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## GSTM1 AND GSTT1 GENETIC SUSCEPTIBILITY AND INTERACTION WITH CHEMICAL EXPOSURES IN CHILDHOOD ACUTE LYMPHOBLASTIC LEUKEMIA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background:** The glutathione s-transferase genes play an important role in the detoxification of carcinogenic substances, and null mutations of these genes are linked to increase in acute lymphoblastic leukemia (ALL) due to an increase in susceptibility to environmental exposures of toxins and carcinogens, and chemical exposures like tobacco smoke and pesticides are common carcinogenic substances that children could be vulnerable to as risk of developing childhood ALL.

**Objectives:** The aim of this study is to analyze the effect of glutathione s-transferase mu1 and theta1 genetic susceptibility and interaction of chemical pesticide and tobacco smoke exposures on childhood ALL.

**Data collection and analysis:** A total of 22 published case-controls were included in the meta-analysis of over forty thousand participants with 14974 cases and 25841 controls.

**Main results:** Overall, the meta-analysis of these studies showed increase risk of ALL among children (random-effect OR 1.30, 95% CI 1.02-1.65). Subgroup analysis showed that the GSTM1 and GSTT1 null genotype has more increase association to childhood ALL (random-effect OR 1.36, 95% CI 1.05-1.76), and chemical pesticide in comparison with tobacco smoke exposures did not have an increase association with childhood ALL (random-effect OR 1.27, 95% CI 0.70-2.29), (random-effect OR 1.38, 95% CI 1.20-1.58) respectively.

**Conclusions:** In this study, the GSTM1 null genotype is significantly associated with susceptibility to childhood acute lymphoblastic leukemia in Asians, and chemical pesticides also showing increase associations. The GSTM1 and GSTT1 null genotypes show increase interaction with chemical pesticides in childhood ALL as compared to Tobacco smoke exposures.