

# Summary of: The erosive potential of candy sprays

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## FULL PAPER DETAILS

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**Objective** To determine the erosive potential of seven different commercially available candy sprays *in vitro* and *in vivo*. **Material and methods** The erosive potential was determined *in vitro* by measuring the pH and neutralisable acidity. The salivary pH and flow rate were measured in healthy volunteers after administration of a single dose of candy spray. **Results** Candy sprays have an extremely low pH (1.9–2.3) and a neutralisable acidity varying between 0.8–1.6 ml of 0.25M NaOH. *In vivo*, candy sprays induced a short-term 3.0 to 5.8-fold increase in salivary flow rate with a concomitant drop in salivary pH to values between 4.4 and 5.8. **Conclusion** All candy sprays tested have an erosive potential. This information is of use for clinicians counselling juvenile patients with dental erosion.

## EDITOR'S SUMMARY

The popularity of sour-tasting sweets raises new challenges for the dental health of those who consume them regularly. Previous work published in the *BDJ* by Davies *et al.*<sup>1</sup> has highlighted the erosive potential of sour candies and also the fact that primary enamel is more prone to erosion than that of permanent teeth. This article by Gambon *et al.* introduces a new type of sour sweet, the sour candy spray, and investigates the erosive potential of a variety of sprays on the market in the Netherlands. Although these sour sprays may be unfamiliar to UK dentists at present, they are available for sale in the UK – a quick internet search revealed that many of the brands in the study were available from UK confectionery websites. It is therefore important that we are aware of the potential effects of this type of sweet, as their use by children is likely to increase.

The results showed that all the candy sprays tested had low pH and high neutralisable acidity, making them potentially very erosive. Experiments on adult volunteers showed that on spraying the candy onto the tongue, salivary flow

rate increased and salivary pH dropped, but that both these measures returned to normal levels within 2–3 minutes. The authors point out that children may respond differently, as their salivary volumes are smaller than adults', and it should also be considered that children may be unlikely to only spray a single dose of the candy into their mouths at one time, and may not spray directly onto the tongue. These inherent variabilities make it difficult to accurately predict the effects of these sprays on children, but their potential to cause damage can be seen from the authors' account of the nine-year-old patient who originally piqued their interest in this subject.

Unfortunately it does not seem probable that confectionery manufacturers will stop producing sour candies; their potential to damage children's teeth is outweighed by their popularity and their commercial potential as a result. Dentists must therefore make sure that they are aware of the effects that these candies can have, in order to be alert for these signs in their young patients and to be able to counsel them and their parents accordingly.

The full paper can be accessed from the *BDJ* website ([www.bdj.co.uk](http://www.bdj.co.uk)), under 'Research' in the table of contents for Volume 206 issue 10.

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Journal Editor

1. Davies R, Hunter L, Loyn T, Rees J. Sour sweets: a new type of erosive challenge? *Br Dent J* 2007; 204: E3.

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## IN BRIEF

- Highlights a recently introduced type of candy, so-called candy sprays.
- These candy sprays have an extremely low pH and a high buffer capacity.
- Use of these candy sprays can decrease the salivary pH to values below 5.5 and so they may have an erosive potential.

## COMMENT

This study investigated seven candy sprays on sale in the Netherlands. Although these sprays may be unfamiliar in the UK, acidic confectionery aimed at young children is available here. The cariogenic potential of sweets is well known. So why the confectionery industry needs to develop products that have erosive potential is cause for concern.

The study assessed pH, neutralisable acidity (also known as titratable acidity) of the sprays and spray stimulated whole salivary pH and flow rate in three healthy volunteers. The pH was very low for all sprays (range from 1.9 to 2.3) and well below the critical pH of 5.5 for enamel demineralisation. The titratable acidity, related to the amount of undissociated hydrogen, was also low, as less than a millilitre of alkali was required to bring five of the sprays to neutrality. This means salivary bicarbonate should work quickly and effectively to combat the acid threat. Unfortunately, the *in vivo* salivary tests were only carried out in three adult volunteers (mean age 53 years). The results show salivary pH was depressed for only 1-2 minutes, but probably long enough for susceptible surfaces to lose a few microns. The effect of the candy sprays in children may be different as the authors recognise a lower salivary volume is present in children.

The volunteers sprayed onto the tongue but the effect of changing the direction of the spray on the outcome measures was not assessed. It would have been an idea to watch children

using the sprays or question them. This is particularly relevant if several 'squirts' were a common habit. The study reported that the volume of a single dose ranged between 132 and 147  $\mu$ l and all the results were based on a single dose. The study would have benefited from positive and negative controls such as orange juice or 10% citric acid solution and water.<sup>1</sup> Controls could have been delivered in a metered dose in a similar fashion to the spray.

The pH and flow rate of expectorated saliva was tested but no discussion was made regarding the ability of stimulated saliva to dilute the concentration of dissolved substances and wash it away, also termed salivary clearance. Both maximum and residual salivary volumes vary widely before and after swallowing and clearance rates of acidic drinks/foods will also vary.<sup>2</sup>

This study has highlighted a new confection with potential to cause dental erosion. Although the candy sprays are popular with children, the *in vivo* part of the study was conducted in 3 adults and thus the applicability of the results must be treated with caution. Perhaps most worrying is the development and promotion of such products to children. The food and drinks industry need to be aware that dietary acids are associated with dental erosion.

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## AUTHOR QUESTIONS AND ANSWERS

## 1. Why did you undertake this research?

Several years ago, a nine-year-old girl presented in our paediatric clinic with severe erosion of the occlusal surfaces of her teeth. On inquiry, she told us that she had recently started the frequent use of a candy spray. This candy has to be sprayed directly into the oral cavity to give a pleasant fresh-sour taste. The pH of this candy spray was below 2.5, which led us to suspect that the frequent use had caused the dental erosion. We also performed a subsequent survey, which showed that candy sprays are popular among primary school children and are frequently used without parents' knowledge.

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

The deciduous dentition is exposed to a wide variety of low pH drinks and solid acidic candies. We intend to compare the erosive potential of candy sprays with these other dietary sources of acid. In addition, we would like to study the best way to inform healthcare professionals, juvenile patients and their parents about the erosive potential of candy sprays. Hopefully, more awareness among these groups about the erosive risks of candies may reduce the development of dental erosion in young children.