

Occupational Diseases: Can we Protect our Workers?

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Abstract

Background: Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations. Occupational diseases have a long latent period sometimes take decades to appear. Though preventable most occupational diseases cannot be treated.

Aetiopathogenesis: External conditions and influences prevailing at the place of work in addition to domestic environment have bearing on health of workers. The interactions between i. Man and agents (Physical, Chemical, Biological), ii. Man and machine and iii. Man and other humans have bearing on health on worker.

Health hazards: Depending upon the occupation a worker may be exposed to physical, chemical, biological, mechanical and psychosocial hazards.

Prevention of occupational diseases: Medical measures include pre-placement and periodical examination, notification of diseases and supervision of working environment. Engineering measures to prevent occupational diseases include designing of building, good housekeeping, general ventilation and substitution of hazardous processes etc. Strict implication of law can safeguard the health of workers in adverse environmental conditions. Legislative measures include defining provisions regarding safety of workers. It also defines the working hours and schedule of work along with occupations where females and younger person are prohibited to work. Law includes various benefits provided to the workers.

Conclusion: Occupational diseases are common in the present world responsible for varying economic and social implications for the workers. Most of these diseases can be prevented even by following safety norms and adequate medical services and strict enforcement of law.

Keywords: Occupational health, pre-placement examination, notification

1. INTRODUCTION

Workforce is a backbone of a country. A healthy, well-trained and motivated worker, increases productivity of the establishment and helps himself earn a satisfying livelihood.

2. OCCUPATIONAL DISEASE

Any disease contracted primarily as a result of an exposure to risk factors arising from work activity [1].

3. BURDEN OF OCCUPATIONAL DISEASES

An estimated 2.34 million people die each year from work-related accidents and diseases. Out of 2.34 million, approximately 2.02 million die from a wide range of work-related diseases. Of the estimated 6,300 work-related deaths that occur every day, 5,500 are caused by various types of work-related diseases. As per statistical data of International Labour Organization (ILO), nearly 160 million cases of non-fatal work-related diseases occur annually [2]. Globally, millions of men and women have to work in poor and hazardous conditions.

Occupational diseases also impose enormous costs. They can impoverish workers and their families, reduce productivity and work capacity of individuals/workers and dramatically increase health care expenditures. The ILO estimates that work-related accidents and diseases result in an annual 4% loss in global gross domestic product (GDP). In other words the loss is equivalent to about US\$2.8 trillion, inclusive of direct and indirect expenditure due to injuries and diseases [3].

4. OCCUPATIONAL HEALTH

Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; protection of workers in their employment from risks resulting from factors adverse to health; placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment, and to summarize: *'The adaptation of work to man and of each man to his job'* [4].

5. AETIOPATHOGENESIS

Occupational diseases have a long latent period sometimes as long as decades. Most of these diseases cannot be treated but can be prevented to a large extent. Health of the industrial workers is influenced by conditions prevailing at their work place in addition to those at his domestic environment. Sum of these external conditions and influences at workplace which constitutes the occupational environment have bearing on health of workers. Various interactions occur in an occupational environment which are directly or

Indirectly linked to development of occupational diseases. These interactions are as follows:

I. Man and agents (Physical, Chemical, Biological): [5]

Table 1: Agents interacting with man

Agents
1. Physical:
Heat, Cold, Humidity, Air movement, Radiation, Light, Noise, Vibrations, Working & breathing space, Toilet, washing & Bathing facilities
2. Chemical:
Chemicals, Toxic dusts, Gases
3. Biological:
Viral, rickettsial, bacterial and parasitic agents

II. Man and machine:

In the modern world there has been increased use of sophisticated machinery and devices and the operator of these devices is none other than man. Machines are sometimes unguarded and may have sharp protruding and moving parts. At times these machines may be poorly installed without safety measures. Worker or operator is continuously interacting with his machinery and is at risk of meeting accidents at his workplace. Workers in certain occupations are bound to work for long hours even in unphysiological postures which lead to fatigue, backache, diseases of joint and muscles; ultimately affecting his health and efficiency apart from making him prone to accidents.

III. Man and man:

Man is interacting with fellow workers at workplace. Workers also have relationship with employers and those in authority. Type and rhythm of work, service conditions, job satisfaction, workers participation in establishment, communication and system of payment and many other factors have bearing on health of workers. If the worker has a healthy relationship with others at workplace and he likes the job, the work output increases and vice-versa.

6. OCCUPATIONAL HEALTH HAZARDS

Health hazards may be attributed to occupation of worker if :

1. Occurs mainly among the workers

2. Exposure at workplace is present

Depending upon the occupation an industrial worker may be exposed to five types of hazards:-

1. Physical hazards if exposed to physical agents
2. Chemical hazards if exposed to chemical or toxic substances
3. Biological hazards if exposed to infective agents
4. Mechanical hazards due to machines
5. Psychosocial hazards due to stress at workplace

7. CLASSIFICATION OF OCCUPATIONAL DISEASES [6]

Table 2: Classification of occupational diseases

I. Diseases due to physical agents	
1. Heat	Prickly heat, syncope, heat hyperpyrexia, heat exhaustion, cramps
2. Cold	Hypothermia, frostbite, trench foot, chilblains
3. Light	Occupational cataract, miner's nystagmus
4. Pressure	Caisson disease, air embolism, blast
5. Noise	Occupational deafness
6. Radiation	Cancer, leukaemia, aplastic anemia, pancytopenia
7. Mechanical	Injuries, accidents
8. Electricity	Burns
II. Diseases due to chemical agents	
1. Gases	CO ₂ , CO, HCN, CS ₂ , NH ₃ , N ₂
2. Dusts (Pneumoconiosis)	
i. Inorganic dusts:	
a. Coal dust	Anthraxosis
b. Silica	Silicosis
c. Asbestos	Asbestosis, cancer lung
d. Iron	Siderosis
ii. Organic (vegetable) dusts:	
a. Cane fibre	Bagassosis
b. Cotton dust	Byssinosis
c. Tobacco	Tobaccosis
d. Hay or grain dust	Farmer's lung
3. Metals	Lead, Mercury, Cadmium, Manganese, Beryllium, Arsenic, Chromium
III. Diseases due to biological agents	
Brucellosis, leptospirosis, anthrax, actinomycosis, hydatidosis, psittacosis, tetanus, encephalitis, fungal infections	
4IV. Occupational cancers: Skin, lung, bladder	
V. Occupational dermatosis: Dermatitis, eczema	
VI. Ds. of psychological origin: Industrial neurosis, hypertension, peptic ulcer	

8. PREVENTION OF OCCUPATIONAL DISEASES [6]

Prevention is key since it not only protects the lives and livelihoods of workers and their families but also contributes to ensuring economic and social development [7]. The active participation of employers' and workers' organizations is essential for the prevention of occupational diseases. Employers have a duty to prevent occupational diseases by taking following preventive and protective measures.

I. Medical measures:

1. Pre-placement examination:[8]

Ideally, the pre-employment medical examination (also referred to as a pre-placement examination) strives to place and maintain employees in an occupational environment adapted to their physiological and psychological capacities. It is simply application of ergonomics i.e. right person is employed for right job. Usually done at the time of employment and includes the workers medical, family, occupational and social history. It is supported by thorough physical examination and a battery of biological and radiological examinations e.g. X-ray, ECG, vision testing, urine and blood examination. Pre-placement examination act as baseline data for workers' health and aids in future comparison of health status.

2. Periodical examination:

Necessary when workers handle toxic or poisonous substances; may also be supported by relevant investigations. Frequency and content of periodical examinations depends upon the type of occupational exposure:

For Ordinarily workers: Once a year

Exposure to lead, toxic dyes, radium: Monthly

Irritant chemicals: Daily examination

3. Medical and health care services:

The medical care of occupational diseases is a basic function of an occupational health service.

4. Notification:

The main purpose of notification in industry is to initiate measures for prevention and protection and ensuring their effective application. Notification also helps in investigating the working conditions and circumstances which have caused or suspected to have caused occupational diseases.

5. Supervision of working environment:

The physician should pay frequent visit to the factory. The aim of visit should be to acquaint himself with the various aspects of the working environment such as temperature, lighting, ventilation, humidity, noise, cubic space, air pollution and sanitation. These factors have important bearing on the health and welfare of the workers. The physician must also get

acquainted about the raw materials, processes and products manufactured and render advice accordingly to the factory management.

6. Maintenance and analysis of records:

Helpful for planning, development and efficient operation. Records regarding worker's health and occupational disability should be maintained.

7. Health education and counseling:

Should ideally start before the worker enters the factory. Educate the workers regarding the risks involved in the industry and measures to be taken for personal protection. The correct use of protective devices-mask, gloves, apron, boots should also be explained to the workers. Counsel the workers about the importance of personal hygiene. Charts, posters and other medium can be utilized for health education and counseling.

II. Engineering measures:

1. Design of building:

Measures for prevention of occupational diseases should commence in the blue print stage. The type of floor, walls, height, ceiling, roof, doors and windows, cubic space should receive attention in the original plan.

2. Good housekeeping:

Covers general cleanliness, ventilation, lighting, washing, food arrangements and general maintenance. Dusts should be cleaned by vacuum cleaners or by wetting agents. Masks, gloves, aprons and other protective equipment should also be kept clean.

3. General ventilation:

Ventilating openings in proportion of 5 sq. feet are required for each worker in a room. In rooms where the dust is generated an efficient exhaust ventilation system must be placed. Good general ventilation decreases the air borne hazards to the workers. Minimum of 500 cu. ft. of air space is recommended for each worker (The Factories Act).

4. Mechanization:

The plant should be mechanized to reduce the direct contact with harmful substances. Dermatitis can be prevented if hand-mixing is replaced by mechanical devices. Acids and other chemicals can be conveyed from one place to another through pipes.

5. Substitution:

Substitution means replacement of a harmful material by a harmless one or one of lesser toxicity e.g. white phosphorus can be replaced by phosphorus sesquisulphide in match industry to eliminate phossy jaw due to white phosphorus.

Similarly zinc and iron paints may be used in place of lead paints.

6. Dusts:

Can be controlled at the point of origin by water sprays, e.g., wet drilling of rock. Wet methods should be tried as far as possible to combat dust.

7. Enclosure:

Enclosing the harmful material and processes will prevent the escape of dust and fumes into the factory atmosphere thereby reducing the exposure to workers.

8. Isolation:

Isolate the offensive process in a separate building so that workers not directly connected with the operation are saved from exposure. Isolate the process not only in space but also in fourth dimension of time so that number of workers exposed are minimal.

9. Local exhaust ventilation:

Dusts, fumes and other injurious substances can be trapped and extracted "at source" before they escape into the factory atmosphere through exhaust ventilation.

10. Protective Devices:

Respirators and gas masks are used to protect the workers against air borne contaminants.

Ear plug, air muffs, helmets, safety shoes, aprons, gloves, gum boots, barrier creams, goggles and screens are other devices which can be used depending upon type of exposure.

11. Environmental monitoring:

Periodical environmental surveys and sampling the factory atmosphere to determine whether the dusts and gases escaping into the atmosphere are within the limits of permissible concentration or not.

12. Statistical Monitoring:

Comprises review at regular intervals of collected data on health and environmental exposure of occupational groups. Aim is to evaluate the adequacy of preventive measures.

13. Research:

Research for better understanding of occupational health hazards and diseases.

III. Legislative measures:

For the protection of the workers engaged in different occupations, Government has employed certain laws:-

1. Factories Act, 1948
2. Employees State Insurance Act, 1948

3. Mines Act, 1952
4. Minimum Wages Act, 1948
5. Maternity Benefit Act, 1961
6. The Child Labour (Prohibition & Regulation) Act, 1986
7. The Air (Prevention & Control of Pollution) Act, 1981
8. Noise Pollution (Regulation & Control) Rules, 2000

These rules and laws are providing legal safety and aid to the worker and the family in form of leaves with wages, financial aid, definite hours of work, ergonomics, ban on child labour and various benefits and rehabilitation facilities. Discussing all the acts is beyond the scope of this chapter.

The factories act, 1948:

The objective was to ensure adequate safety measures and to promote the health and welfare of the workers employed in factories. It also makes provisions regarding employment of women and young persons (including children & adolescents); annual leave with wages etc.

Chapter III deals with health aspects; Chapter IV deals with safety aspects; Chapter V deals with welfare aspects; Chapter VI deals with working hours, holidays etc.; Chapter VII deals with employment of young person.

Employee state insurance (ESI) act, 1948:

Important measure of social security and health insurance; passed in 1948 (amended in 1975, 1984, 1989 & 2010). The act provides cash and medical benefits to industrial employees in case of sickness, maternity and employment injury.

ESI provides following benefits to employees:

1. Medical benefit
2. Sickness benefit
3. Maternity benefit
4. Disablement benefit
5. Dependant's benefit
6. Funeral expenses
7. Rehabilitation allowance

ESI also has provision for following benefits to employers:

1. Exemption from the applicability of Workmen's Compensation Act 1923
2. Exemption from Maternity Benefit Act 1961
3. Exemption from payment of Medical allowance to employees and their dependants or arranging for their medical care
4. Rebate under the Income Tax Act on contribution deposited in the ESI Account
5. Healthy work-force.

REFERENCES

- [1] Occupational health: Occupational and work-related disease. *World Health Organization*. Governed by the Global Plan of Action on Workers' Health. 2008-2017.
- [2] International Labour Office (ILO). ILO introductory report: Global trends and challenges on occupational safety and health, Report, XIX *World Congress on Safety and Health at Work*, Istanbul, (Geneva), 2011. www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_162662.pdf [10 Jan. 2013].
- [3] Based on the world GDP of 2012.
- [4] Kendall, N.,A.,S., International review of methods and systems used to measure and monitor occupational disease and injury: *National Occupational Health and Safety Advisory Committee (NOHSAC) Technical Report 3*. Wellington, New Zealand, 2005.
- [5] Occupational health: A manual for primary health care workers. *World Health Organization*. Regional Office for the Eastern Mediterranean, Cairo. 2001.
- [6] Park, K., Occupational health. *Park's Textbook of Preventive and Social Medicine*. 23rd edition, 2015, pp. 805-806.
- [7] The prevention of occupational diseases. *International Labour Organization*, Geneva, Switzerland, 2013.
- [8] Pachman, J., Evidence base for pre-employment medical screening. *Bulletin of the World Health Organization* , 2009, 87, pp. 529-534. doi: 10.2471/BLT.08.052605.