

# Comparison of Probiotics Combined with Antimicrobial Photodynamic Therapy in Periodontal Treatment

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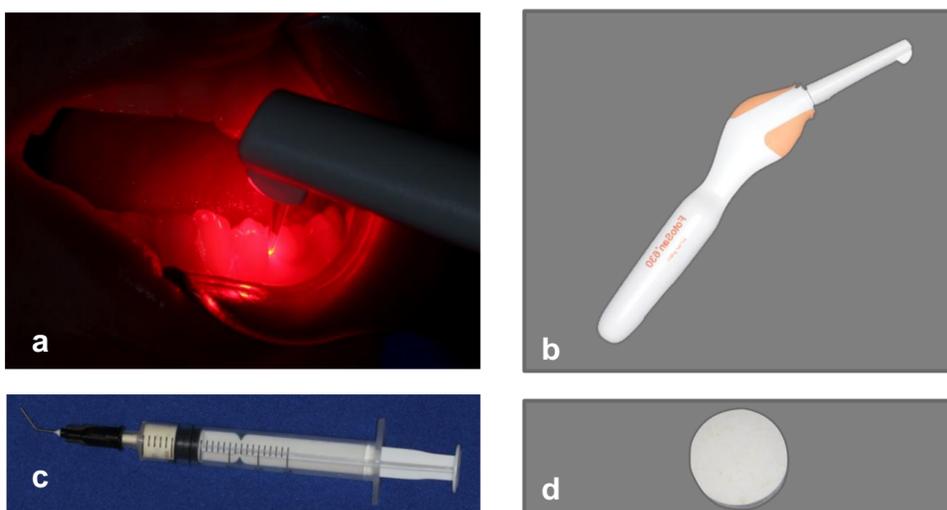
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## Background & Aim

Main goal in periodontal treatment is the reduction or suppression of pathogens causing periodontal destruction. The aim of this study was to evaluate the microbiological and clinical outcomes of antimicrobial photodynamic therapy (aPDT) alone or combined with probiotics as an adjuvant to scaling and root planning (SRP).

## Methods

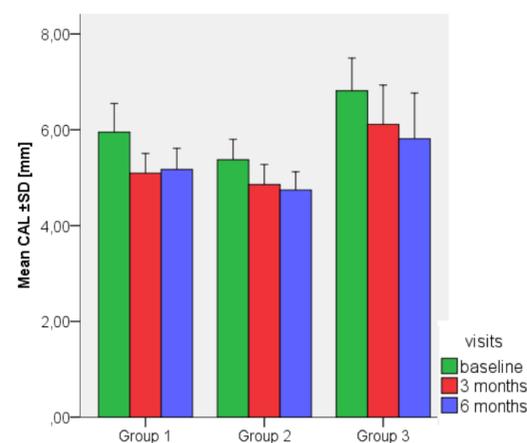
In this randomized controlled clinical trial, 48 chronic periodontitis patients (age: 58±13.59 years; 28 females, 20 males) were included. Clinical attachment loss (CAL), probing pocket depth (PPD), bleeding on probing (BOP) and subgingival microbiological samples (Pado Test, IAI AG, Zuchwil, Switzerland) were recorded at baseline, 3 months and 6 months of follow-up. Patients were randomized into three treatment groups. Group 1 (control) was treated with SRP and chlorhexidine rinse (0.2 %). Group 2 received SRP and adjunctive photodynamic therapy (FotoSan®, CMS Dental, Copenhagen, Denmark) with a photosensitizer (toluidine blue O solution; 0.1 mg/ml) (Figs. 1a-b). Group 3 received SRP, aPDT and probiotics (ProlacSan®, CMS Dental). After SRP and aPDT, the periodontal pockets were treated with a probiotic gel (Fig. 1c) at the same session. Subsequent to the treatment session the patients of group 3 also took probiotic tablets over a period of 3 months (1 tablet/day; daily dose: 62.5mg of *Lactobacillus brevis* and *Lactobacillus plantarum*) (Fig. 1d). To detect differences among groups, ANOVA and a Bonferroni-adjusted post-hoc analysis were performed. Level of significance was set at 5 %, and all analysis were done with SPSS 23 (IBM Corp., Armonk, NY, USA).



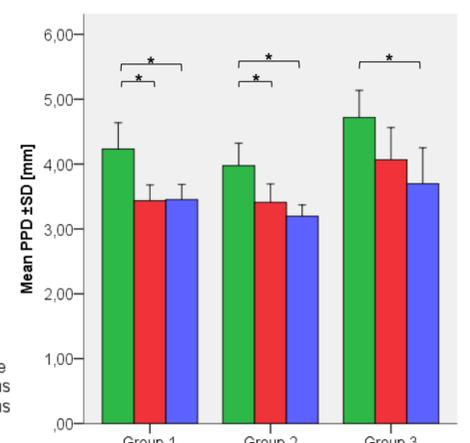
**Fig. 1 a-d:** a) Photodynamic therapy with FotoSan®360-Pen (CMS Dental); wavelength: 620-640 nm, light intensity: 2000-4000 mW/cm<sup>2</sup>  
b) FotoSan®-360-Pen (CMS Dental)  
c) ProlacSan®-gel applicator containing 6 x 10<sup>9</sup> CFU [colony forming unit] of *L. brevis* 7480 CETC and *L. plantarum* 7481 CETC (CMS Dental)  
d) ProlacSan®-tablet containing 1.2 x 10<sup>9</sup> CFU of *L. brevis* 7480 CETC and *L. plantarum* 7481 CETC (CMS Dental)

## Results

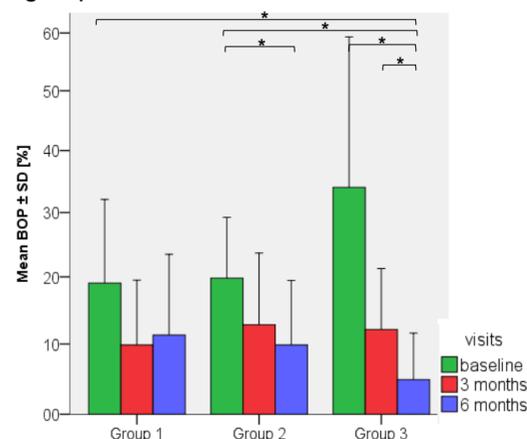
Mean CAL decreased from baseline to 6 months from 5.95±1.12 mm to 5.17±0.82 mm in the control group, from 5.37±0.80 mm to 4.74±0.71 mm in group 2 and from 6.81±1.28 mm to 5.8±1.79 mm in group 3 (Fig. 2). However, the intergroup differences were not significant (p>0.05). Mean PPD decreased significantly (p<0.01) from baseline to 6 months from 4.23±0.76 mm to 3.45±0.43 mm in the control group, from 3.97±0.16 mm to 3.19±0.08 mm in group 2 and from 4.71±0.19 mm to 3.69±0.26 mm in group 3 (Fig. 3). The intergroup differences were also not significant at 3 and 6 months (Fig. 3). BOP decreased significantly in groups 2 and 3 at 6 months compared to baseline (p<0.01) (Fig. 4). The highest reduction of BOP at 6 months when compared to baseline was found in group 3 with 29.12±0.24 % (p<0.01), followed by group 2 (9.93±0.07 %; p<0.01) and group 1 (7.75±0.07 %; p<0.001) (Fig. 5). Microbiologically, higher reductions of relative proportions of red complex bacteria were observed in groups 1 and 3 at 3 and 6 months. Only group 3 presented a significantly higher reduction of *Tannerella forsythia* (47.79%, p<0.05) and *Porphyromonas gingivalis* (61.27%, p<0.01) at 6 months compared to baseline.



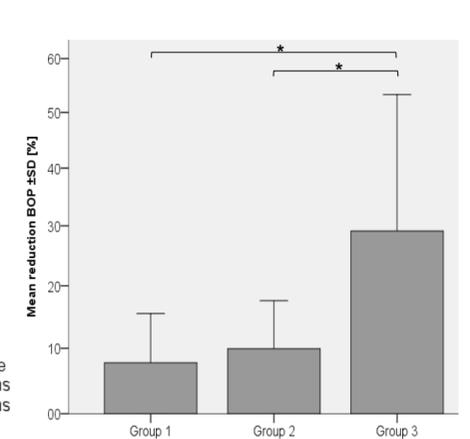
**Fig. 2:** Mean clinical attachment loss [mm] at baseline, after 3 months and after 6 months for all groups



**Fig. 3:** Mean probing depths [mm] at baseline, after 3 months and after 6 months for all groups; \* significantly different (p<0.01)



**Fig. 4:** Mean bleeding on probing [%] at baseline, after 3 months and after 6 months for all groups; \* significantly different (p<0.01)



**Fig. 5:** Mean reduction of bleeding on probing [%] of groups 1-3 after 6 months compared to baseline; \* significantly different (p<0.01)

## Conclusion

Our study shows that adjunctive probiotic treatment may improve clinical and microbiological outcome in chronic periodontitis patients, not only in short-term but also over a follow-up of 6 months.