

# HOW SAFE IS THE NOISE EXPOSURE?

Pages with reference to book, From 60 To 61

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“Noise can disturb man’s work, rest, sleep and communication. It can damage his hearing and evoke psychological, physiological and possibly pathological reaction”.<sup>1</sup> Human attitude and his responses depend a great deal on his environment. While a peaceful atmosphere may bring out the best in a person, a noisy surrounding might be conducive to the worst of accomplishments. Two forms of noise are noticeable in the environment, namely the urban and the rural noise. The rural noise might have pleasing effects e.g. the rhythmic puffing of a water mill, an urban noise eg., public transport could be a menace. There are numerous hazards of noise exposure, but the most obvious one is that on ‘hearing’. Although hearing acuity diminishes with age, a process called pres by acousus, but prolonged exposure to noise may precipitate its early onset<sup>2,3</sup>. It is indeed a common experience in daily life that a villager usually has lesser deficit than a city dweller. Likewise women have better hearing acuity level than men, who are generally more exposed to noise than women folk.<sup>4-6</sup> Two types of hearing losses are noticed after noise exposure i.e., the temporary noise threshold shift and the permanent noise threshold shift. It is the latter that is more significant<sup>7,8</sup>. Loud music can produce permanent changes at 4000 C.P.S.<sup>9</sup> and blasts or explosive sounds like that of a bomb cannot only rupture the ear drum— which incidentally is a lesser harm, than concussion leading to a deaf ear<sup>10,12</sup>, Some researches<sup>11-14</sup> have demonstrated permanent changes in the basal turn of cochlea in acoustic trauma, such as degeneration of the outer hair cells possibly due to mechanical sheering, PH alteration, thermal variation, coagulation of cochlear proteins, spasm of the cochlear end artery or the formation of microthrombi. Whether it is the damage to the hair cells or to the vascular system, is a matter of controversy. It is however established that noise trauma leads to sensori- neural loss which is usually bilateral and permanent. The vascular effect of noise trauma has been demonstrated by some workers<sup>15</sup> suggesting spontaneous closure of vascular channels in cochlea leading to cochlear damage. Others<sup>16</sup> believe that the effect of noise is not on the blood vessels directly but on the RBCS which tend to slow down to almost the level of slugging, in the capillaries of stria vascularis, thus bringing about changes in the oxygen content and P02 levels of cochlea<sup>17</sup>.

This hypothesis can explain sudden deafness and spontaneous development of tinnitus on exposure to the noise of an electronic telephone or a high frequency walkie-talkie. Perhaps, the fall in P02 level of cochlea below a critical level, leads to acute hypoxia resulting in irreversible damage to the sensitive endothelium<sup>16</sup>. Other effects of noise include changes in the C.V.S., and autonomic nervous system. It can also lead to hypercholesterolemia, hyperlipidosis and hyperproteiflemia. Exposure to noise can evoke various types of reflex responses. Neurophysiologically, the reticular and hypothalamic portions of the brain represent the centre of the reflex arc, the acoustic pathway represent the deferent branches and the ascending, descending nervous paths function as the efferent branches. The brunt is borne by the body organs like heart, blood vessels, pupils, adrenal glands etc. Animal studies<sup>18</sup> have shown a rise followed by fall in the corticosteroid output, as well as increased urinary excretion of epinephrine after an exposure to repeated two second stimulus of high frequency sound. Circulatory system reacts in different ways. Persistent exposure to high levels of noise can cause a persistent rise in blood pressure.<sup>19</sup> Other workers<sup>20</sup> discovered an evidence of constriction of blood vessels in the peripheral parts of body eg., fingers and toes, on exposure to a continuous noise of 90 dB. Changes in cardiac output, heart rate, stroke volume, or pulmonary artery pressure have also been described by some workers, but further studies are required in this field to establish the duration and the intensity of noise required for

such changes. Yet another effect of noise is on the equilibrium, which may be the outcome of undue stimulation of the vestibular end organ. Fortunately the noise levels responsible for such effects seem to be as high as 130 dB<sup>21</sup>, not a common happening but can be the case in a jet engineer's nature of job. Continuous exposure of human beings to noise levels between 50 — 125 dB not only produced fatigue, but also affected their task performing efficiency both mentally as well as physically<sup>22</sup>. An association between exposure to noise and the development of neurosis irritability, annoyance and excessive consumption of tranquilizers, hypnotics and even increased incidence of admission into mental hospitals has been described by numerous workers<sup>23-25</sup>. In Pakistan a major contributor to cochlear susceptibility to noise trauma, is the abuse of aminoglycoside group of antibiotics or spurious use of antibiotic ear drops in discharging ears. And finally to summarize it one could quote yet again from WHO's report on Noise that "In addition to a higher incidence of bearing loss the noise exposed persons may have a higher prevalence of peptic ulcer, hypertension, circulatory disorders, fatigue and irritability and more symptomatic diseases like migrain, medical problems, narrow visual fields, decreased colour perception and a significant chance of developing mental morbidity, even disorder".

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