

Occupational Health

1. Occupational hazards-

- An industrial worker is exposed to the following five types of hazards (physical, chemical, biological, mechanical & psychosocial hazards) depending upon the nature of the occupation.

Classification →

a) Physical hazards →

- These are the hazards occurring due to following physical agents:
 - Heat - the effects are heat syncope, heat cramps, heat exhaustion, heat stroke, heat hyperpyrexia, prickly heat, burns - etc.
 - Cold - Frost bite, Reynaud's disease, erythromelalgia, erythrocyanosis, trench foot, gangrene. - etc.
 - Light - Inadequate light - headache, eyestrain, eye fatigue
Excessive light - glaring, visual fatigue, blurring of vision, discomfort & accidents.
 - Radiation - Acute radiation syndrome, Leukemia, aplastic anemia, cancer, congenital defects, cataract, photophobia, microwave sickness, skin cancers - etc.
 - Atmospheric pressure - Caisson disease, syncope, aches, pains in joints, air embolism, deafness, ear pain, ear drum rupture, pulmonary edema, - etc.
 - Electricity - electric shock, burns, ventricular flutter.

b) Chemical hazards →

- Irritants - dermatitis, eczema, ulcerations, folliculitis...etc.
- Dusts - Pneumoconioses
- Fumes - metal fume fever
- Allergens - Allergic rhinitis, bronchitis, asthma, dermatitis, urticaria...etc.
- Ingestants - toxic hazards occurring from the metals like lead, arsenic, mercury, cadmium, manganese, chromium...

c) Biological hazards →

- From animals - zoonotic diseases → Anthrax, rabies, plague, Japanese Encephalitis, KFD, salmonellosis.
- From soil - tetanus, ankylostomiasis, gas-gangrene, anthrax, aspergillosis, mycetoma, malignant edema...etc.

d) Mechanical hazards →

- The mechanical hazards in industry centre around machinery, protruding and moving parts and the like.
- About 10% of accidents in industry are said to be due to mechanical causes.

e) Psychosocial hazards →

- These are due to failure of the worker to develop a healthy relationship with his co-workers, employees, management...etc.
- They are divided into 2 groups.
 1. Psychological (behavioral) changes - such as hostility, anxiety,

depression, aggressiveness, frustration. etc.

- ii. Psychosomatic ill health – such as neurosis, fatigue, propensity to peptic ulcer, HTN, asthma. etc.

Pneumoconioses-

- Pneumoconioses is a health hazard produced by inhalation of dust, leading to fibrosis and other complications.
- Factors influencing disease are :
 - Chemical composition of dust
 - Fineness
 - Concentration of dust in air
 - Period of exposure
 - Health status of person exposed.
- Threshold limit values are different for different dusts.
- Superimposition of infection (like TB) may influence pattern of pneumoconioses.
- Important dust diseases are :

a) Silicosis →

- Major cause of permanent disability and mortality among occupational diseases.
- Caused by inhalation of free silica dust.
- Risk increases with conc of free silica and duration of exposure.
- Pathology – dense nodular fibrosis (3-4 mm).
- Clinical features – insidious onset, cough, dyspnoea, chest pain,
↓ TLC.
- X-ray shows snow-storm appearance.

b) Anthracoosis →

- Simple pneumoconiosis - associated with little ventilatory impairment (may need 12 yrs exposure).
- Complicated pneumoconiosis - progressive massive fibrosis (PMF)
 - severe respiratory disability & premature death.
- Nearly twice the death rate of general population in coal miners.
- Compensable under Workmen's Compensation Act 1959.

c) Byssinosis →

- Due to cotton fibre dust exposure
- Symptoms - chronic cough, dyspnoea, asthma-like attacks.
- Prevalence - 7-8% in independent surveys.
- Large textile industry - ~35% affected among textile workers.

d) Bagassosis →

- Due to inhalation of bagasse dust (sugarcane fibre).
- Symptoms: breathlessness, cough, haemoptysis, fever.
- Can lead to fibrosis, emphysema, bronchiectasis if untreated.
- Preventive measures may include dust control, personnel protection, control moisture content of bagasse, medical control...etc.

e) Asbestosis →

- Due to inhalation of asbestos dust → pulmonary fibrosis.
- Asbestos fibres: 0.5 - 10 μm diameter, 20-500 μm length.
- Causes pulmonary fibrosis, mesothelioma, lung cancer.
- High risk in those exposed to cigarette smoke + asbestos.

f) Farmer's lung →

- Due to inhalation of mouldy hay or grain dust (moisture > 30%)
- Causative organism : *Micropolyspora faeni*
- Leads to allergic alveolitis – cough, dyspnoea, fever.
- Repeated attacks → chronic respiratory symptoms, fibrosis.

Prevention and Control of Pneumoconioses-

a) Medical measures →

- Pre-placement Examination :
 - Includes medical, family, occupational & social history, chest X-ray, ECG, urine and blood tests.
 - Helps select suitable workers and acts as a baseline for future comparison.
- Periodical examination :
 - Regular checkups for early detection of disease (e.g. chest X-ray, lung function).
 - Frequency depends on degree of occupational exposure.
- Medical & Healthcare Services :
 - First-aid facility in the factory.
 - Treatment of illness, rehabilitation, immunization.
 - ESI scheme provides health care for worker & family.
- Notification :
 - Compulsory notification of occupational diseases under Factories Act and Mines Act.
- Supervision of Work Environment :

- Periodic inspection of temperature, lighting, ventilation, noise, dust levels and sanitation.
- Health Education and Counselling:
 - Teach workers about hazards, personal protection, hygiene practices & early reporting of symptoms.

b) Engineering measures →

- Design of building:
 - Proper floor, walls, ceilings, ventilation, adequate space (500 cu.ft. per worker).
- Good House keeping:
 - Regular cleaning, waste disposal, white washing of walls.
- General ventilation - continuous fresh air supply (5 sq.ft/worker)
- Mechanization - reduce manual handling of harmful substances use enclosed systems.
- Substitution - replace harmful material with safer alternatives
- Dust control - wet drilling, dust suppression methods.
- Enclosures Isolation - enclose dust producing operations or isolate workers.
- Local Exhaust Ventilation - Capture dust / fumes at source and remove from breathing zone.
- Protective devices - Masks, respirators, gloves, aprons, goggles.

c) Legislation →

- Factories Act, 1948:
 - Prescribes ventilation, cleanliness, disposal of wastes, and

appointment of safety officers (for >1000 workers).

– Declares silicosis a notifiable disease.

• Mines Act, 1952:

– Silicosis and Coal Workers Pneumoconiosis are notifiable diseases.

• Workmen's Compensation Act, 1959:

– Provides compensation for pneumoconioses.

• Minimum Wages Act

• Employees State Insurance (ESI) Act.

2. Asbestosis-

– Asbestosis is also known as "diffused pulmonary fibrosis" which is caused by inhalation of asbestos fibres.

– Asbestos is a commercial name for 'fibrous materials' that are silicates of varying composition, combined with magnesium, calcium, iron, sodium or aluminium.

– Types of Asbestos →

• Serpentine or chrysotile variety (hydrated magnesium silicate) – safer form.

• Amphibole type (eg- crocidolite, amosite) – more hazardous.

Uses of Asbestos →

• Asbestos is used in cement, fire proof textiles, roof tiling, brake lining, gaskets, etc.

Sources →

• Mined in AP, Bihar, Jharkhand, Karnataka, Rajasthan, also imported from USSR, Canada, US, South Africa.

- Inhalation of asbestos dust particles deposit fibres in the alveoli causing

- Pulmonary fibrosis, leading to respiratory insufficiency & death.
- Carcinoma of bronchus, mesothelioma of pleura or peritoneum, cancer of GIT.

Risk factors →

- Combined exposure with cigarette smoking increases the risk of mesothelioma.

Radiological findings →

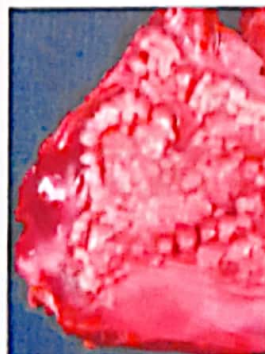
- Nodular fibrosis, ground glass appearance, shaggy-heart margins.

Complications →

- Respiratory insufficiency, death.
- Bronchial cancer, pleural & peritoneal mesothelioma.

Preventive measures →

- Use of safer type of asbestos.
- Substitution with other materials.
- Dust control, periodic medical examination & biological monitoring.



3. Anthracosis-

- Anthracosis is a condition characterized by the accumulation of carbon particles in the lungs & bronchial mucosa.
- It results from prolonged inhalation of smoke, coal dust and other air pollutants.

Epidemiology →

- Anthracosis is commonly observed in individuals living in urban areas & industrial environments where air pollution is high.
- It is especially prevalent among coal miners, tunnel workers & people exposed to heavy concentrations of smoke or dust particles over a longer period.
- It is frequently seen in areas where biomass fuels are used for cooking or heating without adequate ventilation.

Pathology →

- Inhaled carbon particles are engulfed by macrophages present in the lungs.
- These carbon-laden macrophages are transported through lymphatic channels & deposited in lung tissue and lymph nodes, giving a black discoloration (anthracosis).
- This causes lung tissue inflammation & fibrosis.

Clinical features →

- Anthracosis is generally asymptomatic & doesn't cause significant respiratory symptoms.
- But on prolonged exposure causes chronic bronchitis, emphysema

or pneumoconioses.

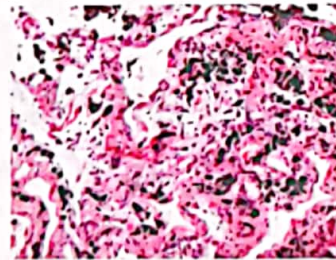
- Complications are fibrosis, airway obstruction & other chronic lung diseases.

Diagnosis →

- Chest X-ray shows diffuse radiopacity.
- Histopathological examination of lung tissue or lymph node shows carbon deposition.

Prevention & Control →

- Reducing exposure to smoke & dust by improving ventilation, using PPE in industrial settings, & promoting cleaner fuels for cooking and heating.
- Periodic medical examination.
- Biological monitoring.



4. Silicosis-

- Silicosis is the major cause of permanent disability and mortality.
- It is caused by inhalation of dust containing free silica or silicon dioxide.
- Silicosis was 1st reported in India from the Kolar Gold Mines.
- In mica miners of Bihar, 34.1% miners suffered from silicosis.

- The hazardous effects of dust on the lungs depend on chemical composition, fineness, conc of dust, duration of exposure & health status of the person exposed.

Pathology →

- Particles are ingested by phagocytes which accumulate and block lymph channels.
- Silicosis is characterized by dense nodular fibrosis, nodules ranging from 3-4 mm in diameter.

Clinical features →

- Insidious onset with symptoms like irritant cough, dyspnoea, and pain in the chest.
- Advanced disease causes impairment of total lung capacity (TLC).

Radiological findings →

- X-ray shows snow-storm appearance in the lung fields.

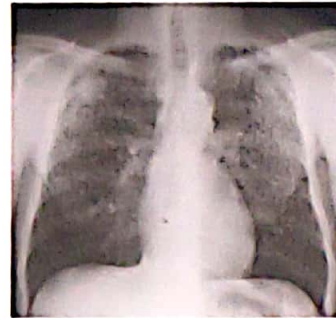
Complications →

- Silicotics are prone to pulmonary tuberculosis, termed silico-tuberculosis.
- It is hard to distinguish silico-tuberculosis from TB in sputum & postmortem findings.

Prevention & Control →

- Dust control measures are taken.
- Engineering controls such as proper ventilation, water sprays to suppress dust.
- Use of PPEs like respirators, masks, etc.

- Periodic medical examination for high-risk workers.



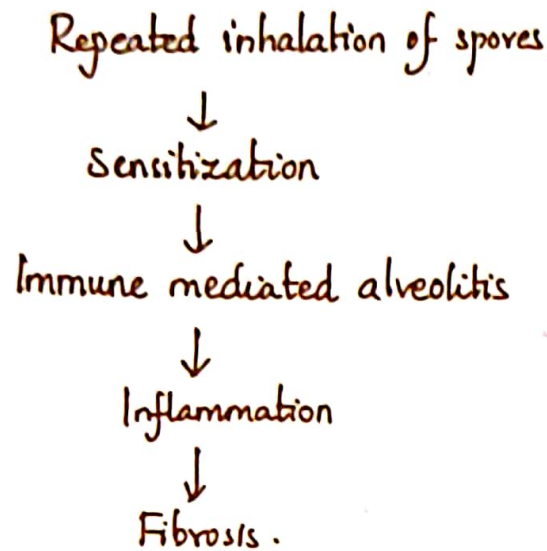
5. Farmer's Lung-

- Farmer's lung is due to the inhalation of the mouldy hay or grain dust.
- It is a type of hypersensitivity pneumonitis, an allergic lung disease.
- In grain dust or hay with a moisture content of over 30%, bacteria and fungi grow rapidly, causing a rise of temp to 40-50°C.
- This heat encourages the growth of thermophilic actinomycetes,
 - *Micropolyspora faeni*.
- The acute illness is characterized by general & respiratory symptoms and physical signs.
- Repeated attacks cause pulmonary fibrosis and inevitable pulmonary damage and cor pulmonale.

Risk factors →

- Farmers, agricultural workers, workers handling hay, straw, grain.
- Exposure to damp, moldy materials.
- Repeated or prolonged exposure increases risk.

Pathogenesis →

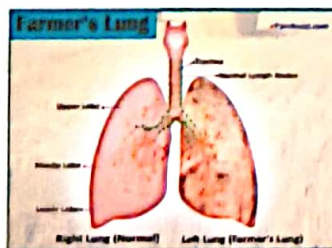


Symptoms →

- Sudden onset of breathlessness, dry cough, chest tightness, fever, chills, malaise.
- Clubbing and pulmonary fibrosis in advanced cases.

Diagnosis →

- Chest X-ray shows diffuse infiltrates, ground glass opacities.
- BAL showing lymphocytosis.



6. Bagassosis-

- It is a occupational disease of lung caused by inhalation of bagasse or sugarcane dust.
- The causative agent of Bagassosis is a thermophilic actinomycete *Thermoactinomyces sacchari*.

- The symptoms consist of breathlessness, cough, haemoptysis, and slight fever.
- Initially there is acute diffuse bronchiolitis.
- Skiagram may show mottling in lungs or shadow.
- Impairment of pulmonary function is noted.
- Early treatment causes resolution of the acute inflammatory condition of the lung.
- If left untreated causes diffuse fibrosis, emphysema and bronchiectasis.

Preventive measures →

- i) Dust control - measures for the prevention & suppression of dust such as wet process, enclosed apparatus, exhaust ventilation etc should be used.
- ii) PPE like masks or respirators with mechanical filters or with oxygen or air supply may be necessary.
- iii) Initial medical examination & periodical medical check-ups of workers are indicated.
- iv) Bagasse control by keeping the moisture content $> 20\%$ and spraying the bagasse with 2% propionic acid.

7. Ergonomics-

- Ergonomics is a new concept in Occupational health. It is concerned with human engineering.
- It is derived from Greek words, 'Ergon' means work and 'Namos' means law.
- It simply means 'fitting the job to the worker.'
- That means placing a worker in an environment, which is adopted to his physiological and psychological capacity.

Objectives →

- i. Improve efficiency and productivity at the workplace.
 - ii. Ensure safety and prevent occupational injuries & illnesses.
 - iii. Reduce physical and mental stress.
 - iv. Adopt work environments to human abilities & limitations.
- The application of ergonomics has made a significant contribution to reducing industrial accidents and to the overall health and efficiency of workers.

Examples →

- i. Healthcare ergonomics → adjustable hospital beds to help patients & reduce caregiver strain.
- ii. Industrial ergonomics → tools with cushioned handles to reduce vibration and hand strain.
- iii. Office workstation ergonomics → adjustable chairs with lumbar support to prevent back pain.

8. Sickness absenteeism-

- Sickness absenteeism is an important health problem in industry.
- It refers to absence from work or duty due to illness or health related problems.
- It may seriously impede production with serious cost repercussions, both direct as well as indirect.
- As the production techniques become more sophisticated, absenteeism tends to increase the adverse repercussions.
- It is a significant indicator to assess the state of health of workers and their physical, mental and social well being.

Causes →

- Socioeconomic causes** — Poor nutrition, lack of access to healthcare, family responsibilities, lack of motivation or job satisfaction.
- Medical causes** — Acute or chronic diseases, injuries, accidents, mental health issues.
- Work-related causes** — unsafe working conditions, poor ergonomics, exposure to harmful substances, excessive workload or long working hours.

Measurement of Sickness Absenteeism →

$$\text{Absenteeism rate} = \frac{\text{total no. of days lost due to sickness}}{\text{total working days}} \times 100$$

Incidence →

- India has workforce of about 20 million in registered factories.
- Research undertaken by National Productivity Council (NPC) into absenteeism showed a marked increase from around 8 to 13% in the early 1950s to around 15-20% or even more in recent years.
- The rate of absenteeism was reported to be 8 to 10 days per head per year.

Prevention →

- The prevention or reduction in sickness absenteeism would result in better utilization of resources & maximising the production.
- It is prevented / reduced by :
 - Good factory management & practices.
 - Adequate preplacement examination.
 - Good human relations.
 - Application of ergonomics.

9. ESI Act-

- The Employees State Insurance (ESI) Act is an important measure of social security and health insurance in India.
- It provides cash & medical benefits to industrial employees in case of sickness, maternity and employment injury.

Scope →

- Covers all power-using factories employing 10 or more persons, whether manufacturing or not.
- Extended to shops, hotels, restaurants, cinemas, theatres, transport establishments, newspaper establishments & private medical educational institutions employing 20 or more persons in some states.
- Covers manual, clerical, supervisory and technical workers earning upto 21,000 Rs per month.

Administration →

- Managed by ESI Corporation, an autonomous body.
- Union Minister of Labour is Chairman and secretary to the Govt of India is vice chairman.
- A standing committee assists in administration.
- The Director General is the chief executive officer.
- Medical Benefit Council is headed by the Director General of Health Services.

Network →

- 24 regional offices, 39 sub-regional offices, 1 divisional office, 2 camp offices, 592 branch offices, 800 cash offices and 422 inspection offices across India.
- Benefits delivered through 339 lakh family units and 7.85 lakh factories and establishments.

Finance →

- Run by contributions from employees and employers and grants from Central & State governments.

- Employer contributes 3.25% of total wage bill, and employee contributes 0.75% of wages.
- Employees earning below Rs. 176 are exempted from contribution.
- State govt share of medical expenditure is $\frac{1}{8}$ & ESI Corporations share is $\frac{7}{8}$ of the total cost.

Benefits to Employees →

- Provides benefits such as:
 - Medical benefit
 - Sickness benefit
 - Maternity *
 - Disablement *
 - Dependants *
 - Financial expenses
 - Rehabilitation allowance.

Medical benefit →

- Includes full medical care free of cost to insured persons during sickness, employment, injury & maternity.
- Services include
 - OP care
 - Supply of drugs & dressings.
 - Antenatal, natal and postnatal services.
 - Specialist services
 - Domiciliary care
 - Immunization, family planning, emergency & ambulance services.

- Care provided directly through ESI hospitals or indirectly through a panel of private medical practitioners.

10. Occupational Cancer-

- Occupational Cancer refer to cancers caused by prolonged exposure to carcinogenic substances, agents or environments during the course of work.
- Occupational cancer is a serious problem in industry. These are also called as Industrial Cancers.
- The most common types of occupational cancers are those of skin, lungs, bladder and blood forming organs (like bone marrow).

Agent factors →

- These are mainly chemical carcinogens, both organic & inorganic.
- Organic chemical carcinogens may cause lung cancer whereas inorganic ones result in skin cancer.

Environmental factors →

- Physical environment like heat & radiation also result in industrial cancers.

Influencing factors →

- The factors influencing the development of industrial cancers are potency of the carcinogen, duration of exposure, degree of personal hygiene and availability of preventive measures.

Features of Occupational Cancers →

- i. They occur in those sites, where the action of carcinogens is constant most intense and prolonged.

- ii. They appear after a prolonged exposure of about 10-15 years.
- iii. They can occur even after cessation of exposure, as in asbestos industry.
- iv. It is more among men than in women.
- v. The average age of incidence of occupational cancers is much earlier than that for cancers in general.
- v. The localization of the tumor is remarkably constant in any one occupation.
- vi. Maintenance of high standard of personal hygiene is very important in the prevention of occupational cancers.

Table 17.6 Types of occupational cancers, their carcinogens and related industries

Type of cancer	Carcinogen	At risk group in the industry
Skin cancer*	Anthracene, coal-tar, soot, pitch, oils and dyes, acids, U-V rays, X-rays.	Farmers, sheperds, fisherman, road-builders oil refiners, dye-stuff makers, radiology department staff, tar distillers, coke-oven workers.
Lung cancer	Arsenic, asbestos, beryllium, chromium, uranium, tobacco, coal tar, nickel.	Asbestos factory, uranium-mines, nickel-refineries, gas industry, tobacco industry.
Bladder cancer #	β -naphthylamine, benzidine, auramine, aromatic amines, para-amino diphenyl, hemotoxins.	Aniline industry, rubber industry, electric cable industry.
Leukemia	Ionizing radiations (X-rays and gamma rays), radioactive isotopes	Radiology department, atomic energy research station

Prevention of Industrial cancers →

- i. Elimination or control of industrial carcinogens.
- ii. Medical examinations
- iii. Inspection of factories
- iv. Personal hygiene measures
- v. Education of workers and management.
- vi. Inspection of factories
- vii. Licensing of establishments
- viii. Research.

11. Measures to prevent Industrial Accidents-

- i. Adequate preplacement examination.
- ii. Adequate job training
- iii. Continuing education
- iv. Ensuring safe working environment
- v. Establishing a safety department in the organization under a competent safety engineer.
- vi. Periodic surveys for finding out hazards.
- vii. Careful reporting, maintenance of records and publicity.

12. Occupational hazards of Agricultural workers-

- Agricultural workers have a multitude of health problems - a fact which is often forgotten because of the widespread misconception that occupational health is mainly concerned with industry and industrialized countries.

- The health problems of workers in agriculture may be :

- i) Zoonotic diseases - the close contact of the agricultural worker with animals or their products increases certain zoonotic diseases such as anthrax, brucellosis, leptospirosis, tetanus, TB, bovine & Q fever.
- ii) Accidents - Agricultural accidents are becoming more frequent as a result of increasing using of agriculture machinery. Insect and snake bites are an additional health problem in India.
- iii) Toxic hazards - Agriculture workers are exposed to toxic hazards from these chemicals (fertilizers, pesti-

cides, insecticides). Associated factors such as malnutrition & parasitic infestation may increase susceptibility to poisoning at relatively low levels of exposure.

iv) Physical hazards – Agriculture worker may also be exposed to extreme climatic conditions such as temp, humidity, solar radiation which may impose additional stresses on him.

v) Respiratory diseases – exposure to dusts of grain, rice husks, coconut fibres, tea, tobacco, cotton, hay, sugarcane fibres & wood causes diseases like byssinosis, baggassosis, farmer's lung and occupational asthma etc.

13. Factories Act 1948-

- The Factories Act 1948 was enacted to regulate the working conditions in factories with the aim of ensuring the health, safety, welfare and working hours of workers.

Objectives →

- i. To ensure health, safety and welfare of workers.
- ii. To prevent occupational diseases & accidents.
- iii. To regulate working hours and provide leave.
- iv. To safeguard women and children from hazardous working conditions.

Applicability →

- Applies to factories using power, and employing 10 or more workers, or without power employing 20 or more workers.

Provisions →

a) Health provisions —

- Cleanliness of factory premises.
- Proper ventilation & temp control.
- Adequate lighting and provision of clean drinking water.
- Separate and hygienic latrines & urinals.

b) Safety provisions →

- Fencing of dangerous machinery.
- Precautions during work near moving machines.
- Ensuring structural safety of buildings & equipment.

c) Welfare provisions →

- Washing and drying facilities for clothes.
- Sitting arrangements for workers.
- First aid facilities
- Canteens in factories employing ≥ 250 workers.
- Shelters, restrooms, and lunch rooms in factories employing ≥ 150 workers.
- Appointment of welfare officers in factories employing ≥ 500 workers.

Working hours →

- Maximum of 48 hrs / week and 9 hrs / day.
- Rest intervals during work hours.
- Spread over not exceeding $10\frac{1}{2}$ hrs.
- Payment for extra work.

Employment of Young persons →

- Employment of children below 14 yrs is prohibited.

- Restriction on working hours for adolescents.

Annual leave with wages →

- Workers entitled to annual leave with wages.
- Leave calculated based on attendance.

Penalties →

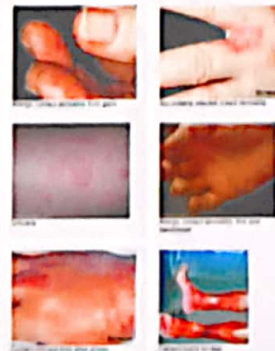
- Penalties for violation of health, safety, welfare, & working conditions provisions.

14. Occupational Dermatitis-

- Occupational dermatitis refers to inflammation of the skin caused by exposure to irritants or allergens in the workplace.
- It is one of the most common occupational diseases.

Causes →

- Physical - heat, cold, moisture, friction, pressure, X-rays, etc.
- Chemical - acids, alkalis, dyes, solvents, grease, tar, pitch, chlorinated phenols, etc.
- Biological - viruses, bacteria, fungi and other parasites
- Plant products - leaves, vegetables, fruits, flowers, vegetable dust, etc.



Types →

- i. Irritant Contact dermatitis – caused by direct damage to the skin due to exposure to irritants like acids, alkalies, solvents or detergents.
- ii. Allergic contact dermatitis – caused by immune reactions to allergens such as rubber, nickel, or chemicals used at work.

Risk groups →

- Construction workers (cement, lime exposure)
- Hairdressers (Chemical exposure).
- Healthcare workers (glove use, disinfectants)
- Agriculture workers
- Leather and textile workers
- Metal workers.

Clinical features →

- Redness, swelling, itching.
- Dry, cracked or scaly skin.
- Formation of blisters or ulcers in severe cases.
- Burning sensation or pain.
- Chronic cases lead to thickened or pigmented skin.

Prevention →

- a) Engineering controls –
 - Substitution of harmful chemicals with safer alternatives.
 - Proper ventilation & use of protective equipment.
- b) Administrative controls –
 - Education about safe handling of chemicals.

- Regular health check-ups.
- Job rotation to reduce prolonged exposure.

c) Personal protection-

- Use of gloves, protective clothing & creams.
- Proper hygiene and skin care.
- Immediate washing after skin exposure.

15. Pre-placement examination-

- Pre-placement examination is the foundation of an efficient occupational health service.
- It is done at the time of employment.
- It includes worker's medical, family, occupational and social history.
- A thorough physical examination and a battery of biological and radiological examinations are done.
- Tests may include chest X-ray, ECG, vision tests, urine and blood examination, special tests for endemic disease.
- A new recruit may either be totally rejected or given a job suited to his physical and mental abilities.
- The purpose of Pre-placement examination is to place right person in the right job, so that the worker can perform his duties efficiently without detriment to his health.
- Pre-placement examination will also serve as a useful benchmark for future comparison.
- In most countries, many workers start employment without the

benefit of a pre-employment medical examination.

Hazard	Undesirable conditions
(1) <u>Lead</u>	<u>Anaemia</u> , <u>hypertension</u> , <u>nephritis</u> , <u>peptic ulcer</u>
(2) <u>Dyes</u>	<u>Asthma</u> ; <u>skin</u> , <u>bladder</u> and <u>kidney</u> diseases; <u>precancerous lesions</u>
(3) <u>Solvents</u>	<u>Liver</u> and <u>kidney</u> disease, <u>dermatitis</u> , <u>alcoholism</u>
(4) <u>Silica</u>	Healed or active <u>tuberculosis</u> of lungs, <u>chronic lung disease</u>
(5) <u>Radium and X-rays</u>	Signs of ill-health, especially any <u>blood disease</u> .

16. Lead Poisoning-

Clinical features →

- Abdominal colic
- Obstinate constipation
- loss of appetite
- blue line on the gums
- Stippling of red cells, anemia
- wrist drop and foot drop
- insomnia, delirium, headache, mental confusion.



Diagnosis →

- Diagnosis of lead poisoning is based on
 - a) History of lead exposure.
 - b) Clinical features
 - c) Laboratory tests
 - i) Coproporphyrin in urine - $> 150 \mu\text{g/lit}$ suggests lead poisoning.
 - ii) Amino levulinic acid in urine - $> 5\text{mg/lit}$ indicates lead poisoning.

iii) Lead in blood and urine -

In urine - $>0.8 \text{ mg/lit}$ indicates lead exposure

In blood - $70 \mu\text{g/100ml}$ is associated with clinical symptoms.

iv) Basophilic stippling of RBC.

Prevention →

- Substitution of lead compounds with less toxic materials.
- All processes which give rise to harmful conc of lead dust or fumes should be enclosed & segregated.
- Adequate local exhaust ventilation system to remove fumes & dust promptly.
- Personal protection by masks or respirators.
- Good house keeping.
- Periodic examination of workers
- Lead concentration in working atmosphere is kept below $2.0 \text{ mg per 10 cu. metres of air}$.
- Personal hygiene i.e. handwashing before eating food in lead present places.
- Health education of workers.