

## Blood Chemo-Profiling in Workers Exposed to Occupational Pyrethroid Pesticides to Identify Associated Diseases

**Authors :** O. O. Sufyani, M. E. Oraiby, S. A. Qumaiy, A. I. Alaamri, Z. M. Eisa, A. M. Hakami, M. A. Attafi, O. M. Alhassan, W. M. Elsideeg, E. M. Noureldin, Y. A. Hobani, Y. Q. Majrabi, I. A. Khardali, A. B. Maashi, A. A. Al Mane, A. H. Hakami, I. M. Alkhyat, A. A. Sahly, I. M. Attafi

**Abstract :** According to the Food and Agriculture Organization (FAO) Pesticides Use Database, pesticide use in agriculture in Saudi Arabia has more than doubled from 4539 tons in 2009 to 10496 tons in 2019. Among pesticides, pyrethroids is commonly used in Saudi Arabia. Pesticides may increase susceptibility to a variety of diseases, particularly among pesticide workers, due to their extensive use, indiscriminate use, and long-term exposure. Therefore, analyzing blood chemo-profiles and evaluating the detected substances as biomarkers for pyrethroid pesticide exposure may assist to identify and predicting adverse effects of exposure, which may be used for both preventative and risk assessment purposes. The purpose of this study was to (a) analyze chemo-profiling by Gas Chromatography-Mass Spectrometry (GC-MS) analysis, (b) identify the most commonly detected chemicals in a time-exposure-dependent manner using a Venn diagram, and (c) identify their associated disease among pesticide workers using analyzer tools on the Comparative Toxicogenomics Database (CTD) website, (250 healthy male volunteers (20-60 years old) who deal with pesticides in the Jazan region of Saudi Arabia (exposure intervals: 1-2, 4-6, 6-8, more than 8 years) were included in the study. A questionnaire was used to collect demographic information, the duration of pesticide exposure, and the existence of chronic conditions. Blood samples were collected for biochemistry analysis and extracted by solid-phase extraction for gas chromatography-mass spectrometry (GC-MS) analysis. Biochemistry analysis reveals no significant changes in response to the exposure period; however, an inverse association between the albumin level and the exposure interval was observed. The blood chemo-profiling was differentially expressed in an exposure time-dependent manner. This analysis identified the common chemical set associated with each group and their associated significant occupational diseases. While some of these chemicals are associated with a variety of diseases, the distinguishing feature of these chemically associated disorders is their applicability for prevention measures. The most interesting finding was the identification of several chemicals; erucic acid, pelargonic acid, alpha-linolenic acid, dibutyl phthalate, diisobutyl phthalate, dodecanol, myristic Acid, pyrene, and 8,11,14-eicosatrienoic acid, associated with pneumoconiosis, asbestosis, asthma, silicosis and berylliosis. Chemical-disease association study also found that cancer, digestive system disease, nervous system disease, and metabolic disease were the most often recognized disease categories in the common chemical set. The hierarchical clustering approach was used to compare the expression patterns and exposure intervals of the chemicals found commonly. More study is needed to validate these chemicals as early markers of pyrethroid insecticide-related occupational disease, which might assist evaluate and reducing risk. The current study contributes valuable data and recommendations to public health.

**Keywords :** occupational, toxicology, chemo-profiling, pesticide, pyrethroid, GC-MS

**Conference Title :** ICT 2022 : International Conference on Toxicology

**Conference Location :** Moscow, Russia

**Conference Dates :** August 30-31, 2022