Better medicines for children: development and evaluation of chloroquine diphosphate using ion exchange resins to overcome taste masking challenges

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INTRODUCTION Currently, children do not have an adequate drug to treat malaria. Taste masking is a critical factor for adherence to pediatric therapy, and the available drugs are not adequate in this regard. The present work proposes to use ion exchange resins (IER) to mask the awful taste of chloroquine diphosphate (CLQ) and improve pediatric malaria treatment. To evaluate the taste masking efficiency of resinate CLQ by in vitro techniques, using an adapted dissolution test and electronic tongue (e-tongue) analysis. The formulations demonstrated considerable taste masking of CLQ and process feasibility. **METHODS** Chloroquine complexes were prepared in a 1:1 drug: resin weight ratio. Sodium polystyrene sulfonate (SPS) (Amberlite IRP69) or polacrilin potassium (PP) (Amberlite IRP88) IER was suspended in CLQ solution (pH 5.0) and stirred for 24 h at 25°C. The resinates were filtered, washed and dried. The resinate drug content (%) was calculated by the difference in drug amount at the initial and after complex formation. The taste masking efficiency was evaluated by an adapted dissolution test using 500 mL of simulated salivary fluid (SSF) at 37 °C and pH 6.8 as a medium, with paddles at 50 rpm. An in-line fiber-optic UV probe measured the CLQ released at λ = 343 nm (5s). The results were evaluated with the CLQ bitterness threshold. For the e-tongue, resinates were suspended in 50 mL of SSF, and CLQ was measured using electrical impedance spectroscopy (1Hz to 1MHz). Data were analyzed with interactive document mapping (IDMAP) and hierarchical cluster analysis (HCA) techniques. **RESULTS** The resinates showed a CLQ loading efficiency higher than 95 %.SPS is a strong cationic exchange resin with strong interaction with CLQ and therefore did not release the drug (not more than 1.0% after 300 s), slightly above the CLQ threshold. In contrast, PP is a weak cationic exchange resin and the resinate released over 10% after 135 s. The e-tongue data corroborate with the dissolution test. Since the clusters for the resinates differ from the drug cluster on the IDMAP plot, it indicates success in taste masking of CLQ. **CONCLUSION** The results showed that complexation with IER does not entirely remove the bitter taste of CLQ but significantly reduces its perception. This work demonstrates a considerable improvement in taste in pediatric formulations. Furthermore, combining in vitro techniques is a good and economical alternative to human taste panels.[1]

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