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Toothpastes For Children and Their Detergent Contents Affect Molecular Mechanisms of Odontogenesis in Zebrafish Embryos

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ABSTRACT

We aimed to evaluate how different types of toothpaste (TP) for children affected molecular mechanisms of odontogenesis in zebrafish embryos. Commercially available TPs were selected according to their detergent contents as the cocamidopropyl betaine (CAPB) containing TP (TP1) and sodium lauryl sulfate (SLS) containing TP (TP2). TP3 contained no detergent. Effects of SLS, and CAPB alone were also examined. TP and detergent concentrations affecting development were determined as 750 mg/L and 4 mg/L, respectively. Embryos were exposed to TP1, TP2, TP3, SLS, CAPB, and embryo medium (control) for 72 h post fertilization. Acetylcholinesterase (AChE) activity and oxidant–antioxidant parameters were analyzed spectrophotometrically. Expressions of tooth development genes were evaluated by reverse transcription PCR (RT-PCR). Intraocular distance, lower jaw, and ceratohyal cartilage length were displayed using Alcian Blue staining. *axin2* and *wnt10a* expressions increased in SLS and TP2 groups. *igf2a* and *eve1* expressions decreased in all groups except TP3. *nrOb1* expression decreased in TP1, SLS, and CAPB groups. Oxidant–antioxidant balance was disturbed in all groups except TP3, evidenced by increased lipid peroxidation, nitric oxide. SLS, and CAPB groups were more affected in terms of AChE, glutathione-S-transferase, and superoxide dismutase; perturbations were observed in cartilage structures. Altered expression of tooth development gene *axin2* correlated with *wnt10a*, and with changes in cartilage structures in SLS and TP2 groups. TP3 group presented no disruptions in oxidant–antioxidant balance. Our study shows the availability of externally developing zebrafish embryos in examining the effects of TP' contents on embryogenesis.