Research Article

EFFICACY OF CETYLPYRIDINIUM CHLORIDE ON GINGIVITIS PREVENTION

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ABSTRACT

Introduction: Gums health has been a concern for the authors lately, overwhelmed in their practice of trying to find the best methods of preventing gingivitis.
Material and methods: 25 patients were studied with evaluation of oral hygiene index and gingival inflammation index at first visit, after 3 month and after 6 month of mouth rinsing with cetylpyridinium chloride.
Results: At first visit OHI mean value was $5,34 \pm 1,92$, and GI mean value was $1,9 \pm 0,49$. After 3 month OHI average value was $4,212 \pm 1,62$ and GI average value was $1,7 \pm 0,48$. After 6 month OHI average value decreased to $1,856 \pm 0,58$ and GI average value decreased to $1,056 \pm 0,3$.
Discussions: There was an improvement in oral hygiene evidenced by lower values of OHI and GI after 3 and 6 month of mouth rinsing with cetylpyridinium chloride. Results revealed a better evolution for severe forms of gingivitis, and healthier gums after 6 month of treatment.
Conclusions: Mouthwash can improve oral health by increasing the effect of tooth brushing on dental plaque control.

INTRODUCTION

Microbial biofilm is widely recognized as responsible for caries, gingivitis and periodontal diseases, and tooth loss. Gingival inflammation may be a reversible gum disease such as gingivitis, caused by heavy, mature dental plaque, leading progressively to periodontitis with irreversible signs of soft tissues destruction.

Severe inflammation of the gum which is described by marked redness, ulcerations, hypertrophy and spontaneously bleeding, when left untreated, leads to loss of teeth.

It is more appropriate to apply preventive methods as therapeutic strategies for gingivitis than trying to treat severe forms of irreversible gingivitis.

There has been an interest lately in preventing gingivitis by using mechanical and chemical solutions to control dental plaque. Mouthwash has been proven to be an effective chemical solution increasing the anti-plaque and anti-gingivitis effects of tooth brushing. (6; 12)

Well-documented approach found that cetylpyridinium chloride solutions are the best alternative to chlorhexidine mouthwashes, known for its side effects. (11)

Daily home care improves oral health by using mouthwash for their anti-plaque and anti-calculus effectiveness. (10)

The strategy of maintain gum health includes improving oral home care with a proper tooth brushing technique, and also the use of mouthwash containing chemical solutions with anti-plaque properties.

MATERIALS AND METHODS

25 patients were studied regarding gingival health and the effect of mouthwash use for 6 months. The study included 12 females and 13 males, aged 19 to 64 years old. The patients were informed about the procedure and they signed consent. The clinical examination focused on gingival health, and an oral hygiene index and a gingival inflammation index were calculated for each patient before and after a period of 3 month, and also after 6 month of mouth rinse with cetylpiridinium chloride solutions.

The first visit included professional hygiene with removal of tartar and professional teeth brushing.

Oral hygiene index (OHI) appreciates the presence and the amount of dental plaque and calculus summing the index of dental plaque and the index of calculus.

Epidemiological studies use simplified OHI which examines only 6 teeth purposed by the authors: 1.6, 2.1, 2.6, 3.6, 4.1, and 4.6.

Evaluation score for dental plaque and also for tartar range from 0, in the absence of dental plaque or tartar, to 3 when

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dental plaque or tartar extends on more than 2/3 of the examined surface.

The index calculates for plaque or calculus as: sum of scores of examined teeth/6.

Oral hygiene score represents the sum of plaque index and calculus index and the values are 0 to 12 points evaluated as follows: excellent (value 0), good (value 0,1 – 2,4), moderate (value 2,5 – 6) and poor (value 6,1 -12).

For gingivitis it has been used gingival inflammation index which use the scores: 0 for normal gingiva, no signs of inflammation, 1 for mild inflammation, slight changes in color and texture, slight edema, no bleeding on probing, 2 for moderate inflammation, redness, glazing, hypertrophy, bleeding on probing and 3 for severe inflammation, marked redness, edema, ulceration, spontaneously bleeding. GI is calculated as score from 0 to 3 points.

Data obtained were statistically analyzed using Excel program.

RESULTS

Of the 25 patients studied, 12 were females and 13 were males, aged 19 to 64 years old.

At the first visit the average values of indices were: plaque index was $2,96 \pm 0,96$ and tartar index was $2,37 \pm 0,96$, so the oral hygiene index had a mean value of $5,34 \pm 1,92$.

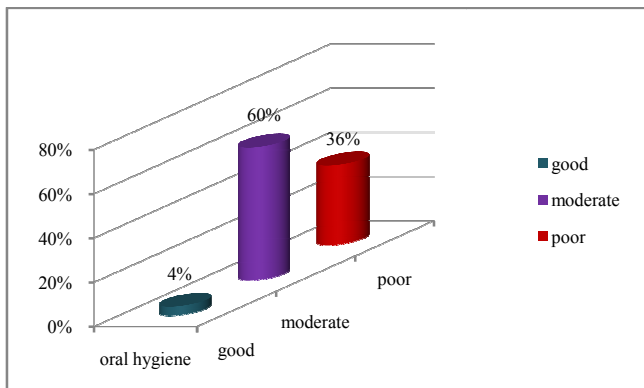By the scores value of hygiene index it was assessed the level of hygiene of the patients as good, moderate or poor.

Fig 1 Levels of hygiene

Gingivitis was evaluated by an index of gingival inflammation whose mean value was $1,9 \pm 0,49$.

Microbial biofilm is responsible for gum inflammation, as can also be seen in this study, which reveals a correlation between oral hygiene index and gingival inflammation index.
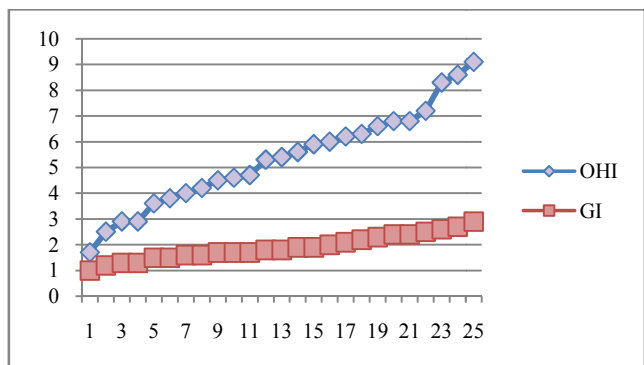

Fig 2 Correlation between oral hygiene index and gingival inflammation index

After 3 month, and after 6 month, with improved oral home care, and twice daily use of mouthwash containing cetylpyridinium chloride, the patients were examined again and for each one it has been calculated dental plaque index, tartar index and gingivitis index.

The results showed a decrease in gingival inflammation especially for severe forms of gingivitis, and also the reduction of hygiene index values at 3 month control, and more significant at 6 month.

It was a statistically significant difference between oral hygiene index values (dental plaque index and tartar index) at first visit in dental office, and after 3 month of cetylpyridinium chloride mouthwash. (p<0,001)
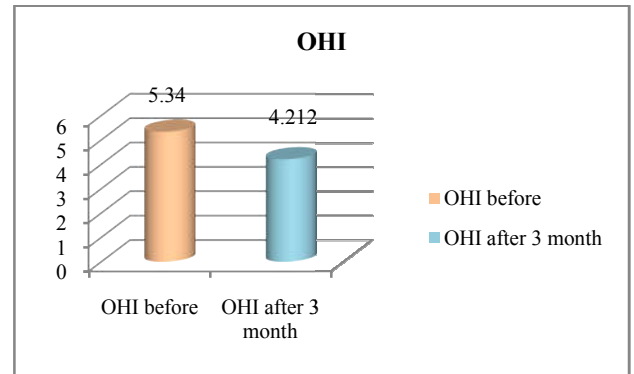

Fig 3 Oral hygiene index at first visit and at 3 month control

After 6 month, the evaluation revealed a more decreased value of OHI than 3 month control, the mean value of OHI index being $1,856 \pm 0,58$. (p<0,001)
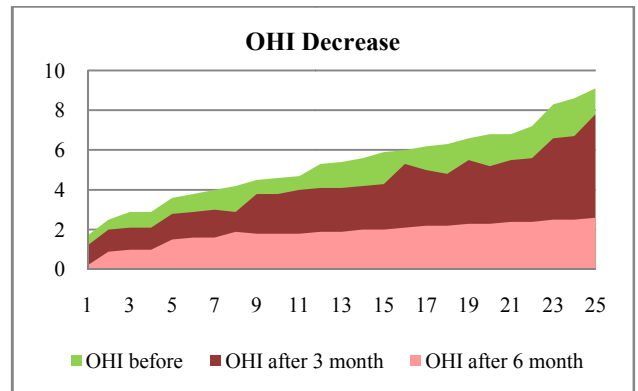

Fig 4 The decrease of OHI value after 3 and 6 month

In what regards gingivitis, data analysis revealed a reduction in the mean value of the gingival inflammation index after 3 month compared to the first value. (Statistically significant difference p<0,05)
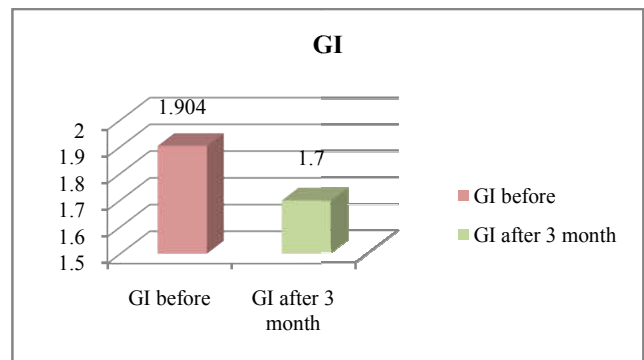

Fig 5 Gingivitis index before and after 3 month of mouth rinse

After 6 month gingival inflammation index decreased to a mean value of 1,056±0,3.
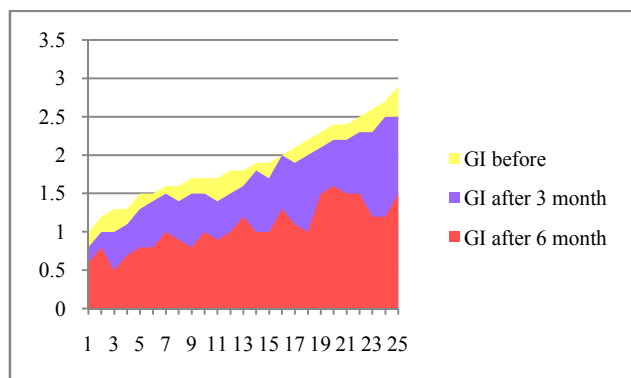

Fig 6 Lower values of gingivitis after 3 month and after 6 month

DISCUSSIONS

In recent decades studies have focused on the research of chemical efficacy in dental plaque control. ADA recommends for studies on plaque and gingivitis control, 3 month and 6 month evaluation to assess the effectiveness of mouth rinses. (ADA, 1997)

Most of the studies found a gingivitis reduction after chemotherapeutic products use. (Cassiano Kuchenbecker Rosing *et al*, 2017) The statistical correlation between oral hygiene levels and gingival inflammation scores incriminates microbial biofilm in the initiation and progression of gingivitis. It is compulsory to remove dental microbial plaque, in order to obtain healthy gums, considering also patient's compliance with oral health. (Barnett ML., 2003)

The higher levels of gingivitis have been shown to have the highest rate of inflammation reduction after using mouthwash. (Mankodi S. *et al* 2005) This study revealed a statistically significant reduction of signs (p<0,001) in sever forms of gingivitis after 3 month of mouth rinse, and also a reduction in mild forms of gingivitis (p<0,05). After 6 month, all indices decreased significantly compared to 3 month results, suggesting that o long period of chemical solutions rinsing could lead to better results.

It is well-documented the fact that dental plaque responsible for caries and gingivitis contains mature biofilm. Considering that, many researchers have suggested the effect of cetylpyridinium chloride mouth rinse in maintaining an immature plaque, which could slow down the gingivitis progression. (Fei Teng *et al* 2016) More studies as long-term trials on cetylpyridinium chloride mouthwash efficacy on gingivitis are needed to provide evidence to mark CPC solutions as therapeutic products. (Albert-Kiszely A *et al* 2007) Faust K. discovered in his study the role of CPC in alteration of inter-microbial relationship of biofilm, so preventing the development of dental plaque. (Faust K *et al*, 2012)

There are also several reviews that revealed a lack of a sustained approach in the evaluation of CPC mouthwash efficacy as an improvement of dental plaque control. (Brecx M., 2000; Gunsolley JC, 2006)

CONCLUSIONS

Removal of microbial biofilm by mechanical and chemical methods is the only solution to combat gingivitis.

Home oral care should be improved with mouthwash to get better results in dental plaque control.

Cetylpyridinium chloride is one of the most effective mouth rinse chemical solution to use as adjunct to tooth-brushing for dental plaque control.

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