

Oral application of probiotics in the treatment of peri-implant mucositis

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Применение пробиотиков в лечении перимукозитов

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Abstract

Relevance: to evaluate the clinical effectiveness of probiotic as an adjunct to professionally administered plaque removal (PAPR) in the treatment of peri-implant mucositis.

Materials and methods: 42 patients with at least 2 implants with peri-implant mucositis and probing depth (PD) of 3-4 mm were selected and randomly divided into two groups. Test group received PAPR plus probiotic powder (Ente flavin® 4 g), whereas control group received PAPR only. Plaque index (PI), Gingival Index (GI), Bleeding on Probing (BoP), PD were measured at baseline and at days 21, 90, 180 and 360 after treatment.

Results: TEST and control groups involved 21 patients with 61 implants and 21 patients with 59 implants, respectively. All clinical parameters were improved in both groups. Inter-group differences for PI, GI, BoP & PD were found to be statistically significant at all time periods after the treatment in favor of test group ($p < 0.05$).

Conclusion: PAPR alone or in combination with probiotic powder revealed clinical improvements in peri-implant mucositis patients. Better results were obtained with the adjunctive administration of probiotic. Probiotic therapy may be useful for the prevention and treatment of peri-implant mucositis.

Key words: dental implants, probiotic, peri-implant mucositis.

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INTRODUCTION

Peri-implant mucositis is a reversible inflammation of the peri-implant soft tissues with swelling, redness and bleeding upon probing without alveolar bone loss around osseointegrated implants [1]. Peri-implant disease is highly prevalent: 80% of all dental implant patients and 50% of all implants present peri-implant mucositis, and 28-56% of all dental implant patients and 12-43% of all implants present peri-implantitis [2]. The effective conservative methods for the treatment of peri-implant mucositis are based on gentle mechanical debridement alone or in the combination with chlorhexidine, triclosan, ozone, hydrogen peroxide, photodynamic, laser therapy and systemically/locally administered antibiotics [3-11]. Recently, the prominence has been given to the use of probiotics for oral healthcare. Probiotics have been defined by the Food Agricultural Organization/World Health Organization as live microorganisms that can offer health benefits when administered in adequate amounts [12, 13]. The application of Streptococcus, Lactobacillus & Bifidobacterium containing probiotics in the oral cavity offer benefits in the treatment of gingivitis, periodontitis, caries and halitosis via reducing the risk of high levels of Streptococcus mutans; inhibiting the growth of Porphyromonas gingivalis and Prevotella intermedia and reducing the concentrations of cytokines that mediate in inflammatory processes [14-17].

AIM OF THE STUDY

To investigate the clinical effectiveness of oral probiotic application as an adjunct to professionally administered plaque removal (PAPR) in the treatment of peri-implant mucositis.

MATERIAL AND METHODS

The present clinical trial was conducted according to the guidelines of Helsinki Declaration of Human Rights of 1975, as revised in 2008. Systemically healthy patients with at least 2 implants with peri-implant mucositis (probing depth (PD) of 3-4 mm with positive bleeding on probing) were included for the investigation. The current smokers, patients with pregnancy, uncontrolled diabetes, receiving medications/supplements such as probiotics, antibiotics or anti-inflammatory drugs during last 6 months and cases with peri-implant bone loss more than 2 mm were excluded from the study. All the patients received PAPR including comprehensive periodontal treatment, gentle mechanical debridement using titanium curettes and polishing at implant sites with proper oral hygiene recommendations. Forty two patients included for the investigation were randomly divided into two groups. Test group (n=21) received PAPR plus probiotic Ente flavin® 4 g (L. reuteri DSM 26866, L. rhamnosus DSM 21690, L. bulgaricus DSM21690, Bifidobacterium animalis ssp. lactis DSM 17741), whereas control group (n=21) received PAPR only. Patients were asked to let dissolve the probiotic after tooth



Table 1. Comparison of baseline and intergroup parameters

Intergroup comparisons	Groups (n = 21)	Baseline	21 days	90 days	180 days	360 days
Plaque Index	PARP + Probiotic	2.320 ± 0.023	0.510 ± 0.019	0.630 ± 0.013	0.670 ± 0.017	0.780 ± 0.022
	PARP	2.28 ± 0.021 p > 0.05	0.970 ± 0.016 p < 0.001	1.120 ± 0.015 p < 0.001	1.250 ± 0.017 p < 0.001	1.450 ± 0.025 p < 0.001
Gingival Index	PARP + Probiotic	2.040 ± 0.026	0.630 ± 0.018	0.760 ± 0.030	0.710 ± 0.033	0.820 ± 0.029
	PARP	2.060 ± 0.024 p > 0.05	1.330 ± 0.017 p < 0.001	1.510 ± 0.033 p < 0.001	1.570 ± 0.035 p < 0.001	1.650 ± 0.040 p < 0.001
Bleeding on Probing (%)	PARP + Probiotic	82.40 ± 0.75	21.30 ± 0.40	15.70 ± 0.29	12.20 ± 0.30	10.60 ± 0.41
	PARP	82.10 ± 0.87 p > 0.05	26.10 ± 0.36 p < 0.001	20.10 ± 0.33 p < 0.001	17.6 ± 0.29 p < 0.001	14.6 ± 0.38 p < 0.001
Probing Depth (mm)	PARP + Probiotic	3.860 ± 0.057	2.980 ± 0.045	2.570 ± 0.078	2.650 ± 0.054	2.830 ± 0.062
	PARP	3.75 ± 0.051 p > 0.05	3.210 ± 0.042 p < 0.001	2.850 ± 0.046 p < 0.001	2.980 ± 0.036 p < 0.001	3.307 ± 0.070 p < 0.001

Mann Whitney U test, p < 0.05

brushing once a day in the morning during 30 days. They were also instructed not to eat or drink for 1 hour after the use of the probiotics and exclude the use of any additional probiotic containing products during the course of the study. The clinical researcher interrogated each patient to check for compliance or any adverse events that the patient might have noticed during all evaluation period. Changes in general health, use of any anti-inflammatory drugs or oral rinses were also questioned. Plaque index (PI), Gingival Index (GI), Bleeding on Probing (BoP), PD were measured at baseline and at days 21, 90, 180 and 360 after treatment and recorded by the same calibrated examiner using a 0.4 mm diameter 15 mm calibrated periodontal probe (PCP UNC 15, Hu-Friedy, USA). Individually prepared acrylic occlusal stents were used and served as the constant points in order to align the probe properly and reduce the errors associated with probe placement at different time intervals. The occlusal stent was made to cover the occlusal surfaces of all teeth and extended apically on the buccal and lingual surfaces to cover the coronal third of the teeth. Four grooves were placed on the stents so that the measurements at selected implant sites could be made at the same position and angulation at every evaluation periods. The patient was maintained as the unit of measurement. NCSS 2007 & PASS 2008 Statistical Software USA was used for all statistical evaluations. Normality was checked for each continuous variable. Quantitative data was recorded as the mean value ± standard deviation. The balancing of groups by age and gender was tested by Student's t-test and Chi-square test, respectively. Intragroup differences were evaluated by Wilcoxon sign tests. Intergroup differences were analyzed by Mann-Whitney U test. The value of significance was set as p < 0.05.

RESULTS AND DISCUSSION

Peri-implant mucositis is caused by biofilm accumulation which disrupts the host-microbe homeostasis at the implant-mucosa interface, resulting in an inflammatory lesion. Optimal biofilm removal is a prerequisite for the prevention and management of peri-implant mucositis [18]. PAPR including comprehensive periodontal treatment with

proper oral hygiene instructions is recommended during the continuous monitoring of dental implants. Treatment of peri-implant mucositis prevents development of peri-implantitis [3]. Different therapeutic modalities for the non-surgical therapy has gained clinical relevance, resulting in highly satisfactory treatment outcomes. Probiotics have potential in the management of multifactorial diseases such as the periodontal diseases and caries, by more effectively addressing the host-microbial interface to restore homeostasis that may not be achieved with conventional treatments [13]. Probiotics create a biofilm and protect the oral tissues against periodontal pathogens, by occupying the space that the latter would tend to occupy [19].

Clinical effectiveness of probiotic as an adjunct to PAPR in the treatment of peri-implant mucositis were evaluated in this randomized controlled clinical study. Test and control groups involved 21 patients with 61 implants and 21 patients with 59 implants, respectively. Baseline measurements were similar in both groups (p > 0.05). All clinical parameters were improved in both groups, whereas intergroup differences for PI, GI, BoP & PD were found to be statistically significant at all time periods after the treatment in favor of test group (p < 0.05) (Table 1; Figure 1,2). The results of our study are in accordance with the recent studies investigating the effectiveness of the oral probiotic application on the treatment of peri-implant diseases [20, 21]. The key finding of this research was that PAPR with Lactobacillus & Bifidobacterium containing probiotic therapy was clinically effective and this concept can be considered effective for the patients with peri-implant mucositis. Dentists can consider the beneficial effects of the oral probiotics as an alternative therapeutic approach in the prevention and treatment of peri-implant diseases.

CONCLUSIONS

PAPR alone or in combination with probiotic application revealed clinical improvements in peri-implant mucositis patients. Better results were obtained with the adjunctive administration of probiotic. Probiotic therapy may be useful for the prevention and treatment of peri-implant mucositis.

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