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Development of dental caries and risk factors between 1 and 7 years of age in areas of high risk for dental caries in Stockholm, Sweden

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Summary of the article:

M. Anderson, G. Dahllöf, A. Warnqvist & M. Grindefjord, et al. conducted a cluster-randomized controlled intervention trial with two parallel arms comparing two prevention programs. The purpose is to investigate cavity predictors at one year and cavity development at five and seven years of age in two groups of children participating in fluoride-based preventive programs. The study was conducted in 23 dental clinics in Stockholm and published in *the Journal of the European Academy of Pediatrics Dentistry* in June 2021 (https://link.springer.com/article/10.1007/s40368-021-00642-1).

The cluster-randomized trial compared two caries preventive programs: one with fluoride varnish applications every six months and one without them to stop the development of the disease at an early stage. Participants were 1- and 3-year-old children registered at 23 dental clinics in high-risk areas in Stockholm, Sweden. The study included a reference group and a test group. Between ages 1 and 3 years, all children in the study received a standard caries prevention program. This intervention was given once a year to the reference group and twice yearly to the test group. The test group received fluoride varnish treatments (Duraphat®, 22.6 mg of fluoride per ml, Colgate-Palmolive) at all intervention sessions. There were no significant differences in caries prevalence between the two programs when the children were three. The purpose of the present trial was to study caries development at ages 5 and 7 years and predictors in children at one year of age who had followed the two different preventive programs from 1 to 3 years of age.

The authors concluded that the development of dental caries in the primary dentition did not decrease longitudinally under an extended standard program that began at age one and included

fluoride varnish application once every six months. Additionally, there was no significant difference in caries progression between the two intervention groups aged five and seven.

Article information:

The article's title is "The Development of Dental Caries and Risk Factors between One and Seven Years of Age in Areas of High Risk for Dental Caries in Stockholm, Sweden. M. Anderson, G. Dahllöf, A. Warnqvist & M. Grindefjord et al. are the study's authors.

It was published online on June 09, 2021, in *the Official Journal of the European Academy of Pediatrics Dentistry*. The link to the article is https://pubmed.ncbi.nlm.nih.gov/34106458/. The DOI link is https://link.springer.com/article/10.1007/s40368-021-00642-1. As stated in the article, there are no conflicts of interest present.

Study analysis

Type of study:

The study is cluster-randomized and has a parallel design based on a caries predictor and caries development. This research study was conducted at 23 dental clinics with a high risk for dental caries in Stockholm, Sweden. The intervention was conducted between March 2011 and March 2014.

Study purpose:

This trial aimed to study caries development at the ages of five and seven years and predictors in children at one year. Before the study, more research on dental caries was conducted. According to the 2017 Global Burden of Diseases Study, 532 million children suffer from dental caries in their deciduous teeth (GBD 2018). Studies have identified immigrant backgrounds and maternal education level as caries predictors in preschool children (Grindefjord et al., 1995b; Grindefjord et al., 1996; Skeie et al., 2008; Wendt et al., 1996). Karjalainen and co-workers found in a recently published study that a high sugar intake at three years of age was significantly associated with a high risk of caries and high mutants streptococci counts (Karjalainen et al., 2015). Sugar is the best predictor of caries development (Burt & Pai, 2001; Mejàre et al., 2014).

According to the authors, this study aims to investigate predictors at one year and caries development at ages five and seven years in two groups of children. At the same time, they showed that some risk factors were associated with caries development; socioeconomic status, consumption of sugar-containing beverages, and gingivitis were the risk factors for caries development. They found that using fluoride toothpaste once a day at one year of age was associated with lower development of dental caries at one, two, three, five, and seven years of age. The caries development was lower for children who used fluoride toothpaste twice daily.

Experiment design:

The study was conducted in 23 dental clinics located in areas with a multicultural population and families predominately of medium or low socioeconomic status. All children born in these areas between January 1 and December 31, 2010, in Stockholm County, were invited to participate. A test group and a reference group were part of the study. Every child in the study received a standard program to prevent cavities between one and three. The reference group received this intervention once yearly, while the test group received it twice. The International Caries Detection and Assessment System (ICDAS), a clinical scoring system with a range of one to six, or defs (decayed, extracted, and filled surfaces in primary teeth), was used to determine the development of dental caries in the trial's participants at the ages of one, two, and three. (Anderson 2017). With an ICDAS score of 3 to 6, a tooth surface was considered decayed. The inspectors likewise recorded whether a tooth had been filled or was missing because it had neglected to erupt, had been separated because of dental caries, or was absent for different reasons. Just the information gathered from children at three years old was collected. The children who did not go to this assessment were viewed as dropouts. According to *World Health Organization Guidelines*, clinicians in Sweden assess the clinical status of each tooth. From five years old, bitewing radiographs are suggested, and proximal sores reaching the dentine are enrolled as decayed. The study was carried out over time and was a longitudinal study.

All participants at the age of one were advised to brush their teeth every day with fluoride toothpaste. At each intervention session, the test group also received fluoride varnish treatments (Duraphat®, Colgate-Palmolive; 22.6 mg of fluoride per ml). The children were enrolled in the same caries preventive program between three and seven years of age. All dental caregivers for

children delivered the caries prevention program that the Stockholm County Council introduced in 2004. The Statistical Package for the Social Sciences (SPSS, IBM Software Statistics, version 26.0) and Stata version 15 (StataCorp, release 15.0) was used to process the data.

Results:

After the last results were analyzed, they concluded that the number of children with caries is increasing in both the test and reference groups. Dental caries defs > 0 (ICDAS 3–6 was found in 1% percent of the children at age one year and 4% at age two, 12% percent at age three, 23% percent at age five, and 42% percent at the age of seven years. Twenty-two children of the one-year-olds in the study had defs > 0 (ICDAS 3–6) and 177 (ICDAS 1-6). Between ages five and seven years, the extent of kids with caries reaching into the dentine almost multiplied. 8% percent of children with permanent teeth had developed caries (DFS > 0) by the age of seven. Boys and girls were equally affected by caries. The fact that the percentage of children with dental caries (defs) nearly doubled between the ages of five and seven is a significant finding from the current study.

Conclusion:

The article's authors concluded that a standard program that included applying fluoride varnish every six months starting at the age of one year did not reduce the development of dental caries longitudinally in the primary dentition. At ages five and seven, the authors observed the continuous development of caries and found no significant difference between the two intervention groups. In conclusion, fluoride varnish is not a suitable prevention method for children. Brushing with fluoride toothpaste from age one could not stop caries from growing. The questions listed for the authors were if more than fluoride varnish twice a year is needed, how many times should it be applied to be effective? Due to the risk of dental fluorosis, sodium fluoride varnish is not the right tool for preventing dental caries in toddlers. However, this study adds more knowledge to the subject because the authors identified socioeconomic factors as significant predictors of the

development of dental caries. These factors included immigrant background, family income, and maternal education level. It was found that sweets and beverages with sugar were significantly associated with developing dental caries. Furthermore, it has been demonstrated that consuming sugary drinks during the day and at night in early childhood is a significant predictor of dental caries in primary dentition in the future (Wigen & Wang, 2015). The authors suggest an excellent homecare routine for the child's first year of life because homecare routines are emphasized as critical health-promoting factors to reduce the development of dental caries in children between one and seven years of age.

My impression:

This study is highly significant because parents had early knowledge of risk factors and preventive information regarding their child's caries development and predictors. A future dental hygienist needs to be aware of the factors that can cause tooth decay, how to prevent it, and how to educate parents so they can help their children maintain excellent oral health.

This study has taught me how to encourage parents to prevent their children from consuming food and beverage with added sugar before age two. It is a good beginning for reducing caries development and improving children's health. Additionally, beginning at one year of age, regular tooth brushing with fluoride toothpaste is essential for preventing caries. Based on recent studies, as a future dental hygienist, I feel more confident discussing the issue with parents and knowing how to educate them. I will also assist parents in preventing cavities in their children by teaching them good oral hygiene routine and see their children every six months for a dental cleaning.

This topic fascinated me because I have a one-and-a-half-year-old girl that I take care of her teeth daily. I was interested in learning more about the factors that contribute to the formation of dental caries in children's early years and how to prevent the development of the condition. Based on the study, I know that from age one, only brushing with fluoride toothpaste cannot stop caries from growing. I will keep a good oral hygiene with my daughter and maintain a healthy diet without the consumption of sugar. The question I have for the authors is if children develop caries in their childhood, what is the most effective method of countering? Is Silver Diamine Fluoride (SF) safe to use?

Reference:

Anderson, Dahllöf, G., Warnqvist, A., & Grindefjord, M. (2021). Development of dental caries and risk factors between 1 and 7 years of age in areas of high risk for dental caries in Stockholm, Sweden. *European Archives of Pediatrics Dentistry*, *22*(5), 947–957. https://doi.org/10.1007/s40368-021-00642-1