CHAPTER I

INTRODUCTION

(1) INTRODUCTION:

The modern environmental movement was born in the mid-1960s. The widely popular concept "Environmentalism", concerns with population control, resource conservation and pollution. It has made a lasting impact on this period of our history.

Modern technology has made it impossible for people to live longer, in more comfort and with greater leisure. There are at least six major interrelated by-products of technology, which have made negative environmental impact, the dangers of modern war, exponential growth of population, waste of raw materials and other natural resources, inadequacies of urban design and organisation, poverty and pollution. Of these six, to a major degree, pollution results secondarily from the others.

The word pollution is derived from a Latin word 'pulluere' which means to defile. Pollution is a phenomenon that has suddenly received public attention. Newspapers, magazines and televisions have brought the evidence sharply into the focus. Therefore, the attitude "out of sight, out of mind" is being dispelled. Pollution is probably the only one for which society has the technical knowledge and this problem can be managed to some extent by various social institutions.

Generally, water and air pollution are well known to the people. There are other different types of pollution - land pollution, radiation pollution, noise pollution etc.. Noise is no less dangerous

than foul air or contaminated water. Noise pollution was previously confined to a few special areas like factory or mill, but today it engulfs every nook and corner of the globe.

Noise has been an old problem. Since Eve first poked Adam in the remaining ribs and told him to stop snoring, she was complaining about the noise pollution. Today noise pollution has different sources. It has not only disturbed the Eve's sleep, but the sleep of the whole world.

We are now living in an incredibly noisy world. The technological environment of today has significantly contributed to the development of the country, but has simultaneously affected the man's natural environment. Civilisation itself is noise and man's progress through the ages increases different activities with ever-increasing noise intensities.

Noise is one of such pollutants, which is a by-product of industrialization, urbanization, population explosion and the rapid advancement that has taken place in communication and electronics during the last few decades. Factories and offices have become noisier with the introduction of more and more mechanical and automated instruments. Communities have become noisier because of increasing noise from factories, traffic, flying aircraft etc.. Homes have become noisier by the increasing use of cooker, mixer, washing machine, television, radio, tape-recorder, air-conditioner, refrigerators etc.

(2) SOUND AND NOISE:

Consonance and Dissonance:

A silent word is not possible nor desirable. Sound is perhaps not as essential to the organism as oxygen, but it is still a very important part of the neural input to the central nervous system. This idea is clear by the concept of consonance and dissonance. Consonance is the 'quality of harmony, smoothness or unity of combination of tones, often experienced as agreeable'. Dissonance is a 'quality of disharmony, illfittingness and lack of unity of combination of tones often experienced as disagreeable. Some sound can be consonant for some individuals and dissonant to others, or both consonant and dissonant to the same individual at different times.

Nature of Sound and Its Measurement:

Sound is produced by the vibrations of an object and transmitted in the form of waves. Sound is a mechanical energy and requires medium like gas, liquid or solid for propagation. The speed of transmission is a function of the transmitting medium and its temperature. The speed in air is 340 m/s at 20°c.

Sound has two important properties - the pitch or frequency and intensity or loudness. According to Dr. M. Pancholy, as light is made up of lights of the various rainbow colours, noise is generally made up of components of different pitch mixed in various proportions. Each component has its own damaging potentiality.

Frequency:

It is the rate of vibration of the sound and is measured

in Hertz (Hz). The frequency of sound is determined by the number of times the vibrating waves undulate per second. The slower the cycle lower the pitch. The pitch becomes higher as the cycles increase in number. The audible range for an exceptionally good human ear is 35 to 20,000 Hz. A more limited range of 80-15,000 Hz is considered as normal for young adults who have had no hearing losses or ear abnormalities. For testing of hearing, the standard procedure is to use eight frequencies 250, 500, 1,000, 2,000, 3,000, 4,000, 6,000 and 8,000 Hz.

The human ear cannot generally hear sounds of frequencies higher than 20,000 vibrations per second (20,000 Hz). Sounds of frequencies higher than 20,000 Hz are inaudible and are called ultrasonic. Bats produce very high pitch sound when they fly, but they are of ultrasonic frequencies from 20,000 to 1,00,000 Hz. So, we cannot bear them.

Intensity:

The intensity of the sound is the amount of energy in the sound wave. Intensity is interpreted as loudness by the listener. The intensity is always measured in decibels. The weakest sound that can be heard is 1 dB(A) and a sound beyond 130 dB(A) may cause pain in the ear. Intensity is not readily measured directly. Instrument has been devised to measure the effective sound pressure.

Sound Pressure Level (SPL):

SPL is expressed as a logarithmic ratio to a reference

level and stated in a dimensionless unit of power, the dB(A) -

$$SPL = 20 \log \left(\frac{P}{P_o}\right) dB$$

where, P is measure of pressure

P_o is reference pressure

$= 2 \times 10^{-5} Nm^{-2}$

Measurement of Sound:

Generally the sound level is measured in two scales, namely, μPa or Pascal scale and dB or decibel scale.

Approximately OdB = 10 μPa sound pressure.

The intensity is usually measured in decibels (dB). The decibel is a physical unit based on the weakest sound that can be detected by the human ear. Here, deci means 10 Bel is named after Alexander Graham Bell, the inventor of the telephone. This is logarithmic scale with reference to ten. In this scale the value represents the number of zeros after 1.

Log 1 = 0

1 has no zero, therefore, Log 1 = 0

Log 10 = 1

1 has one zero, therefore value is 1

Log 100 = 2

1 has two zeros, therefore value is 2.

A rise of 10 represents a ten-fold increase in sound intensity,

a rise of 20 dB(A) means one hundred fold increase in loudness.

$$\text{Loudness in dB of any given sound} = 10 \times \log\text{-}10 \left[\frac{\text{Power of given sound}}{\text{Power of the barely audible sound}} \right]$$

The word 'noise' is derived from the Latin term 'nausea' meaning disgust. Noise is defined as any undesired sound. Scientifically, it is a complex sound with little or no periodicity and psychologically an undesirable sound for the recipient.

According to Harrel noise is an unwanted sound which increases fatigue and under some industrial conditions it causes deafness.

J. Tiffin states that 'Noise is a sound which is disagreeable for the individual and which disturbs the normal way of an individual'.

According to Victor Gruen, an internationally known city planner, noise is slow agent of death.

Blum defines noise as a distractor and, therefore, interfering with the efficiency.

Encyclopaedia Americana states that, 'Noise by definition is unwanted sound. What is pleasant to some ears may be extremely unpleasant to others, depending on a number of psychological factors. The sweetest music, if it disturbs a person, who is trying to concentrate or to sleep, is a noise to him, just as the sound of a pneumatic riverting hammer is noise to nearly every one. In other words

any sound may be noise of circumstances causing disturbances.

Types of Noise Field:

Depending on frequency, level and time range, noise field is classified as follows (Dr. Dhar, 1990):

(A) Noise with constant intensity means continuous noise. There are again two types: (a) continuous wide band noise e.g., background noise in mechanical workshop and (b) continuous narrow band noise, e.g., Planing machine.

(B) Noise with intensity changes with time which include:

(a) Variable noise - whose level changes within a special range

(1) Noise burst - sudden emission of very loud noise lasting for about millisecond, e.g., blast

(2) Impact Noise - single impulse of short duration, e.g., forging, hammering.

(b) Intermittent noise - which shows sharp elevations in level from quietude

(1) Repetitive impact noise, i.e., rivetting, trimming etc.

Noise Level Standard:

Noise thresholds have been suggested by various organisations. These have recommended certain levels. These levels should not

be exceeded so that no permanent hearing loss will result after a long exposure. According to the Koenisberger et al. 1973 (Shrivastava and Gupta, 1988): Acceptable noise levels are -

	Situation		Noise Level dB(A)
1	Residential	Bed-rooms	25
		Living rooms	40
2	Commercial	Offices	35-45
		Conference Venues	40-45
		Restaurants	40-60
3	Industrial	Workshops	40-60
		Laboratories	40-50
4	Educational	Class-room	30-40
		Libraries	35-45
5	Hospital	Wards	20-30

Noise Exposure Index:

In practice, the severity of noise exposure is indicated by the NEI, which includes both the noise level and the exposure durations to the permissible exposure duration as follows:

$$NEI = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \ldots$$

Where C_1, C_2 ... are the actual times to which the worker was exposed to each noise level above 90 dB(A) and T_1, T_2 ... are the allowable exposure times [according to the following table] for

the noise levels to which the worker was exposed. NEI values are often expressed as a percentage of the allowable noise dose and when the NEI value exceeds 1, the worker is said to be over-exposed (Prof. Dhar, 1990).

Permissible Exposure In the Case of Continuous Noise (Prof. Dhar, 1990) (Recommended by the ISO)

Noise Level, dB(A)	Exposure Time
87	16 hrs
90	8 hrs
93	4 hrs
96	2 hrs
99	1 hr
102	30 min
105	15 min
108	8 min
111	4 min
114	2 min

(3.) SOURCES OF NOISE:

There are many sources of noise. Broadly they are classified into -

(A) Non-industrial

(B) Industrial.

(A) Non-industrial:

Non-industrial noise can further be classified into the following categories:

(a) Music:

A study by Agarwal (1987), on the perversive nature of popular music and its potential effects on hearing, shows that such a noise produces hearing damage among the musicians and audiences. The extent of damage is proportional to sound intensity, duration, susceptibility and the age of individual. Health hazards of pop music and their management have been discussed in detail by Dr. T.N. Tiwari (1990). He found that pop music is responsible for hearing damage and the annoyance.

Portable ratios, cassette players are major sources of music. Use of these instruments becomes a great problem on beaches or in places where other people have gone in search of peace and quietude.

Loudspeaker is another source of noise used on many occasions. Over the last few years, there has also been a steady growth in number of disco dances and the use of loudspeaker music at private parties and functions. The problems arise because of high level of sound continued from early hours of the morning.

(b) Religious Rituals and Festivals:

Various religious rituals, festivals and processions are a great source of noise pollution. According to Lal (Srivastava and Gupta, 1988) noise levels of certain familiar functions are given in the following table:

Noise Levels on Some Religious and Cultural Functions

Functions	Noise Level dB(A)
Deepawali	73-114
Durga Pooja	85-100
Fairs	80-90
Firework	92-99
Jargons	84-94
Kirtans	90-102
Pravachans	82-88
Ramleela	78-85
Ravanvadh	90-100
Urs	93-101
Versions	89-102
Group Dances	77-93
Music functions	86-96

(c) Domestic Noise:

Conversation, quarrelling, children shouting and playing, whistling, dancing, singing in loud voice, playing on the Tabala, harmonium and on metal utensils, increased use of pressure-cooker, mixer, washing-machine, air-conditioner, refrigerator, tape-recorder, radios, television, etc.

Their effects are very slow and long-time. Those persons are affected who hear it with a very high volume. It is harmful

as it slowly causes deafness and other bodily changes. According to Tempest (Bhatnagar, Patwardhan and Gopalan, 1991) noise level of food mixer at fast speed is 77 dB(A), cooker 44 dB(A), washing machine 66 dB(A), exhaust fan 59 dB(A), alarm clock 76 dB(A), vacuum cleaner 77 dB(A), hair drier 71 dB(A), door-bell 79 dB(A), and telephone 77 dB(A).

(d) Neighbourhood Noise:

It is widely found in developed countries like England, the U.S.A., Japan etc.. Major sources are noise from cries of domestic animals, noise of drainage in apartment houses etc.. The noise from the multifamily houses in metropolitan cities causes ill effects (Singh and Mahajan, 1990).

(e) Crowded Bazaars:

In metropolitan cities, the crowded markets are major sources of noise pollution. The chattering and bargaining of shoppers, foot-falls on pavements, loudspeakers urging for buyers, stopping and starting of vehicles increase noise level in the market.

Moreover, the high and close buildings on both sides of the narrow markets cause an echoing effect on noise.

(f) Road Traffic Noise:

Major sources are blowing horns, use of defective silencer, engines, gear boxes and exhausts of vehicles, cars and motor-cycles, on high-speed roads such as motor-ways, the noise from tyres is also important. Road traffic noise affecting those persons to a great

extent who live adjacent to roads. Noise level of light traffic is 35-50 dB(A), noisy bus produces 70-80 dB(A), heavy truck and motor-cycle produces 90 dB(A), silencerless motor-cycle produces 110 dB(A) noise (Singh, 1984).

A survey has been conducted in Visakhapatnam city by Rao et al. (1990) which reveals that about 65 per cent of the subjects covered in the survey complained about the disturbance experienced due to traffic noise.

(g) Trains:

Fast trains and steam engines of railways produce noise. This effect is maximum in those areas where railway tracks pass through residential areas. Noise of train whistle at 50 feet distance is 110 dB(A) (Singh, 1984)

(h) Aircraft Noise:

The higher the speed of aircraft the greater is the noise. The take off and landing of an aircraft produce unbearable noise. Another source of noise related with scaring away of birds from airfield by strong noise stimuli. The aircraft noise in terms of NNI in London, Heathrow Airport is 50, while for Bombay, Sahar Airport is 35-40. The landing should be at an angle of 60° to give minimum noise. At a distance of 100 m from jet engine the noise is between 100-120 dB(A) (Sahoo & Khopkar, 1987).

(i) Projection of Satellites in Space:

Satellites are thrown into space with the help of rockets.

This process emits defening noise at the time of 'lifting off' of a satellite. Experimental atomic explosion also creates unbearably loud noise.

(j) Weapon's Noise:

Weapon's noise comes generally from muzzle blast. It is produced by propellant gas, bursting out of muzzle with bullet. The typical sound pressure levels recorded from one of the armoured fighting vehicle are found to vary from 88-112.5 dB(A).

(k) Construction Work:

In India urbanization is developing very fast. Due to the scarcity of space for living, old buildings are being demolished to make room for new huge multi-storeyed buildings. Demolition and construction activities of buildings as also repairs of roads with huge machines produces a lot of noise.

(l) Sport:

The noisiest of all sporting activities is probably motor sport. Whether in rallies, scrambling, grass track racing or stock carrying on roads, because of the type of the machine used it produces huge noise.

(m) Agriculture:

Tractors, threshers, powered sprayers and various combined harvesters are major source of agricultural noise. Studies made at Panjab Agricultural University, Ludhiana have revealed that the agricultural workers are exposed to the noise level of 90 dB(A)

for eight working hours a day (Singh & Mahajan, 1990).

(B) Industrial Noise:

Industrial noise increases with the industrial and technological advancement. With the rapid development of the modern industry, industrial noise has become an international hazard. Mechanical noise is the major part of industrial noise. High noise levels are common in industries, such as steel industries, petrochemical industries, textile mill, flour mill, foundry, cutting machine, Lathe machine, thermal power station etc.. Friction noise, vibration noise and aerodynamic noise are some forms of noise which are found in the industry. Overall sound level in industries generally falls between 78 dB(A) and 135 dB(A). The expansion of industries and the development of high speed machines for increased production produces uncontrolled noise of increased intensity and frequency.

Problems of Industrial Noise:

The basic demand for food, water, clothing, shelter, education, health care, fuel etc. is increasing day-by-day which is bound to put load on the environment. The technological development of today has significantly contributed to the development of the country, but has simultaneously affected man's natural environment. Industry is the biggest polluter worse than transport and sewage. Since the industrial revolution, our activities have begun to modify our environment and have led to serious environmental problems. All industrial centres in India are noisier than they were even a decade ago, affecting

people significantly.

Noise is important in industry for three main reasons:

(1) People do not like it

(2) It causes harmful effects on workers' body

(3) It has bad effect on work efficiency which decreases productivity. (Srivastava & Gupta, 1988)

Noise level is different in different industries. Noise level in a weaving shed is 104 dB (Fleming 1962), Aluminium factory 85-101 dB (Chadha & Singh 1971), Vanaspati filling section 76-87 dB (Pant 1972), Synthetic power industry 90-116 dB (Singh 1973), Power plant 90-100 dB (Singh 1975), Glass blowing shops 70-108 dB (Amba-Sankaran et al., 1978), Heavy vehicle factory 110-115 dB (Ahluwalia and Kesar 1978), Vehicle engine testing areas 90 dB, manufacturing areas 110-118 dB (Panwalkar and Akolkar 1981), Saw mill 90-112 dB (Lal 1984), Silver foil manufacture 90-112 dB (Lal 1984), Hindustan Petroleum Corporation 74-98 dB (Pradhan 1985).

The effect of noise on hearing, human behaviour, work efficiency and productivity is a matter of great concern today. Probably the first published record of the toxic effects of noise was by Fosbrooke (Bunch 1937). Numerous other publications have followed and the history of the problem, preventive medicine and noise control have been well covered by Sataloff (1957) and Glorig (1958). Bell (1966) has produced an excellent summary of the various occupations in which industrial deafness occurs. Gupta (1966) and Srivastava and

Gupta (1988) in an audiometric survey of industrial workers found 9 per cent of them to be suffering from marked hearing loss. Noise has been associated with a number of human ailments (Vaish, 1973). Industrial noise is responsible for ill-health among workers, and loss of production (Krishna et al., 1966; Kasbekar, 1973; Murthy and Panigrahi, 1976; Dhar and Ratan, 1977; Ramaswamy, 1982). Workers exposed to high noise levels had higher incidence of circulatory problems, such as hypertension, peptic ulcers, and neurosensory and motor impairment (Singh 1984). A 20-year study of Bergstron, Bjorn and Bo Nystrom (1986) shows that hearing loss has developed in employees working in timber processing firm, saw mill, paper-pulp production. They are exposed to mean noise level of around 95-100 dB and 80-90 dB. Various data and information concerning 23 administrative sections in the city of Tokushima show significant correlations between the extent of the improvement in the urban infrastructural facilities and the number of complaints against vibration and noise (Hori et al., 1986). Occupational noise exposure during pregnancy also damages the auditory system of the foetus. (LaLande et al., 1986). A total of 131 children were examined. Their mothers had worked, during pregnancy with that child in noise condition ranging from 65-95 dB(A) for 8 hours. Results show a three-fold increase in the risk of having a high frequency hearing loss in the children whose mother is exposed to noise of 85-95 dB and a significant increase in the risk of hearing loss at a frequency of 4,000 Hz. Work on combined effect of noise and vibration on 122 forest workers was carried out (Pyykko, Pekkannen

and Starch, 1987). Result shows that the elevation of diastolic blood pressure correlated significantly with sensory neural hearing loss. Noise also increases blood pressure (Wu et al., 1987). A cross sectional study of occupational noise exposure and blood pressure was conducted in a shipyard company. There were 158 male workers from a higher noise environment [greater than 85 dB(A)] and 258 workers from a lower noise environment [Less than 80 dB(A)]. The workers in the higher noise environment had higher systolic and diastolic B.P.. There is increased risk of high B.P. among workers who were exposed to an over 85 dB(A). Noise-induced deafness occurred among 368 workers who worked a number of years under noisy environment (Sugiuchi et al., 1987). Another study on the diagnostic criterion of occupational noise-induced deafness (Wu et al., 1987) suggested that the average hearing loss of the high frequency band should be greater than the speech frequency band by about 10 dB to have diagnostic significance in the occupational noise-induced deafness. Noise pollution is rapidly becoming a major national problem due to the accelerating rates of industrialisation and urbanisation. Textile, Sugar, Iron and Steel industries were all well-developed even before 1947. After the Independence, particularly after 1951, India made a remarkable progress in the industrial field. Cotton mill, sugar, iron and steel are major large-scale industries in India (Gupta and Gupta, 1990). Recently work has been carried out to examine the effects of heat and noise individually and joint on certain physiological responses (Bhattacharya et al., 1990). With the advent of large-scale mechanisation

in recent years and increased open cast mines, noise problem in open cast mine becomes serious (Prof Dhar 1990, Pal & Mitra 1991 and Pal et al., 1992). The continuous exposure to noisy operations in coal mine can cause hearing loss.

The WHO estimates that noise costs U.S. more than $ 4 billion annually in accidents, absenteeism, inefficiency and compensation claims (Katz, 1972). The Factories Act included noise-induced deafness among the list of scheduled diseases in 1976. But due to the lack of awareness among Indian workers, no claim has ever been made for a noise-induced occupational deafness (Prasad, 1978). While in Britain more than 1,000 claimed such compensation in 1970 alone (Singh, 1984).

Problems In Textile Industry:

Industrialisation plays a vital role in the overall development of the country. To meet the needs of the community, a number of industries were established like cement, steel, iron, sugar, textile, fertilizers etc.

Textile industry is one of the largest industries. Cotton textile with an annual production of about 400 million metres of cloth and approximately 1,000 million Kg of yarn, provides employment to nearly a million workers, approximately, 11,23,000 in cotton textile (Gupta & Gupta, 1990). Textile industry plays an important role in the economy of the country as it is one of the major foreign exchange

earners. Earnings from cotton textile are still the third highest. Exports of cotton textile are still the third highest (Upadhyay and Pandey, 1991). A majority of the textile mills are located in the western region and a few in the Northern and Eastern regions.

Occupational hazards affect the health and well-being of the industrial population who spend major part of their life in such environment. According to Jon Vitek of ILO, for every five minutes one of the world's worker is killed and fourteen permanently disabled as a result of accidents at work or occupational disease. In India, over the last 30 years 36,000 workers have been killed and 64 million injured in accidents (Nair, 1982).

According to Dr. Sensarma (1989), in textile industry occupational health problems arise mainly due to occupational stress factors such as dust, heat, load, excessive work-load, high level of noise and vibration, inadequate light, sub-optimal design of machine and tools etc.

Textile units are always in limelight because of their poor occupational environment and sanitation. The exposure to cotton dust in blow room and carding sections, excessive heat in speed-frame and ring-frame section, excessive noise in various sections, poor light and exposure to various chemicals in dyeing areas are of great concern now-a-days. Various environmental hazards associated with different sections of textile unit have been worked out by Pal and Mohan (1990). In blow-room and carding cotton dust and noise,

in speed-frame and ring-frame cotton dust, heat and noise, in winding and doubling heat and noise are the major environmental hazardous factors.

Textile industry is a subject of research from long time. Volozoeva, K.F. (1968) reported the condition of the cardiovascular system in 24 weavers and 26 spinners. He found that in weavers, 234 observations on the pulse were within normal limit. About 15 cases showed tachycardia and 41 bradycardia [less than 16 beats/min]. A thorough study conducted to investigate the incidence of byssinosis in textile mill workers in Bombay by CLI, Bombay in collaboration with other hospitals of Bombay under ICMR Project (Shenai, 1978) revealed that byssinosis is more frequent in carding - 14 per cent as compared to spinning - 10 per cent and winding 11 per cent. The Factories Act 1987 (EBC 1987) had laid down 0.2 mg/m^2 as permissible limit of exposure for raw cotton dust. But in various textile units this value is much higher. Work has been carried out in textile industry in Madurai by Senthil, Mahadevan and Murugesan (1969). They found that cotton dust is responsible for respiratory diseases. In 266 cotton mill workers Rastogi et al. (1990) observed reductions in pulmonary functions.

Inadequate illumination in textile mill results poor co-ordination of eyes and hands with brain and hence visual fatigue occurs (Pal and Mohan 1990).

Particular environment is necessary for certain typical processes.

Therefore, in some textile units warm and humid conditions are maintained. For example, in spinning department temperature is required to be 85-95°F, in weaving section relative humidity is 70-80 per cent. But such conditions when combined with the climatic heat load and heavy work-load (particularly during summer season) create physiological strain and fatigue among the workers and affect their health, efficiency and productivity. In some of the big textile units such conditions are maintained by putting air-conditioning plant, but it is economically costly.

In factories work is done mostly by machines. A minute quantity of the work done by the machines is not directly converted into useful work or into a waste heat but it is radiated as sound. This unwanted sound is nothing but noise. Noise produces various physiological, psychological and behavioural problems in the textile mill workers. A survey conducted by American Academy of Opthalmology and Otolaryngology revealed that workers in different age-groups lost their hearing sensitivity depending upon the intensity and period of noise to which they are exposed (Shenai, 1978). A comparative study on industrial noise-induced hearing loss carried out in Hongkong (Evans and Huiyat 1982). The relationship between noise exposure and hearing loss was investigated in five groups of industrial workers. Noise survey was conducted in each work environment. Audiometric examinations were made on textile weavers, textile spinners, metal workers, aircraft maintenance and workers in bottling section. Results show that hearing loss of workers in the weaving industry was greater.

Han et al. (1987) described temporary threshold shift induced by industrial noise. The temporary threshold shift was measured at 2, 120, 300, 480 and 960 minutes after noise exposure on 134 ears of industrial workers. These workers were exposed to steady state noise level of about 104 dB(A) for 8 hrs per day in textile mill. Noise along with another environmental factor alters physiological indices. This has been proved by Todərova vasiteva et al. (1987). They found that heat and noise change cardiovascular responses like pulse, systolic and diastolic B.P.. Noise in the textile mill decreases workers' performance and efficiency. A number of laboratory studies show that the workers' efficiency increases with noise reduction. Prof. Harish Ganguli studied the efficiency of 8 weavers in jute mill of Calcutta. Under 100 dB and 80 dB noise level (Shastri and Trivedi, 1988). Another study by Sinha and Sinha suggested that using ear plugs in a textile mill reduces noise 96 dB to 87 dB and increases worker's performance.

Most of the workers are illiterate. Mostly this illiteracy of the workers is responsible for occupational health hazards. Our figure of accident frequency rate is about 3 times that of developed countries. Accident rate is second highest in textile amongst industries (Prof. Vinzanekar 1989). A sizable section of village population is migrating to towns, seeking employment in factories. They do not have educational background, training and experience for ready acquisition of new skills. The exposure of these workers to adverse occupational environment constitutes hazard to their health. It has been found

that village workers are more liable to suffer from accidents and occupational diseases than city workers (Gupta 1991).

(4) EFFECTS OF NOISE:

Noise has manifold effects on living and non-living things.

(A) Effects on Non-Living Things:

Noise decreases value of property for residential purpose near airports, highways, industrial areas and other noisy areas. Sometimes vibration emanating from heavy machinery results into the shattering of the foundation of building and window glasses, loosening plaster of house walls, cracks in walls, cracks in household crockery, etc.. Fast moving jet planes, motor boats, heavy vehicles cause rattling of window-panes, damage them or even damage the building structure.

(B) Effects in Living Things:

(1) Effects on Wild Life:

The Delhi Zoo Director has observed that zoo animals, particularly the deer, lions, rhino are affected from the traffic noise. They have been dull and inactive, their number is not incresing and health deteriorating. It is because a railway line passes through the Zoo area and also due to heavy vehicle noise.

In noisy area there is decrease in the number of migratory birds. Several birds have been observed to stop egg laying. Animals shift from noisy area to less noisy areas.

(2) Effects on Human Being:

There are three types of effects of noise on human being.

(I) Behaviour Effects:

With the increase of noise level human beings show more irrational behaviour. There may be relationship between increased rate of crime and the increasing urban noise level.

(II) Psychological Effects:

Noise reduces the depth and quality of sleep. This may adversely affect over all mental and physical health, which causes annoyance, fatigue, nervousness, headache, poor attention and concentration, mental illness, moodiness and emotional distress.

Dr. Colin Herridge, a British Psychiatrist, found in two years' study that persons living alongside London's Heathrow Airport have a significantly higher rate of admission to mental hospitals than persons living in quieter areas (Katz 1973).

(III) Physiological Effects:

Most of the systems in the body are affected by noise, which changes normal functioning of the body, leads into physiological effects. The following are different noise-induced physiological effects:

i) Occupational Deafness:

The primary toxic effect of noise is the production of industrial or occupational deafness, i.e., permanent hearing loss due to the continuous exposure to noise. It is a gradual process of destruction

of hearing ability. It causes damage to the cochlear sensitive hair cells. Industrial deafness does not occur accidently but because of ignorance or neglect.

'Industrial deafness' differs from 'Blast deafness', which results from an extremely loud noise being applied to the ear for a very short period of time. Blast deafness occurs suddenly. It may involve damage to the cochlea, it also involves damage of the drum and ossicular chain. Ignorance and neglect may be contributing factors, in respect of hearing losses usually occurring accidentally.

Three types of hearing loss resulting from exposure to noise are:

(1) TTS is a temporary loss of hearing acuity resulting from prior exposure to sound or it results from loud noises at very short duration.

(2) NIPTS is caused by chronic exposure to loud noise, earlier known as 'Boiler Maker's Deafness'.

(3) Acoustic Trauma is a permánent loss of hearing acuity due to single intense noise exposure, such as blasting.

The noise-induced hearing loss is influenced by a number of factors such as, (1) Frequencyand intensity of noise, (2) Band width of the noise, (3) Duration of exposure per day and (4) Length of service span.

If the noise is of a fairly wide range of frequencies, hearing loss may first occur to sounds in the region of 4000 c/s.

Extremely high level of sound over 140 dB(A) is capable of causing dizziness or loss of equilibrium since the balancing organ, i.e., semicircular canals are stimulated, which may also cause alterations with other types of sensory behaviour and will cause pain.

ii) Masking:

Noise interference with communication is known as masking. The inability to hear commands, alarm or danger signals due to the excessive noise may increase the industrial accidents. A noise may still disrupt speech communication. According to Kryter's (1946) (Rodda 1967) ear protectors are effective not only in protecting the individual from the temporary and permanent hearing loss but also in improving speech reception.

iii) Annoyance:

Noise is annoying. Annoyance is feeling of displeasure. About 95 per cent people get annoyed by noise (Bhatnagar et al., 1991).

Studies at the P.G. School of Basic Medical Sciences at Madras has shown that people exposed even to low persistent noise, complain about irritating ringing sounds in the ears, even when sources of the noise are removed. This complaint is called tinnitus and can cause headaches or even neurosis (Singh and Mahajan, 1990).

iv) Gastro-Intestinal Disorders:

Chronic noise is responsible for stomach ulcer. It reduces flow of gastric juice and changes its acidity. Flow of saliva also reduces, which finally leads to cessation of digestion temporarily. Exposure to unpredictable bursts of 100 dB noise increases oesophageal contraction significantly (Young et al. 1987).

v) Respiratory System Partly Affected:

As perspiration increases, breathing rate increases.

vi) Disfunctioning of Excretory System:

Noise causes increase in the secretion of ADH from the posterior lobe of hypophysis, which results in a decrease of urine formation.

vii) Disorders of Reproductive System:

Noise may lead to abortions and other congenital defects in unborn children. According to Dr. Nowell Jones an analysis of more than 22,500 births in the Los Angeles showed that there were more birth defects among babies whose mother lived near the international airport than those who lived in quieter sections (Shastri and Trivedi 1988). Noise may lead to abortion. Women living near airport supper from a number of menstrual disorders (Gupta 1972). Noise can influence unborn babies, producing malformation in the foetus nervous system that may affect behaviour later in life. Dr. Lester Sontag of the Fells Research Institute has found that startling sound can quicken a human's foetus's heart rate and cause its muscle

to contract (Katz 1973).

viii) Decreases Body Defence Mechanism:

Noise decreases or slows down the detoxifying functions of the liver.

Noise increases secretion of ACTH which in turn increases the secretion of cortisol from adrenal cortex. Cortisol is important for blood circulatory system. It enhances glucose content of the blood and changes the reaction of body to the infections and further decreases inflammatory reactions.

ix) Endocrine Impairment:

Noise activates sympathetic nervous system, which stimulates adrenal medulla. Therefore, adrenalin secretion increases, which affects the working of heart and releases free fatty acids in the blood. Noise causes increase in secretion of ADH and oxytocin from posterior lobe of hypophysis.

Noise increases level of insulin, which leads to increased blood-sugar level. Such a man becomes more prone to diabetes.

x) Vision Impairment:

Visual activity was worse during the higher sound level. The momentary peak levels in music may play role in disturbing Vestibulo-ocular control (Ayres and Paul 1986).

xi) Workers' Efficiency:

Because of combined physiological and psychological effects

noise interferes with task, the performance of the individual goes down, resulting in the reduced production and increased error rate. When time to perform a task increases, the quality of work done is greatly reduced. According to Sinha and Sinha (Shastri and Trivedi 1988) effects of noise reduction on efficiency varies from worker to worker. Less noise conditions were found to be more comfortable and less annoying for the workers.

High frequency noise, irregular bursts of noise even below 90 dB interfere with performance.

xii) Circulatory Disorders:

Workers exposed to high noise levels had higher incidence of circulatory problems, cardiac diseases and hypertension. There is increase in blood circulation rate and heart beat. A loud unexpected sound increases heart-beat rate and blood pressure. A continuous loud noise increases the peripheral resistance. Such change in blood circulation affects the distribution of blood to muscle, brain and other organs. Cholestrol level and release of free fatty acids in the blood increases. According to Vaish 1973 (Srivastava and Gupta 1988) workers exposed to high noise levels had higher incidence of circulatory problem like hypertension.

As hypertension is one of the cardiovascular defects, we will discuss in brief about hypertension.

5) Heart And Blood Pressure:

The heart is a pump and the events occur in the heart

during the circulation of the blood are called as 'cardiac cycle'. The heart's action originates in the sino-atrial node, then the atria contract, the wave of contraction moves along the bundle of His and ventricles then contract. There is alternate contraction and relaxation of the auricle and ventricle take place. Each contraction or systole of the heart is followed by relaxation or diastole, all of which constitutes the cardiac cycle.

The pulse rate corresponds with the cardiac cycle. If the pulse rate is 70, the cardiac cycle will occur 70 times a minute. The arterial pulse is a wave of increased pressure which is felt at the arteries when blood is pumped out of the heart. It may be felt at any point where an artery crosses a bone and lies superficially. Most common point is the radial artery at the front of the wrist. Pulse rate is not the blood pumped by the heart into the aorta that is felt, but the pressure transmitted from the aorta which travels more rapidly than blood. The normal approximate value of pulse rate is 72 beats/minute.

The pulse rate varies according to the following different factors:

Sex:

In adult female pulse rate is slightly higher than the males, because may be due to the lower blood pressure and more sympathetic tone.

Age:

Roughly the pulse rate is inversely proportional to the age. In newly born child it is 140 beats per minute while in adult man it is 60-80 beats/minute. In old age it is slightly higher probably due to compensatory circulating adjustment against gradual circulatory failure owing to the advancement of age.

Metabolic Rate:

Pulse rate is directly proportional to the metabolic rate. Factors affecting the metabolic rate also affect the heart rate. Exercise, excitement etc. increase metabolic rate also so also pulse rate. Similarly factors which reduce metabolic rate also reduce pulse rate.

Respiration:

As the respiratory rate increases pulse rate also increases and vice versa.

Size of Animal:

Under normal condition pulse rate has inverse relation with the size of animal. In rat heart rate is 250-300 beats/min. In elephant 25 beats/min etc.

Temperature/Environmental Condition:

Higher temperature accelerates the heart-beat and lower temperature decreases the heart-beat.

Hormones:

Adrenalin accelerates the heart beat during condition of

stress.

Emotion, hard work, exercise etc. also increase pulse rate.

Stimulation to the sympathetic nerve accelerates pulse rate and stimulation to the vagus inhibits or slow the heart activity.

Normally, about 60 to 70 cc of blood is forced from each ventricle upon systole. If the heart beats are 70-90 per minute, then the cardiac output is 4-5 litres. Cardiac output is the product of stroke volume and heart rate. During exercise cardiac output increases upto 25-35 litres. Emotion and high temperature increase cardiac output while rest and malnutrition decrease cardiac output.

Arterial Blood Pressure:

Arterial blood pressure is of extreme importance to the body. Blood pressure may be defined as that pressure exerted upon the elastic walls of the vessels in a closed circulatory system as a result of the pumping action of the heart. All of us have blood pressure. An adequate level of blood pressure is essential for life and health. The arterial blood pressure must be great enough to ensure an adequate supply of blood to the tissues. If it is not sufficiently great, the blood supply to the brain and other tissues is diminished, a condition which may lead to dizziness and fainting. On the other hand, if the pressure is too high, it damages the heart and blood vessels first and then to the organs such as brain, liver, kidneys etc.

During ventricular systole, when the left ventricle is forcing blood into the aorta, the pressure rises to a peak, called systolic pressure. During ventricular diastole pressure falls, it reaches the lowest value called as diastolic pressure. Blood pressure should be 100-120 mm Hg systolic and 70-80 mm Hg diastolic. It has been shown by Life Insurance statistical data that there are millions of lives with blood pressure higher than 120/80 mm Hg which increases chances of morbidity and mortality. Therefore, in adults and older persons the ideal blood pressure should be 120/80 mm Hg which is customarily read as "120 over 80" (Dr. Datey & Dr. Hingorani 1983). Due to the elasticity in wall of the artery, artery becomes flexible. So, according to systolic pressure the diameter of the arteries increases a little and during the diastole the wall of the arteries attains its original position.

Factors Controlling Arterial Blood Pressure:

Many factors are responsible for the maintenance of blood pressure, the chief among them are as follows:

(1) Systole of the Left Ventricle:

If the force of ventricular beat is greater, then large volume of blood ejected by the ventricle and ultimately pressure in the arteries increases. If less blood is expelled per each ventricular beat, the arterial pressure is lower.

(2) Cardiac Output:

Any increase in the amount of blood pumped by the heart

into the arteries, everything else being equal, leads to a rise in the arterial blood pressure. If there is increase of minute volume of blood due to the faster heart rate and low stroke volume, then diastolic pressure increases. Thus alternation of cardiac output will alter blood pressure.

(3) Blood Velocity:

A rapidly flowing blood will have more frictional effect than a slower one. Hence, pressure is high in the aorta but low in the capillaries.

(4) Lumen of Capillaries and Veins:

A considerable dilation of capillaries and veins leads to considerable congestion. The blood flow to the heart decreases and blood pressure drops. A constriction of the capillaries and veins over a large body area leads to a flow of the blood away from them into the large veins and thence to the heart. The work of heart increases and arterial pressure starts to rise until the flow of blood to the heart decreases to its former value.

(5) Elasticity of Arteries:

Due to the elasticity of the arterial wall the blood flow is pulsatic in arteries. In capillaries and venules blood flow is continuous. When blood enters in arteries, they constrict and exert a force on the blood.

(6) Distensibility of Arteries:

Helping to balance the constricting effect of the arteries.

The healthy arteries can distend; they are stretched by increasing blood pressure and help to keep the arterial pressure lower.

(7) Total Blood Volume:

If an individual has more blood in his circulatory system, then blood pressure is higher and vice versa. This is because increased quantity of blood in the arterial system and greater stretching of the arterial wall. In polycythemia, too many red blood cells are produced by the bone marrow. Therefore, blood volume is increased and finally blood pressure increases.

(8) Blood Viscosity:

If blood is more viscous or thick, its friction against wall of a vessel is equally higher. The blood offers greater peripheral resistance to its flow, thus blood pressure increases viscosity due to the plasmaprotein and corpuscles, so that in anaemia blood corpuscles are decreased in number thus lowering the blood pressure.

(9) The Amount of Blood:

It is necessary to fill any system of tube to develop pressure. As the blood vessel walls are elastic and distensible, this must be overfilled to create pressure. Loss of blood in hemorrhage will result in a fall of pressure. The administration of the fluid such as saline will cause the pressure to rise again.

(10) Peripheral Resistance:

It is resistance which blood has to overcome while flowing through the vessel. Peripheral resistance depends on the velocity of the blood,

viscosity of the blood, elasticity of the arterial wall and lumen of the blood vessel. Peripheral resistance is directly proportional to velocity and viscosity of the blood and inverse to the elasticity of the arterial wall and lumen of the blood vessel. Arteriole is the chief seat of peripheral resistance where velocity is high and lumen narrow.

Normal Physiological Variations in Blood Pressure:

Blood pressure varies according to the following different factors:

(1) Age:

Blood pressure rises with age. At birth the systolic pressure is 40 mm Hg the diastolic pressure is 20 mm Hg and the pulse pressure is 20 mm Hg. However, the arterial pressure increases rapidly. At the age of two years the systolic pressure is 60 mm Hg and the pulse pressure is 25 mm Hg. During childhood systolic blood pressure is 90-100 mm Hg, diastolic is 60-70 mm Hg. During puberty systolic pressure is 110-120 mm Hg, diastolic is 70-80 mm Hg. During old age systolic pressure is 140-150 mm Hg, diastolic pressure is 80-90 mm Hg.

(2) Sex:

In women blood pressure is slightly lower than in men upto the age of 45-50 years. After menopause blood pressure slightly increases in women.

(3) Build:

In overweight person blood pressure is found to be higher than the normal person. Because increase in fatty tissue results in a greater capillary bed. Thus the peripheral resistance to blood flow increases and blood pressure increases.

(4) Exercise:

Exercise causes an increase in arterial blood pressure. The degree of rise depends upon the strenuousness of the exercise.

(5) Posture:

In the recumbent position the diastolic pressure is lower than the standing or in the sitting position.

(6) Sleep:

Systolic pressure falls by about 15-20 mm Hg. Because, less pressure is needed to pump blood to the brain and to return it from the legs.

(7) Meal:

After ingestion of meal there is slight rise in systolic pressure.

Other factors such as emotions, excitement, worries, tension, fear etc. also affect the arterial blood pressure.

Neuroendocrine Regulation of Blood Pressure:

1) Nervous Regulation:

a) Baroreceptor:

Nervous regulation is carried out by baroreceptors. These

are stretch receptor. Baroreceptors are spray type nerve endings. They are abundant in the walls of the internal carotid arteries slightly above the carotid bifurcation areas known as the carotid sinuses and in the walls of the aortic arch. Carotid sinus baroreceptors are not stimulated by the pressure between 0 and 60 mm Hg but are stimulated by the pressure above 60 mm Hg and show maximum response at 180 mm Hg., while aortic baroreceptors respond at pressure level 30 mm Hg.

When left ventricle contract and blood is pumped, then pressure in the aorta increses above the normal, so that baroreceptor gets stimulated and information sent via vagus nerve to the medulla, when carotid sinus baroreceptor is stimulated due to the increased arterial blood pressure. Information is sent via Hering's nerve to the glasso-pharyngeal and from glassopharyngeal to the medulla. Impulses inhibit the vasoconstrictor center of the medulla and vagal center gets excited which causes vasodialation, decreased heart rate and decreased strength of contraction, decreases stroke volume with a overall decrease in the cardiac output. Therefore, arterial pressure decreases and blood pressure returns to its previous value.

When blood pressure decreases baroreceptors are not stimulated properly because these are stretch receptor. Vasomotor center functions in reverse order, vagus nerve is inhibited, sympathetic nerve is stimulated and adrenalin is released. Adrenalin increases in heart-beat and stroke volume. Thus cardiac output increases and tries to adjust

normal blood pressure.

b) Chemoreceptor:

Carotid and aortic chemoreceptors also control arterial blood pressure. When pressure falls too low chemoreceptors get stimulated and pressure in the aorta and in the carotid arteries indirectly controls the arterial pressure.

The chemoreceptors are chemosensitive cells. Two carotid bodies lie in the bifurcations of the two common carotid arteries and several aortic bodies adjacent to the aorta.

Each carotid or aortic body is supplied with small artery so that chemoreceptors are always in close contact with arterial blood. When arterial pressure falls below normal value chemoreceptor gets stimulated due to the lack of O_2, excess CO_2 and H^+ in the blood. Information is sent via Hering's nerve to the glassopharyngeal nerve and from the glassopharyngeal to the medulla. Thus vasomotor center gets excited. Vasomotor center communicates with the respiratory center; therefore, respiratory rate increases. At the same time heart-beat, stroke volume and ultimately cardiac output increase so that large amount of blood is pumped for oxygenation and properly oxygenated blood is pumped to the aorta and arteries.

This chemoreceptor respond only when arterial pressure falls below 80 mm Hg.

2) Hormonal Regulation:

Blood pressure is also regulated at hormonal level.

i) Vasopressin:

Released from posterior lobe of pituitary. It is vasocoristricter. It causes an increase of blood pressure. But this rise in pressure is not so great; this pressure continues for a long time.

ii) Renin:

Renin from the kidney reacts with angiotensinogen to produce angiotensin-I. In plasma it converts into angiotensin-II, which is powerful vasoconstrictor, which increases peripheral resistance in the arterioles and ultimately leads to the increase in blood pressure.

iii) Epinephrine:

From adrenal medulla constricts the cutaneous and abdominal arterioles. Thus, there is sharp rise in blood pressure; but the elevated pressure does not stand for a long time.

Hypertension:

In an individual high blood pressure is medically called as 'Hypertension'. High blood pressure is sometimes called as silent killer.

Hypertension is found in all ages and both sexes. It is a misconception that blood pressure rises with age. In several primitive and isolated communities situated in Chile, Ester Island, Pukapuka, Tokolau, Papua, New Guinea, and certain parts of South Africa and

Asia in whom very little or no increase in systolic or diastolic blood pressure with age. They have high level of physical activity, a low salt intake, a low overall energy food intake and frequently food is in short supply.

Hypertension is a condition which is directly caused by a narrowing of the small blood vessels throughout the body. This narrowing makes the heart work harder to push the blood through the blood vessels. Thus as the work increases, pressure of the blood increases. If it persists, gradual enlargement of the heart occurs.

As mentioned above, there are two readings, systolic and diastolic. This lower pressure is necessary when the heart is relaxing, to maintain circulation in the tissues. Otherwise, all of the blood would return to the heart leaving none to nourish the tissues, an oxygen lack would occur. The systolic blood pressure will vary from 10-20 points depending on the state of excitement, fear, exercise, rest, eating, fasting, sleep, shock etc.. According to the stress changes, it rises much higher, even 20-30 points. While diastolic pressure rarely rises above 4 to 6 points. Depending upon these two pressures in elderly persons two types of hypertension occur:

(1) Classical Hypertension:

Diastolic blood pressure is more than 95 mm Hg.

(2) Pure Hypertension:

Systolic pressure is of 160 mm Hg or more with diastlic

pressure less than 90 mm Hg often 70-80 mm Hg. In pure systolic hypertensive, patient's ECG abnormalities are more than in nonhypertensive elderly patients.

Classification of Hypertension:

There are two main types of high blood pressure:

1) Primary or Essential
2) Secondary or malignant.

(1) Primary or Essential or Benign or Idiopathic:

In about 90-95 per cent of the cases no cause can be found. Therefore, it is called Primary or Essential or Benign or Idiopathic. Essential hypertension does not usually occur before 30 nor does it occur suddenly in the later years of life. Mostly it occurs between the ages of forty and sixty. Positive hypertensive family history plays an important role. Renal abnormalities, cerebrovascular and cardiac diseases may be present in such types of hypertension. Therefore, benign term is misleading for essential hypertension.

(2) Secondary or Malignant or Accelerated Hypertension:

Only 5-10 per cent are of secondary hypertensive, in which underlying cause can be detected. This hypertension occurs before the age of 30 years. Physiological or pathological malfunction of the kidney results in over production of renin, which results in the retention of salt, a rise in the volume of blood and constriction of blood vessels' walls.

Important common causes of secondary hypertension are organic disease like renal disease, drug and hypertensive disease of pregnancy.

Factors Correlated With Hypertension:

There is a striking correlation between the following factors and hypertension:

(1) Thyroid Enlargement:

Many of the examiners independently noted before the onset of hypertension, thyroid enlargement to occur without any evidences of thyroid disorder.

(2) Heart Enlargement:

Constriction of the blood vessels puts workload on the heart. To overcome the extra work heart is enlarged and results in the hypertension. But in many instances there are evidences of heart enlargement before the onset of hypertension.

(2) Heart Abnormalities:

People who have angina pectoris or disorders of the heart muscle are more likely to have a higher blood pressure.

(4) Albumin in the Urine:

Studies indicate that presence of albumin in the urine indicates that there will be development of hypertension in future.

(5) Rapid Pulse Rate:

When pulse rate increases due to any reason and it is sustained for a long time, then frequently it is associated with high blood pressure development in the future.

(6) High Diastolic Reading:

Under various conditions systolic pressure rises and falls rapidly, while diastolic pressure is remarkably constant, when it increases. It does not increase over 6-8 points and it remains so for longer time. It indicates that high blood pressure is much more likely to appear later.

(7) Obesity:

Overweight individuals have high blood pressure than those of normal weight. An increase in fatty tissue results in a greater capillary bed. Thus peripheral resistance increases and ultimately blood pressure increases.

(6) Factors Responsible for High Blood Pressure:

Only in a few hypertensive cases cause of high blood pressure can be found; but in a majority of cases, no cause can be found. We still have no real idea about how high blood pressure develops. The following are the commonest and most important factors responsible for high blood pressure.

(1) Genetics:

There is no real idea about how high blood pressure is

inherited. Such type of hypertension is called 'Genetic Hypertension'. These individuals rarely have any hypertension until they are forty or fifty years old. If both parents had a normal blood pressure, then there is only 3 per cent chance of high blood pressure in their children. If one parent had high b.p., there are 28 per cent chances. If both parents had high b.p., the incidence was 45 per cent. If there is a greater number of children, then there is less tendency of high b.p. in each succeeding child. This phenomenon is called 'dilution'.

(2) Personality:

Psychologists, psychiatrists and trained observers now claim that it is possible to predict which particular problem will affect with individual according to its personality. For example, people who are prone to high blood pressure, are often quite aggressive, get irritated quickly and competitive.

(3) Skin Colour:

How skin colour should affect the blood pressure is still a mystery. But black people are much more likely to suffer from high blood pressure than white people. Most probable reason behind this is the stress of living in a hostile environment, low economic status and they are more likely to be harassed by the police and by the employers.

(4) Stress:

Revolutionary changes in science and technology creates modern problems. Today individual is always under tension and stress.

Individual has to worry about so many things such as paying of bills, getting and keeping jobs etc.. Stresses and hazards will always cause the blood pressure to rise. People who are engaged in professions characterized by stress are more prone to high blood pressure.

(5) Weight:

In overweight individuals, chances of developing high blood pressure are greater. Because, there is more body to provide blood to the most distant parts of the body. Another reason is that overweight individual eats too much food along with excess salt.

(6) Salt:

Ambard and Beaujard in 1904 (Dr. Coleman 1985), first published papers describing a link between salt consumption and high blood pressure. Genetically susceptible individual shows high blood pressure, when they eat salt. Because they are extra sensitive to salt intake.

(7) Cholesterol and Fats:

There is link between the consumption of cholesterol and the development of heart disease. The first link between fat intake and heart disease was noticed back in the early 1950 (Dr Coleman 1985). Since then much more evidence has been accumulated.

(8) Coffee:

A number of reports have been published in the recent years suggesting that coffee can cause high blood pressure. Greenberg et al. (1987) shows that the effect of caffeine on blood pressure

in individuals with or without family history of hypertension.

(9) Alcohol:

Heavier alcohol consumption increases blood pressure. Since alcohol is usually rich in calories, heavy drinking invariably also means an increase in weight and in turn increase in blood pressure. Otero et al. 1987 proved incidence of hypertension was directly related to the alcohol intake.

(10) Smoking:

There are considerable evidences to show that smoking increases blood pressure. According to some, smoking creates symptoms such as nervousness, which in turn leads to higher blood pressure.

(11) Drug:

Contraceptive pills cause an increase in blood pressure. It is known that contraceptive pills which contain large amounts of estrogen are particularly liked to produce hypertension. The progesteron only pills produce significantly less problems. There are a number of other drugs like carbenoxolone, a drug sometimes used in the treatment of peptic ulcers which can produce high blood pressure.

(12) Pregnancy:

About one in four women suffer from raised blood pressure at some stage during their pregnancy.

(13) Noise:

Nonindustrial and industrial noise is responsible for hypertension.

According to Dr. Coleman (1985) research done in Germany with workers in a bottling plant has shown that there is real link between noise and the development of high blood pressure. When the workers were given ear muffs those individuals whose blood pressure had risen made a remarkable recovery.

(7) Symptoms of Hypertension:

High blood pressure is a sign of something work. One may have high blood pressure without any symptom or if having any symptoms blood pressure may go up for a few days or weeks or months and then drop back to normal.

There are some persons with extensively high blood pressure and no symptoms, and conversely there are some with mild elevation and many symptoms. Often symptoms follow frequently due to fear and not to the disease of hypertension.

On the other hand individuals who have had persistent high blood pressure for some time will have symptoms produced not by their high blood pressure but by a disease or problem caused by the raised blood pressure. For example, patients may develop urinary problems because of kidney damage, or they may develop the sort of chest pains or breathlessness which is due to heart disease. Thus high blood pressure is often quite symptomless and hence it is important to detect it by routine check-ups.

The common symptoms are dizziness, nervousness, tired feeling, weakness, sleeplessness, jumping of the heart and headache.

The headache is usually at the back of the head and most often said to be the worst in the morning.

Occasionally, patients may have strokes and may develop paralysis.

Complications of Hypertension:

In benign hypertension blood pressure is elevated mild to moderate with a few symptoms or complications. In malignant hypertension blood pressure is higher with more complications, most important complications being as follows:

(i) Enlargement of the Heart:

Due to constriction of the blood vessel more strain is put on the heart. To compensate this strain heart must enlarge.

(ii) The Eyes:

Due to the constriction and rupture of the small blood vessels of the eye hemorrhages, scarring and defective vision occur.

(iii) Kidneys:

Due to the constriction of the blood vessels blood supply to the kidney is decreased which hampers or damages the function of the kidney.

(iv) Brain:

Due to the constriction and rupture of the blood vessels hemorrhages, clots and fluid can swell the brain, cause softening

of areas and lead to headache, memory changes, forgetfulness, nausea, vomitting.

According to Dr Coteman (1985) it is estimated that upto twenty per cent of the world's population have high blood pressure, while only 50 per cent of them know it and only 25 per cent are being treated on high blood pressure. It may not be a fashionable disease and it may not attract much attention, but in advance stage it is one of the major causes of death. As noise is slow agent of death and it is one of the causative factors of hypertension, these two aspects, namely, noise and hypertension, are simultaneously taken into consideration.

(8) Reasons Led to the Present Investigation:

The laboratory of physiology Department of Zoology, Shivaji University, Kolhapur has been actively engaged in extensive work on Industrial Physiology. Recently Patil (1990) has described some physiological aspects of noise problem in textile industry. The extension of this work in relation to noise and hypertension in industry forms the basis of the present dissertation.

From the overall critical review of occupational health hazards in textile industry it was observed that, textile industry is one of the largest and oldest industries. It provides employment to a number of workers. Textile industry plays an important role in the economy of the country. Exports of cotton textile are the third highest and earnings from cotton textile are still the third highest. Textile units

are always in limelight because of their poor occupational environment and sanitation. Accident rate is second highest in textile amongst industries. Till not much attention has been paid to the safety and health in the textile industry. Occupational health problems arise due to the occupational stress factors such as dust, hot and humid environment, excessive workload, inadequate illumination, sub-optimal design of machine and tools, high level of noise and vibration. Noise is one of the major risk-factors in the textile industry. Daily during eight hours of working period workers are exposed to the high level of noise which is responsible for the development of hearing loss and other physiological disorders.

Major work on occupational health hazards of textile industry was carried out in different parts of the country. A survey was conducted on occupational helth and safety in textile mills at Bombay by Shenai (1978). He was observed cases of byssinosis and noise-induced hearing loss in the textile mill. A study conducted on measurement of cotton dust level in the cotton mill of Gulbarga (RLI 1987) and of Madras (Gautam , 1988) included a survey carried out in textile industry in Madurai by Senthil Kumari et al. (1989). Pal and Mohan (1990) had suggested various management techniques to control occupational hazards in the textile industry. Das et al. (1990) had studied respiratory impairment in the cotton mill workers in Kanpur. In Lucknow, work on reduction in pulmonary functions of the textile workers was carried out by Rastogi et al. (1990). A study conducted in a textile mill in Kanpur (RLI) indicated that the sound levels were higher

than the prescribed limit for 8 hours at many locations (Pal & Rajput 1991).

Emphasis was given to the measurement of the level of cotton dust, respiratory disorders like byssinosis, noise-induced hearing loss, measurement of noise level in different areas of the textile mill and management of occupational environment in the textile mill.

Most of the work is done at Bombay, Nagpur, Kanpur, Gujarat and Lucknow. Ichalkaranji is one of the oldest textile industrial areas. But a comprehensive information about the actual status of occupational environment in different sections of textile industry and related health hazards is not available. Uptill now work was carried out on noise-induced hearing loss (Patil 1990). Very little attention has so far been paid on cardiovascular system - particularly noise-induced hypertension. Therefore main objectives of the study are as follows:

(1) To study health status of workers in different sections

(2) To measure sound level in different sections of the textile unit

(3) To identify hypertensive cases

(4) To perform puretone audiometry of the selected hypertensive workers and selected office members

(5) To compare the results of exposed and nonexposed groups

(6) To suggest suitable control measures to improve workers' health and to increase workers' efficiency and productivity.

Noise level was measured in different sections of 'B' unit in the textile mill. It was found that in the ring-frame section noise level was 92 dB(A) and NEI value was greater than '1'. Considerable number of workers were present in the ring-frame section. Large number of workers were overexposed to excess noise level in the ring-frame section. Therefore attention was paid to ring-frame section.