ÖZEL GEREKSİNİMLİ ÇOCUKLARDA ORAL SAĞLIĞIN İYİLEŞTİRİLMESİNDE KAZEİN FOSFOPEPTİD-AMORF KALSİYUM FOSFAT BİLEŞİKLERİNİN POTANSİYEL ROLÜ

THE POTENTIAL ROLE OF CASEİN PHOSHOPEPTİDE - AMORPHOUS CALCİUM PHOSPHATE IN HELPING TO ACHIEVE GOOD ORAL HEALTH IN SPECIAL NEEDS CHILDREN

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Özet

Çocukluk döneminde görülen gelişimsel ve edinilmiş engellilik hayat boyunca sürebilmektedir. Bu durum hastanın sosyal kabul edilebilirliğini ve yaşam kalitesini etkilemektedir. Oral hijyenin yeterli ölçüde sağlanamaması dental hastalıkların insidansının artmasına neden olmaktadır. Kazein fosfopeptid- amorf kalsiyum fosfat kompleksinin dental çürükleri kontrol altına alma potansiyeli vardır. Anti-kariyojenik koruyucu etkisini de, demineralizasyonu azaltıp, remineralizasyonu artırarak veya her ikisinin kombinasyonuyla gerçekleştirmektedir.

Bu çalışmanın amacı CPP-ACP kompleksinin günlük kullanımının tükürük pH, tamponlama kapasitesi ve plak pH'sı üzerndeki etkisinin değerlendirilmesidir.

Kliniğe başvuran özel gereksinimli hastalar arasından yaşları 6-12 arasında değişen 10 tane çocuk rastgele seçilmiştir. DMFT, dmft skorları not edilmiş, dinlenme halindekş tükürüğü toplanıp, tükürük pH ve tamponlama kapasitesi GC Saliva-Check Buffer ve plak pH 'sı da GC Plaque Indicator Kit ile ölçülmüştür. Klinik değerlendirmeden sonra, hasta ebeveynlerine 1 ay boyunca günde 2 kez olmak üzere CPP-ACP (GC Tooth Mousse ® Recaldent) kullanmaları belirtilmiştir. 1 ay sonra tükürük ve plak örneklemesi tekrarlanmış ve başlangıç ölçümleriyle karşılaştırılmıştır.

Anahtar Kelimeler: CPP-ACP, tükürük pH, tamponlama kapasitesi, plak pH.

Abstract

Developmental or acquired disabilities are present during childhood or adolescence and last a lifetime. This can affect social acceptability and quality of life. Inability to perform oral hygiene procedures contributes to the increased incidence of dental diseases. The complex formed, casein phoshopeptide-amorphous calcium phosphate (CPP-ACP) has the potential to control dental caries. CPP-ACP should have an anti-caries protective effect, by suppressing demineralization, enhancing remineralization, or possibly a combination of both.

The aim of this study was to evaluate the effects of Casein Phoshopeptide - Amorphous Calcium Phosphate (CPP-ACP) on saliva pH, buffer capacity and plaque pH after regular daily use in disabled children.

A random sample of 10 disabled subjects were selected for the study. Patients were examined using DMFT scores. Resting saliva were collected to determine saliva pH, buffer capacity by GC Saliva-Check Buffer and plaque pH measured by using GC Plaque Indicator Kit. After the clinical examination, patients were told to use CPP-ACP (GC Tooth Mousse ® Recaldent) for one month two times daily. Saliva and plaque sampling were renewed after 1 month. The results obtained were compared with the base-line values.

There was a significant increase in salivary pH and also buffering capacity was notably higher after using CPP-ACP product. Changes related to plaque pH was also recorded. Good oral hygiene, accompanied by early and regular dental examination and treatment will enhance good dental health in intellectually disabled children.

Key words: CPP-ACP, saliva pH, buffer capacity, plaque pH, disabled Children.

Giriş

The AAPD defines special health care needs as "any physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs. The condition may be developmental or acquired and may cause limitations in performing daily self-maintenance activities or substantial limitations in a major life activity".[1] Patients with mental, developmental, or physical disabilities who do not have the ability to understand and assume responsibility for or cooperate with preventive oral health practices are prone to poor oral health. That's inadequate oral health can have a direct and devastating

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impact on the health of those with certain systemic health problems or conditions.[2]

Studies on select populations show that children with special health care needs have both more dental problems and more untreated dental disease relative to other children due to complications like impaired cognitive abilities, behavioral problems, impaired mobility, neuromuscular problems (drooling, gagging and swallowing problems), uncontrolled body movements, gastroesophageal reflux, or seizures which put them at higher risk for developing oral health problems.[3, 4]

Dental caries is common in children with developmental disabilities. Studies have suggested that the diet, or the frequency of sucrose intake, is an important factor for the incidence of dental caries.[5] In addition to problems with diet and oral hygiene, reduced saliva flow contribute to dental caries as well.[6] Saliva is a complex body fluid that provides a general protective function for exposed oral hard tissues and there are several studies which correlate salivary parameters and caries development.[7] Caries activity increases as the viscosity of the saliva increases. Salivary factors, such as salivary flow rate, composition and buffering capacity, might exert protective action on dental surfaces. Enhancing the demineralization capability of saliva is important from the clinical point of view.[8]

Animal and laboratory studies have shown that milk and dairy products have certain anti-cariogenic properties[9,10] and these findings have been supported with the studies in children. According to several review papers suggestions its mainly due to a direct chemical effect of casein phosphopeptides complexed with calcium found in dairy products.[11] The CPP–ACP complex maintains a sufficiently highconcentration of calcium and phosphate ions to promote enamel remineralization. Further, in vitro studies demonstrate that CPP–ACP becomes incorporated into the salivary pellicle and plaque and so provides a rich calcium reservoir with the potential for remineralization.[12]

Therefore, this study was undertaken to evaluate the ability of topically applied CPP-ACP paste (GC Tooth Mousse ® Recaldent) in bringing about changes on saliva pH and buffer capacity, plaque pH after regular daily use in disabled children.

Material and Methods

A prospective study was conducted in total of 10 children with intellectual disabilities between the ages of 6- 12, attending a Special Needs School in Istanbul. Subjects were not included if they had taken antibiotics within 2 weeks and were taking medication affecting salivary flow. Informed consent was obtained from all parents to allow a dental examination and saliva collection after explaining the study protocol to the participant's parents in detail. Both the consent form and the research protocol were approved by the Marmara University Human Subject Ethical Committee.

Clinical assessment of oral hygiene status was done by one pediatric dentist at our department with a mouth mirror while participants seated on dental chair. The participants had no active dental caries or serious periodontal problems.

Prior to the study, all the participants received thorough full mouth oral hygiene care, which included scaling and polishing of tooth surfaces. Then the subjects were instructed to maintain their routine dietary habits and patterns but to refrain from tooth brushing, or other oral hygiene procedures for 48 h prior to the investigation and consume only water in the 2-h before the plaque pH measurement.

After oral examination, plaque pH, saliva pH and salivary buffer capacity of the patients were measured by GC Plaque Indicator Kit® and commonly used Saliva-Check Buffer Kit® (GC Corporation) according to the manufacturer instructions.

The saliva testing procedures always took place between 10 a.m. and 12 p.m., at least 2 hours after breakfast. Saliva was stimulated by chewing parafin wax[13, 14] and then all pH measurements were taken from the buccal surface in the interproximal areas between the lower the first and second premolars and first molar. pH test strips were placed in this area for 10 seconds, and then were checked for the colour of the strip. The pH paper had been designed specifically to function like a series of traffic lights, going from red through to yellow through to green. The colour can be matched directly off to the scale provided, and a red, yellow or green overall result obtained. Highly acidic resting saliva will be in the red section, pH 5.0-5.8. Moderately acidic saliva will be found in the yellow section,

pH 6.0-6.6. Healthy saliva will be in the green section as shown above, pH 6.8-7.8.

While testing buffering, a buffer test strip was placed onto an absorbent tissue with the test side up. Using a pipette, sufficient saliva from the buccal region was drawn, and dispensed one drop onto each of the test pads. Immediately the strip was turned 90 degrees to soak up any excess on the absorbent tissue. The test pads began to change colour immediately and after 2 minutes the final results were available. Then the result was calculated by adding the points according to the final color of each pad: green – 4 points; green/blue – 3 points, blue – 2 points, red/blue – 1 point, red – 0 points. All points were counted and result was determined: 0 – 5 points as very low buffering ability, 6 – 9 points as low, 10 – 12 points as normal/high.

Following baseline measurements, patients parents were told to use topical CPP-ACP paste (GC Tooth Mousse ® Recaldent) on every surfaces of teeth with a toothbrush for one month two times daily.

Saliva and plaque sampling were renewed after 1 month.

Statistical analysis

Statistical analysis of the results of the clinical evaluation between the groups was completed using SPSS 16.0 software (SPSS Inc., Chicago, IL,USA) and the Wilcoxon Matched – Pairs Signed - Ranks Test. A p value < 0.05 was considered to indicate statistical significance.

Results

Baseline and after 1 monthpPlaque pH, saliva pH and buffering capacity values of children are shown in Table 1. As Figure 1 illustrates; after using CPP-ACP product there was an increase in salivary pH and also buffering capacity but not statistically significant, but plaque pH results were statistically significant (p<0,05).

Discussion

Children with disabilities and special needs are at greater risk for oral health problems, require extra help and rely on others to achieve and maintain good oral health. For patients with severe disabilities, mostly priority is given to medical treatment so that oral care is deferred. Dental caries are one of the major problems in children with developmental disabilities and an improved approach to prevention and therapy is needed.[13, 14, 15]

	mean	Std dev	
Plaque pH before CPP-ACP	1,80	± 0,92	n=10
Plaque pH after CPP-ACP	2,50	± 0,71	n=10
Saliva pH before CPP-ACP	7,18	± 0,61	n=10
Saliva pH after CPP-ACP	7,26	± 0,64	n=10
Buffer Capacity before CPP-ACP	1,30	± 0,48	n=10
Buffer Capacity after CPP-ACP	1,60	± 0,52	n=10

Table 1: Baseline and after 1 month Plaque Ph, saliva ph and buffering capacity values

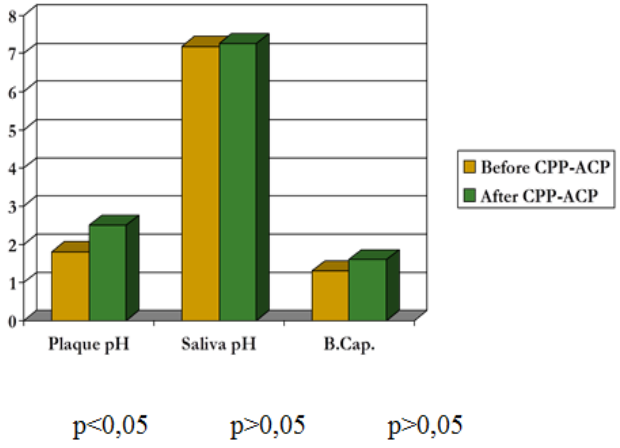

Figure 1. Baseline and after 1 month plaque pH, saliva pH and buffering capacity changes.

A positive correlation between low salivary buffer capacity and caries previouly shown in studies.[3, 16, 17, 18] When salivary pH

was evaluated independent of buffer capacity, it was also found to be an relative indicator of caries.[19,20] Therefore, this study was undertaken to evaluate the ability of topically applied CPP-ACP paste (GC Tooth Mousse ® Recaldent) in bringing about changes on saliva pH and buffer capacity, plaque pH after regular daily use in disabled children. Although the number of subjects investigated in this study was limited, there was an increase in salivary pH and also in buffering capacity which is statistically nonsignificant following CPP-ACP product usage. As caries activity may be related to dental plaque acidogenicity, we also evaluated dental plaque pH activity.[21, 22] And the plaque pH after 1 month results were statistically significant ($p<0,05$). In another study, Caruana et al.,[12] suggest that CPP–ACP delivered in a paste can affect subsequent pH changes in plaque. They evaluated the effect of mousse with and without the CPP–ACP, the outcome of which suggests, at least in the short-term, they found that it has the potential to increase plaque pH levels immediately challenged with carbohydrate intake which is similar with our results.

The potential effects of the presence of CPP-ACP in plaque (reduction in diffusion; inhibition of demineraliza-tion; increase in calcium binding; enhanced remineralization) are mirrored by similar effects from the single most useful anticaries agent, flüoride.[23] Given that CPP-ACP can be incorporated into foodstuffs as well as therapeutic agents and demonstrates none of the adverse effects of fluoride overuse, fluorosis at moderate doses and toxicity at higher doses, it is possible that this product may become an important anticaries agent in the future.[24, 25]

One in vitro study compared the effect of CPP–ACP mouse with fluoride tooth pastes on the reduction of lesion depths in experimentally produced carious lesion.[26] The authors produced artificial caries-like lesions after immersing teeth in a demineralizing solution for 96 h. The effect on lesion depth from CPP–ACP in the form of a tooth paste and topical coating were compared to a fluoridated toothpaste (1100 ppm) and non-fluoridated tooth paste. The fluoridated tooth paste and CPP–ACP containing products significantly reduced the depths of the enamel lesions. The combined effect of the fluoridated tooth paste and the paste containing CPP–ACP had a greater effect. From this laboratory study there is a suggestion that fluoride and CPP–ACP might have a cumulative effect but further work is needed to investigate this in vivo.

Emphasis must be given to developing and implementing preventive protocols for disabled children unable to remove dental plaque through brushing and flossing. Full use must be made of safe, effective, and readily applied chemotherapeutic agents like CPP-ACP, fluoride and chlorhexidine.

In conclusion, the addition of CPP–ACP delivered in GC tooth paste reduced the fall in plaque pH. Tooth Mousse may be effective after meals when the intraoral pH values falls, and/or during sleeping when the benefit of saliva buffer capacity becomes less. Further studies on its short- and long-term effects are needed to evaluate how this potentially protective product is retained in the dental plaque.

Conclusion

Good oral hygiene, accompanied by early and regular dental examination and treatment will enhance good dental health in intellectually disabled children.

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