A Randomized, Double-Blind Trial of Oral Sucrose Solution and Placebo for Pain Relief in Retinopathy of Prematurity Examination

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Background: *Retinopathy of prematurity (ROP) examination is a painful procedure that has impact on pain sensitivity, leading to chronic pain. Non-pharmacologic approaches for the treatment of pain include oral sucrose solution. Currently, the data regarding pain relief are limited and lack of standard protocol.*
Objective: *To investigate if oral sucrose solution decreased pain and physiological distress during ROP examination.*
Material and Method: *Infants <32 weeks gestation or birth weight <1,500 g or selected infants birth weight between 1,500 and 2,000 g or gestational age more than 32 weeks and infants at risk were enrolled. The intervention group received one dose of 0.2 ml of 24% oral sucrose solution compared to control group who received sterile water as a placebo 2 minutes prior to the first ROP examination. Pain was evaluated using a Neonatal Pain, Agitation and Sedation Scale (N-PASS) before and during eye examination.*
Results: *Forty infants were randomized into 2 groups (19 infants in intervention group and 21 infants in control group). N-PASS was found to be significantly lower in intervention group (2 points difference; p = 0.02). Eleven infants (57.9%) in intervention and 14 infants (66.7%) in control group had tachycardia with significant increased heart rate from baseline. No serious adverse event was observed in both groups.*
Conclusion: *Single dose of 24% oral sucrose solution is effective in pain reduction during ROP examination.*

Keywords: *oral sucrose solution, N-PASS (Neonatal Pain, Agitation and Sedation Scale), retinopathy of prematurity (ROP)*

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Retinopathy of prematurity (ROP) is one of the leading causes of infancy and childhood visual disability which is preventable with appropriate eye screening[1,2]. ROP progression is sequential and timely treatment is required to reduce the visual loss. ROP screening is indicated in at risk preterm infants but it is a painful diagnostic and therapeutic procedure[2].

Pain is an unpleasant sensory and emotional experience[3]. Clinical studies of neonatal pain demonstrated that neonates exhibit a physiological increased sensitivity to pain, and may develop prolonged hyperalgesia after acute painful stimuli, leading to chronic pain. Furthermore, it is possibile that the acute responses to painful stimuli may cause or worsen preexisting intraventricular hemorrhage (IVH) or ischemia leading to periventricular leucomalacia (PVL)[4]. Oral sucrose solution is one of the non-pharmacological approaches for pain relief in neonate[5-8].

Although many potential methods for pain relief in neonates have been identified including oral sucrose solution, swaddling, pacifier[5,6,9-11], there were a few studies that demonstrated the effect of oral sucrose solution during ROP examination. Due to methodological limitations such as small sample sizes, leaded to a poor capacity to demonstrate differences among different pain management and inappropriate or uninformative tool to measure pain

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which is unable to detect the different between groups. We, therefore conducted a randomized control study to determine if oral sucrose solution is effective in pain reduction during ROP examination in preterm infant by using N-PASS.

Material and Method

The present study was approved for ethical issue by the Institutional Review Board Royal Thai Army Medical Department (code S005h/58) and by the Institutional Review Board of Research Affairs, Faculty of Medicine, Chulalongkorn University (code 484/59). The study was registered in the Thai Clinical Trials Registry (code TCTR20160603001).

Study population

A multicenter randomized, double-blind placebo trial was conducted during a 6-month period (March to September 2016) in the NICUs of Phramongkutklao Hospital (Bangkok), Banphaeo Hospital (Samut Sakhon Province) and Fort Prachaksinlapakom Hospital (Udonthani Province). All infants recruited to the study met the criteria for screening for retinopathy of prematurity outlined by the American Academy of Pediatrics, American Academy of Ophthalmology, and American Association for Ophthalmology and Strabismus for ROP[2]. Exclusion criteria included Infants who were still required mechanical ventilation or oxygen supplementation, infants with congenital malformations, infants receiving sedation, and infants with no consent from parents. Parents were given verbal and written information regarding the date of ROP examination and written consent was obtained. Patient data were collected and recorded in electronic database using study codes to maintain patient confidentiality and security password was set to limit the access to the data.

Data collection and measurement

On the day of ROP examination, the infants were randomized into treatment and control group by block of 4 randomization provided in sequentially numbered opaque envelopes. Randomization data were kept strictly confidential until the time of unblinding. Infants in treatment group received 24% oral sucrose solution (solution A) which was manufactured by the Pharmacy Department, Phramongkutklao Hospital. The infants in control group received sterile water (solution B), Pharma Innova,Co.Ltd.(Bangkok, Thailand). The two solutions were identical in appearance and packaging. Both solutions were prepared into 1- ml syringes before administration. Each syringe was labeled according to the codes from randomization. All infants were fed (breast milk or infant formula) within 3 hours prior to the ROP examination. The infants were brought to the quiet ROP examination room and controlled for temperature of 27˚C. Preparation for screening included the instillation of mydriatic eye drop (1% tropicamide and 2.5% phenylephrine) 1 drop every 15 minutes for 4 doses and local anesthetic eye drop (1% tetracaine in each eye 15 minutes prior to ROP examination. The infants were swaddled by transparent plastic sheet and pacifiers were not used.

The infants were monitored for heart rate and oxygen saturation by Masimo SET Radical Signal Extraction Pulse Oximeter (California, USA) before, during and after ROP exam. The study solution (2 ml) was given to the infant orally 2 minutes prior to the ROP examination by a research assistant blinded to the treatment allocation. The examination was performed by a pediatric ophthalmologist who was also blinded to the study group. The duration of examination was controlled for time limitation not longer than 5 minutes. Results of ROP examination were recorded including stage and zone and further treatment plan. The infants were assessed for pain by N-PASS performed by first neonatologist before and during ROP examination of the first eye. Heart rate and oxygen saturation were monitored during the eye examination and continued further for 5 minutes after the examination to observe for bradycardia or oxygen desaturation. Video clips were recorded before and during ROP examination of the first eye. The clips were reviewed on the next day and N-PASS were scored by a second neonatologist. In case of discrepancies between the two assessors, the scores were re-evaluated and discussed for the consensus.

N-PASS is a pain assessment tool used in the present study; it is designated to assess acute prolonged pain and chronic pain. Five indicators graded 0, 1 and 2 are included in the N-PASS. The indicators chosen for their established validity, clinical applicability and ease of assessment include crying/ irritability, behavior/state, facial expression, extremities/tone and vital sign. N-PASS was scored from 0 to 2 for each behavioral and physiological criteria, then summed to total score from 0 to 10. Scores for sedation (graded -1, and -2) were not used

in the present study as sedated infant were excluded. Infant demographics, baseline physiological data and all variables were recorded.

Statistical analysis

Descriptive Statistic was presented as mean and SD for continuous variables, count and percentage for categorical data. Quantitative variables were compared between groups using independent sample t-test or Mann-Whitney U test. Adverse events were recorded including physiological change and its treatment for events; tachycardia (heart rate >180 bpm); bradycardia (heart rate <80 bpm); oxygen desaturation (SpO2 <80%) for >10 seconds; and apnea. The categorical variables were evaluated using chi-square test. Statistical analysis was done using SPSS Statistical Software (SPSS version 22: IBM, New York, USA). A p value of less than 0.05 was considered statistical significant. The sample size estimation is based on the data from O'Sullivan's study[8]. A prospective power calculation was required to detect a two point difference in N-PASS scores at 90% power, and a 0.01 significance level. Calculated sample size was 20 infants per group.

Results

Forty-two infants met the eligibility criteria for ROP screening. Two infants were excluded because of no parental consent in one infant and mechanical ventilation in the other infant. A CONSORT diagram showing patient flow through each step of this trial was presented in Figure 1. The groups were similar regarding to gestational age (GA) at birth, birth weight (BW), and age at the first ROP examination was performed. The mean BW and GA were 1,545.9±551 g and 31±3 weeks, respectively. Twenty patients (50%) had BW <1,500 g. The mean postconceptional age (PCA) at the first ophthalmological examination was 35±3 weeks. The data regarding BW, GA, PCA, weight of the infants on the examination day in each group of the study, and result of the examination were displayed in Table1.

Baseline N-PASS scores prior to ROP examination (median, range) were 0 (0-2) and 0 (0-4) in the intervention and placebo group, respectively ($p = 0.59$). N-PASS scores (total score and subscales) during ROP screening were shown in Table 2. The N-PASS scores during sclera indentation was 2 points lower in intervention group compared with the control (7 vs. 9, $p = 0.02$) There was no discrepancy in total score of N-PASS assigned by two examiners at both time-point assessments. Comparison between before and during ROP examination in each group, N-PASS scores were significantly increased from 0 (0-2) to 7 (3-9) and 0 (0-4) to 9 (5-10) in the intervention and placebo group, respectively (both $p<0.001$).

There was statistically significant increased in heart rate in both groups. The heart rate increased 22.9% from baseline in sucrose group and 19.7% in control group respectively. Eleven infants in sucrose group (57.0%) and 14 infants in control group (66.7%) had episodes of tachycardia. Five infants (2 infants in sucrose group and 3 infants in control group) had episodes of oxygen desaturation requiring oxygen supplementation during ROP exam. There was no bradycardia or apnea observed during study.

Discussion

The result of our study showed significant effects of 0.2 ml of 24% oral sucrose solution given 2 minutes prior to ophthalmologic examination for retinopathy of prematurity on pain relief. During the examination, infants receiving sucrose solution had a significantly lower N-PASS scores than infants receiving sterile water. More than half of infants in both groups had increased heart rate during ROP examination but no different in between groups. In the present study, pain assessment was done during the first eye on the ROP examination to eliminate potential confounding effects of pain experience and memory that may deviate the pain evaluation. We determined at phase of scleral indentation which provided the maximum pain of ROP screening. Quality check was performed by the principal investigator. This was a randomized, double-blind trial of intervention as oral sucrose solution and placebo as sterile water, with blinding of process of randomization allocation. the ophthalmologists,and neonatologists were also blinded to the study group.

According to the American Academy of Pediatrics, American Academy of Ophthalmology, and American Association for Pediatric Ophthalmology and Strabismus[2], ROP examination is indicated in infants with a birth weight of less than 1,500 g or gestational age of 32 weeks or less as defined by the attending neonatologist, and selected infants with a birth weight between 1,500 and 2,000 g or gestational age of more than 32 weeks with an unstable clinical course, including those requiring cardiorespiratory support and who are believed by their attending

Table 1. Demographic data

	Sucrose group (n = 19)	Placebo group (n = 21)	*p*-value
Sex, n (%)			0.18
Male	13 (68.4)	10 (47.6)	
Female	6 (31.6)	11 (52.4)	
Gestational age at birth (weeks)*	31±3	30±3	0.42
Gestational age at first ROP exam (weeks)*	35±3	34±2	0.52
Birth weight (grams)*	1,656.9±530	1,445.4±563	0.23
Body weight at first ROP exam (grams)*	2,010.5±683	1,869±703	0.53
Staging of retinopathy of prematurity			
No ROP, n (%)	15 (78.9)	21 (100)	
Stage 1, n (%)	3 (15.8)	0 (0)	
Stage 2, n (%)	1 (5.3)	0 (0)	
Stage 3,n (%)	0 (0)	0 (0)	
Stage 4, n (%)	0 (0)	0 (0)	
Stage 5, n (%)	0 (0)	0 (0)	

* Mean±SD

Table 2. Pain profile and adverse events in the intervention and placebo groups

	Sucrose group (n = 19)	Placebo group (n = 21)	*p*-value
Before ROP exam			
N-PASS	0 (0-2)	0 (0-4)	0.59
Crying/Irritability	0 (0-0)	0 (0-0)	
Behavior state	0 (0-1)	0 (0-1)	
Facial expression	0 (0-1)	0 (0-1)	
Extremities tone	0 (0-1)	0 (0-1)	
Change in vital signs	0 (0-0)	0 (0-1)	
Maximum heart rate	143±17	155±13	0.06
Lowest oxygen saturation	96±1	96±3	0.06
During ROP exam			
N-PASS	7 (3-9)	9 (5-10)	0.002
Crying/Irritability	1 (1-2)	2 (1-2)	
Behavior state	1 (1-2)	2 (1-2)	
Facial expression	1 (0-2)	2 (1-2)	
Extremities tone	1 (1-2)	2 (0-2)	
Change in vital signs	2 (0-2)	1 (0-2)	
Maximum heart rate	180±21	186.6±16	0.29
Lowest oxygen saturation	92±6	90±11	0.42
Number of patients with tachycardia, n (%)	11 (57.9)	14 (66.7)	0.57
Number of patients with bradycardia, n (%)	0 (0)	0 (0)	1.00
Number of patients with desaturation, n (%)	2 (10.6)	3 (14.3)	0.72
Number of patients with apnea, n (%)	0 (0)	0 (0)	1.00

Chi-square teat
Independent T-test presented by Mean±SD
Mann-Whitney U test presented by Median(Min-Max)
Significant $p<0.05$

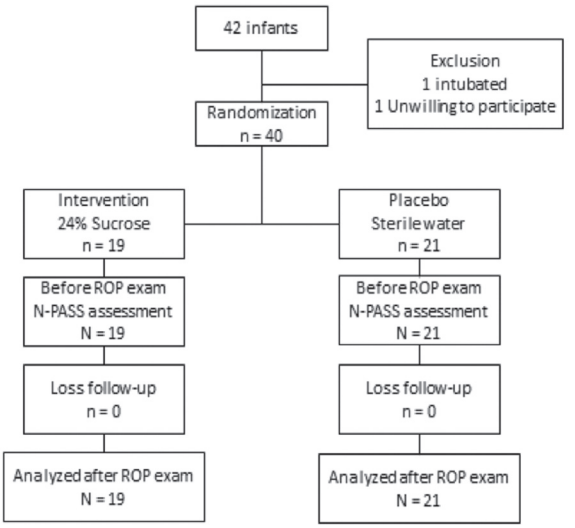

Fig. 1 Flow diagram showing flow of infants through each step of the trial.

pediatrician or neonatologistto be at high risk. It is also recommended that pain assessment should be done during the first eye examination. ROP examination evokes a pain response measured by physiological and behavioral responses[10,12]. Even with the administration of anesthetic eye drops, pain was still present during ROP examination. In our study, both groups demonstrated significantly increased in N-PASS scores in comparison between before and during ROP examination even though received 1% tetracaine eye drops. N-PASS has been shown to be a valid and reliable tool for assessing pain in both physiological and behavioral responses in both acute and prolonged pain[13]. The N-PASS evaluators in our study were well-trained neonatologist with experience in the use of N-PASS.

Our findings were similar to the results of previous studies. Costa[7] conducted a randomized controlled study in 124 infants comparing 1 ml of 25% oral sucrose solution with sterile water administered 2 minutes before ROP examination. The Neonatal Infant Pain Scale (NIPS) was used to evaluate the pain. NIPS score was significantly higher in the control group. Gal[5] conducted a placebo-controlled, double-blinded, crossover study in 23 infants. The treatment group received 2 ml of 24%sucrose solution 2 minutes prior to examination compared with sterile water in control group. The Premature Infant Pain Profile (PIPP) scores were significantly higher in the placebo group. Mitchell[6] compared 0.1 ml drop of 24% sucrose 3 times before and during the eye examination, with same dose of sterile water. The result showed significant differences in PIPP scores during ROP examination. These three studies showed that oral sucrose solution before ROP examination can decrease pain even they used different tool of pain assessment and also in different dose and schedule of oral sucrose solution.

O'Sullivan[14] also compared 24% oral sucrose solution with sterile water during ROP examination in a randomized control study of 40 infants. This study used the same dose of oral sucrose solution and N-PASS for pain assessment similar to our study. There was 2 points difference in pain scores (9.5 vs. 7.5, $p = 0.03$) which was similar to our findings. The study also reported significant bradycardia in the infants in control group. However, we did not find bradycardia or other serious adverse event in our study because we provided close monitoring and gave oxygen supplementation for infants who had oxygen desaturation before they developed bradycardia. We observed two infants (10.5%) in intervention group and three infants (14.2%) in control group had oxygen desaturation requiring oxygen supplementation (no statistically difference between groups). We suggested that even it was the small number of infants with oxygen desaturation, preparing of oxygen supplementation is necessary for ROP examination. However, significant tachycardia was demonstrated significantly in both groups. Monitoring for heart rate alone cannot be used to determine the pain during ROP examination.

Twenty-four persent oral sucrose solution administration for pain relief and minimize distress among infants is commonly used in neonatal intensive care unit and has been used in neonates. The mechanism of pain relief is thought to be the stimulation of lingual sweet taste receptors and release of endogenous opioids[14,15]. However, the certain mechanism remains controversial[16,17]. Stevens[18] demonstated the effective dose of 24% oral sucrose solution at a range of 0.05-0.5 ml for pain relief in preterm infants with venipuncture or heel lance, and higher doses were needed in term infants. The optimal dose of oral sucrose solution still remains to be determined, depending on specific procedure. Based on previous clinical studies, the current recommended dose of oral sucrose for preterm infants is 0.1-0.4 ml and 2 ml for term infants[15].

The limitations in the present study included failure to obtain N-PASS at phase of initial insertion of the speculum which might help to evaluate the

progression of pain followed by the phase of scleral indentation.

Conclusion

Ophthalmologic examination is essential to detect retinopathy in preterm infants but it can cause pain and distress. Pain management guideline during ROP examination should be considered. Our study showed that 0.2 ml of 24% oral sucrose solution administered 2 minutes prior to ROP examination is effective in pain relief assessed by N-PASS. It should be included as a non-pharmacological approach for pain reduction during ROP examination. However, mechanisms of pain relieve by oral sucrose need to be determined.

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What is already known on this topic?

Even there are many methods for relieving neonatal pain; it seems to be insufficient and no standard for pain management. Also, there is conflicting evidence on benefit of sucrose in ROP screening. Furthermore, lack of usage of appropriate tools for pain assessment in Thailand may leads to undetected biological and behavioral change in ROP examination.

What this study adds?

This study shows the effectiveness of 24% oral sucrose solution. Even though it had no serious adverse event in our study, more than half in each groups showed tachacardia and about 10 percent in sucrose group and 14 percent in control group revealed oxygen desaturation. The monitoring for prevention adverse events and established early oxygen supplementation and plans for management should be considered.

Potential conflict of interest

None.

References

1. Fleck BW, McIntosh N. Retinopathy of prematurity recent developments. NeoReviews 2009; 10: e20-30.
2. Fierson WM. Screening examination of premature infants for retinopathy of prematurity. Pediatrics 2013; 131: 189-95.
3. Merskey H, Albe-Fessard DG, Bonica JJ, Carmon A, Dubner R, Kerr FWL, et al. Pain terms: a list with definitions and notes on usage. Recommended by the IASP Subcommittee on Taxonomy. Pain 1979; 6: 249.
4. Bouza H. The impact of pain in the immature brain. J Matern Fetal Neonatal Med 2009; 22: 722-32.
5. Gal P, Kissling GE, Young WO, Dunaway KK, Marsh VA, Jones SM, et al. Efficacy of sucrose to reduce pain in premature infants during eye examinations for retinopathy of prematurity. Ann Pharmacother 2005; 39: 1029-33.
6. Mitchell A, Stevens B, Mungan N, Johnson W, Lobert S, Boss B. Analgesic effects of oral sucrose and pacifier during eye examinations for retinopathy of prematurity. Pain Manag Nurs 2004; 5: 160-8.
7. Costa MC, Eckert GU, Fortes BG, Fortes Filho JB, Silveira RC, Procianoy RS. Oral glucose for pain relief during examination for retinopathy of prematurity: a masked randomized clinical trial. Clinics (Sao Paulo) 2013; 68: 199-204.
8. O'Sullivan A, O'Connor M, Brosnahan D, McCreery K, Dempsey EM. Sweeten, soother and swaddle for retinopathy of prematurity screening: a randomised placebo controlled trial. Arch Dis Child Fetal Neonatal Ed 2010; 95: F419-F422.
9. Boyle EM, Freer Y, Khan-Orakzai Z, Watkinson M, Wright E, Ainsworth JR, et al. Sucrose and non-nutritive sucking for the relief of pain in screening for retinopathy of prematurity: a randomised controlled trial. Arch Dis Child Fetal Neonatal Ed 2006; 91: F166-8.
10. Rush R, Rush S, Ighani F, Anderson B, Irwin M, Naqvi M. The effects of comfort care on the pain response in preterm infants undergoing screening for retinopathy of prematurity. Retina 2005; 25: 59-62.
11. Grabska J, Walden P, Lerer T, Kelly C, Hussain N, Donovan T, et al. Can oral sucrose reduce the pain and distress associated with screening for retinopathy of prematurity? J Perinatol 2005; 25: 33-5.

12. Belda S, Pallás CR, De la Cruz J, Tejada P. Screening for retinopathy of prematurity: is it painful? Biol Neonate 2004; 86: 195-200.
13. Hummel P, Lawlor-Klean P, Weiss MG. Validity and reliability of the N-PASS assessment tool with acute pain. J Perinatol 2010; 30: 474-8.
14. Blass EM, Shah A. Pain-reducing properties of sucrose in human newborns. Chem Senses 1995; 20: 29-35.
15. Stevens B, Ohlsson A. Sucrose for analgesia in newborn infants undergoing painful procedures. Cochrane Database Syst Rev 2000; (2): CD001069.
16. Gradin M, Schollin J. The role of endogenous opioids in mediating pain reduction by orally administered glucose among newborns. Pediatrics 2005; 115: 1004-7.
17. Slater R, Cornelissen L, Fabrizi L, Patten D, Yoxen J, Worley A, et al. Oral sucrose as an analgesic drug for procedural pain in newborn infants: a randomised controlled trial. Lancet 2010; 376: 1225-32.
18. Stevens B, Yamada J, Ohlsson A. Sucrose for analgesia in newborn infants undergoing painful procedures. Cochrane Database Syst Rev 2004; (3): CD001069.

การศึกษาแบบสุ่มและปิดบังสองทางในการให้น้ำตาลซูโครสและยาหลอกทางปากในการลดความเจ็บปวดจากการตรวจหาความผิดปกติของจอประสาทตาในทารกเกิดก่อนกำหนด

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ภูมิหลัง: *การตรวจหาความผิดปกติของจอประสาทตาในทารกเกิดก่อนกำหนด เป็นหัตถการที่ทำให้เกิดความเจ็บปวด และมีผลต่อสรีรวิทยาของการรับรู้ต่อความเจ็บปวดนั้นเพิ่มมากขึ้น และมีผลต่อเนื่องทำให้เกิดการเจ็บปวดแบบเรื้อรังได้ การรักษาโดยไม่ใช้ยา เช่นการให้น้ำตาลซูโครสถูกนำมาใช้ แต่ในปัจจุบันนี้แนวทางการรักษานี้ยังมีข้อมูลการศึกษาที่ไม่เพียงพอและยังไม่เป็นมาตรฐาน*

วัตถุประสงค์: *เพื่อศึกษาผลการลดความเจ็บปวดและการเปลี่ยนแปลงทางสรีรวิทยาจากการตรวจหาความผิดปกติของจอประสาทตาในทารกเกิดก่อนกำหนด โดยการให้น้ำตาลซูโครสทางปาก*

วัสดุและวิธีการ: *ศึกษาในทารกแรกเกิดที่เมื่อแรกเกิดมีอายุครรภ์น้อยกว่า 32 สัปดาห์ หรือน้ำหนักแรกเกิดน้อยกว่า 1,500 กรัม หรือน้ำหนักแรกเกิดระหว่าง 1,500 ถึง 2,000 กรัม หรืออายุครรภ์เมื่อแรกเกิดมากกว่า 32 สัปดาห์ที่มีภาวะเสี่ยง กลุ่มทดลองได้รับ น้ำตาลซูโครสความเข้มข้นร้อยละ 24 ปริมาณ 0.2 มิลลิลิตร เปรียบเทียบกับกลุ่มควบคุมที่ได้รับน้ำบริสุทธิ์ 2 นาที ก่อนการตรวจตรวจหาความผิดปกติของจอประสาทตาในทารกเกิดก่อนกำหนดครั้งแรก และทำการประเมินความเจ็บปวดก่อนและขณะตรวจหาความผิดปกติของจอประสาทตาในทารกเกิดก่อนกำหนดโดยใช้มาตรวัดเอ็น-พาส*

ผลการศึกษา: *ทารก 40 คนถูกแบ่งกลุ่มแบบสุ่ม เป็น 2 กลุ่ม (กลุ่มทดลอง 19 คน และกลุ่มควบคุม 21 คน) การทดสอบความแตกต่างของค่ากลางของสองประชากรอิสระพบความเจ็บปวดจากการตรวจหาความผิดปกติของจอประสาทตาโดยใช้มาตรวัดเอ็น-พาส ในกลุ่มที่ได้รับน้ำตาลซูโครสความเข้มข้นร้อยละ 24 มีคะแนนน้อยกว่ากลุ่มที่ได้รับน้ำบริสุทธิ์ 2 คะแนน ขณะตรวจตา ($p = 0.02$) ทารก 11 คน (ร้อยละ 57.9) ในกลุ่มทดลอง และ 18 คน (ร้อยละ 66.7) ในกลุ่มควบคุมมีภาวะหัวใจเต้นเร็วผิดปกติและสูงขึ้นกว่าขณะพัก ไม่พบภาวะไม่พึงประสงค์ที่ร้ายแรงในทั้งสองกลุ่ม*

สรุป: *การให้น้ำตาลซูโครสความเข้มข้นร้อยละ 24 ทางปาก 1 ครั้งก่อนการตรวจตา มีประสิทธิภาพในการลดความเจ็บปวดจากการตรวจหาความผิดปกติของจอประสาทตาในทารกเกิดก่อนกำหนด*