University of Jordan
Faculty of Medicine

Medical Committee
The University of Jordan

Community Medicine

Lecture Title:	Pesticides				
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- **Pesticides**
- pest: unwanted things , cide: killing

Definition: Certain substances used to kill unwanted things

- these unwanted things are not always insects , they might be plants , rats … etc (common mistake to consider all pesticides as insecticides)

-However, the practical part of this definition might not be 100% like the meaning of the word; if pesticides kill unwanted things, then we shouldn't see them anymore (because pesticides are used worldwide in huge amounts), but yet you still see these unwanted things, this means that we don't always kill them. Sometimes we control or repel or reduce number *you might put an ointment on your skin >> to repel mosquitoes *. Although pesticides means killing, ending and finishing yet that doesn't happen always ,and what happens is a certain type of control on a certain location.

There are some materials that are not pesticides actually but considered as on of them for example :

- plant Growth regulators: they are used to regulate the growth of plants in order not to have much of these unwanted plants , yet it can't be used as killers for pests ! but still considered as pesticides . (e.g: : defoliant, desiccants)

Now it is important to remember that cide in pesticide means kill, this can be dangerous if not used properly.

[in 1989 meeting: we were asked to evaluate worldwide impact of pesticides on public health, they had to come up with definition, and their definition was 3 pages, and by FAO (food and agriculture organization) they have the same definition, 3 pages....]

-As doctors we should know about pesticides because they are dangerous if not used properly, we can't just say that these pesticides are for unwanted things only; we've seen that there is certain abuse of those chemicals, used against human beings as mass destructive weapons.

In the past , Drs used to report any case of pesticides toxicity as Fendol poisoning *well known drug* , and they used to give the patient ampoule of atropine (sometimes they give 2 ampoules) >> this is totally wrong .

-Atropine is used in surgeries to reduce the solution excretion from the body.

When trying to figure out the number of pesticides toxicity cases we used the number of atropine ampoules used to come up with an answer . >>>> VERY high number of cases .

The use of pesticides:

- agriculture (to control pests that might affect the crops)
- at home to control annoying pests
- keeping of cloth from season to season , we add "balls" of naphthalene (they are not naphthalene but called anti moth agents) to keep small creatures like moth away so they won't damage the cloth
- public health programs (cars spread them in streets to control the growth of pests)

- used in transporting and storage of food items .. eg: wheat (10-12 years ago Jordan had a problem with one wheat shipment that contained large amount of animal remains, rats, mice, snakes.. and had a problem with it.. the cause is that these people who brought this shipment to the country didn't use enough pesticides to prevent these creatures from living inside these materials). if you put a sack of wheat in your kitchen you'll find a rat.
- controlling of different goods in trading and transporting cloth or food items (we should use pesticides to protect them)
- Preserving of wood (furniture that is treated/soak with pesticides last longer than the ones that are not...)
- Massive destructive weapons (bad usage)
- pesticides used in animal husbandry : use it to prevent microbes and other creatures found , for animals they bath them to kill ectoparasites (ectoparasites: parasites that live outside the body of animals; cows or sheep)
- forest control: to reduce the thickness (slow the growth) of a certain forest or construction of highway through the forest; instead of cutting those trees you inject certain pesticides in them and they fall down without damaging other things, so it's used widely.

Pesticides is one of the major problem worldwide, although it was of good intention we create these materials (they help in maintaining the systems), yet they cause problems that affect different things including environment, water, soil, other creatures and human beings.

History:

-Used 500 B.C. people created certain pesticides ex: sulfur (the first chemical used for such a purpose). Sulfur is used in agriculture (grapes), used to protect it from insects that might affect it) and still used till now >>powder thrown on plants *التعفير*

-Smokers/ nicotine sulfate has been extracted from tobacco and used as pesticides, farmers use tobacco leaves and put them around the farm and burn them because these creatures run away from nicotine repellant for them.

-after that pyrethrum was introduced :new line of chemicals .

-1939 there was a major breakthrough in pesticides, it was the discovery of DDT, a very effective insecticides, a savior for mankind, treated water related diseases and diseases transmitted by insects (malaria, typhus) was very wide spread and effective. Later we discovered the bad impact of it on our health so many countries stopped using it .

-1950 the usage of pesticides increased to 50 times more (widely)

**Millions of tons are used worldwide >> that's why pesticides are one of the major environmental and health problems in the world .

NOTEs :

-the universal language between Drs is not the commercial name but the active ingredient's name

-many materials that we use are not tested enough.

- amount of pesticides used at homes = double that used in agriculture .

Classification:

1. The group of the targeted pests (insecticides, rodenticides..)
2. Mode of action (the way they act/affect the targeted pests -important to doctors and pharmacists)
3. The chemical nature of pesticides
4. Pesticides formulation (powder, Baits, solution..)
5. Reentry period or interval (REI)
6. LD50
7. Signal words (gives an impression about how bad or safe this pesticide is)

First **: Target:**

1-insecticides: (insecticide is a part of pesticides), they affect creatures by:

- touching (as soon it get in touch with this material it starts dying, because insects have their skeleton outside so it's directly affected, DDT works this way..) doesn't need a mechanism to enter insects
- swallowing (to kill the insect it must eat the material, put in the places where they feed)
- Systematic effect (can be absorbed from different parts of the body> to the inside> to the system and cause the effect)

__broad spectrum: no specific target so it kills other creatures that I don't want to kill, (one of the problems affecting Israeli side is the death of bees from the pesticides used on the other side (Jordan) so they are losing food item (which is an expensive thing,, not only for the honey but also pollination).

(a doctor whom is not very well accustomed with the types of antibiotics would give a broad spectrum antibiotic hoping that the microbe will be affected)

__Narrow spectrum: Specific target :

- chitin synthesis (prevents the formation of the skeleton of insects)
- insect growth regulator (prevents appropriate growth)
- pheromones : chemicals that are used in sexual attraction .

-Insecticides examples:

- organophosphates
- carbamates
- pyrethroids
- microbials
- petroleum oils
- natural organics

>>most are found in the house.

2- Herbicides: more in developed countries because they are expensive>> it kills the herbs.

3- Rodenticides: found in houses, kill rodents (in the form of colorful baits>> problems: children may come with rodenticides poisoning). There's a control center in Jordan that is responsible for the contol of the rodents, put the bait in the sewer system, (most mice are sewer mice).

When using large amounts of rodenticids (warfarin) this won't kill more than one mouse >> y ? mice are clever creatures when they find a new source of food they send one of them to discover whether it's safe or not , so if it was large dose and enough to kill the mouse the rest of them won't eat it ! so we use small doses that kill mice after a while .

The mechanism of action: it causes bleeding of these creatures (internal bleeding). The children affected with this poisoning suffer bleeding (blood in feces), it affects the clotting system..

It's antidote: vitamin K

4- Miticides.

5- Fungicides.

6- Nematicides. For killing nematodes >> warms in the soil that destroy roots of plants .

- used as fumigants

-once a child took a bottle of this fumigant and throw it into a fire >> poisoning of 120 girls

7- Virucides.

8- Molluscicides.

Second: Mode of action:

1. Contact poisoning.
2. Stomach poisoning. Eaten >> start to eat
3. Systemic poisoning. If the pesticide was for systemic target >> washing out the vegetables is not effective)
4. Translocate : (put on the soil> into water >reaches the roots> action in the leaves).
5. Fumigants: fumes.
6. Selective pesticides>> narrow spectrum.
7. Nonselective pesticides> broad spectrum.

Best of luck