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Original Article

Growth Monitoring of Infants in an urban area of Sri Lanka – a Clinical Audit

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Key words: **growth monitoring, infants, growth indices**

Abstract

Background and objective

Regular monitoring of growth in children is important to detect abnormal growth and implement timely interventions. The aim of this audit was to assess the level of adherence to the national guidelines on growth monitoring during infancy in children attending the immunization clinic of a tertiary care hospital

Methods

A clinical audit was conducted in 141 children aged 12 and 18 months attending an immunization clinic at the Lady Ridgeway Hospital, Colombo, Sri Lanka. Data on growth assessment were extracted from the Child Health Development Record. The Sri Lanka national guidelines for growth monitoring recommend that weight should be monitored monthly and length should be checked at 4 and 9 months during infancy. More frequent monitoring is recommended if there are any concerns regarding growth.

Results

Data of 141 children were available for analysis. There were 41.8% (n=59) girls and 77.3% (n=109) were 18 months old. Weight-for-age was <-2SD in 18.4% (n=26), length-for-age <-2SD in 12.1% (n=17) and weight-for-length <-2SD in 15.6% (n=22). Birth weight was recorded in all while length and OFC at birth were recorded in 93.6% (n=132) and 97.9% (n=138) respectively. There were ≥ 9 weight measurements plotted during infancy in 75.9% (n=107). Length was plotted only in 56% (n=79) at 4 months of age, although 92.9% (n=131) had attended the clinic. But length was plotted at least once between 1-6 months in 83% (n=117). Length was not plotted at 9 months in 55.3% (n=78). Of them, 73.1% (n=57) had attended the clinic at 9 months. Length was not measured between 6-12 months in 29.8% (n=42). Frequency of weight and length measurements were significantly lower between 7-12 months of age compared to 1-6 months of age (weight; p<0.001 and length; p=0.02). Weight faltering was noted at some point during infancy in 60.3% (n=85) and 78.8% (n=67) of them had at least one weight-for-length plotted while 28.2% (n=24) of them had two or more recordings plotted.

Conclusion

There is a need to strengthen growth monitoring during infancy in this population with a high prevalence of growth faltering.

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Background

Regular growth monitoring is widely accepted as an important component of childcare. It helps to ensure the wellbeing of children and is an important intervention to detect nutritional problems. Growth monitoring aims at early detection of any abnormal growth, before any form of malnutrition develops, and thus helps to take timely interventions [1,2]. Therefore, it is primarily a preventive activity. In addition, it helps to detect serious underlying disorders that mainly manifest as abnormal growth.

Optimal growth monitoring practices are important to obtain the best benefits. The frequency of monitoring should be decided considering the local patterns of growth and growth faltering [2]. More frequent monitoring of growth is needed in populations with a high prevalence of child malnutrition. Undernutrition in children remains a public health problem in Sri Lanka [3,4]. Therefore, the national guideline for growth monitoring in Sri Lanka recommends that weight should be monitored monthly and length should be checked at 4 and 9 months during infancy [5]. More frequent monitoring is recommended if there are any concerns regarding growth, such as weight gain or impairment of general health.

The most frequently monitored parameter in Sri Lankan infants is weight-for-age but there is a scarcity of data regarding the monitoring of other growth indices. Lack of use of other parameters could affect the achievement of optimum growth of children. This clinical audit was done to assess the level of adherence to the national guideline for growth monitoring during infancy in children attending an immunization clinic of a tertiary care hospital in Colombo, Sri Lanka.

Methods

Participants

A clinical audit was conducted among 141 12- and 18-months-old children attending an immunization clinic of a tertiary care hospital in Colombo. Parents of 12- or 18-month-old children were recruited consecutively to the audit. Fifty percent of the data was collected prior to the COVID lockdown in 2020. The balance data was collected in the first four months after the lockdown and only 18-month-old children were included in the audit after the lockdown. Therefore, data on growth monitoring during infancy in this population was not affected by the COVID lockdown.

Data collection

An interviewer administered questionnaire was used to collect data on demographic and socio-economic status. Data on growth monitoring were extracted from the Child Health Development Record (CHDR). Weight and length at the point of recruitment i.e. 12 and 18 months of age, were measured using standard protocols [6]. Nutritional status was assessed using weight-for-age, length-for-age and weight-for-length at the point of recruitment. When infants were weighed ≥ 9 times during the first year of life, it was considered that regular growth monitoring had occurred [7]. Weight faltering was defined as a downward deviation of weight for age from the growth trajectory [8].

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Analysis

he data were analysed using the SPSS version 21 statistical package. Data was presented as mean and standard deviation (SD) and frequency distribution tables as appropriate. Categorical data were analysed using Chi square tests. The level of significance was set at a $p < 0.05$.

Results

Of the total 141 children in the study population 77.3% were 18-month-old children and 41.8% were girls. Table 1 shows the characteristics of the study population and the nutritional status at recruitment.

Table 1: Basic characteristics and growth indices

Characteristics	Number (%)
Age	
12 months	32 (22.7%)
18 months	109 (77.3%)
Sex	
Male	82 (58.2%)
Female	59 (41.8%)
Maturity at birth	
≥ 37 weeks	134 (95%)
< 37 weeks	7 (5%)
Birth weight	
≥ 2.5 kg	115 (81.6%)
< 2.5 kg*	26 (18.4%)
Weight-for-age SDS	
< -2 SD	26 (18.4%)
≥ -2 SD	115 (81.6%)
Length-for-age SDS	
< -2SD	17 (12.1%)
≥ -2SD	124 (87.9%)
Weight-for- length SDS	
< -2SD	22 (15.6%)
≥ -2SD	119 (84.4%)

*All preterm babies had low birth weight

Anthropometric parameters at birth were plotted in the CHDR in the majority. Birth weight was recorded in all while length and OFC at birth were recorded in 93.6% (n=132) and 97.9% (n=138) respectively. There were ≥ 9 weight measurements plotted during infancy in 75.9% of the study population and 5-8 measurements in 18.4%. Frequency of weight measurements was lower between 7-12 months of age compared to 1-6 months of age (Table 2). Mean frequency of weight measurement during 1-6 months was 5.39 (±1.0) while it was 4.28 (±1.6) between 7-12 months ($p<0.001$). Frequency of length

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measurements was also lower between 7-12 months of age compared to 1-6 months of age (Table 2). Mean frequency of length measurement during 1-6 months was 1.1 (±0.6) while it was 0.89 (±0.7) during 7-12 months (p=0.02).

Table 2: Frequency of monitoring of growth parameters

Number of growth parameters plotted in CHDR*	Between 1-6 months of age	Between 7-12 months of age
Weight-for-age		
≥ 5	117 (82.9%)	72 (51.1%)
3 – 4	21 (14.9%)	49 (34.7%)
≤ 2	3 (2.1%)	20 (14.3%)
Length-for-age		
≥ 2	36 (25.5%)	23 (16.3%)
1	81 (57.4%)	75 (53.2%)
0	24 (17%)	42 (29.8%)
Weight-for-length		
≥ 2	11 (7.8%)	14 (9.9%)
1	61 (43.3%)	55 (39%)
0	69 (48.9%)	72 (51.1%)
Occipito-frontal circumference		
≥ 2	14 (9.9%)	7 (4.9%)
1	19 (13.5%)	20 (14.2%)
0	106 (75.2%)	111(78.7%)

*excluding the weight and length at birth

Table 3: Regular weight-for-age monitoring and the associated factors

Characteristics	≥ 9 weight measurements plotted in the CHDR during infancy		P value
	Yes n=107 (75.9%)	No n=34 (24.1%)	
Birth weight			
2.5 kg and above	86 (74.8%)	29 (25.2%)	0.51
Below 2.5 kg	21 (80.8%)	5 (19.2%)	
Maturity			
37 weeks and above	101 (75.4%)	33 (24.6%)	0.53
Below 37 weeks	6 (85.7%)	1 (14.3%)	
Weight faltering during infancy*			
Absent	38 (67.9%)	18 (32.1%)	0.07
Present	69 (81.2%)	16 (18.8%)	
Mother's age			
Below 35 years	81 (77.1%)	24 (22.9%)	0.55
35 years and above	26 (72.2%)	10 (27.8%)	
Mother's education			
Primary or secondary	52 (81.3%)	12 (18.8%)	0.17
Tertiary and above	55 (71.4%)	22 (28.6%)	
Mother's employment status			
Employed	22 (75.9%)	7 (24.1%)	

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Housewife	85 (75.9%)	27 (24.1%)	0.99

* Downward deviation of weight for age from the growth trajectory

Weight faltering during infancy was noted in 60.3% (n=85). Of them, weight-for-age was plotted ≥9 times in 81.2% (Table 3). There were no significant associations between infant's and mother's characteristics and the frequency of infant's weight-for-age monitoring (Table 3).

Length was plotted only in 56% (n=79) at 4 months of age, although 92.9% (n=131) had attended the clinic. Twenty seven percent had their length plotted on some other occasion between 1 to 6 months of age and the remaining 17% did not have their length measured during first six months of life. Clinic attendance at 9 months was 80.1% but length was plotted only in 44.7%. Thirty percent did not have their lengths measured between 6-12 months. Six percent did not have their length measured during the entire first year of life (Fig 1).

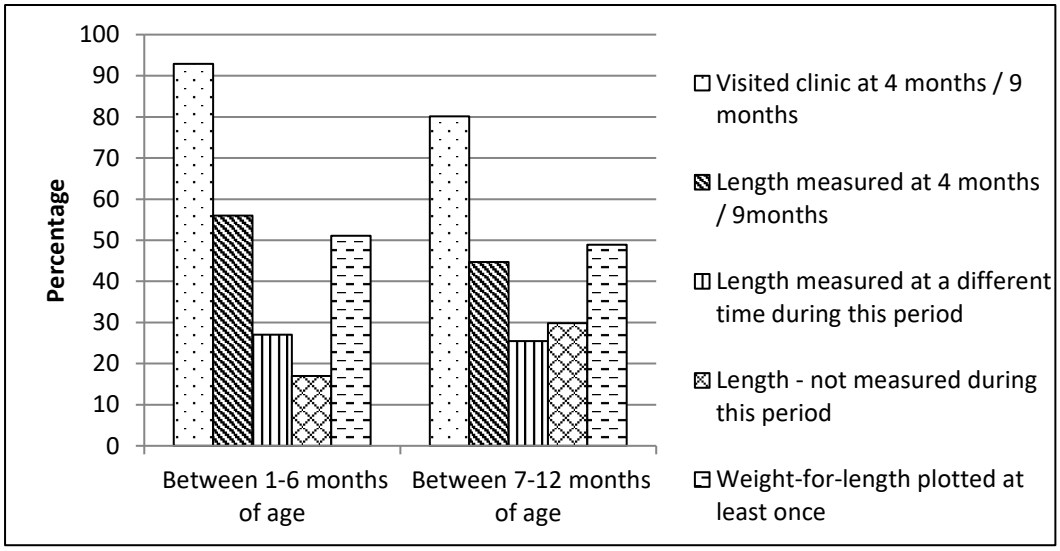

Figure 1: Frequency of Length measurements during infancy

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Weight faltering was noted at some point during infancy in 60.3% (n=85) and 78.8% (n=67) of them had at least one weight-for-length plotted while 28.2% (24) of them had two or more recordings plotted.

Discussion

Effective growth monitoring needs regular and accurate anthropometric measurements, plotting it in the CHDR with correct interpretation and making appropriate interventions to address abnormal growth [1,2]. This clinical audit looked into the frequency of monitoring of growth indices.

According to the national guidelines of Sri Lanka, regular growth monitoring is defined when infants have undergone ≥ 9 weight measurements at designated times during the first year of life, [7]. The proportion of infants whose growth was monitored regularly in Sri Lanka in 2014 was reported to be 84.3% and the target was to achieve 90% in 2020

[4,7]. Our results revealed that regular weight-for-age monitoring was below this figure and the frequency of monitoring reduced significantly during the second half of infancy.

Monitoring weight is the mainstay to monitor growth in the community [2] and it is operated by the well-established preventive health sector in Sri Lanka. The national guidelines recommend monitoring length, as well, at specific time points [5]. Measurement of length is needed to determine length-for-age as well as weight-for-length and hence, assess the nutritional status. Regular growth assessment would assist in determining the nutritional status and any feeding intervention would be based on weight-for-length assessment. Therefore, the value of these growth indices cannot be underestimated, especially when the prevalence of growth faltering is high. This audit shows that the length measurements were not plotted at the recommended time points, even though the infants have attended the clinic. It also showed that the weight-for-length parameter was seldom used even in those with growth faltering.

The reasons for these lapses in growth monitoring could be the lack of resources in the well-baby clinics, clinics being over-crowded with measurements and documentation taking an inordinate length of time or inadequate knowledge about the importance of length measurement and its interpretation. Issues related to suboptimal growth monitoring in the field need to be investigated and addressed. Furthermore, in the hospital setting as well as in other medical consultations, updating the CHDR with growth parameters seldom happens. Although many do take anthropometric measurements, the practice of plotting them on a growth chart does not happen regularly. Health staff in the curative sector should be encouraged to document any growth parameter that is measured during any visit to a health care facility.

Effective growth monitoring would help to detect malnutrition at an early stage, thus making corrective interventions easy, timely and effective, providing all children with the opportunity to grow to their highest potential.

Conclusion

Growth monitoring practices are suboptimal in this population with a high prevalence of growth faltering and there is a need to strengthen growth monitoring during infancy.

List of abbreviations

CHDR - Child Health Development Record
OFC – Occipito Frontal Circumference

Declarations

Ethics approval and consent to participate

Ethics clearance has been obtained from the Ethics Review Committee, Lady Ridgeway Hospital, Colombo, Sri Lanka (LRH/DA/05/2019). Study was carried out in accordance with ethical guidelines of Lady Ridgeway Hospital, Colombo, Sri Lanka. Informed written consent was obtained from all the parents.

Competing interests

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The authors declare that they have no competing interests.

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Authors' contributions

The study was designed by KS, DS and VPW. Data collection: KS. Data analysis: KS. Manuscript writing: KS, DS and VPW. All authors read and approved the final manuscript.

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