

## **The effectiveness of fluoride varnish and fissure sealant in decreasing caries risk : A systematic review**

**By:**

Bassam Abdullah alkhudhayr

[Balkhudhayr@moh.gov.sa](mailto:Balkhudhayr@moh.gov.sa)

General Dentist , Ministry of health, Al Qassim ,Saudi arabia

## Abstract

Vital for prioritising preventive measures at the local level, determining the efficacy of these measures requires evaluation. To that end, we set out to thoroughly review the literature on how fluoride varnish and fissure sealant affect dental caries in kids aged 6–12. We used the terms "fluoride varnish," "fissure sealant," "caries," and "oral health" to search the databases PubMed, EMBASE, Web of Science, the Cochrane Library, and Scopus. Our article search will cover the years 2000 through December 2020. The meta-analysis was conducted with the help of the CMA software version 2 (Comprehensive Meta-Analysis). This study compared two intervention groups, fluoride varnish and fissure sealants, to a control group. There were nine total studies incorporated. There were 84,380 participants in the intervention group and 11,254 in the control group. Randomized clinical trials (RCTs) and field RCTs accounted for eight of the studies, while the remaining two were non-RCTs. Four of the varnishes were entirely effective, one was ineffective, and all four were effective as a Fissure Sealant in the trial. Indexes for decaying, missing, and filled permanent teeth (DMFT) and primary teeth (dmfp) differed significantly between intervention and comparison groups. In addition, the mean DMFT differences between the treatment and control groups were 0.55 and 0.29 for fluoride varnish and fissure sealant, respectively ( $P=0.00$ ). Health goals of societies and health systems treatments in countries can include fissure sealant and fluoride varnish because of their effectiveness in avoiding dental caries in children aged 6-12 years.

**Keywords:** effectiveness of fluoride varnish, fluoride varnish , fissure sealant , decreasing caries risk.

## المخلص:

أمر حيوي لإعطاء الأولوية للتدابير الوقائية على المستوى المحلي ، فإن تحديد فعالية هذه التدابير يتطلب التقييم. تحقيقاً لهذه الغاية ، شرعنا في إجراء مراجعة شاملة للأدبيات حول كفاءة تأثير ورنيش الفلورايد ومانع التسرب على تسوس الأسنان لدى الأطفال الذين تتراوح أعمارهم بين 6-12 عامًا. استخدمنا مصطلحات "ورنيش الفلورايد" و "مانع تسرب الشقوق" و "تسوس الأسنان" و "صحة الفم" للبحث في قواعد البيانات PubMed و EMBASE و Web of Science و مكتبة Cochrane و Scopus. سيغطي بحثنا عن المقالات السنوية من 2000 إلى ديسمبر 2020. وقد تم إجراء التحليل التلوي بمساعدة الإصدار 2 من برنامج CMA التحليل التلوي (الشامل). قارنت هذه الدراسة مجموعتي تدخل ، ورنيش الفلورايد ومانعات تسرب الشقوق ، بمجموعة تحكم. تم دمج تسع دراسات إجمالية. كان هناك 84,380 مشاركاً في مجموعة التدخل و 11,254 في المجموعة الضابطة. شكلت التجارب السريرية المعشاة (RCTs) والتجارب المعشاة ذات الشواهد الميدانية ثمانية من الدراسات ، في حين أن الدراستين المتبقيتين كانتا غير معشاة ذات شواهد. كانت أربعة من الورنيش فعالة تمامًا ، وكان أحدها غير فعال ، وكانت جميع الورنيش الأربعة فعالة كعامل مانع للتسرب في الشق في التجربة. مؤشرات الأسنان الدائمة المتحللة والمفقودة والمملوءة (DMFT) والأسنان الأولية (dmfp) تختلف اختلافًا كبيرًا بين مجموعات التدخل والمقارنة. بالإضافة إلى ذلك ، كان متوسط الفروق DMFT بين مجموعتي المعالجة والضابطة 0,55 و 0,29 ، لطلاء الفلورايد ومانع التسرب على التوالي ( $P = 0.00$ ). يمكن أن تشمل الأهداف الصحية للمجتمعات وعلاجات الأنظمة الصحية في البلدان مانع تسرب الشقوق وطلاء الفلورايد نظرًا لفعاليتيهما في تجنب تسوس الأسنان لدى الأطفال الذين تتراوح أعمارهم بين 6-12 عامًا.

**الكلمات المفتاحية:** فعالية ورنيش الفلورايد ، ورنيش الفلورايد ، ومانع تسرب الشقوق ، وتقليل مخاطر التسوس.

## Introduction:

The incidence of dental caries is extremely high, particularly among young people. One of the leading multi-factor health problems in low-income areas is tooth loss due to these disorders. The risk of tooth decay begins as soon as a tooth erupts in the mouth, and the degree to which individual teeth are susceptible to caries varies. Caries, or cavities, can develop in children's teeth for many different reasons (Nurelhuda & Ahmed, 2009). Child nutrition, dental health, parental socioeconomic position, sweets consumption, dental checkups, and fluoride therapy are all effective factors. Presently, the incidence of dental caries in children varies greatly from kid to child, and the severity and frequency of dental caries in children and adolescents ranges from 60% to 100% throughout different regions of the country (Hopcraft & Wright, 2008).

Caries, or tooth decay, can affect people of any socioeconomic status or racial background. Ignoring dietary factors such as sugary food and drink intake and lack of regular dental care has been linked to an increase in DMFT. Three hundred students were surveyed about their awareness of dental health and preventative measures; most of them were aware of fluoride varnish. In addition, addressing dental health issues is important for kids' overall development. Therefore, preventing dental cavities is an important part of paediatric dentistry. Dental professionals can benefit from fissure sealant and fluoride therapy as one of the primary alternatives for preventing dental caries, as shown by extensive research and clinical practice. Filling up the grooves and crannies of your teeth with a sealant helps keep food and plaque from becoming trapped there and causing deterioration (Seraj et al., 2012).

Additionally, fluoride use has proven one of the most efficient strategies of preventing tooth cavities. The use of fluoride has been shown to be a safe, effective, efficient, and suitable technique of avoiding dental cavities for over six decades of laboratory, clinical, and societal studies on the efficacy and mechanism of fluoride action. Community water and milk fluoridation, fluoride tablets and drops, fluoride toothpastes and mouthwashes, and fluoride treatment are all methods of incorporating fluoride into people's daily routines (ten Cate, 2013).

The use of fluoride varnish and fissure sealant in high-risk caries samples was approved as effective preventative interventions in complete oral health programmes; nevertheless, there was a significant difference in their effectiveness over the course of 3 years (Sicca & Cistaro, 2016). Although fissure sealant and fluoride varnish are widely recognised as effective methods for lowering tooth cavities, their superiority as clinical interventions remains unknown. The authors conducted this investigation since there was a lack of expression of the effects level of these substances in the prevention of tooth decay, as well as a difference in their values in related studies (Chestnutt et al., 2017).

Caries is a major health problem all over the world. Caries affects over 35% of the world's population, or about 2.4 billion people. Despite significant investments in caries prevention over the past few decades, the prevalence of untreated caries over the world has remained stable. If left untreated, caries can have a significant impact on a country's economy (Mathu-Muju & Kennedy, 2016). The annual cost to the economy is in the hundreds of billions of dollars. Caries prevention is an important public health aim because of the high prevalence and heavy disease burden associated with caries (Kassebaum, 2015 & Meier et al., 2017 & List et al., 2015).

Caries prevention places a premium on the first permanent molars (FPMs). Among kids and teens, decayed missing filled tooth index (DMFT) is mostly driven by decayed FPMs. Caries of FPMs is not only incredibly common, but also causes a significant amount of suffering due to the sickness. Permanent occlusion may only be attained with the use of FPMs. Severe FPMs caries can lead to discomfort, illness, a loss of appetite, and even malocclusion (Marcenes, et al., 2013 & Kassebaum et al., 2017).

Currently, two methods are offered to prevent caries of FPMs: fluoride varnish (FV) and fissure sealant (FS), both of which have shown to be successful. However, it is still unclear whether of these two abilities is clinically superior. Current best practices suggest that FS be chosen over FV wherever possible. Two recently published systematic reviews backed this suggestion. These studies showed a statistically significant preference for FS over FV. It was found, however, that the data presented in any of these research was insufficient (Details of their limitations will be identified and discussed below) (Chestnutt et al., 2017). Additionally, a newly revised large-scale RCT found no statistically significant difference in the effectiveness of FPMs caries prevention between FV and FS. This significant argument for doing the present meta-analysis is based on the fact that the validity of prior systematic reviews has been compromised by such factors as fresh contradictory evidences of RCT. In conclusion, we wanted to compare the effectiveness of FS and FV in caries treatment using FPMs (Ahovuo-Saloranta, 2016).

For this reason, we set out to provide a comprehensive health-system-level assessment of the efficacy of two preventative dental therapies (fluoride varnish and fissure sealant).

## Literature Review:

According to Patil, et al (2017) that The study's objective is to determine whether or not intensive application of sodium fluoride varnish can reduce caries incidence in children aged 6 to 7 years. CATALOGUE OF SUPPLIES AND METHODS: The participants were school-aged children (6-7) from Sangamner, Maharashtra, India, and the study design was a randomised controlled trial. Almost two hundred kids were split into a control group and an intervention group (varnish). At both the baseline and the 1-year follow-up visits, dental examinations were performed to document any cases of caries. For a whole year, the fluoride varnish was brushed on three times weekly. The t-test was used to compare the means of decaying, missing,

and filled teeth (DMFT) between and within the groups. The results showed that out of a total of 200 participants, 3% left the control group and 4% left the intervention group. About half of the people who took part in the study were male. Caries rates in the varnish group for deciduous teeth decreased significantly between baseline and follow-up. The results showed a 26% reduction in caries on average. We conclude that intensive fluoride administration in children aged 6 to 7 years significantly reversed caries in the deciduous teeth after 1 year of investigation. Caretakers and dentists alike can be encouraged to adopt this routine as a means of preventing cavities in the first place. Clinically significant findings include the recommendation that dental professionals routinely implement preventive fluoride application (three times a week) into their usual clinical practise to reduce the frequency of identifiable carious lesions.

Muller-Bolla et al (2013) found that A randomised clinical study with split-mouth design was conducted to measure the efficacy of a school-based dental sealant (SBDS) programme for low-income children in France. To evaluate the retention of sealants and evaluate the program's efficacy in relation to individuals' baseline caries risk (ICR). Two hundred and seventy-six students from Nice were a part of the research. The kids who did the sealing were in either the first or second grade. The primary molars were split into two groups at random, with one receiving a resin sealant and the other receiving no treatment at all. Permanent and baby teeth with active caries, plaque, *Streptococcus mutans* (SM) and *Lactobacillus* counts were recorded at baseline to evaluate ICR. Based on the number of new caries at 1 year of follow-up, an intent-to-treat analysis was conducted (study outcome). To evaluate the efficacy of SBDS, researchers conducted univariate and multivariate conditional tooth-matched logistic regression analyses (Proc phreg; SAS). After a year of observation, 253 kids (421 pairs) remained in the data set. First permanent molars that were treated with sealants had a reduced risk of developing new caries at 1 year of follow-up compared to teeth in the control group (OR = 0.26, 95% CI: 0.14-0.49) in the adjusted analysis. Only the variable "active caries at baseline" remained associated to new caries on first molars at 1 year (OR = 3.11, 95% CI: 1.27-7.62), regardless of therapy, SM count, or any other factors. Only when active caries was considered (OR = 0.25; 95% CI: 0.12-0.50) or when a high SM count was present (>105; OR = 0.20; 95% CI: 0.10-0.41), did the sealants have a statistically meaningful effect. Total retention was seen in 52.7% (n = 222) of the treated teeth at the 1-year follow-up. In poor socioeconomic communities, the SBDS programme was shown to be effective after just one year. In an SBDS programme, it is important to carefully select students based on their specific caries risk factors.

Chen et al (2012) provided that The current study set out to examine the effectiveness of sealants made with a high-viscosity glass-ionomer with an enhanced powder-liquid ratio (ART), with energy supplied to this glass-ionomer, and with a glass-carbomer, in preventing caries, in comparison to resin composite sealants. For this randomised controlled experiment, researchers enrolled 407 kids, with an average age of 8. Three dentists worked together in a school compound to seal the pits and fissures of youngsters at high risk for dental cavities. At the half-year, one-year, and two-year marks, results were analysed by a pair of impartial reviewers. The data was analysed using the ANOVA, t-test, and Kaplan-Meier survival plot. Sealants were placed on 1352 primary molars. Between 6.6% and 6.8% of kids and sealants respectively stopped attending school within the first two years. Twenty-seven of the youngsters (eighteen on the occlusal and ten on the smooth surfaces) with re-exposed pits and fissures had caries (decay) in the underlying dentin. Compared to the high-viscosity glass-ionomer with energy supplied (99%) and the resin-composite (98.9%) sealant groups, the cumulative survival of dentin carious lesion-free pits and fissures in the glass-carbomer sealant group was statistically substantially lower (97.4%). After 2 years, there was no statistically significant difference between the groups using high-viscosity glass-ionomer with (99%) and without (98.3%) energy provided sealant in terms of the percentage of pits and fissures in the dentin that remained free of carious lesions.

Since the introduction of fluoride toothpastes, 40 years ago, the prevalence of dental cavities has decreased. Fluoride's efficacy has been extensively studied, and insights into its mechanism of action have been exploited to improve caries prevention initiatives. Fluoride prevents dental cavities from developing by halting the demineralization process and promoting remineralization of early caries. Salivary calcium phosphates are deposited during the remineralization process to restore enamel crystallites that have been partially dissolved. With fluoride added, these strengthened crystallites are more resistant to disintegration from an acid attack brought on by sugar and bacteria. It is in the mouth that fluoride is most effective. The following recommendations can be made to patients by doctors based on our knowledge of the fluoride method of action: Effectiveness is correlated with fluoride content in oral products; nevertheless, a very high concentration is not required. It's crucial to have access to fluoride at all times, and doing so is as easy as including fluoride-containing items into one's regular hygiene routine (F-brushing or rinsing). Patient compliance is not necessary when fluoride is delivered in the form of drinking water or professionally applied F-varnishes or gels. These latter approaches are especially useful as supplementary therapies for people with severe cases of caries (ten Cate, 2013).

Liu et al (2020) found that Pit and fissure sealant's ability to reduce caries was observed to correlate with overall caries prevalence. Pit and fissure sealant public health programmes have been widely used in China since 2005, contributing to the country's incredibly low caries rate. The purpose of this research is to assess the effectiveness of this dental public health initiative in preventing caries in Beijing, the capital city of China. From 2012-2015, researchers analysed data from a longitudinal study of the same subjects. We included all 2,973 of the students from a single Beijing district. There were 1648 children in the sealant group and 1325 children in the no sealant group. At the outset, there was no significant difference between the dental caries risk profiles of the sealant and non-sealant groups. After 28 months, the sealant group had an 18.1% lower caries incidence than the no sealant group among children with only four first teeth (Chi-square test,  $p = 0.001$ ). Using binary logistic regression, the risk ratio for caries yes/no (only four molars) at 28 months was 0.73 (95% CI, 0.60-0.90;  $p = 0.001$ ) in the sealant group compared to the no sealant group. Prevention of dental cavities in primary molars with pit and fissure sealants was a successful public health initiative in Beijing.

The purpose of this research was to examine the links between diet and dental caries in school-aged children's permanent teeth. In 2014, researchers in Kermanshah, western Iran, conducted a cross-sectional survey with 698 students in grades 10 and 12. The research relied on information from a dietary questionnaire and the resulting decayed, missing, and filled teeth (DMFT) index. Zero Inflated Generalized Poisson (ZIGP) regression analysis was used to model the relationship between variables and dental caries. Of the kids, 14% didn't have any cavities. According to the model, the probability of belonging to a caries-vulnerable subgroup was 1.23 (95% CI: 1.08-1.51) times higher for girls than for boys ( $P=0.041$ ). In addition, the mean caries count was 1.41 (95% CI: 1.19-1.63) times higher in children who ingested fizzy soft drinks and sweet biscuits more than once daily compared to those who fell into the category of consuming them less than thrice weekly or never. Caries was more common among females than males. Our findings suggest that dietary status may have a major impact on permanent tooth caries, so we suggest that schools promote healthy eating habits, including limiting sugary beverages to only a few times per week in-between meals (Almasi et al., 2016).

Chestnutt et al (2017), When compared to a no-treatment control group, both fissure sealant (FS) and fluoride varnish (FV) are effective at preventing dental cavities. It is unclear, however, how beneficial these therapies actually are in the clinic. The purpose of this research was to evaluate the clinical efficacy of FS and FV in protecting the first permanent molars (FPMs) of children aged 6 to 7 against dental caries. The study was a randomised controlled trial with two identical groups. Mobile dentistry clinics were employed as part of a programme catering to a specific demographic in schools in South Wales's most impoverished communities. A total of 1,016 kids were split evenly between the FS and FV groups. Caries-free FPMs were treated with resin-based FS and then maintained every six months. Initial and maintenance FV treatments were given at 6-month intervals for a total of 3 years. Principal outcome outcomes included the number of children who progressed caries into dentine (D4-6MFT) on any one of up to four treated FPMs after 36 months. Eight hundred thirty-five (82%) children were still alive at the 36-month mark; 417 in the FS arm and 418 in the FV arm. Children who were given FV were less likely to develop caries into dentine on at least 1 FPM than those who were given FS ( $n = 82$ ; 19.6%) (odds ratio [OR] = 0.84; 95% CI, 0.59 to 1.21;  $P = 0.35$ ). Analyses comparing the odds based on the number of newly decaying teeth and tooth surfaces yielded comparable findings (OR = 0.86; 95% CI, 0.60 to 1.22 and OR = 0.85; 95% CI, 0.59 to 1.21, respectively). Caries prevention in a community oral health programme was not substantially different between semiannual FV application and FS application and maintenance after 36 months.

The purpose of this research is to examine the effectiveness of both conventional and alternative methods of caries prevention. Using the Evidence-based Medicine Criteria, we conducted a systematic review of the literature on the effectiveness of strategies and treatments to prevent caries development, focusing on studies published between January 1, 2002 and December 31, 2015. Thirty systematically reviewed studies on caries prevention were found. According to the statistics analysed from the available literature, preventative interventions have a high success rate. Caries development can be avoided with the help of preventative medicines (Sicca, 2016)

According to Li & Zheng (2020), Preventing caries of first permanent molars (FPMs) is a top priority for public health because of the disease's widespread incidence and consequential economic toll. Two new systematic reviews support current recommendations favouring fissure sealant (FS) over fluoride varnish (FV). These two studies have some weaknesses in their findings, including a lack of data and methodological flaws. In addition, the effectiveness of these two methods was found to be comparable in a recent large-scale randomised controlled trial (RCT). In light of this, we conducted this systematic review and meta-analysis to more properly assess the therapeutic efficacy of FS and FV on caries prevention for FPMs. There were a total of 8 RCTs that met the inclusion criteria, with a total of 3289 participants and 6878 FPMs. At 2–3 years of follow-up, our meta-analysis revealed no statistically significant difference in caries incidence or occlusal DMFS increase between the sealant group and the fluoride varnish group. This suggests that FPMs may benefit equally from biannual applications of FV or FS for caries prevention. These findings shed light on common misconceptions by showing that FS is not recommended over FV in everyday practise. Our results provide a window for doctors to reevaluate the relative merits of these two approaches.

The rising rate of childhood caries has shifted the focus to children's dental health. Using preventative treatments like pit and fissure sealant (PFS) and fluoride varnish (FV) can help keep cavities at bay. It is unclear, however, how well any of these therapies performs in the clinic in comparison to the others. This meta-analysis aimed to determine if pit and fissure sealants or fluoride varnish were more effective at preventing caries in children's first permanent molars. These findings come from a meta-analysis of randomised controlled studies that compared PFS vs FV within a 24-month follow-up period. We examined five databases for papers published in Arabic or English between 1990 and 2019. By employing a random-effects model, we were able to determine the relative risk (RR) and associated 95% CI. A total of 1249 youngsters across both groups were analysed from 4 investigations. No statistically significant increase in caries of first permanent molars (FPM) was found by any of the four included trials after 24 months of follow-up (RR: 0.65; 95% CI 0.31 to 1.35;  $P = 0.26$ ;  $I^2 = 89\%$ ). However, the research revealed no statistically significant differences between FV and PFS in terms of reducing DMFS increase (MD: 0.09; 95% CI: 0.03 to 0.21). Based on the results of this meta-analysis, it is recommended that FV be used because it is less expensive and easier to apply than PFS for the prevention of caries in FPMs over a 2-year follow-up period (Rashed & AlKheraif, 2022)

## Methods

Based on the book "Systematic Reviews to Support Evidence-Based Medicine," the 2020 systematic reviews were conducted (Khan & Antes, 2011).

## Ethical approval

No animal or human subjects were used in the research leading up to this publication.

### Search strategy

Information was gathered from MEDLINE-PubMed, Scopus, Web of Science, Cochrane Library, and EMBASE using the search terms "fluoride varnish," "fissure sealant," "caries," and "oral health." The items were searched between the years 2000 and December 2020.

### Inclusion and exclusion criteria:

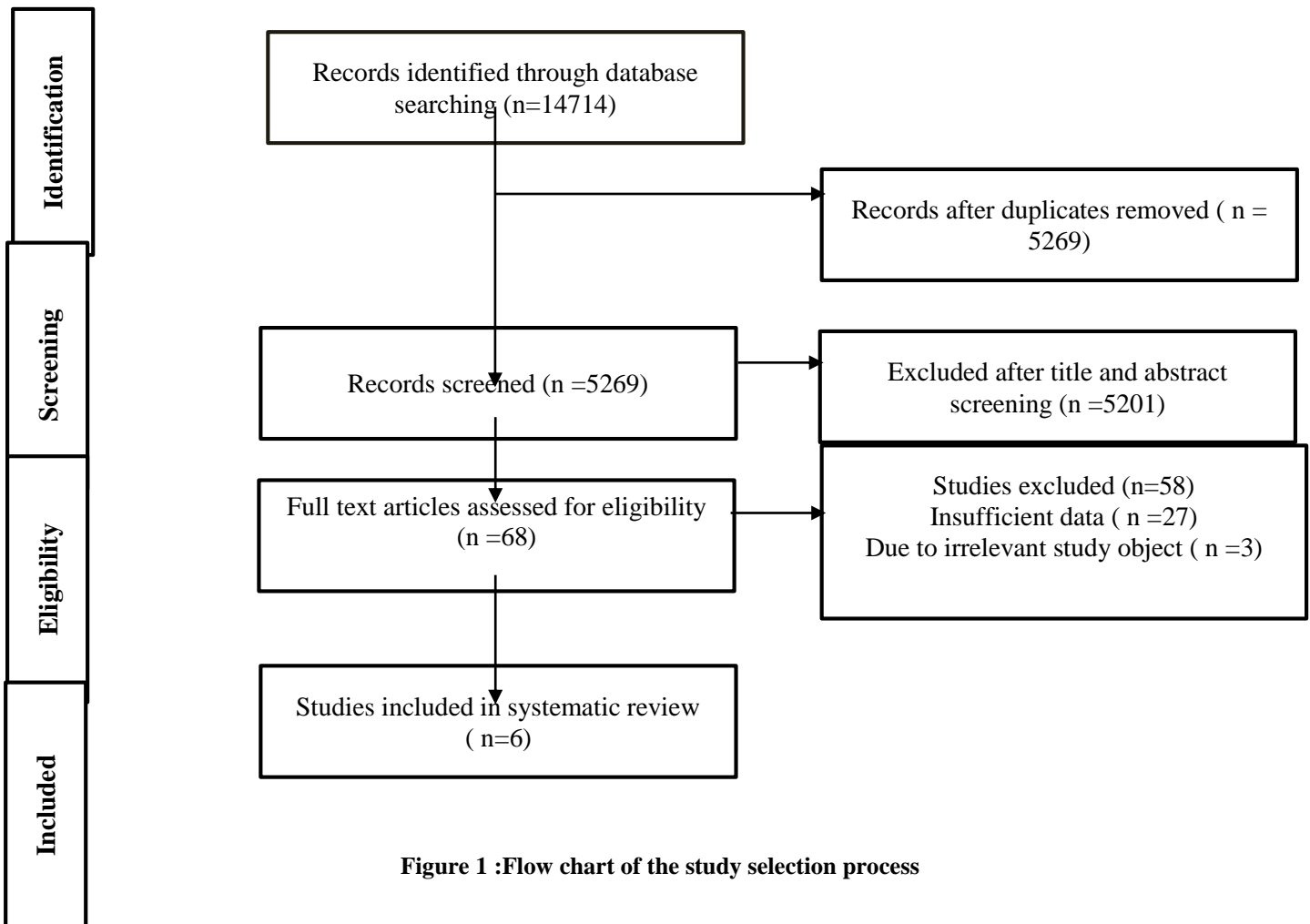
Systematic investigations employ PICO to create study inclusion and exclusion criteria and subsequently screen the collected papers. The PICO (population, intervention, comparison, and outcomes) model was used to assess titles and abstracts for suitability in terms of inclusion and exclusion criteria.

### Quality Assessment:

Two evaluators used checklists to assess the completeness and accuracy of the articles reported after they were extracted from the specified databases using the specified keywords. Randomized clinical trials were assessed using the CONSORT checklist, whereas non-randomized trials were assessed using the TREND checklist. The most recent iteration of the Consort checklist, version 1.1, has 37 items for assessing the 6 key components of clinical trial investigations. The 22-item (57-sub-item) TREND statement checklist was designed to facilitate uniform reporting of nonrandomized controlled trials. Sequence generation, allocation concealment, blinding, insufficient outcome data, selective outcome reporting, and other types of bias were all taken into account in these reviews.

Using the aforementioned instruments as a guide, studies that scored below a third were considered insufficient, while those that scored over two-thirds were considered to be high-quality reviews. Two raters utilised appropriate instruments to assess the level of bias in the remaining ten studies; if there were discrepancies between the surveys (conducted by the two primary individuals), a third rater evaluated the publication. The evaluation findings were also categorised into low, medium, and high categories according on the intensity of the intervention.

### Results



## Assessment of risk of bias of included studies:

The kinds of studies that are available and the questions that are being asked both play a role in determining how the risk of bias is evaluated. It is essential to evaluate the possibility of bias in each and every one of the included studies, regardless of whether they are systematic reviews, overviews, randomised trials, observational studies, studies investigating exposure, causation, or environmental toxicology, animal studies, health economics studies, qualitative studies, or any other kind of source of evidence. It is not recommended that you create an assessment tool because doing so will guarantee that the evaluations are comprehensive, consistent, and as objective as is humanly possible. Instead, make use of a risk of bias assessment tool that has been published, structured, and ideally validated. There are a large number of published tools, but not all of them are created equal in terms of their utility. Using a tool that is not appropriate for the task at hand or failing to use a structured tool. The necessary procedures have been followed, which helps to eliminate the risk of bias.

## Characteristics of Studies

Five articles looked at fissure sealants and their effects on caries indices, and five others looked at the effects of fluoride varnish (DMFT, DMFS, DMFS, dmfs).

## The effects of interventions:

**Fluoride varnish and its aftereffects** See the attached research for the level of proof. Treatment with fluoride varnish is a safe, well-tolerated, and effective method for halting the development of permanent enamel defects. Each coat of varnish was applied every three months for a total of seven applications. Significant changes in caries were seen in the 6–7 year old age group after regular use of fluoride (three sessions per week) and after 12 months of follow-up in the second research (Patil et al., 2017).

Over the course of a 4-year programme (with annual follow-up), a fluoride varnish programme may also prove to be an effective public health measure for children aged 6 to 12 years old in areas with a high prevalence of caries. Decreases in DMFT were seen across the board, both in terms of age and academic year.

The average DMFS score did not change significantly after using fluoride gel among children aged 9.5 to 11.5 with low caries levels. Yet another study found that the programme suggested was unable to prevent pits in at-risk youngsters. Both the control and intervention groups' average caries indices rise as their participants age. Therefore, this intervention is best implemented at a younger age and maintained on a consistent basis.

**Sealants' Repercussions** More than 60% of caries lesions in first permanent molars can be reduced by a school-based dental sealant programme over three years (annual follow-up) among at-risk children (hazard ratio [HR] = 0.33, 95% confidence interval [CI]: 0.24-0.46). Later research showed that after two years of dental caries intervention (using dental caries indicators like dmft and DMFT), glass carbomer performed better than the other groups. The cumulative survival of the sealants in the presence of energy likewise did not differ significantly ( $P=0.13$ ) (Chen et al., 2012). According to questionnaires administered after one, two, and three years, ART-GIS shows promise as a preventative measure in locations where no other such measures are feasible due to lack of resources or affordability. The rate of caries was significantly reduced ( $P<0.001$ ) in the treatment group compared to the control group (Muller-Bolla et al., 2013).

Researchers found that sealants were more effective on the occlusal surface of teeth with mild and medium cavities in a study of adolescents with high and low caries histories. Adolescents with severe decay, however, require additional treatment.

After three phases of annual monitoring, it became clear that fissure sealant intervention was a successful public health initiative for reducing caries ( $P<0.001$ ) (47). Since the metrics indicated that all 5 investigations were successful (with 24- and 36-month follow-ups, respectively). To ensure that sealants remain on teeth and continue to protect against caries, it is best to inspect them at regular intervals (for example, every six months) (Liu & Peng, 2020).

## Discussion:

This study is a large-scale, systematic analysis of the efficacy of fluoride varnish and fissure sealant in kids between the ages of 6 and 12. To that end, we used caries indices to assess the effectiveness of two fluoride varnishes and fissure sealants in the present systematic investigation (DMFT, DMFS, dmft and dmfs). Only ten items out of a total of 14,714 culled from databases and other sources made it into the survey. Six of them were selected for the meta-analysis review. There was a wide variation, from seven to 48 months, between interventions and assessments. Seven countries participated in the overall effort. There were sixteen reported signs, with fifteen indicating success. It was discovered that out of all the trials, 9 had positive effects and 1 had no effect at all. The purpose of this study design was to produce reliable findings by making use of the best available scientific evidence.

The benefits of using fluoride varnishes versus not using them Four out of five trials (80,988 participants) found efficacy using DMFT and DMFS indices, with follow-up ranging from 7 months to 48 months. Additionally, dmft in the control groups was .70, 0.35, and 0.55 units of change in the 12- and 36-month follow-up periods, respectively.

There was a higher rate of decay among participants who received sealants than among those who did not receive sealants across the 24-36 month follow-up period in five different programmes (615 intervention participants). Within the 24-month follow-up period, DMFT and dmft index values were 0.29 and 6.66 units, respectively.

A study's findings lend credence to the efficacy of this approach (Almas et al., 2016). Another study concluded that educational initiatives should be made to improve students' oral health.

In summary, the DMFT index of meta-analysis confirmed that therapies to reduce dental caries in children aged 6–12 years old were successful in both groups.

Studies evaluating the effectiveness of fissure sealants and fluoride therapies have evaluated retention rates of the sealants and caries rates; some studies have investigated the effect of both using a dental caries index (DMFT, DMFS, dmft, and dmfs) approach. However, investigations indicate that periodic surveys of the consequences of interventions as caries indices fail to establish intervention and control groups and fail to report general caries indices of all st (Complete, partial or complete disappearance of sealants). This study's findings corroborate those of previous studies showing that both FV and FS are effective forms of intervention. This research demonstrates the importance of implementing these materials in this age range and their success in avoiding dental cavities.

## Conclusion

Using interventional approaches is an appropriate strategy for preventing dental caries in children aged 6-12 years old. For this reason, those responsible for formulating health policy and planning implement measures to lessen the prevalence of dental caries. Additionally, they prefer this sort of intervention to be prioritised in the health system programmes and actions of countries.



## Reference:

- Patil, S. K., Fatangare, M., Jadhav, R. G., Shinde, G. R., Pawar, S. S., & Kathariya, M. D. (2017). Caries Preventive Effect of Sodium Fluoride Varnish on Deciduous Dentition: A Clinical Trial. *The Journal of Contemporary Dental Practice*, 18(12), 1190-1193.
- Muller-Bolla, M., Lupi-Pégurier, L., Bardakjian, H., & Velly, A. M. (2013). Effectiveness of school-based dental sealant programs among children from low-income backgrounds in France: a pragmatic randomized clinical trial. *Community Dentistry and Oral Epidemiology*, 41(3), 232-241.
- Chen, X., Du, M. Q., Fan, M. W., Mulder, J., Huysmans, M. C. D. N. J. M., & Frencken, J. E. (2012). Caries-preventive effect of sealants produced with altered glass-ionomer materials, after 2 years. *Dental Materials*, 28(5), 554-560.
- Chestnutt, I. G., Playle, R., Hutchings, S., Morgan-Trimmer, S., Fitzsimmons, D., Aawar, N., ... & Chadwick, B. L. (2017). Fissure seal or fluoride varnish? A randomized trial of relative effectiveness. *Journal of dental research*, 96(7), 754-761.
- ten Cate, J. (2013). Contemporary perspective on the use of fluoride products in caries prevention. *British dental journal*, 214(4), 161-167.
- Hopcraft, M. S., Morgan, M. V., Satur, J. G., & Wright, F. A. C. (2008). Dental service provision in Victorian residential aged care facilities. *Australian dental journal*, 53(3), 239-245.
- Nurelhuda, N. M., Trovik, T. A., Ali, R. W., & Ahmed, M. F. (2009). Oral health status of 12-year-old school children in Khartoum state, the Sudan; a school-based survey. *BMC oral health*, 9, 1-9.
- Seraj, B., Shahrabi, M., Shadfar, M., Ahmadi, R., Fallahzadeh, M., Eslamlu, H. F., & Kharazifard, M. J. (2012). Effect of high water fluoride concentration on the intellectual development of children in Makoo/Iran. *Journal of Dentistry (Tehran, Iran)*, 9(3), 221.
- Liu, M., Zhao, M., Chen, W., Xu, Q., & Peng, T. (2020). Caries-preventive effect of a public health programme for pit and fissure sealant. *Oral Health Prev Dent*, 18(1), 67-75.
- Almasi, A., Rahimiforoushani, A., Eshraghian, M. R., Mohammad, K., Pasdar, Y., Tarrahi, M. J., ... & Jouybari, T. A. (2016). Effect of Nutritional Habits on Dental Caries in Permanent Dentition among Schoolchildren Aged 10–12 Years: A Zero-Inflated Generalized Poisson Regression Model Approach. *Iranian journal of public health*, 45(3), 353.
- Chestnutt, I. G., Playle, R., Hutchings, S., Morgan-Trimmer, S., Fitzsimmons, D., Aawar, N., ... & Chadwick, B. L. (2017). Fissure seal or fluoride varnish? A randomized trial of relative effectiveness. *Journal of dental research*, 96(7), 754-761.
- Sicca, C., Bobbio, E., Quartuccio, N., Nicolò, G., & Cistaro, A. (2016). Prevention of dental caries: A review of effective treatments. *Journal of clinical and experimental dentistry*, 8(5), e604.
- Khan, K., Kunz, R., Kleijnen, J., & Antes, G. (2011). *Systematic reviews to support evidence-based medicine*. Crc press.
- Li, F., Jiang, P., Yu, F., Li, C., Wu, S., Zou, J., ... & Zheng, L. (2020). Comparison between fissure sealant and fluoride varnish on caries prevention for first permanent molars: a systematic review and meta-analysis. *Scientific reports*, 10(1), 1-9.
- Rashed, T., Alkhalefa, N., Adam, A., & Alkheraif, A. (2022). Pit and Fissure Sealant versus Fluoride Varnish for the Prevention of Dental Caries in School Children: A Systematic Review and Meta-Analysis. *International Journal of Clinical Practice*, 2022.
- Kassebaum, N. J., Bernabé, E., Dahiya, M., Bhandari, B., Murray, C. J. L., & Marcenes, W. (2015). Global burden of untreated caries: a systematic review and metaregression. *Journal of dental research*, 94(5), 650-658.
- Meier, T., Deumelandt, P., Christen, O., Stangl, G. I., Riedel, K., & Langer, M. (2017). Global burden of sugar-related dental diseases in 168 countries and corresponding health care costs. *Journal of dental research*, 96(8), 845-854.
- Listl, S., Galloway, J., Mossey, P. A., & Marcenes, W. (2015). Global economic impact of dental diseases. *Journal of dental research*, 94(10), 1355-1361.
- Marcenes, W., Kassebaum, N. J., Bernabé, E., Flaxman, A., Naghavi, M., Lopez, A., & Murray, C. J. (2013). Global burden of oral conditions in 1990-2010: a systematic analysis. *Journal of dental research*, 92(7), 592-597.
- Kassebaum, N. J., Smith, A. G., Bernabé, E., Fleming, T. D., Reynolds, A. E., Vos, T., ... & GBD 2015 Oral Health Collaborators. (2017). Global, regional, and national prevalence, incidence, and disability-adjusted life years for oral conditions for 195 countries, 1990–2015: a systematic analysis for the global burden of diseases, injuries, and risk factors. *Journal of dental research*, 96(4), 380-387.
- Ahovuo-Saloranta, A., Forss, H., Hiiri, A., Nordblad, A., & Mäkelä, M. (2016). Pit and fissure sealants versus fluoride varnishes for preventing dental decay in the permanent teeth of children and adolescents. *Cochrane Database of Systematic Reviews*, (1).
- Mathu-Muju, K. R., & Kennedy, D. B. (2016). Loss of permanent first molars in the mixed dentition: circumstances resulting in extraction and requiring orthodontic management. *Pediatric dentistry*, 38(5), 46E-53E.