BRIEF REPORT

Stretched Penile Length of Healthy Term Neonates: Normative Values Among Igbo Babies in Southeastern Nigeria

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SUMMARY

Aim: To determine the normative values of stretched penile length in apparently healthy term Igbo newborn males in South eastern Nigeria and its relationship with gestational age, birth weight and birth length.

Methods: Eight hundred and eleven apparently healthy term male neonates within the first 72 h of life were studied. Enrolled subjects were consecutively delivered babies of Igbo extraction from three hospitals. The stretched penile length was measured using Schonfeld method, and the smoothed centiles (3rd to 97th percentile values) for stretched penile length by gestational age were determined.

Results: The mean stretched penile length of term newborns was 3.46 ± 0.44 cm. The lower and upper limits (±2.5 SD) were 2.36–4.56 cm. Stretched penile length correlated positively with birth length and birth weight (r = 0.343, p = 0.001; r = 0.229, p = 0.001).

Conclusion: This study has created the first smoothed percentile values for stretched penile length by gestational age for Igbo babies.

KEYWORDS: stretched penile length, smoothed percentile values, gestational age, Igbo.

INTRODUCTION

Evidence-based statements from various studies done among different racial/ethnic groups suggest that penile length varies among different populations [1–11]. The normal value of penile length currently in use was derived from three widely referenced studies [1, 3, 4] done among Caucasians and may not be applicable to all populations.

Size abnormalities of the newborn external genitalia may be a pointer to some endocrine and genetic disorders. Abnormalities of the penis might affect the penile length, resulting in micropenis [12]. Micropenis can be a feature seen in congenital hypopituitarism, Noonan and Robinow syndromes [7–9] and some chromosomal abnormalities such as Prader–Willi [9].
Determination of race-related standard values for penile lengths is essential in penile size assessment for early diagnosis of potential life-threatening disease conditions presenting with micropenis, as well as avoiding its over assessment. There is paucity of information on normal penile length of Nigerian babies and Africa at large, which has created a compelling need to embark on the current study.

**SUBJECTS AND METHODS**

This study was carried out in two tertiary and one secondary hospital located in Enugu metropolis. Enugu is located in southeastern Nigeria with a population of 722,664, largely of members of Igbo ethnic group. The city has a hilly geography in a tropical savannah climate with a mean daily temperature of 26.7°C [12] and was a major coal mining area in Africa.

The University of Nigeria Teaching Hospital (UNTH), Enugu State University Teaching Hospital (ESUTH) and Mother of Christ Specialist Hospital (MCSH) participated because they enjoy very high patronage of patients and combined average annual delivery is 1133.3 babies.

**Ethical considerations**

Ethical approval was obtained from participating hospitals. Informed written consent was obtained from the parent/guardian.

**Study design**

It was a hospital-based, cross-sectional and descriptive study. Subjects were enrolled consecutively within the first 72 h of life and were apparently healthy term male neonates of Igbo extraction with appropriate weight. A term baby is one delivered between 37 completed weeks to 42 weeks of gestation [13]. Excluded from the study were neonates with ambiguous genitalia, endocrine disorder, dysmorphism and less than 2.5 kg or more than 4.0 kg.

**Data collection**

Consenting mothers were interviewed and age, sex and tribe of their babies collected. Antenatal history and condition of each infant were obtained from the mother’s and hospital records. All neonates were examined, and gestational age (GA) was calculated using the last menstrual period and the New Ballard Score [14].

**Measurements**

All measurements were carried out by the researchers. A pilot study was conducted to ensure uniformity and validity of accuracy of measurements, and there were no significant differences in measurements (kappa analysis = 0.95, Cronbach’s alpha = 0.97).

The body length was measured to the nearest 0.1 cm using an infantometer (Seca), model: 210182109. Weight was measured by a digital weighing scale (Seca, Vogel and Halke) to the nearest 10 grams.

The stretched penile length (SPL) was measured using the Schonfeld method [1]. Subjects were placed in supine position, perineum exposed and penile length measured to the nearest 0.1 cm using a disposable ruler. The SPL was determined by measuring the stretched distance from the pubic symphysis to the tip of the glans penis. The straight edge of the ruler was placed against the pubic symphysis from the dorsal side of the penis. The penis was subsequently stretched alongside the ruler to the point of maximum resistance. A mark was made on the ruler at the level of the top of the glans penis excluding the foreskin and the value read off in centimeter.

**Data analysis**

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 17.0. The means and standard deviations of continuous variables were calculated. *P*-value < 0.05 was regarded as statistically significant.

**RESULTS**

A total of 811 neonates were studied; 146 neonates were from UNTH, 284 from MCSH, while 381 were from ESUTH. The characteristics of the subjects are shown in Tables 1 and 2. The mean GA was 39.17 weeks ± 1.24.

The mean SPL of term newborns was 3.46 ± 0.44 cm. The lower and upper limits (±2.5 SD) were 2.36–4.56 cm. The weight (*p* = 0.00),
length \((p = 0.00)\) and SPL \((p = 0.00)\) increase with increasing GA, as shown in fig. 1.

The smoothed percentiles for SPL by GA in Table 3 showed the 50th percentile corresponded to the median value of SPL for each GA. Their corresponding values at 37, 38, 39, 40, 41 and 42 weeks were 3.24, 3.31, 3.38, 3.45, 3.52 and 3.59 cm, respectively.

Linear regression analysis demonstrated a statistically significant correlation between SPL, body length and GA \((p = 0.001, R^2 = 0.117; p = 0.0001, R^2 = 0.054)\).

**DISCUSSION**

The mean SPL of term Igbo babies in this study of 3.46 ± 0.44 cm is similar to SPL of 3.5 ± 0.4 cm reported by Feldman and Smith [3] among the Caucasians, 3.49 ± 0.4 cm reported in Denmark and Finland [15] as well as 3.4 ± 0.49 cm reported by Jarret in western Nigeria [16]. However, it was longer than the SPL from Eastern part of Asia (2.86 ± 0.23 cm) [17] and Taiwan (2.9 ± 0.4 cm) [18]. Also the SPL of Igbo babies was relatively shorter than for India (3.55 ± 0.57 cm) [6] and Middle East (3.75 ± 0.4 cm) [7].

In this study, an SPL < 2.36 (mean−2.5SD) is defined as micropenis. This challenges the usage of a single standard value claiming applicability and universality for all. Some investigators [9, 19] have proposed the definition of micropenis be adjusted to penile length of <−2SD, as using <−2.5SD would make the number of suspected cases to be much lower. Therefore, the definition of inadequate penile length should be adjusted to −2 SD as definition of abnormality, as −2.5 SD will perennially face the criticism of declaring 3% of the population with micropenis.

The correlation of SPL and BL at birth was similar to the findings of other studies [3, 8, 10, 15, 20], but some studies found no such correlations [15, 21].

**CONCLUSIONS**

Disparity in SPL exist among different populations, and this study has created the first set of smoothed percentiles for SPL (cm) by GA (wk)

<table>
<thead>
<tr>
<th>Percentiles penile length</th>
<th>3</th>
<th>5</th>
<th>10</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>90</th>
<th>95</th>
<th>97</th>
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<tr>
<td>37</td>
<td>2.61</td>
<td>2.64</td>
<td>2.73</td>
<td>2.84</td>
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<td>3.62</td>
<td>3.86</td>
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<td>4.13</td>
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<td>38</td>
<td>2.66</td>
<td>2.71</td>
<td>2.80</td>
<td>2.94</td>
<td>3.31</td>
<td>3.68</td>
<td>3.90</td>
<td>4.03</td>
<td>4.19</td>
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<td>39</td>
<td>2.71</td>
<td>2.78</td>
<td>2.86</td>
<td>3.05</td>
<td>3.38</td>
<td>3.75</td>
<td>3.94</td>
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<tr>
<td>40</td>
<td>2.76</td>
<td>2.86</td>
<td>2.93</td>
<td>3.16</td>
<td>3.45</td>
<td>3.81</td>
<td>3.97</td>
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<td>41</td>
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<td>42</td>
<td>2.85</td>
<td>3.00</td>
<td>3.07</td>
<td>3.37</td>
<td>3.59</td>
<td>3.94</td>
<td>4.05</td>
<td>4.14</td>
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<table>
<thead>
<tr>
<th>GA (wk)</th>
<th>Frequency</th>
<th>Mean BW kg (±SD)</th>
<th>Mean BL cm (±SD)</th>
<th>Mean SPL cm (±SD)</th>
</tr>
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<tbody>
<tr>
<td>37</td>
<td>115</td>
<td>3.03 (0.42)</td>
<td>49.49 (1.8)</td>
<td>3.12 (.43)</td>
</tr>
<tr>
<td>38</td>
<td>93</td>
<td>3.3 (0.42)</td>
<td>51.21 (1.9)</td>
<td>3.47 (.43)</td>
</tr>
<tr>
<td>39</td>
<td>190</td>
<td>3.4 (0.44)</td>
<td>51.22 (1.9)</td>
<td>3.49 (.44)</td>
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<tr>
<td>40</td>
<td>212</td>
<td>3.40 (0.38)</td>
<td>51.63 (1.8)</td>
<td>3.50 (.41)</td>
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<tr>
<td>41</td>
<td>121</td>
<td>3.49 (0.41)</td>
<td>51.63 (2.0)</td>
<td>3.54 (.41)</td>
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<tr>
<td>42</td>
<td>80</td>
<td>3.54 (0.30)</td>
<td>51.75 (1.8)</td>
<td>3.58 (.40)</td>
</tr>
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\(p = 0.00\)
percentile values for SPL by GA for Igbo babies; however, more studies are needed from the different populations in Nigeria to increase its reliability as a reference standard for Nigerian babies.

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REFERENCES