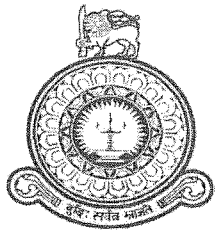

A study of human exposure to selected phthalates in toys in Sri Lanka.

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ABSTRACT

Phthalates are a chemically neutral class of compounds with low water solubility, high fat solubility and low volatility. They are commonly added to polyvinyl chloride (PVC) as plasticizers. However, as they do not chemically bond to PVC, they can leach from the plastic product during or after its life time. They are suspected cancer-causing agents and possible teratogens. In animal studies chronic effects such as decrease in body weight, increase in mortality and a dose related increase in organ weight of liver and kidney are observed. America, the European Union and Japan have restricted the use of certain phthalates in toys which are used by children to 0.1 % by weight.

In this study the levels of six phthalates [dibutyl phthalate (DBP), butylbenzyl phthalate (BBP), di(2-ethylhexyl) phthalate (DEHP), di-n-octyl phthalate (DNOP), diisononyl phathalate (DINP) and diisodecyl phthalate (DIDP)] were determined in soft and hard toys obtained from shops in the Colombo central market between December 2009 and June 2010. The phthalates were determined using the method specified by the American Society for Testing and Materials (ASTM). The procedure involved soxhlet extraction of the plastic with a 1:1 mixture of dichloromethane: methanol, followed by a clean up using florisil. The quantitative determination was carried out by GC-MS in SIS mode.

Percentage recoveries in the acceptable range of 70% to 120% were obtained in this study. The detection limits obtained were (by weight): BBP, DBP, 0.003%; DEHP, DNOP, 0.002%; DINP, DIDP, 0.004%. These detection limits are 10 times lower than the legal allowable level of 0.1%.

Only two phthalates (DBP and DINP) were detected in the squeeze type toys. They were found in 18 of the 30 samples at levels ranging from 24% to 46% by weight. Only DEHP was detected in the hard type toys. It was found in 14 of the 30 samples at levels ranging from 0.01% to 0.15% by weight. The levels of phthalate in 60% of squeeze type toys and 10% of hard type toys exceeded the allowed limit.