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THE EFFECT OF NOISE ON CARDIOVASCULAR SYSTEM

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Noise is one of the most existing common pollution at this point of time. It has a lot of harmful effects on the human body. The purpose of this review is to analyze the harmful effects of noise on the cardiovascular system.

The long-term effects of chronic noise exposure at high noise levels have been studied in animals, showing permanent vascular changes and alterations in the heart muscle, which indicate an increased risk of cardiovascular mortality. Particularly intense noise stimuli (for instance, when healthy volunteers are exposed to noise simulating a military low-altitude flight or a racing car), especially when their content appears aggressive or frightening, trigger the fight–flight reaction, with the secretion of adrenalin and noradrenalin from the adrenal medulla.

The effects of this sympathetic excitation would help the organism to remove the stressor by actively confronting the problem or fleeing from it. Further, high-level noise events beyond the pain threshold and frightening sounds at lower levels also increase plasma cortisol levels, a so-called defeat reaction aimed at mitigating the damages expected from the stressor. Persistent changes in endogenous risk factors due to noise-induced dysregulation and disturbed metabolic function, promote the development of chronic disorders such as atherosclerosis, hypertension, and ischemic heart diseases in the long run.

It is important to note that non-auditory noise effects do not follow the toxicological principle of dosage. This means that it is not simply the accumulated sound energy that causes the adverse effects (dealing with decibels is not like summing up micrograms as we do for chemical exposures). Instead, the individual situation and disturbed activity need to be taken into account (time activity patterns). It may be very well that 80 decibels at work cause less of an effect than 65 decibels when carrying out mental tasks at home or 50 decibels when being asleep. In this respect, the evening hours, when people come home from work for relaxation and the night time when the organism physically recovers from daytime load and brain restoration takes place may be particularly important with respect to noise-induced health effects.

Noise, therefore, seems to be able to influence vascular tone through either an indirect or direct mechanism. It appears that the extra-auditory effects show themselves through nervous circuits represented by the reticular substance (e.g. effects on sleep, on pain); by nerve cortical centers (e.g. effects on consciousness, performance); and by the autonomic nervous system (e.g. effects on heart, on blood vessels).

In a WHO study published in 2018, the investigators analyzed longitudinal studies and found that road traffic noise, starting at 50 dB and per increase of 10 dB, raised the incidence of coronary heart disease by 8%.

Analysis of a Danish cohort (N = 57 053) showed that road traffic noise, starting at 42 dB(A) (N = 57 053) and per increase of 10 dB(A) L_{den}, increases the incidence of myocardial infarction by 12% (incidence rate ratio [IRR] [1.02; 1.22]) independent of air NO_X concentration, smoking behavior, education, and style of nutrition.

A meta-analysis of 24 studies by van Kempen and Babisch revealed that road traffic noise is associated with an elevated risk of the occurrence of high blood pressure starting at 45 dB and per increase of 5 dB.

There has been a lot of research on traffic noise and its influence on cardiovascular system. But most of them do not give accurate results needed to measure exposure. More researches should be done on traffic noises and on occupational noises in natural conditions for more accurate results in order to prevent cardiovascular diseases in all age groups.