Efficacy of One Stage Full Mouth Disinfection on the Oral Health-Related Quality of Life in Patients with Generalised Chronic Periodontitis

Dentistry Section

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ABSTRACT

Introduction: Intraoral translocation of periodontal pathogens from untreated intraoral niches can lead to recolonisation and reinfection of recently treated periodontal pockets. Poor oral health hampers the patient's Quality of Life (QoL) as it causes social isolation, inferiority and the development of psychiatric conditions. Full Mouth Disinfection (FMD) performed within 24 hours using chlorhexidine has reported significant improvements in clinical, microbiological and psychological parameters when compared to conventional periodontal treatment.

Aim: To investigate the long-term effect of FMD on Oral Health-Related Quality of Life (OHRQoL) in patients with generalised chronic periodontitis.

Materials and Methods: This study was a prospective clinical study conducted in the Department of Periodontology, Dr. D.Y. Patil Dental College and Hospital, Pune, Maharashtra, India, from October 2019 to December 2021. Study consisted of 60 participants who were allotted into two groups; 30 periodontally healthy volunteers (control group) and 30 patients (test group) diagnosed with generalised chronic periodontitis. The test group was asked to fill out the Oral Health Impact Profile-14 (OHIP-14) questionnaire to assess the OHRQoL at baseline followed by FMD protocol. All the patients were kept at periodic recall, and

the OHRQoL was assessed again taken after one month, three months, and six months. The control group was asked to fill out the questionnaire at the baseline. Repeated measure analysis of variance with post-hoc bonferroni test was used to compare differences in variation present from baseline to one month, three months and six months. For intergroup comparison at different time intervals, an unpaired t-test was applied.

Results: The age group of participants ranged from 25-55 years with a mean age of 41.3 years. Test group had 18 males and 12 females and, 20 males and 10 females were in the control group. The mean OHIP-14 score at baseline was 3.58±3.29 in the control group and 42.35±4.32 in the test group at baseline, showing a mean difference of -38.76±0.93, which was statistically significant. After one month there was a significant improvement in the OHIP-14 scores of the test group (26.35±2.60), which was further reduced to 17.17±3.41 and 12.5±3.93 by the end of three and six months. Therefore, a notable improvement in the QoL and periodontal conditions of the patients following FMD was appreciated.

Conclusion: Periodontitis negatively impacts the OHRQoL. FMD provides an improvement in the perceived QoL among periodontitis patients.

INTRODUCTION

Periodontitis is an immunoinflammatory disease that can destroy tooth supporting structures due to an imbalance in the virulence factors of pathogenic microbes and an altered host-defence mechanism. Non Surgical Periodontal Therapy (NSPT) is the gold standard to eliminate microbial load [1].

The subgingival microbial load decreases to 0.1% of pretreatment levels after Scaling and Root Planing (SRP). The intraoral translocation of periodontal pathogens from untreated intraoral niches can lead to the recolonisation and reinfection of recently treated pockets within a week [1]. Quirynen M et al., introduced the one-stage Full Mouth Disinfection (FMD) protocol where SRP were performed in two sessions within 24 hours supplemented with supragingival and subgingival use of chlorhexidine [2]. This protocol aims to completely eradicate and suppress all the periodontal microbes in a limited period, not just from the periodontal pockets, but also from the oropharyngeal cavity such as mucous membrane, tongue, tonsils and saliva [2].

Poor oral health causes social isolation, inferiority and depression [3]. Oral Health Impact Profile-14 (OHIP-14) is a measure of Oral Health-Related Quality of Life (OHRQoL) that detects dysfunction, discomfort, and disability, based on the "disease-impairment-disability-handicap" model [4,5]. It is based on seven dimensions functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap [4,5].

Saito A et al., evaluated the OHRQoL in 58 patients with generalised periodontitis at baseline and 3-4 weeks after phase I therapy in the Japanese population. There was an improvement in the OHRQoL in all patients after the initial periodontal therapy [6]. Shah M and Kumar S evaluated the impact of NSPT on the OHRQoL on 55 participants by using the OHIP-14 data at baseline and three months of treatment. It was concluded that periodontitis plays an important role in the OHRQoL [7].

Hence, from the patient's point of view, there is a need to understand how periodontal disease burdens their well-being of life in the long-term. This is the first study conducted with the longest follow-up of six months to evaluate the long-term effects of FMD on the improvement of OHRQoL in patients with generalised chronic periodontitis.

MATERIALS AND METHODS

The present prospective clinical study was conducted from October 2019 to December 2021 in the Department of Periodontology, Dr. D.Y. Patil Dental College and Hospital, Pune, Maharashtra, India. The protocol for the research project has been approved by the Institutional Ethics Committee within which the work was undertaken and it conforms to the provisions of the Declaration of Helsinki (DYPDCH/IEC/120/71/19).

Sample size calculation: A total sample size of 60 was estimated using OpenEpi Version 3 with a Confidence Interval of 95% and

power at 80% with an expected mean difference of 13.62 [8]. The formula used for sample size estimation was:

$$n = (\sigma_1^2 + \sigma_2^2 / \kappa)(z_{1-\alpha/2} + z_{1-\beta/2})^2 / \Delta^2, \text{ where}$$

n=sample size per group, σ_1=standard deviation of Group 1, σ_2=standard deviation of Group 2, D=difference in group means, k=ratio=1, $z_{1-\alpha/2}$=two-sided Z value (eg. Z=1.96 for 95% confidence interval), $z_{1-\beta/2}$=power.

Inclusion criteria: Subjects from the age group of 25-55 years from both genders, systemically healthy, non smokers, and non tobacco chewers were included in the study. None of the patients had undergone subgingival instrumentation within 12 months before the baseline examination.

Exclusion criteria: Uncooperative patients who showed unacceptable oral hygiene, pregnant/lactating mothers and patients with ongoing drug therapy, history of known systemic diseases like hypertension, diabetes, bone metabolic disorders, cancer, and patients wearing a prosthesis or an orthodontic appliance were excluded from the study.

Study Procedure

Sixty participants were randomly allotted into two groups by convenience sampling into the test and the control group. Age and gender matching were done for all participants in both groups and written informed consent was taken from the patients The control group comprised 30 periodontally healthy volunteers, including postgraduate students and auxiliary staff with probing pocket depth <3 mm and absence of clinical attachment loss and bleeding on probing.

The test group consisted of 30 patients diagnosed with generalised chronic periodontitis presenting with more than 30% of the sites with probing depth ≥4 mm and clinical attachment loss ≥5 mm [Table/Fig-1].

The participants in the control group were asked to fill out the OHIP-14 questionnaire to assess their OHRQoL at the baseline [4,5].

[Table/Fig-1]: Preoperative view demonstrating generalised chronic periodontitis at baseline in the test group.

The scoring criteria of the questionnaire are based on a 5-point scale starting from a minimum value of 0-never; 1-hardly ever; 2-occasionally; 3-fairly often to a maximum value of 4-very often. The patients in the test group were asked to fill out the OHIP-14 questionnaires on the 5-point scale to assess their OHRQoL at the baseline followed by FMD.

Full Mouth Disinfection (FMD) Protocol

Local anaesthesia with 2% lignocaine containing adrenaline at a concentration of 1:1,00,000 under aseptic conditions was administered intraorally to the patients. SRP was performed in two sessions within 24 hours using an ultrasonic scaler, universal scaler U15/30, Universal curette 2R/2L, 4R/4L, and Gracey curettes. It was done for the maxillary arch in the first session, followed by the mandibular arch in the second session. The time spent per quadrant was approximately one hour. Brushing the dorsum of the tongue with 1% Chlorhexidine gel (Hexigel®) [Table/Fig-2] for one minute was carried out followed by rinsing twice with 0.2% chlorhexidine mouthwash (Hexidine®) for one minute. For the last 10 seconds, patients were advised to gargle, in an attempt for the mouthwash to reach the tonsils. Subgingival irrigation with Hexigel® was performed thrice within 10 minutes in all the periodontal pockets using a syringe with a bent irrigation needle tip [Table/Fig-3]. The subgingival application using Hexigel® in all periodontal pockets was repeated after eight days [Table/Fig-4].

They were instructed to rinse twice daily for one minute with Hexidine® mouthwash for 14 days and were counselled about oral hygiene maintenance. The patients in the test group were recalled after one month, three months and six months to fill out the OHIP-14 questionnaire during each follow-up visit. The comparison between the test and control group was done to ascertain that the OHIP-14 score is high in the test group. However, the objective of the study was to observe the changes in the test group over time and to assess the effect of FMD.

STATISTICAL ANALYSIS

Statistical analysis was done using IBM Statistical Package for Social Science (SPSS) software version 21.0. The significance level was kept at a 95% Confidence Interval and the p-value <0.001 was considered for statistical significance. Depending upon the Normality of the data parametric and non parametric tests was applied for assessing the data. Mean and standard deviation was obtained for continuous variables. Repeated measure analysis of variance with post-hoc bonferroni was used to compare differences in variation present from baseline to one month, three months and six months. For intergroup comparison at different time intervals, an unpaired t-test was applied.

RESULTS

This clinical study was conducted on a total of 60 participants from the age group of 25-55 years with a mean age of 41.3 years. Study consisted of 18 males and 12 females in the test group, and 20 males and 10 females in the control group.

[Table/Fig-2]: Brushing the dorsum of the tongue with 1% chlorhexidine gel (Hexigel®) for one minute. **[Table/Fig-3]:** Subgingival application with 1% chlorhexidine gel (Hexigel®) in all periodontal pockets. **[Table/Fig-4]:** Repeating the subgingival application with 1% chlorhexidine gel (Hexigel®) after eight days. (Images from left to right)

Intergroup comparison between the test and control group: The mean OHIP-14 score at baseline was 3.58±3.29 in the control group and 42.35±4.32 in the test group at baseline, showing a mean difference of -38.76±0.93, which was statistically significant [Table/Fig-5]. There was a significant difference in OHIP-14 scores at baseline between the test and control group. This demonstrated that the OHRQoL of the test group was significantly high from baseline onwards.

Control group OHIP score (Mean±SD)		Test group OHIP score (Mean±SD)		Mean Difference±SD	p-value
Baseline	3.58±3.29	Baseline	42.35±4.32	-38.76±0.93	<0.001*
		1 month	26.35±2.60	-22.77±1.31	<0.001*
		3 months	17.17±3.41	-13.58±0.81	<0.001*
		6 months	12.5±3.93	-9.0±0.88	<0.001*

[Table/Fig-5]: Intergroup comparison of OHIP-14 scores during different time intervals.
*p-value <0.001 was considered statistically significant

After one month there was a significant improvement in the scores of the test group (26.35±2.60) [Table/Fig-5]. The OHIP-14 scores at three and six months of the test group when compared to the control group also showed statistical significance [Table/Fig-5].

Intragroup comparison: The mean OHIP-14 score at baseline in the control group was 3.58±3.29 [Table/Fig-5] and in the test group was 42.35±4.32 [Table/Fig-6].

Time interval with mean OHIP-14 score	Time interval	Mean±SD	Mean Difference±SD	p-value
Baseline (42.35±4.32)	1 month	6.35±2.60	16.00±0.86	<0.001*
	3 months	17.17±3.41	25.17±0.94	<0.001*
	6 months	12.58±3.93	29.76±1.00	<0.001*
1 month (26.35±2.60)	3 months	17.17±3.41	9.17±0.73	<0.001*
	6 months	12.58±3.93	13.76±0.80	<0.001*
3 months (17.17±3.41)	6 months	12.58±3.93	4.58±0.89	<0.001*

[Table/Fig-6]: Intragroup comparison of OHIP-14 score of the test group at different time intervals.
*p-value <0.001 was considered statistically significant

After one month, the score was reduced to 26.35±2.60, showing a mean difference of 16.00±0.86, which was statistically significant (p-value <0.001). After three months, the mean OHIP-14 score was reduced to 17.17±3.41, showing a mean difference of 25.17+0.94, which was statistically significant (p-value <0.001). There was a significant reduction of 12.58±3.93 after six months, with a mean difference of 29.76+1.00 [Table/Fig-6]. Hence, in the test group, statistically significant improvements were noted in the OHIP-14 scores at different time intervals. There was a notable improvement in the periodontal conditions of the patients following FMD [Table/Fig-7-9].

DISCUSSION
In this study, the mean OHIP-14 score was better in the control group when compared to the test group at baseline. Following the

FMD protocol, significant improvements in the OHIP-14 scores and periodontal conditions of the patients in the test group were noticed after one, three and six months. According to Al Habashneh R et al., periodontitis affects not just the ability to eat, speak and socialise but can also affect an individual's interpersonal relationships and daily work. It can even affect patients smiling patterns and smile-related QoL [8].

Non surgical periodontal therapy is the gold standard method for the treatment of periodontitis. However, following quadrant wise SRP, the multiplication of bacteria within the pocket, either the junctional or pocket epithelium or the dentinal tubules is considered the major cause of subgingival recolonisation [1]. Therefore, FMD in one session seems rational when compared with the standard quadrant wise SRP at numerous time intervals, which possess various other disadvantages such as increased time for completion and low rates of compliance [1].

According to Quirynen M et al., the FMD of the entire dentition in two visits within 24 hours helps to reduce the number of subgingival pathogens [2]. Brushing the dorsum of the tongue with 1% chlorhexidine gel for one minute suppresses the bacteria in the niche and chairside gargling of the mouth with 0.2% chlorhexidine mouthwash for one minute reduces the number of microorganisms in the saliva and the tonsils. Supplementary subgingival irrigation with the help of 1% chlorhexidine gel in all periodontal pockets suppresses the residual bacteria. The optimal oral hygiene measures advised for 14 days using 0.2% chlorhexidine mouthwash help to retard the recolonisation of the pockets.

Therefore, non surgical periodontal therapy performed by the means of FMD aims to completely eradicate and suppress all the periodontal microbes in a limited period, from the periodontal pockets, mucous membrane, tongue, tonsils, and saliva [2,9,10]. It provides better clinical advantages due to its more efficient treatment and time management [2,9,10]. It is becoming increasingly clear that oral and dental problems can have significant impacts on OHRQoL. To date, however, the impact of chronic periodontitis on OHRQoL has not been investigated to a significant degree. Furthermore, there is little information available to suggest which (if any) of the currently available instruments for assessing OHRQoL are the most useful in patients with periodontitis.

This study, therefore, aimed to address these issues by measuring OHRQoL in patients with periodontitis, with healthy individuals using the most widely available, instrument: OHIP-14. These are based on the individual's self-report which could determine the activities most affected by periodontitis as a positive or negative effect after periodontal therapy [11]. OHIP-14 can provide discriminative validity in identifying individuals with self-reported symptoms associated with periodontal diseases [11]. A greater understanding of the difference in oral health that exists between periodontally healthy versus periodontally compromised patients beyond clinical parameters is important as it will provide an insight into the consequence of

[Table/Fig-7]: Clinical improvement seen after one month following Full Mouth Disinfection (FMD) in the test group. **[Table/Fig-8]:** Improvements were seen in the periodontal condition after three months following Full Mouth Disinfection (FMD) in the test group. **[Table/Fig-9]:** Clinical improvement appreciated after six months following Full Mouth Disinfection (FMD) in the test group. (Images from left to right)

periodontal problems for patients' daily life and QoL, as well as illustrate the need for addressing these disparities [12].

In the present study, the mean OHIP-14 score was better in the control group when compared to the test group at baseline. This showed similarity with the study performed by Durham J et al., who noticed significant differences in OHRQoL between patients with chronic periodontitis (48.6±32.0) compared to the control group (36.8±29.8). Patients suffering from periodontitis experience functional, physical, psychological, and social impacts on their OHRQoL as a result of their oral condition [13]. After one month of FMD, there was a significant improvement in the OHIP-14 scores of the test group (26.35±2.60), which further reduced to 17.17±3.41 at three months and 12.5±3.93 at six months when compared to the control group. There was a noteworthy improvement in the periodontal conditions of the patients following FMD by the end of six months, there was excellent clinical improvement noted. This result is in accordance with Saito A et al., who noticed a significant improvement in the perceived oral health of patients after receiving FMD, which supported the belief that periodontal health is an important aspect of the OHRQoL [6].

According to Ng SK and Leung WK patients with better periodontal conditions with minimal history of periodontal destruction are more likely to have a better QoL and vice versa because, besides clinical importance, poor oral health can become a source of personal insecurity leading individuals to increased social isolation and feelings of guilt and inferiority and exacerbating or facilitating the emergence of psychiatric and psychosomatic conditions such as depression [12]. Improvements achieved in this study within a short period in the QoL of patients were able to motivate them to comply with oral hygiene practices and maintenance therapy which were critical for the long-term success of periodontal therapy.

Limitation(s)

Response bias from the participants, limited sample size and confounding bias (Extraneous variables like oral hygiene maintenance, use of mouthwash and the immune system of the patient that could affect the outcome of the study) are the limitations of the study.

CONCLUSION(S)

This present study demonstrated that patients treated with FMD showed an improvement in periodontal clinical parameters, reflecting an improvement in OHRQoL. There was an improvement in the perceived QoL within a short period due to its more efficient treatment and time management. Despite the positive results, QoL is still a matter of concern and should be explored by periodontal research. A future focus could be on the development of more specific questionnaires that can address the impact of periodontitis on OHRQoL.

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