COHORT STUDY ON ASSOCIATION OF SMOKING AND AIR POLLUTION WITH LUNG CANCER AMONG 210,000 PERSONS IN SHANGHAI

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Survey on smoking habit and other related factors has been carried out among 110,000 persons in urban area and 100,000 persons in suburb and outer suburb area. The degrees of air pollution among three areas are different and the urban area is the one with the heaviest degree and the outer suburb with the lowest. Study on the relationship between smoking, air pollution and lung cancer has been carried out among the residents with the age of 40 years old and over in the three areas. The subjects were followed up for six years in urban area and five years in suburb and outer suburb. The total number of lung cancer death found in this period was 828. Most of these diagnosis were classified as group of high (I or II) degree. For non-smokers, there were no significant differences of standardized mortality radio (SMR) of lung cancer among three areas. For male smokers, the highest SMR of lung cancer was seen in urban area, the lowest in outer suburb and these differences reached the significant lever. Cigarette smoking was significantly associated with increased risk of lung cancer by comparing the data between smokers and non-smokers in the three areas. Also, it was showed that the combined effect of smoking with air pollution probably existed.

Lung cancer is one of the most common malignant tumours in Shanghai. The cohort study of 210,000 adults in urban, suburb and outer suburb area of Shanghai has been conducted since 1983 in order to explore the effects of smoking, air pollution and their synergic effect on lung cancer.

MATERIALS AND METHODS

The four urban subdistricts distributed in Lu-
Wang, Hong-Kou and Pu-Tou Districts, eleven suburb communes in Shanghai County and ten outer suburbs communes in Feng-Xian County were selected. Three areas represent the different air pollution levers successively, the urban area with the heaviest lever and the outer suburb area with the lowest according to the evidence from the air monitoring. The subjects are the residents with the age of 20 years old and over in the above areas but the half of female residents in the suburb and the outer suburb area were excluded. The reason is that there were enough no-smoking women of these areas in the study. So 214,297 persons, 112,715 persons in urban area (93.9% of those eligible) and 101,582 persons in suburb and outer suburb area (98.6% of those eligible), were investigated.

The contents of the survey were smoking habit, residential history, condition of housing room and cooking room, fuel use and so on. Every subject has been followed for six years (1983—1988) in urban area and five years (1984—1988) in suburb and outer suburb area to observe whether he has died and whether he has moved out of the selected areas. Once the death was observed the cause of death must be carefully checked. Meantime, the information from the air pollution monitoring points near the selected areas was collected and both of the pollution index (PI) and benzo (α) pyrene (BaP) concentration were chosen to indicate the air pollution level.

The subjects with the age of 40 years old and over were divided into several groups depending on residential area, sex, age and smoking habit, and calculated the standardized mortality ratio (SMR) of lung cancer for three different areas standardized by 1983—1985 age-specified lung cancer mortality rates in Shanghai urban (5 years old as one group).  

RESULTS

Information on Death from Lung Cancer

In urban 308 persons died of lung cancer in male with 44.1% diagnosed in the I or II clinical stage and 89 persons in female with 55.9% diagnosed in the I or II clinical stage were identified during the six years period. In suburb 383 persons died of lung cancer in male with 33.4% diagnosed in the I or II clinical stage and 48 persons in female with 63.1% diagnosed in the I or II clinical stage were observed during the five years period.

Standardized Mortality Ratio (SMR) of the Three Areas

Table 1 lists air pollution index (PI), benzo (α) pyrene (BaP) concentration and standardized mortality ratio (SMR) of subjects with different smoking habit of the three areas. As shown in the Table, the urban area was the one with the heaviest lever and the outer suburb with the lowest lever in both pollution index and benzo (α) pyrene (BaP) concentration. In non-smokers, the relationship between air pollution and lung cancer has not been found through SMR of lung cancer. In male smokers, SMR of lung cancer were significantly different among the three areas, the urban area with the highest and the outer suburb with the lowest. In female smokers, there was no enough persons to show the exposure effect relation between smoking and lung cancer. In the same area, SMR of lung cancer in smokers were significantly higher than that in non-smokers.