

Effect of pesticides on activities of Alanine aminotransferase (ALAT) and G-glutamyltranspeptidase (GGT) in blood among vegetables farmer in Muar, Johor

Abstract

Introduction: Most vegetable farmers are using agricultural chemicals on their farms. Many of these chemicals are used to control pests and are known as pesticides. Pesticides can be considered according to their chemical basis. Most of the more toxic pesticides fall into chemical groups of organophosphates, carbamates and bipyridyls.

Objective: The general objective to study the level of liver enzymes as a result of being exposed to pesticides among the farmers in Muar, Johor. The specific objectives of the study are to identified relationship between pesticides exposure durations with the liver enzyme level, frequency handling the pesticides and using PPE when application the pesticides, compare the liver enzyme level between exposure group and comparative group and finally identified the factor which can influence the liver enzyme lever at farmer who exposed to pesticides.

Methods: The cross sectional study on the effect of pesticides to the liver enzymes among farmer at Muar Johor was conducted by using the liver enzymes such as Alanine aminotransferase (ALAT) and B-glutamyltranspeptidase (GGT) as indicators. 92 workers were selected as respondents, where 47 respondents are in the exposed group and the other 45 respondents in the comparative group. Respondents had been selected from farmers in Muar as the exposed group and respondents who from Terengganu Health District Office as the comparative group. The selection of the respondents was made through purposive sampling from list provided. The liver enzymes level was measured by taking blood from respondent. The Automatic Analyzer Hitachi 902 was used in the blood analysis. Two types of the liver enzymes (ALAT and GGT) were analyzed.

Results: Mean GGT for exposed group was 63.5 Units/L and ALAT was 61.9 Units/L, significantly higher compare to comparative group while the mean of GGT was 20.7 Units/L and ALAT was 23 Units/L. Non-parametric difference Mann-Whitney U test showed there was significant different between exposed and comparative group on GGT ($Z=-6.535$;

$p < 0.001$) and ALAT level ($Z = -5.315$; $p < 0.001$). Five occupational factors have been measured in this study which is years of working, number of pesticide used per day, frequency of handling pesticide per day, pesticide spraying durations and personal protective equipment (PPE) scores. Result showed both GGT and ALAT enzymes level has significant correlations with pesticide spraying durations ($r = 0.412$; $p = 0.004$ & $r = 0.445$; $p = 0.002$) and personal protective equipment (PPE) scores ($r = -0.397$; $p = 0.006$ & $r = -0.478$; $p = 0.001$). Pesticides spraying durations was the occupational exposure factoring which most influence GGT ($r = 0.710$; $p < 0.001$) and ALAT ($r = 0.574$; $p < 0.001$) enzymes level among exposed group after adjustments for all confounders in this study. Conclusions: After adjustments of the confounding factors, result shows that frequency of handling pesticide per day and pesticide spraying duration (hours) influence the enzyme GGT level among exposed workers, meanwhile years of working and pesticide spraying duration (hours) influence the enzyme ALAT level among exposed workers.