



University of Jordan
Faculty of Medicine



Medical Committee
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Community Medicine



Lecture Title:	Workplace hazard groups				
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Workplace hazard groups

- **Mechanical hazard** which is classified by two means :

A. <u>By type of agent :</u>	B. <u>By type of damage :</u>
<ul style="list-style-type: none">- Impact Force- Confined space- Slips and trips- Falling on a pointed object- Compressed air/high pressure- Entanglement- Equipment-Related injury	<ul style="list-style-type: none">- Crushing- Cutting- Friction and abrasion- Shearing- Stabbing and puncture

- **Falling down :**

- This is a kind of accident whereby it might have more frequent in certain type of jobs than the others. Here in construction industries, we know that it's the most active industry in many part of the world and sometimes the economical situation it depends on the increasing in buildings and constructions.

- الاردن في بعض الاحيان يقاس النمو(الوضع) الاقتصادي بسرعة او بالزيادة عدد البناء ..

- China has huge construction comparing to the world that's why it have good economical situation .

- The construction industry accounted for **67% of all fatalities to workers** as a result of falling from a height in 2002/2003.

- the outcome of this falling , most of the time it will be death . As an example about this, the bad jokes between the workers at the top of the building while they doing the construction process, it can lead to death as a result of falling down.

- so the number of deaths that could happen in the tower varies according to the number of workers , the effort , the high and large of these buildings .

--- Other than deaths we have a lot of injuries that can happen.

In the period, 2002/2003 the total number of reported major injuries to employees was 28,426.

All in all **14%-15% of major injuries** that took place among in all worker in the USA was due to falling down.

Ladders accounted for the greatest number of major injuries because they use it to climb from one level to another and if you visit one of these structure sites, you feel there is always problem due to that those ladders are handmade, so sometimes these ladders have missteps or broken one and the workers don't pay attention about it .. So it will have problems and usually they will end with falling down.

■ Falling down has more than one type :

- A- Falling from one level to another (such as falling from the construction and ladders).
- B- Falling at the same level (which called **slipping**) such as slipping on the ground or misstep... which means when you go either up or down on stairs and you skip stair... which is usually occurs when you are lifting objects that obstructs your vision usually you are not seeing enough and you will hit at the end ...

● **Slipping** it is caused by :

- 1- **Different fraction levels.** When you are walking on a certain friction and suddenly, you are walking on a less frictional ground such as ceramic and then you are not adjusted to walk in this ground and you might slip.
- 2- **Slipping might be due to fluids** (oil , water, detergents, etc..) on the floors and this thing usually happens in working places and that's why cleaning person must put caution or signs to avoid injuries that caused by slipping on a wet floor .

- C- **Trips** means that you have things on the floor due to bad housekeeping inside the work place. Sometimes these might be thrown on the floor randomly (hazardly), that's why you may have a problem from these things due to falling on it and sometimes these objects are sharp object like what we found in mechanical places .

■ Physical Hazards :

- Noise
- Vibration
- Lighting

- Barotraumas (Hypobaric/Hyperbaric pressure)
- Ionizing Radiation
- Electricity
- Asphyxiation (الاختناق)
- Cold stress (Hypothermia)
- Heat stress (Hyperthermia)

- Those are physical hazards that can be found in the work place, each one of them has a certain problem.

****P.S.** Some of the ***mechanical hazards*** can cause *acute problems* but in the ***physical hazard*** it makes *chronic problems* which mean it takes more time to have the symptoms.

■ **Electrical Injuries :**

- Injuries from artificial electricity have been reported for almost 300 years
- The first recorded death caused by electrical current from an artificial source was reported in 1879, when a carpenter in Lyons, France.
- *Electrical burns* account for **4% to 6.5%** of all admissions to burn units in the United States and for approximately 1000 fatalities per year in the United States even with the rules, laws and regulations, still we have that much people are dying due to electrical burns .

- Electrical shock can cause local burn. It can pass through the body then it might reach the heart and interfering with the conductivity of the heart and cause fibrillation and causing death (heart arrest due to electrical shock which is stronger than the electrical of the heart).
- This is one of the outcomes when you are attached to the current which lead to contraction of your muscles and you cannot pull your hand out.

People have a wrong opinion about the electrical shock, they believe that electricity catches the human being, but the fact is that the human is the one who catches the electricity.

--- How to save somebody who's exposed to an electrical shock?

- You need some force to save him from the electrical shock. But you have to be careful while doing this because the electrical shock might hit you. E.g. this is what happens in factories when workers try to save someone and they are shocked while saving him because nobody told them about the right

instructions to follow for saving someone that is exposed to an electrical shock.

- So you can use piece of wood or budge him via your shoulder in a way that there will not be any contact between your body and his so it won't catch you
- In the first aid at the hospital we have to make sure that we don't get more victims, so if you don't know the ways to save the person just don't do it.

■ **Noise :**

- It's a combination of unwanted sounds.

--- Why we consider is as a physical hazard?

- Because it creates a circular changes and move inside the air and these changes its reach your ear.

Notice that the outer part of the ear in the human being doesn't use to collect the sound but in the animals, they are capable to move their ears in deferent directions to collect the sound.

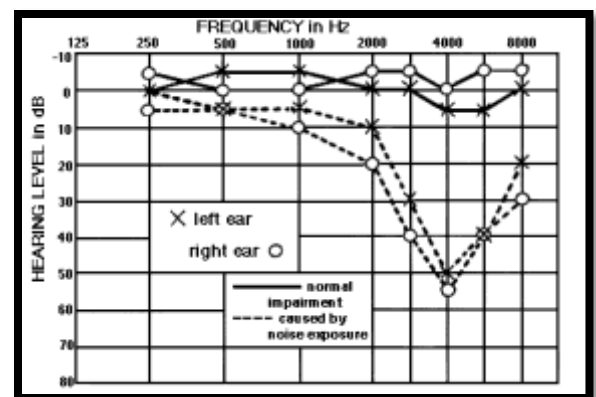
That's why if someone have an accident and lose his ear, the hearing will not be affected.

- Anyway the sounds move in waves in the air. it reaches eardrum (the end of outer ear) which lead to moving it – allow to change those sound waves into movement of something in your body –
- When the drum is moving, vibrations will translate to the three small bones (middle ear) which are called ossicles. after that it will hit the inner ear through the oval window (which is responsible for taking vibrations and communicating them to the inner ear)
- The inner ear contains the cochlea, which is a spiral shaped, ***endolymph*** - fluid filled tube -, in which waves propagate from the *base* (near the middle ear and the oval window) to the *apex* (the top or center of the spiral).
- When the waves pass through the endolymph, it start to move (like sea waves), and according to the strong of these wave, it will affect certain hearing cells that are swimming inside the fluid and each group of these cells

is responsible of certain hearing frequency and accordingly, those cells will be affected and transfer this feeling to the hearing nerves to the brain and the brain is learning by time to explain what kind of sound coming to him.

- **Hearing loss** that can come out of work place caused by :
 - Sudden impacts of very high noise and this might caused temporally loss of hearing due to elevation the threshold of hearing and by this you cannot hear the noise below the threshold for awhile ... so it might you need more time to restore normal hearing.
 - Damaging or rupturing of tympanic membrane (eardrum) which consider as a conductivity problem.
- Hearing loss is divided into **sensory** or **conductivity** problem.
 - Conductive means that one of the part of ear – such as ossicles - ; they could not be able to move any more that’s why some of pregnant women cannot hear due to ossification of ossicles which is preventing them from right movement.
 - The wax that is filling your ear may lead to conductivity problem because the sounds cannot reach to the inner ear.
 - Damaging to the hearing nerves is considered as a sensory problem, which is very hard to back to the normal level of hearing.
- How we can examine the hearing?
 - Using audiogram which is used to draw the hearing of the person in certain bowed and according to it we can diagnose the person to know if he has a problem or not ..

- If we need to examine a person who has problem in his hearing cells (sensory problem) using the audiogram, there will be a sudden dip at 4000 frequency, this is diagnostic for occupational hearing loss.



- Hearing loss might be associated with aging process... That's why when you need to diagnose somebody; you have to compare the result of audiogram to result of young person that has normal hearing level...
- If any person has sensory hearing loss, he will not be able to hear for his life, that's why we have to make frequent audiograms for workers to prevent them from reaching this complex situation.

Noise isn't always responsible for having drops only, but it's sometimes having psychological and physical IMPACTS such as:

- Secrete more HCl
- Secrete more adrenaline
- The heart becomes beating more
- Hypertension (the most is in textile industries).
- Having cardiovascular diseases (Heart attacks)

■ How can you measure the noise inside the work place?

- By using a small machine called sound level meters.

Decibel (dB): is a unit of measurement of the noise and sounds

- Suppose we have two sources of noise in a work place, one of them is 90 dB and the other is 92 dB, so how much the noise that the workers are exposed to it?
 - It is not (182 dB). We have a formula that is used to calculate the result without using a direct summation, that's why the result could be 95 dB, 96 dB or 97 dB.
- ***In Jordan***, the level of noise allowed in ***work place is 85 dB for 8 hours work***.

--- If you are allowed to work in 85 dB for 8 hours. How many hours can you work in 90 dB?

- You are allowed for 6 hours.
- If it is 95 dB, you are allowed for 1 hour work and so on ...

P.S. there is no certain proportionality to decrease the number of working hours when you increase the Decibel.

■ **Vibration :**

- The movement of the body or part of the body up and down of certain reference level.

Vibration could be:

- Partial body vibration: where part of your body vibrated only.
- Total body vibration.
- The most common one is partial body vibration such as arm vibration when you use *pneumatic drills* or *electrical saw* either when you move your hand up and down or forward and backward from the zero level (original references).
- Vibration maybe becomes worse especially for smokers and in cold weather, because this vibration will affect vascularity of the blood supply to that part of the body.
- Some smokers and ladies because of genetic factor, they might inherit narrow blood vessels, and that's why during winter times, they feel very bad pain on the tips of their fingers (**Raynaud's phenomenon**).
- Raynaud's phenomenon: where the blood vessels are narrow due to the cold weather and this will lead to pain and changing in the color of the tips. They might be whitish or bluish, it is depend how bad it is.
- For men smokers they might have these problems after a while , they start to have narrow blood vessels due to damaging of peripheral blood vessels because of smoking .
- Vibration is doing the same thing; it will reduce the amount of blood supply that's why they have problems in their fingers in their legs and arms.
- A good doctor might recognize that when he feels that the temperature of the arm of this person is lower than the temperature of his body.
- The joint will be affected due to continuous movement of the joint.
- Carpel tunnel syndrome: in the wrist joint, the tendons are responsible for the limiting space in this joint, so if there is any fluid accumulation inside the

wrist joint, it will press on the nerves which lead to having numbness in the fingers and might have ulceration (palm) then other joints other than wrist.

- **Total body vibration** : when the whole body are moving up and down when the persons are driving bulldozers or heavy trucks
 - In the developed cars , they have a good shocks to reduce the vibration of the body
 - So by the time, these vibrations might cause deformity in the skeleton in your back, so when you visit a parking area for truck drivers whom might be drive for 8 hours, they have deformity in the vertebral column/scoliosis (due to continuous pressure + bad position) and might associated with some movement of the GI fluids (abnormal secretion of fluids + abnormal intestinal movement).

Sorry for Any mistakes...

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