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The Effect of Photochemical Smog on Respiratory Health Patients in Abuja Nigeria

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Abstract : Summary: This study aims to critically evaluate effect of photochemical smog on respiratory health in Nigeria. Cohort of chronic obstructive pulmonary disease (COPD) patients was recruited from two large hospitals in Abuja Nigeria. Respiratory health questionnaires, daily diaries, dyspnoea scale and lung function measurement were used to obtain health data and investigate the relationship with air quality data (principally ozone, NO_x and particulate pollution). Concentrations of air pollutants were higher than WHO and Nigerian air quality standard. The result suggests a correlation between measured air quality and exacerbation of respiratory illness. Introduction: Photochemical smog is a significant health challenge in most cities and its effect on respiratory health is well acknowledged. This type of pollution is most harmful to the elderly, children and those with underlying respiratory disease. This study aims to investigate impact of increasing temperature and photochemically generated secondary air pollutants on respiratory health in Abuja Nigeria. Method and Result: Health data was collected using spirometry to measure lung function on routine attendance at the clinic, daily diaries kept by patients and information obtained using respiratory questionnaire. Questionnaire responses (obtained using an adapted and internally validated version of St George's Hospital Respiratory Questionnaire), shows that 'time of wheeze' showed an association with participants activities: 30% had worse wheeze in the morning: 10% cannot shop, 15% take long-time to get washed, 25% walk slower, 15% if hurry have to stop and 5% cannot take-bath. There was also a decrease in Forced expiratory volume in the first second and Forced Vital Capacity, and daily change in the afternoon-morning may be associated with the concentration level of pollutants. Also, dyspnoea symptoms recorded that 60% of patients were on grade 3, 25% grade 2 and 15% grade 1. Daily frequency of the number of patients in the cohort that cough /brought sputum is 78%. Air pollution in the city is higher than Nigerian and WHO standards with NO_x and PM₁₀ concentrations of 693.59ug/m³ and 748ugm⁻³ being measured respectively. The result shows that air pollution may increase occurrence and exacerbation of respiratory disease. Conclusion: High temperature and local climatic conditions in urban Nigeria encourages formation of Ozone, the major constituent of photochemical smog, resulting also in the formation of secondary air pollutants associated with health challenges. In this study we confirm the likely potency of the pattern of secondary air pollution in exacerbating COPD symptoms in vulnerable patient group in urban Nigeria. There is need for better regulation and measures to reduce ozone, particularly when local climatic conditions favour development of photochemical smog in such settings. Climate change and likely increasing temperatures add impetus and urgency for better air quality standards and measures (traffic-restrictions and emissions standards) in developing world settings such as Nigeria.

Keywords : Abuja-Nigeria, effect, photochemical smog, respiratory health

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