

To chew or not to chew ...



Salivary Phosphate-Binding Chewing Gum Reduces Hyperphosphatemia in Dialysis Patients

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Rationale

In uremic patients, hyperphosphatemia is associated with cardiovascular calcification and increased cardiovascular mortality. Despite the use of phosphate binders, only half of hemodialysis (HD) patients achieve recommended serum phosphate levels. A hyperphosphoric salivary content, which correlates linearly with serum phosphate, has been reported in HD patients. We hypothesized that binding salivary phosphate during periods of fasting in addition to using phosphate binders with meals could improve the treatment of hyperphosphatemia. We assessed the phosphate-binding capacity of the natural polymer

Study profile

- « Principle of proof », open label study

- Inclusion criteria:

HD patients with serum P > 1.92 mmol/L

- Exclusion criteria:

Acute infections, malignancy, inflammatory syndromes, Sjögren's syndrome, diabetic neuropathy ...

- Study profile

6 wks observational period, 2wks interventional, 4 wks observational...

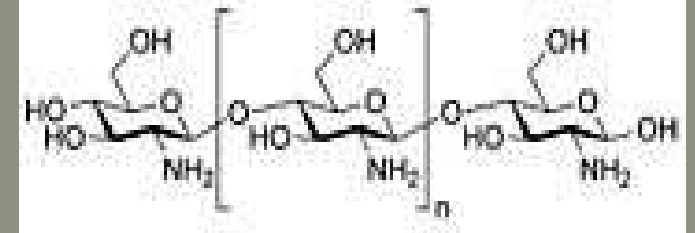
- Intervention:

to chew the gum two times a day during fasting periods for 60 min and to spit it out at the end of the chewing session

- Measurements:

salivary and serum P04, serum ca, serum PTH

In Vitro Study of Chitosan's Phosphate-Binding Properties



20 mg-chitosan-loaded chewing-gums

Table 1. Results of the "in vitro" determination of PO₄ binding capability by low and medium viscosity chitosan

Chitosan (g/ml)	PBS	Low Viscosity		Medium Viscosity	
		PBS	Chitosan	PBS	Chitosan
Protocol A (%)					
2	1	0.90	0.10	0.85	0.15
10	1	0.85	0.15	0.75	0.25
15	1	0.80	0.20	0.67	0.33
Protocol B (%)					
				Liquid Phase	Chitosan
10	1			0.70	0.30
20	1			0.50	0.50

Population clinical and demographical characteristics

Table 2. Patients characteristics^a

Patient	Gender	Age (yr)	Dialytic Age	Sevelamer HCl Daily Dosage (mg [no. of pills/d])	Serum PO ₄	Ca ²⁺	PTH
1	F	65	12	4800 (6)	7.08 ± 0.12	8.75 ± 0.26	658.33 ± 11.25
2	M	63	18	4000 (5)	6.32 ± 0.12	8.58 ± 0.21	223.33 ± 25.03
3	M	58	18	4800 (6)	7.85 ± 0.76	8.17 ± 0.36	287.67 ± 30.87
4	M	62	96	4800 (6)	8.95 ± 0.54	8.03 ± 0.47	703.33 ± 42.27
5	M	55	17	3200 (4)	6.07 ± 0.08	8.27 ± 0.23	251.00 ± 26.50
6	M	62	22	4800 (6)	7.52 ± 0.12	8.88 ± 0.08	358.33 ± 7.53
7	M	30	14	4800 (6)	7.27 ± 0.41	8.87 ± 0.36	375.00 ± 18.71
8	M	78	264	4800 (6)	6.93 ± 0.31	8.60 ± 0.21	828.00 ± 56.36
9	F	56	204	4000 (5)	6.58 ± 0.60	9.13 ± 0.56	143.00 ± 3.46
10	F	58	180	4800 (6)	8.30 ± 0.30	8.90 ± 0.09	735.00 ± 28.81
11	M	62	72	4800 (6)	7.40 ± 0.09	8.82 ± 0.08	665.00 ± 12.25
12	M	71	84	4800 (6)	7.22 ± 0.33	8.75 ± 0.14	678.33 ± 14.72
13	F	69	27	4800 (6)	6.88 ± 0.10	8.90 ± 0.24	133.83 ± 4.92

^aData are means ± SD.

Results

Table 3. Parameters at baseline (T0), during chewing gum use (weeks 1 and 2), and after chewing gum discontinuation (weeks 4 and 6; $n = 13$)^a

Parameter	Baseline T0	Chewing-Gum Add-on		Follow-up (after Chewing Gum Discontinuation)	
		Week 1	Week 2	Week 4	Week 6
Serum Ca (mg/dl)	8.41 ± 0.98	8.35 ± 0.54	8.45 ± 0.63	8.45 ± 0.70	8.58 ± 0.70
PTH (pg/ml)	508.42 ± 283.88	444.75 ± 238.80	397.67 ± 254.20	382.92 ± 221.80	496.35 ± 285.75
Salivary P (mg/dl)	73.21 ± 19.19	52.02 ± 12.89	33.19 ± 6.53	68.91 ± 16.05	75.33 ± 18.11
Serum P (mg/dl)	7.60 ± 0.91	5.38 ± 0.81	5.25 ± 0.89	5.64 ± 1.02	7.55 ± 0.75
Calcium-phosphate product	63.82 ± 10.01	45.68 ± 6.45	44.30 ± 7.99	47.75 ± 9.89	64.71 ± 8.03

^aData are means ± SD.

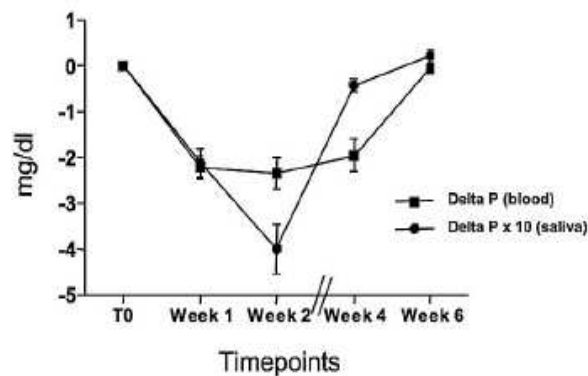


Figure 1. Serum and salivary PO₄ levels (mg/dl) at baseline (T0), at 7 d (week 1) and 14 d (week 2) of chewing gum use, and at 14 d (week 4) and 30 d (week 6) after chewing gum discontinuation.

Discussion

- Preliminary observations
- Direct salivary phosphate binding by chitosan
- After chewing cessation delayed increase in serum PO₄ worth investigating... (explains PTH trend ?)
- Useful approach to the dietary management of serum PO₄ ?
- Feasibility ? elderly, toothless patients ?

Conclusion



Merci pour votre attention