DETERMINATION OF BIRTH INDICES IN HEALTHY NEONATES

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Abstract- Determination of birth indices is essential for primary supportive care, evaluation of perinatal anomalies, determination amount of difference from standard values and for further follow up. In this study using a multicentre sampling, a number of 2832 healthy neonates selected. Mean and percentile values of four main birth indices; weight, height, head and chest circumference are presented. In this study, males outnumbered the females (50.8% vs. 49.2%). Mean (± SD) weight, height, head and chest circumferences were 3231.70 gr (±3.92), 49.77 cm (±1.76), 35.03 cm (± 1.27) and 33.34 cm (±1.56), respectively. Weight, height and head circumference had significant statistical differences in male and female. Chest circumference had difference in gender groups, but it seemed to be clinically not significant (mean difference= 0.416). Birth weight in both genders plus height and chest circumference in girls were significantly lower than NCHS standard values. But, head circumference was more. Height and chest circumference of males had no statistically difference.

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Keywords: Birth indices, weight, height, head circumference, chest circumference

INTRODUCTION

Determination of birth indices (weight, height, head and chest circumference) is essential in neonatal assessment in order to avoid unnecessary diagnostic and therapeutic interventions (1).

It is necessary in each populations from different locations for planning their subsequent children growth charts. Nowadays, it has been proved that birth parameters can predict specific diseases in adulthood (2).

In this study, we determine birth indices of about 3000 healthy neonates born in Tehran and compare them to published references.

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MATERIALS AND METHODS

This is a descriptive cross -sectional study in healthy term neonates born in governmental hospitals in Tehran during 2001-3. Data collected by using standard measuring tools and trained persons in this field. Inclusion criteria were: gestational age of 37-42 weeks, being appropriate for gestational age, appropriate prenatal care, suitable socio-economical status and pregnancy between 20-35 years. Exclusion criteria were cigarette smoking, premature rupture of membranes, malnutrition, drug abuse, trauma, preeclampsia or eclampsia, neonatal and chromosomal anomaly, maternal (chronic hypertension, diabetes, heart failure and autoimmune problem) and placental (placenta abruptio and previa) disease or infection. Data were analyzed by using "SPSS for windows 11.5" soft ware. Frequency, percent, central tendency indicators (mean, median and mode), distribution indices (standard deviation, variance, range and standard error) were analyzed. Statistical significant level was $\leq$ %0.05.

Table 1. Comparison of birth indices of current study with NCHS results

Birth indices	Gender	Mean NCHS	Mean current study	Sig
Weight	Female	3239	3176.1	0.000
	Male	3309	3285.4	0.025
Height	Female	49.62	49.51	0.019
	Male	50	50.27	0.572
Head	Female	34.17	34.78	0.000
circumference	Male	34.54	35.28	0.000
Chest	Female	33.32	33.13	0.000
circumference	Male	33.6	33.55	0.220

Sig, significance.

RESULTS

A total number of 2832 cases were analyzed. Males outnumbered the females by 1439 (50.8%) vs. 1393 (49.2%), respectively. Mean weight (± SD) of neonates was 3231.70 gr (3.92). Minimum (min) weight was 2500 and maximum (max) 4500 gr.

Mean height (± SD) of neonates was 49.77cm (± 1.76), min 35 cm and max 56. Mean head circumference (± SD) of neonates was 35.03 cm (± 1.27), min 31 and max 40 cm. Mean chest circumference (± SD) was 33.34 cm (± 1.56), min 35 cm and max 39. Distribution of all indices did not followed normal distribution. Weight, height and head circumference had significant statistical differences in male and female. Chest circumference had difference in gender groups, but it seemed to be clinically not significant (mean difference = 0.416). All of birth parameters had significant correlation, the strongest was between weight and chest circumference (Pearson correlation = 0.726).

Mean values of birth indices in current study compared with NCHS results (table1).Weight in both genders plus height and chest circumference in girls were significantly lower than NCHS standard values. Height and chest circumference of males had no statistically difference and head circumference was more than NCHS values. Percentiles of NCHS study compared with current study (Table 2).

Table 2. Comparison of current study percentiles with NCHS

Percentile	Weight NCHS	Weight current study	Height NCHS	Height Current study	HC NCHS	CC Current study
5 percentile						
M	2540	2600	46.4	47	32.6.6	33
F	2360	2600	54.4	47	32.1	33
10 percentile						
M	2780	2750	47.5	48	33	34
F	2580	2750	46.5	48	32.9	33
25 percentile						
M	3000	3000	49	49	33.9	35
F	2930	2900	48.2	49	33.5	34
50 percentile						
M	3270	3250	50.5	50	34.8	35
F	3230	3150	49.9	50	34.3	35
75 percentile						
M	3640	3500	51.8	51	35.6	36
F	3520	3450	51	50	34.8	36
90 percentile						
M	3820	3750	53	52	36.6	37
F	3640	3650	52	52	35.5	36
95 percentile						
M	4150	4000	54.4	53	37.2	37
F	3810	3850	52.9	52	35.9	37

Abbreviations: HC, head circumference, CC, chest circumference

DISCUSSION

Interpretation of growth parameters requires plotting the measurements on percentile charts constructed from a similar race and environmental population. In 1877, Bowdeach design first growth charts for school children in United States (1). In 1960s, growth monitoring increasingly became popular in clinics around the world (3, 4).

Many studies performed on growth curves, the most complete and accurate one widely used in the world was the national centre for health statistics (NCHS) report (1, 5). It constructed by combining data sets compiled in different time periods.

When the 1977 NCHS growth charts were first developed, NCHS recommended that they should be revised periodically as necessary. The 2000 CDC growth charts represent the revised version of the 1977 NCHS growth charts. Most of the data used to construct these charts come from the National Health and nutrition examination Survey (NHANES), which has periodically collected height and weight and other information on the American population since the early 1960s (6).

There are multiple factors affecting birth indices such as race, mother's weight, age and nutrition, number of previous pregnancies, socioeconomical condition of the family, child anomaly and placental disease (7, 8).

Regarding previous studies, it seems that birth indices is lower than reference values in Asian and African and upper in European and American populations.

In a study in 2005, Saudi newborns were lighter and shorter than those of NCHS (9). Feleke *et al.* reported a mean birth weight of 3065 g in Ethiopia (10). Dhar in a study in Bengal reported medium birth weight of their children less than NCHS values (11). In another study in Africa, by Kalanda, lesser weight, length and head circumference was reported at all gestations for Malavian compared with Swedish newborns (12). Weller in 1993 reported mean birth indices upper than NCHS and they suggested the use of this standard curves for their newborns in that part of Germany (13).

In a research by Britton in 1992 in America, mean values were upper than references and they suggested data of growth curves should be updated to prevent misclassification of infants (14). In Canada, Blinder reported 50 percentile weight of 3530 g for male and females (15).

Gatrad in a study reported lower weight in Asian children than European population (16). In the present study, also, mean weight of newborns were less than NCHS values. But, head circumference were more.

According to the influence of race, socioeconomical condition, maternal and cultural environment on birth indices, a national study on growth charts is recommended in each country to detect their own reference values, which should be periodically updated.

Conflict of interests

The authors declare that they have no competing interests.

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