Title: Pesticides contaminated dust exposure, risk diagnosis and exposure markers in occupational and residential settings of Lahore, Pakistan.

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Highlights:

\begin{itemize}
  \item This is the first assessment of pesticides using indoor dust, urine from Pakistan.
  \item Combined influence of various factors explains pesticides content in studied sites.
  \item Site specific differences were observed for Pesticide concentration.
  \item Significant variations were noted in pesticides biomarkers level in exposed group.
  \item Health status markers indicate that occupational groups at greater risk.
\end{itemize}

Abstract

There are few studies documenting the dust loaded with pesticides as a potential non-dietary exposure source for occupational worker and populations living near agricultural farms and pesticides formulation plants. In present study we have evaluated the pesticide concentration in dust from potential sites and relevant health risk from dust ingestion. Furthermore, the effect of currently used pesticides was investigated on blood and urine parameters of subjects: farmer, factory worker, urban resident and rural resident and controlled subjects with presumably different levels of exposure. The urinary metabolites (TCPY and IMPY) were quantified as biomarkers of exposure to chlorpyrifos and diazinon in relation with biomarkers of effect including BuChE, LH, FSH, testosterone and oxidative stress. Results showed that chlorpyrifos and diazinon were present in higher concentration in dust and posed a high health risk to exposed subjects. The mean SOD value was high among the farmer (3048 U/g Hb) followed by factory worker (1677.6U/g Hb). The urinary biomarkers - TCPY and IMPY- were found higher in exposed subjects as compared to control. Furthermore, testosterone was found in higher concentration in factory worker than control (12.63ng/ml vs 4.61ng/ml respectively). A decreased BuChE activity was noticed in occupational group and significant differences were observed in control verses exposed subjects. The PCA analysis evidenced the impact of pesticides on exposure biomarkers and male reproductive hormones. The study suggests that dust contaminated with pesticides engenders significant health risk particularly related to the nervous and endocrine system, not only for occupational workers exposed to direct ingestion but also for nearby residential community. Succinctly putting: Pesticides loaded dust in the city of Lahore, being a high priority concern for the government of Pakistan, demands to be addressed.
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