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RESIDUAL ACCELERATOR AND CYTO-TOXICITY STUDIES OF NR SURGICAL GLOVES

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The quantification of residual accelerators present in natural rubber surgical gloves belonging to six commercial brands available in Indian market was carried out. The total accelerator leached into acetonitrile from these gloves was estimated using UV-Visible Spectroscopy. Separation of the glove extract components, followed by specific accelerator identification and subsequent quantification was achieved by HPLC method. HPLC studies have shown that the major accelerator used in all the glove brands was the zinc diethyl dithiocarbamate (ZDEC). The quantification by UV analysis showed that the total residual accelerators varied from 926 to 2725 $\mu g g^{-1}$. The quantification of the specific ZDEC peak by HPLC revealed that ZDEC content varied from 873 to 2616 $\mu g g^{-1}$ among the pre-powdered surgical gloves. The quantification of bioavailable accelerator from different brands showed that more than 14 per cent of the total residual accelerator was available in 'sweat equivalent' aqueous extracts. The cytotoxicity studies of the aqueous extract of the glove brand against L-929 cell line using MTT assay revealed severe toxicity with less than 20 per cent cell viability at various dilutions. The direct contact assay of the glove sample showed severe cytotoxicity of grade 4. The study highlights the need for methodologies to reduce or eliminate the residual accelerators to improve the biocompatibility of NR surgical gloves in Indian market.

Key words: Cytotoxicity, Gloves, HPLC, Residual accelerator

INTRODUCTION

Natural rubber (NR), Neoprene, Nitrile or Vinyl based disposable gloves are often worn by health care professionals as hygiene and contamination protection measures. In the market of disposable gloves, NR gloves (powdered, powder free and surgical) leads the segment with a total share of 66 per cent, followed by nitrile (28%) and vinyl (6%) as per the International trade data, 2015 (https://www.topglove.com). Both NR and synthetic gloves have its own advantages and limitations. The NR gloves have the advantages of high durability due to high tensile strength and puncture resistance. The NR gloves are just like a 'second skin' with best comfort, fit, flexibility and memory. In addition, the excellent touch sensitivity and dexterity, superior donnability and wet/dry grip and broad chemical resistance further makes them preferable over synthetic gloves specifically for long and complicated surgical procedures. Economically they are of lower cost than nitrile and neoprene and environmentally friendly due to its biodegradability. Their market lead is

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