Artículo

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Changes in Sucking Patterns and Craniofacial Dimensions in Neonates: A Pilot Study

Laila Yaned González-Bejarano

https://orcid.org/0000-0002-7949-102X
Universidad Nacional de Colombia, Colombia
lygonzalezb@unal.edu.co

Luz Mery Hernández-Molina

https://orcid.org/0000-0003-3327-7439
Universidad Nacional de Colombia, Colombia
lmhernandezmo@unal.edu.co

Gabriela González-Villamizar

https://orcid.org/0009-0003-0734-9053
Pontificia Universidad Javeriana, Colombia
gabriela_gonzalez@javeriana.edu.co

Nelson Alirio Cruz-Gutiérrez

https://orcid.org/0000-0002-7370-5111
Universitat de les Illes Balears-Escola Politécnica Superior, España
nelson-alirio.cruz@uib.cat

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Contribution to the Discipline: From the theoretical perspective of Nursing, Callista Roy's Adaptation Model guided the development of the interdisciplinary work, which demonstrates the newborn's physiological adaptation process during breastfeeding. This pilot study contributed to the validity and reliability of the instruments and measurements for a primary study aimed at establishing the association between the physiological adaptation mode of sucking during feeding and its influence on craniofacial growth.

Abstract

Introduction: The influence of sucking patterns during breastfeeding (BF) on craniofacial (CF) growth is beginning to be investigated. Therefore, a preliminary pilot study is needed to provide methodological validity to a primary study. **Objective**: To evaluate sucking patterns measurements and CF structures at two different points in time in newborns (NB) during breastfeeding. **Methodology**: Sixteen full-term newborns (FTNB), 37-40 weeks of gestation (WG), and birth weight ≥ 2500 g were observed. FTNBs with CF anomalies and neuromotor, or cardiorespiratory disorders were excluded. The research was approved by institutional ethics committees. An examiner assessed the sucking patterns using the Neonatal Oral Motor Assessment Scale (NOMAS) through the analysis of a video recording. Two general anthropometric variables and nine craniofacial variables were measured at two points in time (T1-T2) with an eight-day difference. **Statistical Analysis**: To identify differences between sucking patterns and CF dimensions, the variable di = Yi2-Yi1 was constructed, and a null *Ho:u_d = 0* hypothesis was proposed. The Kappa Index measured the concordance of NOMAS characteristics. **Results**: The p-values of CF measurements were > 0.05, meaning, the null hypothesis was not rejected, except for the anteroposterior head length variable, p = 0.04. The Kappa Index = 0.82 showed concordance with NOMAS characteristics at T1/T2. **Conclusion**: It is the nursing and the interdisciplinary team's responsibility to assess changes in the neonate's sucking pattern to promote effective breastfeeding and ensure comprehensive newborn care.

Keywords (Source: DeCS)
Sucking; newborn; anthropometry; growth; breastfeeding.

Cambios en los patrones de succión y dimensiones craneofaciales en neonatos: estudio piloto

Resumen

Introducción: la influencia de los patrones de succión durante la lactancia materna (LM) en el crecimiento craneofacial (CF) se está empezando a investigar; por esta razón, es necesario realizar un estudio piloto preliminar que aporte validez metodológica a un estudio primario. **Objetivo:** evaluar las mediciones del patrón de succión y las estructuras craneofaciales (CF) en dos momentos diferentes en el recién nacido (RN) en etapa de lactancia. **Metodología:** se observaron 16 recién nacidos a término, 37-40 SG, peso al nacer ≥ 2500g. Se excluyeron RNAT con anomalías CF, alteraciones neuromotoras y cardiorrespiratorias. La investigación fue aprobada por los comités de ética de las instituciones. Un examinador evaluó los patrones de succión con la escala Neonatal Oral Motor Assessment Scale (NOMAS), a partir del análisis de una videograbación. Se midieron dos variables antropométricas generales y nueve craneofaciales en dos tiempos (T1-T2) con ocho días de diferencia. **Análisis estadístico:** para identificar las diferencias entre los patrones de succión y dimensiones CF, se construyó la variable di=Yi2-Yi1; sobre esta se planteó la hipótesis nula $Ho{:}u_d = 0$. Con el índice Kappa se midió la concordancia de las características NOMAS. **Resultados:** los valores p de las mediciones CF fueron >0,05, es decir, no se rechaza la hipótesis nula, excepto la variable longitud anteroposterior de la cabeza, p=0,04. El índice Kappa= 0,82, mostró concordancia con las características de NOMAS en T1/T2. **Conclusión:** es responsabilidad del equipo de enfermería e interprofesional evaluar los cambios en el patrón de succión del neonato para promover un amamantamiento efectivo y garantizar una atención integral al recién nacido.

Palabras clave (Fuente: DeCS)
Succión; recién nacido; antropometría; crecimiento; lactancia materna.

Alterações nos padrões de sucção e nas dimensões craniofaciais em neonatos: um estudo-piloto

Resumo

Introdução: A influência dos padrões de sucção durante o aleitamento materno no crescimento craniofacial (CF) está começando a ser investigada; por esse motivo, é necessário um estudo-piloto preliminar para fornecer validade metodológica a um estudo primário. **Objetivo:** avaliar as medidas do padrão de sucção e das estruturas craniofaciais (CF) em dois momentos diferentes no recém-nascido durante o aleitamento materno. **Materiais e método:** Foram observados 16 recém-nascidos a termo, 37-40 GS, peso ao nascer ≥ 2500 g. Foram excluídos bebês com anomalias de CF, anormalidades neuromotoras e cardiorrespiratórias. A pesquisa foi aprovada pelos comitês de ética das instituições. Um examinador avaliou os padrões de sucção com a Neonatal Oral Motor Assessment Scale (Nomas), com base na análise de gravações de vídeo. Duas variáveis antropométricas gerais e nove variáveis craniofaciais foram medidas em dois momentos (T1-T2) com oito dias de intervalo. **Análise estatística:** Para identificar as diferenças entre os padrões de sucção e as dimensões da CF, foi criada a variável $d_i=Y_{i2}-Y_{i1}$; com base nela, foi colocada a hipótese nula $H_0:u\_d=0$. Resultados: os valores de p das medidas de CF foram > 0,05, ou seja, a hipótese nula não foi rejeitada, exceto para a variável comprimento anteroposterior da cabeça, p = 0,04. O índice Kappa = 0,82 mostrou concordância com as características do Nomas em T1-T2. **Conclusão:** É responsabilidade da equipe de enfermagem e interprofissional avaliar as mudanças no padrão de sucção do neonato, a fim de promover o aleitamento materno eficaz e garantir o cuidado integral ao recém-nascido.

Palavras-chave (Fonte DeCS)

Sucção; recém-nascido; antropometria; crescimento; aleitamento materno.

Introduction

The sucking pattern during breastfeeding is an innate physiological process that requires an integrated level of adaptation. Callista Roy's Adaptation Model (1, 2) describes individuals as adaptive human systems, allowing the visualization of the sucking nutritive function as a biological and social process involving three subsystems: the newborn, the environment, and the mother. These interact with the development of oral feeding motor skills, which mature over time (3-5). Nevertheless, the relationship between sucking patterns and their effect on craniofacial growth remains insufficiently described (3).

Given this, breastfeeding is an interprofessional shared responsibility (6, 7), serving as a basis for nursing and dentistry care, following Callista Roy's Physiological Model. Within this shared responsibility approach, dentistry and nursing professionals act as counselors and advocates for breastfeeding practice up to two years of age (6, 7).

The feasibility and methodological validity of primary research largely depend on the design, planning, and implementation of a pilot study (8). Identifying difficulties related to sample collection, data recording, and participant measurements, as in this study, helps mitigate risks that may delay operational processes and facilitates exploratory data analysis. Therefore, this study aimed to assess the measurements of sucking patterns and craniofacial structures (CF) in newborns (NB) at two different points in time, while also refining hypotheses for future research.

Sucking Pattern During Breastfeeding

A normal sucking pattern is defined as the coordination between sucking, swallowing, and breathing in a NB, characterized by continuous bursts of more than ten sucks with brief pauses in between, followed by sequential swallowing and breathing. The coordination of sucking, swallowing, and breathing (S-S-B) is sometimes a complex and variable process, as not all NB achieve effective feeding within their first week of life. The NB must learn to feed because, although the search and sucking reflexes are innate, the process demands a skill that is acquired over the days (8-11).

Despite differences between breastfeeding and bottle-feeding, most studies on oxygenation and heart rate changes associated with S-S-B patterns have focused on bottle-feeding, highlighting the need for further research on breastfeeding patterns. One of the most recognized scales for evaluating sucking patterns in neonates is the Neonatal Oral Motor Assessment Scale (NOMAS) (4). Concordance rates between 59 and 100% have been reported and it is used to evaluate preterm and term infants (10, 11). For some authors, the NOMAS scale can be considered the gold standard for diagnosing suction-swallowing problems. Based on this scale, three categories of suction patterns are identified: normal, disorganized, and dysfunctional (12).

Breastfeeding as a Factor in Craniofacial Growth

Although sucking is essential for nutrition, little is known about its effects on craniofacial growth. This can be explained by the forces exerted by soft tissues, muscles, cavities, and organs on the craniofacial skeletal structures during sucking, based on the concept of craniofacial plasticity in early childhood (13, 14). Oral motor function during breastfeeding forms the basis for developing fine motor skills and adaptive functions while promoting harmonious maxillary development and stimulating orofacial musculature activity (15, 16). The S-S-B action is linked to the maturation of masticatory muscles, because each muscle performs a suction-swallowing function which, over time, develops and performs a more complex function: mastication (15). A breastfeeding duration of less than six months is associated with reduced maxillary growth, narrow arches, and dental crowding, as well as an increased risk of developing oral habits such as thumb or tongue sucking and pacifier use (17, 18). While the nutritional benefits of breastfeeding on growth are well-documented, further studies are needed to investigate its association with craniofacial structure growth. Anthropometry is a technique used to describe changes in the dimensions and proportions of the body, and the head and face structures (19-21). It has been used to describe growth increments in regions of the head and face in early childhood children, then taken as a reference to characterize the growth patterns of Colombian children from 0 to 5 years of age (22-24).

Methodology Design

This observational pilot study was conducted with 16 FTNBs from a healthcare institution in Bogotá, D. C., selected based on inclusion and exclusion criteria: Age 0-30 days old, 37-40 GS, birth weight ≥ 2500g. FTNBs with CF anomalies and neuromotor or cardiorespiratory disorders were excluded.

The sample size calculation was based on the differences in craniofacial measurements after six months of breastfeeding compared to artificial feeding. The minimum sample size, adequate for a 5% difference with 90% power, was n=154, based on the results of previous studies (22-24). In this sense, n=154 was calculated as 10%, equivalent to approximately 16 infants, considering this value above the minimum recommended ones (25, 26) in pilot studies of association and mean differences in quantitative variables (27).

Method

Two general anthropometric variables (weight and length) and nine craniofacial variables were measured at two different points in time (T1-T2), with an eight-day difference (a period during which no dimensional changes occur) (22, 23). Additionally, during the first session (T1), a video recording of the mother-infant dyad was made during breastfeeding to document the number of sucks and pauses, as well as to identify the characteristics of sucking patterns using the NOMAS scale. Each video was evaluated twice by an examiner, with an eight-day difference. Measurements were taken at two different points in time to minimize intra-examiner random error and reduce observer measurement bias, which occurs when a researcher's actions influence trial results.

Measurement Instruments

Weight and length: A digital Health o meter Professional 386KGS-01 scale, with a 25 kg capacity, and calibrated to 100 grams, was used. Infant length was measured with a portable infantometer (Kramer brand) with millimeter precision for vertex-to-heel measurement.

Pediatric Pulse Oximeter: The H100b ®Edan neonatal sensor was used to measure blood oxygen saturation (SpO2) and heart rate (beats per minute). Cardiorespiratory measurements were conducted by the healthcare institution's nursing staff. Craniofacial anthropometry: A SECA 201 measuring tape, 12 mm wide, was used for head and face measurements, recorded in centimeters and millimeters, with the last visible millimeter noted. To verify accuracy, a standard metal ruler of at least 30 cm in length was recommended (22-24).

Video recordings: A Huawei Y9 2021 camera with a 48-megapixel lens and f/1.8 aperture was used.

NOMAS Scale: The NOMAS scale consists of 28 items (28), of which 14 relate to mandibular movements and 14 to tongue movements, as described in Table 1. This tool allows for the classification of sucking patterns into three categories: 1) Normal sucking pattern: Characterized by the coordination of sucking, swallowing, and breathing (S-S-B) in both non-nutritive and nutritive sucking; 2) Disorganized sucking pattern: The neonate cannot coordinate the S-S-B, primarily due to respiratory, cardiac, or gastrointestinal issues; and 3) Dysfunctional sucking pattern: Abnormal tongue and jaw movements associated with neuromotor disorders.

The NOMAS scale is one of the most commonly used tools for assessing sucking patterns in full-term neonates, enabling objective identification of mandibular and tongue movement characteristics with prior training. Da Costa's study (3) reported Cohen's kappa concordance among evaluators between 0.33-0.94 for evaluated characteristics and Cohen's k concordance of 0.40-0.65 for the diagnosis.

In accordance with this, as well as to meet the conditions required for using this tool, one of the researchers completed a three-day training course with the author of the NOMAS scale (28). This training achieved 88% reliability and involved reviewing theoretical foundations, identifying and scoring scale characteristics in two-minute nutritive sucking observations of 50 neonates with different gestational ages (28). Prior training contributed to the reliability of the measurements and the rigor of this research in evaluating sucking patterns.

Table 1. Palmer's NOMAS

Mandible		
Normal	**Disorganized**	**Dysfunctional**
- Consistent degree of mandibular depression	- Inconsistent degree of mandibular depression	- Excessively wide excursions that disrupt the intraoral seal of the nipple
- Rhythmic excursions	- Arrhythmic mandibular movements	- Minimal mandible excursions, clenching sensation
- Spontaneous jaw movements with tactile nipple presentation up to 30 minutes before feeding.	- Difficulty to initiate movements	- Asymmetry: Lateral deviation of the mandible
- Mandibular movements that have a range of 1/s (1/2 the range of non-nutritive sucking (NNS))	- Small trembling movements are observed - There is no response to the presence of the nipple until it is moved into the mouth	- Absence of movement (% of time)
- Sufficient closure over the nipple during the expression phase, to extract fluid from the nipple	- Persistence of immature sucking pattern beyond age -40 weeks below HC age (transitional sucking)	- Missing speed change between SNN and SN (SNN=2/s; SN=1/s)
Tongue		
Normal	**Disorganized**	**Dysfunctional**
- Cup or groove configuration, groove position during suction.	- Excessive protrusion of the tongue beyond the labial border during milk extraction while sucking, without interrupting the rhythm.	- Flaccid and flattened tongue, without grooved position - Tongue retracted, rolled towards the oropharynx
- Extension-elevation-retraction movements occur in an anterior-posterior direction.	- Arrhythmic movements	- Asymmetry: lateral deviation of the tongue.
- Rhythmic movements - Movements occur at a rate of one per second	- Inability to sustain sucking pattern for 2 minutes due to: - Habituation - Poor breathing - Fatigue	- Excessive protrusion of the tongue beyond the labial border (before), then grasping the nipple with an outward and downward motion
- Liquid is efficiently sucked into the oropharynx for swallowing.	- Lack of coordination between sucking/swallowing, and breathing, resulting in nasal flaring, head-turning, and unusual movements	- Absence of movement (%) of time

Note: SN: nutritive sucking. NNS: non-nutritive sucking.

Source: from Da Costa et al. 2010.

Techniques for General and Craniofacial Anthropometric Measurement

The anthropometric measurement techniques were conducted by an examiner who received training from (24) and participated in studies that used the same craniofacial techniques in the Colombian infant population (22, 23). Weight and length were measured following the World Health Organization (WHO) protocols (29).

Craniofacial Anthropometry: The NB should be in a warm, well-lit place, lying in a supine position on a flat surface, such as a fixed examination couch or table. In this position, the baby can observe the surroundings, express their needs, orient themselves in the space, and maintain eye contact with the examiner, who is positioned beside the examination table. The examiner's fourth and fifth fingers serve as support to firmly hold the newborn's head, placing them in areas that do not interfere with the anatomical reference points for craniofacial measurements. Likewise, the measuring tape should be held with the examiner's index and thumb fingers of both hands and stretched to simulate a linear plane parallel to the structure of the head or face being measured, at a distance of approximately 1 cm. One end of the tape marks 0, while the other indicates the linear measurement in cm or mm (22).

Figure 1. Measurement Technique. Bizygomatic Distance

Source: Prepared by the authors.

Measurement of Caniofacial Parameters

Table 2. Craniofacial Parameters Measurement and Variables

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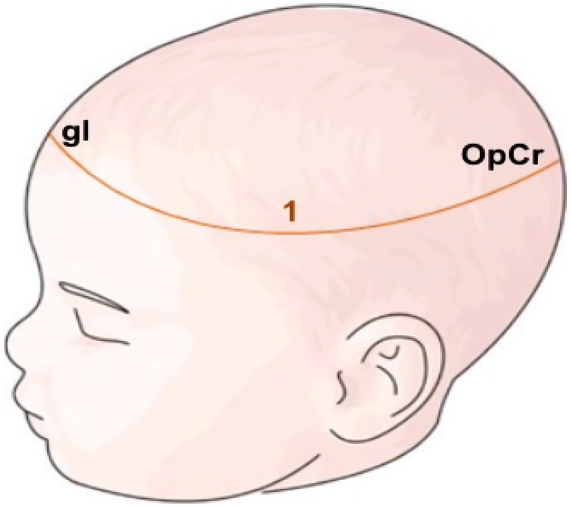

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<td>
1. Head circumference: Measurement of the head circumference. The measuring tape is placed around the head and should pass through the glabella point (gl), located between the eyebrows, and the occipital eminence, opistocranion (OpCr).
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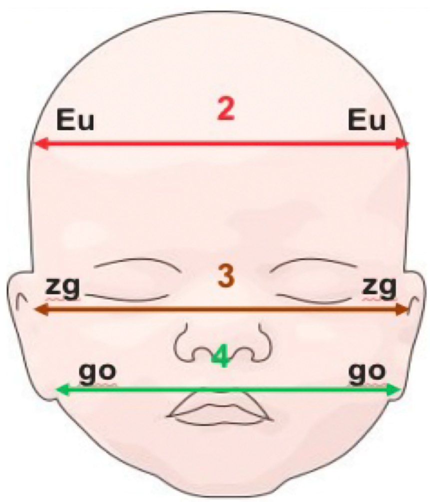

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<td>
2. Head width: Measurement of the distance between the most lateral point of the head eurion-eurion (eu-eu).

3. Bizygomatic width: Represents the upper width of the face; it is obtained by measuring the distance between the most lateral points of the zygomatic arches, zygium-zygium (zg-zg). (zg-zg).

4. Lower face width: Represents the width of the lower face, taken at the level of the gonial angles, the distance between the gonion-gonion point (go-go).
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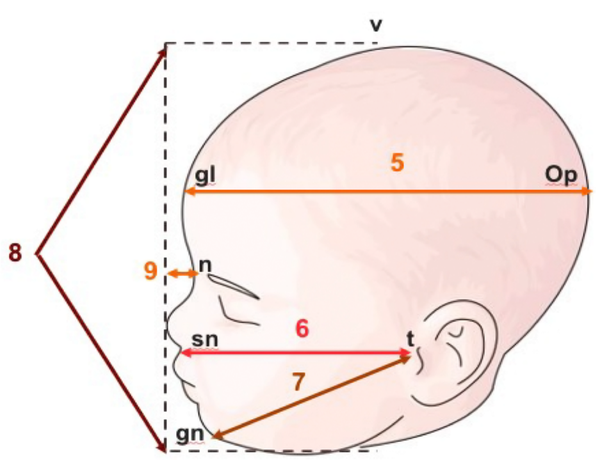
<td>
Length or depth variables


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<td>
5. Anteroposterior length of the head: Measurement of the length of the head taken from the most anterior point of the head, glabella (gl) to the most posterior point of the head, opisthion (Op).

6. Depth of the maxilla or midface: Distance between tragus (t) and subnasal (sn).

7. Depth of the middle third of the mandible: Distance between tragus (t) and gnathia (gn).

8. Total craniofacial height: Measurement of the distance between vertex (v) and gnathion (gn) in the vertical plane.

9. Anterior facial height: Distance between nasion (n) and gnathion (gn) in the vertical plane.
</td>
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Source: Prepared by the authors.

Breastfeeding Technique: The mother should be seated in a chair with a fixed backrest to keep her back straight, with her feet resting on the floor. A rolled-up blanket should be placed under her breast to maintain the baby's mouth at the right angle to the nipple. Additionally, she can support the breast with her hand. The NB should be positioned on their side, with their head resting on the mother's forearm so that the jaw, base of the mouth, lips, and cheeks can be viewed in profile. The video camera should be positioned 1 meter away from the baby's face, with markers placed at the lateral corner of the eye and the chin. The recording will take place during the day, at least two hours after the NB has last been fed, to ensure that the baby is hungry.

From a three-minute recording, the first feeding episode of two minutes will be selected to evaluate the baby's sucking pattern using the NOMAS scale. During the recording, aspects such as behavioral changes during feeding, crying, or discomfort will be noted.

Ethical Considerations and Data Analysis

This research involves minimal risk. It was conducted following the guidelines established in Resolution 008430 of October 4, 1993, and the ethical principles of Law 911 of 2004, Nursing Code of Ethics. The study was approved by the ethics committees of the involved institutions.

Statistical Analysis

For the descriptive analysis of sociodemographic variables and to establish the difference in means between the number of sucking movements and pauses, as well as anthropometric measurements at two different points in time, consultation was made with (30). The SPSS software, version 26, was used to analyze intra-examiner agreement on the characteristics of the sucking patterns.

Phase I or Data Collection Phase

The proposed methodology for data collection is presented in Figure 2. The left column shows the activities performed in each of the planned sessions: The first session (T1) and the second session (T2), with an eight-day difference between them.

To ensure privacy and security during the assessments, the institution provided an appropriate consultation room. Additionally, the examiner followed each step described in the care process (Figure 2), and the quality of the information was verified by another evaluator.

Figure 2. Methodology for Data Collection

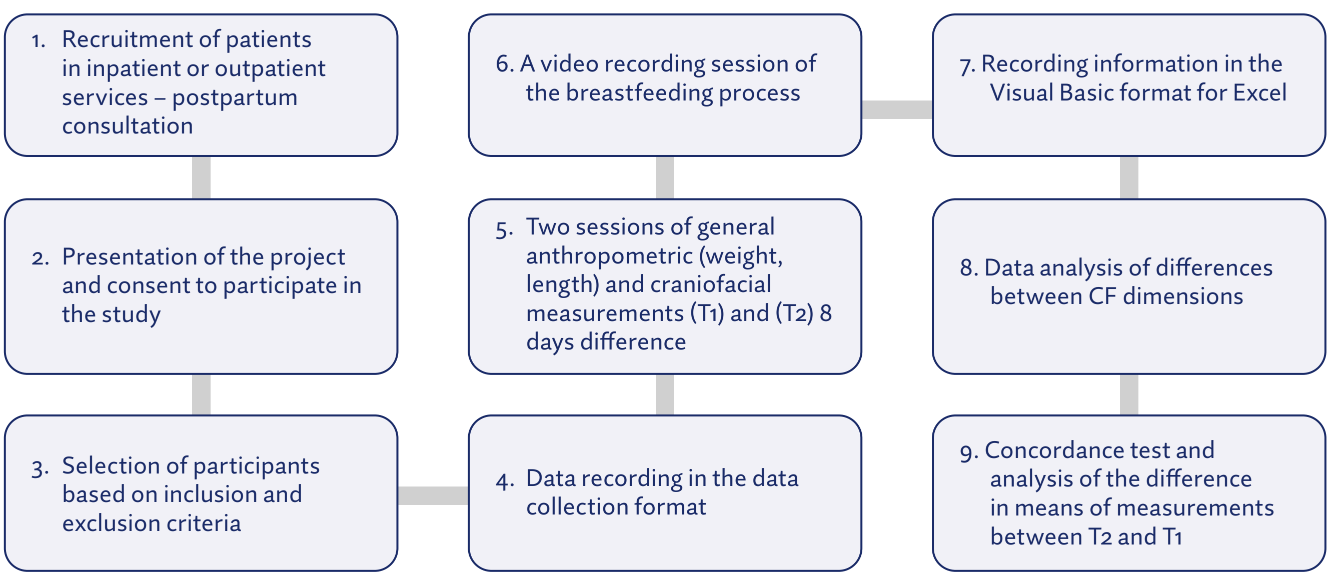
Activities to be performed	T1, first session (NB age: 0-30 days)	T2, second session with an 8-day difference
Sociodemographic data of the mother, age of the NB in days and health conditions.	✓	
Suction pattern (no. of suctions, and no. of pauses between suctions)	✓	✓
FR, HR, and oxygen saturation measurements	✓	✓
Weight and length measurements	✓	✓
Head and face measurements	✓	✓

Source: Prepared by the author.

Database Design and Operationalization for the Recording of Variables

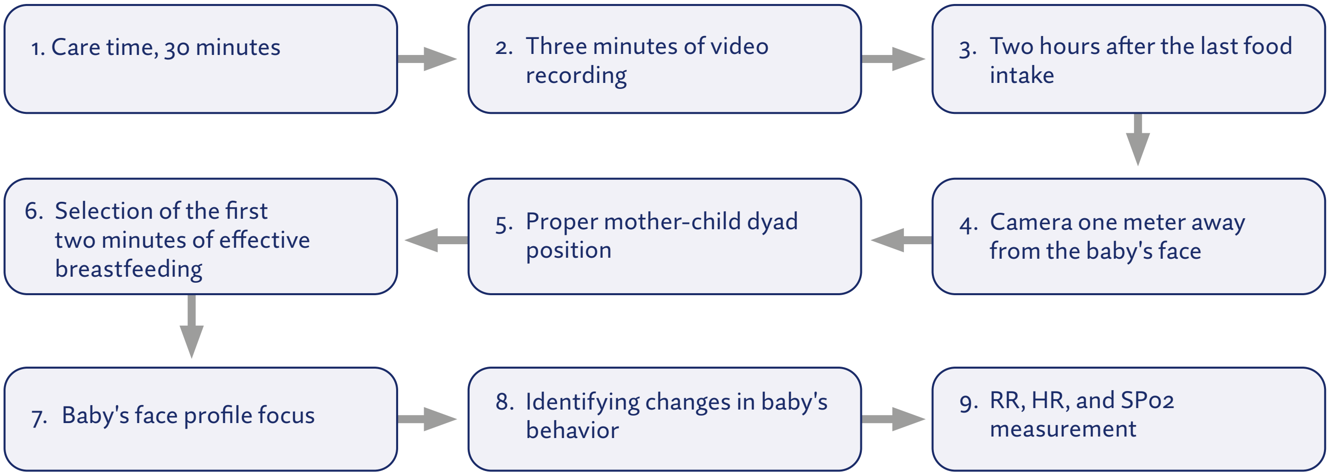
The data collection form contains sociodemographic data; prenatal, perinatal and postnatal medical history; type of breastfeeding—exclusive maternal breastfeeding, artificial, and mixed—indicating the number of times per day; cardiorespiratory physiology; sucking patterns; NOMAS Scale classification, and anthropometric variables.

Figure 4. Pilot Test Flowchart



Source: Prepared by the authors.

Figure 5. Care Process



Source: Prepared by the authors.

Results

The NB's place of birth was Colombia, children of Colombians 56.25% (n=9), children of migrants 43.75% (n=7), marital status of the parents, domestic partnership 81.25% (n=13), socioeconomic status 2, 56.25% (n=9), income of the family nucleus greater than one minimum wage 75% (n=12), schooling of the mother, completed secondary school 75% (n=12), stay-at-home mother 81.25% (n=13).
The sample was distributed in 62.5% boys (n=10) and 37.5% girls (n=6), mean age 9.1 days ± 7.57 (SD), gestational age 38.3SG ± 1.07 (SD), birth weight 3086g ± 291 (SD), length at birth 50.65cm ± 1.79 (SD) and head circumference (HC) at birth 34.18cm ±0 .47 (SD). Vaginal delivery predominated in both boys 60% (n=6) and girls 40% (n=4); of the total cesarean sections (n=6), 66.6% (n=4) were performed for boys and 33.3% for girls (n=2).

When evaluating the characteristics of sucking patterns with the NOMAS scale, two categories were found: 1) normal 81.25% (n=13) and 2) disorganized 18.75% (n=3), with two subcategories: immature disorganized 12.5% (n=2), neonates four days old, arrhythmic jaw movements, less than 40 weeks post-conception, and transitional disorganized 6.25% (n=1), 20 days old, arrhythmic jaw movements and transitional sucking. Concordance between evaluators measured with Cohen's Kappa Index was 0.821429. The means of the CF dimensions and T1 sucking patterns are presented in Table 3.

Table 3. Craniofacial Anthropometry Parameters and Sucking Patterns

Parameters	Means (SD)
Weight (g)	3.138 (±) 455
Size (cm)	50,60 (±) 2,15
Head circumference (cm)	35,40 (±) 1,207
Head width (cm)	9,0 (±) 0,605

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Parameters	Means (SD)
Bizygomatic width (cm)	8,09 (±) 0,423
Lower facial width (cm)	7,60 (±) 0,382
Total craniofacial height (cm)	10,30 (±) 0,713
Anterior facial height (cm)	5,56 (±) 0,394
Long head ant post (cm)	12,11 (±) 0,557
Maxillary depth (cm)	6,98 (±) 14,76
Mandibular depth (cm)	7,12 (±) 0,295
Number of suctions/s /2 min	89,10 (±) 30,26
Number of pauses/s /2 min	33,50 (±) 14,76

Source: Database.

To establish the difference in means for the CF measurements and sucking patterns at times T2 and T1, the ANOVA was not used for the two measurements because the *Yi*1 and *Yi*2 variables are not independent. Instead, the most appropriate solution was to construct the variable *i=Yi*2-*Yi*1, and based on this, the null $Ho{:}u_d = 0$ hypothesis was proposed, where *Yi*1 is the observation of individual *i* in period 1, and *Yi*2 is the observation of that same individual in period 2. If the u_d mean is 0, it is because the average is the same for each individual's measurement at T1 and T2.

In all variables, the p-value was greater than 0.05, that is, the *Ho* was accepted, except for the anteroposterior head length variable, *p*=0,04097, indicating that there were differences in the mean between the first and second measurements. The results are presented in Table 4.

Table 4. Mean Differences between Suction Patterns and CF Variables at T2-T1

	Difference in means at times T2-T1	P-value
Number of suctions/s	0,2997	0,76852
Number of pauses/s	0,25052	0,80558
Head circumference	1,5667	0,13803
Head width	0,56493	0,58047
Bizygomatic width	1,77518	0,09616
Lower facial width	1,77518	0,09616
Total craniofacial height	0,5	0,59396
Anterior facial height	1,86052	0,08253
Long head ant post	2,23607	0,04097
Maxillary depth	2,08683	0,05439
Mandibular depth	1,86052	0,08253

Source: database.

Discussion

The pilot study (PS) sample consisted of 16 healthy NBs, selected according to inclusion and exclusion criteria. The mothers' sociodemographic characteristics were similar to those of a study conducted on 86 NB born in Bogotá to Colombian mothers (23). The only difference with this study was the women's nationality: Colombian mothers predominated (56.25%) and Venezuelan migrant mothers (43.75%) with live births in Colombia. This situation has increased since 2017 in Bogotá and some regions of the country. The DANE 2021 statistics report that births in Bogotá to Venezuelan mothers increased from 11. 8% in 2017 to 20.9% in 2020 (31, 32).

The anthropometric characteristics at birth were: weight 3098 g, height 51 cm, and WC 34 cm. When comparing these measurements with the WHO references (33, 34), they were found to be approximately ±1 (SD) above the mean, which ensured adequate conditions for the neonates to participate in the pilot test.

For the PS, the trained researcher performed the nine craniofacial measurements at two T1 and T2 points in time (on the 8th day), finding that there were no differences between the measurements with $p = 0.05$ except for the anteroposterior head length variable, $p = 0.04097$. It was assumed that this difference was due to the measurement technique. The researcher reported the difficulty of keeping the baby's head still when turning it to take the measurement. To correct the method error, the mother, father or guardian was trained to turn the NB's head and keep it still while the measurement was taken. This condition was maintained throughout the study. Regarding the method error, the craniofacial anthropometry study performed by Gamboa and colleagues (23) reported a systematic error in the mandibular depth variable $p = 0.0498$, with a 95% confidence level. This error was also explained by the difficulty in timing the measurement, an aspect that was considered throughout the data collection process to minimize it.

Since the studies did not show significant changes over an eight-day period, the T1 and T2 measurements were considered adequate for validation (22-23).

When comparing the CF measurements from the pilot study with Gamboa's study (23), it was found that the CP of the PS neonates was 1.8 cm greater than in that study, while the other variables presented similar measurements.

The concordance between evaluators of the NOMAS Cohen's k characteristics was 0.82 in the PS. In this regard, the study by (3) reported concordance between evaluators for Cohen's k between 0.33 and 0.94, while the concordance between evaluators regarding the diagnosis was moderate to substantial (Cohen's k between 0.40 and 0.65). Similarly, the minimal differences found in T1 and T2 of this pilot study between the number of sucks and the number of pauses are explained by the prior training of the evaluator with 88 % reliability (28).

The obtained results provided reliability and validity for subsequent studies to guide the evaluation and follow-up of breastfeeding and contribute to the early diagnosis and timely management of the difficulties presented in this process, considering that not all NBs achieve a coordinated and stable sucking during the first month of life (15). Understanding the physiological processes involved in exclusive breastfeeding and its impact on craniofacial growth based on Callista Roy's Adaptation Model (1), allowed the nursing and dental team, in their care processes, to identify abnormal conditions to support therapeutic actions for effective feeding (4, 11, 13), which will later impact functions such as chewing and the development of wide maxillary arches that reduce the risk of dental malocclusions, and the presence of habits such as digital sucking, tongue thrusting, among others.

Conclusion

The PS served to identify and correct errors in each of the stages related to the methodological design and measurement techniques and to compare the results obtained with those of other research to assess reliability, constituting a good starting point for a primary study with similar characteristics, which seeks to establish the association between the mode of physiological adaptation of sucking during breastfeeding and craniofacial growth as a contribution to interprofessional research and public policies on breastfeeding (31).

The clinical relevance of this research has to do with the responsibility of the interprofessional team to evaluate changes in the sucking pattern of the neonate and promote effective breastfeeding, guaranteeing comprehensive care for the NB.

Conflict of Interest: The authors declare there is no conflict of interest.

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