

NICKEL CONCENTRATION IN IMITATION JEWELLERY SOLD BY SMALL-SCALE RETAILERS IN KANDY AREA

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Nickel (Ni) is usually incorporated in the imitation jewellery industry. When exposed to higher levels, Ni can be the main source of Allergic Contact Dermatitis (ACD). The present study investigates the Ni concentration in imitation jewellery sold by small-scale retailers in the Kandy area. According to the nickel directive of the European Union (EU), the nickel released from the jewellery to pierced parts of the body should be $<0.2 \mu\text{g cm}^{-2} \text{ week}^{-1}$. Nickel released from the jewellery coming into direct and prolonged contact with the skin should be $<0.5 \mu\text{g cm}^{-2} \text{ week}^{-1}$. If the nickel concentration is $> 0.05\%$ w/w ($500 \mu\text{g g}^{-1}$), it is not advisable to come into direct contact with healing wounds after piercing. In order to investigate whether the small-scale retailers in the Kandy area adhere to standard regulations, the imitation earring samples were collected from five small-scale retailer shops in the Kandy area once a month for 12 months. The samples were collected in monthly intervals as the retailers renewed their stocks monthly. Surface analysis of the earring samples was performed using XRF to have an initial estimation of the metal composition, and the accurate concentrations were determined using atomic absorption spectrophotometry (AAS). The artificial sweat immersion method was used to determine the nickel concentrations released into the sweat solutions by preparing artificial sweat solutions with ultra-pure water, 0.5% sodium chloride, 0.1% urea, and 0.1% lactic acid. pH value was adjusted to 6.5 using 1% ammonia. Each earring sample was placed in the artificial sweat and stored in an incubator at 34°C for 7 days. The nickel concentrations ranged from $0.04 \mu\text{g cm}^{-2} \text{ week}^{-1}$ to $317.70 \mu\text{g cm}^{-2} \text{ week}^{-1}$. Percentage Ni concentrations in earring samples were determined using AAS after dissolving in aqua regia in order to extract all Ni into solution. The results showed that Ni concentration ranged from $0.01 \mu\text{g g}^{-1}$ to $4.70 \mu\text{g g}^{-1}$. Out of 180 earring samples tested, 110 samples exceeded the threshold limit of $0.2 \mu\text{g cm}^{-2} \text{ week}^{-1}$ from the sweat solution method, and 130 samples exceeded the accepted threshold level of 0.05% w/w. All tested small-scale retailers have exceeded the permissible level of Ni during the investigated period.

Keywords: Earrings, Imitation Jewelry, Kandy, Nickel