



NUTRITION

Sugar content, cariogenicity, and dental concerns with commonly used medications

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Because of the bitter taste of many medications, sugar (sucrose) is often combined with other ingredients to provide more palatable forms that may improve patient compliance.¹⁻³ Sucrose provides other functional properties in addition to sweetness; it also acts indirectly as a solvent, demulcent, and bulking agent.⁴ Unfortunately, the biofilm covering teeth (plaque) contains over 500 species of bacteria that consume carbohydrates such as sucrose, creating acid as a by-product. If there is ongoing exposure to sucrose, an acidic environment is created that can decalcify tooth enamel, leading to carious lesions. Left untreated, caries can lead to pulp infection and potential tooth loss; hence, alternative sweeteners such as sorbitol and xylitol are increasingly common in medicinal preparations in lieu of sucrose.^{5,6}

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ABSTRACT

Background and Overview. Oral adverse events such as cariogenicity are often overlooked as drug-associated effects because the sugar content of many medications may be negligible compared with the patients' overall dietary intake of sugar. There are, however, several liquid formulations of medications with significantly high sugar content that are commonly used in patients with swallowing difficulties. These medications may be associated with negative oral health sequelae and should be considered part of the oral health care providers' differential diagnosis of oral pathologies.

Methods. We reviewed the literature regarding the sugar content of oral liquid medications commonly prescribed by oral health care providers, with consideration to their caries potential. Where not available via public sources, pharmaceutical companies were contacted directly for additional information on the sugar (carbohydrate) content of these oral liquid medication formulations.

Results. Over 50 commonly used oral liquid medications prescribed for patients with swallowing difficulties were reviewed and found to contain sugar in varying amounts up to 4 grams per dose (usually 1 teaspoon or 5 milliliters). Patients who are required to take multiple doses per day of these sugar-containing oral liquid medications may be at increased risk for caries and associated oral health consequences.

Conclusions and Practical Implications. Recognition and avoidance of sugar-containing oral liquid medications can help clinicians optimize patient treatment, decreasing the risk for potential drug-induced caries while emphasizing patient safety and improved oral health.

Key Words. Drugs; dental care; cariogenicity; patient safety; sugar content.

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TABLE 1

Sugar-containing oral liquid medications commonly prescribed by oral health care providers.¹¹⁻¹⁵			
MEDICATION	ACTIVE INGREDIENT CONCENTRATION AVAILABLE, mg*/5 mL†	USUAL ADULT DOSE	SUCROSE CONTENT, g‡/5 mL
Antibiotics			
Amoxicillin	125, 200, 250, 400	250-500 mg every 8 h	1.70, 1.68, 1.85, 1.88
Amoxicillin-clavulanic acid	125-31.25, 250-62.5	250-500 mg every 8 h or 875 mg every 12 h	0.53, 0.67
Azithromycin	100, 200	250-500 mg once daily	3.86, 3.87
Bactrim	200-40	4 mL every 12 h	3.2
Cefaclor [§]	125, 250, 375	250-500 mg every 8 h	2.3, 2.1, 2.0
Cefadroxil [§]	250, 500	500-1,000 mg every 12 h	2.2, 1.9
Cefdinir	125, 250	300 mg every 12 h	2.9, 2.7
Cefpodoxime [§]	50, 100	100-400 mg every 12 h	3.0, 3.1
Cefprozil [§]	125, 250	500 mg every 12-24 h	2.2, 2.0
Cefuroxime [§]	125, 250	125-500 mg every 12 h	3.2, 2.4
Cephalexin	125, 250	250-1,000 mg every 6-12 h	3.0, 3.0
Ciprofloxacin [§]	250, 500	250-750 mg every 12 h	1.4, 1.3
Clarithromycin [§]	125, 250	250-500 mg every 12 h	2.4, 2.4
Clindamycin	75	150-450 mg every 6-8 h	1.5
Doxycycline [§]	25 (suspension), 25 (syrup)	100 mg every 12 h	1.7, 4.4
Erythromycin	200, 400	250-500 mg every 6 h	3.0, 3.0
Levofloxacin [§]	125	250-750 mg daily	2.5
Penicillin VK [¶]	125, 250	250-500 mg every 6-8 h	2.7, 2.7
Analgesics and Anti-inflammatories			
Acetaminophen	160	325-650 mg every 6-8 h	2.5
Acetaminophen with codeine	120-12	325-650 mg every 6-8 h (acetaminophen)	3.0
Codeine	30	15-60 mg every 4 h as needed	4.3
Ibuprofen	100	200-400 mg every 4-6 h	1.6
Miscellaneous			
Diphenhydramine	12.5	25-50 mg every 6-8 h	0.42
Dexamethasone	0.5, 5	4-10 mg every 12 h	1.7, 3.2
Nystatin	500,000 U/5 mL	1-5 mL every 6 h	2.5
Prednisolone	15	Titrated to the individual	1.9
Prednisone	5	Titrated to the individual	0.8
* mg: Milligram. † mL: Milliliter. ‡ g: Gram. § Personal communication from the manufacturer. ¶ Can be brand specific (Stada brand = 2.6 g/5 mL and 2.6 g/5 mL, respectively; Bristol-Myers Squibb brand = 3.5 g/5 mL and 3.5 g/5 mL, respectively).			

Encapsulating medicines in solid oral dose forms such as capsules or tablets is an effective method to avoid unpleasant medication tastes, but these formulations can be problematic for patients who have trouble swallowing. Patients with pathologies that are aggravated by medications that irritate the oral mucosa (such as patients undergoing radiotherapy to the oral cavity or chemotherapy), those with feeding tubes in place, or patients who simply cannot swallow tablets or capsules may be better suited for liquid formulations of

medications, such as oral solutions or suspensions. These patients pose a significant challenge for oral health care providers (OHCPs), who may prescribe (or who may treat patients who have been prescribed) sugar-containing oral liquid medications.

Here we review the sugar content of oral liquid medications commonly prescribed by OHCPs with consideration to their caries potential. Because the oral cavity is a potential source of sepsis, early and definitive dental intervention, comprehensive oral hygiene measures, and elimination of the cause will reduce the risk for oral and associated systemic complications.⁷⁻¹⁰ We focus specifically on some of the most common sugar-containing oral liquid medications patients may be exposed to; we review their oral health implications; and we provide guidance for contemporary dental practice.

DISCUSSION

OHCPs who are prepared with evidence-based information about the formulation of liquid medications can advise their patients regarding

optimal medication therapy, potentially helping to ensure healthy outcomes. We based this literature review on searches of the following knowledge-based resources without any restrictions on dates of publication: Medline, PubMed, Embase, and the Cochrane Database of Systematic Reviews. The search terms were “dental care” and “dentistry”; “cariogenicity” and “sugar

ABBREVIATION KEY. OHCP: Oral health care provider.

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