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INTRODUCTION

- Patients with end stage renal disease (ESRD) in dialysis could present taste abnormalities that affect food palatability, food intake, and nutrition status.
- On the other hand, taste test is not part of the routine nutritional assessment; therefore, there is a few information about the frequency of the taste disturbance among this patients.

- There is no published information related to altered taste perception and nutritional status.
- **Objective:** to evaluate the perception of the five basic tastes and its relationship with the nutritional status of patients on dialysis.

PATIENTS AND METHODS

Cross-sectional analytic study

- We evaluated 74 patients with ESRD on dialysis with at least two months in this therapy. Exclusion criteria were smoking, complete dental prosthesis, and upper airway infections.
- Identification of the five basic tastes (sweet, salty, sour, bitter and umami) were evaluated with Barcenás's paired taste test¹. The products and concentrations for the test are shown in Table 1.
- The taste test were performed with fasting of at least 4 hours. Each taste was tested randomly with 10 ml and patients were asked to mention the perceived taste. Altered taste perception was considered as the wrong identification of at least one taste.

- Additionally, taste intensity was evaluated using an analog visual scale, (Figure 1). Mouth rinsing with distilled water was indicated between each flavor test.

Figure 1. Flavor intensity scale

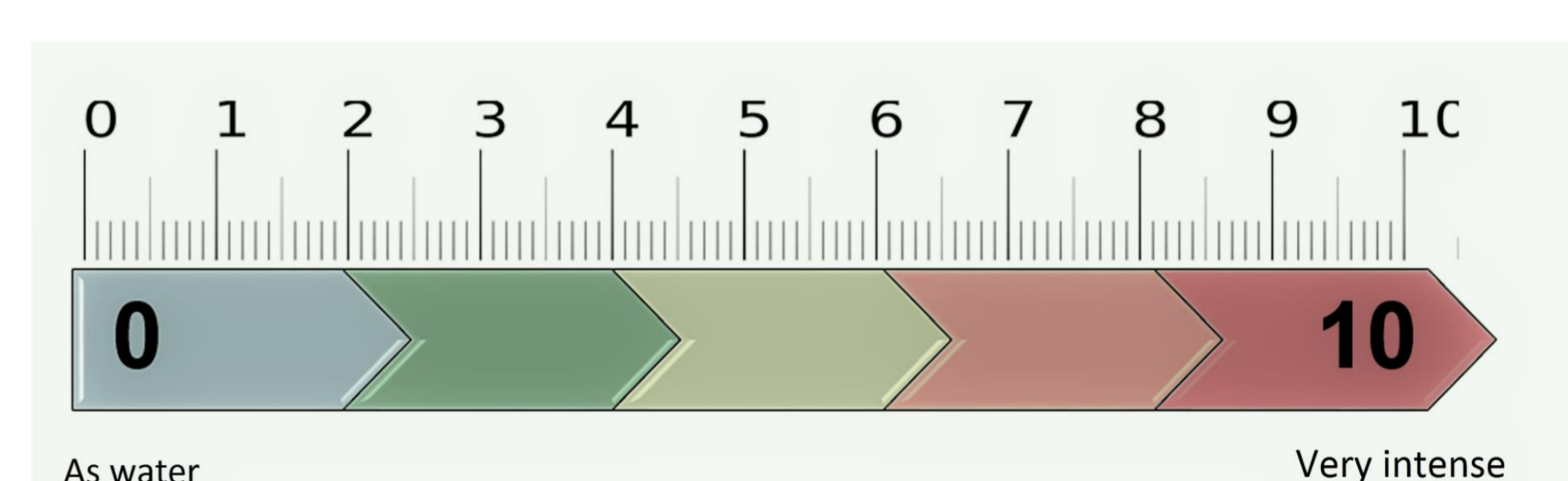


Table 1 Products and concentrations for the preparation of taste test

Taste	Product	Concentration
Sweet	Saccharose	2%
Salty	Sodium chloride	0.5%
Sour	Citric acid	0.1%
Bitter	Caffeine	0.06%
Umami	Monosodium glutamate	0.25%

- Demographic, clinical, dietetic, anthropometric and biochemical variables were collected; additionally, dialysis malnutrition score (DMS) and gastrointestinal symptoms were evaluated.

- **Statistical analysis:** descriptive statistics, χ^2 , student-t test and Mann Whitney U-test. A p value > 0.05 was consider significant.

RESULTS

Figure 2. Alteration taste perception frequency

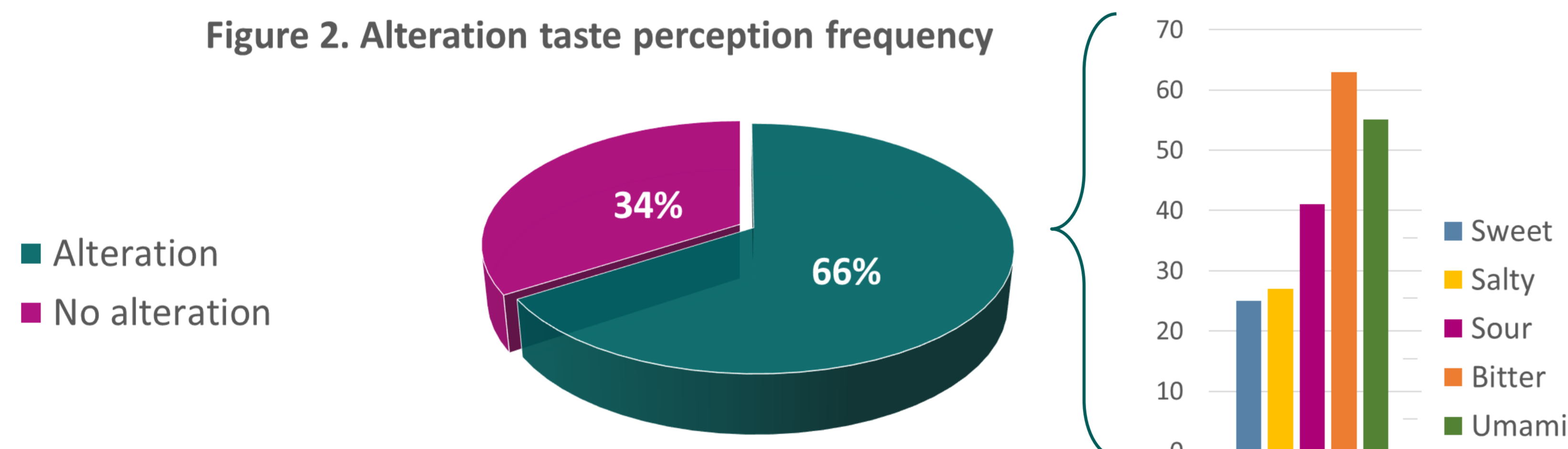


Table 2. Comparison on taste intensity and nutritional variables according to the alteration in taste perception

Taste intensity	Alteration n=21	No alteration n=33	P
Sweet	5.0 ± 2.6	6.0 ± 2.6	0.14
Salty	6.4 ± 2.8	7.1 ± 2.2	0.41
Sour	5.9 ± 2.4	6.2 ± 2.4	0.47
Bitter	4.1 ± 3.5	5.6 ± 2.4	0.07
Umami	5.7 ± 2.6	7.4 ± 2.6	0.07

Anthropometric and dietary intake characteristics

Triceps skin fold, mm	13.4±5.7	13.9±5.7	0.67
Biceps skin fold, mm	10.0±4.8	10.0±5.2	0.14
Middle arm circumference, cm	26.4±4.6	28.1±5.8	0.74
DMS score			
Normal, %	0	100	0.11
Mild malnutrition, %	100	92	0.11
Self-perceived taste change, %	67	33	1.0
Energy intake, kcal/day	1596 ± 737	1643 ± 493	0.20
Protein intake, g/day	70.3 ± 25.6	79.6 ± 27.5	0.16
Sodium intake, mg/day	1212 ± 813	1047 ± 700	0.39
Phosphorus intake, mg/day	875 ± 434	1048 ± 420	0.03
Potassium intake, mg/day	1735 ± 690	2151 ± 709	0.01
Coffee consumption, %	5	20	0.21
Add salt to meals, %	10	20	0.44
Add sugar to meals, %	30	34.5	0.76

Gastrointestinal symptoms frequency

Anorexy	16.3	24	0.53
Nausea	18.4	12	0.74
Vomit	16.3	8	0.47
Gastroesophageal reflux	36.7	28	0.60

Table 3. Comparison of clinical and biochemical characteristics by group

Variable	Alteration (n=21)	No alteration (n=33)	P
Clinical characteristics			
Males, %	72.7	27.3	0.33
Age, years	35.9 ± 14.3	35.2 ± 13.1	0.98
Dialysis vintage, years	2.5 (1.5-5.7)	3 (1.5-5)	0.98
Type of dialysis (HD/PD), %	61/74	40/26	0.31
Biochemical values			
Glucose, mg/dL	94 (84-110)	166 (150-239)	0.04
Urea, mg/dL	96 (28-131)	84 (25-111)	0.39
Albumin, g/dL	3.9 (3.4-4.3)	3.7 (3.5-4.1)	0.67
Phosphorus mg/dL	6.2 (4.7-7.7)	4.6 (3.7-5.6)	0.007
Calcium, mg/dL	8.8 (8.0-11.2)	9.2 (8.4-9.2)	0.77
Potassium, mEq/L	4.9 (4.4-5.4)	4.8 (4.2-5.3)	0.50
Cholesterol, mg/dL	150 (126-172)	179 (137-195)	0.23
Triglycerides, mg/dL	126 (93-175)	118 (93-171)	0.85

Table 4. Logic regression to identify associated factors to altered taste perception

($\chi^2 = 12.31$ p = 0.006)

Variable	RR	IC 95%	p
Weight	3.4	0.99-1.12	0.086
Protein intake g/kg/day	12.3	3.14-12x10 ³	0.012
Iron intake	6.1	0.554-0.99	0.049

Independent variables: Dialysis vintage, creatinine, albumin, total cholesterol, triglycerides, energy/kg/day, selenium, iron, phosphorus and vitamin-D intake.

CONCLUSIONS

- Altered taste perception was frequent in dialysis patients.
 - Bitter and umami tastes were the most prevalent altered tastes.
 - Presence of malnutrition seemed to be no associated with altered taste perception.
 - Phosphorus and potassium intake was higher in the no altered perception group; nevertheless phosphorus concentrations is higher in patients with altered taste perception.
 - Protein and iron intake and marginally the weight were the associated factors to the presence of altered taste perception.
 - Is necessary to increment the sample and include patients with different grades of malnutrition.
- Reference: ¹Barcenás E. El panel de catadores. En: Ibañez FC. Barcina Y. Análisis sensorial de alimentos. Métodos y aplicaciones. Springer. Barcelona, España. 2001: 73-85.