B-13.1.2 Health Effects at Population Level: Its Diversity by Life Style and Behavior

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Total Budget for FY1990-FY1992 11,099,000 Yen

Abstract Temperature control using air conditioners (AC) at home and office was studied in a rural area, a new flats area, and an old town near Naha city. People in high flats suffered from poor wind intake with symptoms related to AC. In office the actual temperature was lower than the comfortable level, the latter was similar to that at home. Patients of hypertension and ECG abnormality had a lower temperature in the office. Nutritional data from 19 prefectures of the national survey were combined with the local temperature. The temperature had significant negative relationships with the total calorie, protein, lipid, and carbohydrate intakes in rural area during 1982-1986, which disappeared in 1987-1990. Analyses of the total death, and the death from traffic accidents (TA) were done using temperature on the day of death. The total death rate in the maximum temperature levels divided in six decreased commonly during 1980-1984 but increased during1986-1990. The death rate from TA had relations with the monthly mean temperature only in winter (positive) and summer (negative). n winter and summer the mean, daily temperature of TA (percentile of cumulative death frequency) was low during 1980-1984, however became high during 1985-1989.

Key words Health Effect, Occupation, Airconditioner, Daily Activity, Personal Environment Temperature, 24-hr Heart Rate

1. Introduction

The control of the outdoor and indoor temperatures via natural change (season, day, and time) and behavioral selection (of place and activities as well as active temperature control) strongly effects on the urban life with various personal deviation of its status and the degree of adaptation. To evaluate health risk by the global warming, we need information on (1) temperature, wind,ventilation, and heat production by human activities, (2) usage of airconditioner and status of physiological adaptation, (3) temperature control in work environment as well as personal sensitivity and preference by health condition, and (4) possible heat exposure related to transportation, work, shopping, and life at home.

2. Research Objective

(1) Analysis of the statistical data on total death and car accident death in Japan during 1980-1990 for possible relationship with outdoor temperature of the death day
(2) Collection of baseline data in actual life settings by measuring personal temperature environment of the young office-workers (system engineer), and the middle-aged people who could freely select daily behaviors
(3) Mass survey of aircondition usage in the occupational and home environment and its relationship with the individual health status

3. Results

(1) The relationship of the outdoor temperature with the total death and death by car accident during 1980 and 1990 in Japan

The death registration in Kyushu, southern Japan combined with the outdoor maximum temperature (Tx) of the death-day suggests that the total death rate decreased in 1980-1984 but increased again in 1985-1989 at Tx $\geq$25 ℃ (Fig. 1,2). The death rate by car accident increased with monthly mean of the outdoor temperature of 47 prefectural capital cities. The death rate showed a significant positive correlation with the temperatures in January to March and July to August, but not in the intermediate months. Using individual cases of the death paired with the outdoor mean temperature of the day, its range in winter and summer reduced from 8 to 5 ℃ in 1985-1990 compared with 1980-1984 (Fig.3). Change of the outdoor temperature may effect on the life style and human environment leading to excess death at the specific temperature condition.

(2) Heart rate and personal environmental temperature in various activities

Personal environmental temperature (Tm) and heart rate (HR) during daily life in 1990 summer were studied on 31 middle aged people (male and female, mean age 50 years old) using 24hr-recorder. People using airconditioner during sleep shoed lower Tm (29.5 vs.30.8 ℃). The comparison of groups with Tm<31 ℃and Tm$\geq$31 ℃had significant difference in HR during sleep only(62.4 vs.55.2 beats/min).

25 male office-workers (mean 29.5yrs) in airconditioned buildings (temperature: 24-27 ℃). In 1991 summer the temperature had the hot (30 ℃) and cool (25 ℃) periods, where personal Tms were buffered to 28.5$\pm$2.8 ℃and 27.0$\pm$2.3 C(S.D.), respectively. Their HR showed significant difference (86.4+18.5 vs. 83.4+22.4 beats/min), where the former suggested possible stress under the upper limit temperature of airconditioning at work (28 ℃). The two phase showed clear differences in Tm and HR during sleep, working daytime,hobby, and exercise. The standard outdoor temperature in Tokyo had no

relationship with the activities under aircondition, except for Tm during sleep and transport. Thus, the difference of Tm and HR between the middle-aged people (a high and broad Tm range and low HR with the reduced activity) and the younger office workers (a flattened and narrow Tm range) is due to behavioral selection and may have some health related risks.

(3) Aircondition usage in the office and home and the health status in Naha

AC was introduced due to rapid urbanization during 1980s in Naha City, Okinawa. Attendants to health check (N=344, mean age 59 yrs) from suburbs (old town, new housing development, rural area) were asked about AC usage. People in housing development had poor wind intake and stayed in the AC room all the day in spite ofphysical discomfort. People who discontinued AC earlier in September had good life styles such as longer sleep time, exercise and dieting.

People working in Naha City (N=218, mean 47.1 yrs) reprted the temperature conditions (Ts) and their preference (Tp) of AC at office and home. The minimum and maximum values of Ts at office were lower than those of Tp. Engineers stayed under the coldest Ts in both office and home. In contrast, managers had the hottest Ts. Ts of construction workers varied by day-night or range of Ts (Fig.4). Laboratory abnormalities were related with minimum values of Ts and Tp (Fig.5). AC usging may have different health risks by occupation and may be related with the adaptive behavior due to health status.

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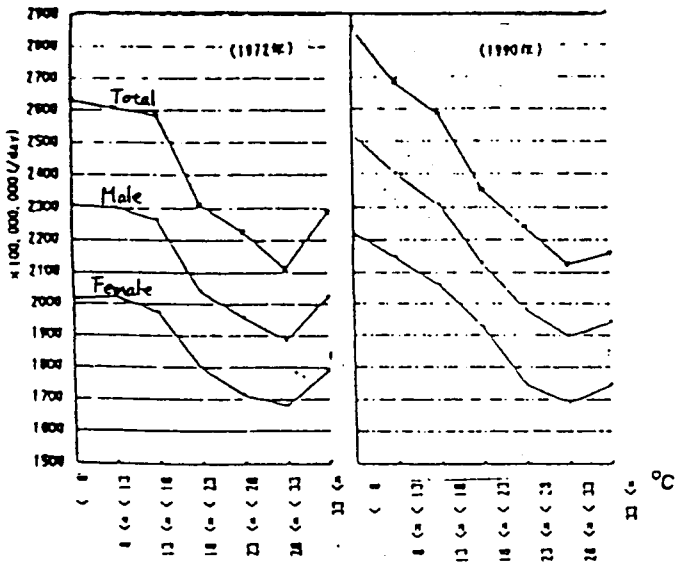

Fig.1 The relationship of the maximum daily outdoor temperature and total death rate in Kyushu district.

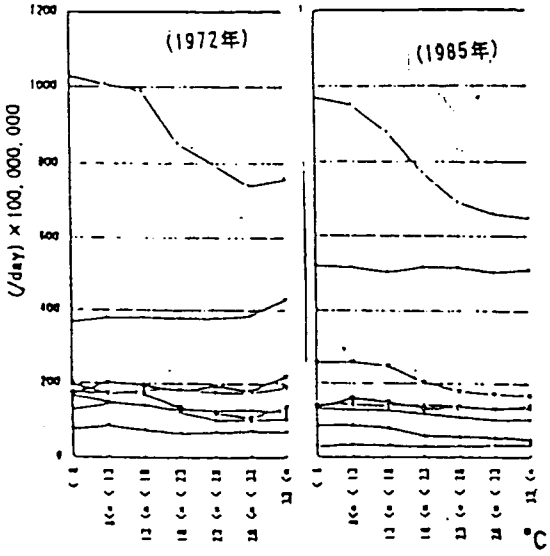

Fig.2 The relationship of the maximum daily outdoor temperature and death rates by major diseases in Kyushu district, both sexes.

— Infection
— Malignancy
— Cardiovascular
— Respiratory
— gastrointestinal
— Senility
— Accidents
— Others

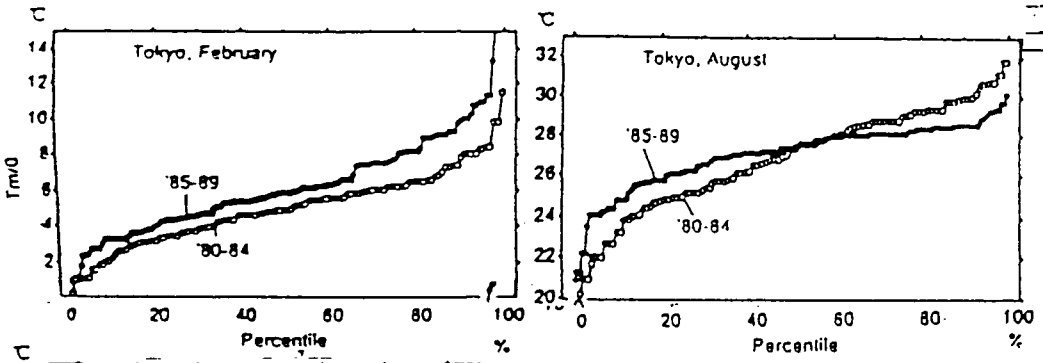

Fig.3 The percentile of death cases cumulated by mean outdoor temperature of the day of car accident in Tokyo during 1980-1989.

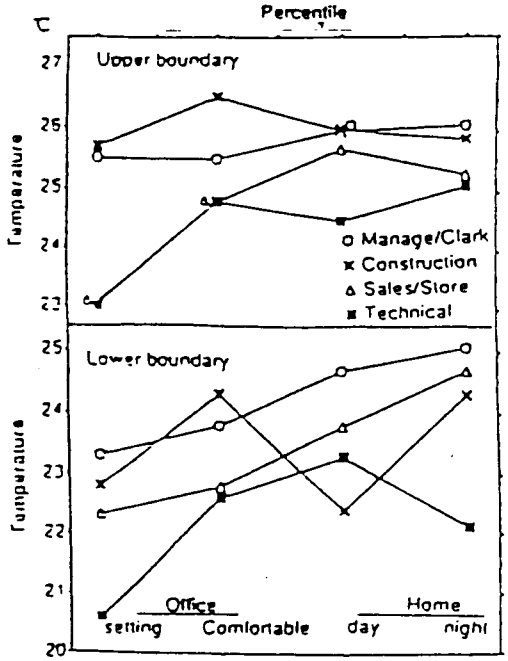

Fig.4 The emperature of the workplace and home in various occupations.

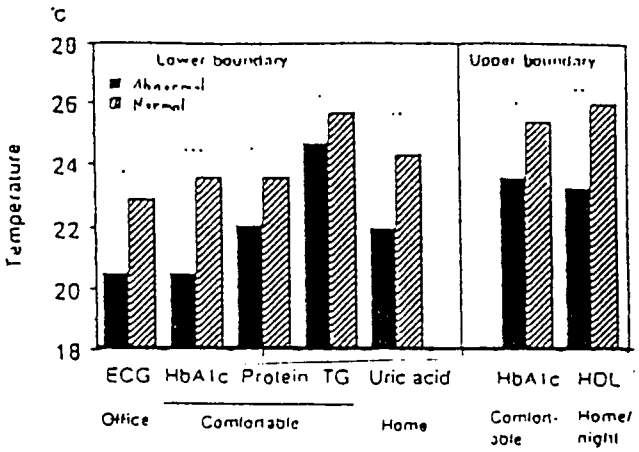

Fig. 5 The frequency of abnormal laboratory data related with the temperature in the workplace and home