

Summary of: Sour sweets: a new type of erosive challenge?

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FULL PAPER DETAILS

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Online article number E3
Refereed Paper – accepted 12 July 2007
DOI: 10.1038/bdj.2007.1203
[©]British Dental Journal 2008; 204: E3

Objective To assess in the laboratory the erosive potential of a number of commercially available sour sweets.

Methods The erosive potential was assessed by measuring the pH, neutralisable acidity and ability to erode permanent and deciduous enamel. These parameters were compared to those of an orange juice positive control. **Results** The pH of the sour sweets ranged from 2.30–3.14 with their neutralisable acidity ranging from 9.78–66.9 ml of 0.1M NaOH. The amount of permanent enamel removed following one hour immersion in the drinks ranged from 2.16–10.88 µm and from 1.02–18.34 µm for deciduous enamel. In comparison, the orange juice (Tropicana™ smooth) control had a pH of 3.86, a neutralisable acidity of 37.1 ml of 0.1M NaOH and removed 5.23 µm of permanent enamel and 6.27 µm of deciduous enamel. **Conclusion** All the sour sweets tested were found to be erosive, some more so than orange juice. This information will be of use to clinicians when counselling younger patients with tooth surface loss.

EDITOR'S SUMMARY

This paper is a timely and important addition to the literature on diet and tooth surface loss. Sour sweets do seem to be increasingly popular, with an ever-widening variety available in shops and this first attempt at assessing their erosive potential should prove a useful resource to inform practitioners and provide a starting point for future research.

The results of the study are startling: one of the sour sweets tested caused 18.34 micrometres of deciduous enamel loss in one hour and another caused 16.49 micrometres, the highest values reported in confectionery or food to the authors' knowledge. The products' pHs ranged from 2.30–3.14 and neutralisable acidity ranged from 9.78–66.9 ml of 0.1M sodium hydroxide – this top quantity again being the highest reported value for food or confectionery.

Although the authors correctly point out that *in vitro* erosion testing tends to overestimate the amount of enamel lost compared to the clinical situation, the extremely high values seen

in some of the sweets should be of concern to all dentists. Some of the products tested were designed to be sucked for long periods of time, which will increase the likelihood of significant erosion occurring.

A clinical study investigating the erosive potential of sour sweets would provide more precise evidence for the amount of erosion these products can cause. As the authors state in their answers to our questions (right), however, obtaining ethical approval for such a study might well be problematic. In the meantime, this study clearly highlights the potential these sweets have for causing erosion and caries when consumed frequently and provides important information for dentists to pass on to their patients.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 204 issue 2.

Rowena Milan,
Journal Editor

DOI: 10.1038/bdj.2008.34

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IN BRIEF

- Highlights the introduction of a new type of sweet with a sour coating.
- Confirms the high erosive capacity of this type of confectionery.
- Highlights the fact that deciduous enamel is more prone to erosion than permanent enamel.

COMMENT

'Scrumdiddlyumtious', trumpets the commercial website talkingretail.com in an article that addresses the question 'Can the sugar confectionery market maintain sales growth while catering to consumer demand for more healthy and flavoursome treats?'¹ This reports a decline in the confectionery market and attributes it to consumers' concern about their own and their children's health. This gives scope for new products, such as sour sweets, to address this. These are said to be proving extremely popular.¹ The sour flavour derives from the inclusion of lactic, citric or malic acid.

This laboratory investigation characterises seven sour sweet products by measuring their pH and titratable acidity in solution. These values are compared to fresh orange juice – a drink beloved by erosion researchers for its reliability to produce dental erosion. The paper assays the loss of tooth substance that follows one hour immersion, of both deciduous and permanent teeth, in such solutions. The selection of teeth reflects the age range that are likely to consume such products. Compared to orange juice the sweets were more acidic (pH range 2.3–3.14) and demonstrated a disturbing range of titratable acidity (9.78–66.9 ml). The latter test reflects the level of undissociated acid in a product. It is simply the volume of sodium hydroxide (0.1M) that must be added to the stirred solution to bring its pH to neutrality. Such high values of titratable acidity are unprecedented and raised

concern to the commentator. This was confirmed by the significantly higher losses of tooth substance, compared to orange juice, reported for two of the sour sweets.

Readers should note the potential for tooth damage to occur upon cumulative consumption of these products. They should maintain their vigilance to any new products which may enter the niche market place, so they can advise their patients. There is little published data on the potential erosiveness of foods/beverages and more research of this type should therefore be encouraged.

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1. Mehta S. Category report: sugars, mints and gum – scrumdiddlyumtious sweets. www.talkingretail.com, 24 August 2005. <http://www.talkingretail.com/reports/1333/Category-report-Sugar-mints-an.ehtml>. Accessed 29 August 2007.

AUTHOR QUESTIONS AND ANSWERS**1. Why did you undertake this research?**

The principal authors (LJH and JSR) both have a longstanding clinical and research interest in tooth wear and erosion. A preliminary measurement of the pH of some sour sweets was reported by Josie Beeley of Glasgow Dental School at the British Society of Dental Research meeting at 2005. At around the same time a report appeared on the Food Standards Agency website about sour sweets possibly causing circumoral chemical burns due to their high acid content and prolonged contact times. This study revisited the pH, but also assessed the neutralisable acidity content and the ability of sour sweets to remove both permanent and deciduous enamel in the laboratory.

2. What would you like to do next in this area to follow on from this work?

We appreciate from previous work that the laboratory assessment of erosion can over-estimate the amount of erosion caused in the mouth by up to a factor of 10. This is principally due to the protective effect of pellicle, plaque, calculus and saliva. It would be very interesting to re-measure the enamel erosion caused by these sweets in a short term prospective clinical study, using enamel blocks placed in upper removable appliances. However, due to the strong erosive effects of these sweets it may prove difficult, if not impossible, to obtain ethical approval for this.