

COMPARISON OF GROWTH OF BLACK AND WHITE INFANTS DURING THEIR FIRST TWO YEARS OF LIFE

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Growth data were analyzed on 406 infants (211 black, 195 white) during their first two years of life. Only term children weighing more than 2500 g were included in the study. Prenatal and postnatal care were provided at the same university affiliated health maintenance organization. Mean birth weight of black female newborns was 150 g less than white female newborns with a statistical significance of $P = .028$. Mean birth weight of black male newborns was 40 g less than white male newborns. The difference was not statistically significant. Black male infants were significantly heavier at 12, 18, and 24 months and significantly taller at 24 months than their white counterparts.

Significant differences in velocity of growth were seen between black and white female infants regardless of type of feeding. Black female infants gained more weight between 6 and 12 months and increased their length more rapidly between 18 and 24 months than their white cohorts. These data suggest that black infants demonstrate a somewhat different growth pattern than white infants.

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Physical growth in terms of height and weight is used as an important index of health in infants. Standards currently in use are based on data collected several years ago from a small homogeneous white population.¹ Data on growth of black infants from a mixed socioeconomic background are not readily available.

Wingerd et al² published comparisons on the growth rate of white and black infants (aged 1 month to 2 years) who attended a prepaid health care program. There are several problems with the methods of data collection in this study that make interpretation difficult. First, infant length was measured using a yardstick. Second, children who could stand were measured with a stadiometer. No information was given regarding the age at which the change in the method of measurement took place. Finally, not all of the children were in the program for the full two years. The authors concluded that separate growth curves were not necessary for black infants.

Other data suggest that black infants and children grow more rapidly than white infants. Garn et al,³ using data from eight states, concluded that black children tended to have greater stature during the first 12 years than white children, particularly when matched for per capita income. Owen and Lubin,⁴ using data collected on a 1- to 6-year-old population in 36 states, concluded that sometime within the first two years of life black children became bigger than white children. Reviewing available data from several surveys, Garn and Clark⁵ concluded that blacks are smaller

TABLE 1. NUMBER AND PERCENTAGE OF INFANTS WHO WERE FORMULA FED OR BREAST FED

	Female				Male			
	Formula No.	%	Breast No.	%	Formula No.	%	Breast No.	%
Black	75	71	30	29	87	80	22	20
White	45	46	53	54	43	44	54	56
Total	120	59	83	41	130	63	76	37

at birth, but of greater stature from the second to the 14th year.

Contemporary data are lacking on the growth rate of black infants from birth to age 2 years; these are needed to determine when the trend first appears and whether there is a need in this population for separate growth curves. This study was undertaken to determine whether there were significant differences in the growth rate of black and white infants from birth to age 2 years as measured by changes in weight and length. Several indices based on these measurements were calculated.

METHODS

The growth rate of 211 black and 195 white infants was monitored from birth to age 2 years. The distribution of infants by sex, type, and duration of feeding is shown on Table 1. Data were collected from patient records if the infant was followed in the medical-school-affiliated health maintenance organization (HMO), was born to a mother who received her prenatal care at the same HMO, weighed 2,500 g or more at birth, was 38 to 42 weeks' gestation, and was seen for the entire two-year period. Data were collected on length, weight, type of feeding, sex, race, maternal age, and time of weaning for those infants who were breast-fed. Infants who were breast-fed less than two months were considered formula-fed. Breast feeding was defined as obtaining at least 95 percent of the caloric intake from human milk. The percentage of breast-fed infants is shown on Table 1. Growth data were only collected when the infant was seen for well-child visits.

Weight and length were measured by trained personnel using standard techniques for these

procedures. Four body mass indices were calculated from the weight-to-length data: the weight-to-length ratio (W/L), body mass index (BMI), ponderal index (PI), and weight-to-length index (WLI). All indices were calculated in kilograms and centimeters. Body mass index was calculated as weight divided by the square of the length; ponderal index, as weight divided by the cube of the length; and WLI was calculated by the child's weight-to-length ratio divided by the weight-to-length ratio of a child at the 50th percentile of the same age. Incremental (velocity of) growth was determined by calculating the amount of change in either weight or length per unit of time.

The role of sex, race, and sex-race interaction in weight and length was determined by ANOVA. In a second analysis, birth weight was covaried out using the SPSSX Manova procedure for an unbalanced design. Student's *t* test was used to compare specific time points by race and sex.

RESULTS

Mean birth weight of black female newborns was approximately 150 g lighter than white female newborns (Table 2). Mean birth weight of black male newborns was only 40 g lighter than white male newborns (Table 3). The difference was significant only for female newborns ($P = .028$). By ANOVA, race ($P = .044$) and sex ($P = .001$) were significant factors in birth weight. Because type of feeding was not significant, comparisons were made using the whole population.⁶

Mean weight, standard deviation, and median values for other ages are given in Table 2 for female infants. Black female infants were heavier at 24 months of age ($P = 0.048$) than their white

TABLE 2. WEIGHT AND LENGTH OF FEMALE INFANTS BY RACE

Age	Black Infants			White Infants		
	Mean	SD*	Median	Mean	SD*	Median
Weight**						
Birth	3.28	0.47	3.26	3.43	0.47	3.39
1 mo	4.19	0.48	4.22	4.29	0.59	4.32
3 mo	5.78	0.64	5.74	5.88	0.65	5.92
6 mo	7.33	0.76	7.27	7.46	0.71	7.49
9 mo	8.53	0.84	8.44	8.51	0.80	8.51
12 mo	9.55	0.99	9.39	9.36	0.89	9.26
18 mo	11.11	1.68	11.17	10.88	1.56	10.75
24 mo	12.65	2.03	12.67	12.14	1.56	12.02
Length**						
Birth	50.8	2.3	50.8	51.1	2.0	51.6
1 mo	53.6	2.0	53.6	53.8	2.3	54.1
3 mo	59.9	2.0	60.2	59.9	2.3	59.7
6 mo	66.3	2.5	66.5	66.0	2.5	66.0
9 mo	70.9	2.5	71.1	70.1	2.3	69.9
12 mo	74.4	2.3	74.4	73.1	2.3	73.1
18 mo	79.0	8.4	79.5	79.0	2.8	79.2
24 mo	84.6	9.1	85.6	84.1	3.8	84.1

*SD, standard deviation

**Weight is given in kilograms; length is given in centimeters

TABLE 3. WEIGHT AND LENGTH OF MALE INFANTS BY RACE

Age	Black Infants			White Infants		
	Mean	SD*	Median	Mean	SD*	Median
Weight**						
Birth	3.50	0.44	3.46	3.54	0.50	3.49
1 mo	4.51	0.47	4.49	4.48	0.62	4.50
3 mo	6.36	0.72	6.36	6.31	0.70	6.35
6 mo	8.10	0.85	8.02	7.95	0.87	7.94
9 mo	9.28	1.01	9.20	9.03	0.96	9.03
12 mo	10.26	1.11	10.30	9.92	1.06	9.86
18 mo	11.95	1.39	11.90	11.48	1.25	11.28
24 mo	13.34	1.60	13.38	12.80	1.50	12.68
Length**						
Birth	52.1	2.3	52.1	52.1	2.3	52.6
1 mo	54.6	2.5	54.6	55.1	2.5	55.1
3 mo	61.7	2.5	61.7	61.5	2.5	61.7
6 mo	68.6	2.5	68.6	67.8	2.5	68.1
9 mo	72.6	2.3	72.6	71.9	2.5	71.9
12 mo	75.7	2.3	75.7	75.2	2.5	74.9
18 mo	81.5	3.6	81.3	80.8	3.0	80.8
24 mo	86.9	4.3	86.9	85.6	3.6	85.3

*SD, standard deviation

**Weight is given in kilograms; length is given in centimeters

counterparts. They were also significantly taller at 9 and 12 months of age ($P = .002$ and $P = .0001$, respectively). There were no significant differences by race in any of the calculated indices.

Data on mean weight, standard deviation, and median are given in Table 3 for male infants. Black male infants are significantly heavier at 12, 18, and 24 months of age than white male infants (P values, .026, .014, and .016, respectively). For length, black male infants were significantly taller only at 24 months of age ($P = .012$). Once again, there were no statistically significant differences by race in any of the indices.

For incremental or velocity growth, there were significant differences between black and white female infants for the period from 18 to 24 months for weight and for the 6 to 12 and 18 to 24 month periods for length. When all female infants were compared (regardless of type of feeding), incremental weight gain was significantly different for the 6 to 12 and 18 to 24 month periods ($P = .015$), with black female infants growing at a faster rate. In length, black female infants grew faster than white female infants.

For formula-fed male infants, there were significant differences in incremental weight for the period from 12 to 18 months and length for the periods of 2 to 6 months and 18 to 24 months, with black infants always growing at the faster rate. When all male infants were considered, the differences in weight gain were no longer significant, but the difference in rate of length gain remained highly significant.

When data were corrected for differences in birth weight, race was highly significant for weight from nine to 24 months (P values ranged from .013 to .0001). For length, race was highly significant from 3 to 12 months of age (P values ranged from .014 to .0001) and somewhat significant at 24 months ($P = .041$).

DISCUSSION

The study data have demonstrated that black infants do not necessarily weigh less than white

infants at birth. Patterns of growth of black infants are different and should be recognized. Race was found to be directly significant for birth weight doubling time, and became directly significant for both doubling time and tripling time when adjusted for sex and type of feeding.⁷ As noted in other published studies, fewer black infants than white infants were breast-fed. However, a larger percentage of black infants were breast-fed in the study population than in other published data.

Published data have shown that there are differences in the growth of older children when compared by race. The study data reported here show that the difference appears for length in black male infants at age 24 months. For female infants, the differences observed at 9 and 12 months did not continue.

Maternal age correlated with weight for most time points presented here, ie, birth 1, 3, 6, 9, and 24 months of age. Maternal age was not correlated significantly to weight for white female infants regardless of feeding and for male infants of both races for most feeding patterns.

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