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PONDERAL GAIN OF NEWBORNS FEED WITH EXCLUSIVE HUMAN MILK VS MIXED BREASTFEEDING ENTERED IN THE NEONATAL SPECIAL CARE UNIT OF THE REGIONAL HOSPITAL OF AUTLAN DE NAVARRO, MEXICO

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Abstract. Introduction: This research addresses the analysis of the weight gain of neonates fed with exclusive breastfeeding and mixed breastfeeding in the Neonatal Special Care Unit of the Autlan Regional Hospital. Method: It is a prospective, cross-sectional, descriptive-comparative and experimental investigation, identifying the type of breastfeeding and the modification of body weight from birth to one month of life. The universe is made up of 961 newborns in the institution, 112 correspond to those admitted to the UCEN. The sampling technique was non-probabilistic through the Census, discarding those neonates with hospital stays <5 days, the total sample was 64 children. Results: 59% were male, 41% female. 28% of neonates were exclusively breastfed, 72% mixed breastfeeding. Of the 100% of infants fed EBF, 39% increased their weight, the remaining 61% decreased. Of those with mixed lactation, 48% had a negative modification, 52% had a positive modification with respect to the initial weight. Discussion: Children fed with mixed breastfeeding show greater weight gain, compared to those fed with exclusive breastfeeding. EBF allows normal functional growth and development, fully covering nutritional needs and requirements, providing hormonal and / or nutritional components, protecting and stimulating the newborn's immune system; it also plays a protective role against obesity. In contrast, the dairy formula presents nutritional components in high amounts according to the nutritional requirements of the newborn, which stimulates accelerated weight gain.

Keywords: lactation, neonates, weight.

GANANCIA PONDERAL DE NEONATOS ALIMENTADOS CON LECHE HUMANA HOMÓLOGA EXCLUSIVA VS LACTANCIA MIXTA INGRESADOS EN LA UNIDAD DE CUIDADOS ESPECIALES NEONATALES DEL HOSPITAL REGIONAL DE AUTLÁN DE NAVARRO, MÉXICO

Resumen. Introducción: La presente investigación aborda el análisis sobre la ganancia ponderal de neonatos alimentados con lactancia materna exclusiva y lactancia mixta en la Unidad de Cuidados Especiales Neonatales del Hospital Regional Autlán. Método: Es una investigación prospectiva, transversal, descriptiva-comparativa y experimental, identificando el tipo de lactancia y la modificación de peso corporal desde el nacimiento hasta el mes de vida. El universo es compuesto por 961 recién nacidos en la institución, 112 corresponden a los ingresados en la UCEN. La técnica de muestreo fue no probabilística a través de Censo, descartando aquellos neonatos con estancia hospitalaria < 5 días, la muestra total fue de 64 niños. Resultados: El 59% corresponde al sexo masculino, 41% sexo femenino. El 28% de neonatos llevó lactancia materna exclusiva, 72% lactancia mixta. Del 100% de neonatos alimentados con LME, el 39% aumentó su peso, el 61% restante disminuyó. De aquellos con lactancia mixta el 48% tuvo modificación negativa, el 52% modificación positiva respecto al peso inicial. Discusión: Los niños alimentados con lactancia mixta presentan mayor ganancia de peso, comparados con los alimentados con lactancia materna exclusiva. La LME permite un crecimiento y desarrollo normo funcional, cubriendo totalmente necesidades y requerimientos nutricionales, aportando componentes hormonales y/o nutricionales protegen y estimulan el sistema inmune del neonato; además cumple un papel protector contra la obesidad. A diferencia, la fórmula láctea presenta componentes nutricionales en cantidades elevadas de acuerdo a los requerimientos nutricionales del neonato, lo cual estimula la ganancia acelerada de peso.

Palabras clave: lactancia, neonatos, peso.

Introduction

Neonatal feeding is a fundamental pillar to achieve the correct growth and development of the infant (9). It is known that human milk is the best food for them, it contains all the nutrients in the right amount to sustain and protect the child's life (10-11); however, sometimes it is necessary to use breast milk substitutes to complement the neonate's diet, due to the mother's or newborn's state of health, their residence, among other factors, which does not allow that, at hospital level in a Neonatal Special Care Unit, the total energy requirement of the infant is covered 100% with human milk (14). Infants who receive either total or partial artificial breastfeeding may present differences in the contribution of both macro and micronutrients in the daily intake, which could cause a significant difference in the growth and development of the newborn (1). Breast milk has been evolving and adapting to the characteristics and environment of the human being, providing all the necessary nutrients, offering protection, health and well-being. Currently, the percentage of exclusive breastfeeding in our country is lower than global rates and it is worrying that Mexico occupies the first place in child obesity worldwide (2), which has been reflected from infants.

The hypothesis proposed is that mixed breastfeeding allows a faster weight gain compared to exclusive breastfeeding in newborns at the Neonatal Special Care Unit of the Autlan Regional Hospital, due to the high protein content of breast milk substitutes causing an increase in the secretion of Growth Factor 1, facilitating greater adiposity in the infant. The objective of this study is to analyze the relationship between the weight gain of neonates fed

with exclusive homologous human milk vs. mixed breastfeeding admitted to the Neonatal Special Care Unit of the Regional Hospital of Autlan de Navarro, Mexico.

Analysis of the literature

The neonatal period includes from birth to 28 days of life, during this time the neonate undergoes changes to adapt to extrauterine life, and close monitoring by the multidisciplinary team is needed to achieve timely detection of alterations and global clinical conditions of the newborn (7).

In 1961 the first Neonatal Special Care Unit was created worldwide (5), this area is responsible for the specialized treatment in neonatology with the use of prenatal steroids, ventilatory techniques, use of surfactant, use of orogastric tubes for better nutrition, if necessary parenteral nutrition is administered which has improved the physiological state of newborns who for some reason need intensive care (6).

The main risk factors for anatomical or functional deviation in a preterm newborn are the immaturity of its apparatus and systems and its clinical characteristics (11). Significant changes of adaptation, extrauterine nutrition, intestinal function and intermediate metabolism arise in the newborn. Sánchez M, Arévalo M, Figueroa M., in their work state the following (5): "It has been proved that enteral feeding after birth stimulates the increase of circulating intestinal hormones (gastrin, duodenal secretin and jejunal cholecystokinin), which induce the nutritional adaptation of the premature newborn and favor its development and maturity". Neonatal feeding is a pillar for growth and development, in premature newborns it is necessary to closely monitor the sucking reflex, swallowing, assessment of respiratory effort during feeding and identification of signs of feeding intolerance (vomiting, gastric residue and abdominal distention), as well as the presence of bronchial aspiration (6).

The evaluation of the neonatal nutritional status in the NICU aims to establish the patient's feeding behavior from the moment of admission, determining the nutritional diagnosis for the nutritional therapeutic plan. The nutritional evaluation takes information in relation to the clinical history, identifying (8): weight, length, head circumference, gestational age. Serial measurements of these parameters will allow us to identify the growth pattern in an individualized manner, identify neonates with alterations and therefore act in a timely manner (9,10). Plascencia J, Villalobos G, Márquez M. (8), state that: "Weight reflects the total mass of all body compartments: lean tissue, fat, intra and extracellular fluids. Weight reflects changes in body composition, as well as development". Marín A, Jaramillo B, Gómez R, Gómez U. (7) determine that weight gain is the result of various physiological and nutritional factors, the most significant increase is observed up to 4-6 months of life, then the curve flattens and although each child has a different weight gain over time, a relative increase is estimated as follows:

- 1st trimester: 20-30 g/day
- 2nd trimester: 15-20 g/day
- 3rd trimester: 12-15 g/day
- 4th trimester: 10-12 g/day
- 5th month: doubles birth weight
- 8th month: 8 kg - 11th month: triples birth weight.

A newborn has an average gain of 1 g per hour, and this increase is prolonged during the first three months of life; at the end of this trimester the gain decreases with an approximate of 0.8 g per hour, and it is in the third trimester when approximately 0.5 g/hour is gained, relatively a weight gain for half that occurred in the first trimester (7,8). A child who does not gain weight should not always be considered as sick, since several considerations such as pathological, psychological, social and nutritional influence the growth, so that there is no unified definition of the problem. Delayed gain should be considered if the child presents one of the following percentile adjustments:

- Weight below the 3rd percentile on the weight-for-age charts.
- The child's weight-for-age is less than 80% of his or her ideal weight.
- If the child's weight falls two percentiles over time on a conventional chart (7).

The neonatal period is a vulnerable stage, since it is a critical time for the transition from the fetal stage (in which the placenta supplies the necessary nutrients) to birth, during which several changes occur for adaptation to the new environment.

Breast milk is the best food for a newborn, since it is the ideal source of nutrients and energy; it completely covers the requirements of the newborn, thus guaranteeing a correct growth and development, strengthening its immune system every day. Compared to breast milk substitutes, it has a lower protein intake, but it completely covers its requirements, avoiding an excessive protein intake which is a predominant agent for obesity in later life and a renal overload caused by artificial feeding (1). Its contribution of macronutrients stands out, with two groups of proteins: caseins and whey proteins, whey proteins being present in greater quantity in the first 10 days (90%) and even up to 8 months (60%); these proteins are made up of alpha lacto albumin, lactoferrin and IgA immunoglobulins. The total protein content of breast milk is 1.1 g/100 ml (1). Fats are the macronutrient that varies the most in breast milk since there is a higher lipid intake in the afternoon. Human milk contains lipase, which is stimulated by bile salts that favor its absorption. It contains an excellent supply of omega 3 and 6 fatty acids, which enable neurological and visual development. Its cholesterol content favors the differentiation and proliferation of adipocytes in later life, which promotes a lower risk of cardiovascular disease (1, 9). The main carbohydrate is lactose, which promotes the growth of lactobacilli and acidifies the intestinal pH favoring the growth of intestinal flora; it increases calcium absorption and promotes lactase synthesis. Human milk contains oligosaccharides that act as soluble receptor analogues, preventing pathogenic microorganisms from binding to the receptors of the infant's brush border cells, thus modulating epithelial and immune responses inhibiting pathogenic bacterial colonization and growth (1), thus preventing and combating bacteria, viruses, fungi and parasites such as: E. coli, salmonella, campylobacter jejuni, vibrio cholerae, hemophillus influenzae, clostridium botulinum, rotavirus, respiratory syncytial virus, poliovirus, influenza, cytomegalovirus, HIV, giardia lamblia, candida albicans (1, 9).

Samples of human milk have been taken from mothers with preterm infants, as well as full-term breast milk, showing that the former has high levels of: total nitrogen (increased by 20%), proteins, long, medium and short chain fatty acids, cholesterol and phospholipids; and they are justified because they have an indispensable role to mature, increase and form tissues and organs. Similarly, IgA, sodium, magnesium, magnesium, chloride and iron levels are

elevated, but lactose levels are low, since nature is wise and adapts breast milk to the needs of the newborn, as preterm patients have insufficient levels of lactase (1, 11, 18).

Breastfed infants have a lower protein intake and metabolize fewer calories. There is a close relationship between high protein intake at an early age and "adipocyte rebound" as well as elevated BMI in adulthood. Breast milk has approximately 60-70% less protein and 10-18% less caloric density compared to a human milk substitute. The high protein intake of breast milk substitutes causes an increase in the secretion of insulin-like growth factor 1 (IGF-1), leading to increased adiposity in the infant.

Method

This research takes place at the Autlán Regional Hospital, located in the municipality of Autlán de Navarro, Jalisco, offering services to the population of the 19 municipalities of the Sierra de Amula and Costa Sur Region of Jalisco. This institution is accredited as a Baby and Child Friendly Hospital, by the international strategy launched by the WHO, has key areas of care to promote and protect the health of the mother and child binomial, among which are the NICU, labor and delivery department, Emergency, two operating rooms and the Lactarium, which aims to provide training in breastfeeding to postpartum mothers, as well as to guide and assist them in the extraction of breast milk so that it can be provided in a homologous way to the newborns in the NICU.

This research was conducted in four sequenced moments, namely: literature review, reading of journals and specialized articles, collection of field information and systematization and interpretation of the material through statistical methods, to obtain the results of weight gain of neonates fed with exclusive homologous breast milk and those fed with mixed breastfeeding in the institutions of the NICU of the Autlan Regional Hospital in the period from June to December 2016.

This research aims to analyze the weight gain according to the type of feeding of neonates hospitalized in the UCEN, it was necessary to review in detail the standards of weight gain for healthy and sick neonates, as well as the physiological characteristics of children of this age, biochemical composition of human milk and breast milk substitutes through a literature review in order to determine the reason for weight gain related to dietary intake.

Research approach

A two-stage model was used. First, a quantitative approach was applied in which the weight gain of hospitalized neonates during their stay in the NICU was analyzed statistically, taking data 5 days after admission, 10, 20 and 30 days later, a process that was carried out by means of a technical file that collected the data of each neonate. Subsequently, the data was plotted and then a qualitative approach was applied, which made it possible to go deeper into the results found. At the end, a synthesis was made to include the results of both phases of the research process.

Research design and scope

It is a prospective, cross-sectional, descriptive-comparative and experimental research, identifying the type of breastfeeding and the modification of body weight from birth to one month of life. This study meets the two requirements to achieve control and internal validity since a group of newborns were compared according to established variables such as weight,

type of feeding, medical diagnosis, gestational age, milliliters of milk indicated per feeding at the beginning and at each measurement, and sex. Likewise, we worked with pre- and post-test data when taking weight measurements at a determined time from birth to one month of life, as long as the infant was still in the NICU for each weight-taking session, and thus could be related to the type of feeding for the determination of weight gain.

Universe, population and sample

The universe is composed of 961 newborns in the institution, 112 correspond to those admitted to the NICU. The sampling technique was non-probabilistic through census, discarding those neonates with hospital stay < 5 days, the total sample was 64 children. Similarly, during data collection it was identified that of the total number of newborns studied, only 3 had a hospital stay of 30 days, and 5 were admitted for 20 days, so the results are based on a hospital stay of 0 to 10 days.

The data collected were taken from the medical records of each newborn admitted to the NICU during the period from June to December 2016; likewise, data were obtained from the records of the Feeding Logs and the records of the institution's Lactary Feeding Census.

Instrument

The measurement instrument used to determine the weight gain of neonates admitted to the NICU was a technical sheet which, as a data sheet, was a key element for the research because it facilitated the collection of information by means of variables that made it possible to identify the amount and type of food received by the newborn admitted to the Neonatal Special Care Unit of the Autlan Regional Hospital, as well as the weight gain secondary to medical and nutritional treatment during their hospital stay. This instrument is detailed in Table 1 below.

Table 1. Measuring instrument.

Recién nacido	Sexo	Fecha de ingreso	Edad Gestacional	Diagnóstico Médico	Tipo de Alimentación	ml inicial espoma	Peso inicial Kg	ml por toma a los 5 días de vida	Peso en kg a los 5 días de vida	ml por toma a los 10 días de vida	Peso en kg a los 10 días de vida	ml por toma a los 20 días de vida	Peso en kg a los 20 días de vida	ml por toma a los 30 días de vida	Peso en kg a los 30 días de vida	Ganancia de peso a los 5 días	Ganancia de peso a los 10 días	Ganancia de peso a los 20 días	Ganancia de peso a los 30 días

Note*: Own elaboration.*

The Data Processing Technique

We worked with pre- and post-test data with the control group by taking weight data at baseline and between each specific measurement.

Data validation

The results were validated by means of a specialized database in Excel, where the collected data were concentrated and through statistical formulas it was possible to obtain the weight gain of the neonates admitted to the NICU of the Autlan Regional Hospital.

Results

According to the aforementioned methodology, field work was carried out in which the Census was applied, where it was necessary to eliminate from the research those newborns that did not meet the parameter of days of hospital stay to corroborate the weight change, those whose days of hospitalization were less than 5 days were discarded, therefore, the total sample was 64 newborns. Once the information was collected, it was necessary to take as a research parameter a hospital stay of no more than 10 days, because of the total number of newborns studied, only 3 had a hospital stay of 30 days, and 5 were admitted for 20 days.

Thus, we obtained the results of the type of feeding that each neonate received from the first day of hospital stay to the day of discharge, which is detailed in Table 2, highlighting that

28% of the newborns admitted to the NICU received their diet based on exclusive breastfeeding. However, 72% of the total number of neonates were fed with mixed breastfeeding.

Table 2. Classification of neonates according to their type of feeding.

Type of feeding	No. of neonates	Percentage
Exclusive Breastfeeding	18	28
Mixed Breastfeeding	46	72
Total	64	100

Note: Own elaboration.

Tabla 3. Clasificación de neonatos de acuerdo al sexo.

Sex	N° of neonates	Percentage
Male	38	59
Female	26	41
Total	64	100

Note: Own elaboration

Of the 64 infants studied, 38 corresponded to the male sex with a percentage of 59%, while the female sex was represented by 26 newborns, 41% of the sample studied.

Taking into account the type of feeding, Table 4 classifies the newborns admitted to determine weight gain or loss during their hospital stay, showing that of the 100% of the infants fed exclusively with human milk, 39% had an increase in weight, compared to the remaining 61% who had a reduction in body weight. Meanwhile, 52% of the infants fed with mixed breastfeeding showed weight gain, compared to the remaining 48% who showed weight loss.

Table 4. Neonatal weight change with exclusive breastfeeding during a hospital stay of 5 to 10 days.

Weight change	N° of newborns	Percentage
Weight gain	7	39
Weight loss	11	61
Total	18	100

Note: Own elaboration.

In order to identify more concretely the weight gain of each newborn, the weight at birth and the weight of each programmed measurement were taken into account to determine the percentage of weight gain in relation to the birth weight. However, as mentioned in the theoretical framework within the evolution of weight in the first days, it is normal that in the first week there is a loss of 7 to 10% of the birth weight, which should be recovered on the seventh day. Therefore, Table 5 shows in detail that, of the 18 neonates fed exclusively with breast milk, 39% showed weight gain; however, this gain was never greater than 10% of their

birth weight. The remaining 61% decreased their weight, but this loss was not greater than 10% of their initial weight.

Table 5. Change in neonatal weight compared to birth weight, according to exclusive breastfeeding.

Weight change	N° of neonates with wl or wg	Percentage
wl > 10% at birth	0	0
wl < 10% at birth	11	61
wg > 10% at birth	0	0
wg< 10% at birth	7	39
Total	18	100

Note: *wl: weight loss. **wg: weight gain. Source: Own elaboration

Considering the 46 infants studied with mixed breastfeeding, Tables 6 and 7 show that, as in the case of exclusive breastfeeding, the weight change does not include more than a gain or loss of more than 10% of their birth weight. However, 48% presented a decrease in weight of less than 10% of their birth weight and the remaining 52% of children with mixed breastfeeding had a market weight gain of no more than 10% of their birth weight.

Table 6. Neonatal weight modification with mixed breastfeeding.

Weight modification	No. of neonates	Percentage
Weight gain	24	52
Weight loss	22	48
Total	46	100

*Note:*Own elaboration

Table 7. Change in neonatal weight compared to birth weight, according to mixed breastfeeding.

Modificación de peso	N° of neonates with wl or wg	Percentage
wl > 10% at birth	0	0
wl < 10% at birth	22	48
wg > 10% at birth	0	0
wg< 10% at birth	24	52
Total	46	100

Note: *wl: weight loss. **wg: weight gain. Source: Own elaboration

In relation to the weight gain of the newborns with their medical diagnosis, Table 8 shows that of the 64 newborns studied, 19 of them had a diagnosis of Acute Pulmonary Disease corresponding to 29% of the sample, while 23 infants corresponding to 35% of the total were diagnosed with Sepsis, 16 infants, corresponding to 24% of the sample, were premature and finally, there is a different case of jaundice, syphilis, hydroelectrolyte imbalance, convulsive crisis, hypoglycemia, and genopathy/congenital malformations, each of them representing 2%

of the total sample. Likewise, the type of feeding is presented according to the grouping by medical diagnosis.

Table 8. Classification of neonates according to medical diagnosis and type of feeding.

Medical Diagnosis	N° of neonates studied	Percentage	Exclusive Breastfeeding	Mixed Breastfeeding
Acute Lung Disease	19	29	21%	79%
Sepsis	23	35	35%	65%
Prematurity	16	24	19%	81%
Jaundice	1	2	100%	-
Syphilis	1	2	100%	-
Seizures	1	2	-	100%
Genopathy/congenital malformations	1	2	100%	-
Hydroelectrolyte imbalance	1	2	-	100%
Hypoglycemia	1	2	-	100%
Total	64	100		

Note: Own elaboration

According to the type of feeding and medical diagnosis, Table 9 shows that those exclusively breastfed infants with sepsis, prematurity and syphilis gained < 10% of their weight at birth, while those infants who were mixed breastfed with a diagnosis of acute pulmonary disease, sepsis, prematurity, convulsive crisis, hydroelectrolyte imbalance and hypoglycemia also showed weight gain of < 10% at birth, prematurity, seizures, hydroelectrolyte imbalance and hypoglycemia, also showed weight gain < 10% with respect to birth, coinciding with the results obtained in the research "Comparison between weight gain of preterm infants fed exclusively breastfed and those of mixed breastfeeding or substitutes"; directed by Velásquez G. , where he followed the nutritional study including anthropometry of 48 patients, obtaining as a result that the average daily weight gain of those who received exclusive breastfeeding was 32.4 + 9.2g; while the infants who received breast milk substitutes presented an increase of 36.2 + 7.3 g. (26).

Table 9. Modification of neonatal weight in relation to Medical Diagnosis and Type of Feeding.

	Weight modification with SML	Weight modification with LM

Medical Diagnosis	Exclusive Breastfeeding	Mixed Breastfeeding	**wl > 10 % al na ci mi ent o**	**wl < 10 % al na ci mi ent o**	**wg > 10 % al na ci mi ent o**	**wg < 10 % al na ci mi ent o**	wg < 10 % al na ci mi ent o	wl < 10 % al na ci mi ent o	wg > 10 % al na ci mi ent o	wg < 10 % al na ci mi ent o
Acute Pulmonary Disease	21%	79%	0%	100%	0%	0%	0%	67%	0%	33%
Sepsis	35%	65%	0%	37%	0%	63%	0%	27%	0%	73%
Prematurity	19%	81%	0%	67%	0%	33%	0%	62%	0%	38%
Jaundice	100%	-	0%	100%	0%	0%	0%	0%	0%	0%
Syphilis	100%	-	0%	0%	0%	100%	0%	0%	0%	0%
Seizures	-	100%	0%	0%	0%	0%	0%	0%	0%	100%
Genopathy/ congenital malformations	100%	-	0%	100%	0%	0%	0%	0%	0%	0%
Hydroelectrolyte imbalance	-	100%	0%	0%	0%	0%	0%	0%	0%	100%
Hypoglycemia	-	100%	0%	0%	0%	0%	0%	0%	0%	100%

Note: Own elaboration

Discussion and conclusions

In this research work, an analysis has been made through a methodology to be followed at different times, in this way it is possible to reach the conclusion about exclusive breastfeeding, which allows supporting the newborn in its growth and normal functional development, covering all the nutritional needs and requirements, providing hormonal and/or nutritional components that allow protecting, developing and reinforcing the immune system of the newborn; it also plays a protective role against obesity (10-12). In contrast, breast milk substitutes have nutritional components in high amounts according to the nutritional requirements of the newborn, which is why they stimulate accelerated weight gain. It can be identified that a newborn has an average gain of 1 g per hour since it oscillates between 20 and 30 g per day, and this increase increases during the first three months of life; however, at the end of this trimester the increase decreases with an approximate 0.8 g per hour, and it is in the third trimester when approximately 0.5 g/hour is gained, (4) relatively a weight gain for half that which occurred in the first trimester.

It is important to note that changes occur in the first week of life, as there is a decrease of up to 10 and 15% of the total weight respectively in term and preterm newborns. In extremely low birth weight newborns, i.e., below 1000 g., a greater decrease can be expected. This weight

loss is recovered by two weeks of life; however, for newborns born below 27 weeks of gestation, the estimated weight gain ranges between 10 and 20 g/kg/day, while neonates born after 27 weeks of gestation reach a weight gain between 20 and 35 g/kg/day (5).

Breast milk is the best food for a newborn, since it is the ideal source of nutrients and energy; it also completely covers all the requirements of the newborn and the infant, thus guaranteeing a correct growth and development, strengthening their immune system every day.

Most human milk substitutes provide a very high percentage of protein compared to breast milk, maintaining approximately 1.45 to 1.8 g/100 ml, which represents 50% more than in human milk. The total protein content of breast milk is 1.1 g/100 ml (1). The predominant protein in cow's milk is alpha-lactoglobulin, which is an allergenic component, while in breast milk alpha-lactalbumin is the most important. There is a marked difference between breast-fed and formula-fed children, with the latter showing higher serum levels of threonine, phenylalanine, valine and methionine (7,9). Breast milk substitutes generally contain lactose as an available carbohydrate, as does breast milk.

Breast milk in comparison to artificial feeding, plays a basic role in the development of the immunology of the newborn as it contains immunoglobulins, lactoferrin, lactoferricins B and H, lysozyme, lactoperoxidase, nucleotide hydrolysing antibodies, k-casein, α-lactalbumin, haptocorrin, mucins, lactadherin, free secretory component, fatty acids, leukocytes, maternal cytokines, SCD14, complement, complement receptors, β-defensin 1, Toll-like receptors, bifidus factor; and all of them together make human milk work as an antimicrobial agent against infections, as long as its consumption persists. It has been proven that colostrum and human milk serum present high doses of IgG, IgA and IgM (12).

Regarding the contribution of micronutrients, the contribution of calcium and phosphorus is described in detail, highlighting a greater contribution in infant formulas; however, 75% of the calcium in breast milk is absorbed, compared to 20% in human milk substitutes, which is essential for the development of bone tissue in the newborn. The same is true for the iron supply, since the iron contained in breast milk has a bioavailability of 49%, compared to only 4% in artificial breastfeeding. Breast milk also contains a complete hormonal profile, including oxytocin, prolactin, leptin, ghrelin, adiponectin, insulin, IGF-2, cortisol, prostaglandins, thyroid-stimulating hormone and thyroxine; it should be noted that, in the first six months of life, the high concentrations of insulin, leptin, IL 6 and TNFa in breast milk will help to avoid overweight, excess fat mass and consequently accelerated weight gain (3).

According to the results obtained, it can be concluded that most of the neonates admitted to the Neonatal Special Care Unit are fed with mixed breastfeeding and a very low percentage are exclusively breastfed. However, when taking into account the type of diet to compare the parameters in neonatal weight gain, only 39% of the total number of infants exclusively breastfed had weight gain <10% of the weight at birth, compared to the infants fed with mixed breastfeeding where more than 50% had weight gain compared to the weight at birth. For this reason we can conclude that, regarding the type of feeding, there is a higher incidence of accelerated weight gain in infants fed with human milk substitutes, compared to infants who exclusively received milk from their mothers; however, in addition to breaking the balance of their normal growth and development, the fact of consuming more protein than required in a milk substitute may represent a health risk due to the renal load of solutes that this implies.

Taking into account the weight gain of the neonates with their medical diagnosis, we found a limitation, since, in terms of jaundice, syphilis, hydroelectrolyte imbalance, seizures, hypoglycemia, and genopathy/congenital malformations, only one case per pathology was presented, which is why it is not possible to make a comparison of weight gain. Regarding the 19 neonates diagnosed with Acute Pulmonary Disease, all the exclusively breastfed infants showed weight loss, and more than half of the mixed breastfed infants also showed a marked weight loss. While 63% of the children who were diagnosed with sepsis and exclusively breastfed gained weight, 73% of the mixed breastfed children gained weight in relation to their birth weight.

Of the preterm neonates who were exclusively breastfed, only 33% of them achieved a weight gain of <10%, and of the preterm neonates who were sustained with mixed breastfeeding, 38% of them had a weight gain in relation to birth. Therefore, it can be emphasized that, of the medical diagnoses presented in neonates admitted to the Neonatal Special Care Unit of the Autlan Regional Hospital, Mexico, in the period from June to December 2016; Acute Pulmonary Disease and Prematurity have greater metabolic demand, a situation that makes it more difficult for neonates to gain weight, regardless of the type of feeding they receive.

As mentioned in the analysis of the literature, the medro is influenced by pathological, psychological, social and nutritional considerations, therefore, the weight gain may also be conditioned by the pathology or medical condition of the neonate, This is also mentioned by Murillo Fajardo in his research on weight gain in premature infants hospitalized in the Neonatal Intensive Care Unit from January 1 to December 31, 2018, in which he states that "in order to achieve optimal weight gain in the newborn, it will depend on the expertise of health personnel in both the nutrition received and the resolution of diseases in the newborn that hinder their growth" (28). It will be interesting to start a new research correlating the pathology of the newborn, type of feeding and weight gain.

In spite of the fact that most of the population has empirical knowledge about the benefits of breastfeeding for newborns, in many occasions they choose to use industrialized feeding, either with mixed breastfeeding or artificial breastfeeding in its totality, ignoring the risk factors involved in its consumption, especially when it comes to obesity and its complications in adulthood.

It is important to raise awareness among healthcare staff and the population in general about the indiscriminate use of human milk substitutes, in order to favor and increase the statistics of exclusive breastfeeding during the first six months of life, which will result in a generation of healthier children.

In spite of knowing that breast milk is the best neonatal food, since it fulfills the nutritional requirements of both macro and micronutrients, favoring the growth and normal development of the infant, protecting and favoring its immune system and preventing it from chronic diseases such as obesity, diabetes and hypertension in adulthood; there are situations in which breast milk is not available or is contraindicated for infant feeding, either because of maternal or newborn illness, or because of a shortage of breast milk in the institution's lactation center, or because of the mother's decision; in these cases, the use of human milk substitutes will be acceptable. It may be interesting to carry out an investigation in which the causes of abandonment of exclusive breastfeeding in patients admitted to the Neonatal Intensive Care Unit of the Autlan Regional Hospital are determined, and thus be able to support the mother in

the factors that are preventing this feeding, which will undoubtedly favor the health of the binomial.

Knowing the standards of weight gain of the newborns while they were admitted to the Neonatal Special Care Unit of the Autlan Regional Hospital, Mexico, it is important to follow a line of research by monitoring these patients for at least 6 months, since this is the period of time that the World Health Organization (WHO) establishes as a period of exclusive breastfeeding; In addition, as health professionals we have the capacity to influence as breastfeeding advisors, thus supporting the mother in difficult situations that she considers a risk to abandon this practice of neonatal feeding, which contributes to the health of the infant and the mother herself, both in the short and long term.

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