

MICROMINERAL CHARACTERIZATION OF BONE TISSUE IN HUMAN MAXILLA. PRELIMINARY STUDY

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BACKGROUND

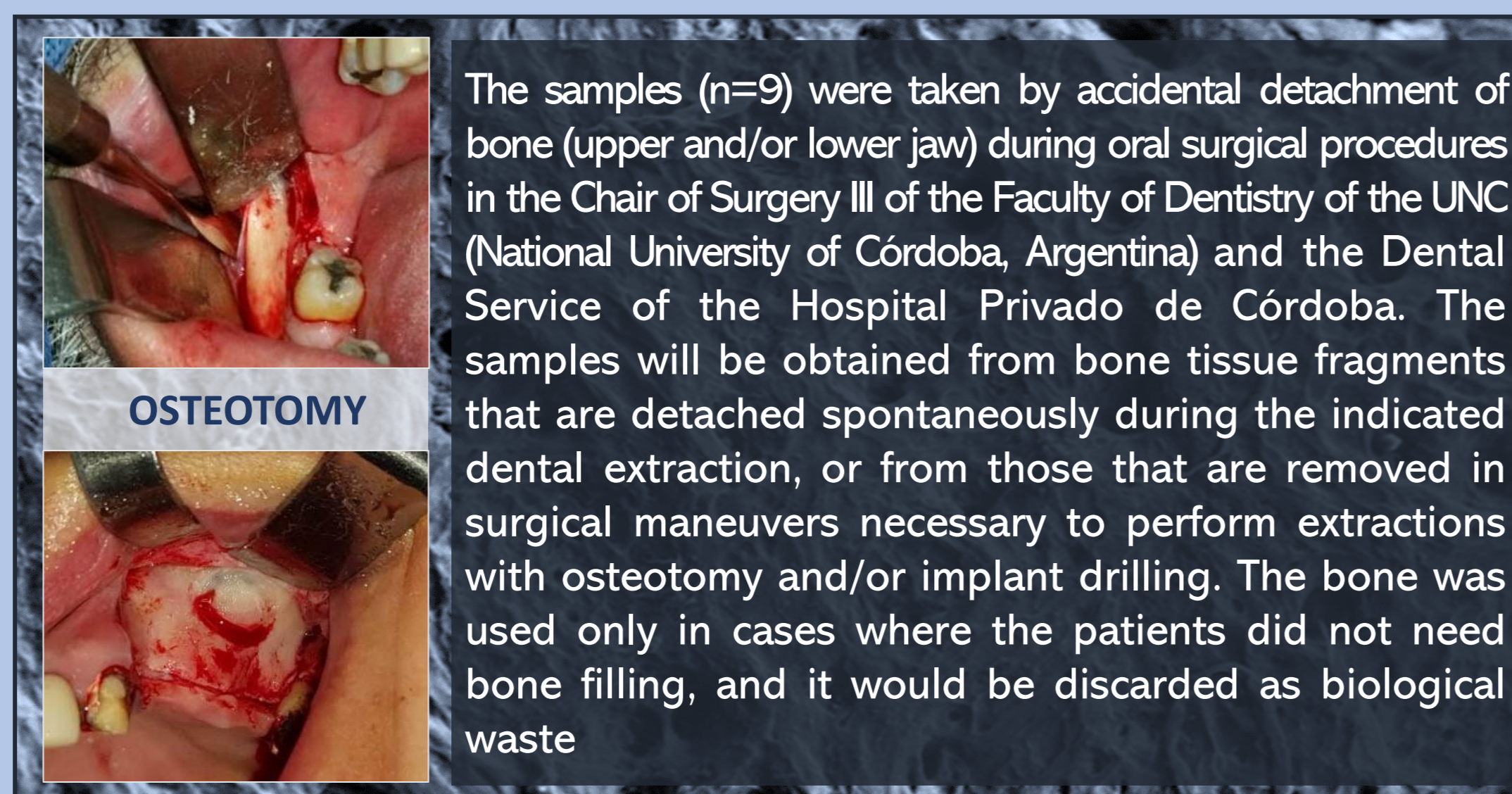
It is known that there are different factors that influence the mineral composition of bones. In recent years, there have been deep changes in the way of living, and lifestyles have changed, as well as the supply of the food and beverage market. There is a tendency towards the choice of packaged and processed foods outside the home, with low nutritional value and high energy value, in addition to the selection of sugar-sweetened beverages. Simple sugars are, for the World Health Organization, critical nutrients, because their access to it is associated with obesity, metabolic syndrome, and indirectly with diabetes, cardiovascular diseases and cancer. Consequently, it is important to reduce your intake to below 10% of your total caloric intake, and avoid excess of starches. The sucrose belongs to this group of foods, it is a substance of high consumption in the general population. In Argentina, it has an average of 45 grams per inhabitant per day, when the recommended is 22. A diet rich in sucrose affects the mineralization of all hard tissues in general, by mechanisms that are not fully applied and that are the subject of constant research. In relation to bone tissue, it was observed that the volume and thickness of the trabecular bone decreased, altering its material properties, with the consequent decrease in resistance to mechanical forces and fracture in the lower tibiae of rats of both sexes, together with the reduction of calcium and phosphorous concentrations, decreasing mineralization. In addition, a slower bone neoformation was observed in exodontia in rats, resulting in a bone with a lower percentage of calcium and phosphorus, osteocytic lagoons of greater size and lower final bone volume.

AIM

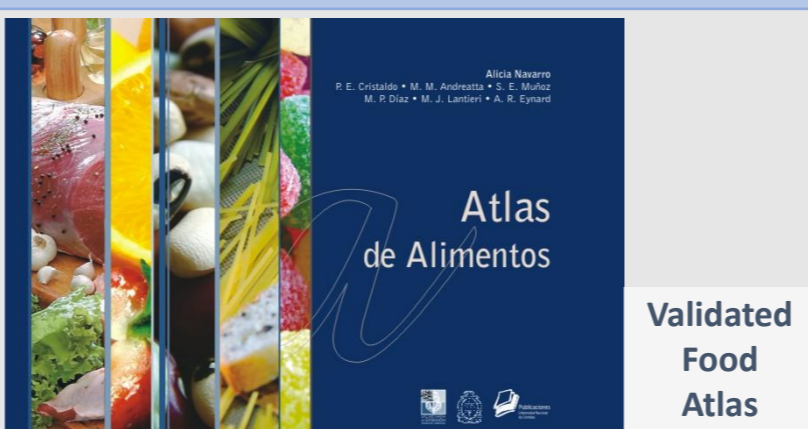
To study changes in the mineral composition of the maxillary bone caused by nutritional factors.

The general objective of the present work was to analyze the changes in the tissue of human jawbones, caused by a diet rich in sucrose, focused mainly on changes in mineral proportions and morphological changes.

MATERIAL AND METHODS



A specific medical history was carried out with protection of personal data, informed consent with clear explanations to the patient and a nutritional survey designed specifically for this study in order to identify individuals with a consumption of more than 40 grams of sucrose per kilogram of weight. The questionnaire was self-administered with the support of a validated food atlas, and was subjected to a reliability and feasibility process, obtaining an interobserver kappa index of 0.83, stability had a k value of 0.67 and consistency with a value of 0.69. The patients were distributed into 2 groups: **EXPERIMENTAL** and **CONTROL**. In this preliminary work, samples were taken from 9 patients, of which 3 met the requirements of the sucrose-rich diet in 3 patients and the remaining 6 were taken as controls.



EXCLUSION CRITERIA

- ★ Patients with daily tobacco and alcohol consumption
- ★ Patients with chronic diseases (diabetes, morbid obesity)
- ★ People with daily medication taken for more than six months as antihypertensives, corticosteroids and bisphosphonates
- ★ Bone tissue fragments surrounding periaapical inflammatory processes

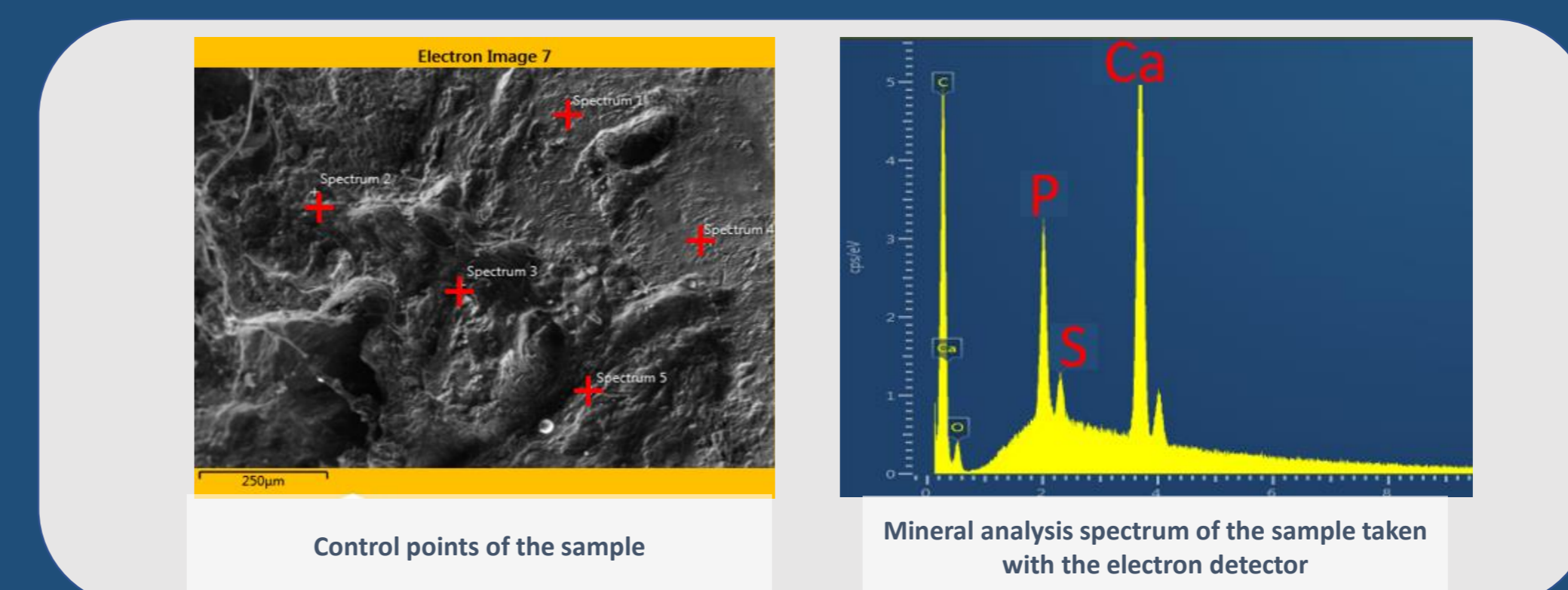


The material was obtained in the form of blocks and microparticles, it was washed with physiological solution and immediately fixed with 10% formalin buffer. The samples were prepared for their analysis under a scanning electron microscope, with drying and impregnation with carbon particles, in order to be subjected to the x-ray detector to analyze the proportional mineral composition (LAMARX – FAMAFC, UNC)

This project was analyzed by the Ethics Committee of the Faculty of Dentistry of the National University of Córdoba under the number CAIS- 501.

RESULTS

The mineral analysis was performed through an electron detector (SEM), with a record of 5 points per sample, and the relations Calcium/Phosphorus (Ca-P) and Calcium/Sulfur (Ca-S) were taken into account

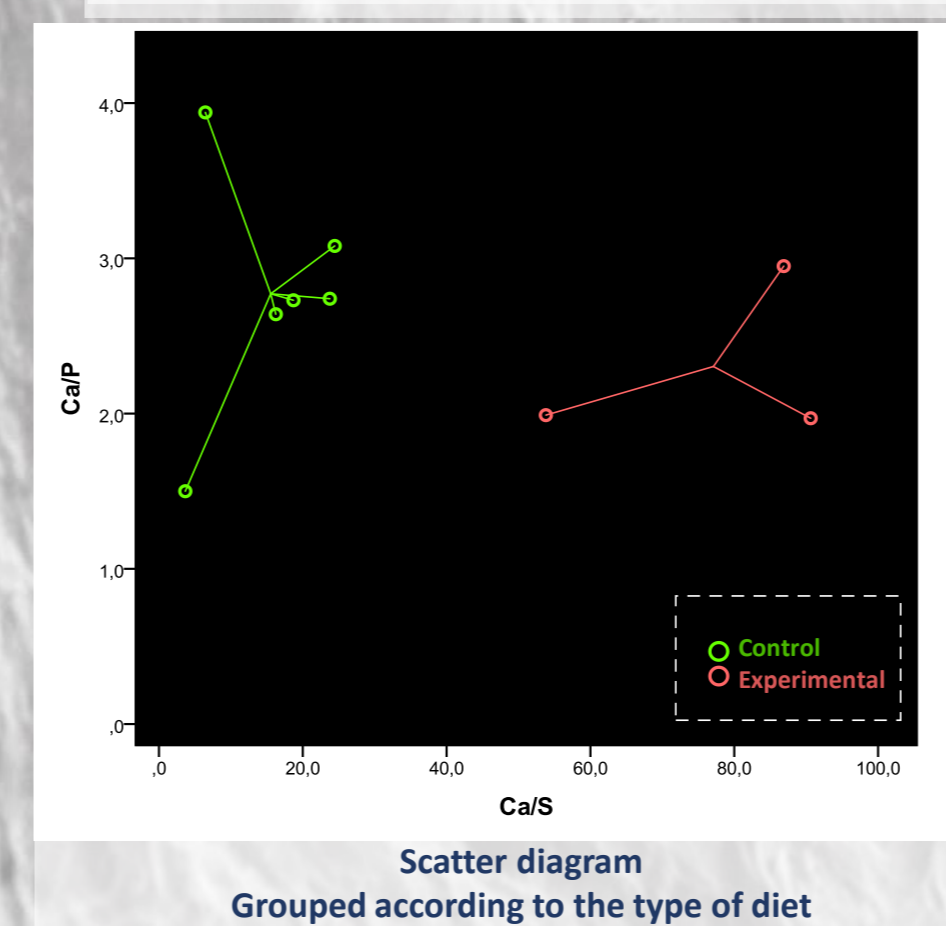


The data obtained was statistically analyzed (CI=95%) and regression models were proposed to explain the relationship between mineral proportions and the explanatory variables considered in this study: **DIET, AGE, SEX** and the **JAW** from which the samples were obtained.

Group	Ref	Ages	Jaw	Ca/P	Ca/S
EXPERIMENTAL	M11	41	Lower	1,99	53,8
	M17	36	Upper	1,97	90,6
	M21	52	Lower	2,95	86,9
Averages		43,0	1s, 2i	2,30	77,1
CONTROL	M2	22	Upper	2,73	18,7
	M5	18	Lower	3,08	24,4
	M13	47	Upper	3,94	6,5
	M16	41	Lower	1,50	3,7
	M18	30	Upper	2,74	23,8
	M19	57	Upper	2,64	16,3
Averages		35,8	4s, 2i	2,77	15,5

Case summaries: Age, jaw, Ca/P and Ca/S ratio according to type of diet

p>0,01 **p<0,01**



Topic	Category with a tendency to higher Ca/S values	t	Sig.
Diet	Sucrose -rich	7,48	<0,01
Jaw	Lower	-2,23	0,11
Ca/P	Inverse relationship	2,11	0,13
Age	Older	-1,84	0,16
Sex	-	-0,71	0,53

Contrast of the topics of the model. Dependent Variable Ca / S

When studying the Ca/P ratio, the factors analyzed did not show a significant effect, although patients whose diet was rich in sugar (n=3) had lower values (2.3±0.6/2.8± 0.8). With respect to the Ca/S ratio, the patients who consumed more sugar showed significantly higher values than the others (77.1± 20.3/15.5± 8.7), with a p<0.01. The changes in sulfur in the samples of patients with a diet rich in sucrose is explained by the variations in calcium

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CONCLUSIONS

The preliminary results of this work, with a reduced number of samples, showed that the most relevant and significant factor within those analyzed was diet. In conclusion, a tendency to increase the calcium-sulfur ratio was observed in individuals with a high sugar consumption.

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