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Noise Pollution and Its Impact on Health

Authors: [1]SHUBHA AGARWAL, Assistant Professor(DEPARMENT OF CIVIL ENGINEERING , TRUBA INSTITUTE OF SCIENCE & TECHNOLOGY),Research Scholar AISECT University, Bhopal
[2] SHALINI YADAV, Professor (PATEL INSTITUTE OF SCIENCE & TECHNOLOGY, BHOPAL)
E-mail : [1]shubha188@ gmail.com, shaliniy2000@gmail.com,

Abstract
This paper aims at noise levels prediction at different locations inside the steel fabrication industry by some noise parameters i.e. equivalent noise levels, distance from sources at which a change in sound field occurs, intensity of sound, sound energy density & true sound level of different sources. Impact of industrial noise pollution on the health of workers by their personal interviews and the effect of industrial noise exposure on hearing capacity of workers by their clinical and audiometric examination.
Key words : Noise Level , Steel Fabrication Industry , Industrial Noise Pollution , Hearing Capacity , Audiometric Examination, Environment.

1.INTRODUCTION

Noise produces damaging effects among exposed persons notice. "You may forgive noise but your body will never". When one talks about noise pollution it is industrial noise that attracts the most attention among other sources of noise such as traffic noise and community noise. WHO definition of health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity[1].Then excessive noise is clearly a health problem. Prolonged exposure to unpleasant noises, or even a pleasant sound which is too loud or which comes at the end of a harrowing day, can lead to severe mental disorientation and in some cases violent behaviour.

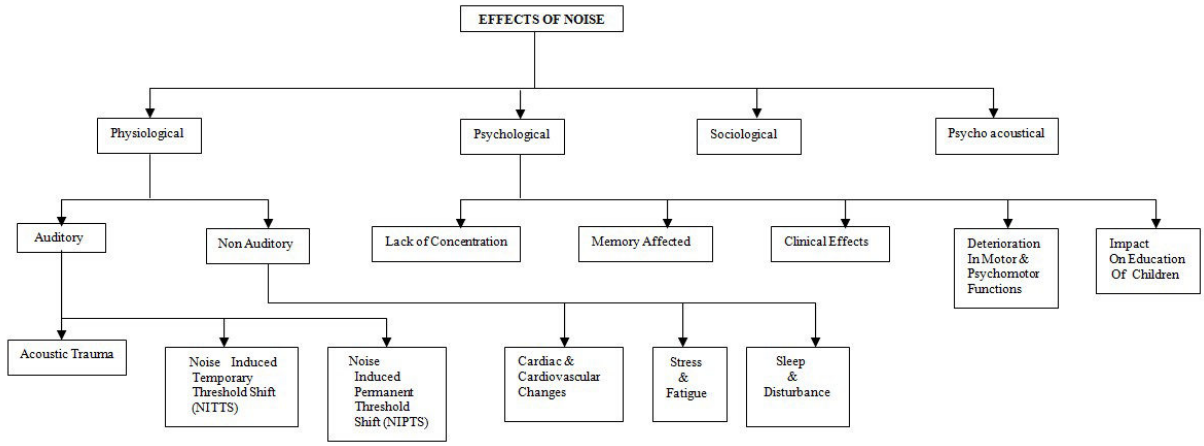
Noise not only disturbs man's work, sleep, rest and communication but it also damages his hearing capacity and evokes other psychological, physiological and possibly pathological reactions. Noise contributes to the development of cardiovascular problems like-heart disease and high blood pressure due to construction of the peripheral blood vassals. Experiments have reported rise in serum cholesterol and body plasma concentration in workers exposed to noise. Noise affects the central nervous system too. Peptic ulcer is more frequent and allergies like asthma and eczema are also aggravated. The interference is felt at three distinct levels, that is audio logical, biological and sociological [2,3]. However because of their complexity, their variability and the interaction of noise with other environmental factors, the adverse health effects of noise do not land themselves to a straightforward analysis.

2.SOURCES OF NOISE IN INDUSTRY

The most intense noise in factories is generally caused by machine tools and by operations involved in making and handling the product [4].

- Impact
- Reciprocation
- Friction
- Air Turbulence

3. EFFECTS OF NOISE



4. INSTRUMENTATION & METHEDOLOGY

4.1 Instrumentation

The most readily measurable aspect of sound by commercially available instrument is pressure levels dB. A sound level meter measures sound pressure level. Its accuracy and that of the meter are dependent upon:

1. The type of field and microphone orientation
2. The environment
3. Human error
4. Outside interference

4.2 Calculation of Equivalent Continuous Sound Level

4.2.1 The distance from the sound source which describes the transition from a directional sound field to a diffuse field be calculated by [3]

$$\gamma_G = 0.14\sqrt{}_{a\,A}$$

Where, γ_G = Critical radius or the distance from the sound sources at which the plane field changes to a diffuse field.

a =Absorption coefficient of walls (value obtained from National Building Code)

A = Total surface area of the room.

4.2.2 Sound Intensity is characterized by the formula :

$$I = p.v$$

where, "I" = sound intensity,

p = measured sound pressure

v = particle velocity

4.2.3 Sound energy density can be obtained by equation

$$E = p^2/x\,c^2$$

Where, E = sound energy in ergs/cm^3

p = sound pressure level in dynes/cm^2

x = density of air in gm/cm^3

c = speed of Sound in cm/sec.

4.3 Tests of Hearing

- Whispered Voice Test
- Tuning Fork Tests
- **Rinne's Test**
- Absolute Bone Conduction Tests
- Weber's Test
- False Negative Rinne

5. RESULTS AND DISCUSSION

The results of workers survey are discussed below :

5.1. Problem of noise is encountered by almost all workers of the industry.

5.2. The highest percentage up to 75 percent workers has complaint for lack of concentration.

5.3 The percentage for headache, stomach pain, eye disease each was about 68 percent.

5.4 These noise levels were found intolerable during working hours to 22 percent of the workers and are intolerable at time to 67 percent of the workers. Only 11 percent of the workers found them tolerable throughout.

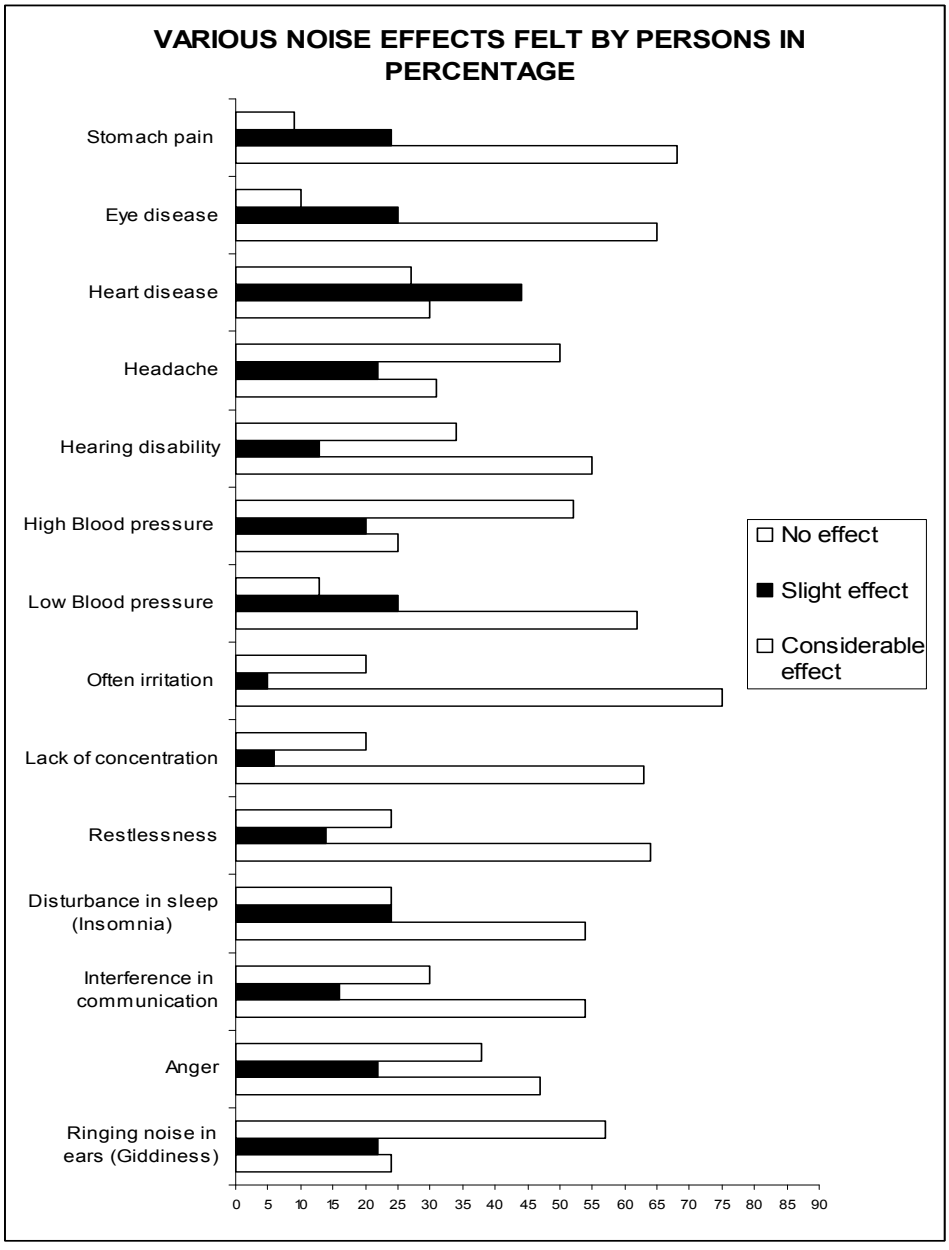
5.5 Clinical and Audiometric Testing Report :

5.5.1 As already described, out of 100 workers 10 were selected for their audiometric testing. Seven were found to have their threshold of hearing within normal limits, whereas two were found bilateral mild hearing. One worker was found deaf in his right ear and mild hearing in left ear.

5.5.2 During clinical examination of workers 'External Auditory Canal' was found normal in most of the cases and in a few cases 'wax' was present. 'Pinna' was found normal in almost all cases. 'Tympanic membrane' was found perforated in 2-3 cases. 'Handle of Malleus' has been seen in the similar 2-3 cases and normal in other cases.

5.5.3 It has been concluded that in around 20 to 30% of workers threshold of hearing has been shifted permanently. This may be because of their continuous exposure in noisy environment. It has been observed that old people mainly above 35 years are facing more hearing problem as compared to young people. As the young workers are able to bear noisy environment

The Magnitude of the Problems as Perceived by persons:



Clinical Examination Report

	Name of worker	Age in years	Ear	External auditory canal	Pinna or Aucricular	Drum (Tympanic membrane)	Handle of Malleus
1.	A	39	Right	Normal	Normal	Normal	Normal
			Left	Wax	Normal	Normal	Normal
2.	B	22	Right	Normal	Normal	Normal	Normal
			Left	Wax	Normal	Normal	Normal
3.	C	23	Right	Wax	Normal	Perforated	Retracted
			Left	Normal	Normal	Normal	Normal
4.	D	37	Right	Normal	Normal	Normal	Normal
			Left	Wax	Normal	Normal	Normal
5.	E	39	Right	Cong++	Normal	Perforation in centrally	Retracted
			Left	Normal	Normal	Normal	Normal
6.	F	26	Right	Normal	Normal	Normal	Normal
			Left	Normal	Normal	Normal	Normal
7.	G	43	Right	Normal	Normal	Cong+ at inter inferious point	Normal
8.	H	23	Right	Normal	Normal	Normal	Normal
			Left	Wax	Layer of dest polate	Normal	Retracted
9.	I	42	Right	Normal	Normal	Normal	Normal
			Left	Wax	Normal	Normal	Normal
10.	J	40	Right	Wax	Bleeding	Perforations	Normal
				Normal	Normal	Normal	Ritracted

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