

# Measurement of penile size in healthy Nigerian newborns using conventional penile length measurement technique

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**Objectives** We attempted to establish a standard penile length for male newborn Nigerians using the conventional penile length measurement technique.

**Summary** Defining the normal penile size in the neonate is paramount to making accurate diagnosis of abnormalities of the penis and the medical and surgical management of these anomalies.

**Patients and methods** We carried out a prospective cross-sectional study of all term male neonates within 72 h of birth from April 2013 to March 2014 in the three largest obstetric centres (University College Hospital, Adeoyo Maternity Hospital and Our Lady of Apostles Catholic Hospital) in Ibadan, Nigeria. They underwent clinical examination, and their penile sizes were measured using the conventional penile length measurement technique.

**Results** A total of 675 male Nigerian newborns were studied. The mean penile length was  $3.14 \pm 0.65$  cm, and the mean penile width was  $0.97 \pm 0.15$  cm.

**Conclusion** The penile dimensions obtained are comparable with reported values in previous studies in other parts of the world. *Ann Pediatr Surg* 12:155–157 © 2016 Annals of Pediatric Surgery.

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**Keywords:** measurement, neonates, Nigeria, penile size

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## Introduction

Examination of the external genitalia is an integral part of physical examinations of all newborns at birth. A penis of inadequate length or appearance in a newborn or infant can cause parental anxiety and may also be a source of severe psychological disturbance in the child at puberty, affecting body image [1]. Normal penile length (PL) and penile width (PW) are important functionally and for cosmetic reasons [2]. Penile dimension is also important as a rough guide for some corrective surgeries of anomalies of the penis. Measurement of penile dimensions (PL and PW) at birth represents the endocrine environment in utero; therefore, size abnormalities of the penis in neonates might be the first sign of underlying pituitary or hypothalamic hormonal deficiencies or genetic disorders such as congenital hypopituitarism [3,4]. Since a normal reference value for the newborn penis (length:  $3.5 \pm 0.7$  cm and width:  $1.1 \pm 0.2$  cm) was established by Feldman and Smith [5], various studies have developed standards for different ethnic groups [6–8]. These reference values are valuable in the diagnosis and assessment of penile anomalies such as micropenis, macropenis and ambiguous genitalia in the newborn [9]. In determining the reference values, the authors [2,8] have used the Schonfeld's method, which is the standard [conventional penile length measurement (CPLM)], whereas Ozbey, *et al.* [10] developed another method that makes use of the syringe to measure penile size in newborns. Although both methods are reliable and comparable, one can be selected for use instead of the other in any paediatric setting.

This study seeks to establish a standard for male newborn Nigerians using the CPLM technique.

## Patients and methods

This prospective cross-sectional study of full-term male infants within the first 72 h of life was conducted over a

year period from April, 2013 to March, 2014 in Ibadan, South–West Nigeria. Ibadan is home to the Yoruba ethnic group in Nigeria, and as such the majority of mothers in the town are of the Yoruba ethnic group. The study thus included only mothers from that ethnic group. A total of 675 healthy, male neonates were recruited into the study from among the 1508 male neonates delivered at the University College Hospital, Ibadan, Adeoyo Maternity Hospital, Ibadan, and Our Lady of Apostles Catholic Hospital, Oluyoro, Ibadan, over the study period. These hospitals are known for delivering standard obstetric care and account for the majority of hospital deliveries in Ibadan. Informed consent was obtained from the mothers of all individual participating newborns. Neonates with hypospadias, epispadias, disorders of sexual differentiation and other anomalies of the penis or abnormalities of testicular descent were excluded. Children of mothers from other ethnic groups apart from Yorubas, those with family histories of birth defects or delayed pregnancies and mothers who had illnesses in the first trimester or used medications – both orthodox and traditional during the first trimester of pregnancy – were excluded. Children who were delivered at gestational ages less than 37 completed weeks and those who were postdate were also excluded from the study. Children of elderly mothers and those with delayed pregnancies were excluded. In addition, neonates whose mothers refused to provide consent to carry out the examination were excluded. Under warm environmental conditions, all newborn babies of consenting mothers had complete examination of their external genitalia, including measurement of penile size (PL and PW), whereas perinatal history was obtained from the mothers and were entered into a proforma.

For measuring PL, the Schonfeld's method (CPLM) was used. Using the CPLM technique, PL was determined by

measuring the stretched distance from the symphysis pubis to the tip of the glans penis. The rounded end of a wooden spatula was placed against the pubic ramus alongside the stretched penis, and the shaft of the penis was stretched to the point of increased resistance; the length between the pubic ramus and the tip of the glans (excluding the prepuce) was marked on the spatula and this was measured with a ruler. The width of the mid penile shaft was also measured to determine the width of the penis using a Vernier calliper. The callipers were sterilized before use on each patient. The penile measurements were performed twice on each participant, and the mean values were recorded.

All procedures (including examination and measurement of penile dimensions of the newborns) performed in this study were in accordance with the ethical standards of the joint University of Ibadan/University College Hospital Ethical Committee and with the 1964 Helsinki declaration and its later amendments. Ethics approval was obtained from the joint University of Ibadan/University College Hospital Ethical Committee before the study commenced.

**Statistical analysis**

Analysis of the data was carried out using statistical package for the social sciences (version 21; SPSS Inc., USA). The mean ± SD of the PLs and PWs were determined, and Pearson's correlation coefficient was used to express the relationship between the penile dimensions (PL and PW) and birth weight, gestational age, maternal age at birth and the parity of the mothers.

**Results**

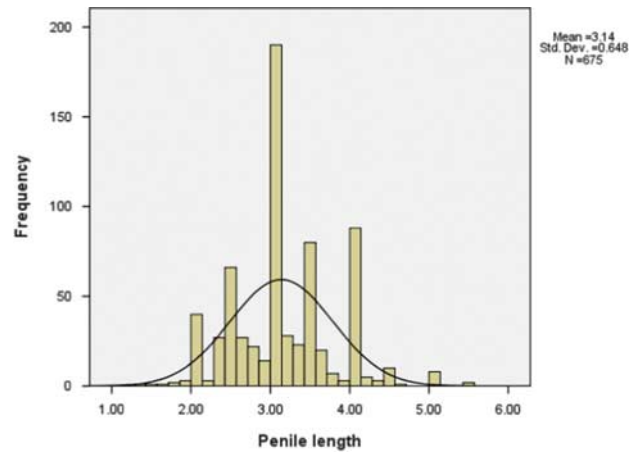
A total of 675 male newborns were recruited into the study. The mean age of the babies was 2.51 ± 6.05 days, and the gestational age at delivery ranged from 37 to 42 weeks with a mean of 39.55 ± 1.32 weeks. The mean age of the mothers was 30.00 ± 4.91 years with a range of 16–45 years, and the mean parity of the mothers was 2.1 ± 1.22 with a range of 1–7. PL ranged between 1.4 and 5.5 cm with a mean of 3.14 ± 0.65 cm (Fig. 1) Using the third percentile, the following penile dimensions could be considered as micropenis – PL of 2.0 cm and PW of 0.8 cm (Fig. 2). PW ranged between 0.8 and 1.4 cm with a mean of 0.97 ± 0.15 cm.

There were significant correlations between gestational age and birth weight and PL ( $r = 0.13, P = 0.001$  and  $r = 0.15, P = 0.046$ ) as well as between gestational age and PW ( $r = 0.10, P = 0.015$ ). Maternal age was inversely related to PL ( $r = -0.04, P = 0.257$ ) and PW ( $r = -0.09, P = 0.821$ ), respectively, and parity was inversely related to PW ( $r = -0.02, P = 0.628$ ), but these were not statistically significant (Table 1). There was a significant correlation between PL and PW ( $r = 0.22, P < 0.001$ ).

**Discussion**

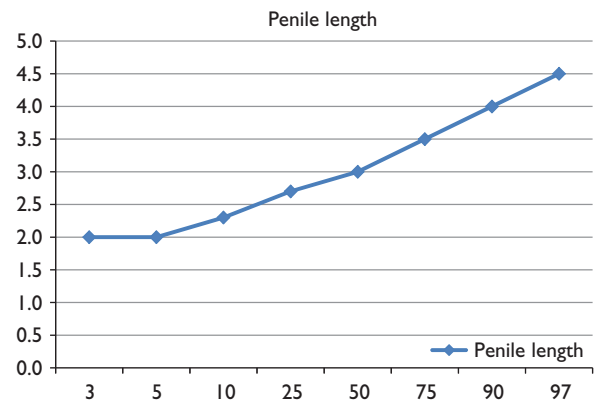
Defining the normal penile size in neonates is paramount to making accurate diagnosis of abnormalities of the penis and the medical and surgical management of these anomalies. Accurate evaluation of penile size is critical in determining the prognosis of the anomaly. When comparing the mean PL from

**Fig. 1**



Histogram showing the distribution of penile lengths.

**Fig. 2**



Percentile distribution of penile length.

**Table 1 Relationship between penile dimensions and maternal age, maternal parity, gestational age and birth weight of the neonates**

	Penile length	Penile width
Gestational age	$r = 0.13, P = 0.001$	$r = 0.10, P = 0.015$
Birth weight	$r = 0.15, P = 0.046$	$r = 0.12, P = 0.102$
Maternal age	$r = -0.04, P = 0.257$	$r = -0.09, P = 0.821$
Mothers' parity	$r = 0.10, P = 0.789$	$r = -0.02, P = 0.628$

*r*, correlation coefficient.

this study (3.14 ± 0.65) with similar ones from other parts of the world, the mean PL measured by the CPLM technique is similar to lengths reported in Iran (3.21 ± 0.35 cm) [4], China (3.1 ± 0.41 cm) [11], Saudi Arabia (3.55 ± 0.57 cm) [2], Singapore (3.5 ± 0.4 cm) [12], UK (3.04 ± 0.43 cm) [13] and Turkey (3.26 ± 0.56 cm) [10] using the same technique.

The CPLM may be associated with significant interobserver variation, especially when used on a circumcised penis; however, the elimination of the prepubic fat when the syringe method is used to give objective results makes it a credible alternative [10]. Variations observed in different studies may be explained by ethnic differences between

populations, the size of the population studied, the sizes and selection of participants and the methods used to determine penile dimensions [14]. Other contributory factors may include nutrition, genetic [15] and endocrine [16] status of the patients. The third percentile value of penile dimensions obtained in this study can be used as a standard in assessing the penile size of the newborns in this environment to reduce the rate of over diagnosing micropenis as this may impact on its management and prevent undue delay in the surgical management of such micropenis with hypospadias and other penile anomalies that may be amenable to surgical correction.

The penile size (PL and PW) is a clinical measure of the degree of androgenization in utero. The inverse relationship observed between penile dimensions and maternal age and parity in this study, although not significant, is similar to the reported findings of Romano-Riquer *et al.* [16], who observed that PL decreased with increasing maternal age, whereas PW increased with increasing birth weight but decreased with increasing maternal age. Therefore, the fact that older pregnant women tend to have lower testosterone levels [17,18] and testosterone levels seem to be inversely related to the birth size [19] may explain the reported inverse relationship observed between maternal age and penile dimensions [16], in this study.

### Conclusion

The penile dimensions obtained in this study are comparable with reported values in previous studies in other parts of the world. However, the fact that this study was carried out among one of the three major ethnic groups in Nigeria may make a larger and multicentre study across various ethnic and age groups necessary to develop normative values typical of an African population.

### Acknowledgements

#### Conflicts of interest

There are no conflicts of interest.

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