PBL 3

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Literature Review

*-- The impact of air pollution on humans*

All components of air pollution are harmful to human health, but the most serious impact is from atmospheric PM which contains various toxic substances and carries them into the respiratory tract. When breathing in PM, coarse particles will remain in the nasal cavity and upper respiratory tract of people, and fine and ultrafine particles of PM may though the alveoli and enter the bloodstream[1]. Research has shown that the increase in mortality rate is related to short-term and long-term exposure to PM. The percentage increase of all-cause mortality associated with short-term PM exposure is between 0.4% and 1.5% for each 20 micrograms/m3 increase in coarse PM10, and between 0.6% and 1.2% for every 10 micrograms/cubic meter increase in finer PM2.5. [2] These increases are much higher in Southeast Asian countries, especially in China and India, people there is facing high-levels air pollution due to the rapid development of industry and dense population. [3]

In addition, air pollution is also related to the increase in mortality and hospitalization caused by cardiovascular and respiratory disease.

***Air pollution and Vascular disease***

Various studies have found that there are relationships between air pollution and cardiovascular diseases, the most important one is after breathing in the PM, the activation of inflammatory pathways, primary and secondary hemostasis and production of reactive oxygen species. [4] In addition, PM increase by 10 μG/m3 is associated with a 4.5% increased risk of acute coronary syndrome (unstable angina and myocardial infarction) [5].

About heart failure, in a British study, long-term exposure to PM and NO2 was associated with an increased incidence rate. Moreover, a recent analysis showed a positive correlation between short-term increases in gas composition and PM and the risk of hospitalization for heart failure. [6]

With regard to Cerebrovascular disease, studies have shown that there are relationships between air pollution and stroke incidence rate and mortality. In the United States and Denmark, for every 10 micrograms/cubic meter increase in long-term PM2.5 exposure, non fatal and fatal strokes increased by 35% and 83%[7]. Similarly, in China, exposure to PM10 and NO2 is also associated with an increase in cerebrovascular mortality. [8]

***Air pollution and Respiratory disease***

Exposure to air pollutants is associated with Chronic obstructive pulmonary disease (COPD), acute respiratory infection, cancer and respiratory allergy[9]. In a study on the number of admissions related to heart and lung diseases in the United States, for every 10 micrograms/cubic meter increase in PM10, the number of COPD admissions increased by 2.5%[10]. Another study found that a sudden increase in PM2.5 is associated with an increased risk of hospitalization for COPD by approximately 0.9%[11]. On the other hand, a study conducted in the heavily polluted city of Los Angeles reported that since 1994, with the gradual improvement of air quality in the city area, the lung function of adolescents has improved[12].

***Association with other diseases***

The data indicates a connection between air pollutants and the deterioration of allergic diseases (rhinitis, eczema, etc.) [13]. Diabetes and cognitive effects are also associated with exposure to air pollutants. And recently, people are concerned that air pollutants may have an impact on pregnancy and the first extrauterine life cycle [14]. Some studies have also found an association between exposure to air pollution during pregnancy and low birth weight at term and delayed psychomotor development in childhood [15].

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