

# WEIGHT, LENGTH, HEAD, AND FACE MEASUREMENTS IN TURKISH NEWBORNS OF CENTRAL ANATOLIA

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## SUMMARY :

**Purpose :** Mean and standard deviations for weight, length, head circumference, head length and width, face height and width were calculated by measuring 402 normal singleton newborns delivered in Ankara. **Methods:** All babies were weighed naked with an electronic scale to the nearest 10 grams. Newborn crown-heel length was recorded to the nearest 0.1 cm on an infantometer with fixed head and mobile foot parts keeping the baby in supine position with the knees fully extended. Head length, head and face width were measured by a cephalometer, while the face height was measured by a sliding compass. **Results:** The mean values for males were as follows, birth weight  $3284 \pm 457$  g, crown-heel length  $50.6 \pm 2$  cm, head circumference  $35.3 \pm 1.3$  cm, head length  $118.2 \pm 4.6$  mm, head width  $95.2 \pm 3.9$  mm, face height  $53.5 \pm 3.1$  mm, face width  $80.0 \pm 4.1$  mm. The mean values for females were, birth weight  $3117 \pm 456$  g, crown-heel length  $49.5 \pm 2$  cm, head circumference  $34.7 \pm 1.4$  cm, head length  $115.9 \pm 4.5$  mm, head width  $94.0 \pm 4.1$  mm, face height  $52.4 \pm 3.1$  mm, face width  $79.0 \pm 4.1$  mm. **Conclusion:** All anthropometric variables were shown to be highly correlated with one another. The male newborns were larger than their female counterparts for all measured variables.

**Key Words:** Infant; Newborn, Anthropometry, Birth Weight, Body Height, Cephalometry.

## INTRODUCTION

Anthropometric parameters serve as useful adjuncts to other observations in evaluating intrauterine growth and development and in detecting neonatal problems (1, 2). The position of the newborn on growth charts may indicate that he is within the usual limits of growth, he may be near to or outside of the extremes of normal growth, or there may be discrepancies between the percentile positions of weight, length, and head circumference (2). Determination of anthropometric measurements, especially of birth weight of newborn in first few days after birth is

important for the assessment of neonatal nutritional status, gestational maturity, and prediction of early neonatal death (3, 4). Background newborn anthropometric data against which deviations from normal could be assessed are generally lacking in developing countries. So, the physical measurements of newborn are compared with the standards of other countries (1). But these standards have some limitations related to differences in nutritional and environmental factors (5).

In several studies, researchers have been used anthropometric measurements, such as weight and length in order to evaluate growth of infants; some

have also been used head, chest, and arm circumferences (3, 4, 6-9). The present study aimed to determine whether or not head length and width, face height and width can be used in the assessment of the newborn in addition to crown-heel length, weight, and head circumference. Relationships between different parameters and sexual differences were searched and compared with previous findings. This study was also planned to contribute to the collection of newborn standards of Turkish population by determining newborn parameters in Central Anatolia.

**MATERIALS AND METHODS**

The study was conducted from May 1995 to May 1996 at Ankara Zübeyde Hanım Obstetric Hospital on 402 newborns delivered at term. Multiple births, cesarean sections, infants with major congenital anomalies, or unstable vital signs were excluded as were those whose mothers with hypertension and diabetes. Mothers were selected from those who did not use alcohol, tobacco and drugs except safe antibiotics, vitamin and iron preparations during pregnancy.

Parameters were measured by two investigators within the first 24-72 hours following delivery. Informed consent was obtained from the mothers of all newborns. Procedural errors in this study are negligible since the measurements were taken by the same individuals and were repeated if needed. During measurements, reference points identified in surface anatomy were used (10, 11).

All babies were weighed naked with an electronic scale to the nearest 10 g. Newborn crown-heel length was recorded to the nearest 0.1 cm on an infantometer with fixed head and mobile foot parts keeping the baby in supine position with the knees fully extended. A non-stretchable plastic measuring tape was used to measure head circumference around the maximum occipito-frontal circumference. Since head circumferences were taken at least 24 h after delivery, we avoided edema and head molding commonly observed on first day of life.

Head length, head and face width were measured by a cephalometer while the face height was measured by a sliding compass (Fig. 1-2).

The means and standard deviations were calculated for each of the measurements. Data

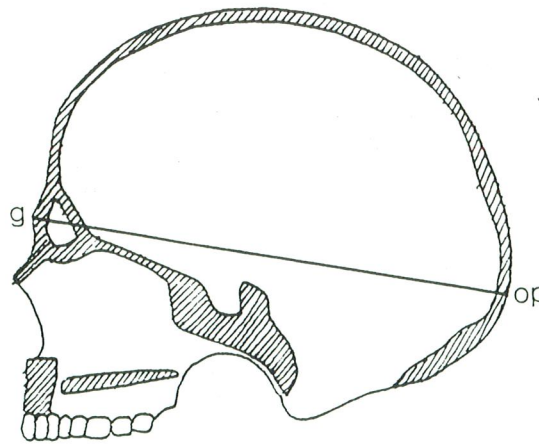


Fig - 1 : Head length (g-op). g : glabella. op : opisthocranium.

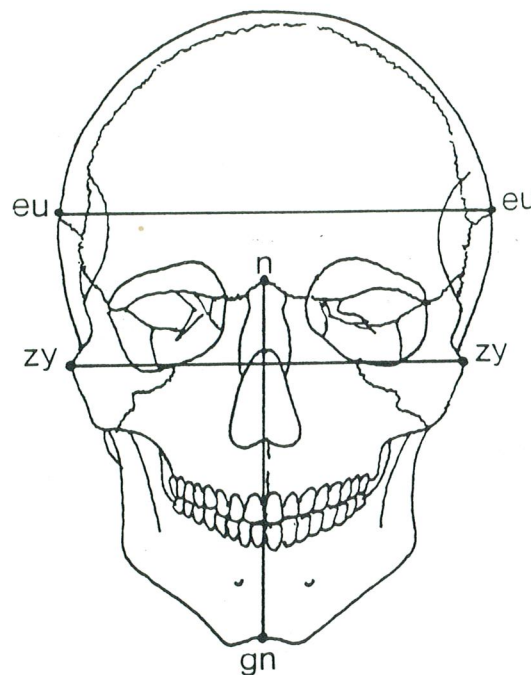


Fig - 2 : Head width (eu-eu), face width (zy-zy), face length (n-gn). eu : euryon, zy : zygion, n : nasion, gn : gnathion.

analysis was made by SPSS PC Plus statistical package.

**RESULTS**

Table 1 gives the means and standard deviations weights, crown-heel lengths and head circumferences of the 402 normal singleton Turkish newborns born at term against sex and for both sexes together. Male newborns were heavier, taller, and had greater head circumferences as compared to females. Males weighed approximately 167 g more than the females at term. They were approximately 1.1 cm taller and their mean head circumference was 0.6 cm more than

		FEMALE	MALE	BOTH SEXES
WEIGHT (g)	n	208	194	402
	X	3116.97	3284.12	3197.64
	SD	456.22	457.50	463.87
LENGTH (cm)	n	207	194	401
	X	49.5	50.6	50.0
	SD	2.0	2.0	2.1
HEAD CIRCUMFERENCE (cm)	n	208	194	402
	X	34.7	35.3	35.0
	SD	1.4	1.3	1.4

All the differences between sexes are statistically significant,  $p < 0.001$ .

Table 1 : Means and standard deviations of newborn weight, length and head circumferences.

that of females. These differences were statistically significant (t-test,  $p < 0.001$ ). Means and standard deviations of head length, head width, face height and face width of male newborns were also greater than that of females. The difference was more significant for head length and face height (Table 2).

3.4 % of female and 2.1% of male newborn head circumferences were smaller than normal ( $< -2$  SD), while head circumferences of 2.4% of female and 3.1% of male newborns were greater than normal ( $> +2$  SD).

The correlation coefficients were calculated between various parameters under study. All parameters were significantly correlated to one another. Table 3 gives the matrix of correlation

coefficients.

### DISCUSSION

It may be anticipated that in a normal newborn, different anthropometric parameters would vary parallel to one another and only interpersonal differences could be seen. Thus, we expect a well-grown newborn to possess higher weight, length, head circumference, head length and width, face height and width. We found significant positive correlations between all of the mentioned parameters at the end of our study. For this reason, in case the newborn baby cannot be weighed, one of these parameters, for example head circumference may serve to assess the condition of the baby.

		FEMALE	MALE	BOTH SEXES
HEAD LENGTH (mm)	n	208	193	401
	X	115.9 *	118.2 *	117.4
	SD	4.5	4.6	4.7
HEAD WIDTH (mm)	n	208	194	401
	X	94.0 **	95.2 **	94.6
	SD	4.1	3.9	4.1
FACE HEIGHT (mm)	n	206	193	399
	X	52.4 *	53.5 *	53.0
	SD	3.1	3.1	3.1
FACE WIDTH (mm)	n	208	194	402
	X	79.0 **	80.0 **	79.5
	SD	4.1	4.1	4.1

\*  $p < 0.001$ , \*\*  $p < 0.05$ , statistically significant sexual differences.

Table 2 : Means and standard deviations of newborn head and face measurements

	FACE HEIGHT	FACE WIDTH	HEAD WIDTH	HEAD LENGTH	HEAD CIRCUM	LENGTH
FACE WIDTH	0.4014					
HEAD WIDTH	0.4516	0.6101				
HEAD LENGTH	0.4485	0.5821	0.6046			
HEAD CIRCUM.	0.4525	0.6449	0.7871	0.8797		
LENGTH	0.4517	0.5732	0.6064	0.6067	0.6884	
WEIGHT	0.4542	0.6909	0.6426	0.6755	0.7647	0.7619

All of the correlation coefficients are statistically significant by Pearson test,  $p < 0.001$ .

Table 3 : Correlation coefficients.

Bhatia and Tyagi have found strong positive correlations between weight, length and head circumference and they stated that length and head circumference measurements can be used in home or rural area deliveries to estimate the weight of the newborn (the correlation between head circumference and weight: 0.766; the correlation between head circumference and length: 0.840)(6). Landicho et al also reported positive correlation between weight, length and head circumference (the correlation between length and weight: 0.722; the correlation between head circumference and weight: 0.738; the correlation between head circumference and length: 0.579) (8).

Taha, in his study on 1000 newborns in Sudan, reported weight, length and head circumferences (mean weight:  $2909.8 \pm 743$ , mean length:  $45.3 \pm 5.1$ , mean head circumference:  $33.3 \pm 3.2$ ) (5). These values are quite smaller than ours. The difference may arise from nutritional, environmental, or ethnical factors. The mean weight, length, and head circumference found as a result of a study in Zambia are 100 g, 1.4 cm and 0.45 cm smaller than our mean values for weight, length, and head circumference respectively (1).

A study from Pakistan reported mean values very close to our values for newborn weight, length and, head circumferences. The researchers found that male-female differences in weight and length were not significant statistically, and male and female neonates did not differ significantly in terms of head circumference (for males mean weight:  $3200 \pm 43$ , mean length:  $50.2 \pm 0.4$ , mean head circumference:  $35.5 \pm 0.3$ ; for females mean weight:  $3184 \pm 52$ , mean length:  $49.9 \pm 0.3$ , mean head circumference:  $35.2 \pm 0.2$ ) (9). But in a study in Arizona, Britton et al. demonstrated that male

newborns had higher values for weight, length, and head circumferences and values for term males exceeded those for females by 141 g, 0.9 cm and 0.3 cm (7). Their result agree with our findings.

Chetcuti et al. compared Indian newborns born in England with white newborns and reported that whites are heavier, taller and larger headed than all Asian subgroups they studied. Sikh newborns were heavier and taller than Hindu and Moslem newborns and nearer to whites (12). Our values are between English and Sikh groups.

The mean head circumference values we found are higher than the ones recorded by Eregie in Nigeria in the first 24 h (mean head circumference:  $34.2 \pm 2.6$ ) and repeated in third, fifth and seventh postnatal days (3). The head circumference values determined by Ounsted, Moar and Scott in England are very near to our values (for males mean head circumference:  $35.25 \pm 1.30$ , for females mean head circumference:  $34.60 \pm 1.21$ ) (13).

We believe that the newborns in our study constitute a representative sample population. Population in and around Ankara represents, to some extent, the Turkish population. The results of this study indicate that the newborn weight, length and head circumference values we found are equal or very close to those reported from developed countries and higher than those reported from developing countries. The highly significant positive correlations between measured anthropometric parameters have shown us that any of these parameters may help to assess the newborn if standard percentile tables specific to region or country can be constructed.

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