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Original Article
Artigo Original

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Oxygen saturation and heart rate in premature: comparison between cup and finger feeding techniques

Saturação de oxigênio e frequência cardíaca em prematuros: comparação entre as técnicas de copo e sonda-dedo

Keywords

Feeding Behavior
Speech, Language and Hearing Sciences
Infant, Premature
Vital Signs
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ABSTRACT

Purpose: To evaluate the oxygen saturation, heart rate, length of hospital stay and weight preterm infants or preterm newborns (PTNBs) (in the Neonatal Intensive Care Unit in the diet supply by cup and finger feeding techniques, simultaneously with breastfeeding. **Methods:** Simultaneous randomized clinical trial. Twenty-five preterm infants admitted to the Neonatal Intensive Care Unit of the Public Hospital from October 2011 to February 2012 were selected. The sample was divided into two groups: Eight preterm infants who received the diet in the cup probe group (CPG) who were born on the same day, and 17 by finger probe group (FPG) who were born on the odd day. In the diet offer, the minimum and maximum values of oxygen saturation (O_2 Sat) and heart rate (HR) were recorded: before offering the diet, during and after the offer. **Results:** Regarding the variables O_2 Sat and HR, no statistically significant differences were observed between the groups, but in the group vs time factor, the groups showed differences, not continuous in the O_2 Sat variable. Regarding weight, a statistically significant gain was observed for both groups, and in CPG the highest weight gain was due to the longer hospitalization time. It was verified that FPG presented shorter hospitalization time. **Conclusion:** There were no differences regarding O_2 Sat and HR. However, when analyzing the time factor, the groups presented some differences, not continuous, indicating the need for other studies for a better understanding of the effect. The FPG presented shorter hospitalization time and the CPG infants had greater weight gain due to longer hospitalization time.

Descritores

Comportamento Alimentar
Fonoaudiologia
Recém-nascido Prematuro
Sinais Vitais
Métodos de Alimentação

RESUMO

Objetivo: Avaliar a saturação de oxigênio (SatO2), a frequência cardíaca (FC), o tempo de internação e o peso dos recém-nascidos pré-termos (RNPTs) em Unidade de Terapia Intensiva Neonatal, na oferta de dieta pelas técnicas de alimentação via copo e sonda-dedo, simultaneamente ao aleitamento materno. **Método:** Ensaio clínico randomizado simultâneo. Foram selecionados 25 prematuros internados na Unidade de Terapia Intensiva Neonatal de hospital público, no período de outubro de 2011 a fevereiro de 2012. A amostra foi dividida em dois grupos: 8 prematuros nascidos em dia par, que receberam a dieta no copo (GCP) e 17 prematuros, nascidos em dia ímpar, que receberam a dieta pela sonda-dedo (GSD). Na oferta da dieta foram anotados os valores mínimos e máximos da SatO2 e FC, antes de oferecer a dieta, durante e após a oferta. **Resultados:** Quanto às variáveis SatO2 e FC, não foram observadas diferenças estatisticamente significativas entre os grupos, mas, no fator grupo versus tempo, os grupos apresentaram diferenças, não contínuas na variável SatO2. Em relação ao peso, foi constatado ganho estatisticamente significativo para ambos os grupos, sendo que, no GCP, o maior ganho de peso foi por causa do maior tempo de internação. Foi verificado que o GSD apresentou menor tempo de internação. **Conclusão:** Não houve diferenças quanto à SatO2 e FC. Contudo, ao se analisar o fator tempo, os grupos apresentaram algumas diferenças, não contínuas, o que indica a necessidade de outros estudos para melhor compreensão do efeito. O GSD apresentou menos tempo de internação e os RNPTs do GCP tiveram maior ganho de peso em razão do maior tempo de internação.

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INTRODUCTION

At birth, preterm newborns (PTNBs) receive painful, visual and auditory stimuli at the Neonatal Intensive Care Unit (NICU), which may trigger physiological responses not appropriate for age and cause psychological and physiological changes.

This imbalance in the organism physiology can cause a decrease in oxygen saturation (O_2 Sat) and increase heart rate (HR) and respiratory rate (RR)[1], harming the global metabolism of the newborn (NB)[2].

In this context, as survival of premature infants has increased, it is necessary to perform food transition techniques safely to minimize the possible complications to which they are susceptible.

Feeding represents a continuous challenge for those responsible for newborns (NBs) nutrition, especially those who are born with very low weight[3].

One question arises for health professionals in general: what is the most effective way to perform the transition from gastric tube to oral diet for PTNBs while they are in the NICU?

Some professionals advocate the idea that the cup ("cup-feeding")[4] should be used. This is an alternative method to feed the NB, proposed by the United Nations Children's Fund (UNICEF)[5]. This procedure takes place when NBs are not yet being breastfed exclusively in the maternal breast (MB), or when the mother is unable to breastfeed[4].

Avoiding the use of the bottle, it is the justification for the use of this device, which prevents "confusion of nozzles" (between MB and bottle), so the NB privilege breastfeeding (BF) as soon as possible[6].

Carvalho[7] affirms that the cup allows the baby to regulate suction, managing to control breathing and swallowing more easily, as it requires little energy. In addition, it encourages the involvement of parents, body, and visual contact with the baby, contributing to not using the bottle.

In its turn, in the evaluation of the effects of oral support on feeding low-birth-weight NBs without eating difficulties, in the NICU, it was possible to observe, in a later study, that in both situations (cup and bottle), with and without speech therapy intervention, there was no immediate O_2 Sat or HR[8].

A study mentions that diet offering by the cup is more adequate following the hypothesis that the PTNB is able to regulate the ingestion of milk and does not require sucking effort[9], control the suction rhythm, which provides adequate coordination of breathing and swallowing.

However, it should be noted[10] that the use of this device is considered by speech therapists as promoter of several changes in the diet supply to the NB, such as: escape and milk waste; absence of anterior labial sealing; increased risk of bronchoaspiration and decreased stimuli of the muscles involved in sucking.

In turn, health professionals believe that finger feeding should be used in order to promote suction in the PTNBs that are transitioning from gastric feeding to oral route in the absence of their mother, when they are unable to receive the diet in MB or in general, as a complement of oral route in NB[11].

In view of these different trends, it could be observed, in the service of the hospital where the present research was carried out, that for PTNBs is easier to perform suction with the probe-finger technique, probably because the device – involving gloved little finger of speech therapist – is similar to MB. It follows the justification for this preliminary hypothesis.

Articulating the physiology of sucking with subjectivity, it is noteworthy that, in the first stage of pre-genital sexual evolution (oral phase) described by Freud[12], it is of fundamental importance to contact the oral cavity of the NB with MB during suction, since this provides a pleasurable experience since the baby's oral region is mobilized as an erogenous zone[13].

In this perspective, at the time of breastfeeding, the child's relationship with the mother is a source of excitation and sexual satisfaction. This is because the mother takes the child as a sexual object, snuggling them/kissing them, arousing the sexual pulse of the child. Therefore, breastfeeding is characterized by sexuality, by the mother's desire in relation to the child, and food is the object that embodied this maternal investment[12].

In this phase, pleasure is linked to the diet ingestion, but also to the excitation of the oral mucosa that constitutes a self-erotic pleasure, extending from the birth period until weaning[14].

From a phsysiological point of view, it is well known that the baby is born helpless, needing care to satisfy hunger and thirst[15]. This physiological need to perform the suction function arises at birth, and, even satisfied, the baby continues sucking their lips pleasantly during sleep. Such behavior suggests that the baby still does not differentiate the outside world in relation to themselves[14].

Thus, this approach considers that the oral area, represented by the mouth, refers to the orality that exceeds the organic dimension of this body region, as it is inseparable from subjectivity[16]. In other words: the mouth is the first place of pleasure, and orality is the founder of the individual.

It is noteworthy that the region of oral cavity is characterized by high tactile sensitivity, which allows the recognition of objects, such as mother's nipple[17], and it is the first source of pleasure, communication[18], discovery of sensations and investigation of the world[19].

The objective of this article was to evaluate the O_2 Sat, HR, length of hospitalization and the weight of PTNB in NICU in diet by feeding techniques via cup and finger probe, simultaneously to BF.

METHODS

This is a simultaneous randomized clinical trial.

The Ethics Committee of the hospital and the Platform Brazil approved the research, under the CAAE: 01720013.6.0000.5482. All the responsible persons involved signed the informed consent form.

Casuistic: 25 PTNBs of both sexes were selected, admitted to the NICU of a state public hospital, in the city of Vila Velha/ES, from October 2011 to February 2012, and who were being breastfed on MB.

The sample was divided into two groups: eight (32%) PTNBs received diet through cup probe group (CPG) and 17 (68%) received the diet through finger probe group (FPG). The cup feeding (or cup probe group) included the babies that were born in an odd day, and the finger feeding (or finger

probe group) FPG, those who were born in an even day. In both groups, human milk was offered by the mother or by a formula prescribed by the doctor.

Selection criteria

The selection criteria were: PTNBs with stable clinical conditions; gestational age (GA) from 35 to 36 weeks (Capurro method); weight above 1,300 grams; pulse oximeter monitoring; up to two weeks in the NICU; submission to the non-nutritive sucking technique (NNS) by stimulation with a "gloved finger" together with the feeding tube diet (Nasogastric Tube (NT) or Orogastric Tube (OT)) and/or relactation technique via stimulation with "empty breast" (concomitant to the diet offering via feeding tube diet (NT or OT) and in BF).

The PTNBs with neurological alterations and/or drug use (sedatives/hypnotics) were excluded from this study, in other words, PTNBs who were using continuous positive airway pressure, with facial deformities that influence food function, with genetic syndromes, with medical diagnosis of oropharynx and larynx structural anomalies (tracheomalacia, laryngomalacia, tracheal or larynx stenosis, etc.), with HR lower than 80 beats per minute (BPM) and higher than 160 bpm, and O_2 Sat values lower than 80%.

Procedures

Individuals were selected by consulting the standardized medical records from Neonatology Service of NICU. For identifying the preterm infants, the following data were collected: newborn's birth date; sex; GA (based on Capurro method); birth weight; current weight; weight at hospital discharge (HD); O_2Sat and HR.

To perform the evaluation, the mother was asked to milk 15 milliliters (mL) of breast milk into the standardized hospital cup.

In the cup probe group, it was used the technique standardized by World Health Organization (WHO) and UNICEF[5] as follows: hold the baby seated or semi-seated in the lap (90º); hold the glass with milk next to the baby's lips; move the cup so that the milk touches the baby's lips (the cup should rest lightly on the lower lip and its edges should touch the outer part of the upper lip). The NB will "lick", putting the tongue in the milk and starting the suction. It should be avoided spilling milk into the baby's mouth; just hold the cup next to his/her lip.

For diet on the finger probe, a number four probe was used, fixed on the researcher's little finger with a thin adhesive tape. One end stood on the finger, and the other end, inside the cup. The cup used to offer the diet was offer by the hospital, standardized, plastic and millimeter.

During the offer, the PTNB remained on the mother's lap or inside the incubator, in both groups, in the initial 3 minutes, and the values of HR and O_2 Sat were measured and recorded with the portable oximeter of the Fingertip Oximeter brand, on the right or left foot of the PTNB. After 1 minute of interval, these values were evaluated again. The stopwatch of the iPhone cell phone was used. HR lower than 80 bpm was considered as bradycardia and HR higher than 160 bpm, as tachycardia. The risks in clinical stability are considered moderate if O_2 Sat values remained between 85% and 80%, and severe, when they are less than 80%[20].

In cases in which the PTNBs reduced the suction movements, gazed, coughed, decreased reflexes, show tongue tremor, cyanosis in the extremities and perioral, respiratory and heart rhythm changes, fall of O_2 Sat, hypoactivity and hiccup, the stimulation was interrupted, since those are parameters for PTNBs limit, according to routine procedures established in this hospital.

It was verified homogeneity between the groups of PTNBs who received feeding via cup and finger probe group ("feeding cup") at the beginning of the study. Therefore, it could be described the variables by means of absolute and relative frequencies, measures of central tendency (average and median) and dispersion (standard deviation, minimum and maximum values). In the qualitative variables, the chi-square and Fisher's exact tests were applied. For the quantitative variables, it could be verified adherence to the normal curve, besides the use of non-parametric tests and, subsequently, the use of the Kruskal-Wallis test.

The longitudinal analysis of the data was performed separately for both groups, cup and finger probe, in the O_2 Sat and HR outcomes before offering the food, during and after the offer, using the non-parametric Friedman test. When there were statistically significant differences, Dunn's post-hoc test was applied to see the time of alteration. The weight was compared before the onset of the speech therapy intervention and at the time of discharge by the non-parametric Wilcoxon test. To control and identify interactions among the factors group and time, according to the outcomes, it was applied the technique Generalized Estimating Equations (GEE).

A descriptive level of 5% was assumed for statistical significance. The data were tabulated in Excel and analyzed by the SPSS program, version 17.0, for Windows.

RESULTS

For the characterization of this study, 25 PTNBs in the NICU were selected. From 58 medical records analyzed, 33 were excluded according to the following criteria: 17 were full-term NBs; seven PTNBs had not started BF; five were using nasal Continuous Positive Airway pressure (CPAP); three presented neurological impairment; and one had facial deformity (cleft lip and cleft palate).

Twenty-five (100%) PTNBs were evaluated, of which eight (32%) received the diet in cup probe group ("cup feeding"), and 17 (68%), by finger probe group ("finger feeding"). It is noteworthy that two pairs of twins were part of this last group.

Table 1 shows the descriptive statistics of the comparison variables at the beginning of the study. It could be observed that the groups analyzed were homogeneous, evidencing the quality of the randomization process ($p>0.05$).

Regarding O_2 Sat, according to the CPG and FPG, it was verified that there was no statistically significant difference in the measurements evaluated before, during and after offering the diet.

However, in the GEE analysis considering two factors, group and time, characterized by the days of hospitalization, it is identified the interaction effect group versus time present for

this outcome (p<0.001). It could be observed that the difference between the groups over time was not constant (Table 2).

Table 3 shows that there was a statistically significant difference in relation to the HR only at days 4, 8 and 10 in the CPG. As for the FPG, at day 5, there was a statistically significant difference before offering the diet and during the offer (Dunn's test), as well as at day 7.

In the analysis by the GEE, we perceived that, along the feeding for the mentioned days (Table 3), the HR of CPG was higher only at days 4 and 5 (p<0.001). The other days, the FPG showed higher average values.

Table 4 shows that, for weight, only the main effect time showed difference between the onset of speech therapy interventions and discharging from hospital.

Table 1. Number and percentage of PTNBs for comparison variables at the beginning of the study

Variable		CPG	FPG	p*
		n (%)	n (%)	
Sex	male	4 (50.0)	9 (52.9)	1.000
	female	4 (50.0)	8 (47.1)	
Variable		CPG	FPG	p§
Gestational age (weeks)	average	35.7	35.2	0.883
	(SD)	(0.8)	(2.1)	
	median	36.0	36.0	
	minimum	34.0	30.0	
	maximum	36.5	38.5	
Birthweight (kg)	average	2,215.0	1,995.9	0.200
	(SD)	(592.2)	(427.9)	
	median	2,275.0	2,010.0	
	minimum	1,090.0	1,335.0	
	maximum	2,880.0	2,775.0	
Weight with which started the speech therapy intervention (kg)	média	2,386.3	2,199.0	0.440
	(SD)	(478.7)	(435.1)	
	median	2,232.5	2,160.0	
	minimum	1,885.0	1,400.0	
	maximum	3,130.0	2,980.0	
Hospitalization time (days)	average	8.1	5.3	0.065
	(SD)	(3.4)	(3.2)	
	median	9.5	5.0	
	minimum	1	1	
	maximum	11	12	

*Fisher's exact test; *p*-value < 0.05; §Kruskal-Wallis; *p*-value < 0.05
Caption: CPG = cup probe group; FPG = finger-probe group; n = number of patients

Table 2. Number and percentage of PTNBs, according to O_2Sat before, during and after offering the diet for the groups

DAY	n	O_2Sat – COPO									p*
		Before			During			After			
		average (SD)	Median	min-max	average (SD)	median	min-max	average (SD)	median	min-max	
1	8	88.9 (7.9)	90.5	73-99	92.5 (4.6)	93.0	85-99	89.6 (6.3)	88.0	80-99	0.341
2	7	93.3 (4.5)	95.0	86-98	94.3 (3.1)	96.0	89-97	94.0 (2.2)	95.0	90-96	0.446
3	7	93.4 (3.7)	95.0	87-97	94.7 (2.5)	96.0	91-98	94.1 (3.8)	96.0	87-97	0.607
4	7	96.3 (2.0)	97.0	92-98	94.4 (2.2)	95.0	90-96	97.7 (3.9)	97.0	94-106	0.080
5	7	94.6 (3.7)	96.0	88-98	96.0 (2.1)	96.0	92-98	96.1 (1.3)	96.0	94-98	0.172
6	6	96.2 (1.2)	96.5	94-97	97.2 (1.5)	97.5	95-99	96.3 (1.4)	96.5	94-98	0.401
7	6	96.8 (1.6)	97.5	94-98	96.8 (1.2)	97.0	95-98	96.8 (0.8)	97.0	96-98	0.504
8	6	95.7 (0.8)	95.5	95-97	96.3 (0.5)	96.0	96-97	96.7 (1.2)	96.5	95-98	0.422
9	6	95.8 (0.4)	96.0	95-96	96.3 (1.5)	97.0	94-98	97.2 (0.4)	97.0	97-98	0.055
10	4	97.3 (1.0)	97.5	96-98	97.8 (1.0)	97.5	97-99	96.3 (1.5)	96.0	95-98	0.319

*Friedman Test; p value for the GEE test according to p = 0.055, p time < 0.001, group X time p < 0.001
Caption: O_2Sat = oxygen saturation; n = number of patients; *p*-value < 0.05

Table 2. Continued...

DAY	n	O_2Sat – FINGER-PROBE									p*
		Before			During			After			
		average (SD)	median	min-max	average (SD)	median	min-max	average (SD)	median	min-max	
1	17	96.4 (1.9)	96.0	90-99	95.4 (2.3)	96.0	89-99	94.9 (4.5)	95.0	79-99	0.315
2	15	94.5 (2.9)	95.0	87-98	95.9 (2.3)	96.0	89-98	95.2 (3.0)	96.0	87-99	0.077
3	13	94.1 (5.2)	96.0	81-99	94.2 (5.3)	96.0	80-99	94.3 (5.2)	96.0	81-98	0.913
4	11	96.6 (1.9)	97.0	93-99	97.6 (2.9)	97.0	95-106	95.9 (2.3)	96.0	91-100	0.497
5	10	96.4 (2.2)	97.0	91-99	96.0 (3.3)	97.0	87-98	95.7 (2.7)	96.0	89-99	0.303
6	8	94.5 (4.5)	96.0	84-98	96.0 (3.0)	97.0	89-98	95.3 (3.0)	96.0	88-97	0.174
7	6	96.3 (3.3)	97.0	90-99	97.2 (1.5)	97.5	95-99	97.0 (1.5)	96.5	96-100	0.405
8	3	97.0 (1.0)	97.0	96-98	96.0 (1.0)	96.0	95-97	96.3 (0.6)	96.0	96-97	0.273
9	2	96.5 (0.7)	96.5	96-97	96.0 (1.4)	96.0	95-97	97.5 (0.7)	97.5	97-98	0.368
10	2	97.5 (2.1)	97.5	96-99	96.0 (0.0)	96.0	96-96	97.5 (0.7)	97.5	97-98	0.368
11	2	97.0 (0.0)	97.0	97-97	96.5 (2.1)	96.5	95-98	96.0 (0.0)	96.0	96-96	0.607

*Friedman Test; p value for the GEE test according to p = 0.055, p time < 0.001, group X time p < 0.001
Caption: O_2Sat = oxygen saturation; n = number of patients; *p*-value < 0.05

Table 3. Number and percentage of PTNBs, according to HR before, during and after diet offering for the groups

DAY	n	Heart rate – CUP									p*
		Before			During			After			
		average (SD)	median	min-max	average (SD)	median	min-max	average (SD)	median	min-max	
1	8	133.4 (10.4)	133.0	120-148	141.8 (18.2)	143.0	112-167	130.4 (22.5)	132.0	83-156	0.159
2	7	143.3 (6.9)	145.0	130-149	144.6 (13.6)	143.0	121-158	142.6 (10.4)	144.0	131-160	0.867
3	7	144.3 (5.2)	142.0	140-154	148.3 (10.2)	151.0	131-159	150.4 (8.2)	153.0	135-158	0.368
4	7	147.7 (8.9)	150.0	134-161	152.9 (10.3)	160.0	135-162	143.3 (13.5)	148.0	120-157	0.012
5	7	150.7 (4.9)	153.0	143-155	153.9 (10.4)	157.0	134-166	153.1 (2.7)	153.0	150-157	0.121
6	6	145.5 (12.8)	148.5	128-164	152.2 (11.4)	152.0	135-169	147.8 (17.4)	147.5	130-176	0.311
7	6	142.7 (13.8)	145.0	120-159	151.3 (7.3)	152.5	138-158	145.5 (14.3)	147.5	120-160	0.154
8	6	141.0 (14.7)	148.0	120-154	151.2 (9.3)	154.5	133-159	146.5 (7.9)	150.0	134-153	0.016
9	6	142.3 (19.4)	147.5	107-162	150.3 (10.2)	153.0	132-162	147.3 (8.0)	148.0	135-159	0.069
10	4	143.5 (11.2)	148.0	127-151	152.8 (4.5)	155.0	146-155	141.8 (10.9)	144.0	128-151	0.050
DAY	n	Heart rate – FINGER-PROBE									p*
		Before			During			After			
		average (SD)	median	min-max	average (SD)	median	min-max	average (SD)	median	min-max	
1	17	137.4 (22.8)	137.0	90-176	146.3 (16.5)	145.0	103-174	144.4 (13.8)	145.0	120-176	0.137
2	15	140.0 (24.0)	140.0	90-180	144.1 (20.2)	148.0	85-169	144.3 (12.8)	145.0	122-164	0.374
3	13	148.1 (13.1)	146.0	120-174	147.2 (10.6)	149.0	130-160	145.8 (10.1)	147.0	126-160	0.484
4	11	131.1 (18.7)	141.0	92-148	141.3 (21.3)	137.0	95-180	137.8 (16.0)	140.0	104-160	0.103
5	10	141.5 (12.0)	140.5	127-164	146.2 (13.0)	146.0	125-169	144.5 (14.1)	146.0	124-172	0.009
6	8	147.6 (18.8)	146.0	114-178	151.9 (17.6)	148.0	129-188	146.9 (16.8)	151.5	108-160	0.446
7	6	132.8 (21.7)	139.0	90-151	145.2 (20.9)	151.0	104-162	139.7 (16.5)	145.5	112-155	0.030
8	3	147.7 (7.5)	148.0	140-155	154.7 (2.5)	155.0	152-157	152.0 (4.4)	150.0	149-157	0.060
9	2	149.5 (6.4)	149.5	145-154	156.5 (2.1)	156.5	155-158	153.5 (0.7)	153.5	153-154	0.223
10	2	149.5 (2.1)	149.5	148-151	154.0 (4.2)	154.0	151-157	153.0 (1.4)	153.0	152-154	0.223
11	2	153.5 (0.7)	153.5	153-154	160.5 (0.7)	160.5	160-161	157.5 (0.7)	157.5	157-158	0.135

*Friedman Test; p value for the GEE test according to group p = 0.056, p time < 0.001, group X time p < 0.001; *p*-value < 0.05

Table 4. Number and percentage of PTNBs, according to weight at the beginning of the speech therapy intervention and at discharge for CPG and FPG

Groups	n	Weight (kg)						p*
		Speech therapy intervention beginning			At hospital discharge			
		average (SD)	median	min-max	average (SD)	median	min-max	
CUP		2,386.3 (478.7)	2,232.5	1,885-3,130	2,634.0 (461.2)	2,543.5	1,990-3,340	0.012
FINGER-PROBE		2,199.0 (435.1)	2,160.0	1,400-2,980	2,355.5 (459.3)	2,290.0	1,489-3,220	0.001

*Wilcoxon test; p value for the GEE test according to group p = 0.186, time p = 0.002, group X time p = 0.483; *p*-value < 0.05

DISCUSSION

The choice of transition from gastric tube to oral route technique in PTNBs is always a significant challenge to professionals who work in hospital clinical practice. Due to the fact that glass is used in the NICU and maternity throughout the country, few studies report indication of the finger probe technique.

Although cup feeding is proposed as a preferable alternative method to feed the NB[5], insofar as it is easy for the baby to regulate milk ingestion and coordinate the rhythm of suction[9], this device may also present some problems, such as risk of bronchoaspiration, stimulation of the muscles involved in sucking decrease, excessive loss of food with the use of the cup, sucking, swallowing and breathing incoordination, which may lead to the absence of anterior labial sealing, cough, choking with suggestive speech-language diagnosis of dysphagia[10,21,22].

From this perspective, it is evident that the inadequacies in the cup technique are worrying. Therefore, further studies should propose to evaluate other PTNBs feeding transition techniques.

From a recent systematic review on the transition from enteral feeding to oral diet in PTNBs, it was possible to verify that several physical and clinical characteristics of preterm infants have been used to describe this process and observed the importance of stimulation strategies of the oral sensorimotor system to decrease the transition period to full oral feeding[23].

However, another study emphasizes that the finger probe technique can bring benefits to PTNB, since the NB can exercise the suction and the oral parameters for its efficient performance, besides adjusting the sensitivity and coordination of sucking, swallowing and breathing[24].

With regard to the PTNBs selected in the study, it is necessary to clarify that the groups are homogeneous, with similar characteristics in relation to sex, GA, birth weight and length of stay at the Hospital.

Regarding the length of hospitalization, it was observed in this study that the FPG presented less length of hospitalization. It is worth noting we defined the length of hospitalization of up to two weeks (14 days) as a methodological criterion of inclusion, aiming to standardize the sample and avoid possible interferences of this variable in the physiological data fetched in relation to both feeding techniques.

There was no statistically significant difference for O_2 Sat according to the group. The data corroborate research[4,25] that demonstrated that PTNBs showed better results with the use of the cup in relation to the physiological stability of O_2 Sat.

A recent article[26] with the aim of comparing the use of syringe and finger probe technique for feeding preterm infants found that O_2Sat and HR variables remained within the limits of normality for both methods of supply.

In the study by López et al.[27], O_2 Sat was less than 85% after diet by cup feeding. These findings differ from the findings of the present study. The authors[27] emphasize that the possible fall of O_2 Sat may be related to the greater effort made by the PTNB in the attempt to suck the food from the cup, since no aspiration episodes were observed.

A study with RNPTs from 32 to 34 weeks of GA that used the cup pointed out the presence of some complications, such as O_2 Sat drop, cyanosis, respiratory effort and choking. However, it could not be observed significant difference regarding the complications when comparing the finger and cup probe groups in PTNBs with GA of 34 + 1/36 + 6[28].

Regarding HR measures, variations on days 4, 8 and 10 in CPG and on days 5 and 7 FPG may be justified due to signs of stress, excessive handling, painful procedures, pain, noise[29] or lack of BF. This last data was not evaluated during the study, but research shows that the feeding relationship between the mother and the NB is influenced by physiological and interactional factors[30].

According to the weight analysis, this aspect was comparatively evaluated between the onset of speech-language pathology interventions and the time of hospital discharge. It could be noted that there was a statistically significant gain in the average weight value for both groups, verifying that, in the CPG, the highest weight gain was due to a longer hospitalization time.

In a recent study, authors[28] verified a similar weight gain between the probe-finger and cup groups, but perceived a greater diet escape in the cup group in PTNBs with GA between 32-34 weeks, confirming that the PTNBs using the probe-finger technique have better use of the diet[26].

After all these results, there is a scarce literature comparing both dietary transition techniques in relation to O_2 Sat and HR. Although this study did not observe differences between these two variables, feeding with the finger probe technique proved to have more physiological properties than the cup, since it provides stimulation of the oral sensorimotor system and benefits suction training. It was also observed that, with the use of the finger probe technique, the PTNB had greater control of the diet in the oral cavity and better organized sucking, swallowing and breathing coordination.

The limitation of this study is the reduced number of participants and the lack of control of other variables, such as RR, body temperature and frequency of evacuations.

There is still a need to perform new studies to verify the repercussion of the probe-finger and cup techniques in the prevalence of BF after hospital discharge and its consequences during the NB life.

CONCLUSION

Thus, it was not observed differences regarding saturation and HR in PTNBs fed by the cup and finger probe techniques. However, when analyzing the time factor, the groups showed some non-continuous differences, which indicates the need for further studies to understand better its effect.

The finger probe group reported less length of hospitalization, and the cup group had a higher weight gain due to the longer hospitalization time.

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Author contributions

JAN conducted the conception of the study; methodology; data collection and outline of the article; EMGB conducted the critical review of the article; MCC was the supervisor of this study.