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Original Article

One year follow up study of term babies born at Kathmandu medical college teaching hospital

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Abstract
Objective: To study the mean, standard deviation and centiles for anthropometry and haemoglobin in healthy term infants followed up to 12 months of age. **Design**: Cohort study **Settings**: Kathmandu Medical College Teaching Hospital (KMCTH) in Kathmandu. **Subject:** Consecutive healthy term newborns Method**:** 100 consecutive healthy term newborns were enrolled at birth.19 babies were lost in follow up. So, 81(45 male, 36 female) healthy, full term infants were followed up from birth to 12 months of age. Anthropometry (weight, length, and head circumference) and haemoglobin were measured at birth, 6 weeks, 6 months, 9 months and 12 months of age. Haemoglobin was estimated by Hemocue microcuvette method. The data so obtained was subjected to statistical analysis by using SPSS computer package.
Main outcomes: Mean, centile and standard deviation score values for weight (Kgs), infant length (cms), head circumference (cms) and haemoglobin (gm/dl) at birth, 6 weeks, 6 months, 9 months and 12 months of age. **Results:** Out of 100 babies enrolled, data presented here is for the remaining 81 babies. Among 81 babies, 76 were appropriate for gestational age (AGA) and 3 were small for gestation (SFD). The mean, standard deviation and percentile values are presented for anthropometry (weight, length and head circumference) and haemoglobin at birth, 6 weeks, 6 months, 9 months and 12 months of age. The mean birth weight was 3.05 kg (SD 0.41). The mean infant length and head circumference at birth were 49 cm (2.28) and 33.8 cm (SD1.4) respectively. The mean haemoglobin at birth was 15.7 gm/dl (SD 2.29). At 12 months of age mean weight, length, head circumference and haemoglobin were 9 kg (SD 0.81), 73.5 cm (SD 2.9), 45 cm (SD 1.2) and 11.1 gm/dl (SD 1.41) respectively. Almost 50% of the babies at 6 weeks, 9 months and 12 months of age were found to be anaemic (Hb <11 gm/dl). Among the babies, 49% were exclusively breast fed for 6 months of age. Other feeding practices seen were, mother's breast feed with water supplementation (25%), mother's breast feeding with formula feed (16%) and formula feeding only (5%). National and international comparisons of anthropometry and haemoglobin data are shown in table.

Introduction

Neonatal anthropometric parameters are significant predictive factors of neonatal and adult morbidity and mortality. Birth weight is an important determinant of infant's survival and future development. The prevalence of low birth weight (<2.5 kg) in Nepal is very high -27%[1]. Maternal nutritional status is suboptimal in our country. Antenatal check up (ANC) rate is low and there is poor care during pregnancy and child birth. These factors contribute to high neonatal morbidity and mortality.

The aim of this follow up study was to calculate mean, standard deviation and centile values for anthropometry and haemoglobin of the term newborns at birth, 6 weeks, 6 months, 9 months and 12 months of age.

Methods

Location

This study was conducted at Kathmandu Medical College Teaching Hospital, in Kathmandu, Nepal. Subjects were enrolled during the period from May 2003 to December 2003 and followed up to December 2004.

Selection of subjects

This was a cohort study in which consecutive healthy term newborns were enrolled. The newborn infants were followed up in the well baby clinic on Tuesdays at 6 weeks, 6 months, 9 months and 12 months of age**.**

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Study protocol

A full explanation was given to the mother and her permission was taken for enrolment. The neonatal data regarding, weight, length, head circumference and haemoglobin were recorded in a proforma. Haemoglobin estimation was done by using Hemocue microcuvette method (HemoCue AB, Angelholm, Sweden). Naked baby's weight was taken using an electronic weighing machine (Seca Model 835, Japan) with sensitivity of 10 g. Infant length was measured with the help of an assistant with a Kiddimetre (Child Growth Foundation, UK) which can read up to 1 mm. Head circumference was measured with a non stretchable measuring tape which can read up to 1 mm.

The infants were followed up at 6 weeks, 6 months, 9 months and 12 months of age and all measurements were repeated at each visit with the same instruments and by the same person (K.M.). Data so obtained was analyzed by using SPSS (version 11) computer package to obtain mean, median, mode, SD, range and percentile values.

Statistical analysis

The data was coded and edited for missing values. The data entered into SPSS computer package (version 11) and mean, median, mode, SD, range and percentiles values were calculated.

Results

Table I: Distribution of infant continuous variables in study sample

	Birth	**6 weeks**	**6 m**	**9 m**	**12 m**
Mean weight kg (sd.)	3.05 (0.41)	4.72 (0.86)	7.28 (0.79)	8.32 (0.86)	9.0 (0.81)
Mean length cm (sd.)	49.(2.28)	56.6 (4.05)	65.3 (6.9)	69.2 (8.6)	73.5 (2.9)
Mean head circumference cm (sd.)	33.8 (1.4)	38.1 (2.8)	43.2 (5.7)	44.2 (4)	45 (1.2)
Mean Hb gm/dl (sd.)	15.7 (2.29)	10.9 (1.78)	11.3 (1.52)	10.9 (1.1)	11.1 (1.41)

The mean and standard deviation values for infant anthropometry (weight, length, head circumference) and haemoglobin at birth, 6 weeks, 6 months, 9 months and 12 months of age are presented in Table I. The mean birth weight was 3.05 kg (s.d 0.41). The mean infant length and head circumference at birth were 49 cm (2.28) and 33.8 cm (s.d.1.4) respectively. The mean haemoglobin at birth was 15.7 gm/dl (s.d. 2.29). At 12 months of age mean weight, length, head circumference and haemoglobin were 9 kg (s.d 0.81), 73.5 cm (s.d. 2.9), 45 cm (s.d. 1.2) and 11.1 gm/dl (s.d. 1.41) respectively. Almost 50% of the babies at 6 weeks, 9 months and 12 months of age were found to be anaemic (Hb <11 gm/dl). Haemoglobin value ranged from 7.7 gm/dl to 14.8 gm/dl from 6 weeks to 12 months of age.

Table II: Centile values for anthropometry and haemoglobin at birth, 6 weeks, 6 months, 9 months and 12 months of age

	At birth			**6 weeks**			**6 month**			**9 month**			**12 month**		
Centile	**10**	**50**	**90**	**10**	**50**	**90**	**10**	**50**	**90**	**10**	**50**	**90**	**10**	**50**	**90**
Weight Kg	2.5	3.05	3.5	3.7	4.7	6	6.22	7.2	8.3	7.1	8.2	9.4	7.8	9.1	10
Length cm	46	49	52	52.5	56.5	62.5	61	66.5	69.7	66.9	71	73.5	69.7	73	77.1
OFC cm	32	34	36	36	38	40	40	42.2	43.7	42.5	44	45	43	44.8	46.3
Hb gm/dl	13	15.6	18.7	8.6	10.7	13.5	9.36	11.5	13	9.4	10.9	12.5	9.46	11.2	12.8

(ofc= head circumference)

Fig. I:Centile curve for weight

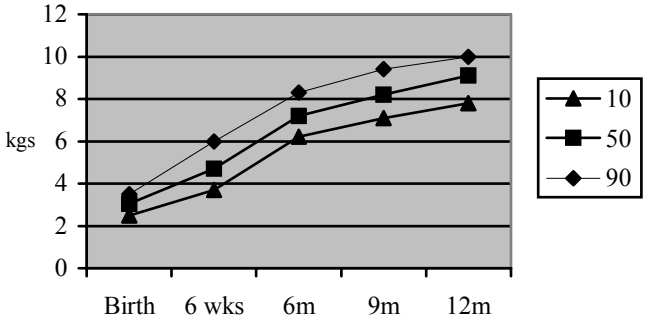


Fig. II: Centile curve for length

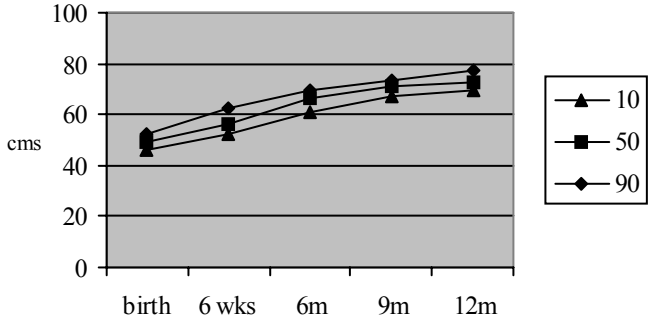
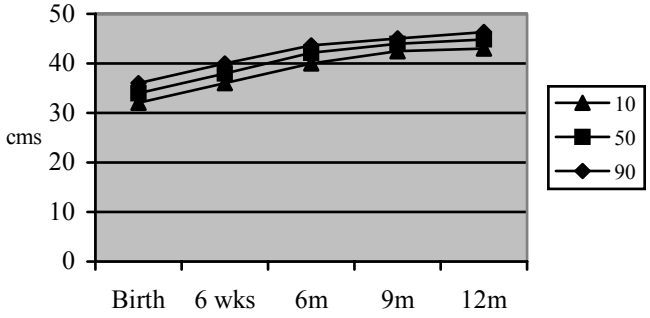


Fig. III: Centile curve for head circumference



Centile values (10^{th}, 50^{th} and 90^{th}) for important anthropometric measurements (weight, length, head circumference) and haemoglobin at birth, 6 weeks, 6 months, 9 months and 12 months of age are shown in Table II.

Table III: Distribution of the babies according to the type of feeding

Type of feeding	**No.**	**%**
Exclusive breast feeding	40	49%
Mother's breast feeding + water	20	25%
Mother's breast feeding + formula feed	13	16%
Formula feed	4	5%
Missing	4	5%

Table III. shows types of feeding practices done by the mothers in the study sample. 49% of the babies were exclusively breast fed for 6 months. Other feeding practices seen were, mother's breast feed with water supplementation (25%), mother's breast feeding and formula feed (16%) and formula feeding only (5%).

Table IV: Comparisons of anthropometric and haemoglobin data for Nepal, India and Canada

	Nepal (present study)				India[3]		Canada[4]			
	mean wt. kg	**mean lt. cm**	**mean HC cm**	**mean Hb gm/dl**	Mean wt. kg	mean lt. cm	mean wt. kg	mean lt. cm	mean HC cm	mean Hb gm/dl
birth	**3.05**	**49**	**33.8**	**15.7**	3.14	50.3	3.7	50	35	n.a
6 wks	**4.75**	**56.6**	**38.1**	**11**	n.a	n.a	n.a	n.a	n.a	n.a
6 m	**7.31**	**65.3**	**43.2**	**11**	7.35	65.86	8.1	68.2	44	11.6
9 m	**8.41**	**69.2**	**44.2**	**10.9**	8.49	70.6		n.a.	n.a.	n.a.
1yr	**9.19**	**73.5**	**45**	**10.9**	9.32	74.32	10.8	77	47.2	12

Nepali newborns are smaller than Indian[3] and Canadian[4] newborns in all measurements as shown in Table IV. The mean birth weight of Canadian babies is 3.7 kg, which is 650 gm higher than newborns of the present study. At 1 year of age mean weight of Canadian newborns was 10.8 kgs which is 161 gm higher than the Nepali newborns of the present study. Similarly, length and head circumference of Canadian babies at 1 year of age were higher than Nepali babies by 3.5 cm and 2.2 cm respectively. The Indian newborns anthropometry lies between Canadian and Nepali newborns.

Discussion

This cohort study, we believe, is the first study of the newborn infants followed up to 1 year of age, in Nepal. This study has provided the mean, centile and standard deviation values for anthropometry and haemoglobin of the newborns and infants at the age of 6 weeks, 6 months, 9 months and 1 year. This study comprised largely urban Kathmandu valley residents with higher socioeconomic status. 93% of the mothers were educated, with 100% ANC visits. These maternal factors have shown great impact on anthropometric parameters of their newborns. The mean birth weight in this study was 3.05 kg, which is 270 gm higher than the mean birth weight found in the previous study done at Prasuti Griha[2], Kathmandu, 7 years back. Though both studies were done in Kathmandu, newborns in the present study have significantly higher anthropometric values compared with the previous study. The probable reason for the difference was the low educational and socioeconomic status of the mothers of the previous study as, many of the mothers were garment factory workers. Mothers attending at Prasuti Griha are mainly from lower socioeconomic group compared to those attending KMCTH. Antenatal check up in the previous study was only 47% compared to 100% in this study.

Nepali newborns are smaller than Indian[3] and Canadian[4] newborns in all measurements as shown in Table IV. The mean birth weight of Canadian babies is 3.7 kg, which is 650 gm higher than newborns of the present study. At 1 year of age mean weight of Canadian newborns was 10.8 kgs which is 161 gm higher than the Nepali newborns of the present study. Similarly, length and head circumference of Canadian babies at 1 year of age were higher than Nepali babies by 3.5 cm and 2.2 cm respectively. The Indian newborns anthropometry lies between Canadian and Nepali newborns.

Similarly, the mean birth weight of the babies in the present study is found to be 295 gm lower than the British newborns[5] reported in British Growth Study. However, the mean birth weight of the babies in the present study is 161gm higher than Bengali babies born at public maternity hospital.[6]

Lower birth weight in this study indicates the poor socioeconomic status of the mothers compared to well nourished mothers of the Canadian and Indian study group, although the educational and socioeconomic status of the mothers of this study group seems better than the educational and socioeconomic status of the mothers of the previous Nepal study done 7 years ago.

Conclusion

This is a study of the term newborns born at Kathmandu Medical College Teaching Hospital, followed up to one year of age. The mean, standard deviation, 10th and 90th centile values of the infant weight, length, head circumference and haemoglobin at birth, 6 weeks, 6 months, 9months and 12 months are presented. The anthropometric values in this study are higher than the values reported by the earlier study done in Kathmandu.

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References

1. UNICEF/ MIRA. Low Birth Weight Prevalence and Associated Factors in Four Regions of Nepal. June 2000
2. Manandhar D S, Rajbhandari S, Pal D and Costello AM. Anthopometry of the term newborn and postnatal mother in Nepal. J Nep Med Assoc 1997; (35)150-157
3. O P Ghai, Piyush Gupta, V K Paul. Ghai Essential Paediatrics. Fifth Edition
4. Friel JK, Aziz K, Andrews WL, Harding SV, Courage ML, Adams R. A double-masked, randomized control trial of iron supplementation in early infancy in healthy term breast-fed infants. Journal of Pediatics2003;143:582-586
5. Cole, T.J., Freeman, J.V., and Preece, M. A. (1995). Body Mass Index reference curves for the UK, (1990). Archives of Disease in Childhood, 73, 25-29. reporting from the British Growth Study.
6. Dhar B, Mowlah G, Kabir DM. Newborn anthropometry and its relationship with maternal factors. Bangladesh Med Res Counc Bull. 2003 Aug; 29 (2): 48-58

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