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Effects of Microbiological Elements in Indoor Air Quality on Office Workers in Cyberjaya Corporate Building

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Structured Abstract

Background: The health, comfort, and productivity of office workers are greatly impacted by indoor air quality (IAQ), especially in tropical areas where mechanical ventilation and air conditioning (MVAC) systems run constantly. Legionnaires' disease and Sick Building Syndrome (SBS) have been connected to airborne biological pollutants like bacteria and fungi. Few studies have looked at the association between MVAC thermal performance, airborne microbiological concentrations, and occupant-reported health symptoms in Malaysian corporate offices, despite the fact that compliance with national IAQ regulations is frequently utilised to evaluate indoor settings. The purpose of this study was to measure the quantities of airborne viable microorganisms in specific office areas of a corporate building in Cyberjaya and to determine any possible health risks.

Methods: A Surface Air System (SAS) sampler was used to sample the air, and the microbial concentrations were reported as colony-forming units per cubic meter (CFU/m³). In order to reflect areas with different occupancy levels and activities, sampling locations were chosen using a walkthrough survey. Supply and return air temperatures were measured in order to evaluate MVAC thermal performance. Over the course of three months, a questionnaire survey was given to residents in order to assess the frequency of SBS-related symptoms. The Malaysian Industry Code of Practice on Indoor Air Quality (ICOP, 2010) was used to compare measured bacterial and fungal concentrations. The impact of temperature and occupant-related parameters on microbial dispersal was investigated using correlation and geographical analysis.

Results: All values were below the ICOP (2010) limit of 500 CFU/m³, with airborne bacterial concentrations ranging from 9.0 to 164.3 CFU/m³ and fungal concentrations ranging from 27.0 to 84.0 CFU/m³. Effective MVAC filtration and moisture control were demonstrated by the consistently low and evenly distributed fungal concentrations. Bacterial concentrations, on the other hand, exhibited significant regional diversity, with the greatest levels found in administrative zones with high occupancy. Over-cooling by itself did not lower airborne bacteria, according to correlation analysis, which showed weak and non-significant connections between MVAC temperature and microbial concentrations. The results of the questionnaire revealed recurrent symptoms associated with SBS, especially in regions with increased bacterial loading.

Conclusion: Localised bacterial hotspots and recurrent SBS symptoms were noted even when microbiological levels met ICOP (2010) criteria. This suggests that occupant density and activity, rather than MVAC thermal performance, were the main factors impacting perceived indoor air quality.

Keywords: Indoor Air Quality (IAQ), Microbial Concentrations, Sick Building Syndrome (SBS)

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