

MARIA DO SOCORRO RAMALHO GUANABARA ARAÚJO

**AVALIAÇÃO CLÍNICA DO USO DO DIGLUCONATO DE CLOREXIDINA
ASSOCIADO A UM SISTEMA ADESIVO AUTOCONDICIONANTE EM LESÕES
CERVICAIS NÃO CARIOSAS – ESTUDO PILOTO**

Dissertação de Mestrado a ser apresentada ao Programa de Pós-Graduação em Odontologia da Faculdade de Farmácia, Odontologia e Enfermagem da Universidade Federal do Ceará como requisito parcial para a obtenção do título de Mestre em Odontologia.

Área de Concentração: Clínica Odontológica

Orientador: Prof. Dr. Vicente de Paulo Aragão
Saboia

**Fortaleza
2012**

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Aprovada em: 30 de Agosto de Concentração: Clínica Odontológica

BANCA EXAMINADORA

Prof. Dr. Vicente de Paulo Aragão Saboia
Universidade Federal do Ceará - UFC

Prof^a. Dra. Monica Yamauti
Universidade Federal do Ceará – UFC

Prof. Dr. Renato Cilli
Universidade de Fortaleza – UNIFOR

DEDICATÓRIA

A DEUS, minha vida, luz que ilumina meus caminhos, força que recebo para lutar e enfrentar todos os desafios .

Dedico este trabalho à memória do meu inesquecível pai, ANTÔNIO DE SOUSA RAMALHO, e minha mãe, GUADALUPE RAMALHO, por todo amor, dedicação e sabedoria na minha formação e educação e, principalmente, por serem modelos de pessoas de Fé, Humildade, Honestidade e Caráter. Obrigada por tudo que fizeram para possibilitar a realização dos meus sonhos. Amo vocês! Muito Obrigada!

E ao meu esposo, FERNANDO GUANABARA, por seu grande amor, incentivo, exemplo e dedicação à nossa família. Aos meus filhos, FERNANDO, ANDRÉ e ERIK, razões das muitas alegrias e orgulho que uma mãe pode ter com filhos tão bons e maravilhosos e ao meu netinho ARTHUR. Obrigada por compreenderem meu desvio de atenção para dedicar-me a mais uma etapa da minha formação profissional. Amo muito a todos!

A toda minha família, irmãos, sogros, cunhados, sobrinhos, noras, primos e amigos, que sempre me apoiaram incondicionalmente. Vocês são muito importantes para mim!

Dedico este trabalho a vocês!

AGRADECIMENTOS ESPECIAIS

Ao meu orientador, Prof. Dr. Vicente de Paulo Aragão Saboia, por sua simplicidade e grandeza de alma, sabendo conduzir, com muita delicadeza e maestria, própria dos grandes mestres, suas orientandas, a caminhar passo a passo para a concretização dos objetivos traçados. Sinto-me orgulhosa por ser sua colega de turma e, hoje, sua orientanda e por sua amizade. Meu sincero obrigado!

Às amigas Fabianni Magalhães Apolonio, Lidiane Costa de Souza e Lívia Oliveira Barros, pela amizade, dedicação, companheirismo, paciência e disponibilidade. A colaboração imensurável de vocês foi essencial neste trabalho! A convivência com vocês neste momento trouxe-me muito engrandecimento pessoal e profissional. Vocês são exemplos de competência, dedicação e esperança de uma Odontologia cada vez melhor.

Aos colegas e avaliadores, Prof. Francisco Cláudio Fernandes Alves e Silva e Prof. Dr. Emmanuel Arraes Alencar Jr., pela amizade, disponibilidade, atenção e valiosa contribuição.

À Prof^a Dra Lidiany Karla Azevedo Rodrigues, pelo apoio, orientação, incentivo e presteza, na colaboração com a estatística deste trabalho.

Ao Prof. Dr. Francisco Fábio Oliveira, professor de Bioquímica, por toda paciência e disponibilidade em esclarecer inúmeras dúvidas sobre as interações químicas dos produtos analisados.

À Dra. Laura Isabel Nunes Moraes, por disponibilizar seu laboratório e ao Dr. José de Maria Albuquerque de Melo Jr., pela colaboração para a realização da incorporação da Clorexidina, ao adesivo estudado.

A todos os professores do Programa de Pós-Graduação em Odontologia da Universidade Federal do Ceará, pelos valiosos ensinamentos durante o curso de mestrado.

A todos os meus professores da graduação do Curso de Odontologia da Universidade Federal do Ceará, do período de 1982 a 1986, por me transmitirem a base da minha formação em Odontologia e o amor pela profissão.

À Denise Moraes, pelo grande incentivo à realização deste mestrado, e pelo orgulho que tenho de ser sua dentista desde a infância, e vê-la hoje como minha colega de profissão e professora dedicada e competente. Obrigada por ter me motivado a enfrentar este desafio!

Às alunas de Iniciação Científica, Diana Araújo Cunha e Nara Sousa Rodrigues, pela cooperação e pelo tempo dispensado na realização da pesquisa clínica.

A minhas atendentes, Rochelle Lima Costa e Elisângela Santos Silva, pela ajuda na organização da realização da pesquisa clínica.

E, principalmente, tenho muito a agradecer aos voluntários que, com muita boa vontade e confiança, aceitaram participar desta pesquisa.

Aos colegas do curso de mestrado, Fernanda, Eduardo, Walter, Ernest, Patrícia, Raquel, Iracema, Juliana, Karla, Gustavo, Malena e Carolina, pela troca de conhecimentos e experiências, pelos momentos de alegria e descontração. Obrigada!

AGRADECIMENTOS

À Universidade Federal do Ceará, por meio do reitor Prof. Jesualdo Pereira Farias.

À Faculdade de Farmácia, Odontologia e Enfermagem (FFOE/UFC), na pessoa de sua diretora Prof^a. Maria Goretti Rodrigues de Queiroz.

Ao Curso de Odontologia, na pessoa de seu Coordenador Prof. Fabrício Bitu Sousa.

Ao Programa de Pós-Graduação em Odontologia da Universidade Federal do Ceará, na pessoa de sua coordenadora, Prof.^a Dr^a Lidiany Karla Azevedo Rodrigues.

Aos membros da banca examinadora, pela disponibilidade e presteza em avaliar e enriquecer este trabalho.

Às funcionárias da secretaria de pós-graduação em Odontologia da Universidade Federal do Ceará, Lúcia Ribeiro Marques Lustosa, e Janaine Marques Leal pelo auxílio e disponibilidade.

À Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES, através do PROJETO REUNI, pela concessão da bolsa de estudo e a oportunidade da experiência em docência, que foi muito gratificante e enriquecedora.

A todos aqueles que, de forma direta ou indireta, tornaram possível a realização deste trabalho.

***Importante é saber, mas, mais importante do que saber,
é nunca perder a capacidade de aprender.***

Leonardo Boff

RESUMO

Este estudo avaliou o efeito da incorporação de Clorexidina no primer de um sistema adesivo autocondicionante, no desempenho clínico de restaurações de resina composta, realizadas em lesões cervicais não-cariosas (LCNC), imediatamente, após sua confecção e após 6 e 12 meses. Sessenta e cinco restaurações foram realizadas em 22 pacientes com LCNCs. Os dentes foram distribuídos aleatoriamente em 2 grupos: G1 (CSE): o sistema adesivo Clearfil SE foi aplicado na superfície das lesões segundo as indicações do fabricante; G2 (CSE/CHX): o Primer do Clearfil SE contendo 1% de Digluconato de Clorexidina foi aplicado como descrito para G1. Todos os preparos foram restaurados com a resina micro-híbrida Z250 (3M-ESPE). Dois clínicos avaliaram as restaurações logo após a execução (baseline), 6 e 12 meses, usando os critérios modificados do Serviço de Saúde Pública dos Estados Unidos (USPHS). Não houve diferença estatisticamente significativa entre os dois grupos para qualquer dos critérios avaliados.

Conclusão: Os dados deste estudo sugerem que a inclusão de Clorexidina ao primer do sistema adesivo Clearfil SE não apresentou vantagens clínicas no período de avaliação de um ano.

Palavras-chave: Clorexidina, sistema adesivo autocondicionante, LCNC e ensaio clínico.

ABSTRACT

This study evaluated the effect of the incorporation of chlorhexidine into primer of one self-etching adhesive system on the clinical performance of composite restorations placed in non-carious cervical lesions (NCCLs) at baseline and after 6 and 12 months. Sixty-five restorations were placed in 22 subjects being treated for NCCLs. The restorations were randomly placed in two groups: G1 (CSE): Clearfil SE Bond system applied following manufacturer's instructions and G2 (CSE/CHX): as described in G1 but using the Clearfil Primer containing a concentration of 1% chlorhexidine digluconate. Filtek Z-250 composite resin was used as the restorative material for all restorations. Two clinicians evaluated the restorations blindly at baseline, 6 months and 12 months after restoration's placement using the modified United States Public Health Service (USPHS) criteria. No statistically significant difference between the two groups was observed for all criteria available.

Conclusion: The data of this study suggest that the inclusion of chlorhexidine in the primer of the CSE adhesive system did not present clinical advantages in the one-year evaluation period.

Keywords: Chlorhexidine, self-etching adhesive system, non-carious cervical lesions (NCCLs), clinical trials.

SUMÁRIO

1. INTRODUÇÃO GERAL -----	11
2. PROPOSIÇÃO -----	14
2.1 – Objetivo Geral	
2.2 – Objetivos Específicos	
3. CAPITULO -----	16
4. CONCLUSÕES GERAIS -----	31
5. REFERÊNCIAS -----	33
6. ANEXOS -----	35

Introdução Geral

1. INTRODUÇÃO GERAL

A ênfase dada à estética, em odontologia, tem resultado na ampliação do uso das resinas compostas. Com o desenvolvimento e aprimoramento dos materiais restauradores estéticos, os sistemas adesivos tornaram-se elementos fundamentais em diversas aplicações clínicas, sendo responsáveis pela união do material restaurador às estruturas dentárias (CARVALHO, *et al.*, 2004). Enquanto a adesão ao esmalte é duradoura e efetiva (FRANKENBERGER, KRAMER & PETSCHERT, 2000), a união resina-dentina constitui-se um desafio para os pesquisadores, uma vez que este substrato é intrinsecamente úmido e heterogêneo, tornando o procedimento adesivo altamente sensível (HALLER, 2000). A durabilidade limitada dos adesivos dentinários contemporâneos é uma grande lacuna na odontologia restauradora, e tem sido estudada por vários pesquisadores (MJØR, 2000; TAY *et al.*, 2006).

Estudos recentes têm mostrado que a degradação das fibrilas de colágeno pode ser acelerada pela presença de enzimas endógenas, conhecidas como metaloproteinases (MMPs) (PASHLEY *et al.*, 2004; HASHIMOTO *et al.*, 2000; HEBLING *et al.*, 2005; CARRILHO *et al.*, 2007A). As MMPs são um grupo de 23 enzimas cálcio- zinco- dependentes (TJÄDERHANE *et al.*, 1998) capazes de degradar os componentes da matriz extracelular da dentina. A matriz dentinária contém muitas proteínas não colagênicas, nas quais estão incluídos alguns tipos de MMPs: MMP-2, MMP-8, MMP-9 e MMP-20 (MARTIN, VALENZUELA & OVERALL, 2000; SULKALA, *et al.*, 2007). Estas endopeptidases que estão presentes na saliva e na matriz extracelular das células humanas, apresentam atividade metabólica de remodelação e degradação de vários tipos de colágenos, estando envolvidas nos processos de amelogênese e dentinogênese (BOURD-BOITTIN *et al.*, 2005). Após a mineralização do órgão dental, essas enzimas ficam presas às estruturas formadas, permanecendo em estado latente (SULKALA *et al.*, 2002; VAN STRIJP *et al.*, 1992; FUKAE *et al.*, 1991). Situações de desequilíbrio metabólico, como liberação de ácidos no desenvolvimento da cárie, condicionamento ácido prévio à aplicação do adesivo, bem como a acidez, intrínseca dos adesivos

autocondicionantes, podem reativar as MMPs, desencadeando o processo de degradação do colágeno (TJÄDERHANE *et al.*, 1998; CHAUSSAIN *et al.*, 2006).

O Digluconato de Clorexidina é um eficaz agente antibacteriano, de amplo espectro, que tem se mostrado efetivo na inibição de, pelo menos, três tipos de metaloproteinase MMP-2, MMP-8 e MMP-9 (GENDRON *et al.*, 1999). Acredita-se que a clorexidina interaja com os grupos sulfidril e/ou cisteína presentes nos sítios ativos de algumas MMPs (MMP-8) ou, ainda, possa quelar o cálcio presente nos tecidos, inativando outras MMPs (MMP-2 e MMP-9) e inibindo a atividade colagenolítica dessas enzimas (GENDRON *et al.*, 1999).

Alguns estudos têm demonstrado a utilização de Clorexidina (CHX) como inibidor de MMPs, antes ou após o condicionamento total da dentina, em sistemas adesivos convencionais, com o intuito de aumentar a longevidade da adesão a este substrato (HEBLING *et al.*, 2005; CARRILHO *et al.*, 2007A; CARRILHO *et al.*, 2007B; KAMORI *et al.*, 2009). No entanto, poucos estudos utilizam a Clorexidina em sistemas adesivos autocondicionantes, sendo esta aplicada separadamente ao primer, como passo adicional (CAMPOS, *et al.*, 2009; TAY *et al.*, 2006) ou incorporada ao primer do sistema adesivo (ZHOU *et al.*, 2009; ZHOU *et al.*, 2010; ZHOU *et al.*, 2011).

Seguindo essa linha de raciocínio, o uso da CHX, incorporada aos sistemas autocondicionantes, poderia trazer benefícios no tocante à facilidade de execução da técnica e aumento da longevidade das restaurações adesivas.

Proposição

2. PROPOSIÇÃO

O presente trabalho teve como objetivos:

2.1 Objetivo Geral

- Avaliar o efeito da adição de Clorexidina em um sistema adesivo autocondicionante no desempenho clínico de restaurações de lesões cervicais não cariosas.

2.2 Objetivos Específicos

- Avaliar o comportamento clínico das restaurações nos critérios de retenção, adaptação marginal, pigmentação marginal, sensibilidade pós-operatória e cárie secundária, usando o escore USPHS modificado.
- Avaliar o comportamento clínico das restaurações imediatamente após a sua realização e nos períodos de 6 (seis) e 12 (doze) meses.

Capítulo

3. CAPÍTULO

Esta dissertação está baseada no Artigo 46 do Regimento Interno do Programa de Pós-Graduação em Odontologia da Universidade Federal do Ceará, que regulamenta o formato alternativo para dissertações de Mestrado e teses de Doutorado, e permite a inserção de artigos científicos de autoria ou coautoria do candidato. Por se tratar de pesquisas envolvendo seres humanos, ou parte deles, o projeto de pesquisa foi submetido à apreciação do Comitê de Ética em Pesquisa da Universidade Federal do Ceará, tendo sido aprovado (Anexo1). Assim sendo, esta dissertação é composta de um artigo científico que será submetido ao periódico Operative Dentistry, conforme descrito abaixo:

CLINICAL EVALUATION OF CHLORHEXIDINE INCORPORATION IN TWO-STEP SELF-ETCHING ADHESIVE – A PILOT STUDY

ARAÚJO MSRG, SOUZA LC, APOLONIO FM, BARROS LO, RODRIGUES LKA &
SABOIA VPA

CLINICAL EVALUATION OF CHLORHEXIDINE INCORPORATION IN TWO-STEP SELF-ETCHING ADHESIVE – A PILOT STUDY

MARIA DO SOCORRO RAMALHO GUANABARA ARAÚJO¹, LIDIANE COSTA DE SOUZA², FABIANNI MAGALHÃES APOLONIO³, LÍVIA OLIVEIRA BARROS⁴, LIDIANY KARLA AZEVEDO RODRIGUES⁵, VICENTE DE PAULO ARAGÃO SABOIA⁶.

1. Maria do Socorro Ramalho Guanabara Araújo

DDS, MS student – Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Fortaleza, Ceará, Brazil

R. Estefânia Mendes Mota, 455 – São Gerardo – Fortaleza – CE- 60325-140

Tel: +55 85 8726 2165 – msocorro.ramalho@gmail.com

2. Lidiane Costa de Souza

DDS, MS student – Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Fortaleza, Ceará, Brazil

R. Quintino Cunha, 859 – Jardim América – Fortaleza – CE – 60416-104

Tel: +55 85 8836 9992 – lidiane.csouza@yahoo.com.br

3. Fabianni Magalhães Apolonio

DDS, MS, PhD student – Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Fortaleza, Ceará, Brazil

R. Silva Paulet, 665/901R – Meireles – Fortaleza – CE- 60120-020

Tel: +55 85 9955 9413 – fabiani@gmail.com

4. Lívia Oliveira Barros

DDS, MS, PhD student – Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Fortaleza, Ceará, Brazil

R. Estefânia Mendes Mota, 455 – São Gerardo – Fortaleza – CE- 60325-140

Tel: +55 85 8698 2444 – livinhabarros@yahoo.com.br

5. Lidianny Karla Azevedo Rodrigues

DDS, MS, PhD - Associate Professor, Department of Restorative Dentistry - Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Fortaleza, Ceará, Brazil

R. Monsenhor Furtado s/n – Rodolfo Teófilo – Fortaleza- CE – 60430-355

Tel: +55 85 9993 2702 – lidianykarla@gmail.com

6. Vicente de Paulo Aragão Saboia

DDS, MS, PhD - Associate Professor, Department of Restorative Dentistry - Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Fortaleza, Ceará, Brazil

R. Gilberto Studart, 770/901 – Cocó – Fortaleza – CE – 60190-750

Tel: +55 85 8807 4623 – vpsaboia@yahoo.com

Corresponding author

Vicente de Paulo Aragão Saboia

R. Gilberto Studart, 770/901 – Cocó – Fortaleza – CE – 60190-750

Tel: +55 85 8807 4623 – vpsaboia@yahoo.com

CLINICAL EVALUATION OF CHLORHEXIDINE INCORPORATION IN TWO-STEP SELF-ETCHING ADHESIVE – A PILOT STUDY

SHORT TITLE: Chlorhexidine into self-etching primer

CLINICAL RELEVANCE: The incorporation of chlorhexidine into primer of the self-etching adhesive system could improve the performance of composite resin restorations.

ABSTRACT

This study evaluated the effect of the incorporation of chlorhexidine into primer of one self-etching adhesive system on the clinical performance of composite restorations placed in non-carious cervical lesions (NCCLs) at baseline and after 6 and 12 months. Sixty-five restorations were placed in 22 subjects being treated for NCCLs. The restorations were randomly placed in two groups: G1 (CSE): Clearfil SE Bond system applied following manufacturer's instructions and G2 (CSE/CHX): as described in G1 but using the Clearfil Primer containing a concentration of 1% chlorhexidine digluconate. Filtek Z-250 composite resin was used as the restorative material for all restorations. Two clinicians evaluated the restorations blindly at baseline, 6 months and 12 months after restoration's placement using the modified United States Public Health Service (USPHS) criteria. No statistically significant difference between the two groups was observed for all criteria available.

Conclusion: The data of this study suggest that the inclusion of chlorhexidine in the primer of the CSE adhesive system did not present clinical advantages in the one-year evaluation period.

Keywords: Chlorhexidine, self-etching adhesive system, non-carious cervical lesions (NCCLs) and clinical trials.

INTRODUCTION

The most significant frailty in present day dentin adhesives is the fact that they have a limited duration^{1,2}, since dentin bond strength values measured promptly after formation of the bond do not always have a correlation with lengthy stability³ as degeneration throughout the denting bonding interface occurs swiftly⁴.

The adhesion degeneration over time occurs probably due to hydrolysis of both the resin and collagen⁵. The latter is provoked by metalloproteinase (MMP) enzymes in both saliva and dentin⁶ which may promote matrix degradation to slow the progression of caries through removal of the dentinal collagen exposed by demineralization⁷. The MMPs consist of a group of 23 enzymes zinc- and calcium-dependent that present the metabolic activity of remodeling and degradation of various types of collagens⁸. Human dentin encloses at least MMP-2, MMP- 8, MMP-9 and MMP-20^{8,9}.

Chlorhexidine has been widely used for cavity cleaning after performing cavity preparation for dentinal disinfection to reduce the bacterial count¹⁰. Another important aspect that has recently become the goal of more in-depth studies is that in addition to its antimicrobial capacity, chlorhexidine has a hindering action on metalloproteinases (MMPs)^{8, 11, 12} significantly enhancing the integrity of the hybrid layer in the course of time¹³.

It has been shown that simplified etch-and-rinse adhesives¹⁴ and self-etching adhesives¹⁵ have moderate acidity and are capable of releasing and activating endogenous MMPs during dentin bonding, which are thought to be responsible for the manifestation of thinning and vanishing of collagen fibrils from incompletely infiltrated hybrid layers in aged, bonded dentin¹⁵. The activity of MMPs can be covered up by protease inhibitors¹¹ denoting that MMP inhibition may be beneficial in the preservation of hybrid layers.

Non-carious cervical lesions (NCCLs) are often used to clinically evaluate the performance of adhesive restorations, because of the large dentin area and assuagement of visual examination^{16,17}. This study evaluated the effect of incorporation of Chlorhexidine into primer of one self-etching adhesive system on the clinical performance of composite restorations placed in NCCLs at baseline and after 6 and 12 months. The null hypothesis tested was that the incorporation of

Chlorhexidine would not affect the clinical performance of composite restorations placed in NCCLs.

MATERIALS AND METHODS

A total of 65 restorations, in a period of a month, were placed in 22 subjects (8 males and 14 females; age range 25-60 years) being treated for non-carious cervical lesions (NCCLs). Patients with medically compromised history, periodontal diseases, orthodontic treatment, extreme caries risk, xerostomy and heavy bruxism, as well as pregnant patients were excluded from the study. In addition, all restored teeth had a normal occlusion relationship with the opposite teeth. The subjects had at least 2 vital teeth with NCCLs that required restoration on the buccal surfaces of premolars, canines or incisors (minimum depth = 1 mm; minimum mesiodistal width = 2 mm) and be able to return for subsequent follow-up examination. Prior to participating in the study, all patients signed a written informed consent form.

This clinical trial protocol was reviewed and approved by the Federal University of Ceará Committee for Ethics in Human Subjects (Nº 95/10). One experienced operator placed all restorations. Plaque-covered lesions were cleaned preoperatively with a flour of pumice and water in a rubber cup (no. 8040RA and no. 8045RA, KG Sorensen, Barueri, São Paulo, Brazil). Operative procedures were performed without local anesthesia and the teeth were isolated with cotton rolls and gingival barrier (Top dam, FGM, Brazil). Cavo-surface angles were not beveled, and no additional retention grooves were placed.

A two-step self-etching adhesive system, Clearfil SE Bond (Kuraray, Osaka, Japan), was used for this study. For the chlorhexidine (CHX) incorporation, 50 µl of 20% chlorhexidine digluconate (Cadila Pharmaceuticals, Índia) were added directly to the 950 µl Clearfil SE primer to form a mixture containing a concentration of CHX 1.0 wt%. The composition of the Clearfil SE Bond can be seen in Figure 1.

The restorations were randomly placed in two groups, according to the following protocol:

Group 1 (CSE): Clearfil SE Bond self-etch adhesive system - Primer was applied to the lesions surfaces for 20 s and gently air dried for 5 s. Bond was applied, air thinned and light-cured for 10 s.

Group 2 (CSE/CHX): Clearfil SE primer containing a concentration of 1% chlorhexidine digluconate was applied as described for Group 1. Bond was applied, air thinned and light-cured for 10 s.

Filtek Z-250 composite resin (3M ESPE) was used as the restorative material for all restorations. The proper shade of composite was determined by using a shade selection guide (Filtek Z250 shade guide, 3M ESPE). The composite was placed in at least two 2-mm-thick increments, which were light-cured individually for 20 s each using light curing unit operating at 1250 mW/cm² (Emitter B Schuster - Brazil), maintaining the light-guide tip at a distance of 1 mm from the composite surface.

The restorations were immediately finished with a flame-shaped, 12-fluted carbide finishing burs and polished with slow-speed polishing points (Jiffy Polishers, Ultradent, South Jordan, UT, USA) and aluminum oxide disks in decreasing abrasiveness (Sof-Lex, 3M ESPE, St Paul, MN, USA). A total of 65 restorations were placed, with 32 in group 1 and 33 in group 2. All the restorative procedures were randomized in each patient, following the inclusion criteria for this clinical trial, as previously described. The groups are summarized in Figure 2.

Two clinicians evaluated the restorations blindly at baseline (immediately after insertion), 6 months and 12 months after placement using the modified United States Public Health Service (USPHS) criteria (see Figure 3). To help with the evaluation, intraoral color photographs were collected at baseline and at the recall appointments. Clinical photographs consisted of digital images obtained using a Nikon D 90X camera with a 18-105-mm Medical Nikon lens (Nikon Inc, Melville, NY, USA). Retention, secondary caries, marginal staining and marginal adaptation were evaluated using a mirror, a probe and air blast. Pre and postoperative sensitivity were recorded as absent (Alpha, A) or present (Charlie, C), if the tooth was sensitive to a 5 s air blowing applied directly at 3 cm from the restoration site. For retention, the restorations were evaluated as retained (A) or missing (C). Marginal staining was recorded as absent (A), superficial staining (Bravo, B) or deep staining (C). Marginal adaptation was recorded as undetectable margin or slight detectable step (A), detectable gap (B) or obvious gap or fracture (C). Secondary caries was also recorded as absent (A) or present (C).

Cumulative failure percentage was calculated as follows: Cumulative failure % = $[(PF+NF)/(PF+RR)] \times 100\%$, where PF is a number of previous failures before the current recall; NF the number of new failures during the current recall; RR is the number of restorations recalled for the actual recall.

Statistical analysis

Mann-Whitney was used to determine the statistical differences in clinical data between the groups. For differences between the time intervals, data were analyzed using Kruskal Wallis followed by Student-Newman-Keuls. Significant level was set at 5% ($p < 0.05$).

RESULTS:

All twenty-two patients were evaluated at the 6-month recall. Two patients, with 2 lesions each, could not be evaluated at the 12-month recall due to non attendance (98.9% recall rate).

The number of retained restorations, restorations that had undetectable margins and restorations that had no marginal staining is shown on Table 1. No statistical difference was found for the evaluated criteria, both on the intra-group and inter-group comparisons. The cumulative fail rate was of 0% for group 1 and 13% for group 2, given that for the latter group three restorations were lost after 6 months and 1 restoration was lost after 12 months.

Remaining clinical variables

None of the restorations showed postoperative sensitivity or secondary caries and all of the retained restorations were clinically and aesthetically acceptable.

DISCUSSION

Most of the preview studies had applied chlorhexidine in etch-and-rinse adhesives and used chlorhexidine as an additional primer, in which a chlorhexidine solution was applied after or prior to the acid etching step^{13, 18-20}. Only a few studies applied chlorhexidine in self-etching adhesives, in which chlorhexidine was also used as an additional separately applied primer²⁰. The present study was the first one to

evaluate the clinical use of the chlorhexidine incorporated directly into the primer of one adhesive system.

The incorporation of MMP-inhibitors into primers or adhesives has several potential limitations: the incorporated MMP-inhibitor might affect the bond strength of dentin adhesive; the incorporated MMP-inhibitor might leach from the cured dentin hybrid layers and its MMP-inhibitory effect might be weakened; during acid-etching, the MMP-inhibitor might be affected by the released calcium ions^{21, 22}.

It has been reported that even at very low concentrations, chlorhexidine possesses desirable MMP-inhibitory properties¹². Chlorhexidine at concentrations as low as 0.03% can completely inhibit MMP-2 and MMP-9 gelatinase activity¹². However when chlorhexidine incorporated into the primer is applied, higher concentrations of chlorhexidine should be more effective, since the concentration of chlorhexidine will decrease over time and its MMP-inhibitory effect will be weakened²³. In the present study, it was used chlorhexidine digluconate at 1.0% w/w concentration. This concentration was the same of the study of Zhou *et al.* (2009), in which they conclude that chlorhexidine was able to preserve dentin bond for at least 1 year when concentration of chlorhexidine in the adhesive primer was 0.1% or higher²³.

Clinical effectiveness of adhesive systems is ideally conducted in Class V non-carious cervical lesions (NCCL) as recommended by the ADA²⁴. Such lesions are preferred because: (a) cervical lesions do not provide any macromechanical retention, therefore ineffective bonding will result in loss of the restoration; (b) the restoration contains both enamel and dentin margins; (c) they are usually located on the buccal aspect of anterior and premolar teeth, thus offering good access for operative procedures and subsequent evaluation by direct visualization or replication; (d) restorative procedures are relatively easy and minimal, thus reducing the operator variability; (e) lesions are widely available and are seen in multiple teeth, thus facilitating patient selection and study design²⁵; and (f) the mechanical properties of the composite resin are less important to the outcome than the actual performance of the adhesive²⁶.

Clearfil SE Bond has been described many times in laboratory and clinical researches as a gold-standard self-etch adhesive²⁷⁻²⁹. One study of 8-year clinical survival of NCCL restorations placed with Clearfil SE Bond³⁰ showed that it largely surpasses the durability of bonds made with this adhesive to sound dentin as

reported from laboratory studies^{31,32}. Clearfil SE Bond contains a highly hydrophilic 10-methacryloxydecyl dihydrogen phosphate (10-MDP) monomer, which is readily adhered to Ca^{2+} ions released upon partial dissolution of hydroxyapatite. These ions diffuse within the hybrid layer and assemble MDP molecules into nano-layers, a process that is driven by MDP-Ca salt formation. It was suggested that such nano-layering at the MDP/HAp interface may provide multi-functional properties to the interface with, in particular, direct benefit to bond durability³³. Indeed, the strong hydrophobic nature of the nano-layered structure may help to protect the formed hybrid layer against biodegradation³⁴. On the other side, it has been claimed that the association MDP-HEMA may increase the hydrophilicity of CSE making it more susceptible to hydrolysis³⁵.

In the present study, no significant statistical differences were found among the groups in the any evaluated time-periods. However, the loss of 4 restorations after 12 months in the second group represents a cumulative fail rate of 13% in contrast with 0% in the first group, which shows a higher tendency to failures in the group where chlorhexidine was added to the primer. This can be explained through two factors: (1) inhibition of the formation of the link MDP-Ca due to the competitive action of the chlorhexidine by the hydroxyapatite and (2) the addition of water in the primer composition, which may have modified its physic-chemical properties.

The precise action mechanism of the chlorhexidine still remains unclear. It is suggested that this cationic agent could compete with the receptors of the MMPs, which should be filled with ions such as calcium or zinc for its activation³⁶. As a result, the collagenolytic activity over the collagen fibrils is significantly reduced when they are pre-treated with chlorhexidine¹³. However, due to its cationic characteristic, chlorhexidine is also capable of connecting itself through electrostatic force to phosphate grouping present on the hydroxyapatite of the dentinal tissues adjacent to the restoring material, thus competing with the calcium ions for the union site³⁷. This process might inhibit MDP-Ca salt formation which may have contributed for the loss of retention of the restorations done with Clearfil Se Bond added to CHX.

According to Clearfil SE Bond manufacturer's, the dentin need not be "moist" when it is applied, since it has water in its composition. However, the incorporation of chlorhexidine digluconate added to water in the primer, the more water present in the dentinal tubules, can lead to interference in the formation of hybrid layer. Moreover, the polymerization of Clearfil SE Bond depends on water evaporation after priming³⁸,

which could be compromised by the addition of more water to the primer, resulting in adhesion shortfall.

The restorations loss over the course of the study indicates that bonds were formed initially but they were unable to withstand either mechanical fatigue or hydrolysis over time. Even though studies show that the reduction of the enzymatic degradation effects may be granted with the incorporation of chlorhexidine^{39,40} to the adhesion protocols to the healthy dentin, the hydrolytic degradation still has significant effect, and maybe predominant, on the deterioration of the resin-dentin union, especially in cavities with no margins established for the enamel³⁶, such as NCCL.

Laboratory studies^{23, 39} show that the inclusion of chlorhexidine to the primer of the adhesive system CSE improved or simply did not interfere in the union resistance of the resin/dentin interface. The cumulative failure rate observed in the present study for Group 2 can be related to the modification of the primer by the addition of chlorhexidine as well as with significant morphological and structural differences between the bonding substrate used in vitro testing versus the substrate encountered in NCCL⁴¹. These differences qualify NCCL as a hostile substrate for bonding, yielding bond strengths that are usually lower than those obtained in normal dentin⁴².

CONCLUSION:

The data of this study suggest that the inclusion of chlorhexidine to the primer of the adhesive system CSE did not show clinical advantages in the period of one year of evaluation. It rather, to a certain extent, compromised the retention of those restorations. However, new studies adding CHX in the form of acetate or other MMPs inhibitors, to the composition of self-etching adhesives systems, as well as clinical studies of longer duration should be performed.

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Annexes

Clearfil SE Bond	
Primer 10-Metacriloloixidecil dihidrogênio fosfato (MDP), 2- hidroxietil metacrilato (HEMA), dimetacrilato hidrofílico, di- canforoquinona, N,N-dietanol-p- toluidina, água	Adhesive 10-Metacriloloixidecil dihidrogênio fosfato (MDP), Bisfenol Glicidil diMetAcrilato, (bis-GMA), hidroxietil metacrilato (HEMA), dimetacrilato hidrofóbico, di- canforoquinona, N,N-dietanol-p-toluidine, sílica coloidal silanizada

Figure 1 - Adhesive system composition

GROUP	ADHESIVE SYSTEM	N	CHX 1,0 %	PROTOCOL
1	CLEARFIL BOND	32	NO	Primer was applied to for 20s and gently air dried for 5 s. Bond was applied, air thinned and light-cured for 10 s.
2		33	YES	

Figure 2: Division of groups

CATEGORY	ACCEPTABLE	UNACCEPTABLE	CRITERIA
Retention	Alfa		Retained
		Charlie	Missing
Marginal Staining	Alfa		Absent
	Bravo		Superficial staining (removable, localized)
		Charlie	Deep staining (not removable, generalized)
Marginal Adaptation	Alfa		Undetectable margin or slight detectable step
	Bravo		Detectable gap
		Charlie	Obvious gap or fracture
Post Operative Sensitivity	Alfa		Absent
		Charlie	Present
Secondary Caries	Alfa		Absent
		Charlie	Present

Figure 3: Modified U.S. Public Health Service (USPHS) criteria for clinical evaluation.

Table 1: Results of clinical evaluation of retention, marginal adaptation and marginal staining for groups at 6 and 12 months

Group 1: Clearfil SE	Retention			Marginal Adaptation			Marginal Staining		
	n	Alfa	Charlie	n	Alfa	Bravo	n	Alfa	Bravo
Baseline	32	32 (100%)	0	32	32 (100%)	0	32	32 (100%)	0
6 months	32	32 (100%)	0	32	27 (84,37%)	5 (15,63%)	32	32(100%)	0
12 months	30	30 (100%)	0	30	23 (76,66%)	7 (23,34%)	30	30(100%)	0
Group 2: Clearfil SE+CHX	Retention			Marginal Adaptation			Marginal Staining		
	n	Alfa	Charlie	n	Alfa	Bravo	n	Alfa	Bravo
Baseline	33	33(100%)	0	33	33 (100%)	0	33	33 (100%)	0

Conclusões Gerais

4. CONCLUSÕES GERAIS

Da avaliação dos resultados obtidos neste trabalho, pode-se concluir que:

Os dados deste estudo sugerem que a inclusão de clorexidina ao primer do sistema adesivo Clearfil SE não apresentou vantagens clínicas no período de avaliação de um ano.

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Anexos
