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Occupational Bioaerosol Exposure in Academic Libraries And Its Implications For Respiratory Health

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Structured Abstract

Background: University libraries are enclosed indoor workplaces where librarians may experience repeated exposure to airborne bioaerosols, particularly fungal spores, arising from book handling, dust accumulation, and limited air circulation in certain zones. While indoor air quality (IAQ) has received growing attention, microbial exposure in library settings remains underexplored, despite its potential contribution to respiratory discomfort and occupational health concerns. This study aimed to quantify airborne fungal concentrations across selected library work areas and examine their association with respiratory symptoms among librarians.

Methods: A cross-sectional study was conducted at Perpustakaan Tun Abdul Razak 1 (PTAR), UiTM Shah Alam. Six indoor sampling locations representing distinct work areas were selected using purposive sampling. Airborne fungi were collected using an SKC QuickTake 30 Microbial Air Sampler operated at 28.3 L/min for 5 minutes, cultured on Malt Extract Agar, and expressed as colony-forming units per cubic metre (CFU/m³). Respiratory symptoms were assessed among 27 librarians using the ATS-DLD-78A questionnaire. Concurrent measurements of temperature, relative humidity, and air velocity were recorded. Associations between fungal concentrations and respiratory symptoms were analysed using Spearman correlation and simple logistic regression, with statistical significance set at $p < 0.05$.

Results: Mean airborne fungal concentrations ranged from 48.29 to 170.79 CFU/m³. The highest levels were observed at SP6 (170.79 ± 26.60 CFU/m³) and SP4 (166.08 ± 47.46 CFU/m³). All measured concentrations were below the ICOP-IAQ recommended limit of 1000 CFU/m³. Respiratory symptoms were frequently reported, notably chest illness (51.9%) and shortness of breath (37.0%). However, no significant association was found between total fungal concentration and the presence of at least one respiratory symptom (OR = 1.008, p = 0.452).

Conclusion: Although airborne fungal concentrations in the university library were within recommended IAQ limits, respiratory symptoms among librarians were prevalent. These findings suggest that occupational health risks in library environments may be influenced by multiple interacting factors beyond fungal exposure alone, underscoring the importance of comprehensive IAQ management and preventive occupational health strategies.

Keywords: Bioaerosols, indoor air quality, fungal concentration, librarians

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