus try.due to the way that it manages parasites, bugs, and nematodes independently. Another such outline is 2, 4-D, a broadleaf weedkil ler.even at low rates it goes about as a plant development controller. Attractants in light of the fact that because of their work in bug control, anti-agents are viewed as pesticides.

able 3:.Pesticide classification according to target pests

Sl. No.	Type of pesticide	Target pests/Functions	Examples
1.	Acaricides	Substances that are used to kill mites and ticks or to disrupt their growth or development	DDT, dicofol, chlorpyrifos, permethrin, etc
2.	Algicide	Substances that used to kill or inhibit algae	Copper Sulphate, diuron, oxyfluorfen, etc
3.	Antifeedants	Chemicals which prevent an insect or other pest from feeding	Chlordimeform, azadirachtin, etc
4.	Avicides	Chemicals that are used to kill birds	Strychnine, fenthion, etc
5.	Bactericides	Compounds that isolated from or produced by a microorganism or a related chemical that is produced artificially, which are used to kill or inhibit bacteria in plants or soil	Streptomycin, tetracycline, etc
6.	Bird repellents	Chemicals which repel the birds	Diazinon, methiocarb, etc
7.	Chemosterillant	Chemicals that renders an insect infertile and thus prevent it from reproducing.	Diflubenzuron
8.	Desiccants	Act on plants by drying their tissues	Boric acid
9.	Fungicides	Chemicals which are used to prevent, cure eradicate the fungi.	Cymoxanil, thiabendazole, Bordeaux mixture
10.	Herbicide softener	A chemical that protect crops from injury by herbicides, but does not prevent the herbicides from killing weeds.	Benoxacor, cyometrinil
11.	Herbicides	Substances that are used to kill the plants, or to inhibit their growth or development.	Alachlor, paraquat, 2,4-D
12.	Insect attractant	A chemical that lures pests to trap, thereby removing them from crops animals and stored products	Gossyplure, Gyplure
13.	Insect growth regulator	A substance that works by disrupting the growth or development of an insect	Diflubenzuron
14.	Insecticides	A pesticide that is used to kill insects or to disrupt their growth or development	Azadirachtin, DDT, chlorpyrifos, malathion, etc.
15.	Larvicides	Inhibit the growth of larvae.	Methoprene

Table 4: Pesticide classification according to target pests

16.	Lampricides	Target larvae of lampreys which are jawless fish like vertebrates	Nitrophenol
17.	Mammal repellent	A chemical that deters mammals from approaching or feeding on crops or stored products	Copper napthanate, trimrethacarb, etc.
18.	Mating disrupters	Chemicals that are interfere with the way that male & female insects locate each other using airborne chemicals, thereby preventing them from reproducing	Disparlure, gossyplure, etc.
19.	Molluscicides	Substances used to kill slugs and snails.	Metaldehyde, thiadicarb, etc.
20.	Moth balls	Stops any damage to cloths by moth larvae	Dichlorobenzene
21.	Nematicides	Chemicals which are used to control nematodes	Carbofuron, chlorpyrifos, methyl bromide, etc.
22.	Ovicides	Inhibit the growth of eggs of insects and mites	Benzoxazin
23.	Piscicides	Acts against fishes	Rotenone
24.	Plant growth regulators	Substances alters the expected growth, flowering or reproduction rate of plants	2,4-D, gibberellic acid, etc.
25.	Rodenticides	Substances used to kill rats and related animals	Strychnine,Warfarin, zinc phosphide, etc.
26.	Silvicides	Acts against woody vegetation	Tebuthiuron
27.	Synergists	A chemical enhances the toxicity of a pesticide to a pest but that is not by itself toxic to pest	Piperonyl butoxide
28.	Termiticides	Kill termites	Fipronil
29.	Virucide	An agent having capacity to destroy an inactivate viruses	Ribavirin
30.	Miscellaneous		Aluminium phosphide, sodium cyanide

IV. Classification according to the pesticide's chemical makeup

Pesticides are most frequently and successfully labeled based on their potent chemicals. Such category dispenses records approximately the effectiveness, both physiological and chemical characteristics of the corresponding insecticides. Main details on chemicals substances and whilst determining the mode of movement of pesticides, bodily properties are pretty beneficial of utility, measures that need to be taken in the course of application, and the prices of software. Pesticides are divided into four essential lessons in step with Their chemical make-up includes organochlorine and organophosphates., carbamates, pyrethrin, and pyrethroids. Based on chemical substances pesticide categorization is a complicated process. The majority of modern-day insecticides are organic materials. They encompass both herbal and synthetic insecticides foundation. But positive inorganic substances are also employed as insecticides. Important insecticides, together with insecticides, can be in addition divided into some subclasses. Figure 3 provides the sub-classification of pesticides.

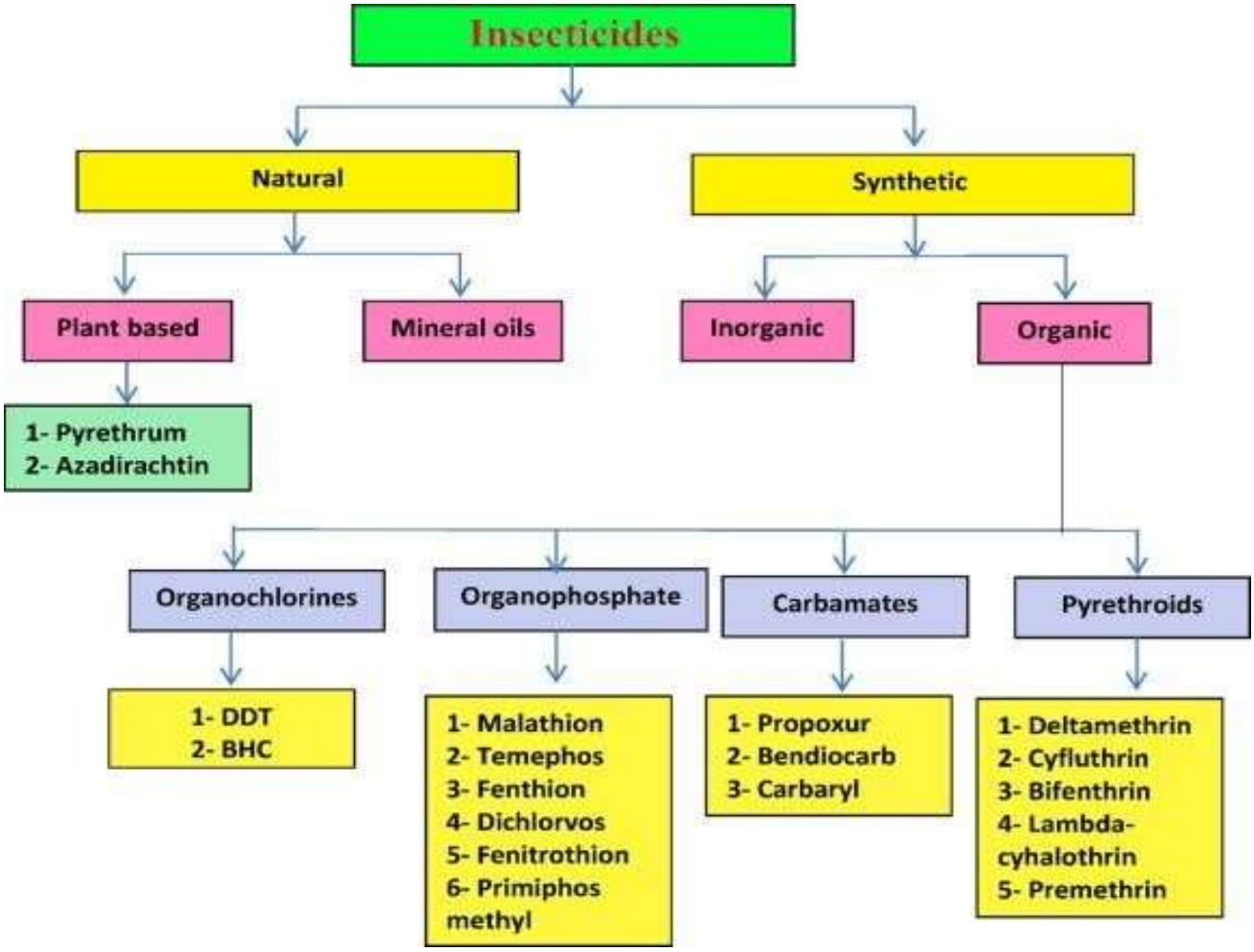

Figure 3: Insecticides Classification

A. Organano chlorines

Organochlorines insecticide are organic compounds that contain 5 or more number chlorine atoms. They are among the initial insecticide institutions to be Farming and public health advantage from its synthesis. the majority of them have beencommonly using as insecticides to restrict a diverse variety of insects, additionally, they have a lasting effectnimpact on the environment . Those pesticides may interfere with an insect's central nervous, causing seizures and dysfunction, and possibly death. Among the most popular insecticides are DDT, lindane, endosulfan, aldrin, dieldrin, and chlordane. Though the manufacturing and application of DDT become banned in most evolved nations along with the United States a few years in the past, it is nevertheless being used in most tropical growing international locations for vector manipulation.

B. Organophosphates

Organophosphorus insecticides are chemicals that kill a wide range of insects. These chemical compounds constitute a significant portion of all pesticides used in the United States, including those used on food plants. The majority of organophosphorus insecticides were phased out in the United States. Certain organophosphorus pesticides (for example, malathion and naled) are also used to manipulate mosquitos in the United States. examples of widely used Ops are in Table 5.

People are exposed to organophosphorus pesticides through eating foods that have been treated with these chemicals. Hand-to-mouth contact with insecticide-contaminated surfaces can also cause exposure. Less unusual pesticide exposures include

inhaling them or absorbing them through the pores and skin. Farm workers, gardeners, florists, pesticide applicators, and insecticide manufacturers may be more exposed than the general public. Approximately 75% of the organophosphorus pesticides in use in the United States are converted to breakdown products known as dialkyl phosphate metabolites once they enter the body. These metabolites are not poisonous, but they have been linked to organophosphate insecticides. Unprecedented exposure to large quantities of organophosphorus pesticides can also cause nausea, vomiting, infrequent or slow heartbeat, breathing difficulties or chest tightness, weakness, paralysis, salivation, and seizures. People who are exposed to small quantities of these pesticides over time will be vulnerable, Displeased, downcast, or unobservant.

Table 5: Types of organophosphorus pesticides

S. No.	Type	Pesticides
1	Pyrophosphates and related compounds	TEPP, Schradan
2	Phosphates	Chlorfenvinphos, Mevinphos, Dichlorvos, Monocrotophos, Tetrachlorvinphos
3	Thiophosphates	Chlorpyriphos, Diazinon, EPN, Ethyl parathion, feniitrothion, Fenthion, Methyl parathion, Primiphosmethyl, Triazophos
4	Dithiophosphates	Dimethoate, Aazinphos-methyl, Malathion, Phorate
5	Phosphonates	Terbufos, Trichorfon
6	Phosphoramidates	Acephate, Tebophos, Methamidophos

C. Carbamates

The carbamates are esters of carbamic acid. Unlike organophosphates, carbamates aren't structurally complicated. Carbamates are now used in greater quantities than organophosphates. due to the fact carbamates are taken into consideration to be safer than organophosphates. Their foundations, moreover, are distinguished. The method by which action of carbamates pesticides is comparable to that of pesticides made of organophosphate in that they interfere with nerve impulse transmission indicators, causing in the pest's demise via toxicity. Which sometimes are widely utilized as interaction and abdomen poisons, in addition to fumigants. They may be effortlessly degraded beneath herbal environments with minimal environmental pollutants. Insecticides in this category includes carbaryl, carbofuran, propoxur, and aminocarb.

D. Synthetic pyrethroids

Synthetic pyrethroids are synthetic derivatives of naturally occurring pyrethrins derived from pyrethrum, an oleo-resin extract of dried chrysanthemum plant life. Pyrethrins' insecticidal properties are derived from keto alcoholic esters of chrysanthemum and pyrethroid acids. Pyrethroids are broad-spectrum pesticides that are effective against a wide variety of insect pests. They are sprayed over edible goods beforeto harvest to control pests and are also used as domestic insecticides and grain protectants. They work in animal shelters, fields, and green homes, and they are widely used in veterinary medicine. Table 6.

Table 6: Pyrethroid Uses

Pyrethroid	Insects	Crops	Other locations and applications
Allethrin	Flies, mosquitoes, ants	N/A	Residential, public health, animal houses, topical application in pet sprays and shampoos
Bifenthrin	Beetles, weevil, houseflies, mosquitoes, lice, bedbugs, aphids, moths, cockroaches, locust	Alfalfa hay, beans, cantaloupes, cereals, com, cotton, field and grass seed, hops, melons, oilseed rape, potatoes, peas, raspberries, watermelons, squash	N/A
Bioresmethrin	Houseflies, mosquitoes, cockroaches	N/A	Household, public health, animal houses
Cyfluthrin	Aphids, cabbage stem flea beetle, cockroaches, houseflies, mosquitoes, rape winter stem weevil	Alfalfa, cereals, cotton, citrus, deciduous fruit, ground nuts, maize, oilseed rape, pears, potatoes, rice, sugar beet, sugarcane, tobacco, vegetables.	Green houses
Cyhalothrin	Bedbugs, beetles, houseflies, ked, lice, mosquitoes, moths, weevils	N/A	Public health, animal houses, inert surfaces
Cypermethrin	Cockroaches, flies, mosquitoes, moths	Cotton, lettuce, onions, pears, peaches, pecans, sugar beets	Residential and commercial buildings, animals houses
Deltamethrin	Aphids, beetles, bollworm, bud-worm, caterpillars cicadas, coding moths, totrix moths, weevils, whitefly, winter moths	Alfalfa, beet, cereals, coffee, cotton, figs, fruits, hops, maize, oilseed rape, olives, oil palms, potatoes, rice, soybeans, sunflowers, tea, tobacco, vegetables.	Forests, households, animal houses, stored products
Esfenvalerate	Beetles, moths	Cabbage, com, cotton, fruit trees, grains, groundnuts, maize, pecan, potatoes, sorghum, soybeans, sugar cane, sunflowers, sweet com, tomatoes, vegetables, wheat	Ornamentals, non crop land.
Fenvalerate	Beetles, cockroaches, flies, locusts, mosquitoes, moths	Alfalfa hay, apples, beet, cereals, cotton, com, cucurbita, fruit, green beans, groundnuts, hops, maize, nuts, oilseed rape, olives, potatoes, sorghum, soybeans, squash, sugarcane, sunflower, vegetables, vines, tobacco.	Ornamentals, forestry, non-crop land.
Fluvalinate	Aphids, leafhoppers, moths, spider mites, thrips, white-flies.	Apples, cereals, cotton, pears, peaches, tobacco, vegetables, vines	Outdoor and indoor ornamentals, turf.
Permethrin	Ants, beetle, bollworm, bud-worm, fleas, flies, lice, moths, mosquitoes, termites, weevils.	Alfalfa hay, com, cotton, grains, lettuce, onion, peaches, potatoes, sweet com, tomatoes, wheat.	Home gardens, green houses, pet sprays and shampoos.

E. Other Classes of Pesticides

Classification according to the action method:

Table 7: pesticide classes depending on the method of action

Type	Mode of action	Examples
Physical poison	It kills the insect by producing physical effects	Activated clay
Protoplasmic poison	Which coagulates the proteins.	Arsenicals
Respiratory poison	Which inactivates respiratory enzymes.	Hydrogen cyanide
Nerves poison	Involved in the conduction of impulses.	Malathion
Chitin inhibition	Chitin synthesis in pests is inhibited by chemicals.	Diflubenzuron

V. Origin-based classification

The classification is primarily based on the foundation's resources. Pesticides are Chategorised into two types based on its origins: Chemical pesticides and bio-insecticides. The primary benefits of using organic insecticides are unique to the host.Those are most effective against the pest that is being targeted and related organisms, where a variety of results are caused by chemical pesticides on a large group of non-target organisms. Bio-insecticides are generally less toxic, decompose easily, and are only needed in small amounts. Chemical pesticides causing significant pollutions in the environment because these are highly poisonous and are not usually biologically degradable.Other significant importance of the use of bio-pesticides is , they are much greater resistance to genetic change in plant crops. This demonstrates pesticide resistance is not a major threat,which is uncommon with chemical pesticides. Bioinsecticides are insecticides produced from natural sources, such as organisms, crops, and microorganisms. They are divided into three categories.

A. Microbiological pesticides

Microbial pesticides contain effective ingredients that are microorganisms such as bacteria, fungus, or protozoan. These exterminate insects by causing microorganism to release toxins either by infecting the beings. Bacillus thuringiensis (Bti) bacterial toxin and live bacteria Bacillus sphaericus most common pesticides in this groups . The typical method of activity is to produce a a protein that adheres to the binding site in the mosquito larvae intestine causing starving. The application of these 2 bacterial toxins to kill larvae of black flies and mosquitoes, respectively.

B. Plant - incorporated protectants

Plants produce this pesticide category naturally. Furthermore, genetic engineering is used to introduce the pesticide-production gene into the plant. As a result, plant-incorporated protectants refer to the pesticide as a result of such a introduced plant and genetic material (PIPs).

C. Biochemical insecticides

These third group of pesticides are natural pesticides, called biochemical pesticides materials contain nontoxic pest prevention mechanisms. These includes sex pheromones of insects and a wide range of concentrates of aromatic plants (work by attracting insect pests into traps).

VI. Classification based on the range of target it kills

It divides pesticides into 2 groups : selective pesticides and broad-spectrum pesticides. Broad spectrum pesticides kill a variety of pests and organisms that aren't the target. They don't discriminate and have the ability to kill Reptiles, fish, domestic animals, and birdsTwo examples of broad-spectrum pesticides are chlorpyrifos and chlordane. Selective pesticides, on the other hand, are pesticides that kill only one or a few pests while Other organisms are unaffected or have little effect.. 2, 4-D is an example of a selective pesticide because it only broad-leaved plants are affected while losing greenery crops alone ssalone.

VII. Categorisation according to various preparations of pesticides

preparations for pesticides are made up of both Ingredients can be either active or inert. AI is done safely, extra efficient, and easier to quantify, combine, and implement by incorporating inanimate additives (such as water, hydrocarbons solvent, cleaning fluids, spewers, decals, and thickeners). In addition, less difficult to work with. To create such pesticides, one pesticide group may be combined with another non-pesticide group. One pesticide group is combined with another pesticide group to improve one pesticide's efficiency and offer greater defense against a pesticide chemical. Which can also control multiple pesticides with a single application of a single pesticide. Pesticide formulations are classified as solids ,gases and liquids most popular preparations are included in Table 8.

Table 8: The most commonly used formulations of pesticides

Sl. No.	Type of Pesticide Formulations	Description	Typical Uses	Examples
		Solids		
1.	Bait	Mixture of active ingredient and food that attracts pests in the form of meal, pellets.	For insects, rodents, birds, or slugs	Maxforce FC, Niban, Amdro etc
2.	Dry flowable (DF)or Water Dispersible Granules (WDG)	Mixture of active ingredient and inert material made into small pellets, granules. Forms a suspension in water.	Sprays for insect's disease and weed control.	
3.	Dust (D)	Finely ground inert particles i.e., talc, clay, and volcanic ash.	Spot treatment, Animal powder, Seed treatment	Deltadust, Ficam D, Drione, Sevin D, Malathion D
4.	Ear tag/ Vapour Strips	Solid material with volatile or solid active ingredient slowly release vapour	Animal ear tag, Fly control	
5.	Granules (G or GR)	Dry inert materials (i.e., clay, walnut shell, corn cob) combined with active ingredient	Sol treatment for insect or weed control.	Dursban G, Talstar G
6.	Pellets	Inert material containing active ingredient like granules, but has more uniform shape and weight.	For control rodents, slugs	
7.	Soluble powder (SP)	Dry powder or granules which dissolves in water to spray solution.	Mostly sprays for insects & weed control.	
8.	Wettable powder (WP or W)	Finely ground inert ingredients with active ingredient Forms a suspension in water.	Sprays for insect, disease and weed control.	Demon WP, Tempo WP
		Liquids		
9.	Aerosols (A)	Usually contain small amount of active ingredient and a petroleum solvent. Two main Types: 1. Ready-to-use small pressurized containers. Fog generators are not under pressure; equipment breaks the liquid into fine mist or fog.	Spray cans used for home/ garden insecticides. Used in greenhouses or mosquito control.	Wasp Freeze, ULD-BP-50, Ultracide, Ultraguardian
10.	Emulsifiable concentrate (EC)	Contains active ingredient, petroleum solvent and emulsifiers. Pesticide is suspended in spray which is milky coloured.	Sprays for insect, disease and weed control	Chlorpyrifos EC Cypermethrin EC.
11.	Flowable (F)	Finely ground particles suspended in an inert liquid carrier. Forms suspension in spray mix like WP	Sprays for insect, disease and weed control	Carbaryl AF
12.	Gel	Semi liquid emulsifiable concentrate	Herbicides and insecticides	
13.	Micro- encapsulated materials	Consists of pesticide surrounded by aplastic coating. Mixed with water and sprayed. Break down slowly.	Insecticide and pheromone sprays	Demand ES
14.	Solution(SN)	Active ingredient dissolved in liquid. Forms a solution in spray mix.	Sprays for weed control.	Premise SC, Termidor SC, Bora-care
15.	Ultra-low volume concentrate (ULV)	Liquid with very high concentration of active ingredient designed to be used as is or *slightly diluted in ULV equipment.*	Insecticide sprays inside greenhouses or for forestry.	
		Gases		
16.	Fumigants	Volatile liquids or solids packaged to release a toxic gas	Greenhouses, mushroom houses, graineries. Pre-plant soil treatment for soil borne pests.	Phosphine, Phostoxin,
		Packaging		
17.	Water-Soluble Packets	Pre-weighed amount of WP or SP formulation in a special plastic bag which dissolves in spray tank and releases contents.		Demon WP

VIII. Classification according to the pesticide toxicity

A pesticide's ability to cause harm. harm to an organism is referred to as its toxicity. It is determined by exposing target organisms to varying doses of a specific formulation, in accordance with the hazardous health effects associated with toxic pesticide behaviour. They were chategorised into 4 types . WHO conducted a lab experiment on rats to administer pesticide doses (orally and dermally). Table 9 shows the four categories, ranked from lowest to highest toxicity and expressing a specific toxicity level.

Table 9: The lowest to highest toxicity and expressed a certain toxicity level

WHO Type	Toxicity Level	LD_{50} for the Rat(mg/kg Body Weight)		Examples
		Oral	Dermal	
Type Ia	Extremely hazardous	<5	<50	Parathion, Dieldrin
Type Ib	Highly hazardous	5–50	50–200	Eldrin, Dichlorvos
Type II	Moderately hazardous	50–2000	200–2000	DDT, Chlordane
Type III	Slightly hazardous	>2000	>2000	Malathion

IX. Paths of human exposition to pesticides

Pesticide usage can take place directly or indirectly through occupational, agricultural, and household use. Pesticides may also be consumed by members of the general public as a result of their use on golf courses, near major roads, and so on. Pesticides primarily reach humans via different sources.

A.A. Skin contact

One of the most prevalent and efficient methods of pesticide exposure for pesticide applicators. Pesticide dermal uptake during pesticide blending, packing, removal, and/or rinsing can occur as a result of a splash, spill, or spray drift. Absorption may occur when exposed to a large amount of residue. When workers handle concentrated pesticides (e.g., mixing), the risk of skin absorption increases . Pesticide absorption is more vulnerable in some appendages, like the genital region , the ear tube. As a result, the rate of dermal absorption varies by body part (see Figure 4).

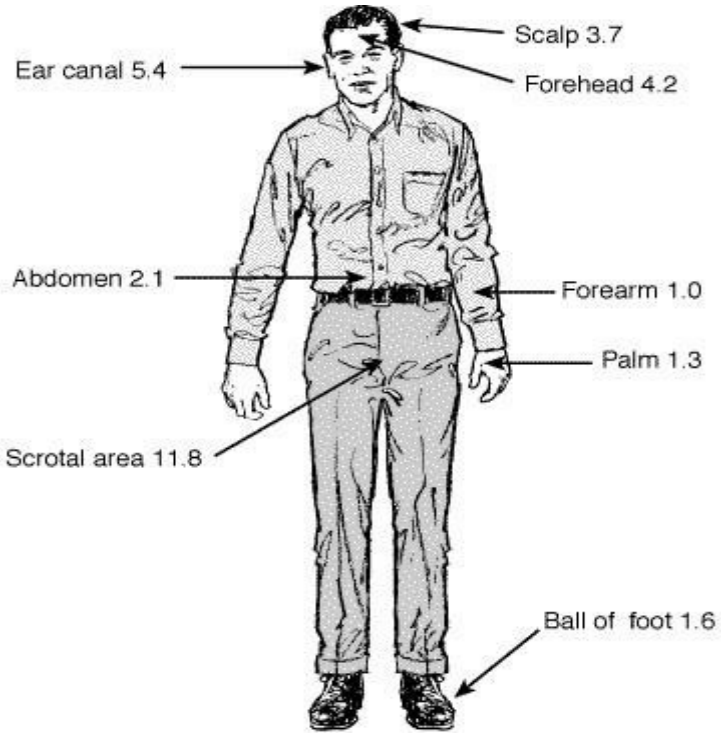

Figure 4: Pesticide dermal exposure in various parts of the body

B. Mouth exposition

First most dangerous poisoning can occur when a pesticide is applied via mouth exposition. Mouth pesticide exposition is typically the result of carelessness or on purpose. Important situations of unintentional oral intake occurred once pesticides have been moved from their primary site labeled to a jar unlabeled tin. Many people have died as a result of pesticides stored in Containers of beverages in pesticide-polluted bottles. While intake (by mouth) becomes less frequent, this can consequence the most serious toxicosis. There are innumerable stories of people sipping pesticides that were unintentionally placed in an unmarked vial or soft drink pint glass . If workers do not wash their hands after consuming food , they may unknowingly ingest pesticides.

C.Respiratory exposure

Pesticides have a high potential for respiratory exposure as a result of the existence of organic solvents. Breathing enough pesticides results in serious problems to the nasal passages, larynx, and mouth and lung tissues. However, when Pesticides are splashed on the crops large droplets with standard application equipment, the risk of pesticide exposure is generally less. However, because smaller droplets are generated when When a condensed substance is utilised using limited devices, the possibility of respiratory secretions exists . It is recognised that pesticides can cause significant respiratory exposure when used in enclosed spaces. In addition, as the temperature increases, the vapour levels of different pesticides rise, exacerbating the exposition.

D.Eye exposure

Main risk of chemical injury to eye tissues is high. Several pesticides were indicated to be widely consumed enough amounts by the eyes to trigger severe damage,even Disease that is potentially lethal. Due to the personal particle's weight and size granular pesticides are especially hazardous to the eyes. Pesticide At increased speeds, pellets may keep bouncing off greenery or other surface speeds when applied with high efficient equipment, causing significant eye damage. When going to measure or blending heavily focused or toxic pesticides, it is also necessary to wear eye protection. Wear protective face shields or goggles when appliying pesticides or avoiding eye exposure to dust. The risk of chemical injury to eye tissues is high.

IX. Pesticides and human health

Threat analysis of pesticide human health consequences is neither a simple or terribly accurate procedure due to variations in exposure times and levels, pesticide kinds (in aspects of poisoning), combinations or cocktails employed in the ground, as well as the geospatial and climatic conditions of farming areas where pesticides are used. Furthermore, No matter if pesticides discovered in drinks and food pose a significant risk in regards to human health remains a source of great scientific debate.

Pesticides can cause acute and chronic health effects that can manifest weeks a long time after exposure. Eye burning, itching, blistering, loss of vision, vomiting, and vertigo, diarrhoea, and also death some of the immediate physical consequences. Chronic chages include cancer, congenital malformations, fertility problems , immunotoxicity, Toxicology in the brain and growth, and endocrine system disruption. Several individuals are more vulnerable to pesticides compared to all others Pesticide toxic effects is identified to just be greater in babies and young children than in grownups. Farmers and sprayers are also listed as a result of increased exposure.

A. Acute (immediate)health effects

Pesticide exposure causes immediate health effects such as nose, throat, and skin irritation, which causes burning, stinging, and itching, as well as rashes and blisters. Common side effects include nausea, dizziness, and diarrhea. Some pesticides, particularly pyrethrin/pyrethroid, organophosphate, and carbamate pesticides, can cause severe allergic reactions in asthmatic individuals. Pesticide poisoning symptoms are frequently confused with cold or flu symptoms. Because sicknesses triggered by pesticides resemble or Pesticide intoxications are similar to certain other chronic conditions frequently underrecognized and underreported. The instant signs could not be sufficient to warrant treatment prompt a person to seek medical care .

B. Long-term health implications

In addition to congenital malformations, fertility problems, and other pregnancy complications, health implications can also damage the internal organs, kidneys, respiratory system, and other important organs. Carcinoma and other tumours can also create.. It can be challenging to link pesticides to negative health outcomes because persistent impacts might not be evident for months at least, or even years after exposed. Pesticides have the potential to cause birth defects, stillbirth, Abortion by choice and fertility problems .Synthetic chemicals are chemical compounds that, at amazingly low concentrations, end up causing endocrine

disruption. Potentially exposed to these substances has been connected to similar results. chemicals. Figure 5 depicts the acute and chronic health consequences of pesticide exposure

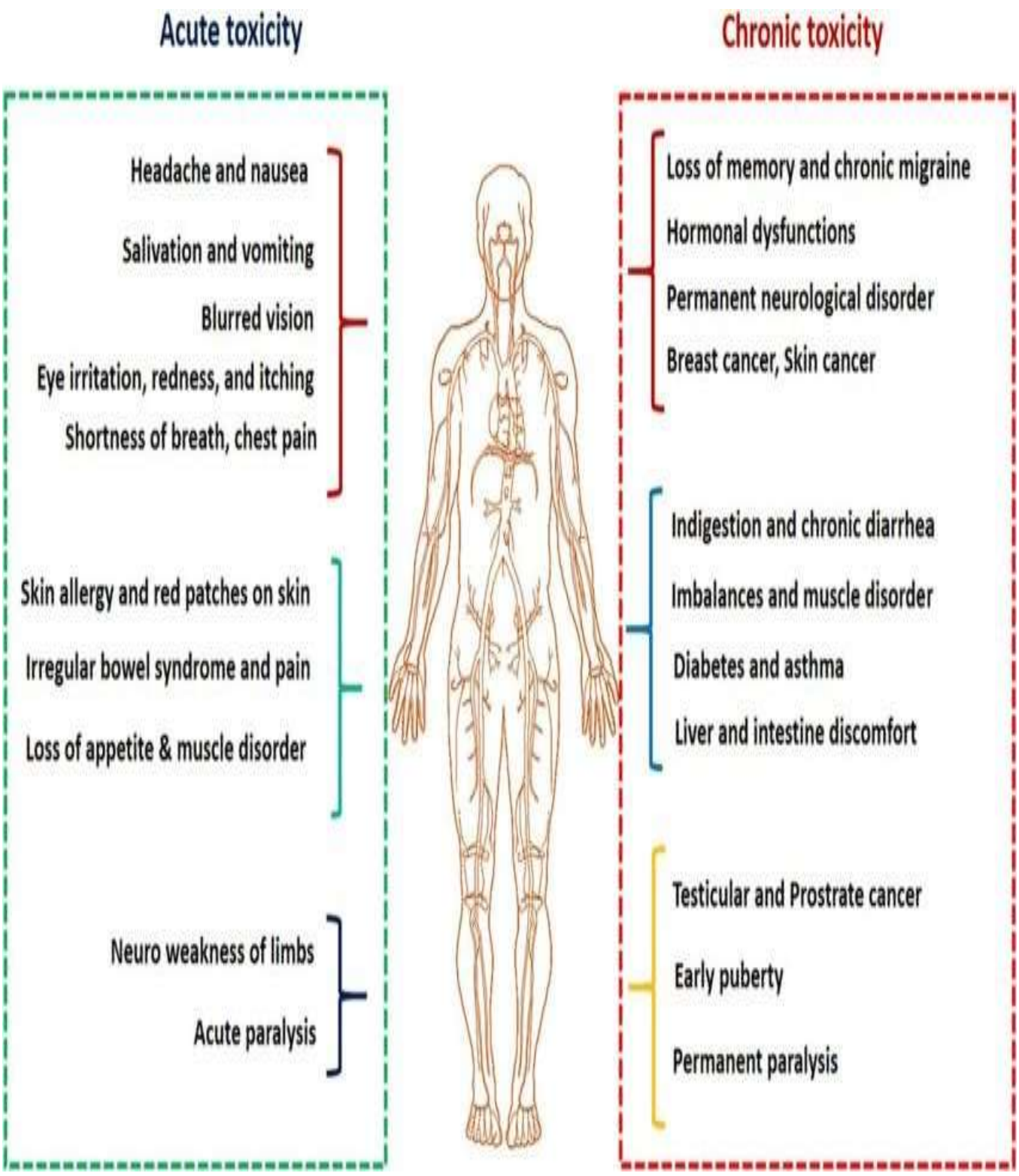

Figure 5: Health effect (acute and chronic) of pesticide

C. Kids are more susceptible to exposure

Minors do not merely"mini- grown ups." Because while still developing, their immune function, central nervous system, and organelles. Children were also more exposed to pesticide exposure. Children also have a lower ability to eliminate and remove toxins. Pesticides exposed to specific developmental stages will result in irreversible harm.

The physical systems and behavior of children increase their likelihood of recieving Being even more susceptible to pesticides than adults and exposed to further pesticides toxicity. The majority of pesticide exposure occurs Kids have access to the skin more more skin surface area per kilogram of body weight than adults. Adult people' breathing rates are slower than those of kids, so individuals faster breath pesticides from the air . Kids' behavior they are exposed to more pesticides as a result of their increased contact such as surfaces, yards, and play areas.

Human exposure, whether direct or indirect, can get both instant and lengthy medical consequences. Pesticide poisoning has been initially cited in India , in 1958 and in Kerala, in which the proportion has decreased even though more over 100 people got killed after consuming wheat flour polluted with parathion . skin cuts and scrapes, headaches, dizziness, dual eyesight, increased sensitivity, allergies,and other symptoms of acute pesticide poisoning can occur. Mexican agricultural workers applied pesticides primarily as triazines, and polychlorinated compounds experienced poisoning (20percent of total of the time) and a variety of physiological systems that were most likely caused by pesticide exposure. These effects, as well as their underlying mechanisms, are detailed below and tabulated in Table 10.

Table 10: Pesticide Toxicity Mechanisms and Implications

Organ system	Symptoms	General mode of action of pesticides
Respiratory system	Allergic rhinitis and bronchial asthma-like diseases	I. Sensitization to allergens due to their possible modulatory effect on T-cells
	Fall in the diffusing capacity, lower pulmonary volumes	II. Production of ROS due to pesticide induced oxidative stress
	Chest pain or stiffness, cough, dyspnea or short breath and laryngeal itch and pain	III. Peroxidation of lipid bilayer
	Chronic bronchitis	
Liver and kidney	Liver and kidney dysfunctions and RTI, heapatitis, dysponea and burning sensation	I. Oxidative stress leading to necrosis and apoptosis
	Heptomegaly	II. Disruption of glycolysis and fatty acid cycles
GIT	Gastroenteritic irritation, intense nausea, vomiting, and diarrhoea	
Skin	Blister, dermatitis, urticaria, hyperhidrosis, pruritus and swelling	Increased sensitization to allergens of various kinds due to their possible modulatory effect on T-cells
	Chloracne in skin	
	Skin rashes while applying pesticides	
	Tickling sensation	
Cardiovascular system	Arrhythmia and tachycardia	Oxidative stress
Nervous system	Headache, dizziness	I. Pesticide induced oxidative stress leads to neural degeneration and less ATP production which finally leads to apoptosis
	Emotional irritability, mental obtundation, cognitive impairment and convulsions, coma	
	Drowsiness, lack of attention confusion, lethargy, anxiety, emotional lability, depression, visuomotor integration, verbal abstraction, perception constructs fatigue and irritability. Occurrence of neonatal hypotonia or hyporeflexia	II. Inhibition of enzyme acetylcholinesterase
		III. Another possible mechanism is that pesticide induced oxidative stress leads to protein aggregation of plasma membrane Ca^{2+}-ATPase and its degradation
	Alzhiemer's disease and Parkinson's disease	IV. Exposure to pesticides leads to misfolding and aggregation of α-synuclien
	Suicidal tendency	
Reproductive System	Hypospadias, cryptorchidism, decreased penile length, low sperm counts disruption of male hormone signalling pathway	I. Endocrine disruption: Inhibition of natural ligands that bind to androgen receptors and androgen binding ligands, competitive inhibitor of androgen receptors
	Foetal death	II. Pesticide can enhance reactive oxygen species (ROS) and oxidative stress which finally leads to apoptosis of sertoli cells and germinal cells, hence disturbing the spermatogenesis process

D. Neurotoxicity of pesticides

Many pesticides, such as organophosphates, organochlorine, and tshose who intake carbamates threat damage to there own nervous system pesticides have shown acute or chronic, long-term or short-term nervous system effects through high or low-level exposure during adulthood, childhood, or in utero exposure, leading to very chronic nervous disorders such as Parkinson's disease. Any adverse effect on the central or peripheral nervous system caused by chemical, biological, or physical agents is defined as neurotoxicity. Despite the fact that cancer has been the primary concern about chemicals, the neuro-behavioral effects of chemical aversion remain a major current concern and importance. It was previously thought that the antagonistic effects on brain development reflected the same fundamental mechanism that underpins integral noxiousness, namely cholinesterase inhibition and subsequent cholinergic hyperstimulation. However, the accumulation of evidence over the last decade has entangled a slew of other mechanisms that rely alternately on direct targeting of incidents specific to the developing brain. Acetylcholine accumulation at cholinergic synapses as a result of AChE (acetylcholinesterase) inhibition causes muscarinic and nicotinic receptor overstimulation. Furthermore, acetylcholine is essential for brain development..

Children of the same tribe who have been exposed to a cocktail of pesticides, including organophosphates, had impaired short-term memory, hand-eye coordination, and drawing ability, despite the fact that they were obscured. Similarly Preschoolers from agricultural fraternities performed worse on motor speed and latency tests than those from urban fraternities in the United States. OPs can cause intermediate syndrome, which occurs in 20-50 percent of cases of acute OP poisoning, in addition to acute cholinergic syndrome. The intermediate affliction is not a direct result of AChE inhibition, and its explicit elemental mechanisms are unknown, but it could be caused by nicotinic receptor desensitization caused by prolonged cholinergic stimulation. Convulsions, speech disorders, insomnia, drowsiness, coma, anxiety, irritability, depression, impaired memory, and personality disorders are among the CNS manifestations of OP intoxication. Dizziness, mental confusion, headache, weakness, convulsions, and coma are examples of cholinergic symptoms on the CNS. Some OPs have been linked to short-term peripheral nerve diseases. after an intoxication incident.

XI . Major health effects of pesticides

A. Asthma

Several pesticide expositions has been linked to pulmonary hyperresponsiveness and breathing problems in clinical and observational studies. Pesticides can aggravate asthma symptoms by causing Inflammatory, hormone disruption, immunodeficiency, or discomfort. Moreover, the majority of pesticides are only mildly allergenic, limiting their Few pesticides have the potency to harm the bronchial mucosa, but many have the capacity to sensitize airways in people exposed to them. Asthma is caused by a number of factors, including pesticide exposure in childhood. Even at low levels of exposure, some pesticides, for example, can trigger an asthma attack.

B. Parkinson's disease

Parkinson's disease begins while dopamine is not available produced by it's significant Dopaminergic nigral neurons in the central nervous system, resulting in a loss of co - ordination,tremor, and control of muscle certain pesticides,such as rotenone and paraquat, have been found to disrupt these dopaminergic neurons, inhibit dopamine production, and cause Parkinson's disease. Parkinson's disease is linked to pesticide exposition. Pesticides, their metabolites influence mitochondrial function and xenobiotic metabolic activity resulting in Parkinson's disease. In a study, discovered that rotenone causes neurodegeneration in the peripheral nervous system as well as a slowing down of the conduction rate of the motor nerve, particularly the nerves of sciatica. A absence of dopamine a breakdown the synapse of chemical in the nerves of the periphery are the causes. Figure 6 depicts pesticides' role in Parkinson's disease.

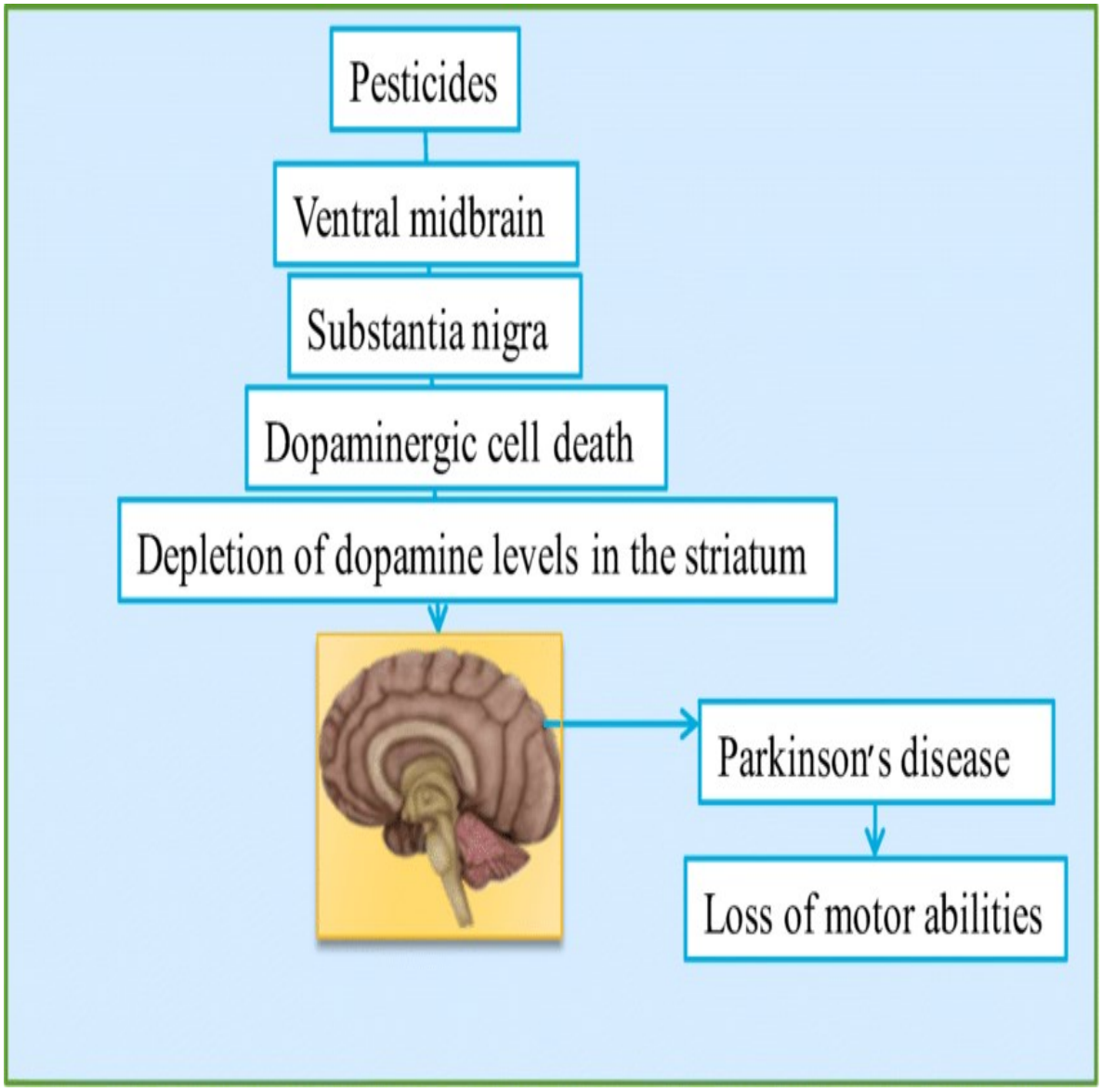

Figure 6: Action of pesticides in parkinson's diseases

C. Alzheimer disease

Dementia is a mental decline that has become more common in recent years. One theory for the current increase is that it is the result of increased pesticide exposure, which may have accelerated dementia pathogenesis. However, other research suggests that pesticides interfere with microtubules and cause hyperphosphorylation, which results in Dementia. Organophosphate and organochlorine pesticides have shown to affect acetylcholinesterase control in synaptic junctions in the systems of nerves, potentially leading to Dementia, particularly in older people. Another study discovered that certain herbicides interfere with the bioenergy actions of mitochondria, reductive actions and oxygen metabolic activity contribute to Dementia.

D. Diabetes

According to emerging scientific evidence, environmental pollutants may have an impact on diabetes. Pesticide exposure, particularly exposure to organochlorines and metabolic products, is thought to raise the chance of acquiring diabetes type II and its complications. Pesticide exposure (Organic contaminants that remain, CPOs) regardless of age or gender, and the prevalence of type 2 diabetes in adults.or BMI. Such chemicals focus on fat cells, which could be one of the factors that make obese individuals more susceptible to develop the disorder., when higher will be COP concentrations in body, more fat there is in the body.

E. Pesticides and cancer

Much well-conducted etiological research has discovered a best connection to pesticide exposition to cancer incidence. Pesticide use, both commercial and household, significantly raises the possibility of developing cancer of blood, papillary cancinoma, brain metastases, or other malignancies. Cooperative actions in molecular biology, pesticide toxicology, and epidemiological research aid in our comprehension of the carcinogenicity of pesticides. Many pesticides, including sulfate, organochlorines, and sulfates, have been shown in studies to be carcinogenic, while lindane as well as chlordane are melanoma agents.

F. F. Pesticide exposure and pediatric leukemia

Blood cancer is a disease that produces an increase in the production of white blood cells. Several studies have discovered that parental pesticide contact triples the effects of young child blood cancer. Primary caution lymphoblastic leukemia, according to the Children's Cancer Study Group, is parental pesticide exposure, and children who are regularly exposed to household pesticides have a Risk rose by 3.5 times of developing leukemia. Pesticides can in children whose mothers have the disease had contact with them while pregnant; small children under the age of one year are seven times more likely to develop leukemia if exposed to permethrin pesticides. Blood cancer can be results when babies whose moms were comes to contact with Permethrin at the time of pregnancy, another insecticide is used to protect Keeping pets free of bedbugs while also killing mosquitoes. This chemical may affect insects' nervous systems and has been linked to cancer in some studies. A change in an infant's DNA causes childhood leukemia. According to the findings, the period between pregnant women and eleven months of nursing was critical for kids, who have a twofold increased risk of developing leukemia if ex.sed..

G. Cancers of the bladder and colon

Compounds consisting of the aromatic ring which are in use as pesticides are known to be cancer-causing and cause cancers in the bladder in those who are exposition to them. Adducts of aromatic ring amines can be observed in a variety cancers. According to research, people who are exposed to insecticides have a 137 percent increased risk of developing bladder cancer. Aromatic amines have been discovered to be used as herbicides in plants in other studies. Cancer strikes 2,907 of the pesticide's 20,646 users. Cancer occurrence is determined by the ferocity and duration along with exposition. has been discovered the occurrence rates of colorectal cancer are rising by 78% in unprotected individuals. According to the findings of those studies, the use of aromatic amines (imazethapyr and imidazolinone compound) in the prevention of bladder and colon cancer is limited.

H. Thyroid cancer

Pesticides such as A number of heterocyclic organochlorine pesticides, including dioxins, plasticizers, PBDE ethers (PBDEs), and interfere with maintaining stable hormone levels affecting hormone balance, transportation, and metabolism. Other chemical compounds with similar structures to releasing hormones of the thyroid attach to there own cellular binding sites and severely damage the thyroid organ.

I. Cerebral cancer

A study of 767 patients for the incidence of brain cancer discovered that 462 had a malignant tumor and 195 had glioblastoma., two various forms of brain cancer. Later investigation into about there illness via questionnaires reveals a lack of connection between glioma and pesticide exposition. Meningioma has a specific relation to exposure to pesticides in the past in females as opposed to males. Herbicide usage significantly leads to the development of meningioma. Pesticide exposure earlier, all through, or just after childbirth was linked to a greater likelihood of evolving children's brain melanoma, based on research that increases the risk of developing tumour in the brain significantly. In professional applicators, exposure to a termiticide followed by contact with another pesticide doubles the chance of developing brain cancer. Other pesticides raise the risk of tumours in brain by 30 pecentage, also termiticides raise the risk by 50%.

J. Pesticides and reproductive health

Pesticide exposure interrupts to sex, reproductive capacity, and reproductive capacity all through susceptible life stages

in organisms. It can results in a variety of negative outcomes, including congenital malformations, teratogenic effects, genetic abnormalities, genetic problems, malignancies, pregnancy complications, reduced fertility, miscarriages, unexplained stillbirths, and birth problems.

K. Men's Reproductive System

Toxins in the environment that bind to steroid receptors disrupt the development and function of the testis, epididymis, and other sex organs. ROS induction by environmental contaminants is toxic to the male reproductive system. Oxidative damage, specifically A crucial molecular basis for deoxyribose nucleic acid damage is the production of oxidants by organic pollutants or intracellular sources contributing to bad sperm features, a deficiency in semen quality, and sexual dysfunction. pesticides with organochlorines, also known as xenohormones, are responsible for a wide range of abnormalities affecting the male reproductive identity, including undescended testicle, cryptorchidism, reduced male genital size, reduced testicles, and inguinal canal weight, low number of sperm or efficiency, as well as the ability to disrupt the male hormone signaling pathway.

L. Reproductive System of Females

Pesticides attempt to impede the function of the female androgen and/or estrogen receptors, disrupting the hormonal balance required for proper functioning. Hormone concentration modulation, ovarian cycle irregularities, and pregnancy complications are some of the pesticides that disrupt the female reproductive system's endocrine system.

M. Reproductive Abnormalities in Offsprings

Pesticide exposition to either parent relates to the fetus and offspring malformations. Pesticides can enter both paternal and maternal reproductive tissues and organs, causing pre-fertilization harm to the progeny and continuing all stages of lactation and pregnancy. In high enough doses, pesticides may make you more vulnerable to boy-child deficiency, unplanned pregnancy, birth defects, or fetal growth retardationIn addition, there is a mother’s exposure timing that follows a predictable pattern among untimely fetal deaths due to defects present at birth. Pesticide exposure posed the greatest risk of fetal death due to congenital anomalies from the third to eighth week of pregnancy. Endosulfan exposure slowed sexual maturation and prevented the synthesis of sex hormones in young males.

XII.Minimize the adverse effects of pesticides

Despite ongoing disagreements about pesticide risks, people appear to be becoming more concerned about pesticide use, particularly its impact on the health of people and the state of the environment. The primary cause of this increased concern was decreased faith in industrial and agricultural production techniques, as well as government regulations aimed at protecting the environment and human health considering a specific existence as a result. Uncertainty in determining pesticide safety, scientific evidence, policy guidance, and expert opinion in determining pesticide beneficial use within acceptable risk limits you must reflect. The potential for reducing the environmental risk associated with pesticide use is extremely limited. Lowering hazards necessitates reducing production or increasing the use of pesticide alternatives. As a result, strategies to reduce pesticide-related risks impose costs on the agricultural sector, affecting agricultural product prices. Paul and colleagues accomplished this. It was determined which value function-based production model was used. This means that the requirements for reducing pesticide-related environmental risks impose significant costs on agriculture. These costs are directly related to increased demand for effective pesticides at certain levels of agricultural production, which, along with the increased costs, are driving innovations to improve pesticide quality. Concerns about the impact effects of pesticide use on human health and, consequently, the environment prompted, European Union to create a "Thematic Strategy for Sustainable Pesticide Use." Farmers have also begun developing supplemental methods of crop management to mitigate the negative effects agriculture impact on the environment and human health (mainly based on the use of pesticides to protect crops). Integrated Crop Management (ICM) in particular provides guidelines used by farmer organizations to implement measures to produce safe produce while respecting the environment. Furthermore, the ICM includes measures to implement Good Agricultural Practices (GAPs), product safety, worker health, and hygiene, comprehensive measurement traceability, and specific environmental safeguards. To control pests in animals, ICM employs complementary pest control methods (e.g., plant biological control, bug and fungal resistance, and other societal or physical precautions). Or pesticides against other agricultural ecosystem components, reducing weed populations to levels below economic damage.

CONCLUSION

Pesticides are currently used extensively in agriculture. It is also used to boost production in apartments and other public places by protecting crops from potential threats. With increased use, you can keep insects and other unwanted creatures at bay. Because of their long half-life, pesticides are also consumed by humans. These chemicals do doesn't quickly deteriorate and end up in the environment posing a serious threat to people worldwide. The improved Incidents of Parkinson's disease and Alzheimer's disease, in addition to other neural malformations such as loss of memory, interference with the body's neural coordination,and as a result of this disorder, paralysis of other body systems such as digestion and respiration, suppression or increased production of the production High response or no response to a neurotransmitter from the such as receptor sites neurotransmitters are due exposition to pesticides. In utero exposition of the fetus to congenital genetic anomalies. The diseases begin when their DNA is hampered during progression. The endocrine disruption was discovered to be a side effect of childbirth and afterward. The most dangerous effects of pesticides on both children and adults are caused by their carcinogenic effects. In children, this exposure causes leukemia, bladder, cloned, thyroid, and brain cancers, and in adults, it causes leukemia, bladder, cloned, thyroid, and brain cancers. We discovered that pesticides are extremely dangerous to humans, but due to their economic and medical importance, we cannot completely prohibit or restrict their use. However, by implementing particular precautions for agricultural workers and

avoiding young one and preggers, we can reduce their exposure and impact.

REFERENCES

[1].Raanan, R., Harley, K.G., Balmes, J.R., Bradman, A., Lipsett, M., Eskenazi, B., 2015. Early-life exposure to organophosphate pesticides and pediatric respiratory symptoms in the CHAMACOS cohort. Environ. Health Perspect.123 (2), 179–185.

[2].Ratner, M.H., Farb, D.H., Ozer, J., Feldman, R.G., Durso, R., 2014. Younger age at onset of sporadic Parkinson's disease among subjects occupationally exposed to metals and pesticides. Interdiscip. Toxicol. 7 (3), 123–133.

[3].Rauh, V., Arunajadai, S., Horton, M., Perera, F., Hoepner, L., Barr, D.B., Whyatt, R., 2011. Seven-year neurodevelopmental scores and prenatal exposure to chlorpyrifos, a common agricultural pesticide. Environ. HealthPerspect. 119 (8), 1196–1201.

[4].Rivero, J., Luzardo, O.P., Henríquez-Hernández, L.A., Machín, R.P., Pestano, J., Zumbado, M., Boada, L.D., Camacho, M., Valerón, P.F., 2015. In vitro evaluation of oestrogenic/androgenic activity of the serum organochlorine pesticide mixtures previously described in a breast cancer case-control study. Sci. Total Environ. 537, 197–202.

[5].Rull, R.P., Ritz, B., 2003. Historical pesticide exposure in California using pesticide use reports and land-use surveys: an assessment of misclassification error and bias. Environ. Health Perspect. 111 (13), 1582–1589.

[6].Saldana, T.M., Basso, O., Hoppin, J.A., Baird, D.D., Knott, C., Blair, A., Alavanja, M.C., Sandler, D.P., 2007. Pesticide exposure and self-reported gestational diabetes mellitus in the Agricultural Health Study. Diabetes Care 30 (3), 529– 534.

[7].Salvatore, A.L., Bradman, A., Castorina, R., et al., 2008. Occupational behaviors and farmworkers' pesticide exposure: findings from a study in Monterey County, California. Am. J. Ind. Med. 51, 782–794.

[8].Samanic, C.M., De Roos, A.J., Stewart, P.A., Rajaraman, P., Waters, M.A., Inskip, P.D., 2008. Occupational exposureto pesticides and risk of adult brain tumors. Am. J. Epidemiol. 167 (8), 976–985.

[9].Sarwar, M., 2015. The dangers of pesticides associated with public health and preventing of the risks. Int. J. Bioinfor.

[10].Sever, L.E., Arbuckle, T.E. and Sweeney, A. Reproductive and developmental effects of occupational pesticide exposure: the epidemiologic evidence. Occup. Med.: State Art Rev. 1997; 12:305–325.

[11].Smargiassi, A., Mutti, A., De Rosa, A., De Palma, G., Negrotti, A. and Calzetti, S. A case-control study of occupational and environmental risk factors for Parkinson ‘ s disease in the Emilia-Romagna region of Italy. Neurotoxicology 1998; 19:709–712.

[12].Smith, J.L., Garry, V.F., Rademaker, A.W. and Martin, R.H. Human sperm aneuploidy after exposure to pesticides. Mol Reprod Dev 2004; 67:353–359.

[13].Swan, S.H., Kruse, R.L., Liu, F., Barr, D.B., Drobnis, E.Z., Redmon, J.B., Wang, C., Brazil, C. and Overstreet, J.W. Semen quality in relation to biomarkers of pesticide exposure. Environ Health Perspect 2003; 111:1478–1484.

[14].Tanner, C.M. and Goldman, S.M. Epidemiology of Parkinson’s disease. Neuroepidemiology 1996; 14:317–335. [15].Tetrud, J.W., Langston, J.W., Irwin, I. and Snow, B. Parkinsonism caused by petroleum waste ingestion. Neurology 1994; 44:1051–1054.

[16].Uitti, R.J., Snow, B.J., Shinotoh, H., Vingerhoets, F.J.G., Hayward, M., Hashimoto, S., Richmond, J., Markey, S.P.,Markey, C.J. and Calne, D.B. Parkinsonism induced by solvent abuse. Ann Neurol 1994; 35:616–619.

[17].Van Wijngaarden, E., Stewart, P.A., Olsham, A.F., Savitz, D.A., Bunin, G.R. Parental occupational exposure to pesticides and childhood brain cancer. Am J Epidemiol 2003; 157: 989–997.

[18].Vigliani, E.C. Carbon disulfide poisoning in viscose rayon factories. Br J Ind Med 1954; 11:235–241. [19].White, F.M.M., Cohen, G.G., Sherman, G. and McCurdy, R. Chemicals, birth defects and stillbirths in New Brunswick: associations with agricultural activity. Can Med Assoc J 1988; 138:117–124.

[20].Yang, W.L. and Sun, A.Y. Paraquat-induced cell death in PC12 cells. Neurochem Res 1998; 23:1387–1394. [21].Zahm, S.H. and Ward, M.H. Pesticides and childhood cancer. Environ Health Perspect 1998; 106(suppl 3):893–908.[22].Giordano, F., Dell'Orco, V., Giannandrea, F., Lauria, L., Valente, P., Figà-Talamanca, I., 2006. Mortality in a cohort of pesticide applicators in an urban setting: sixty years of follow-up. Int. J. Immunopathol. Pharmacol. 19, 61–65.

[23].Gunnell, D., Eddleston, M., Phillips, M.R., Konradsen, F., 2007. The global distribution of fatal pesticide self-poisoning: systematic review. BMC Public Health 7, 357–371.

[24].Hansen, M.R., Jørs, E., Lander, F., Condarco, G., Schlünssen, V., 2014. Is cumulated pyrethroid exposure associated with prediabetes? A cross-sectional study. J Agromedicine. 19 (4), 417–426.

[25].Henneberger, P.K., Liang, X., London, S.J., Umbach, D.M., Sandler, D.P., Hoppin, J.A., 2014. Exacerbation of symptoms in agricultural pesticide applicators with asthma. Int. Arch. Occup. Environ. Health 87 (4), 423–432. http://dx.doi.org/10.1007/s00420-013-0881-x.

[26].Hernández, A.F., Parrón, T., Alarcón, R., 2011. Pesticides and asthma. Curr. Opin. Allergy Clin. Immunol. 11 (2), 90–96.

[27].Hernández, A.F., Parrón, T., Tsatsakis, A.M., Requena, M., Alarcón, R., López-Guarnido, O., 2013a. Toxic effects of pesticide mixtures at a molecular level: their relevance to human health. Toxicology 307, 136–145.

[28].Hernández, A.F., Gil, F., Lacasaña, M., Rodríguez-Barranco, M., Tsatsakis, A.M., Requena, M., Parrón, T., Alarcón, R., 2013b. Pesticide exposure and genetic variation in xenobioticmetabolizing enzymes interact to induce biochemical liver damage. Food Chem. Toxicol. 61, 144–151. http://dx.doi.org/10.1016/j.fct.2013.05.012 Epub 2013 May 18.

[29].Hoppin, J.A., Umbach, D.M., London, S.J., Henneberger, P.K., Kullman, G.J., Alavanja, M.C., et al., 2008. Pesticides and atopic and nonatopic asthma among farm women in the Agricultural Health Study. Am. J. Respir. Crit. Care Med. 177 (11–810.1164/ rccm.200706-821OC).

[30].Jaacks, L.M., Staimez, L.R., 2015. Association of persistent organic pollutants and non-persistent pesticides with diabetes and diabetes-related health outcomes in Asia: a systematic review. Environ. Int. 76, 57–70.
[31].Jacobsen, C.S., Hjelmsø, M.H., 2014. Agricultural soils, pesticides and microbial diversity. Curr. Opin. Biotechnol. 27, 15–20.
[32].Jaga, K., Dharmani, C., 2006. Ocular toxicity from pesticide exposure: a recent review. Environ. Health Prev. Med. 11 (3), 102–107.
[33].James, K.A., Hall, D.A., 2015. Groundwater pesticide levels and the association with Parkinson disease. Int. J. Toxicol. 34 (3), 266–273.
[34].Kavvalakis, M.P., Tzatzarakis, M.N., Alegakis, A.K., Vynias, D., Tsakalof, A.K., Tsatsakis, A.M., 2014. Development and application of GC–MS method for monitoring of long-term exposure to the pesticide cypermethrin. Drug Test. Anal. 1, 9–16.
[35].Gilden, R.C., Huffling, K., Sattler, B., 2010. Pesticides and health risks. J. Obstet. Gynecol. Neonatal. Nurs. 39 (1), 103–110. http://dx.doi.org/10.1111/j.1552-6909.2009.01092.x. PMID 20409108
[36].Richter Elihu D, Chlamtac Noga. Ames, pesticides, and cancer revisited. Int J Occup Environ Health. 2002 Jan-Mar;8(1):63–72.
[37].Abhilash PC, Singh N (2009) Pesticides use and application: an Indian scenario. J Hazard Mater 165:1–12 [3A]. Mathur SC. Future of Indian pesticides industry in next millennium. Pesticide Information. 1999;24(4):9–23. [Google Scholar]
[38].Andersson H, Tago D, Treich N (2014) Pesticides and health: A review of evidence on health effects valuation of risks, and benefit-cost analysis.Toulouse School of economics 24: 203: 295.
[39].Van der Werf, H.M.G. Assessing the impact of pesticides on the environment. Agr. Ecosyst. Environ. 1996, 60, 81-96.
[40].Wilson, C.; Tisdell, C. Why farmers continue to use pesticides despite environmental, health and sustainability costs. Ecol. Econ. 2001, 39, 449-462.
[41].Pimentel, D. Environmental and economic costs of the application of pesticides primarily in the United States. Environ. Dev. Sustain. 2005, 7, 229-252.
[42].Maroni, M.; Fanetti, A.C.; Metruccio, F. Risk assessment and management of occupational exposure to pesticides in agriculture. Med. Lav. 2006, 97, 430-437.
[43].Soares, W.L.; Porto, M.F.D. Estimating the social cost of pesticide use: An assessment from acute poisoning in Brazil. Ecol. Econ. 2009, 68, 2721-2728.
[44].Ecobichon, D.J. Pesticide use in developing countries. Toxicology 2001, 160, 27-33.
[45].Ibitayo, O.O. Egyptian rural farmers' attitudes and behaviors regarding agricultural pesticides: Implications forpesticide risk communication. Risk Anal. 2006, 26, 989-995
[46].Asogwa, E.U.; Dongo, L.N. Problems associated with pesticide usage and application in Nigerian cocoa production: A review. Afr. J. Agr. Res. 2009, 4, 675-683.