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The Okinawa study: effects of chronic aircraft noise on blood pressure and some other physiological indices

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1. Objectives

Some physiological indices obtained by health examinations were investigated to find relationships with aircraft noise exposure. The examinations were conducted by the local authorities in the fiscal years of 1994 and 1995, which were suggested by Japanese government for senior citizens over 40 years of age to undergo on the basis of Health and Medical Service Act for the Elderly.

2. Material and methods

The subjects were 29,000 residents living around military airfields in Okinawa, Japan. Blood pressure, lipid concentrations (total cholesterol, neutral fat, LDL, HDL) and serum uric acid level were analyzed by multiple logistic regression model with adjustment for some confounding factors, i.e. age, sex, BMI and their interactions. The outcome variables were converted into dichotomous variables with cut-off points of the medians for the analysis. Trend test was applied

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to detect linear dose–response relationship between Ldn and adjusted odds ratio. The rate of hypertension was also investigated by the logistic regression model.

3. Results

The results showed clear dose–response relationships between blood pressure and noise exposure. Highly significant trend was obtained for hypertension ($p=0.0002$). The odds ratio starts its increase from the lowest noise-exposed group (Ldn: 60–65dB) under the investigation and reaches 1.4 at the highest noise-exposed group (Ldn: >70dB) compared to the control ($p<0.0001$). Significant decreases of lipid concentrations with the increase of aircraft noise level were found on total cholesterol, LDL and HDL ($p<0.0001$). The concentration of neutral fat, however, did not show any significant relationship with aircraft noise exposure. The serum uric acid level showed significant decrease ($p=0.0010$), in which odds ratio was also adjusted for creatinine level.

4. Comments

From the questionnaire survey conducted by the present authors [1], it was found that smoking rate and drinking habit were similar among the residents around the airfields. There seems to be no remarkable differences in socio-economic factors, which might raise blood pressure and lower lipid concentrations.

Reference

- [1] T. Miyakita, T. Matsui, A. Ito, T. Tokuyama, K. Hiramatsu, Y. Osada, T. Yamamoto, Population-based questionnaire survey on health effects of aircraft noise on residents living around US airfields in the Ryukyus —Part I: an analysis of the 12 scale scores, *Journal of Sound and Vibration* 250 (2002) 129–137.