

PS1.1.42

Exposure to volatile organic compounds and kidney dysfunction in one thin-film transistor-liquid crystal display (TFT-LCD) company

Ta-Yuan Chang, Guei-Hong Huang
China Medical University, Taiwan

Background and Objective: The thin-film transistor-liquid crystal display (TFT-LCD) is a new emerging industry worldwide but the health status among workers is unclear. The aims of this study were to investigate the exposure to volatile organic compounds (VOCs) and to determine the prevalence rate of kidney dysfunctions among workers in a TFT-LCD company.

Methods: We selected a TFT-LCD manufacturing company with 2162 employees as the subject population. The hazardous zones were identified by a walk-through survey. Canisters and the gas chromatography/mass spectrometry were used to determine VOCs concentrations in workplaces of array, cell and module processes. We collected self-administered questionnaires and health-checkup data from a panel of 155 volunteers to perform the health assessment. Logistic regression models were conducted to associate VOCs exposure with workers' kidney dysfunctions.

Results: We found that ethanol (1302.2 ± 1493.8 ppb), acetone (709.8 ± 586.5 ppb) and isopropyl alcohol (297.3 ± 395.3 ppb) were three dominant solvents used in this company. The average concentration of total VOCs in module processes (4651.4 ± 1855.4 ppb) was significantly higher than those in array processes (1867.2 ± 1161.9 ppb) and cell processes (2775.2 ± 1878.3 ppb). Sixty-three array workers were at higher risk of kidney dysfunction than eighteen in module processes (odds ratio=3.84, 95% confidence interval=1.02-14.40). Workers with cumulative exposure to VOCs ≥ 327 ppb-years had significantly higher risk of kidney dysfunctions (OR = 2.71, 95% CI = 1.07-6.83) after adjusting potential confounders.

Conclusions: Our findings revealed that array workers are at higher risk of kidney dysfunction compared to workers in module processes. Cumulative exposure to VOCs is associated with kidney dysfunction. Further studies with detail measurements of personal exposure and a longer follow-up are suggested to investigate adverse effects related to occupational exposure among TFT-LCD workers.