

Probiotics in oral health and disease: a systematic review

Perrine Saiz, Nuno Taveira and Ricardo Alves, Centro de Investigação Interdisciplinar Egas Moniz (CiiEM), Instituto Universitário Egas Moniz, 2829-511 Monte de Caparica, Portugal. Corresponding author: Nuno Taveira (ntaveira@egasmoniz.edu.pt)

Table S4- Characteristics of clinical trials of probiotics in gingivitis and gingival health

Reference Oral condition	Parameters evaluated - Evaluation time	Study design - Groups of study	Sample size (at the end of the study) - Age or age group	Vehicle - Administration time	Probiotic strain(s) used (Dose)
Alanzi <i>et al.</i>, 2018 Gingival health	Clinical: PI, GI / Microbiological (saliva and plaque samples) - baseline and 4 weeks	RCT placebo-controlled, double-blind - Probiotic group and Placebo group	101 healthy patients - 13-15 years	Lozenges - 4 weeks (twice a day)	<i>Lactobacillus rhamnosus</i> , <i>Bifidobacterium lactis</i> (4.8 x 10 ⁸ CFU each)
Deshmukh <i>et al.</i>, 2017 Gingival health	Clinical: OHI-S, PI, GI - baseline, 7, 14 days	RCT placebo-controlled, triple blind - Group A: HiOra 15mL/Group B: CHX 0.2%/Group C: probiotic (dissolved in 20mL water)	45 healthy patients - 18-21 years	Mouthwash - 14 days (twice a day for 60 seconds)	<i>Lactobacillus rhamnosus</i> , <i>Bifidobacterium longum</i> , <i>Lactobacillus acidophilus</i> , <i>Saccharomyces boulardii</i> (1.25 x 10 ⁹ CFU)
Kuru <i>et al.</i>, 2017 Gingival health	Clinical: PI, GI, PD, BOP/ Immunological: GCF volume, levels of IL-1 - baseline, 28, 33 days (5 days without brushing)	RCT placebo-controlled, simple blind - Probiotic group: 110g yogurt + probiotic Placebo group: yogurt 110g	51 healthy patients - 16-26 years	Yogurt 110mg - 28 days (once a day)	<i>Bifidobacterium animalis subsp. lactis</i> DN-173010 (>10 ⁸ CFU)
Yousuf <i>et al.</i>, 2017 Gingival health	Clinical: GI, PI - baseline, 7, 14, 21 days	RCT controlled, double-blind - Group A: probiotics/Group B: lyophilized lactic acid bacillus/Group C: placebo of calcium carbonate powder 250 g	22 healthy patients - 12-15 years	Lyophilized preparation - 3 weeks (once a day)	<i>Bifidobacterium longum</i> , <i>Lactobacillus acidophilus</i> , <i>Bifidobacterium bifidum</i> , <i>Bifidobacterium lactis</i> and lactic acid <i>Bacillus</i>
Hallström <i>et al.</i>, 2013 Experimental gingivitis	Clinical: GI, PI, BOP/Microbiological/ Immunological: GCF volume, levels of cytokines - baseline, 3 weeks	RCT, cross-controlled, double-blind Run in 2 weeks / intervention 3 weeks / washout 2 weeks / intervention 3 weeks - Probiotic group and Placebo group	18 healthy women - mean age 38 years	Lozenges - 3 weeks (twice a day)	<i>Lactobacillus reuteri</i> DSM17938 and ATCC PTA 5289
Keller <i>et al.</i>, 2018 Gingivitis	Clinical: BOP, PI/Immunological: GCF volume, levels of IL-1 β , IL-6, IL-8, IL-10, TNF- α in GCF - baseline, 2, 4, 6 weeks	RCT placebo-controlled, double-blind - Probiotic group and Placebo group	47 patients with at least 2 sites with moderate gingival inflammation according to the Löe index, with PD \leq 5 mm - mean age 26,9 years	Tablet - 4 weeks (twice a day)	<i>Lactobacillus rhamnosus</i> PB01, DSM 14869, <i>Lactobacillus curvatus</i> EB10, DSM 32307
Sabatini <i>et al.</i>, 2017 Gingivitis in diabetics type II	Clinical: PI, BOP - baseline and 30 days	RCT controlled, double-blind - Probiotic group and Control group	80 patients with diabetes type II controlled and generalized gingivitis - mean age 47 years	Tablet - 30 days (twice a day)	<i>Lactobacillus reuteri</i> DSM 17938 and ATCC PTA 5289
Alkaya <i>et al.</i>, 2017 Gingivitis	Clinical: PI, GI, PD, BOP, coating lingual - 3 and 8 weeks	RCT placebo-controlled, double-blind - Probiotic group and Placebo group	40 healthy patients, generalized gingivitis - 18-31 years	Toothpaste, mouthwash, cleanser brush (3 modes of application) - 8 weeks (twice a day)	<i>Bacillus subtilis</i> , <i>Bacillus megaterium</i> , <i>Bacillus pumilus</i> (5.9 x 10 ⁷ spores)
Montero <i>et al.</i>, 2017 Gingivitis	Clinical: PI, GI/Microbiological - baseline and 6 weeks	RCT placebo-controlled, double-blind - Probiotic group and Placebo group	52 patients with gingivitis - 18-55 years	Tablet - 6 weeks (twice a day)	<i>Lactobacillus plantarum</i> , <i>Lactobacillus brevis</i> , <i>Peiococcus acidilactici</i> (1 x 10 ³ CFU each)
Schlagenhauf <i>et al.</i>, 2016 Gingivitis in pregnant women	Clinical: GI, PI/Microbiological: <i>P. intermedia</i> /Immunological: levels of TNF- α - baseline and 2 days <i>postpartum</i>	RCT placebo-controlled, double-blind - Probiotic group and Placebo group	45 healthy women with pregnancy gingivitis (3 rd trimester of pregnancy) - 24-40 years	Tablet - Twice a day until birth (about 7 weeks)	<i>Lactobacillus reuteri</i> DSM17938 and ATCC PTA 5289 (> 10 ⁸ CFU each)
Nadkerny <i>et al.</i>, 2015 Gingivitis	Clinical: PI, GI, IHO-S - baseline, 2 and 4 weeks	RCT, controlled - Group A: probiotics/Group B: 0.02% CHX (positive control)/Group C: saline solution (negative control)	45 healthy patients with chronic gingivitis - 20-30 years	Mouthwash - 15 days (twice a day for 60 seconds)	<i>Lactobacillus rhamnosus</i> , <i>Bifidobacterium longum</i> , <i>Lactobacillus acidophilus</i> , <i>Saccharomyces</i> , <i>Lactobacillus sporogenes</i> (1.25 x 10 ⁹ CFU)
Lee <i>et al.</i>, 2015 Experimental gingivitis	Clinical: PI, GI, BOP/ Immunological: levels of MMP-8, PGE2, NO in GCF samples - baseline, 3, 7, 10 and 14 days (PI and GI weren't evaluated on days 3,10)	RCT placebo-controlled, double-blind - Probiotic group and Placebo group	18 healthy patients - mean age 38 years	Lozenges- 3 weeks (twice a day)	<i>Lactobacillus brevis</i> CD2
Dhawan & Dhawan 2013 Gingivitis	Clinical: PI, GI, tarter - baseline, 14, 28 days	RCT placebo-controlled, double-blind - Group B probiotic and Group A placebo	36 healthy patients with chronic gingivitis - mean age 21 years	Tablet - 2 weeks (twice a day)	<i>Lactobacillus sporogenes</i> (100 x 10 ⁶ CFU), <i>Streptococcus faecalis</i> PC (60 x 10 ⁶ CFU), <i>Clostridium butircum</i> TO-A (4 x 10 ⁶ CFU), <i>Bacillus mesentericus</i> TO-A (2 x 10 ⁶ CFU)

Iniesta <i>et al.</i>, 2012 Gingivitis	Clinical: PI, GI/ Microbiological (saliva and subgingival samples) - baseline, 4 and 8 weeks (weeks 2, 4, 6, 8 monitoring probiotic colonization)	RCT prospective cross-over, placebo-controlled, double-blind Intervention 4 weeks/ washout 4 weeks/ intervention 4 weeks - Probiotic group and Placebo group	40 healthy patients with gingivitis - 20-24 years	Tablet - 4 weeks (once a day)	<i>Lactobacillus reuteri</i> DSM17938 and ATCC PTA5289 (2.9 x 10 ⁸ CFU)
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