
CHLORHEXIDINE USE AT DENTISTRY

José Roberto de Magalhães Bastos¹
Priscila Ariede Petinuci Bardal²
Roberta Francisca Martins de Castro²
Haroldo José Mendes²
Fabiano V. Vilhena²

¹DDS, Ms, PhD.,
Chair Professor, at
the Department of
Community Health,
Bauru Dental School,
University of São
Paulo, Brazil

² DDS, graduation
student at the
Department of
Community Health,
Bauru Dental School,
University of São
Paulo, Brazil

BASTOS, José Roberto de Magalhães et al. Chlorhexidine use at dentistry. *Salusvita*, Bauru, v. 23, n. 1, p. 15-24, 2004.

ABSTRACT

*Diseases prevention and health promotion have been standing out in modern Dentistry. Biofilm control still is a major challenge to clinicians, independently of treatment that will be done. Success during and after treatment is related to professional care and to patient cooperation. Mechanic methods to maintenance of oral hygiene cannot be substituted, but, sometimes, it is difficult or even impossible to control biofilm suitably. At these cases, appropriated use of chemistry agents should be a good alternative as co adjuvant in different treatments. Chlorhexidine is the product that has been showing best clinics results at biofilm control when compared to others topical antimicrobial agents. Chlorhexidine has different applicability since it can be used as a surface and root canal disinfectant and effective antimicrobial at biofilm control, gingivitis and periodontal disease prevention and treatment, control of *S. mutans* colonization, caries prevention and prevention of possible systemic infection for bacteria that could occur after simple proceedings like suture removal. Chlorhexidine gluconate should be used for prevention or therapeutics at different presentations like solution, varnish, sub-gingival solution, intra oral gadgets, and others. Protocol of concentration and period of application vary according the use and it must be proposed according to individual needs of each patient.*

Received on: October 24/2003
Accepted on: February 25/2004

KEY WORDS: chlorhexidine, dental plaque, prevention and control, dentistry

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

INTRODUCTION

Analyzing Dentistry in present context, it must be consider an alteration of the practices in concern of the health/disease relationship. Focus on disease prevention and health promotion has been directing actions at different dentistry specialties. One of the major challenges to dentists has been controlling of biofilm (bacterial plaque), which is necessary to obtain satisfactory results during and after therapy, considering as much caries or periodontal diseases.

There are many ways of oral health promotion and maintenance through biofilm control. Mechanic methods as efficient tooth brushing with toothpaste and flossing are able to promote a correct biofilm control. Cury (1999) have stressed the need of prescribing chemical agent anti-plaque use to patients who have problems in maintain a correct mechanic control of biofilm. Others authors have considered chemical control of biofilm as co-adjuvant of mechanical control and have considered the possibility of short periods of replacing mechanical control by chemical control, according with each case/patient (CURY, 1999).

BIOFILM CONTROL AT DIFERENT DENT

Some substances have been analyzing in vivo and in vitro with the aim of control biofilm. Scientific literature has described chlorhexidine (CHX) as the product that shows better clinical results when compared to other topical antimicrobial agents (FEIST et al., 1989; CRIVELLO JUNIOR et al., 1996; SILVA; ALVES, 2000).

Caries and periodontal diseases are the most important diseases at Dentistry. Due the bacteria origin of them, it is reasonable that chemical agents should be used to combat them. Furthermore, these agents could help at cases in which individuals are not able to maintain an adequate biofilm control by mechanic methods (Carvalho et al., 1991).

Controlling biofilm and reduction of *Streptococcus mutans* levels are the more accurate, best documented and normally indicated use of CHX (DELILBASE et al., 2002; RIBERO; BUSSADORI, 2000). Chlorhexidine is bactericidal when used in high concentration

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

due its cell membrane penetration ability and subsequent cell cytoplasm precipitation. It offers a bacteriostatic environment when used in low concentration and acts interfering at inter-membrane transportation and allowing low molecular weight substances to enter at cell (bacterium). In the oral cavity, it is adsorbed to glycoproteins by reversible electrostatic linking and it is slowly release. This process is called substantivity (KONIG et al., 2002). The effectiveness of CHX was confirmed by research of Løe and Schiot in 1970, when two daily oral rinses had effectively prevented biofilm formation. Good results of this study have opened a discussion about the possible use of CHX in toothpaste composition. However, although there are toothpastes with CHX in market, studies shows that it presents a reduced activity when present at this way. It is supposed that CHX should interact with surfactants of toothpaste and that it should have some competition between CHX and toothpaste calcium for retention places at oral cavity. Beyond controversy about its effectiveness when present at toothpaste formula, cost-benefit of this application is questionable due to collateral effects of CHX, especially teeth pigments impregnation (FLOTRA, 1973).

Chlorhexidine have been used at different presentations for controlling dental plaque. In Brazil, CHX is more frequent found in oral rinses solutions, 0.12% concentration, but it is also used in 0.20% concentration. Gel of CHX is another presentation of product that is found in different concentrations, which vary from 0.12% to 0.20%. A topical application is made when gel is used. This treatment is recommended in cases when patient cannot make oral rinses, like patients that do not leave bed at hospital, special patients and others. Controlling of sub-gingival plaque could be done with local irrigation of 0.02% - 0.20% CHX (CAIELLI et al., 1995; FAYLE et al., 1992).

Other method of controlling sub-gingival plaque is implantation of a biodegradable controlled release (chip) of CHX after root cleaning and polishing. This chip helps controlling biofilm and reducing probe deep (MACHADO et al., 2002a).

Application of CHX varnish at enamel pits and fissures is a less diffused use. Schaeken et al., 1994, have used 40% CHX varnish and found significant reduction of mutants at fissures previously selected after two days. There were no mutant's re-colonization and there were others less sensibly streptococcus colonization. When fluoride varnish and CHX gel were compared, besides both of them had showed effects on reducing mutants levels, there have been a little advantage to fluoride (RIBEIRO; BUSSADORI, 2000). However, when CHX is compared with other

mouth rinses, the varnish superiority is generally comproved (EMILSON, 1994).

Given that reduction of mutants levels by CHX action is confirmed and that adverse reactions for CHX are local and reversible, an appropriated group of individual to receive CHX benefits are pregnant women. CHX use would prevent, at this group, baby premature contamination by mutants. Additionally, its use would give better health conditions for the mothers (BASTOS; HEINTZE, 1996; KOHLER et al., 1984).

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

SURGERY

Among the different utilities of CHX in dentistry practice, one is the use in pre and post surgery intervention. CHX could be use since preparation of surgery, at staff hands and patient extra oral anti-sepsis (concentration: 4%), at intra oral antiseptis (concentration: 0.12%-0.20%) and at pos surgery phases, at different concentration, in order to promote treatment success. Baraldi et al., 1998, affirmed that it is usual to indicate 0.12% CHX mouth rinses to oral fractured patients. However, considering different surgery intervention usually made at oral cavity, standing out tooth extraction, Aranega et al., 1999, showed that intra oral suture removal could cause transitory bacteraemia at 5% of patients. It is a special risk to patients with prior history of endocarditic or cardiac valves implantation. Authors affirmed that CHX given before tooth extraction had made possible a better capillary and fibroblastic neoformation at dental alveoli and that the use of this substance before suture removal had reduced significantly bacterian contamination on suture thread surface.

ENDODONTICS

Root canal treatment and endodontic therapy success depends on microorganism control by biomechanic proceedings. Due to anatomic complexity of root canal system, dentinal tubes may not be reach peached by mechanical instrumentation and some bacteria must be found at these place. Intracanal irrigation may help cleaning root canal system when done with antimicrobial, organ tissue soluble and lubricant and periapical tissue non toxic substances. CHX has been used to irrigate root canal system and has showing a high success level. Results have showed that different concentrations

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

CHX is similar or superior comparing with sodium hypochloride (NaOH) in respect of antimicrobial control, with advantage of not causing any problem to periapical tissue. CHX destroys microorganisms instantly, like NaOH, however CHX has showed other advantage related with NaOH: it shows substantivity, or, CHX has some residual effect and CHX intracanal dressing acts for longer time when compared to NaOH. CHX alone do not dissolve organic tissues, but it may be associated with another agent, like NaOH. There are some speculation that CHX gel may facilitate instrumentation and this formulation would be superior than organic tissue solve inability (FERRAZ et al., 2001; FRENTZEN et al., 2002; JEANSONNE; WHITE, 1994).

ORTHODONTICS

Seeking for functional or esthetic orthodontic therapy has increased during past decades. Orthodontics has turned more accessible to people. Effective control of biofilm in intra oral fixed appliances patients may suffer some limitations (GARIB et al., 1997; HEINTZE, 1996).

Brightman et al., 1991, have concluded that patients under orthodontic therapy who had developed gingivitis showed plaque (64.9%), gingival (60.0%) and bleeding gingival (77.2%) index reduction after 0.12% CHX mouth rinse twice a day during three months. Authors have considered CHX as an alternative agent to reduce gingival incidence.

Júnior et al. (1996) have founded similar results. They have observed orthodontic patients during three months and have founded significant gingival bleeding reduction in the group with had used 15 ml 0.12% CHX mouth rinses twice a day.

According to Heintze (1996), motivating orthodontic patients to attain a correct oral hygiene must be constant. Author have considered basic prevention in orthodontics the following proceedings: oral hygiene with fluoride toothpaste, interdental toothbrush and Superfloss use, professional plaque removal, CHX varnish application at risk surfaces (2 or 4 times a year) and patient awareness about an adequate diet.

If orthodontic patient have showed high mutants level, antibacterial treatment with CHX is indicated. Application 6 times during 2 days of 1% CHX gel have gave good results in reducing mutants level. One single application of CHX gel have not showed efficacy, but tooth brushing with CHX gel have been considered yet less effi-

cient, according to Heintze, 1996. Another possibility pointed by this author is application of CHX varnishes at risk surfaces (rounding brackets), which would maximize the CHX substantivity. Author has cited some examples of varnishes, like Cervitec, Chlorzoin and Ec 40, which have showed best long-term effect. There is some evidence that preventive treatment using CHX varnishes should give best results related to mouth rinses and gel use. There is no interaction between fluoride and CHX varnish and both could be applied at same visit (HEINTZE, 1996).

Cetilpiridine chloride has not showed interference on CHX action mechanism. According to Garib et al., cetilpiridine chloride chemically associated with CHX could even increase CHX power. Authors have evaluated dental plaque and gingivitis reduction with 0.12% CHX and 0.05% cetilpiridine chloride mouth rinses. They have founded that both mouth rinses have reduced significantly plaque and gingival bleeding index. When cetilpiridine chloride have been used alone, there were 23.6% and 55.9 % plaque and gingival bleeding index reduction, respectively; however, when it has been associated with CHX, these values had raised to 52.2% and 62.9%, respectively.

An orthodontic patient with fixed appliance may take about 10 minutes to have a satisfactory oral cleansing. A good hygiene demands patient discipline and cooperation during orthodontic therapy (HEINTZE, 1996). When patient is a teenager, dentist may found difficult to create and to maintain patient awareness on the need for preventive a self-care. Garib et al., 1997, have verified better plaque index reduction in cooperative patients compared to non cooperative patients, independently of mouth rinse used to control biofilm. However, chemical agents should not be uniformly indicated to all patients, which may occur with mechanic agents (CURY, 1999). Dentist should evaluated individual caries and periodontal disease risk before selecting strategies to maintain patient oral health during orthodontic therapy.

Considering CHX efficacy, its use should be established in cases where there is high caries or periodontal disease risk and/or need of an auxiliary to mechanic method. CHX is usually used as 0.12% or 0.20% CHX mouth rinses twice a day, during 15 days. This therapy is repeated after 3 months, while orthodontic therapy takes place. It is a viable, efficient and collateral effects reversible method to control biofilm and consequently to warrant patients oral health (BRIGHTMAN et al., 1991; CARVALHO et al., 1991; CRIVELLO JUNIOR et al., 1996).

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

SPECIAL PATIENTS

To take care of patients must be a more complex attitude to doctors or dentists than only trying to solve patient's pain problem or any other inconvenient. Health promotion must be a guide to all practices related to patients. Under this point of view, patients with special needs may receive special attention, because they usually have oral diseases manifestation correlated to their systemic diseases.

Machado et al. (2002b), have approached correlation between periodontal disease and systemic diseases and biofilm control importance in hospital patients, who are unable to make oral hygiene by themselves. In this case, it is very important the use of 0.12% CHX to biofilm control and subsequently gingivitis and periodontal disease control, as well to decrease systemic contamination risk by high bacteria levels and bacterial products.

Oral complications in patients under chemotherapy or radiotherapy are common. For this reason, oral health care before and after treatment against cancer is very important. One focus is on biofilm control or gingivitis treatment. Joyston-Bechal (1992), have stated that patient with natural teeth should use 0.20% or 0.10% chlorhexidine gluconate solution twice a day in the week before cancer treatment.

Concentration of solution varies according to mucositis severity. They have recommended periodontal disease long-term treatment and control. Beyond it is possible to use CHX mouth rinses, Lopes et al. (1998) have recommended topical CHX gel application to avoid secondary infection in these patients. Some cases may request CHX gel application during 5 minutes for 14 days each three month.

Considering the number of CHX indications in dentistry (CARVALHO et al., 1991; FERRAZ et al., 2001; HEINTZE, 1996; PAVARINA et al., 2003), it is recommended that its reasonable use as treatment adjuvant, either as prophylaxis or therapy. Dentists must evaluate individual needs and conditions of each patient.

RESUMO

As práticas de prevenção de doenças e promoção de saúde têm tido especial destaque na Odontologia atual. Independentemente do tratamento especializado a ser realizado no paciente, o controle da placa bacteriana tem sido ainda o grande desafio para o cirurgião dentista. Alcançar o sucesso trans e pós-tratamento implica tanto

*em cuidados profissionais quanto na colaboração por parte dos pacientes. Os métodos mecânicos para manutenção da higiene oral são imprescindíveis, entretanto, em algumas circunstâncias, há impossibilidades ou dificuldades de se manter um grau satisfatório de controle da placa. Nesses casos, a utilização racional de agentes químicos seria uma alternativa promissora como coadjuvante nos diversos tratamentos. A clorexidina tem sido o produto que tem apresentado melhores resultados clínicos no controle da placa, quando comparada a outros agentes antimicrobianos tópicos. A aplicabilidade desta substância abrange desde função desinfetante de superfícies, de canais radiculares, até a atuação como antimicrobiano eficaz no controle de placa dentária, na prevenção e tratamento de gengivite/periodontite, controle da colonização por *S. mutans*, prevenção de cáries e até possíveis bacteremias advindas de procedimentos como uma simples remoção de sutura. O Gluconato de clorexidina pode ser utilizado profilática e/ou terapêuticamente, em forma de solução para bochechos, verniz, gel, irrigação subgengival, dispositivos intraorais de liberação lenta, entre outros veículos. O protocolo referente às concentrações e periodicidade de aplicação variam conforme a especialidade odontológica envolvida e deve ser proposto de acordo com as necessidades individuais de cada paciente.*

PALAVRAS-CHAVE: clorexidina; placa dentária; prevenção e controle; odontologia

BASTOS, José Roberto de Magalhães et al. Chlorhexidine use at dentistry. *Salusvita*, Bauru, v. 23, n. 1, p. 15-24, 2004.

BIBLIOGRAPHIC REFERENCES

1. ARANEGA, A. et al. Clorexidina e fio de sutura: influência da antiseptia com clorexidina sobre a contaminação bacteriana em suturas com fio de poliéster. Estudo microbiológico e histomorfológico em ratos. *RGO*, Porto Alegre, v. 47, n. 2, p. 71-4, 1999.
2. BARALDI, V. et al. O uso da clorexidina no pré e pós-operatório em cirurgia buco-maxilo-facial. *Rev Inst Cienc Saúde*, São Paulo, v. 16, n. 2, p. 123-127, 1998.
3. BASTOS, J. R. de M.; HEINTZE, S. D. Prevenção primária-primária. *Jornal da ABOPREV*, Rio de Janeiro, v. 7, p. 14, mar./jun. 1996.
4. BRIGHTMAN, L. J. et al. The effects of a 0.12% chlorhexidine gluconate mouthrinse on orthodontic patients aged 11 through 17 with established gingivitis. *Am J Orthod Dentofacial Orthop*, Illinois, v. 100, n. 4, p. 324-329, out.1991.

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.

5. CAIELLI, C.; MARTHA, P. M.; DIB, L. L. Seqüelas orais da radioterapia: atuação da odontologia na prevenção e tratamento. *Rev Bras Cancer*, Rio de Janeiro, v. 41, n. 4, p. 231-241, out./dez. 1995.
6. CARVALHO, L. E. P. et al. Clorexidina em odontologia. Uso do gluconato de clorexidina no controle da placa bacteriana. *RGO*, Porto Alegre, v. 39, n. 6, p. 423-427, nov./dez. 1991.
7. CRIVELLO JUNIOR, O. et al. Efeitos de bochechos de clorexidina na saúde gengival em pacientes portadores de aparelhos ortodônticos. *Periodontia*, Rio de Janeiro, v. 5, n. 3, p. 309-311, jan./jun. 1996.
8. CURY, J. A. Controle químico da placa dental. In: PINTO, V. G. *Aboprev: promoção da saúde bucal*. 2. ed. São Paulo, Brazil: Artes Médicas, 1999. p.130-140.
9. DELILBASE, C. et al. Effects of 0.2% chlorhexidine gluconate and amoxicilin plus clavulanic acid on the prevention of alveolar osteitis following mandibular third molar extractions. *Oral Surg*, St. Louis, v. 94, n. 3, p. 301-304, Sep. 2002.
10. EMILSON, C. G. Potential efficacy of chlorhexidine against mutans streptococci and human dental caries. *J Dent Res*, Minneapolis, v. 73, n. 3, p. 682-689, mar. 1994.
11. FAYLE, S. A. et al. Oral problems and the dentist's role in the management of paediatric oncology patients. *Dent Update*, Guildford, v. 19, n. 4, p. 152-159, May 1992.
12. FEIST, I. S. et al. Clorexidina: os prós e contras da sua utilização em periodontia. *Rev APCD*, São Paulo, v. 43, n. 1, p. 20-23, jan./fev. 1989.
13. FERRAZ, C. C. et al. In vitro assessment of the antimicrobial action and the mechanical ability of chlorhexidine gel as an endodontic irrigant. *J Endod*, Hagerstown, v. 27, n. 7, p. 452-455, jul. 2001.
14. FLOTRA, L. Different modes of chlorhexidine application and related local side effects. *J Periodontal Res Suppl.*, Baltimore, v. 12, p. 41-44, 1973.
15. FRENTZEN, M. et al. Clinical and microbiological effects of local chlorhexidine applications. *Int Dent J*, Ferney-Voltaire, v. 52, n. 5, p. 325-329, Oct. 2002.
16. GARIB, D. G. et al. Efeito do uso do gluconato de clorexidina e do cloreto de cetilpiridínio, em bochechos, como meio complementar da higiene bucal em pacientes sob tratamento ortodôntico. *Ortodontia*, São Paulo, v. 30, n. 2, p. 21-30, maio/ago. 1997.
17. GJERMO, P.; ROLLA, G. The plaque inhibiting effect on chlorhexidine containing dentifrices. *Scand J Dent Res*, Copenhagen, v. 79, n. 2, p. 126-132, 1971.
18. HEINTZE, S. D. A profilaxia individual em pacientes com aparelhos fixos – recomendações para o consultório. *Ortodontia*, São Paulo, v. 29, n. 2, p. 4-15, maio/ago. 1996.

19. JEANSONNE, M. J.; WHITE, R. R. A comparison of 2.0% chlorhexidine gluconate and 5,25% sodium hypochlorite as antimicrobial endodontic irrigants. *J Endod*, Baltimore, v. 20, n. 6, p. 276-278, jun. 1994.
20. JOYSTON-BECHAL, S. Prevention of dental diseases following radiotherapy and chemotherapy. *Int Dent J*, Ferney-Voltaire, v. 42, n. 1, p. 47-53, Feb. 1992.
21. KOHLER, B. et al. The effect of caries-preventive measures in mothers on dental caries and the oral presence of the bacteria streptococcus mutans and lactobacilli in their children. *Arch Oral Biol*, New York, v. 29, n. 11, p. 879-883, 1984.
22. KONIG, J. et al. Anti-plaque effect of tempered 0,2% chlorhexidine rinse: an in vivo study. *J Clin Periodontol*, Copenhagen, v. 29, n. 3, p. 207-210, mar. 2002.
23. LOE, H; SCHIOTT, C. R. The effect of mouthrinses and topical application of chlorhexidine on the development of dental plaque and gingivitis in man. *J Periodontal Res*, Oxford, USA, v. 5, n. 2, p. 79-83, 1970.
24. LOPES, M. A. et al. Reconhecendo e controlando os efeitos colaterais da radioterapia. *Rev APCD*, São Paulo, v. 52, n. 3, p. 241-243, maio./jun. 1998.
25. MACHADO, W. A. S. et al. Reação tecidual ao implante de um dispositivo de liberação lenta (Periochip) em dorso de rato albino. *RBO*, Rio de Janeiro, v. 59, n. 2, p. 94-96, mar./abr. 2002.
26. _____. A clorexidina no controle de placa em pacientes internados: estudo piloto. *RBO*, Rio de Janeiro, v. 59, n. 6, p. 390-392, nov./dez. 2002.
27. PAVARINA, A. C. et al. An infection control protocol: effectiveness of immersion solutions to reduce the microbial growth on dental prostheses. *J Oral Rehabil.*, Birmingham, v. 30, n. 5, p. 532-536, May 2003.
28. RIBEIRO, S. K.; BUSSADORI, S. K. Comparação entre gel de clorexidina e verniz de flúor na contagem salivar de s.mutans. *Rev Paul Odontol*, São Paulo, v. 22, n. 4, p. 48-52, jul./ago. 2000.
29. SILVA, F. I. P.; ALVES, R. A. A eficácia de três enxaguatórios bucais sobre a placa bacteriana: estudo comparativo. *Rev. ABO Nac.*, São Paulo, v. 8, n. 2, p. 307-311, 2000.
30. SCHAEKEN, M. J. et al. Effect of chlorexidine varnish on streptococi in dental plaque from occlusal fissures. *Caries Res.*, Geneva, v. 28, n. 4, p. 262-266, 1994.

BASTOS, José
Roberto de
Magalhães et al.
Chlorhexidine use at
dentistry. *Salusvita*,
Bauru, v. 23, n. 1,
p. 15-24, 2004.