



Unit-2

Extra Reading

Prevalent health related problems in rural areas due to agricultural practices

Perhaps more than any other occupational group, agricultural workers are exposed to a tremendous variety of hazards that are potentially harmful to their health and well-being. Accidents, infection with diseases spread by animals, exposure to agricultural chemicals and hazards due to extreme weather conditions are most common.

Before studying the various diseases and health hazards due to agricultural practices, given below is a list of different factors that influence farm work and enhance the risks of injury:

- Weather conditions - Farm work must often be completed regardless of weather extremes.
- Emergency services - Not readily available; often involves a delayed response due to isolation of work site.
- Isolation of work - Co-workers often not within sight or hearing distance when trouble occurs.
- Personal hygiene - Often required and made available in other occupations. Left up to individual workers in agriculture.
- Environmental hazards (noise, vibration, lighting, dusts, etc.) - Hazards and exposures are not monitored or regulated in agriculture as they are in most hazardous industries.

I. Respiratory Diseases

Farmers and other individuals involved in agriculture have the potential of being exposed to a very wide range of substances that can be inhaled, the following paragraphs elaborate on each of them.

Organic Dust

Airborne and settled particulate material of biological origin is often referred to collectively, in the field of occupational hygiene, as organic dust. The term is broadly defined as dust with an extremely heterogeneous composition. Organic dust may contain microorganisms, mycotoxins, or allergens; decomposition gases; pesticides; etc. The worker is exposed to organic dust when dealing with animals, harvesting, processing or storing grains or other plant matter, or when the soil, plants, or stables are treated with chemical agents such as pesticides and disinfectants.

The major pathological conditions suffered by the concerned workers when exposed to organic dust are as follows.

a). Extrinsic Allergic Alveolitis – *Extrinsic Allergic Alveolitis* (EAA) is a diffuse interstitial lung disease characterised by an allergic reaction of lung tissue several hours after the inhalation of organic dust. The EAA can be caused by the inhalation of organic dust containing particles with diameter of 2-5 μm . These dust particles reach deep into the respiratory airways and lung tissue. The organic dust contains various types of microorganisms such as thermophilic *Actinomycetes*, *Aspergillus spp*, *Alternaria spp*. etc. It is estimated that 5-10 per cent farmers are at risk of EAA. Some common forms of EAA are –

- Farmer's lung - Majorly caused due to over exposure to mouldy hay and the main allergens are Thermoactinomyces, Saccharopolyspora rectivirgula (Micropolyspora faeni), Thermoactinomyces vulgaris.
- Bagassosis - Caused mainly due to exposure to mouldy bagasse and the prominent allergens are T. vulgaris and T. viridis.
- Wood pulp worker's lung - Caused mainly by mouldy wood pulp and major causative allergens are fungi, Alternaria spp.
- Mushroom worker's lung - As the name suggests caused mainly by mushroom compost and the prominent allergens are Thermoactinomyces, Saccharopolyspora rectivirgula, T. vulgaris.

The symptoms and signs in each form of EAA are similar and the individual form of the disease is named after the occupational group in which it was first discovered. The main symptoms in the acute stage are breathlessness, dry cough, general malaise, fever and pain in the muscles. The symptoms generally occur after an interval of about four to ten hours of exposure. Symptoms persist for 12-24 hours and then clear up within a few hours. Initially symptoms occur intermittently but after repeated exposure, breathlessness becomes continuous. At the chronic stage breathlessness is marked, but auscultatory signs are usually present. Sometimes a rapid and marked weight loss is observed.

b). Organic Dust Toxic Syndrome (ODTS) - Organic Dust Toxic Syndrome is a febrile flu like illness following the inhalation of agricultural dust in high concentrations. The condition is frequently observed among grain elevator workers and confinement workers. Various studies suggest that prevalence may vary between one to ten per cent. It is suspected that endotoxins and other microbial components of agricultural dust may be responsible for this condition. The main symptoms of ODTS are the sudden onset of fever, chills, myalgia, headache, though cough and breathlessness are generally not prominent.

Organic Dust Toxic Syndrome is differentiated from EAA by the facts that the former is caused by low to moderate dust exposure while the latter is caused by exposure to heavy dust. Secondly, lung injury is moderate to severe in EAA while it is mild in the case of ODTS.

c). Asthma- Occupational asthma in agricultural workers is seen among workers exposed to barn dust particularly animal dander, storage mites and grain dust. The condition is characterised by rhinitis, conjunctivitis and broncho-spasm. The prevalence of occupational asthma ranges between 6.2 to 21 per cent of the farming population.

d). Bronchitis- Workers exposed to grain dust have a chronic cough and sputum, which is aggravated by smoking and the duration of exposure. These workers show a greater decline in lung function in the later stages of the disease.

Inorganic Dust

Recent research has identified the adverse respiratory effects of inorganic dust exposure in the agricultural workplace. This is particularly a hazard in regions with dry climate farming. Inorganic dust comes primarily from soil components, and is dominated by silicates but may include significant concentrations of crystalline silica. Exposure to inorganic dust, which is often mixed with organic dust and other components, may result in macules, nodules, and interstitial fibrosis. The prevalence and natural history of this disorder among agricultural workers has not been studied adequately.

Toxic gases

Manure gas intoxication and silo filler's disease are among the prominent problems caused by exposure to toxic gases in the agricultural environment.

a). Manure Gas Intoxication - This hazard is present where liquefied manure is stored. This is found among workers of large dairy farms and animal confinement houses. Gases like hydrogen sulphide, ammonia, methane, carbon dioxide and carbon monoxide accumulate above the level of slurry. Some of these gases act as simple asphyxiants by displacing oxygen. Hydrogen sulphide is an extremely toxic gas and at higher levels it may cause profound respiratory depression and cardiac dysrhythmias. In extreme cases, in the absence of prompt treatment, it may lead to the loss of consciousness and later death.

b). Silo Filler's Disease - A silo is a place where animal feed is stored. Silos, a hallmark of many rural landscapes, are feed-crop storage and fermentation structures for livestock production. Harvested field crops such as corn, clover, and alfalfa are typically chopped and blown into the silo. In the silo, fermentation takes place under anaerobic conditions, and the silage pH is reduced through the production of organic acids. These acids reduce bacterial growth and silage degradation, effecting increased storage time without significant spoilage. A number of gases and vapours are liberated in the fermentation process, including amines, ammonia, carbon dioxide, organic acid vapours (predominantly acetic and butyric acids), and oxides of nitrogen. Of these, the oxides of nitrogen and carbon dioxide predominate. The production of toxic gases is more common in corn silage than grasses. The exposure to such gases may induce laryngo-spasm and broncho-spasm. In some cases it leads to asphyxia, dyspnoea, pulmonary oedema, hypoxia, acidosis and hypotension.

Pesticides

This group of compounds encompasses several subcategories, from herbicides (weed-killers) to insecticides, fungicides, nematicides (anti-roundworm preparations), acaricides (used against mites), molluscicides, rodenticides, and biocides. There are between 500 and 1,000 individual pesticide compounds registered for use on farm crops, food animals, forests, structures, roadsides, and home gardens, formulated into several thousand products. With the notable exception of sulphur, sodium chlorate, Bordeaux mixture, and a few other inorganic compounds, the majority of the pesticides currently in use are synthetic compounds, including organohalogenes, such as dicofol, methyl bromide, and 1, 3-dichloropropene (1, 3-D); organophosphates (e.g., parathion, chlorpyrifos, and malathion); carbamates, such as carbaryl and benomyl; synthetic pyrethroids, such as permethrin; and phenoxy acid and triazine herbicides, such as 2, 4-D and atrazine.

For the vast majority of reported cases, the dermal route greatly exceeds inhalation in overall occupational pesticide exposure, but in certain cases, respiratory exposure assumes great importance. For highly volatile pesticides—particularly such fumigants as methyl bromide, ethylene oxide, and 1, 3-D— inhalation can be the most important route of exposure.

The side effects of most of the above mentioned chemicals on human health have been dealt with in the earlier unit.

II. Skin Disorders

The handling of hand tools and heavy agricultural operations over long periods may cause callosities of the hands, as well as cracking or blistering. Some chemicals cause contact dermatitis, a skin disorder that occurs among agricultural workers. There are two general categories: irritant and allergic. Irritants act directly on the skin at the place of contact. Allergic sensitizers create changes in the immune system so that subsequent contact produces a reaction. Phototoxic or photo allergic reactions occur when light, in combination with certain substances, causes skin disease. Other types of agricultural dermatitis include heat rash, origin infections, and insect and plant irritants. Pesticides or solvents that may be handled on the farm can cause dermatitis. Some dermatophytoses (fungi) are transmitted from domestic animals to man.

III. Musculoskeletal Diseases

Musculoskeletal disorders (MSDs) are common in production agriculture and may increase as labour intensive agricultural work increases. These include forceful exertion, most agricultural activities are recognised as being hard physical work. Chronic back pain, arthritis of the hips and knees has been associated with dairy farming and driving tractors. Working with raised arms, repetitively forceful lifting, and pressure on the shoulders from heavy loads cause various other MSDs. Injuries due to sprains and strains are great stressors affecting the back. Ergonomic stressors have been identified as pinching, stooping, prolonged static postures, awkward positions, continual bending and twisting at the waist while handling excessive or asymmetrical weights. Backache is particularly common among the women workers.

IV. Cancers

A high incidence of cancer is suspected but not well documented among the farm worker population. Agricultural workers are exposed to known cancer-causing chemicals, and studies find a high prevalence of breast cancer, brain tumours, non- Hodgkin's lymphoma, and leukaemia within agricultural communities. Constant exposure to the sun can promote skin cancer. There are three major types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. Basal cell carcinoma is the most common form. Skin cancer is a concern on the farm due to the long hours farmers spend in the sun. A place of particular concern for farmers is the back of the neck. Because farm workers are mobile, live and work within numerous and varied situations, the long-term studies necessary to investigate cancer prevalence have been lacking within this population.

V. Problems Due To Noise and Vibration

Today's mechanized agriculture involves many engines and machines, which produce dangerous noise and vibration levels. The operator is often seated or standing close to the source of noise. Vibration is transmitted to the body through the feet, buttocks, hands, and arms. Tractors, combines, chain saws, and other powered machines produce vibration. Vibration, noise, and repetitive motion can cause nerve and muscle damage. Vibration (frequency of 0.1 to 1 cycles per second) in excess of the body's tolerance can impair nervous and circulatory function or lead to motion sickness with symptoms like nausea, vomiting, or malaise. Whole body vibration (WBV) is caused (typically due to tractors and lift trucks with vibration frequency of 1 to 80 cycles per second) resulting in chronic backache, hip/knee pain and reduced comfort and reduced proficiency as a result of fatigue. Vibration white finger (VWF) or hand arm vibration is a disorder of the blood supply to the fingers and hand which can be caused by regular use of vibrating hand-held tools (with a vibration frequency of 5 – 1500 cycles per second).The first sign of the disease is that one or more fingers turn white and the sufferers may have a permanent loss of sensation in their fingers, causing difficulty in picking up and manipulating small objects. The medical name of the disease is *Raynaud's Phenomenon*.

Prolonged exposure to excessive noise can lead to permanent hearing loss. Ears provide two warning signs for overexposure: temporary threshold shift (TTF) and ringing in the ears (tinnitus). Noise also causes fatigue, irritability, lack of concentration, blood pressure disorders etc.

Repetitive motions lead to joint injury or to fatigue that reduces the operator's performance. Repetitive motion causes pain in the joints of the arms, legs, or back. Strain in the lower back causes pain in the lumbar region, carpal tunnel syndrome pain and numbness of the wrist, tendonitis causes pain in the hands, wrist, elbow, knee, or ankle and ganglionic cyst leads to swelling and pain, usually in the wrist.

VI. Insect Bites, Zoonoses and Parasitic Diseases

Farm work may bring one into contact with animals on the farm, as well as, wildlife that may occupy the same area. Understanding the risks of these exposures is important. Some animal health problems can be transferred to humans. Farm workers may unexpectedly encounter potentially hazardous animals, snakes and insects and other parasitic diseases.

Zoonoses is the term that denotes diseases that can be transmitted between vertebrate animals and humans. These diseases can be transferred in several ways.

Animal manure, urine, bedding, and products (raw meat, unprocessed milk, hides, hair, etc.) can serve as a source of human infection. E. coli is a bacteria found in manure. This bacteria can cause intestinal disease, with nausea and general feelings of ill health.

Animal hides and hair may harbour insects that can carry diseases, bite, or sting a person. Workers who must handle raw animal products are at risk for exposure to insects and ticks. Wasps, hornets, bees, and other stinging and biting insects, as well as, spiders and tarantulas are

found in plenty in farm areas. Insect bites create health problems for some people including allergic reactions to the sting or bite.

Anaphylactic shock is caused by insect venom and is a serious medical emergency. It is characterised by swelling of the throat which can cause suffocation and a sudden decline in blood pressure, which could be fatal.

Rabies is a viral disease of mammals, transmitted through the bite of an infected animal. Most cases of rabies come from wild animals such as raccoons, skunks, bats, and foxes. Cats, cattle, and dogs can also become infected.

Ringworm or leptospirosis is a zoonotic disease transmitted by cattle and rats. Its symptoms range from skin problems to 'flu-like' conditions in the initial period, which may lead to prolonged illness if left untreated. Ticks often attach themselves to warm-blooded animals and feed on their blood. Their blood filled bodies are commonly found on dogs (dog tick) and deer (deer tick) or the ticks other cattle. The same ticks also attach and feed on human blood. Ticks are often found on people who have been walking in areas infected by ticks. Lyme disease in one such example which if left untreated can cause a rash and flu-like symptom followed by a loss of coordination, memory loss, irregular heartbeat, and arthritis. Infections of the animal's reproductive tract can be transmitted to people who assist in the birth of cattle (calves, piglets, lambs, and foals). These diseases are caused due to indirect contact with animals through soil, plants, and water contaminated by animal waste.

Agricultural zoonotic diseases include anthrax, brucellosis, bovine tuberculosis, and Q-fever. Some of the agricultural parasitic diseases are malaria, trypanosomiasis and schistosomiasis.

VII. Severe Weather Conditions and Related Stress

Agricultural work must be done during various weather conditions. Farm work does not stop for summer heat or winter cold. Crops must be harvested, livestock must be tended, and every daily routine completed. Exposure to high summer temperatures can cause illness. Heat cramps, heat exhaustion, heat stroke and dehydration are some of the serious problems of this season. Heat cramps causes leg and stomach cramps. The symptoms of heat exhaustion are cool, moist, pale or flushed skin, headache, nausea, dizziness, weakness, and exhaustion. The symptoms of heat stroke include red, hot, dry skin; changes in consciousness; rapid, weak pulse; and rapid, shallow breathing. Heat stroke can result in the death of a person if not treated immediately.

Health risks due to overexposure to the sun and heat include sunburn/skin cancer. The bright sun can damage the eye through the effects of UV radiation. This damage is called keratitis, an inflammation of the cornea of the eye. Sun-induced cataracts (a clouding of the lens of the eye) have been reported.

During rainy season sudden rainstorms are often preceded by violent lightning storms. Lightning is caused by the build up of static electricity in the air. Lightning energy as high as 100 million volts and as much as 50,000 degrees Fahrenheit is released within half a second. Lifelong disability and death can result from exposure to the extreme levels of electricity and temperature.

Winter causes different types of hazards. Frostbite, hypothermia, and loss of traction leads to hazardous work conditions. *Frostbite* occurs when the body tissue freezes. Medical attention is necessary for this condition. *Hypothermia* involves a general cooling of the entire body below 96 degrees. The symptoms include weakness, drowsiness, or confusion. When the body cools down, normal processes cease to function properly. Gradual warming of the patient's body, as well as immediate medical treatment is necessary.

VIII. Injuries and Hazards within the Agricultural Sector

Within the agricultural sector, the workers work for hours under extreme temperatures – such as extreme heat and freezing climate, rains and dust. Injuries are caused while working in the fields for hours, especially injuries from agricultural machinery. Cuts, burns, fractures and amputations occur when there is a fall, collision or any other accident.