The effect of choline-stabilized orthosilicic acid on periodontitis: a randomized, double-blind, placebo controlled study

Wim Teughels [1], DDS, PhD, Sara Persyn [2], PhD, Cenk Haytac[3], DDS, PhD
[1]Department of Oral Health Sciences, KU Leuven & Dentistry (Periodontology), Leuven, Belgium
[2]Research & Development, Bio Minerals NV, Destelbergen, Belgium
[3]Dentistry Faculty, The Department of Periodontology, Cukurova University, Adana, Turkey

INTRODUCTION

Periodontitis is an inflammatory disease resulting in an often painless destruction of the tooth-supporting tissues that can lead to tooth loss. This destruction is caused by a mixture of micro-organisms in the periodontal pocket in a direct and/or indirect way. Choline-stabilized orthosilicic acid (CS-OSA) was previously found to stimulate bone collagen formation in osteopenia[1] and to improve biomarkers of cartilage degradation in knee osteoarthritis[2,3].

OBJECTIVES

The aim of the study was to investigate the effect of oral administration of CS-OSA on symptoms of periodontitis in a randomized, double-blind, placebo-controlled study.

METHODS & MATERIAL

- Patients with severe, generalized periodontitis characterized by the presence of more than 14 teeth of which 14 or more than 14 teeth had at least one site (of the 6 measured sites per tooth) with an attachment loss of 6 or more than 6 mm prior to initial non-surgical periodontal therapy were included.
- 85 patients were randomly allocated to either receive a capsule with CS-OSA (520 mg beadlets containing 5 mg of silicon and 100 mg of choline in the form of CS-OSA, Bio Minerals NV, Belgium, n=42) or placebo (n=43) twice daily for 6 months.
- At the baseline visit (T0), an initial periodontal examination was performed (probing pocket depth (PPD), bleeding on probing (BOP), recession (REC), plaque index (PI) and gingival index (GI)) followed by a Full Mouth One Stage Disinfection treatment.
- Measurements were repeated after three (T3) and six (T6) months.
- Subcategory analysis:
  - *Dental hygiene, patient level*: teeth with a PI ≥ 4 after baseline were excluded from the analysis. Subcategories were made based on the PPD.
  - *Shallow pockets, tooth level*: only teeth with a PPD ≤ 3 for all of the six measured sites were included for the analysis.

RESULTS

72 patients with severe, generalized periodontitis completed the study. No significant differences were found in PPD, BOP and REC after 3 and 6 months of treatment with CS-OSA versus placebo when all teeth of all patients were included in the analysis.

Dental hygiene

In the subgroup of patients with good dental hygiene, PPD improved significantly compared to baseline for both groups after 3 and 6 months. The PPD value after 3 and 6 months of treatment was significantly higher in the extreme pockets of the placebo group compared to the CS-OSA group (p<0,05) (Table 1, Fig. 1).

		Placebo (n= 32)		CS-OSA (n= 38)	
	Time	Mean ± SD	change ± SD	Mean ± SD	change ± SD
All	T0	4,48 ± 0,75		4,23 ± 1,03	
	T3	3,34 ± 0,76[a]	-1,14 ± 0,73	2,98 ± 0,76[a]	-1,25 ± 0,64
	T6	3,18 ± 0,82[a]	-1,30 ± 0,85	2,93 ± 0,83[a]	-1,30 ± 0,82
Extreme	T0	10,29 ± 0,49		10,09 ± 0,14	
	T3	7,56 ± 2,06[a]	-2,73 ± 1,80	6,37 ± 1,06[a;b]	-3,72 ± 1,11
	T6	7,02 ± 2,29[a]	-3,26 ± 2,01	5,78 ± 1,73[a;b]	-4,30 ± 1,79

a: p<0,05 vs baseline, b: p<0,05 vs placebo (Linear Mixed Model)

Table 1: PPD measures at baseline, 3 months and 6 months in the placebo and CS-OSA group. Subcategories were determined according to PPD ("All"; "Extreme": PPD≥10mm), total number of patients was 70.

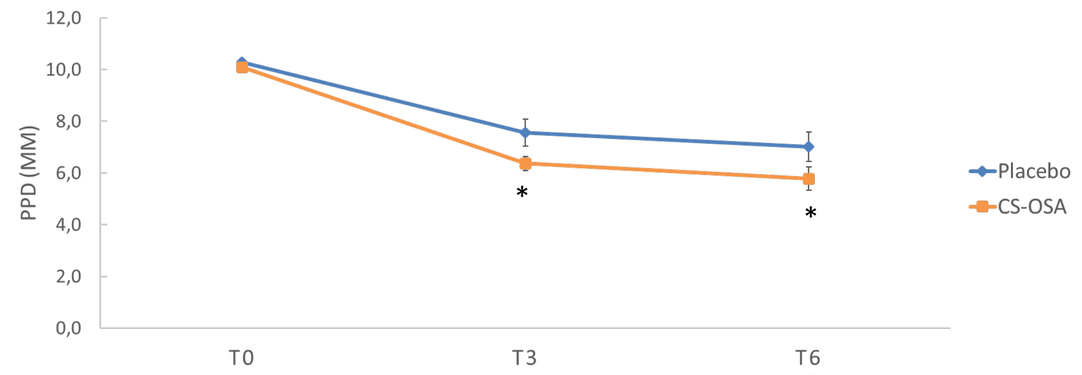

Fig. 1: Mean PPD (± SE) measures on baseline and after 3 months and 6 months of treatment for the subcategory extreme pockets (PPD≥10mm).
*: p<0,05 vs placebo (Linear mixed model)

Shallow pockets

Analysis of the shallow pockets showed that PPD improved significantly compared to baseline after 3 months in the placebo group and after 3 and 6 months in the CS-OSA group (p<0,05). The PPD after 6 months of treatment is significantly lower (p<0,001) in the CS-OSA group compared to the placebo group. Furthermore, the change in PPD after 6 months was significantly higher in the CS-OSA group compared to placebo (p<0,001) (Table 2, Fig. 2).
BOP decreased significantly compared to baseline after 3 and 6 months in the CS-OSA group, while BOP did not significantly change after 6 months in the placebo group. The change in BOP after 6 months was significantly higher in the CS-OSA group compared to the placebo group (p<0,05) (Table 2, Fig. 3).

		Placebo (n= 17)		CS-OSA (n=20)	
	Time	Mean ± SE	change ± SE	Mean ± SE	change ± SE
PPD (mm)	T0	2,31 ± 0,09		2,24 ± 0,09	
	T3	2,15 ± 0,10[a]	-0,16 ± 0,06	1,92 ± 0,09[a]	-0,32 ± 0,06
	T6	2,26 ± 0,10	-0,05 ± 0,08	1,74 ± 0,10[a;b]	-0,50 ± 0,07[b]
BOP (N)	T0	3,41 ± 0,39		3,38 ± 0,37	
	T3	2,31 ± 0,36[a]	-1,11 ± 0,28	2,30 ± 0,34[a]	-1,08 ± 0,27
	T6	3,15 ± 0,37	-0,26 ± 0,30	2,22 ± 0,34[a]	-1,17 ± 0,29[b]

a: p<0,05 vs baseline, b: p<0,05 vs placebo (Linear Mixed Model)

Table 2: PPD and BOP measures of shallow pockets at baseline and after 3 and 6 months supplementation with placebo or CS-OSA in 37 patients.

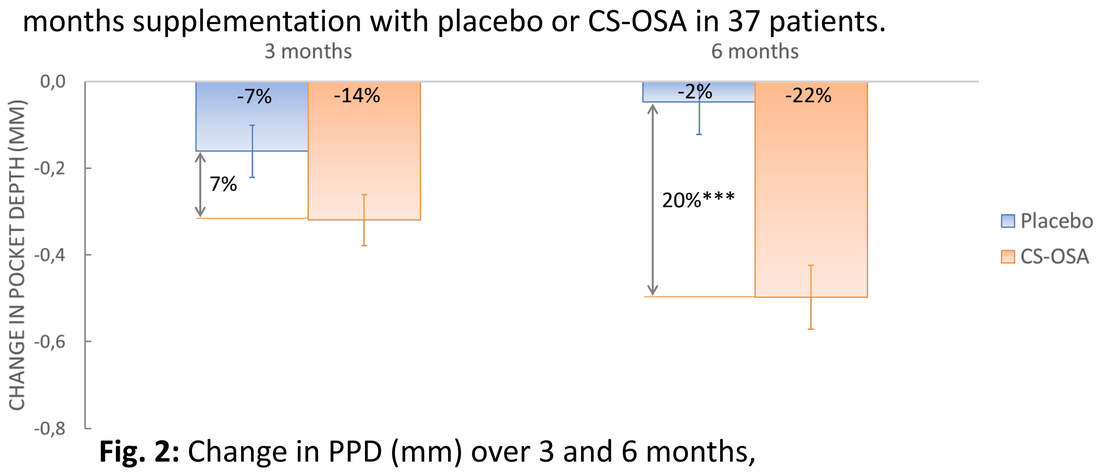

Fig. 2: Change in PPD (mm) over 3 and 6 months,
***: p<0,001 vs placebo (Linear mixed model)

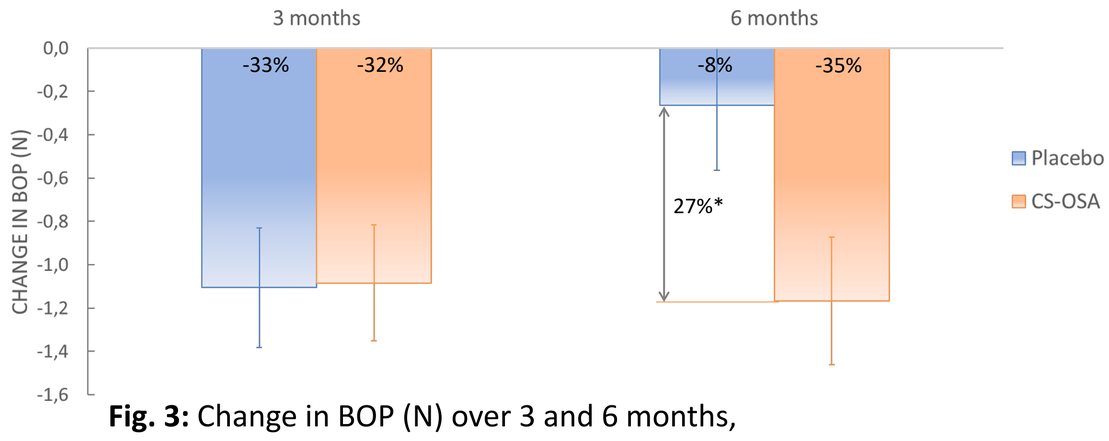

Fig. 3: Change in BOP (N) over 3 and 6 months,
*: p<0,05 vs placebo (Linear mixed model)

CONCLUSION

This study indicates that choline-stabilized orthosilicic acid may have a preventive action against the development of periodontitis and associated tooth loss.

REFERENCES

[1]Spector et al. Choline-stabilized orthosilicic acid supplementation as an adjunct to calcium/vitamin D3 stimulates markers of bone formation in osteopenic females: a randomized, placebo-controlled trial. BMC Musculoskeletal Disorders 2008, 9: 85.
[2]Geusens et al. Effect of choline-stabilized orthosilicic acid on symptoms of knee osteoarthritis in a randomized double-blind, placebo-controlled trial. Annals of the Rheumatic Diseases – The EULAR Journal 2014, 73 Suppl.2: 753.
[3]Geusens et al. A 12-week randomized, double-blind, placebo-controlled multicenter study of choline-stabilized orthosilicic acid in patients with symptomatic knee osteoarthritis. BMC Musculoskeletal Disorders 2017, 18(1): 2.

Presented at the 97th Annual Session of the Greater New York Dental Meeting in 2021