



**Study of the evolution of premature infants of less than 1500 grams breastfed**

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**Abstract**

**Background:** Our study proposed to evaluate and follow premature infants with a birth weight of less than 1500g in the neonatology unit of the National Reference and Nutrition Centre of the Rabat Child hospital.

**Methods:** This was a retrospective, analytic descriptive study carried out over a one-year period (1er January to 31 December 2015) in the Neonatology service of the National Reference and nutrition Centre of the Rabat Children's Hospital. Children born before 37 weeks of amenorrhea (GA) were included with a birth weight less than or equal to 1500g; those with a birth weight greater than 1500g, term newborns and with hypotrophy were excluded from the study.

**Results:** The analysis focused on 50 premature babies. Their age varied between 28 SA and 36 SA, at the output the variable weight from 1500 to 2250 g with an average of 1732±196, the average absolute gain was 19.9 g / day, the size ranged from 39 to 44 cm, the absolute height gain was 0.11 cm / day. The majority of premature infants were fed with breast milk and / or pre-milk with vitamin D plus iron through an orogastric tube. 54% of premature babies acquired food independence between 36 and 38 weeks of the corrected age.

**Conclusion:** Premature feeding is a neonatal emergency, as an early deficit can have long-term consequences. In our experience the presence of moms in the service, the early initiation of breastfeeding coupled with a supplement with preterm formula, have allowed us good results on growth in the medium term..

**Keywords:** breastfeeding, prematurity, birth weight 1500g.

**Introduction**

The quality of the nutritional management conditions the fate of the premature by modulating not only its growth but also its quality and quantity adapted to all aspects of its development, in the short or long term. In order to provide optimum nutrition, two main principles must be respected: to optimize parenteral nutrition early and to introduce adequate enteral nutrition as soon as possible, preferably with breast milk [1]. Breastfeeding is one of the first factors in the sustainable protection of the child's health. Several studies have objectively tested a positive impact of breastfeeding on the neuro-developmental and sensory prognosis of premature infants in the long term [2,3]. The World Health Organization (WHO) and the United Nations Children's Organization (UNICEF) recommend food in the exclusive breast for the first six months, followed by the introduction of complementary

foods coupled with the pursuit of Breastfeeding up to two years of the child or more. In Morocco, the practice of breastfeeding is still insufficient and lower than the goals recommended by WHO. Indeed, in national surveys, the exclusive breastfeeding rate for newborns at the age of 6 months rose from 62% in 1992 to 32.5 % in 2018 [4.5]. Many studies have shown that inadequate postnatal diets are significantly associated with an increase in neonatal morbidity and mortality and adulthood at a higher risk of obesity, disease cardiovascular disease and death [6.7].

The main objective of this study is to assess the impact of breastfeeding in a cohort of premature infants weighing less than 1500g in our context.

## Materials and methods

### 1. Type and period of study

This is a retrospective cross-sectional study with descriptive and analytical aim, carried out over a period of one year, from January 1 to December 31, 2015.

### 2. Place of study

The study took place at the National Reference Centre for neonatology and Nutrition, which is a center located on the ground floor of the Rabat Child Hospital. Our Centre's current hospital capacity is estimated at 55 beds divided into three units:

-A 12-bed medico-surgical Neonatal resuscitation unit, providing assisted ventilation and the various acts of resuscitation essential for life-saving.

-An intensive care and post-resuscitation unit with 11 beds providing the various urgent care and monitoring outside the mechanical ventilation.

-A standard care and rearing unit of 32 beds equipped with a room to receive the mothers who are breastfeeding their baby, recently arranged. There are two units in the delivery room of Souissi maternity. In addition to its units, the center provides a day-hospital activity and has an emergency, functional area 7 d/7 and 24h/24.3.

### Study population

**Inclusion criteria:** Included in the study were all preterm weighing less than 1500g and over or equal to 800 g.

**Exclusion criteria :** were excluded from our study all term newborns with a intrauterine growth retardation of less than 1500g, all premature infants whose birth weight was greater than or equal to 1500g, as well as those whose gestational age was not specified in the file and as well as incompletes Records. The collection of information was carried out in two stages. A first database collected from newborn hospital records in 2015; The information extracted concerned the number of premature babies, their sex, their gestational age and the evolutionary data. A second collection was carried out for each newborn child detailing the socio-demographic, pregnancy and clinical data of the newborn at the time of admission... The variables studied in premature were: gender, gestational age, anthropometric data, admission temperature, evolutionary data during hospitalization, including respiratory, hemodynamic, Metabolic, infectious, neuro developmental, length of hospitalization. The variables studied in the mother were: maternal age, occupation, marital status, inbreeding, home environment mode and place of delivery, surveillance of pregnancy (number of prenatal consultations), taking drug during pregnancy. Definitions of terms the gestational age was selected using one or more criteria: a theoretical term determined from the 1st day of the date of the last rules, the term ultrasound before 12 GA, or the morphological score of Farr. Premature is newborn born before 37 weeks of Amenorrhea (WA) (196 days gone but less than 259 days gone).

The classification of prematurity adopted is as follows:

- The very large prematurity 22 GA-26 GA + 6 days (less than 196 dayspast).
- The great prematurity between 27 GA-31 + 6 days.

- The simple prematurity of the 32 GA-36 GA + 6 days [8].

Birth weight is the weight obtained by weighing the newborn right after birth. Ideally, the weighing must be carried out within the first hour following the birth [9].

Low birth weight is a birth weight lower than 2500g regardless of gestational age. One distinguishes: The very low birth weight which is a birth weight less than 1500g and the extremely small birth weight, which is a birth weight less than 1000 g [8.9].

Intrauterine growth retardation is a slowing of fetal growth resulting in a weight lower than the 10th percentile for gestational age. It can be harmonious (identical to the weight, size and possibly the cranial perimeter) or disharmonious (predominant or exclusive impairment of weight) [8].

A healthy newborn has been defined by any birth with good adaptation (Apgar  $\geq 7$ ) and has no clinically detectable malformations or any associated morbidity.

A pregnancy was said to be followed if there were at least three antenatal consultations.

**Multiple pregnancies:** It is a twin pregnancy, triplet; quadruple or more [8]

**Primiparous:** Woman with only one pregnancy;

**Pauciparous:** Woman who had two to three pregnancies;

**Multiparous:** Woman with more than four pregnancies up to 6 pregnancies;

**Large multiparous:** Woman with 7 or more pregnancies.

Food autonomy was defined by a well-tolerated total enteral.

**Food1:** Those who benefited from a breastfeeding type of diet (maternal presence) + preterm formula + skin to skin.

**Food2:** Category fed by preterm formula.

The woman was considered non-illiterate when she did not know how to write or read. Monthly income: According to a study carried out in 2007 by the High Planning Commission (CHP) of Morocco, it is estimated

that if the salary received is lower than 3000 dirhams, the socio-economic level is low and if the salary received is higher than 3000 dirhams, the socio-economic level is average. Other elements have been used such as the type of housing, the occupancy of the dwelling, the ground floor material, the drinking water, the type of lighting in the house, the type of sanitary facilities, the storage of household waste and the goods of Sustainable consumption [12]. Other elements have been used such as the type of housing, the occupancy of the dwelling, the ground floor material, the drinking water, the type of lighting in the house, the type of sanitary facilities, the storage of household waste and the goods of Sustainable consumption. The definitions of world Health Organization and the National Agency for Health Accreditation and evaluation (ANAES) have been used [10.11] the term "breastfeeding" is reserved for the feeding of the newborn or infant by the mother's milk; Passive reception of the expressed breast milk is considered to be breastfeeding even if it is not breastfeeding; Breastfeeding is exclusive when the infant receives only breast milk, is partial when associated with another diet. Breastfeeding is artificial when it receives preterm formula.

#### 4. Statistic analysis

The data entry was done on Microsoft Excel 2011 version 14.7.1 and the analysis of the results was done using the SPSS software (statistical Package for the Social Sciences) version 13.0. The quantitative variables were expressed on average and standard deviation; the qualitative variables were expressed as numbers and percentages. The quantitative variables were compared by the student test and the qualitative variables by the CHI2 or the exact Fisher test. The method used in multivariate analysis is logistic regression. The degree of statistical significance was retained for  $P < 0.05$ .

#### Results

**1. General data:** 131 newborn infants were recorded during the period of our study among them 50 met our criteria for inclusion. The analysis in Table 1 revealed that almost half of moms were aged between 18 to 34 years with a low socioeconomic level in 60% of cases and a rural origin in 20% of cases. 42% were primiparous and 58% were multiparous. Compared to the premature population, the gender distribution was statistically similar, the sex ratio was 0.92. The gestational age of premature infants varied between 28 and 36 weeks. 12% had a birth weight less than 1200 g and 40% a weight between 1400 and 1499g. The majority (75%) was born in the Souissi maternity and the pregnancy was not followed in 56% of cases. 44% of newborns were born by caesarean delivery.

**2. Nutritional Data:** The analysis in table 2 representing the distribution of preterm infants according to the state of Trophicity reported that almost two thirds of the newborns were eutrophic or 60% of cases while 40% were born with IUGR. The median size was 33.5 cm with extremes ranging from 30 to 37 cm. This size was greater than the 10th percentile in 53%, lower than the 10th percentile in 27%. The cranial perimeter ranged from 21 cm to 25 cm with a median of 23 cm. It was higher than the 10th percentile in 56%, lower than the 10th percentile in 22%. The milk used was preterm formula (17 cases) or the milk of the own mom (33 cases). The average corrected age of the dietary autonomy was 36 GA (Extreme 32 GA + 4 days and 54 GA + 4 days). A parenteral-based amino acid supplement was performed on umbilical venous catheter in 32% of cases, and on peripheral venous pathway (PVP) in 16% of cases. Parenteral nutrition lasted on average 2.5 days (extreme 1-4 days) on umbilical venous catheter and 2.8 days (extreme 1- 8 days) on PVP. Pathologies encountered during hospitalization were respiratory and metabolic in (27.1%), infectious in (8.2%) and hemodynamic (1.8%).

**3. Analysis of evolutionary data:** The length of hospital stay varied from 05 to 90 days with an average of 24.7 days. The corrected term at discharge varied from 34 GA + 6 days to 44 + 1 day with a median of 37 GA + 2 days. The weight ranged from 1500 g to 2250g with a median of 1732±125 g. The average weight gain was 19.9 g/d. Of the total of 30 baby admitted eutrophic, 83.3% remained eutrophic at discharge and 16.7% acquired during the stay, a postnatal growth retardation that was associated with respiratory pathologies in 53% of cases and metabolic complication in 25%, and an extended duration of hospitalization in 22% of cases ( $P < 0.001$ ). 65% of newborns had a normal weight for their age at discharge. The size ranged from 32cm to 37 cm with a median of 33.75 cm. The average absolute height gain was 0.21 cm/d. Of the 30 patients with a size greater than the 10th percentile at admission, 83.9% kept at discharge a size greater than the 10th percentile; Of the 20 patients who were at the entrance below the 10th percentile, 15% had caught up. The head circumference (HC) ranged from 27.5 cm to 36.5 cm with a median of 32.1 cm. The average absolute gain of the cranial perimeter was 0.1 cm/week. Of the 30 patients with a HC higher than the 10th percentile at admission, 93.3% retained at the exit a HC superior to the 10th percentile; While 2 have had a pathological HC. The extrauterin growth retardation (EUGR) was acquired in 6 cases especially during the initial stay in NICU in 4 cases. The EUGR concerned babies less than 32 GA in 6 cases with an average weight of 1287±96 g. Early breastfeeding was observed in 78.3% of cases with early enteral feeding the first day of hospitalization. The majority of premature were fed breast milk or pre-milk with vitamin D and iron supplementation.

Table 1: Maternal and neonatal characteristics

Variables	Effective N=50
<b>Neonatal characteristics</b>	
Newborn Age (Day) <sup>a</sup>	0 [0 – 1]
Birth Weight (g) <sup>b</sup>	
< 1200	6(12)
1201-1399	24(48)
1490-1400	20(40)
Average length of hospitalization (day) <sup>c</sup>	24.7±2
Sex <sup>b</sup>	
Male	24(48)
female	26(52)
<b>Maternal Characteristics <sup>b</sup></b>	
<b>Maternal age</b>	
<18ans	16(32)
18-34ans	23(46)
>35ans	11(32)
<b>Parity</b>	
Primiparous	21(42)
multiparous	29(58)
<b>Delivery Mode</b>	
Normal delivery	28(56)
caesarean	22(44)
<b>Social coverage</b>	
Yes	15(30)
No	35(70)
<b>Pregnancy Follow-up</b>	
Yes	28(56)
No	22(44)
<b>Education level</b>	
Illiterate	24(48)
Primary	18(36)
Secondary	5(10)
Higher	3(6)

The values are expressed on average ± standard deviation (c), (a)median [interquartiles],(b)Number and percentage

**Table 2: Distribution of newborns by state of trophicity at the admission and exit of the service**

State of trophicity	type	Number	total	Percentage %
<b>At Admission</b>				
Normal Weight for age		30	30	60
	Harmonious	13		
IUGR			20	40
	Disharmonious	7		
Total				100
<b>At the exit of the service</b>				
Normal Weight for Age		39	39	78
	Harmonious	3		
EUGR			11	22
	Disharmonious	8		
Total				100

**Table 3: Distribution of premature according to the type of feeding received**

Type of milk	Eutrophic	IUGR harmonious	IUGR disharmonious
<b>breastmilk+skin to skin*</b>	26 (86.67)	8 (61.53)	5(71.43)
<b>Preterm formula*</b>	4 (13.33)	5 (38.46)	2(28.57)

*IUGR: intrauterine growth retardation, \*number (%)*

86.67% of premature eutrophic were fed with breast milk versus 13.33% fed by artificial milk

**Table 4: Correlation between type of feeding and Weight gain in multivariate analysis**

Variables	OR	CI 95%	p
<b>Food1</b>	0.7	0.3-0.91	0.025
<b>Food2</b>	0.25	0.72-1.5	0.6

food1 (breastfeeding + premature milk+skin to skin) food2 (artificial milk ), OR (odds ratio): adjusted by logistic regression; CI confidence interval Multivariate Analysis (table 3) revealed a statistically positive significant correlation (P = 0.025) between breast milk and weight gain (OR = 0.7; CI = 0.3-0.91).

## Discussion

The majority of our premature babies were fed mainly by breast milk associated with preterm formula. This diet was administered by enteral and usually through a nasogastric depending on the clinical context. In front of any contraindications it was started at first day of life in most of our premature babies with breast milk. This introduction was accompanied by regular monitoring of the umbilical perimeter associated with transit stimulation if necessary for the immaturity of the digestive tract in this category, the latter tolerated well compared to those, in which the food was started with artificial milk. The start-up of artificial milk instead of breast milk was linked to the non-availability of breast milk due to the absence of mothers who had given birth in another structure (out born), or due to maternal pathology.

The main issue is to obtain breast milk quickly and in sufficient quantity, the delay in the onset of breastfeeding was linked to medical causes in the case of hospitalized mothers, problems of accessibility, a phobia among Primiparous teenage girls. Indeed, studies have shown that the risk of death by neonatal infection is multiplied by three in the event of a late start of breastfeeding. (OR: 2.61; 95%, CI: [1.68, 4.04]). [13]. In our study food autonomy was acquired on average at 36 GA, those who received more breast milk acquired autonomy very quickly compared to those who took more preterm formula. 25 (21%) presented a NEC. The lack of breast milk banks in our context requires us to use artificial milk, which is more associated with digestive complications. Breast milk is the ideal food for this category, starting as early as possible because it has positive effects on the digestive with an increase in intestinal growth, a decrease in mucosal intestinal atrophy, an increase in enzymatic activity, a decrease in abnormal bacterial colonization, a decrease in the duration of parenteral feeding and its complications (sepsis, cholestasis) [13]. A correlation was

observed between the decrease in the length of stay and the practice of feeding based on breast milk in our context. 78% of premature were eutrophic at discharge; these data are comparable to those of K.V. Asia et al in Côte d'Ivoire, which observed a rate of 74% eutrophic baby [14]. Enteral Nutrition is the most physiological modality to bring an adapted diet. In our study the factors associated with EUGR found in 16.7% of premature babies were related to a very low birth weight < 1200 in 26.7% with an RR = 1.1; A enterocolitis in 19.2% of cases ( $P < 0.012$ ), and extended period of hospitalization. [15.16]. Premature infants with low birth weight frequently have postnatal growth retardation, at the end of their hospitalization, most have a weight lower than the 10th percentile of the fetal reference weight [17] this was not the case in our Context. The nutritional recommendations, which had so far been intended to allow a premature to have a growth rate equivalent to that of the fetus and to prevent deficiencies, are currently being debated. A large number of premature babies have an uncompensated growth delay in the first few weeks of life. Current recommendations take into account the quality of weight gain (lean mass) and the need to achieve catch-up growth as early as possible [18].

## Conclusion

Premature feeding is a neonatal emergency, as an early deficit can have long-term consequences. In our experience the presence of moms in the service, the early initiation of breastfeeding coupled with a supplement with preterm formula, have allowed us good results on growth in the medium term.

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