

Alterations in Liver Enzymes and Acetylcholinesterase Activities among Pesticide Sprayers

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Background and Aim

- Organophosphates are known to be responsible for various adverse health effects.
- Liver is the major organ of our body in detoxifying the harmful chemical xenobiotics such as organophosphates.
- This study aimed to assess serum liver enzymes and erythrocyte acetylcholinesterase activities in pesticide sprayers exposed to organophosphates.

Methods

- A cross-sectional study was conducted in two villages in Magway Township, Magway Region, Myanmar.
- Thirty-seven pesticide sprayers who worked in peanut and sesame fields were included in this study.
- For control subjects, equal number of villagers who had no relation to pesticide spraying and handling was recruited from the same region.
- The serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and erythrocyte acetylcholinesterase (AChE) were measured by spectrophotometric methods.
- The data were presented as mean \pm standard deviation (mean \pm SD). Student's t-test was used to compare the data and level of significance was set at $p < 0.05$.

Results and Discussion

	Pesticide Sprayers	Controls	p value
Age (years)	36.21 \pm 9.89	33.97 \pm 8.05	0.288
BMI (kg/m ²)	20.41 \pm 3.13	20.20 \pm 3.24	0.781
Duration of exposure (year)	6.02 \pm 3.43	-	-

Table 1. Baseline characteristics of participants (mean \pm SD)

- There were 32 males and 5 females in pesticide sprayer group and 29 males and 8 females in control group.
- Acephate and chlorpyrifos were the most commonly used organophosphates in this study.
- Concerning the use of personal protective equipment (PPE), 51.35% of sprayers did not use any kinds of PPE and 48.65% of sprayers used partial PPE. None of the sprayers used full PPE.

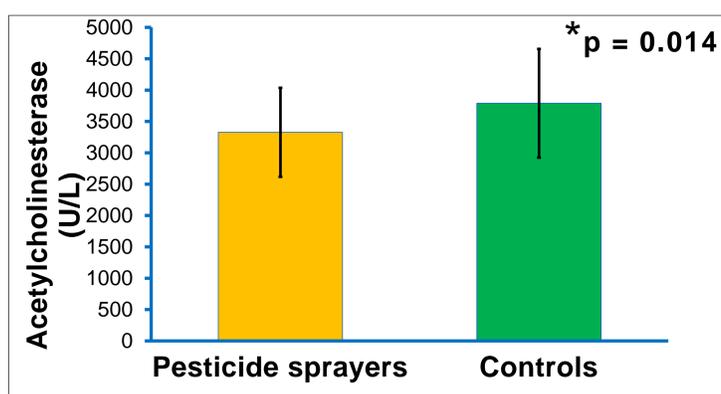


Figure 1. Comparison of erythrocyte Acetylcholinesterase activity between pesticide sprayers and controls

- The mean erythrocyte AChE activity in pesticide sprayers (3326.96 \pm 709.21 U/L) was significantly lower than that of control group (3790.50 \pm 866.24 U/L) ($p = 0.014$).

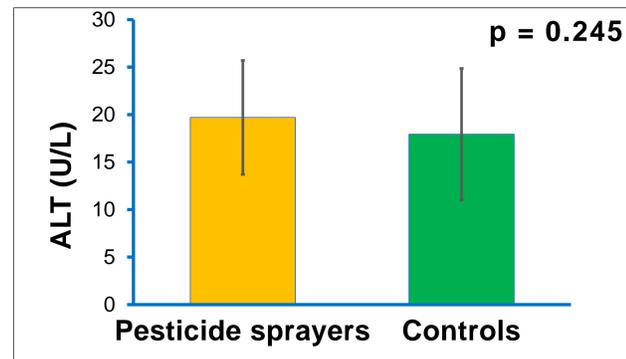


Figure 2. Comparison of serum alanine aminotransferase activity between pesticide sprayers and controls

- There was no significant difference in the mean serum ALT activity between pesticide sprayers (19.70 \pm 5.99 U/L) and control group (17.94 \pm 6.92 U/L) ($p = 0.245$).

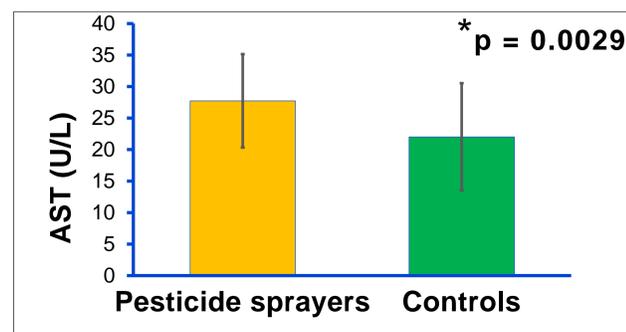


Figure 3. Comparison of serum aspartate aminotransferase activity between pesticide sprayers and controls

- The mean serum AST activity is significantly higher in pesticide sprayers (27.73 \pm 7.40 U/L) than in control group (22.01 \pm 8.51 U/L) ($p = 0.0029$).

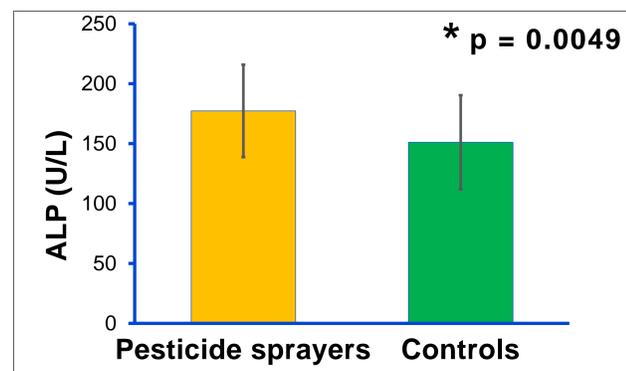


Figure 4. Comparison of serum alkaline phosphatase activity between pesticide sprayers and controls

- The mean serum ALP activity of pesticide sprayers (177.27 \pm 38.54 U/L) was significantly higher than that of control group (151.08 \pm 39.25 U/L) ($p = 0.0049$).
- These pesticide sprayers did not use PPE properly and need to practice the safe handling of pesticides and effective use of PPE.
- The erythrocyte acetylcholinesterase activity of pesticide sprayers was significantly lower than that of controls and this may be due to organophosphate exposure that inhibited the enzyme.
- Serum AST and ALP in pesticide sprayers were found significantly higher than that of controls. This may be due to liver injury induced by organophosphate exposure.

Conclusion

- ❖ The results showed that there were significant alterations of erythrocyte acetylcholinesterase and serum liver enzymes activities in sprayers compared to controls.
- ❖ The findings of this study suggest that the exposure to the organophosphates decreases the acetylcholinesterase activity and affects the liver.