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Tanveer Khan
University of North Dakota

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Oral Sucrose is an Effective and Safe Analgesic for Painful Minor Procedures in Infants during Primary Health Care Visit

Tanveer Khan, PA-S

Physician Assistant Program, University of North Dakota School of Medicine & Health Sciences
Grand Forks, ND 58012-9037 www.med.und.nodak.edu

Abstract

Pain induced by minor office procedures are associated with infant and family's distress with possible long term psychological effects. Despite this known fact, it is not adequately treated in common practice. American Academy of Pediatrics (AAP) recommends pre-procedural oral sucrose to alleviate pain during the procedures. The purpose of this study was to review published literature for the efficacy and safety of oral sucrose as a pre-procedural intervention in infants for mild to moderate procedural pain.

A PUBMED, MEDLINE and COCHRANE database search was performed using the terms analgesia, infant, neonatal, newborn, nociception, pain, sucrose and randomized controlled study. Thirteen studies were selected for review after the exclusion criteria. The studies were reviewed for the outcome measures reported including, 1) efficacy of a single oral dose of sucrose as determined by pain scores, behavioral and physiological indicators and, 2) adverse events reported and safety. Furthermore, some other interventions outcomes were also reviewed including the dose, concentration of solution, timing and method of delivery of oral sucrose.

Oral sucrose is effective in reducing crying time and decreasing behavioral pain responses when given in a single dose 30 seconds to 2 minutes before the procedure in 10 out of 13 studies. No clinical significant adverse event was reported in 12 out of 13 studies. In conclusion, oral sucrose is an effective, safe, and immediate acting analgesic which reduces crying time and behavioral pain responses after minor painful procedures in infants. This literature review of high quality studies supports the AAP recommendation of using pre-procedural oral sucrose for pain control in infants during office procedures.

Research Questions

- 1) Is oral sucrose effective in decreasing pain responses in infants during their primary health care office procedures?
- 2) Is oral sucrose safe when given for procedural pain control in infants during their primary health care office procedures?

Literature Review

- A search was performed on PUBMED, MEDLINE and COCHRANE database of the studies published within the last 10 years.
- Search terms used were; analgesia, infant, neonatal, newborn, nociception, pain, sucrose and randomized controlled trial.
- Duplicate manuscripts, non-English articles, review articles, comments, case reports, practice guidelines, news and published erratum were excluded.
- After the exclusion, studies were analyzed for the outcome measures.
 - The outcome measures included pain measurements using various scales, behavioral and physiological indicators, safety and efficacy of single dose of oral sucrose in infants.
 - The interventions outcomes reviewed were dose and concentration, timing and method of delivery of sucrose by a syringe, with a pacifier or through a nasogastric tube.
- If no major adverse event was reported in the study, it was assumed that no adverse events happened and thus oral sucrose was safely administered.
- 13 studies were relevant to the two research questions and the findings are summarized in Table 1.

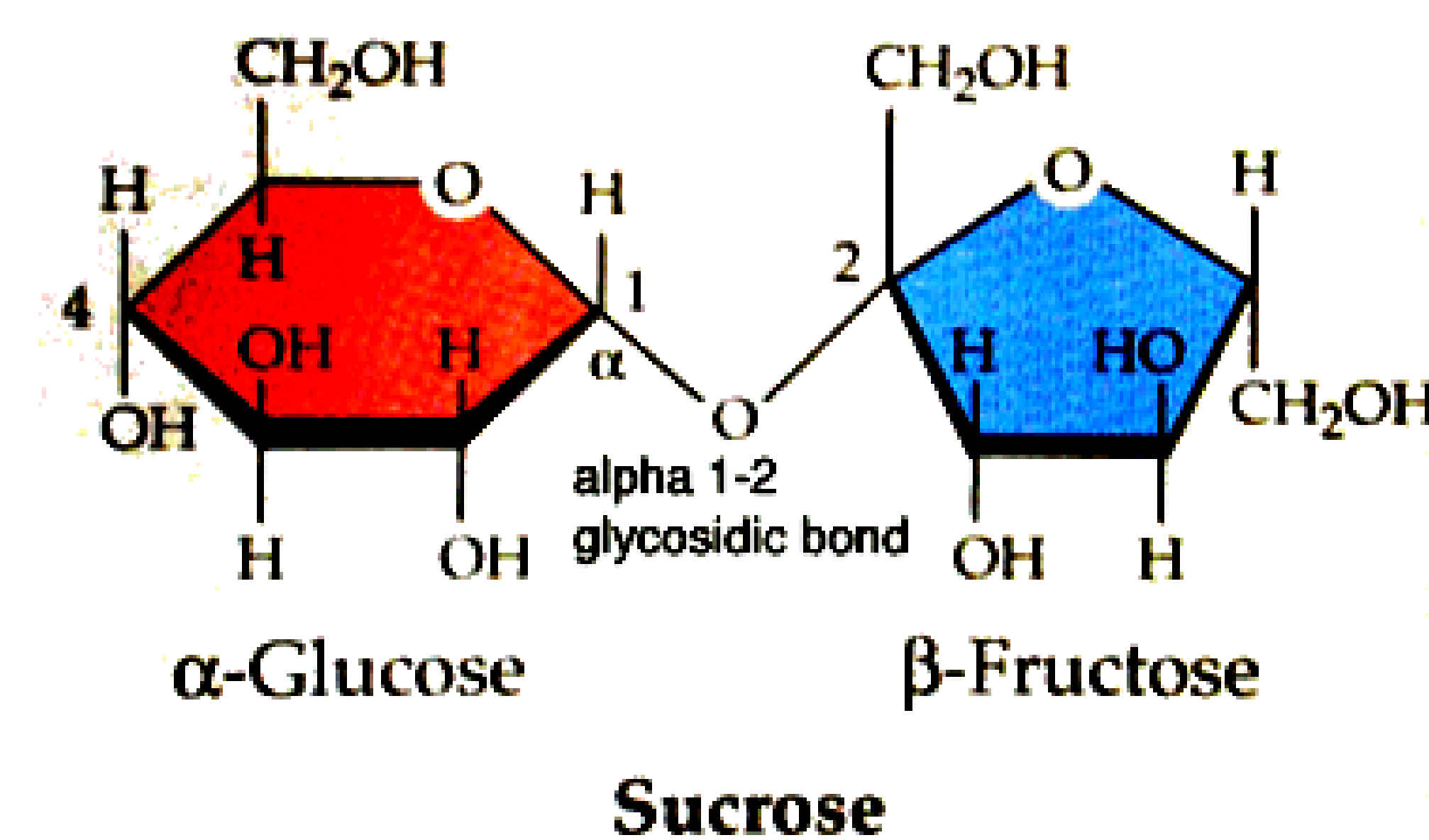
Discussion

- Oral sucrose was effective in decreasing pain responses in 10 out of the 13 reviewed studies. This analgesic effect is present in patients beyond neonatal age up to 12 months of age.
- There is wide variation of doses and concentration used in the studies. Most commonly used dose is 2 mL of 24% (weight/volume) solution given orally 2 minutes prior to the procedure. It is affordable and easily administered.
- Although 3 studies did not show a beneficial effect but they included different patient population and clinical setting.
- Oral sucrose offers a beneficial response when used alone or in combination with other non-pharmacological interventions such as non nutritive sucking, formula bottle, nurse-led distraction, maternal holding and/or maternal interaction.
- Only two studies mentioned minor coughing, gagging, and vomiting episode which did not require any medical intervention. Hence it appears to be a safe agent for clinical use.

Applicability to Clinical Practice

- Oral Sucrose should be used by health care providers for minimizing pain in infants up to the age of 12 months who are going through painful procedures e.g., intramuscular injection for vaccination, venipuncture etc. during clinic visits.
- Low rate of minor adverse events, ease of administration and low cost make sucrose a preferred choice.
- A suggested effective oral sucrose dose is 2 mL of 24% (weight/volume) solution orally 2 min prior to the planned procedure. In addition, healthcare providers should encourage combining this with other pain reducing interventions, such as non nutritive sucking, nurse-led or parent-led distraction, and/or breastfeeding.
- Parents should be counseled on the importance of pain control during the minor painful procedures and the safety profile of oral sucrose in this setting.

Figure 1



Chemical structure of Sucrose.
Source: <http://www.chm.bris.ac.uk/motm/glucose/sucrose.gif>

Introduction

- Infants frequently receive minor procedures that are associated with significant pain during their primary health care office visits such as immunization, venipuncture and heel sticks. Studies suggest that pain during these procedures is not adequately treated.
- These painful experiences may serve as a potential causative factor for adverse neurological and developmental outcome in infants which could persist into adolescence and adulthood.
- Oral Sucrose has been shown to have calming effect during distress in term newborns and analgesic properties in term and preterm infants for pain associated with venipuncture and heel lance.
- Several guidelines from the American Academy of Pediatrics, American Pediatric Society, the Canadian Paediatric Society and the American Pain Society recommend use of oral sucrose for minor painful procedures in neonates but not many guidelines regarding pain control in infants beyond neonatal age during office procedures are available for the clinicians.
- Health care providers need to utilize best available evidence to relieve pain in this setting.

Statement of the Problem

- Current literature suggest that procedural pain in infants during primary care health office visits is not often treated which is associated with short term and long term sequelae. Procedural pain during minor office procedures needs to be treated effectively to minimize adverse experience and to improve adherence to immunization guidelines.

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Table 1

Studies	Is oral sucrose effective in decreasing pain responses in infants during office procedures?	Is oral sucrose safe when given for pain control during office procedures in infants?
	(Theme 1)	(Theme 2)
Hatfield LA, 2008	YES	YES
Hatfield LA, 2008	YES	YES
Rogers AJ, 2006	NO	YES
Efe E Savaser, 2007	YES	YES
Curtis SJ, 2007	NO	NO
Boyle EM, 2006	NO	YES
Ogawa S, 2005	YES	YES
Mitchell A, 2004	YES	YES
Taddio A, 2009	YES	YES
Stevens B, 2013	YES	YES
Harrison D, 2010	YES	YES
Dilli D, 2009	YES	YES
Reis E, 2003	YES	YES
Total # YES/ALL	10/13	12/13