



UNIVERSIDAD CATÓLICA  
SAN ANTONIO  
**UCAM**

## Study on the effect of xylitol tooth crystals conducted by the University UCAM in Murcia, Spain

Three researchers from UCAM are leading the study to discover the effectiveness of the alkalizing dental crystals developed to prevent tooth decay and provide most effective dental hygiene in the simplest way.



Department of Oral Implantology and Surgery – Clinical and Experimental Odontology Research Group. Faculty of Health Sciences – Catholic University of Murcia – UCAM

– **Prof. Dr. Jose Luis Calvo-Guirado** Professor of Oral Surgery and Oral Implantology

– **Prof. Dr. Jose Eduardo Mate Sanchez de Val** Professor of Oral Surgery and Oral Implantology

– **Prof. Dr. Carlos Perez Albacete Martinez** Professor of Oral Surgery and Oral Implantolog

The UCAM Clinical and Experimental Dentistry Research Group holds the International Chair for Research in Dentistry and has excellent clinicians and outstanding national and international researchers who are leaders in their field. Recent caries research has focused on xylitol and its ideal application in dentistry. UCAM experts are investigating whether crystalline xylitol in the form of tooth crystals improves caries prevention and plaque maintenance at a higher rate than conventional treatments.

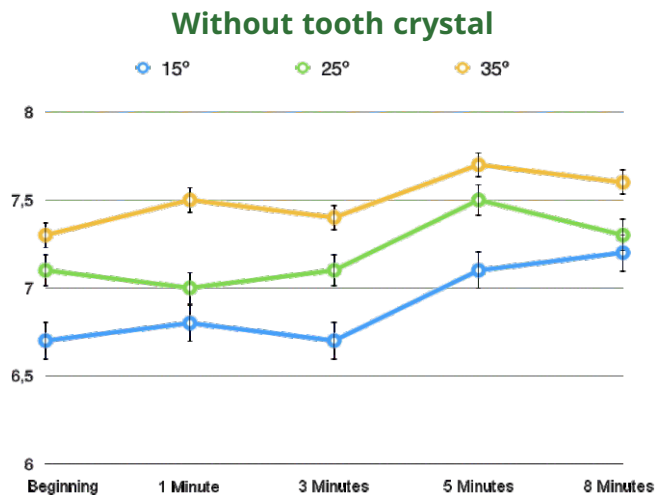


### In vitro study:

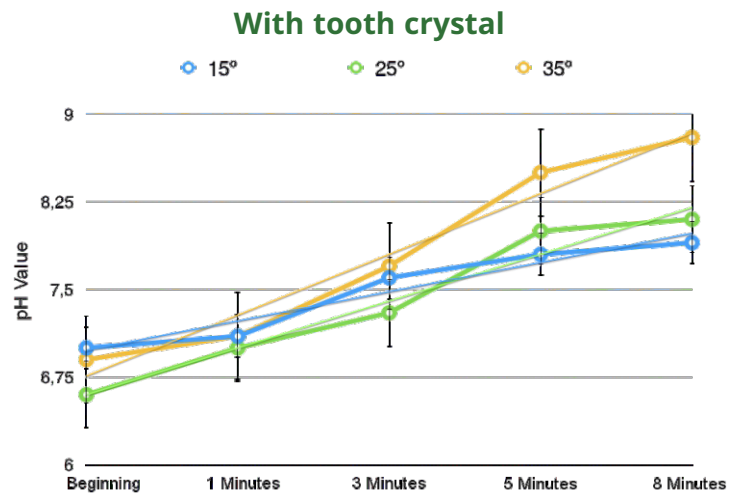
Analysis of bacteriostatic-bactericidal potential of xylitol in commercial presentation, analysis of bioavailability of xylitol in commercial presentation, analysis of degradation of presentation format. Analysis of the degradation of caramel in artificial saliva. Calculation of volumes by micro-CT: before and after exposure time in artificial saliva: 1 minute, 3 minutes, 5 minutes, 7 minutes, 10 minutes.



## pH - Evaluation of the buffering effect of xylitol tooth crystals in artificial saliva (in vitro)



Variation of pH by time and temperature without tooth crystal



Variation of pH by time and temperature with tooth crystal

- 100 ml natural saliva sample.
- The pH value is recorded at the end of each working time.
- Variations of temperature of 10 degrees.
- 10 measurements are made for each field, values expressed as mean and standard deviation.

## Results

The pH varies depending on the development time and temperature used for the experiment.

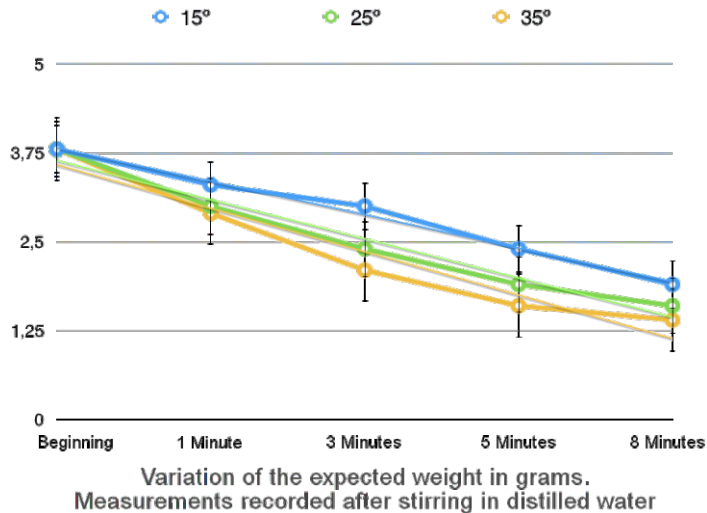
Thus, we observed how the pH value in the artificial saliva was kept constant and without major fluctuations from the first moment until 8 minutes after the experiment, when the tests were performed without tooth crystals. There were no significant fluctuations, only the influence of time caused a movement towards slightly higher values with a change to 7.2, 7.3 and 7.6 at 15° and 35°, 25°, respectively. Thus, there were no obvious fluctuations. The Wilcoxon test was applied for non-parametric samples, with an assigned p-value of <0.05. No significant differences were found.

For the experiment in which the xylitol tooth crystals were present, the same time intervals and temperature variations were used. Significant differences were found within each group and significant differences were found when comparing between groups. With variations from 7.0 to 7.9 (15°) and from 6.9 to 8.8 (35°), 6.6 to 8.1 (25°). Comparison of the three groups by time value also revealed significant differences, most pronounced at 8 min. 7.9 vs. 8.1 vs. 8.8.



## Results of in vitro use of xylitol tooth crystals in terms of their dissolution over time

### Evaluation of solubility in distilled water



Initial weight of the tooth crystal : 3.8 g.

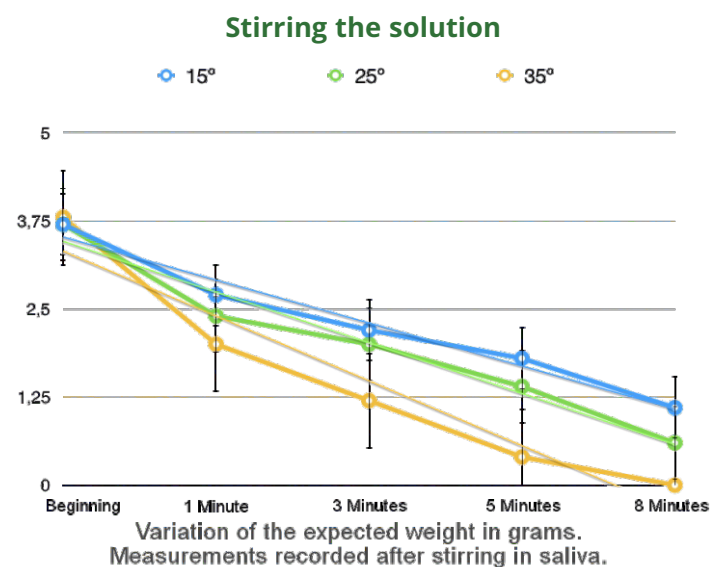
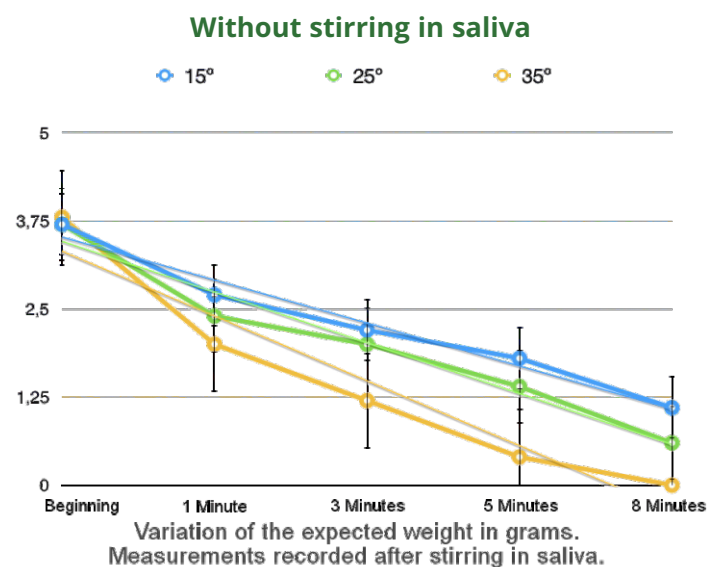
- Amount of distilled water: 100 ml.
- The weight is recorded at the end of the analysis period.
- The weight at the end of each period is recorded in grams.

The variations of the weight in grams when the tooth crystal is immersed in distilled water give the expected results compared to the results obtained in saliva.

In the experiments in distilled water, the solution is not complete in any of the cases and the final values are 1.9, 1.6 and 1.4 for 8 minutes and at 15°, 25° and 35°, respectively.

Compared to the solutions in saliva without stirring, there is a significant difference in terms of the weight of the tooth crystal, where the values after 8 minutes are 1.3, 0.9 and 0, respectively, at the same temperatures. Thus, there are significant differences in the values found. ( $p < 0.05$ ) Wilcoxon test.

### Assessment of saliva solubility



- Initial weight of the tooth crystal 3.8 g.
- Quantity of saliva: 100 ml.
- The weight is recorded at the end of the analysis time.
- Weight at the end of each time expressed in grams.
- Variation of the temperature in 10 degrees.
- 10 measurements are made for each field, values expressed as mean and standard deviation.



## Results

As expected, the solubility of the tested material is progressive, with the weight in grams decreasing per time and with direct influence of temperature during the experiment. The tests were performed by separate measurements with and without agitation of the solution. In all cases, agitation increased the solubility rate, causing a more significant decrease in the weight of the tooth crystals.

In the cases where there was no agitation of 25 ° and 8 minutes, the tooth crystal dissolution was practically total 0.9, being complete for the same time, but at 35 °. In the case where it was stirred, the dissolution was faster, so that 0.4 grams of the tooth crystal at 5 minutes with 35 °, 0.6 grams at 8 minutes and 25 ° and complete dissolution at 8 minutes and 35 °.

## Summary

The results of the in-vitro study carried out with the xylitol tooth crystals confirm that the special crystallization and composition of the tooth crystals allow a prolonged dissolution time in the mouth, increases bacteriostatic and bacteriocidal activity and provides effective protection against caries and associated gingivitis and periodontal disease.



The application of xylitol in the form of dental crystals is more effective than any other form of xylitol application in terms of oral and dental hygiene, because xylitol is in contact with the mucous membranes for much longer and can develop its full effect.

Measurements in *Streptococcus mutans* culture show a significant difference between values obtained with and without tooth crystals.

These results are due to the stability of xylitol in the tooth crystals and the resulting high retention time, so that the tooth crystals can promote maximum bacteriostatic and bacteriocidal action and effective mineralization of teeth and bones.