

FULL MOUTH SCALING AND USING LOCAL ADJUNCTIVES, COMPARING THE OUTCOMES: A SYSTEMATIC REVIEW

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ABSTRACT

Periodontitis has a strong association with the presence of bacterial biofilm and dental calculus especially on the root surfaces. Therefore, one of the foremost goals of the non-surgical periodontal therapy (NSPT) is to eradicate microbial and calculus deposits. There has been a long-standing debate about the value and effectiveness of adjunctive therapies along with scaling and root surface debridement and this systematic review aims to scrutinize available literature and develop an understanding about the benefits of adjunctive treatments (AT) such as mouthwashes or topical application of chlorhexidine gel (CG).

This systematic review involves the comparison of full mouth scaling (FMS) with or without the use of AT. Systemic antibiotics were not considered chemical adjunctive in this review. The search was mainly carried out on PubMed database using appropriate vocabulary. Only published data was used, abstracts and articles from non-peer reviewed journals were not selected to further potentiate the study.

Application of the definite search strategy and related parameters resulted in the retrieval of three hundred and seventy articles, of which only 4 articles satisfied the inclusion and exclusion criteria. The included studies displayed no statistically significant difference either in test or the control group in moderate pockets, however, one study showed a statistically significant difference only in deep pockets.

From the available literature, it can be concluded that full mouth disinfection in combination with FMS does not provide any major difference in clinical outcomes when compared to FMS alone. The adjunctive use can be selected on a preference base of the clinician and acceptance of the patients.

KEYWORDS: full mouth scaling and polishing, adjunctive antimicrobial therapy, periodontal therapy

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INTRODUCTION

Abu I-Qasim in 10th century have been the foremost to give solemn thought about dental calculus as the main causative factor in the development of diseases related to gingivae. He therefore suggested 'professional' cleaning, which was carried out by a set of 14 scalers¹. Non-the less, Egyptian hieroglyphics specify that, NSPT may have been in practice for 2000 years BC¹. Periodontitis has a strong association with the presence of bacterial biofilm and dental calculus especially on the root surfaces, therefore one of the foremost goals of NSPT is to remove microbial and calculus deposits². Hugoson et al 2008³ in a Swedish study carried out over a period of 30 years found that the prevalence of gingivitis and periodontitis is reduced with effective plaque control. Unfortunately, many studies have proven that complete removal of hard and soft deposits is not possible even with the most experienced personnel⁴. However,

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NSPT is an effective therapy for periodontal diseases as it markedly reduces the clinical signs and symptoms of an active disease⁵. It is important to analyse the type of treatments available for NSPT. According to the literature there are three methods of treatments available namely debridement; defined as the instrumentation done for the removal of microbial film⁶, scaling; which means instrumentation resulting in the removal of mineralised deposits of calculus⁷ and lastly, root planning; which is defined as the instrumentation done to remove contaminated cementum and dentine⁸. There has been a long-standing debate about the value and effectiveness of using AT along with NSPT⁹ and this systematic review aims to scrutinize and develop a further understanding about the benefits of AT. The present systematic review compares FMS protocols alone or in combination with AT.

METHODS

Search strategy

The search was mainly carried out in PubMed database using appropriate vocabulary to adjust all the parameters. PICO formula was used to formulate the research question therefore, for each section of the PICO all the related vocabulary was used to extract the relevant articles. Search on Google scholar also resulted in similar articles hence, PubMed search was given preference.

The research topic in question was formulated according to the following PICO formula:

Population

Generalized periodontitis OR Periodontitis OR Chronic periodontitis OR Periodontal disease

Intervention

Full mouth scaling and polishing with chlorhexidine OR Full mouth scaling with adjunctive chemicals OR Scaling and adjunctive chlorhexidine OR FMS and adjunctive chemicals OR PerioChip.

Comparison

Full mouth scaling and polishing OR Full mouth debridement OR Full mouth scaling OR FMS OR Full mouth scaling protocols.

Outcomes

Pocket depth reduction OR Bleeding on probing OR Clinical attachment gain OR BOP red OR CAL gain OR BOP OR CAL

Inclusion Criteria

Studies with participants having a clinical diagnosis of chronic periodontitis (CP) based on the International

Classification of Periodontal Diseases (Armitage et al. 1999¹⁰) were included. Only articles in English language were selected due to unavailability of a translator. Studies having a jadad score of 4 and higher were selected.

Exclusion Criteria

Studies involving participants diagnosed with aggressive periodontitis, any systemic disorders or those who were taking antibiotics were excluded. Articles from non-peer reviewed journals were not selected to further potentiate the study.

Types of outcome measures selected

Primary outcomes

- Change in probing depths (PD) after three to four months
- Change in bleeding on probing (BOP) after three to four months

Secondary outcomes

- Change in clinical attachment levels (CAL) after three to four months

Data extraction

The two main authors (HS, IH) screened the titles of the articles collected by the advanced search option from PubMed as the first stage of screening. Each title was read individually, and a third reviewer (MN) was involved where there was disagreement amongst the authors. After the screening process, the studies were extracted based on the following data: author name, journal name, study design, PDs included, research setup, reduction in PD in both control and test groups, reduction in BOP in both control and test groups, and reduction in CAL in both control and test groups.

RESULTS

The initial literature search resulted in the extraction of 370 titles. 350 articles were rejected because either they did not show FMS or AT, or they did not compare control and test groups. 10 studies demonstrated a high risk of bias and 6 did not report the required outcomes. Therefore, 4 articles were finally selected for data synthesis that met the inclusion and exclusion criteria. Fig.1 explains the search strategy.

All the studies included were Randomized Clinical Trials (RCTs) with a jaded score of 4 and with a low to medium risk of bias; none of the studies included had reporting bias. Two of the included studies were performed in Europe (Quirynen et al. 2006¹¹; Swierkot et al. 2009¹²), one was carried out in Brazil (Zanatta et al. 2006¹³) and one study was done in Japan (Koshy

TABLE 1: SHOWS THE COMPARISON OF THE AVERAGE PD REDUCTION UP TO 6 MONTHS OF RECALL. © IS REDUCTION IN POCKET DEPTH IN THE CONTROL GROUP AND (T) IS REDUCTION POCKET DEPTH IN THE TEST GROUP

Study	Study design	Control Group Intervention	Test Group Intervention	PD included	PD Reduction ©	PD Reduction (t)
Koshy et. al 2005 ¹⁴	RCT	FMS	FMS with AT	>5 mm	4.26+/- 1.10mm	4.02+/- 1.40mm
Quirynen et al. 2006 ¹¹	RCT	FMS	FMS with AT	>6mm	3.20+/- 0.90mm	3.40+/- 0.90mm
Zanatta et al. 2006 ¹³	RCT	FMS	FMS with AT	>5mm	4.36+/- 0.54mm	4.02+/- 0.72mm
Swierkot et al. 2009 ¹²	RCT	FMS	FMS with AT	>5mm	3.31+/- 0.15mm	3.48+/- 0.19mm

TABLE 2: SHOWS THE COMPARISON OF CHANGE IN CAL UP TO 6 MONTHS OF RECALL. © IS THE GAIN IN CAL IN THE CONTROL GROUP AND (T) IS THE GAIN IN CAL IN THE TEST GROUP.P

Study	Study design	Control Group Intervention	Test Group Intervention	Change in CAL ©	Change in CAL (t)
Koshy et. al 2005 ¹⁴	RCT	FMS	FMS with AT	3.46+/-0.9mm	2.90+/-0.9mm
Quirynen et al. 2006 ¹¹	RCT	FMS	FMS with AT	N/A	N/A
Zanatta et al. 2006 ¹³	RCT	FMS	FMS with AT	3.10+/-0.94mm	3.50+/-01.08mm
Swierkot et al. 2009 ¹²	RCT	FMS	FMS with AT	3.13+/-1.09mm	3.37+/-0.67mm

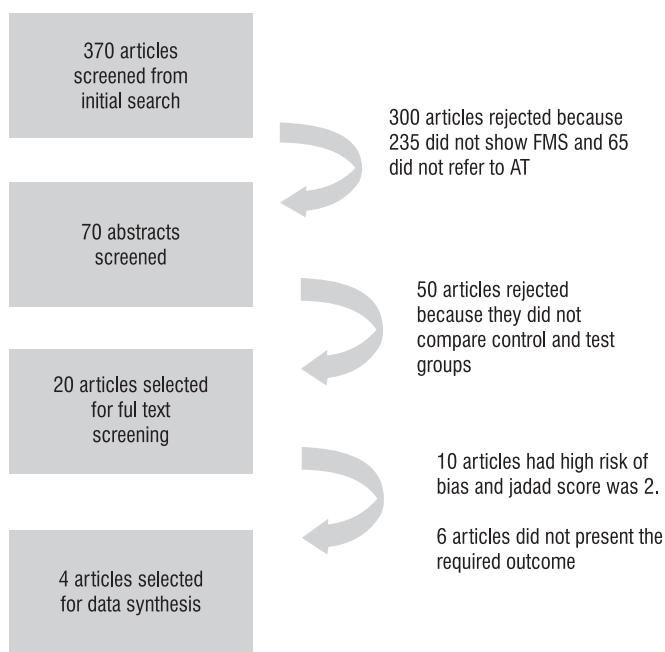


Fig 1: Search strategy

et al. 2005¹⁴). None of the studies reported tooth loss and only one study gave a sextant wise analysis of the data (Quirynen et al. 2006¹¹).

PD reduction

All studies included a population with PD greater than 5mm and the maximum PD recorded was 10mm. The studies involved marked pocket depths of 5mm to 7mm as moderate pockets (MP) and above 7mm as deep pockets (DP). The three studies (Koshy et al. 2005¹⁴; Quirynen et al. 2006¹¹; Swierkot et al. 2009¹²) manifested no statistically significant difference in the test group and the control group in both MPs and DPs. However, one study (Zanatta et al. 2006¹³) revealed a statistically significant difference in only DPs after 6 months of recall. Tab. 1 illustrates the tabular representation of the PD reduction.

Gain in CAL

The extrapolated data on gain in CAL in the two studies (Swierkot et al. 2009¹²; Zanatta et al. 2006¹³) reported that there was a statistically significant difference in favour of the FMS with disinfection (DI) for

DPs. However, the difference is not that significant in MPs. Koshy et al. 2005¹⁴ showed statistically significant difference in the two modes of treatment in both MPs and DPs in the favour of FMS without the use of DI. Quirynen et al. 2006¹¹ presented no potent change in gain in CAL. However, the available clinical data revealed no significant difference between the two modes of treatment. Tab.2 illustrates the graphical comparison of the change in CAL in the two modes of treatment reported in three studies.

BOP

Koshy et al. 2005¹⁴ reported a statistically significant difference in BOP in the favour of FMS without DI. Studies done by Swierkot et al. 2009¹² and Zanatta et al. 2006¹³ showed a statistically significant difference in favour of the FMS without AT. However, the difference was evident following a follow up period of 3 months, while after 6 months no statistically significant difference was appreciated in the two treatment regimens. Quirynen et al. 2006¹¹ also measured the BOP percentage and reported a borderline difference in favour of the FMS with DI in the first 3 months only in subjects with baseline PDs of more than 7mm however, after 6 months no difference was observed in both the treatment modalities.

DISCUSSION

In 1995, Quirynen et al.¹⁵ suggested a FMS protocol in combination with CG with the aim of improving the outcomes in terms of PD and BOP reduction, while gain in CAL. The study results showed a statistically significant difference in treatment outcomes. However, the results are debatable in long term regarding PD reduction. CG has a plaque inhibitory effect along with an antimicrobial action. Hence, using CG as an adjunct to the FMS protocol was considered to have further improved the outcomes of the treatment¹⁵. However, a recent study on the effect of CG stated that no statistically significant difference¹⁶. However, these studies did not compare the effectiveness of manual instrumentation alone and in combination with CG. The heterogeneity in the percentage of CG used makes it difficult to formulate a consensus on the effectiveness of the AT in a FMS protocol.

The present review has scrutinized the data from various studies conducted in different parts of the world involving diverse races with almost the same periodontal status. However, smokers were only incorporated in one study (Swierkot et al. 2009¹²), while the other study (Zanatta et al. 2006¹³) was unclear about including smokers. Smoking affects the overall healing and outcomes of the treatment offered hence, adding smokers in the strata could affect the results pertaining to reduction in PDs, BOP, and gain in CAL.

Secondly, none of the studies mentioned the number of cigarettes per day which could be another important factor in determining the outcomes¹⁷.

PD reduction

With regards to PD reduction three studies showed no major difference with an AT. Koshy et al. 2005¹⁴ observed that in moderate pockets the patients given FMS alone had better pocket reduction than the test group with AT. PD reduction of pockets less than 7mm with a low percentage of BOP can heal adequately without the use of any AT as reported by the golden literature on NSPT¹⁸. Moreover, the formation of long junctional epithelium marks the healing of the periodontal pocket after manual or ultrasonic instrumentation, therefore it can be safely predicted that the use of AT in MPs might prolong the formation of the epithelium. The most important factor in the healing of the periodontal pocket is the reattachment of the epithelium to the directly attached cells (DAT) cells present on the surface of the teeth. DAT cells play a pivotal role in the healing of the soft tissue around teeth, therefore, use of AT might disrupt this re-attachment and thus, result in delayed or even less pocket reduction. Zanatta et al. 2006¹³ however, observed in DPs statistically significant difference can be seen in the reduction of the PDs in favour of the control group. One of the most important factors considering the reduction in PDs is the type of bone defect associated with periodontal pockets. Nibali et al. 2018¹⁹ advocated the reduction of three wall DPs up to 12mm can be reduced below the critical PDs with meticulous non-surgical minimally invasive treatment, as the healing is dependent mainly on blood clot formation and stabilisation. The use of ATs can provide initial disinfection on the root surface for better healing however, specialised debridement with ultrasonics and water provides the same effect²².

Gain in CAL

Quirynen et al. 2006¹¹ did not mention gain in CAL, however, the remaining three studies provided sufficient data. Clinical attachment loss refers to the pathological detachment of collagen fibers from cemental surface with the concomitant apical migration of the junctional or pocket epithelium onto the root surface²⁰. As shown in Tab. 2, gain in CAL mostly follows the pattern of the reduction in PD. Koshy et al 2005¹⁴ revealed that there is a statistically significant difference in CALs in favour of the control group. On the other hand, Swierkot et al. 2009¹² observed statistically significant difference in favour of the test group. The stark difference between the two studies was due to the use of different ATs. Koshy et al. 2005¹⁴ used povidone and Swierkot et al. 2009¹² used chlorhexidine gel. Comparing the two studies CG provided better results in terms of gain in CAL, since the gel disinfected the root surface better

than povidone. Eberhand et al. 2008²⁰ recommended CG to provide better results when used adjunctively with ultrasonic scaling however, the effect was not long term and only for an average of 12 to 15 hours. Nonetheless, the available evidence on the working time of CG is still inconclusive. The effect of AT should be able to provide benefits only for the initial phase of healing. Long term healing of the pockets is dependent on several other factors such as follow up, professional cleaning, oral hygiene reinforcements, patient motivation, plaque retentive factors, furcation involvement, smoking, general medical profile, and diet.

Potential bias in the review and quality of literature involved

The authors have tried their best to reduce any bias with the involvement of the third reviewer at the point of article selection which had ambiguity. Furthermore, a detailed analysis of the data has been carried out individually by both the main reviewers without the influence of each other, hence the results and the calibration of the data was done in an unbiased manner. The discussion section was the accumulation of all the results and the data scrutinized simultaneously by both the reviewers. The data available in terms of potent trials comparing FMS with or without DI are lacking and the evidence although had a high JADAD score and a low level of bias, the number of studies is very less to predict a potent outcome. The studies had very low level of reporting bias hence, their results can be used to predict clinical treatment outcomes. A split mouth design was not present in any of the studies which could have further potentiated the results. Moreover, none of the studies have mentioned the quality of life of patients and plaque retentive factors. Additionally, details on the protocols of follow up and recalls are not mentioned which can affect the results of the study.

CONCLUSION

From the available results and discussion, it can be concluded that FMS along with disinfection does not provide any major difference in the clinical outcomes when compared to FMS alone. The adjunctive use can be selected on a preference base of the clinician and acceptance and convenience of the patients. Potent conclusions would need further detailed studies on this matter, especially considering local application of CG in DPs comparing it with a control in a split mouth design RCT. The present study provides good evidence that FMS without the use of DI provides sufficient treatment outcomes and the use of DI along with scaling gives no added benefits in MPs. However, in DPs the use of CG can provide added advantage in terms of reduction of PPDs and gain in CALs.

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- 4 Nuvaira Ijaz:** Study design, critical revisions.
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