THE EFFECT OF ORALLY SWEETENERS BY SUCROSE 35% AND DEXTROSE 35% TO THE LEVEL OF PAIN DURING VENIPUNCTURE

Arie Kusumaningrum

ABSTRACT

Insertion a needle on the skin layer structure will impact to the neural responses of pain sensory receptors what make a pain's sense to baby and make them would cry, struggle and irritable. That were inhibit the invasive process and aggravate the trauma in infants because of repeated procedures and hormonal responses that increase pain. Side effects of pain that were make in permanent damage element cognitive development, learning, memory and behavior, and increased somatic complaints in their development. Nurses have a responsibility to treat pain in patients as a form of nursing actions to aplicate the principle of atraumatic care in which not to cause trauma on intervention care and therapeutical long-term nature.The Objective of this research was to know how difference orally sweetener administered by sucrose 35% and dextrose 35% to the level of pain during venous puncture, short-term goal is to know the difference in giving a pain scale of 35% sucrose and dextrose 35% and the control group. Tests performed on mice were divided into three groups: first group were 35% sucrose, dextrose 35% and control as the last group. The results showed there is no difference pain scale in control groups, sucrose 35% and dextrose 35% ($p = 0.09$). There was lower pain in dextrose 35% group than the control group (mean = 5.8 to mean: 5.6). It was recommend for further investigation with a larger sample and measuring pain scale appropriate to the mice.

Keywords: orally sweeteners, sucrose, dextrose, vein puncture.

BACKGROUND

Infants who experience acute pain can cause a response like cry, stiffness, irritability, and physiological responses such as increased heart rate and blood pressure, rapid respiration, and increased muscle tone (Wong, et al. 2008). Untreated response promptly can lead to hypersensitivity, elongated pain, increased of chemicals and hormones release, and increase patient morbidity in NICU (Wong, 1992; quoted Wong, et al, 2008).

Nurses as the healthcare provider, have a responsibility to give an intervention as nursing care and eligible patients free from pain. Nurses act as a care giver and duty of nursing action must aplicate a principle of atraumatic care which not to cause trauma and make a therapeutic nature. Adequacy of pain control will lead to faster healing and recovery, blocking the pain

instead of healing, recovery, and death (AHCPR, 1992; Schecter, cleared, & Yaster, 1993, in Vincent & Denyes, 2004).

Orally adminesterred sweetener is one of the efforts to reduce infant pain levels when injection as noninvasive/nonphtramalogical management. The use of oral sweetener has lower physiological and behavioral responses induced acute pain stimulation. Almost sweetener can be used are sucrose, fructose / levulose, glucose, lactose, and dextrose. However, these sweeteners have each other's weaknesses. For example, fructose / glucose or fruit sugar in honey turned out to contain the bacteria Clostridium botulinum which brought foot wasp. In the absence of hygienic spores become toxic if consumed by infants aged <12 months will cause the disease botulism (Rachdian, 2008). While the lactose (milk sugar) can cause lactose intolerance in some babies are allergic to milk proteins or in infants who do not produce the enzyme (or production is not much) so can not digest lactose. Dextrose was another form, but dextrose is less stressed due to lack of evidence based to administered on oral (Chermont, et al, 2009). Dextrose solutions are easily found in Hospitals, Clinics and Pharmacies at affordable prices. In addition, dextrose available in sterile packaging so it is safe to give a baby because it is free from contamination.

Objective

Determine the effect of orally sweeteners sucrose 35% and dextrose 35% to the level of vein puncture.

Material and Methode

There were three group in this study,the first one was the experimental group received oral treatment of 35% sucrose (5 mice), the second was received 35% dextrose (5 mice), and the last was control group (5 mice), followed by measurement using a pain scale modification of pain assessment tools FLACC, and results was compared.

Sucrose was made using 35% sugar solution and dextrose diluted to a concentration of 35%. Then each put in 0.5 cc syringe. Needle was removable and that will be dripped into the mouth of mice 1 minute before vein puncture.

Data were analyzed on quantitatively by univariate and biviariat analysis. There was non parametric test by Mann Wheatney dan Kruskal Wallis.

Result and Discussion

Table 1. Diference of pain scale during vein puncture

No		Mean `	SD	Min - maks	P value
1	Sukrosa 35%	6	0.84	5-7	0.99
2	Dekstorse 35%	5.6	2.5	4.9	
3	Control	5.8	1.87	3-8	

There is no signicant difference from three group data, but the lowest of pain scale on dextrose 35% group.

Table 2. Diference of pain scale during vein puncture within two group (control and intervention)

No		Mean `	SD	Min - maks	P value
1	Sukrosa 35%	6	0.84	5-7	0.91
	Control	5.8	1.87	3 – 8	
2	Dekstorse 35%	5.6	2.5	4.9	0.91
	Control	5.8	1.87	3-8	

Two table showed how same the three group. That was different from research who conducted by Chermont, et al (2009) to study the painful level on intramuscular injection of 0.5 ml of hepatitis B vaccine using 25 gauge needle size showed 1 ml of 25% dextrose orally administered 2 hours prior to intramuscular injection can decrease the mean of pain scale (PIPP of 6.8 ± 1.6) and to reduce behavior and multidimensional pain response in 2 minutes after the injections, compared with procedures performed without analgesia (standard care).

Some authors explain dextrose 25% was less potent than sucrose 25%, but the authors suggest a systematic dextrose (30-50%) with a higher concentration to trigger effectiveness as an analgesic for acute pain in neonates (Bellieni, et al, 2005; Carbajal, et al, 2002; Bauer, et al, 2001; Akcam, et al, 2004; quoted Chermont, et al, 2009).

Gharehbaghi and Ali (2007) trial also showed that statistically dextrose 25% had a significant effect on anti nosiseptik can reduce pain behavioral response with a minimum value 0 in the intervention group while the control group gained at least 3 values. In addition, it can also

shorten the duration of crying after venepuncture cry duration longer than 7 seconds in the intervention group while the control group to 40 seconds.

Similar evidence obtained no significant difference pain scale between sucrose group and a control group. The use of oral sucrose to decrease pain during painful or stressful procedures is the most extensively studied pharmacologic intervention in neonates. The Cochrane review of randomized, controlled trials of sucrose in neonates by Stevens et al,7 including updates through September 2003, found 24 published studies that included >1800 infants with gestational ages from 25 to 42 weeks.7 Significant decreases in crying, grimacing, heart rate, and pain scores have been reported in neonates who were given sucrose solution before a procedure when compared with water,7 and repeating the dose every 2 minutes up to 3 times increases the effect (Johnston, et al,1999).

An earlier study investigated whether the effects of sucrose were attributable to the sweet taste or the carbohydrate content, and it determined to be attributable to effect of sweetness, with any solution 12% or higher being effective. There was no sweetness dose response above 24%.10 The mechanism of action of lingual sucrose is markedly different from that of other systemic analgesics that are used in the NICU. Administration of sucrose to the stomach by nasogastric tube is not an effective analgesic. The onset of action (10 seconds) is so rapid that there is not time for oral absorption to occur. The peak action is 2 minutes, and the duration of action is 5–10 minutes and therefore cannot be related to clearance from the circulation of any measurable agent (Leffral. Et al. 2006).

Although many studies have shown the efficacy of oral sucrose in the management of procedural pain in neonates, few have described adverse effects similar in this evidence. In a randomized, double-blind, controlled trial, Johnston et al, cit. (Leffral. Et al. 2006). found no differences in outcomes between infants who were <31 weeks' postconceptional age and received 0.1 mL of a 24% oral sucrose solution and those who received water for invasive procedures during the first week of life.

They did describe lower scores on certain components of the Neurobehavioral Assessment of the Preterm Infant in infants who received higher numbers of doses of sucrose than those who received fewer doses (Johnston, et al, 1999). The infants who received more doses also had higher Neurobiologic Risk Scores at 2 weeks' postnatal age but not at discharge. Because of the possible long-term effects suggested by these findings, judicious use of sucrose analgesia and, perhaps, limiting the number of doses in infants who are <32 weeks' postconceptional age is advocated.

Conclusion and recomendation

Thats showed there was no difference pain scale in control groups, sucrose 35% and dextrose 35% (p = 0.91). There was lower pain in dextrose 35% group than the control group (mean = 5.8 to mean: 5.6). It was recommend for further investigation with a larger sample and measuring pain scale appropriate to the mice.

Reference

Ain, H. (2011). Pemberian Larutan Sukrosa Oral 35% Untuk Menurunkan Respon Nyeri Pada Bayi Yang Diinjeksi Imunisasi di Wilayah Kerja Puskesmas Purwodadi Kabupaten Pasuruan. Fkep Unair: Thesis

Aritonang, H.H. (2010). *Tinjauan Pustaka: Konsep Nyeri, Perilaku Nyeri, Self Efficacy*. Dari http://repository.usu.ac.id/bitstream/123456789/20600/4/Chapter%20II.pdf diperoleh 10 April 2011.

Chermont, A.G., Falcao, L.F.M., Silva, E.H.L., Balda, R.C.X, Guinsburg, R. (2009). Skin-to-Skin Contact and/or Oral 25% Dextrose for Procedural Pain Relief for Term Newborn Infants. *Official Journal of The American Academy of Pediatrics*, 124 (6), 1101-1107.

Curtis, S.J., Jou, H., Ali, S., Vandermeer, B., & Klassen, T., (2007). A randomized controlled trial of sucrose and/or pacifier as analgesia for infants receiveing venipucture in a pediatric emergency departemen. *BMC Pediatrics*, 7(27):1471-2431.

Gharehbaghi, M.M. & Ali, P. (2007). *The Effect of Oral Dextrose on Pain Relief of Newborn Infants*. Dari http://pjms.com.pk/issues/octdec207/article/article12.html diperoleh 9 Maret 2011.

Harrison, D., Steven, B., Bueno, M., et al. (2010). Efficacy of Sweet Solution for Analgesia in Infants Between 1 and 12 Months of Age: A Sistematic Review. *Arch Dis Child*, 95 (10), 406-413.

Holsti, L., & Grunau, R.E. (2010). Considerations for Using Sucrose to Reduce Procedural Pain in Preterm Infants. *Official Journal of The American Academy of Pediatrics*, 125 (5), 1042-1047.

Johnston CC, Stremler RL, Horton L, Freidman A. Repeated doses of oral sucrose for decreasing pain from heelstick in preterm neonates. Biol Neonate. 1999;75:160–166

Johston, C.C., Filio, F., Snider L., Majnemer, A., Limperopoulos, C., & Walker, C. (2002). Routine sucrose analgesia during the first week of life in neonatus younger than 31 week's postconceptional age. *Pediatrics*, 110:523-528.

Kurniawati, S. (2009). *Persepsi Perawat Terhadap Perawatan Atraumatik Pada Anak Di Ruang III RSUD Dr. Pirngadi Medan.* Skripsi Strata Satu, Program Studi Ilmu Keperawatan Fakultas Kedokteran Universitas Sumatera Utara. Medan. (tidak dipublikasikan).

Kusumaningrum, A., Natalia R., & Nuryanto. (2011). Pengaruh Pelukan Ibu terhadap Skala Nyeri bayi saat imunisasi di Wilayah Kerja Puskesmas Indralaya Ogan Ilir. Skripsi. Program Studi Ilmu Keperawatan Fakultas Kedokteran Universitas Sriwijaya. (Belum dipublikasikan).

Lefrak, L., Burch, K., Caravantes, R., Knoerlein, K., DeNolf, N., & Duncan, J., et al. (2006). Sucrose analgesia:Identifying potentially better practices. *Pediatrics*, 118:197-202.

Liebert, M. A. (2010). *ABM* Clinical Protocol #23: Non-Pharmacologic Management of Procedure-Related Pain in the Breastfeeding Infant. *The Academy of Breastfeeding Medicine Protocol Committee*, 5 (6), 315-319.

Morash, D., & Fowler, K. (2004). An evidenced based approach to changing practice: Using sucrose for infant analgesia. *Journal of Pediatric Nursing*, 19(5):336-370.

Starships Children's Health Clinical Guideline (2008). *Sucrosa analgesia for simple neonatal procedures.* Dari http://www.starships.org. diperoleh tanggal 20 April 2008.

Rachdian, R.A. (2008). *Madu tidak baik untuk kesehatan Bayi (kurang dari 1 tahun).* Dari http://www.aqilaputri.rachdian.com/index2.php?option=com_content&do_pdf=1&id=24 diperoleh 6 April 2011.

Vincent, C.V.H., & Denyes, M. J. (2007). Relieving children's pin: Nurse's abilities and analgesic administration practices. *Journal of Pediatric Nursing*, 19(1), 40-49.

Wong, D. L., Hockenberry-Eaton, M., Wilson, D., Winkelstein, M.L., Schwartz, P. (2001). *Wong's Essensial of Pediatric Nursing (6th Ed.).* Diterjemahkan Oleh Hartono, A., Kurnianingsih, S., & Setiawan. Edt. Yudha, E.K., Wahyuningsih, E., Yulianti, D., Subekti, N.B. (2008). *Buku Ajar Keperawatan Pediatrik (Edisi 6, Volume 1).* Jakarta: EGC.