

Brief Literature Review PVP-I

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Topical fluorides have been the mainstay in the prevention of dental caries for decades. There are abundant data on sodium fluoride's (NaF) ability to foster remineralization of tooth enamel (Gao et al., 2016). Dental NaF varnish preparations are the recommended vehicle for delivering topical NaF for dental caries prevention and arrest in young children under 6 years of age according to guidelines from the American Dental Association (ADA), the American Academy of Pediatrics, the American Academy of Pediatric Dentistry and the US Preventive Services Task Force (Weyant et al., 2013; Clark et al., 2014; American Academy of Pediatric Dentistry, 2013; Moyer VA 2014). In children, less than 6 years of age, at high risk for dental caries, the recommendation is application of NaF varnish every three months (Weyant et al., 2013). Fluoride varnishes have been shown safe in very young children (Milgrom et al., 2014).

However, topical fluorides alone are not enough to prevent tooth decay in high-risk populations. Caries researchers for some time have suggested strategies that combine topical antiseptic application to reduce or eliminate tooth surface colonization by cariogenic bacteria in addition to topical fluoride applications that primarily remineralize enamel (Milgrom et al 2009). Povidone iodine is an FDA-approved and widely used bactericidal antiseptic. For the oral flora, iodine has preferential activities against streptococcal species, pathogens implicated in the causation of dental caries (Tam et al., 2006; Furiga et al., 2008). Moreover, iodine's effectiveness may last as long as 6 months (Caufield et al., 1979).

Studies have examined the chemotherapeutic suppression of oral *Streptococcus mutans* (Sm) by povidone iodine (10%) in children with Severe Early Childhood Caries (S-ECC). In one study, the teeth of children two to six years of age were treated topically with povidone iodine (10%) or saline following dental treatment under general anesthesia for S-ECC (Zhan et al., 2006). Levels of Sm were significantly reduced up to three months in the povidone iodine group. A second study demonstrated suppression of Sm up to 90 days in children with S-ECC who received a single application of povidone iodine (10%) followed by a topical application of 1.23% acidulated phosphate fluoride foam after surgical elimination of active caries lesions (Berkowitz et al 2009).

Other studies have assessed the effect of povidone iodine (10%) on dental caries. A clinical study involving babies in Puerto Rico who were at high risk for S-ECC as they were all colonized by Sm and had decay-promoting feeding behaviors, demonstrated that povidone iodine (10%) applied bimonthly was successful in preventing the development of early tooth decay lesions in the maxillary primary incisors (Lopez et al., 2002). In a randomized clinical trial, povidone iodine (10%) applied bi-monthly significantly reduced the rate of recurrent dental decay at six months following treatment of children under general anesthesia for S-ECC (Amin et al., 2004).

Two cohort studies have tested the effect of combining these two anti-caries agents by sequentially applying povidone iodine (10%) followed 5% NaF varnish. The first study assessed the effect of protecting erupting 1st permanent molars from developing dental caries in children five to six years old (Tut & Milgrom, 2010). The second studied the effect in the primary dentition of children 12 to 30 months (Milgrom, Tut & Mancl, 2011). They demonstrated that treatment with povidone iodine reduced the rate of new decay significantly over the standard of care

alone. Yet, to date, no one has tested the effectiveness of sequential treatment using the current generation of fluoride varnishes.

Clinical application of 10% povidone-iodine is fast, easy, and economical and should be done at every well child visit to maintain the suppression of cariogenic organisms. Cotton gauze is used to clean the teeth and then the facial surfaces are painted. Single use dosettes are available for dental use, are inexpensive, and have good shelf life. Once proficient this should take a medical provider only a few seconds to complete before fluoride varnish. PVP-I will not stain skin or mucosa and has little taste with the amount administered. Parents can also be taught how to apply povidone iodine at home using the same dosettes used in the clinic.

Povidone-Iodine Safety

Risks from povidone iodine include rash and swelling at the site of application. Iodine can cause thyroid gland problems, but this is rare and is very unlikely at the amount used in this clinical application. Previous cohort studies have demonstrated no harms.

Ongoing Research

There are currently two RCTs evaluating sequential PVP-I+FV prevention in preschoolers. The first is being conducted at U Rochester (NCT05272254) and is in the active recruitment phase. The second will be conducted by the National University of the Altiplano-Puno and University of Washington in Peru and is in the ethics review stage at the University prior to implementation.

AAPD Position

AAPD does not have a formal position or guideline on the use of PVP-I although it is mentioned in some of their documents and articles have been published in their journals about it.

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