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Statural and Weight Growth of Low Birth Weight at 9 Months

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Abstract

Introduction: Low birth weight (LBW) is defined as a birth weight < 2500 g at birth, regardless of the term of pregnancy. The objective of this study is to evaluate their stature and weight growth from 0 to 9 months of corrected age (CA) in Senegal. **Methodology:** This is a prospective, descriptive, and analytical cohort follow-up up to 9 months of CA including all live newborns of LBW hospitalized and followed up from 01 August 2019 to 31 May 2020. World Health Organization growth charts were used to assess stature and weight growth. **Results:** During the study 136 LBW newborns were included. The mean gestational age was 32 weeks of amenorrhea. At discharge, 46 children (33.82%) were exclusively breastfed. At birth, the mean weight was 1487 g (3^{rd}-10^{th} percentile) and the mean height was 41.52 cm (10^{th}-25^{th} percentile). At 9 months of CA, the mean weight was 8119 g (median) and the mean height was 74 cm (median). The children had achieved satisfactory growth in weight (84%) and height (89%). At 9 months of CA, 27% of the children were behind in one of the four areas of psychomotor development. **Conclusion:** At the end of 9 months of CA, stature and weighted growth was normal.

Keywords

Low-Birth-Weight, Growth, Stature, Weight, Child, Senegal

1. Introduction

Low birth weight (LBW) is defined as any live birth with a weight < 2500 g, regardless of the term of the pregnancy [1]. In sub-Saharan Africa, one in 36

children dies in the first month of life, compared to one in 333 in developed countries [2]. In Senegal, neonatal mortality was estimated at 23 per thousand in 2018, representing almost half of infant and child mortality [3]. The main causes of neonatal deaths worldwide are low birth weight (prematurity and intrauterine growth retardation) followed by infection and perinatal asphyxia [2] [4]. Globally, about 20 million children are born weighing less than 2500 g and more than 96% of them are born in developing countries [5]. In addition to high mortality, LBW can affect psychomotor development and subsequent growth [6] [7]. The aim of this study was to analyze the impact of the LBW anomaly on the short-term outcome, in particular on the stature and weight development of these children from birth to the corrected age of 9 months.

2. Methodology

This is a prospective, descriptive and analytical study conducted from 01 August 2019 to 31 May 2020 (10 months). It was carried out in the hospital environment in the neonatology unit of the Abass Ndao University Hospital of Dakar, which is a level 3 hospital in the national health pyramid. This center houses one of the largest mother-child centers in the country with a large maternity ward with a capacity of more than 5000 deliveries per year. In addition to the maternity ward, the neonatology department is also a referral service that receives newborns from all regions of the country. The study included all live newborns weighing less than 2500 g at birth admitted during the study period. The data were collected from the pre-established forms (Appendix) based on the records of the hospitalized newborns and during the follow-up in the service. The newborns were followed up with scheduled visits at 40 days' gestation and at corrected age (CA) of 2 months, 4 months, 6 months, and 9 months. During each visit, the following data were collected anthropometric data (weight, height, head circumference, Lefort-Leroy growth curves and WHO standard growth curves). The data were recorded on a computerized survey form using Sphinx software version 5.1.0.7. Data analysis was performed with SPSS version 18.0. The descriptive study was carried out with the calculation of frequency and proportion for the qualitative variables and the calculation of means for the quantitative variables. The analytical study was done with cross-tabulations.

3. Results

3.1. Socio-Demographic Data

During the study period, 556 LBW newborns were admitted out of a total of 1414 newborns, *i.e.* 39.32% of newborns. Among the LBWs, 98 died during hospitalization (17.62%), 19 were referred to other health facilities and 322 (57.9%) were lost to follow-up. Thus, we collected 136 LBW newborns, 82% of whom were born in the hospital maternity ward (in-Born). The level of education was low, with only 29.41% having attained higher education, despite a high school enrolment rate (88.97%).

3.2. Maternal and Neonatal Data

The average age of the mothers was 27.53 years [extremes 15 and 44 years] with a peak in frequency between 18 and 34 years, representing 72.8% of the mothers. During pregnancy, 64 (47%) of the women had presented an obstetric complication and pre-eclampsia was the most frequent with 21.32%. The mean gestational age was 32.07 days after birth. In our population, 71 newborns (52.2%) were very premature at less than 32 weeks of amenorrhea. The sex ratio was 1.1. The birth weight was between 1500 - 2499 for 66 newborns (48.53%) with a mean birth weight of 1487 g [extremes 750 - 2400 g]. The mean height at birth was 41.52 cm, between the 10th and 25th percentile [extremes 33 and 48 cm] and 19 babies (14%) had a height at age below the 3rd percentile. The mean head circumference (HC) at birth was 30.47 cm at the 50th percentile and 22 (16.17%) had a HC at age below the 3rd percentile. Intrauterine growth retardation was present in 60% of cases. Respiratory distress and hypothermia were the main neonatal complications with 74.26% and 68.38% respectively. The average length of hospitalization was 11.84 days [extremes 2 and 66 days]. Anthropometric parameters at birth are summarized in Table 1.

3.3. Data on Feeding Mode

In hospital all newborns were on mixed feeding and 103 (75.73%) newborns were on parenteral feeding. At discharge, 79 newborns (58%) remained on the mixed diet. Almost all the children (92%) were breastfed. However, only 33.82% of the children under six months of age were exclusively breastfed.

Evolution of Anthropometric Data during Follow-Up

- **At discharge:** The mean post-conceptional age at discharge was 35SA. The mean weight at discharge was 1703 g and 86 newborns (63.23%) had a weight for age below the 3rd percentile. The mean height at discharge was 43.67 cm, between the 3rd and 10th percentile, and 62 babies (45.6%) had a height-for-age below the 3rd percentile. The mean head circumference at discharge was 31.25 cm between the 25th and 50th percentile and 36 newborns (26.47%) had an age-related HC below the 3rd percentile.
- **At 40 weeks post-conceptional:** The mean weight was 2639.27 g and 49 children (36.03%) had a weight for age below the 3rd percentile. The mean

Table 1. Distribution according to average anthropometric parameters at birth (Lefort-Leroy curve).

Repartition	Medium	percentile
Gestational Age	32.07 SA	
Weight	1487.61 g	<10
Length	41.52 cm	>10
Head Circumference	30.47 cm	>10

height was 49.67 cm, between the 25th and 50th percentile and 26 children (19.12%) were below the 3rd percentile for height for age. The mean head circumference was 34.7 cm between the 25th and 50th percentiles and 6 children (4.41%) had a HC for age below the 3rd percentile

- **At 2 months corrected age (CA):** The mean weight was 4666.76 g (between the 15th and 50th percentile) and 27 children (or 19.85%) had a weight for age below the 3rd percentile. The mean height was 56.7 cm (15th percentile) and 29 children (21.32%) had a height-for-age below the 3rd percentile. The mean head circumference was 39.07 cm (50th percentile) and 26 children (or 19.12%) had a HC for age below the 3rd percentile.
- **At 6 months of CA**: The mean weight was 7532.35 g (between the 50th and 85th percentile) and 11 children (8.1%) were below the 3rd percentile for weight for age. The mean height was 71.27 cm (between the 85th and 97th percentile) and 7 children (5.14%) had a height at age below the 3rd percentile. The mean head circumference was 45.94 cm (between the 85th and 97th percentile) and 5 children (3.67%) had a HC relative to age below the 3rd percentile
- **At 9 months of CA:** The mean weight was 8119.26 g (between the 15th and 50th percentile) and 5 children (3.67%) were below the 3rd percentile weight for age. The mean height was 74.3 cm (between the 50th and 85th percentile) and 4 children (2.94%) had a height at age below the 3rd percentile. The mean head circumference was 46.6 cm (between the 85th and 97th percentile) and 3 children (or 2.2%) had a HC for age below the 3rd percentile.
- **In total:** The average weight gain from corrected PCA to 9 months corrected age was 1326.33 gr. The mean stature gain from corrected PCA to 9 months corrected age was 6.5 cm. The average gain in CP between the corrected APC and 9 months of corrected age was 3.2 cm. The evolution of the curves of the different growth parameters are summarized in Figure 1 and Figure 2.

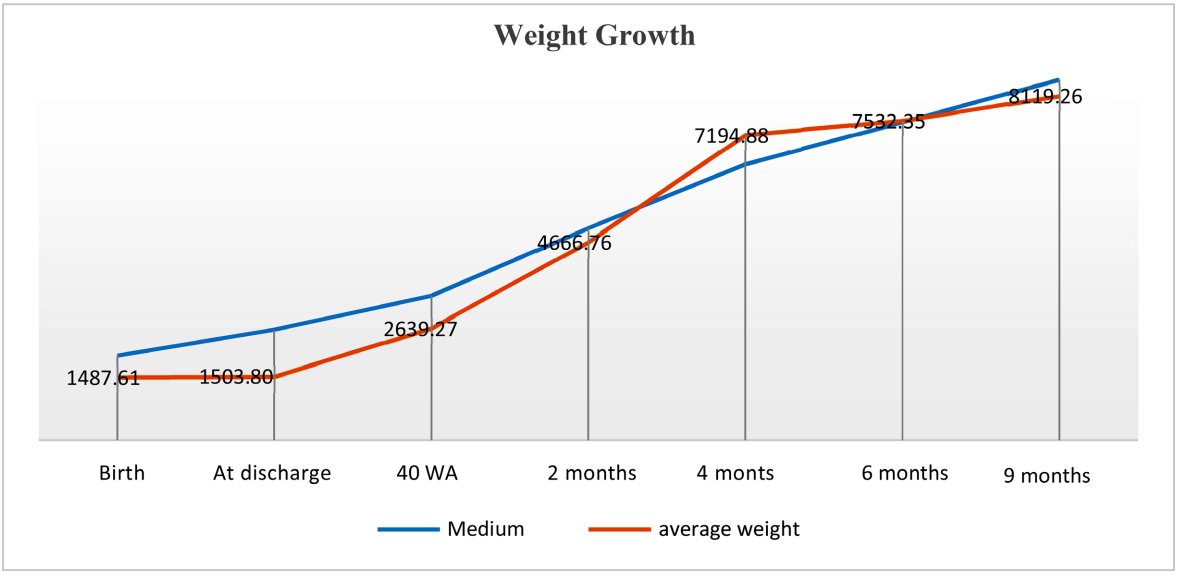

Figure 1. Distribution by weight growth.

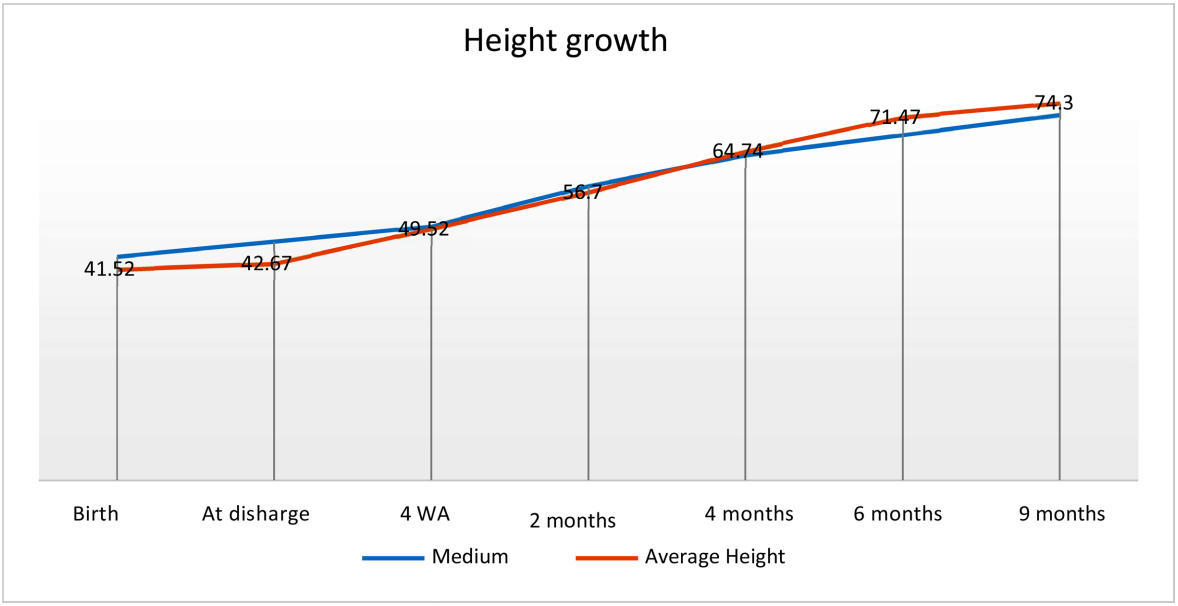

Figure 2. Distribution of patients by height growth.

4. Discussion

4.1. Socio-Demographic Aspects

The prevalence of LBW was 39.32%. This prevalence was higher than those reported by UNICEF worldwide (15.5%), in Africa (14.3%) and particularly in West Africa 15.4% [8]. In Senegal in 2018 the prevalence was 12% [3]. In underdeveloped countries, LBW occurs mainly because of poor fetal growth, as confirmed again by Sania *et al.* in Tanzania [9] [10]. Loss of sight represents more than 50% of the initial population. The high number of drop-outs could be explained by the remoteness of these children's homes, the low socio-economic level and the health context related to the Covid-19 pandemic. In our study, we found that the frequency of LBW was higher in the 18 - 34 age group, *i.e.* 72.8%, and the average age of mothers was 27.53 years. These results are comparable to those of Charpak N *et al.* [2], Kabore *et al.* [11] and Luhete P K *et al.* [13], *i.e.* 27.3 years, 29.7 years and 26.6 years respectively. It is classically reported that primiparity, the age of the mothers, lack of employment, and low level of education increase the birth of premature babies or LBW [14] [15] [16].

4.2. Weight Growth

At term (40 SA post-conception), the mean weight was 2639 g, the mean height was 49.67 cm and the mean head circumference was 34.7 cm with 36% of the population underweight at the 3rd percentile. This was slightly lower than the average weight in Bogota (2851 g) [2] and Vietnam (2920 g) [9]. At 9 months corrected age, the mean weight was 8119.26 g, the mean height was 74.3 cm and the mean head circumference was 46.6 cm. The weight growth of the LBW children remained below −2DS for 16.17% of whom only 3.67% were below −3DS. This means that in our series, most children (84%) were able to achieve

satisfactory weight gain at 9 months. Other studies have shown the same tendency for weight gain in LBW in the first year. The study by Gascoin G *et al.* on the evaluation of the long-term consequences of children born in the context of LBW found that most children had caught up in weight by 6 months [1] [17].

4.3. Stature Growth

The dynamics of stature catching up in our series was more important with a better progression up to almost 90% at 9 months. Only 11% of the children had a height at 9 months lower than −2DS and 4 children (3%) had a height for age lower than −3DS. Other studies have confirmed that the majority of children have caught up in height in the first 2 years and that there is very little catching up after 2 years. Studies have shown stature recovery in the first 6 months, and at 1 year of age only 13.4% of LBW infants were below −2DS [18] [19]. However, genetic factors, including parental height, should not be overlooked in the growth potential of the child in height.

4.4. Growth in Head Circumference (HC)

The head circumference of the children remained below −2DS at 9 months in 6% and 7 children (5.14%) had a HC for age below -3DS. Failure to catch up in HC growth at one year is still considered to be a poor prognosis [18]. Brandt *et al.* described the more frequent occurrence of cognitive impairment when head circumference was less than −2DS between 12 and 18 months corrected age [19].

5. Conclusion

At the end of 9 months of CA, stature and weighted growth was normal.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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