

THE IMPACT OF NOISE ON HUMAN HEALTH

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Introduction

Noise pollution in urban areas has been as one of major environmental problem in recent years. The major causes are traffic, construction and commercial activities. With increasing population and urbanisation, problem of noise is becoming critical. Noise affects us throughout our lives. During infancy and childhood, youngsters exposed to high noise levels may experience learning disabilities and generally suffer poorer health. This study was carried out to assess the effect of environmental noise exposure on hearing ability of primary school children; its relationship with cognitive development and neurobehavioral scores.

Materials and Methods

A total of 154 students from 2 primary schools in Kuala Lumpur (urban) and 132 students from a school in Bukit Kuang, Terengganu (rural) were recruited through random sampling stratified according to class and sex. The urban schools were located near busy roads and thus had higher environmental noise level than the rural school. Audiometric tests using Pure Tone Audiograms with an audiometric booth and a questionnaire were administered on the selected students. General cognitive test and neuro behavioral tests were also done.

Results and Discussion

Audiometric test results showed that majority of the children has normal hearing while some experienced mild hearing loss. The more severely affected frequencies were the low frequencies of 250 Hz and 500 Hz, and also the high fre-

quencies of 6000 Hz and 8000 Hz. The results showed that there was a significant difference in the mean hearing ability of urban and rural children at speech frequencies of 500 to 3000 Hz in the left ears ($t=4.592$, $p<0.001$) as well as right ears ($t=5.899$, $p<0.001$). Levels of noise which do not interfere with the perception of speech by adults may interfere significantly with the perception of speech by children as well as with the acquisition of speech, language, and language-related skills (U.S. EPA, 1978). Overall, the urban children have poorer hearing than rural children. This is due to the fact that the urban school is located near busy roads, which has high volume of traffic. For both groups of children, the mean hearing thresholds of left ear appeared to be higher than right ear. The difference was statistically significant at 250 Hz, 500 Hz, 6000 Hz and 8000 Hz for both groups of children. Significant inverse correlations were found between all children's hearing thresholds for both left and right ears at frequency range of 500-3000 Hz (left: $r = -0.219$, $p=0.013$; right: $r = -0.206$, $p=0.020$) and 250-8000 Hz (left: $r = -0.224$, $p=0.011$; right: $r = -0.221$, $p=0.012$) with their general cognitive scores. A study by Evans et al. (1995) concluded that cognitive data indicate selective impairment in cognitive functioning among children from noisy communities. Children may cope with noise by developing cognitive strategies like tuning out noise, which may have consequences for language acquisition and speech processing. Pearson's correlation test also showed that there was an inverse correlation between hearing thresholds of right ear at 250-8000 Hz ($r = -0.209$, $p=0.027$) and at 500-3000 Hz ($r = -0.216$, $p=0.023$) with the children's behavioural neuro scores.

Conclusions

In conclusions, environmental noise pollution produced from the vicinity affects the urban children's hearing thresholds, mental development and neuro behavioral scores.

References

- Evans, G.W., Hygge, S. and Bullinger, M. 1995. "Chronic Noise and Psychological Stress" *Psychological Sciences*. 6: 333-338.