Title: Occupational Risk Assessment of BTEX and Their Metabolites in Petrol Attendants and Controls at Baseline and Post-Intervention in Central Johannesburg, South Africa

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Abstract

Introduction

Volatile organic compounds (VOCs) from petrol products, especially benzene, toluene, ethylbenzene, and xylene (BTEX), are significant air pollutants posing health risks to petrol attendants through prolonged inhalation and, depending on the level of exposure, might result in acute or chronic health concerns. A thorough investigation hoewever of occupational health risks in hazardous areas like petrol stations, particularly concerning BTEX exposure from vaporization sources, remains incomplete especially in South Africa, despite known health risks from BTEX exposure.

Methods

This study aims to fill this gap by investigating the occupational exposure of petrol attendants to BTEX emissions at petrol stations in Johannesburg. Biological specimens such as urine, breath and blood have been utilized to determine biological exposure to various toxic substances. Nonetheless, it has been observed that BTEX concentrations significantly decrease in breath samples following exposure. While blood analysis may offer dependable results, its invasive sampling method is deemed

unfavourable. Consequently, the non-invasive approach of collecting urine samples continues to be a preferred choice.

BTEX are metabolized by hepatic enzymes and the metabolites formed in secondary reactions are often specific to their parent BTEX, thus making them suitable biomarkers for the detection of BTEX in urine.Therefore, this study will be conducted by measuring BTEX and their metabolites in urine samples from petrol attendants and control. The analysis will be conducted using two-dimensional gas chromatography with time-of-flight mass spectrometry (GCxGC-ToF-MS) to qualify and quantify the target analytes.

Conclusion

This groundbreaking study will address a significant void in occupational health research by concentrating on a particularly susceptible group of workers in South Africa. It utilizes a comprehensive method that merges environmental monitoring with biomonitoring, offering unparalleled perspectives on the occupational risks associated with BTEX chemicals, providing crucial insights for the development of enhanced regulatory frameworks and safety interventions for petrol station attendants in South Africa.