ABSTRACT

Title of Abstract : Comprehensive literature review : Determinant Factors of Organophosphate pesticide Exposure and Its Impact on Farmers Cholinesterase Level

Authors of Abstract : Evi Paulina Simanjuntak, Iwan M Ramdan, Ida Ayu Indira Dwika Lestari

Affiliation : Others

Correspondence E-mail : evipaulinadr@gmail.com

Background : Organophosphate (OP) pesticide exposure remains a significant occupational health issue in agricultural sectors, particularly in developing countries like Indonesia. OP compounds inhibit acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE), enzymes responsible for breaking down acetylcholine at neural synapses. Their inhibition leads to acetylcholine accumulation, causing acute symptoms such as dizziness, tremor, nausea, and fatigue, as well as long-term effects including peripheral neuropathy and cognitive impairment. Blood cholinesterase activity serves as a key biomarker for pesticide exposure but can be influenced by various biological and occupational factors

Objective : This scoping review aims to identify and map determinant factors affecting cholinesterase levels among farmers and pesticide sprayers exposed to OP pesticides, providing an evidence base for developing occupational health and safety (OHS) strategies.

Research Methods/ Implementation Methods : Following PRISMA-ScR guidelines, eight relevant studies were selected from PubMed, ScienceDirect, SpringerLink, and Garuda databases. The included studies involved agricultural workers exposed to OP or carbamate pesticides, with cholinesterase activity as the main outcome

Results : Findings show that reduced cholinesterase activity results from multifactorial interactions. Individual factors such as age, gender, nutrition, and smoking influence detoxification capacity. Behavioral factors especially PPE use and hygiene significantly affect exposure, with compliant workers showing 18–25% higher enzyme activity. Occupational factors like long work duration and high spraying frequency decreased AChE by 28–30%. Organizational efforts, including biomonitoring and safety training, maintained enzyme activity within normal limits, while hot climates increased dermal absorption

Conclusion/Lesson Learned : In conclusion, comprehensive OHS measures integrating education, monitoring, and safe work practices are essential to prevent pesticide-related subclinical poisoning

Keyword : organophosphate pesticide, cholinesterase, farmer