Brief Communication

SUPINE LENGTH, WEIGHT AND HEAD CIRCUMFERENCE OF NEONATES AT BIRTH IN URBAN AREAS OF ARAK AND FACTORS AFFECTING THEM

Keywords: Neonates, supine length, head circumference, weight at birth, NCHS

Supine length, weight and head circumferences of 10241 neonates (5241 boys, 5000 girls, sex ratio 105) born in Arak (central Iran) in 2002 are reported. Mean±SD of boys and girls (p-value for sex difference) supine length (mm), weight (gr) and head circumference (mm) were estimated as 501±30 and 497±31 (p<0.001); 3194±586 and 3100±532 (p<0.001); 351±18 and 345±18 (p<0.001), respectively. Supine length and weight of our subjects were significantly lower than that of their American counterparts (p<0.01), but our boys head circumferences were significantly higher than the NCHS reference data (p<0.01), while no significant differences was seen among girls.

Anthropometric measurements at birth are significant indicators for predicting neonatal health. Several studies have shown that different anthropometric measurements at birth can be used as valid indicators of low birth weight.1-3 Two limited studies were carried out on birth weight in Iran over 30 years ago4,5 and several others recently.6-10 The only population based study on healthy neonates was carried out in 1996,11 which include supine length, weight, arm, chest and head circumferences at birth and provide reference data for sizes at birth in southern Iran.

At present, no data are available on sizes at birth in urban Arak areas (Iran). The present study reports supine length, weight and head circumferences of all neonates born in 2002 in Arak, the main city in the central province of Iran. The paper further compares the data with that of NCHS12 and south Iranian reference data.11

The data relate to a cross-sectional study of all the 10241 live neonates (5241 boys, 5000 girls, sex ratio 1.05) born in 2002 in Arak. Arak is an industrial city with a population of nearly 700,000 of whom a large proportion immigrated from western provinces of Iran. The city is located 270 km south west of Tehran, Iran’s capital and is classified as a semi-developed city.

Supine length (SL) and head circumferences (HC) were measured to the nearest 1 mm with non-stretchable plastic coated tapes. Weight (WT) was measured by

<table>
<thead>
<tr>
<th>Variable</th>
<th>Boys</th>
<th></th>
<th></th>
<th></th>
<th>Girls</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>95% CI</td>
<td>p</td>
<td>Mean</td>
<td>SD</td>
<td>95% CI</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Weight (gr)</td>
<td>3194</td>
<td>586</td>
<td>3178-3210</td>
<td>&lt;0.001</td>
<td>3100</td>
<td>532</td>
<td>3085-3115</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Supine Length (mm)</td>
<td>501</td>
<td>30</td>
<td>500-502</td>
<td>&lt;0.001</td>
<td>497</td>
<td>30</td>
<td>496-497</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Head Circumference (mm)</td>
<td>351</td>
<td>18</td>
<td>350-351</td>
<td>&lt;0.001</td>
<td>345</td>
<td>18</td>
<td>345-347</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

Supine length, weight and head circumferences of all neonates were significantly lower than that of their American counterparts (p<0.01), but our boys head circumferences were significantly higher than the NCHS reference data (p<0.01), while no significant differences was seen among girls.

Table 1. Anthropometric measurements at birth of Arak neonates.

Correspondence: S.M.T. Ayatollahi, Ph.D, FSS, CStat., Department of Biostatistics and Epidemiology, School of Public Health, Shiraz University of Medical Sciences, Shiraz. E-mail: ayatolahim@sums.ac.ir, Telephone:+98-711-7251001, Fax: +98-711-7260225

*Correspondence: S.M.T. Ayatollahi, Ph.D, FSS, CStat., Department of Biostatistics and Epidemiology, School of Public Health, Shiraz University of Medical Sciences, Shiraz. E-mail: ayatolahim@sums.ac.ir, Telephone:+98-711-7251001, Fax: +98-711-7260225
Length, Weight and Head Circumference in Arak Infants

Table II. Centiles of anthropometric measurements at birth of Arak neonates.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Centiles</th>
<th>5</th>
<th>10</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>85</th>
<th>90</th>
<th>95</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (gr)</td>
<td></td>
<td>2250</td>
<td>2500</td>
<td>2900</td>
<td>3250</td>
<td>3500</td>
<td>3700</td>
<td>3800</td>
<td>4000</td>
</tr>
<tr>
<td>Supine Length (mm)</td>
<td></td>
<td>460</td>
<td>470</td>
<td>490</td>
<td>500</td>
<td>520</td>
<td>530</td>
<td>530</td>
<td>540</td>
</tr>
<tr>
<td>Head Circumference (mm)</td>
<td></td>
<td>320</td>
<td>330</td>
<td>340</td>
<td>350</td>
<td>360</td>
<td>365</td>
<td>370</td>
<td>370</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (gr)</td>
<td></td>
<td>2200</td>
<td>2500</td>
<td>2827</td>
<td>3150</td>
<td>3450</td>
<td>3550</td>
<td>3700</td>
<td>3828</td>
</tr>
<tr>
<td>Supine Length (mm)</td>
<td></td>
<td>450</td>
<td>470</td>
<td>490</td>
<td>500</td>
<td>510</td>
<td>520</td>
<td>530</td>
<td>540</td>
</tr>
<tr>
<td>Head Circumference (mm)</td>
<td></td>
<td>320</td>
<td>330</td>
<td>340</td>
<td>350</td>
<td>355</td>
<td>360</td>
<td>360</td>
<td>370</td>
</tr>
</tbody>
</table>

Table III. Anthropometric measurements at birth of Arak neonates & Shiraz study and NCHS.

<table>
<thead>
<tr>
<th>Study</th>
<th>Variable</th>
<th>Boys</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>95% CI</strong></td>
<td><strong>P</strong>*</td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>95% CI</strong></td>
<td><strong>P</strong></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>95% CI</strong></td>
<td><strong>P</strong></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>95% CI</strong></td>
<td><strong>P</strong></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>95% CI</strong></td>
</tr>
<tr>
<td>Arak</td>
<td>Weight (gr)</td>
<td>3194</td>
<td>586</td>
<td>3178-3210</td>
<td>---</td>
<td>3100</td>
<td>532</td>
<td>3085-3115</td>
<td>---</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supine Length (mm)</td>
<td>501</td>
<td>30</td>
<td>500-502</td>
<td>---</td>
<td>497</td>
<td>30</td>
<td>496-497</td>
<td>---</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Head Circumference (mm)</td>
<td>351</td>
<td>18</td>
<td>350-351</td>
<td>---</td>
<td>345</td>
<td>18</td>
<td>345-347</td>
<td>---</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shiraz</td>
<td>Weight (gr)</td>
<td>3300</td>
<td>500</td>
<td>2300-3000</td>
<td>&lt;0.001</td>
<td>3150</td>
<td>450</td>
<td>2250-4000</td>
<td>&lt;0.001</td>
<td>&lt;0.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supine Length (mm)</td>
<td>494</td>
<td>23</td>
<td>448-540</td>
<td>&lt;0.001</td>
<td>448</td>
<td>21</td>
<td>446-530</td>
<td>&lt;0.001</td>
<td>&lt;0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Head Circumference (mm)</td>
<td>346</td>
<td>15</td>
<td>316-376</td>
<td>&lt;0.001</td>
<td>342</td>
<td>13</td>
<td>316-368</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCHS</td>
<td>Weight (gr)</td>
<td>3309</td>
<td>430</td>
<td>---</td>
<td>&lt;0.001</td>
<td>3239</td>
<td>410</td>
<td>---</td>
<td>&lt;0.001</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supine Length (mm)</td>
<td>500</td>
<td>20</td>
<td>---</td>
<td>0.004</td>
<td>496</td>
<td>18</td>
<td>---</td>
<td>0.202</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Head Circumference (mm)</td>
<td>345</td>
<td>18</td>
<td>---</td>
<td>&lt;0.001</td>
<td>341</td>
<td>19</td>
<td>---</td>
<td>&lt;0.001</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P: p-value for comparing mean of the variables in boys and girls
P*: p-value for comparing mean of boys in Arak & Shiraz and NCHS
P**: p-value for comparing mean of girls in Arak & Shiraz and NCHS

NCHS values References: New pediatric growth charts provide a tool toward future weight problems. URL: http://www.cdc.gov/nchs/releases/00news/grow.htm(last reviewed in March 01,2001).
Table IV. Correlation coefficient between anthropometric measurements at birth of Arak neonates.

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>Supine Length</th>
<th>Head Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td></td>
<td>0.509*</td>
<td>0.552*</td>
</tr>
<tr>
<td>Supine Length</td>
<td>0.518*</td>
<td></td>
<td>0.471*</td>
</tr>
<tr>
<td>Head Circumference</td>
<td>0.536*</td>
<td>0.534*</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.01.

Correlation coefficients were applied to find the correlations of the anthropometric measurements.

Table I presents mean (SD) measures at birth of boys and girls and their 95 percent confidence intervals (95% CI). The significance of anthropometric measurement differences between boys and girls is also reported. Boys’ measures were significantly greater than girls (p<0.001). Centiles of anthropometric measurements at birth of boys and girls are given in Table II. Table III compares our data with that of NCHS12 and reference data for Shiraz.11 The correlation between neonate anthropometric measurements at birth is given in Table IV. Anthropometric measurements were correlated to each other significantly (p<0.001). However, correlation of head circumference with weight was the highest.

Anthropometric measurements at birth of our subjects were significantly lower than that of NCHS for both sexes (p<0.001). Also, anthropometric measurements at birth of our subjects were significantly lower than that of Shiraz for both sexes (p<0.001), the reference data at birth for Shiraz, Iran, the most developed city of southern Iran.11 This trend was observed when we compared our weight data with that of Tabriz,8 a main developed city located in north west Iran. However, birth weight of Islamshahr (a north Tehran developing city) neonates10 were significantly lower than ours (p<0.001), showing that birth weight may be considered as a good indicator of development. By using multivariate analysis the joint vector of height, weight and head circumference in boys was greater than this vector in girls (p<0.001).

Birth weights and head circumference at birth of neonates whose mothers had normal delivery (57%) were significantly higher (p<0.001) than those whose mothers endured caesarian section (43%). However, the difference between their supine lengths was not significant in the two mentioned groups.

**REFERENCES**

Length, Weight and Head Circumference in Arak Infants