Comparison of Two Types of Pit and Fissure Sealants in Reducing the Incidence of Dental Caries Using a Split-Mouth Design

Usporedba dviju vrsta smola za pečačenje fisura i jamica u smanjenju incidencije zabnog karijesa primjenom dizajna podijeljenih usta

Abstract
Objectives: To evaluate the effectiveness of two pit and fissure sealants (PFS) in reducing the incidence of dental caries in schoolchildren. Material and Methods: A randomized split-mouth experimental design was used in a sample of 140 subjects assigned to two groups. The sealants used were Clinpro©3M and BeautiSealant©Shofu placed in first permanent molars (FPMs). Each sealant was compared to molars in the controls to determine effectiveness over a period of 6 months. The study had a 12.9% loss to follow-up. No statistically significant differences (p>0.05) were observed for sex, age, baseline dmft, or type of sealants. Nonparametric tests were used for statistical analysis. Results: Average dmft index at baseline was 4.10±3.16. Lower incidence of caries was observed in FPMs with pit and fissure sealants (p<0.01), regardless of the type used. When sealants remained intact there was a lower caries incidence compared to sealants partially or completely missing — but differences were only significant for FPM 16. Conclusions: Pit and fissures sealants are an effective preventive treatment to reduce caries during a 6-month follow-up in schoolchildren 6 to 8 years of age, regardless of the type of sealant used. The sealant brand that showed greater effectiveness in terms of prevention and retention was Clinpro©3M.

Introduction
According to the Global Burden of Disease in 2010, untreated caries in permanent and primary teeth represented the first and tenth most prevalent condition, respectively (1). In Latin America, oral diseases constitute a public health problem (2). Specifically, in Mexico six-year olds have caries on their primary teeth, with caries index ranging from 0.73 to 5.35 (decayed, missing and filled primary teeth (dmft index)), and caries prevalence is between 26.3% and 77.5%.
For permanent teeth, dental caries index among 12-year olds ranged from 0.52 to 3.67 (Decayed, Missing and Filled Permanent Teeth (DMFT index)) and caries prevalence ranged between 30.7% and 79.2% (3). For 15-year-olds, the average DMFT ranged between 1.12 and 5.31, and prevalence between 37.6% and 88.6% (3). The results of the studies conducted in developing countries revealed that more than 80% of caries lesions in primary and permanent teeth required restorative treatment. The high prevalence and treatment needs represent an economic burden for both public health systems and households, with the latter often paying out-of-pocket expenses for private care (4,5).

First permanent molars (FPMs) are the earliest teeth to erupt in the secondary dentition (6). The occlusal morphology of pit and fissures is an important reason for dental caries at this surface. While diverse restorative materials can be used to restore occlusal cavities (7), pit and fissure sealants are highly effective preventive interventions whereby a low-viscosity resin is placed in pits and fissures (8-10). In Mexico, less than 2.5% of children and adolescents aged 6 - 12-years had sealants of any type (11).

The present study set out to ascertain the effectiveness of sealants in general in a group of community-dwelling children in terms of caries prevention performance in first permanent molars (FPM). Secondly, we compared the performance of two commonly used sealants: ClinPro©3M and BeautiSealant©Shofu pit and fissure sealants.

Material and methods

Design

We conducted a randomized controlled split-mouth clinical trial in elementary school children in Hidalgo, Mexico. Figure 1 shows the methodological design. Our design included the conventional Clinpro sealant (Clinpro©3M, Saint Paul, MN., USA) and one sealant based on Giomer technology (BeautiSealant©Shofu, Kyoto, Japan). Clinpro©3M is a resin-based product that requires an etching adhesive system (12). BeautiSealant©Shofu sealant uses Giomer technology with an adhesive system that does not require phosphoric acid (13). Different technologies may affect various aspects of performance (e.g., pit penetration (14), retention (15) and microfiltration (16), which was not individually addressed in the present research.

Our research protocol was approved by the Ethics Committee of the Health Sciences Institute at the Autonomous University of the State of Hidalgo (Cimv/o/032/2016).

Sealant application

Dental prophylaxis with fluoride-free abrasive paste and rubber cup was carried out at low speed. Relative isolation was attained with cotton rolls. A conventional adhesive system was followed with the Clinpro sealant; that is, the enamel surface was etched for 20 seconds, and after rinsing with plenty of water, the sealant was placed with applicator tips (3MESPE). For the BeautiSealant sealant, first conditioning was attained with air gently applied for 5 seconds, followed by placing the sealant (Shofu). Both products were cured}

%. Za trajne zube indeks karijesa među 12-godišnjacima bio je od 0,52 do 3,67 (trajni zubi s karijesom, izvađeni mliječni zubi i mliječni zubi s ispunom – DMFT indeks), a prevalencija karijesa kretala se između 30,7 i 79,2 % (3). Za 15-godišnjake je prosječni DMFT indeks iznosio između 1,12 i 5,31, a prevalencija između 37,6 i 88,6 % (3). Istraživanja provedena u zemljama u razvoju pokazala su da više od 80 % karijesnih lezija na mliječnim i trajnim zubima zahtijeva restaturativno liječenje. Velika prevalencija i potreba za liječenjem financijsko su opterećenje i za javnozdravstveni sustav i za kućanstva, pri čemu kućanstva često plaćaju privatno liječenje iz vlastita džepa (4, 5).

Prvi trajni kunnjaci prvi su zubi koji niknu u trajnoj denticiji (6). Okluzalna morfologija fisura i jamica na tom je dijelu uzrok nastanka zubnog karijesa. Iako se različiti materijali mogu upotrijebiti za restauraciju okluzalnih kvitet (7), smole za pečaćenje fisura i jamica vrlo su učinkovite u prevenciji, pri čemu se u fisure i jamice aplicira smola niske viskoznosti (8 – 10). U Meksiku je kod manje od 2,5 % djece i adolescenata između 6 i 12 godina primijenjena smola za pečaćenje bilo koje vrste (11).

Cilj ovog istraživanja bio je općenito analizirati učinkovitost smola za pečaćenje fisura u skupini djece u smislu prevencije karijesa na prvom trajnim kunnjacima. Kao drugo, usporedili smo performanse dviju često korištenih smola za pečaćenje fisura i jamica – ClinPro© 3M i BeautiSealant© Shofu.

Materijali i metode

Studijski dizajn

Proveli smo randomizirano kontrolirano kliničko istraživanje s podijeljenim ustima kod djece osnovnaškolske dobi u Hidalgu u Meksiku. Na slici 1. je metodološki dizajn. U potrijebljeni materijali za pečaćenje bili su Clinpro (Clinpro® 3M, Saint Paul, MN., SAD) i jedan temeljen na giomernoj tehnologiji (BeautiSealant© Shofu, Kyoto, Japan). Clinpro® 3M proizvod je na bazi smole koji zahtijeva adhezivni sustav za jetkanje (12). BeautiSealant© Shofu smola je na bazi giornerne tehnologije s adhezivnim sustavom koji ne zahtijeva ortofoformsku kiselinu (13). Različite tehnologije mogu utjecati na različite aspekte izvedbe, na primjer, na prodiranje u fisure (14), retenciju (15) i mikrofiltraciju (16), što nije obrađeno pojedinačno u ovom istraživanju.

Naš protokol za istraživanje odobrio je Etički odbor Instituta za zdravstvene znanosti pri Autonomnom sveučilištu države Hidalgo (Cimv/o/032/2016).

Aplikacija smole za pečaćenje

Najprije je provedena profilaksa abrazivnom pastom bez fluorida i gumenim polierom pri maloj brzini. Razmjerno suho radno polje postignuto je svitcima staničevine. Na konvencionalnog adhezivnog sustava aplicirana je smola Clinpro, to jest površina kaciljek jetkana je 20 sekunda, a na kon postirana s obilno vode smola je nanesena vrhom aplikatora (3MESPE). Za smolu BeautiSealant prvo je kondicioniranje postignuto ispuhivanjem zakom tijekom 5 sekunda, nakon čega je slijedila aplikacija smole (Shofu). Oba proizvo-
with a LED lamp for 20 seconds. We followed the manufacturers’ instructions.

Study sample and participant selection

A formula for proportional difference was used to calculate the sample size. The prevalence of caries in the FPMs with and without sealants (30% and 60%, respectively) was based on a p-value of 0.05 and 90% power. We added 10% loss to follow-up calculations, leading to 70 participants per sealant.

We selected the participants randomly from ten public elementary schools after holding a meeting with heads of households in each school, before asking for their signed informed consent. Inclusion criteria were (1) having four fully erupted and sound FPMs; (2) being enrolled in one of the ten selected schools; (3) being between six and eight years old; (4) having no fixed orthodontic appliances; and (5) the child assenting to go through dental examination.

data polimerizirana su LED svjetiljkom 20 sekunda. Slijedili smo upute proizvođača.

Uzorak i odabir ispitanika

Za izračunavanje veličine uzorka korištena je formula proporcionalne razlike. Prevalencija karijesa na prvim trajnim kutnjacima sa smolom za pečaćenje i bez nje (30 %, odnosno 60 %) temeljila se na p-vrijednosti od 0,05 do 90 % snage. Proračunima smo dodali gubitak od 10 % ispitanika tijekom praćenja, što je rezultiralo s ukupno 70 sudionika po smoli za pečaćenje.

Sudionike smo odabrali nasumično iz deset javnih osnovnih škola nakon sastanka s ravnateljima, prije nego što smo zatražili njihov potpisani informirani pristanak. Kriteriji za uključivanje bili su (1) četiri potpuno eruptirana i zdrava prva trajna kutnjaka; (2) upis u jednu od deset odabranih škola; (3) dob između šest i osam godina; (4) bez fiksnih ortodontskih naprava; (5) pristanak djeteta na stomatološke preglede.
Intervention

Once participants were selected, we performed an initial randomization to determine which sealant would be used for each child. We then performed the second randomization to determine on which side of the mouth the sealant would be placed. Sealants (experimental group) were applied in the first upper permanent molar and first lower permanent molar on the same side of the mouth. In this way, the control group was assigned to the opposite arch.

Data collection and statistical analysis

We used the International Caries Detection and Assessment System II (ICDAS II) to measure caries experience at baseline and follow-up (six months after intervention); dmft index was used at baseline as well. Both the clinical examiner and recorder were calibrated and standardized (kappa > 0.80) on this scale. As recommended by other authors (17), we assessed pit and fissure sealants during follow-up as 0 = intact or complete, 1 = partial retention, or 2 = missing.

After describing general characteristics of the sample, we performed a bivariate analysis to ascertain whether differences had arisen between the two groups of participants in terms of loss to follow-up, and for each of the independent variables. We performed a chi square test to establish the association between dependent and exposure variables. Finally, we estimated the relative risk (RR) and the incidence of caries in the FPMs with and without a sealant. Given the split-mouth design of our study, the tooth was analyzed so that a comparison could be made with the contralateral tooth.

Variables

Our dependent variable was the incidence of caries, measured dichotomously (0 = sound, 1 = visible changes in enamel or caries > 1 in ICDAS II). Our main independent variable was the presence of sealant (0 = without sealant, 1 = with sealant). In addition, we analyzed data by sex (0 = male, 1 = female), age (6-8 years), baseline dmft, type of sealant (0 = Clinpro, 1 = BeautiSealant) and sealant status six months after placement (0 = intact, 1 = partial retention, 2 = missing).

Blinding

The simple blind design was used; i.e., participants were unaware of group assignment, but researchers were aware of it. Similarly, both clinicians and patients knew that the treatment would be provided, but patients did not know which type of sealant would be applied. The dentists placing the sealants were different from those scoring the caries experience, the presence of sealants, or collecting data for the trial.

Results

Table 1 shows the general sample and demographic characteristics. Of 140 participants, mean of age was 6.92 ± 0.74 years; 52.1% were boys. Mean baseline dmft index was 4.10 ± 3.16. Although the study had a 12.9% loss to follow-up, no statistically significant differences (p > 0.05) were observed for sex, age, baseline dmft nor type of sealants between the FPMs with and without a sealant.

Postupak

Nakon odabira sudionika obavili smo početnu randomizaciju kako bismo utvrdili koja će se pečatna smola upotrebljavati za svako dijete. Zatim smo učinili drugu randomizaciju i utvrdili na koju će se stranu usta postaviti pečatna smola. Pečatne smole (ekperimentalna skupina) primijenjene su u gornjem prvom trajnom kutnjaku i donjem prvom trajnom kutnjaku na istoj strani usta.

Prikupljanje podataka i statistička analiza

Koristili smo se međunarodnim sustavom za otkrivanje i procjenu karijesa II (ICDAS II) za mjerenje prevalencije karijesa na početku praćenja i tijekom praćenja (šest mjeseci nakon intervencije). DMFT indeks također je upotrijebljen na početku. Klinički ispitivači su kalibrirani i standardizirani (kappa > 0.80) na ovoj ljestvici. Prema preporuci drugih autor (17), smole za pečaćenje fisura i jamica tijekom praćenja ocjenjivali smo sljedećim ocjenama: 0 = intaktne ili potpune, 1 = djelomična retencija ili 2 = nedostaje.

Nakon opisa općih karakteristika uzorka proveli smo bi- varijantnu analizu kako bismo ustanovili jesu li se pojavile razlike između dviju skupina sudionika u smislu gubitka praćenja i za svaku od neovisnih varijabli. Proveli smo hi-kvadrat test kako bismo utvrdili povezanost između ovisnih i varijabli izloženosti. Na kraju smo procijenili relativni rizik (RR) i prevalenciju karijesa na primijenjenoj skupini putem kontralateralnog zuba.

Zasljepljivanje

Primijenjen je jednostavan dizajn zasljepljivanja, tj. sudioniici nisu bili svjesni raspoređivanja skupina, ali istraživači su i kliničari i pacijenti znali da će se obaviti liječenje, ali pacijenti nisu znali koja će se vrsta smole za pečaćenje primijeniti. Statistike koji su pečatili zube nisu bili oni isti koji su bilježili incidenciju karijesa, prisutnost pečatne smole i prikupljali podatke za istraživanje.
children who left the study and those who completed the follow-up. There were no statistically significant differences (p>0.05) in caries incidence in FPMs by age or sex. A lower caries incidence was observed in FPMs with pit and fissure sealants (p<0.01) (Tables 2 and 3), regardless of the type used.

Table 1 General sample characteristics at baseline and analysis of participants who remained and did not remain (loss to follow-up) in the study

| Variable • Varijabla | Baseline measurement • Početno mjerenje n (%) | Lost to follow up • Gubitak praćenja 18 (12.9) | Remained in study • Ostali u istraživanju 122 (87.1) | P value • P vrijednost |
|----------------------|-------------------------------------------------|--------------------------------------------------|--------------------------------------------------|-------------------------|
| Sex • Spol           |                                                 |                                                  |                                                  |                         |
| Male • Muški         | 73 (52.1)                                       | 11 (15.1)                                        | 62 (84.9)                                        | p=0.415 *               |
| Female • Ženski      | 67 (47.9)                                       | 7 (10.4)                                         | 60 (89.6)                                        |                         |
| Type of sealant • Vrsta smole za pečaćenje | BeautiSealant | 70 (50.0)                                      | 11 (8.4)                                         | 62 (88.6)              | p=0.614*               |
|                      | Clintpro                                        | 70 (50.0)                                      | 10 (14.3)                                        | 60 (85.7)              |                         |
| Age • Dob            |                                                 |                                                  |                                                  |                         |
|                       | Mean±SD • Srednja vrijednost ± SD               | Range • Raspon                                  | Mean±SD • Srednja vrijednost ± SD               |                         |
|                       | 4.10±3.16                                       | 0-13                                            | 14.3                                              |                         |
| Baseline dmft • Početni DMFT |                        |                                                  |                                                  |                         |

*p=0.1117**

Table 2 Caries incidence in FPM16 and FPM26 vs independent variables

| FPM16 • PTK16 | Sound • Zdravo | Decayed • Karijes | P value • P vrijednost |
|---------------|----------------|-------------------|-----------------------|
| Presence of sealant • Prisutnost pečata | With sealant • S pećatom | 43 (74.1) | 15 (25.9) | p=0.006* |
|               | Without sealant • Bez pećata | 32 (50.0) | 32 (50.0) |                         |
| Sealant status • Status pečata | Intact • Intakzan | 36 (81.8) | 8 (18.2) | p<0.0001* |
|               | Partial • Diplomično očuvan | 28 (60.9) | 18 (39.1) |                         |
|               | Missing • Izgubljen | 11 (34.4) | 21 (65.6) |                         |
| Type of sealant • Vrsta smole za pečaćenje | Clinpro | 45 (75.0) | 15 (25.0) | p=0.003* |
|               | BeautiSealant | 30 (48.4) | 32 (51.6) |                         |
| Sex • Spol |                                                 |                                                  |                                                  |                         |
| Male • Muški | 38 (61.3)                                        | 24 (38.6)                                        | p=0.966*                                           |
| Female • Ženski | 37 (61.7)                                      | 23 (38.3)                                        |                         |
| Age • Dob | 6.89±0.70                                       | 7.08±0.80                                        | p=0.1757**                                           |
| Baseline dmft • Početni DMFT | 3.74±3.08                                      | 4.57±3.15                                        | p=0.1336**                                           |

*p=0.0489**

Table 3 Caries incidence in FPM16 and FPM26 vs independent variables

| FPM26 • PTK26 | Sound • Zdravo | Decayed • Karijes | P value • P vrijednost |
|---------------|----------------|-------------------|-----------------------|
| Presence of sealant • Prisutnost pečata | With sealant • S pećatom | 51 (79.7) | 13 (20.3) | p<0.0001* |
|               | Without sealant • Bez pećata | 17 (29.3) | 41 (70.7) |                         |
| Sealant status • Status pečata | Intact • Intakzan | 28 (63.6) | 16 (36.4) | p=0.120* |
|               | Partial • Diplomično očuvan | 27 (58.7) | 19 (41.3) |                         |
|               | Missing • Izgubljen | 13 (40.6) | 19 (59.4) |                         |
| Type of sealant • Vrsta smole za pečaćenje | Clinpro | 36 (60.0) | 24 (40.0) | p=0.351* |
|               | BeautiSealant | 32 (51.6) | 30 (48.4) |                         |
| Sex • Spol |                                                 |                                                  |                                                  |                         |
| Male • Muški | 32 (51.6)                                        | 30 (48.4)                                        | p=0.351*                                           |
| Female • Ženski | 36 (60.0)                                      | 24 (40.0)                                        |                         |
| Age • Dob | 6.97±0.71                                       | 6.96±0.80                                        | p=0.9383**                                           |
| Baseline dmft • Početni DMFT | 3.52±2.76                                      | 4.74±3.44                                        | p=0.0489**                                           |

*p=0.966***

There were no statistically significant differences (p>0.05) in caries incidence in FPMs by age or sex. A lower caries incidence was observed in FPMs with pit and fissure sealants (p<0.01) (Tables 2 and 3), regardless of the type used.
When sealants remained intact there was a lower caries incidence compared to sealants partially or completely missing – but differences were only significant for FPM 16. The caries incidence was higher for BeautiSealant sealed teeth than 0.01) (table 2. i 3.), bez obzira na upotrijebljenu pečatnu smolu.

Kada je pečat ostao intaktan, bila je manja incidencija karijesa u usporedbi s djelomično ili potpuno nestalim pečati-
Clinpro’s, but it was only statistically significant in FPMs 16, 36 and 46 (p < 0.05). The caries incidence was higher in those cases with a higher baseline dmft but it only reached statistical significance in FPMs 26 and 36.

Table 5 shows the incidence distribution by ICDAS II type of lesion. They were primarily ICDAS 1 and 2; 63.8% of 47 FPM 16, 77.7% of 54 FPM 26, 54.9% of 51 FPM 36 and 48.0% of FPM 46.

The caries incidence in sealed and non-sealed FPMs is presented in Table 5. In terms of relative risk (RR), FPMs with pit and fissure sealants had lower caries risk of than those without sealants.

Discussion

Our study demonstrated that pit and fissure sealants are effective for a six-month follow-up period when applied to first permanent molars (FPMs). This is consistent with previous studies in various countries (18, 19), although the follow-up times differ. While widely acknowledged for effectiveness, it is a pity that in Mexico pit and fissure sealants are not employed as often as it could be expected. According to a report from the Ministry of Health, less than 2.5% of the population surveyed had received sealants (11). Given demonstrated effectiveness, health programs should be emphasizing sealant utilization in public and private dental services, as it has often been recommended in other countries (18, 19).

Caries lesions are predictive of new ones (20); a previous history of caries experience suggests an increased risk (21). Pit and fissure sealants are especially indicated for children at risk of developing caries. When we analyzed the relationship between the initial appearance of caries in primary dentition and the incidence of caries in sealed teeth, we found higher incidence of caries in patients with greater dmft at baseline. Despite our limited follow-up time, overall results strongly support the use of sealants (15, 17-19).

The BeautiSelant©Shofu sealant utilizes glass ionomer together with a polymer in its composition, which offers the advantage of releasing and recharging fluoride. Recent studies have compared this type of technology to conventional sealants with favorable results (22, 23). Clinpro®3M is a resin-based sealant that releases fluoride. It has been suggested that this type of sealant provides greater benefits as it tends to remain longer in the mouth (24): resin-based sealants offer extended retention as a result of the adhesive system used (25). Our study results showed a smaller number of missing seal-

ma, no razlika je bila značajna samo za zub 16. Incidencija karije bila je veća na zubima zapečaćenima smolom Beauti-Sealant, nego smolom Clinproove, ali je razlika bila statistički značajna samo za zube 16, 36 i 46 (p < 0.05). Incidencija karijesa bila je veća u slučajevima s višim početnim DMFT-om, ali je statistički značajna bila samo za zube 26 i 36.

U tablici 4. nalazi se distribucija incidencije prema tipu lezije ICDAS II. Uglavnom su to bili ICDAS 1 i 2: 63,8% od 47 na zubu 16, 77,7% na 54 na zubu 26, 54,9% od 51 na zubu 36 i 48,0% na zubu 46.

Incidencija karije na zapečaćenim i nezapečaćenim prvim trajnim kutnjacima prikazana je u tablici 5. Kad je riječ o relativnom riziku (RR), zapečaćeni prvi trajni kutnjaci imali su manji rizik od nastanka karijesa od onih bez pečata.

Rasprava

Naše istraživanje pokazalo je da su smole za pečaćenje fisura i jamica učinkovite tijekom šestomjesečnog razdoblja praćenja kada se primjenjuju na prvima trajnim kutnjacima (FPM). To je u skladu s rezultatima dosadašnjih istraživanja u raznim zemljama (18, 19), iako se vrijeme praćenja razlikuje. Iako je dokazana učinkovitost, u Meksiku se, nažalost, smole za pečaćenje fisura i jamica ne primjenjuju toliko često koliko bi se moglo očekivati. Prema izvješću Ministarstva zdravstva, manje od 2,5 % ispitate populacije ima zapečaćene fisure i jamice (11). S obzirom na dokazanu učinkovitost, zdravstveni programi trebali bi isticati korist od pečaćenja zuba u javnim i privatnim stomatološkim ordinacijama, kao što se često prepoređuje u drugim zemljama (18, 19).

Postojeće karijesne lezije prediktivni su čimbenik za ostanak novih (20); povijest karijesa upućuje na povećan rizik (21). Smole za pečaćenje fisura i jamica posebno su indicirane za djecu kojoj prijeti karijes. Kada smo analizirali vezu između inicijalne pojave karijesa u mlječnoj dentitiji i incidencije karijesa na zapečaćenim zubima, ustanovili smo veću učestalost kod pacijenata s većim DMFT indeksom na početku. Unatoč našem ograničenom vremenu praćenja, ukupni rezultati snažno podupiru primjenu smola za pečaćenje (15, 17 – 19).

Smola za pečaćenje BeautiSelant© Shofu sadržava stakleni ionomer zajedno s polimerom, što ima prednost oslobađanja i punjenja fluorida. Nedavno provedena istraživanja usporediva su tu vrstu tehnologije s konvencionalnim smolama za pečaćenje s povoljnim rezultatima (22, 23). Clinpro®3M bazira se na smoli koja oslobađa fluor. Sugestira se da je ta vrsta smole za pečaćenje korisnija jer obično ostaje dulje u ustima (24): takve smole za pečaćenje imaju prodženu retenciju.
Pit and fissure sealants offer an effective preventive treatment for reducing the incidence of caries over a six-month follow-up period in six to eight years old schoolchildren, regardless of either one of two types of sealants used. In our study, the sealant that proved to be most effective in terms of prevention and retention was Clinpro© 3M.

Conclusions

Pit and fissure sealants can be an effective tool to prevent dental caries and thus help improve oral health of the child population. Our research findings support sealant utilization in one of the prime age groups who can benefit from such a caries prevention approach (7-10, 14-19, 28-30).

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Competing financial interests

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Author's Contribution: M.A.F.-B., T.de J.S.-M., C.E.M.-S., and G.M., conceptualized and designed the study. R.J.S.-V., and M.de L.M.-C., contributed to data analysis and interpretation of data. All authors contributed to a critical review of the manuscript, writing the first draft and approving the final version. All authors have read and agreed to the published version of the manuscript.

dants and a lower level of caries in FPMs when Clinpro©3M sealants had been used. The effectiveness of pit and fissure sealants is closely related to their permanence on the tooth surface (26-28). However, we found no differences in terms of the incidence of caries in relation to retention. Our study differed from others because our follow-up measurement was limited to six months; the effect of total or partial loss of sealants may have been more evident over a longer period.

While selection criteria included four first permanent molars in good shape, such condition may have not ensured good overall dental health status; primary teeth could have had caries. In Table 1, we had dmft 4.10±3.16, which is considerable. Through resorting to ICDAS II, we were able to identify enamel changes, from minimal color changes indicating demineralization (ICDAS 1 and 2) to carious lesions encompassing small cavities as well as extensive enamel breakdown (ICDAS>2). Most lesions scored were ICDAS 1 and 2, a few ICDAS 3, and none above ICDAS 3.

Pit and fissure sealants can be an effective tool to prevent dental caries and thus help improve oral health of the child population. Our research findings support sealant utilization in one of the prime age groups who can benefit from such a caries prevention approach (7-10, 14-19, 28-30).

Conclusions

Pit and fissure sealants can be an effective tool to prevent dental caries and thus help improve oral health of the child population. Our research findings support sealant utilization in one of the prime age groups who can benefit from such a caries prevention approach (7-10, 14-19, 28-30).

Competing financial interests

The authors state that there are no actual or perceived conflicts of interest. The authors received no product support or any kind of financial support from the manufacturers of the sealants.

Author’s Contribution: M.A.F.-B., T.de J.S.-M., C.E.M.-S., and G.M., conceptualized and designed the study. R.J.S.-V., and M.de L.M.-C., contributed to data analysis and interpretation of data. All authors contributed to a critical review of the manuscript, writing the first draft and approving the final version. All authors have read and agreed to the published version of the manuscript.

kao rezultat upotrijebljenog adhezivnog sustava (25). Rezultati našeg istraživanja pokazali su manje izgubljenih pečata i nižu razinu karijesa na prvim trajnim kutnjacima kada je kočenka smola Clinpro© 3M. Učinkovitost smola za pečaćenje fisura i jamica usko je vezana s njihovom postojanošću na površini zuba (26 – 28). No nismo pronašli razlike u vezi s incidencijom karijesa u odnosu prema retenciji. Naše istraživanje razlikovalo se od ostalih zato što je praćenje bilo ograničeno na šest mjeseci; učinak potpunog ili djelomičnog gubitka pečata mogao je biti očitiji tijekom duljeg razdoblja praćenja.

Iako je kriterij za uključivanje bio četiri zdrava prva trajna kutnjaka, takvo stanje možda zapravo nije jamečilo dobro ukupno zdravlje zuba – mišićni zubi mogli su imati karijes. U tablici 1. DMFT je iznosio 4,10 ± 3,16, što je prilično visoko. S pomoću klasifikacije ICDAS II uspješno smo identificirali promjene cakline – od minimalnih promjena boje koje upućuju na demineralizaciju (ICDAS 1 i 2) do karijesnih lezija s malim kvitetima te opsežno uzrastanje cakline (ICDAS > 2). Većina lezija bile su ICDAS 1 i 2, nekoliko ICDAS 3 i ni jedna nije bila iznad ICDAS-a 3.

Smole za pečaćenje fisura i jamica mogu biti učinkovito sredstvo za prevenciju karijesa i tako poboljšati oralno zdravlje djece populacije. Načini u našem istraživanju idu u prilog pečaćenju fisura u jednoj od najvažnijih dobnih skupina koje imaju korist od takvog pristupa prevenciji karijesa (7 – 10, 14 – 19, 28 – 30).

Zaključci

Smole za pečaćenje fisura i jamica učinkovit su preventivni tretman za smanjenje incidencije karijesa tijekom šestomesečnog razdoblja praćenja kod šestogodišnjaka, neovisno o kojoj je od dviju vrsta pečatne smole riječ. U našem istraživanju smola koja se pokazala učinkovitijom, kad je riječ o prevenciji i retenciji, bio je Clinpro© 3M.

Zahvala

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Sukob interesa

 Autori navode da nisu bili u sukobu interesa. Nisu dobili ni proizvode, ni bilo kakvu financijsku potporu od proizvođača smola za pečaćenje.

Doprinos autora: M. A. F.-B., T. de J. S.-M., C. E. M.- S., G. M. – koncept i dizajn istraživanja. R. J. S.-V., Mde L. M.-C. – doprinos analizi i interpretaciji podataka. Napisavši prvi nacrt i odobrivši konačnu verziju, svi su autori dali svoj doprinos kritičkom pregledu rukopisa. Također su ga svi pročitali i složili se s verzijom rukopisa za objavljivanje.
Usporedba smola za pečaćenje fisura i jamica

Zaključak

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MeSH pojmovi: materijali za pečaćenje fisura; zubni karijes; dijete

Ključne riječi: smole za pečaćenje fisura i jamica, oralno zdravlje, karijes

Usporedba smola za pečaćenje fisura i jamica

Ključne riječi:
fisura; zubni karijes; dijete

MeSH pojmovi: materijali za pečaćenje fisura; zubni karijes; dijete
27. Tianviwat S, Chongsuvivatwong V, Sirisakulveroj B. Loss of sealant retention and subsequent caries development. Community Dent Health. 2008 Dec;25(4):216-20.

28. Horuztepe SA, Ergin E, Onen A, Gürgan S. Comparison of Resin Infiltration Technique with Conventional Preventive Applications on Occlusal Fissures: EDS and SEM Analyses. Acta Stomatol Croat. 2020;54(4):382-391.

29. Fernández-Barrera MA, Lara-Carrillo E, Scougall-Vilchis RJ, Pontigo-Loyola AP, Ávila-Burgos L, Casanova-Rosado JF, et al. Study protocol of the cost-effectiveness comparison of two preventive methods in the incidence of caries: a randomized, controlled clinical trial. Medicine (Baltimore). 2019 Jul;98(30):e16634.

30. Garcia IM, Rodrigues SB, Leitune VCB, Collares FM. Antibacterial, chemical and physical properties of sealants with polyhexamethylene guanidine hydrochloride. Braz Oral Res. 2019 Mar 18;33:e019.