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Population-specific reference values for clitoral dimensions and anogenital distance among healthy term female neonates in Ethiopia: a Cross-Sectional Study

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Research Article

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Abstract

Background

Careful examination of the external genitalia at birth is an essential component of newborn assessment and may provide the first indication of disorders of sex development (DSD), including congenital adrenal hyperplasia (CAH), a potentially life-threatening endocrine disorder if unrecognized. In many low-resource settings, where newborn screening programs and timely hormonal or genetic investigations are limited, clinical assessment remains a critical tool for identifying infants who require further evaluation. Objective measurements of clitoral size and anogenital distance (AGD) provide simple, non-invasive markers of external genital development and prenatal androgen exposure. However, population-specific reference data for these measurements are lacking in Ethiopia. This study aimed to establish normative reference values for clitoral dimensions and AGD among healthy term female neonates in Ethiopia and to evaluate their relationship with neonatal anthropometric characteristics.

Methods

A hospital-based cross-sectional study was conducted among 284 healthy term female neonates delivered at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, from July to August 2021. Clitoral length (CL), clitoral width (CW), anus–fourchette distance (AFD), and anus–clitoris distance (ACD) were measured within the first 72 hours of life using calibrated digital vernier calipers by trained examiners. Neonatal anthropometric characteristics, including birth weight, length, and head circumference, were recorded. Reference intervals were calculated using the mean ± 2 standard deviations (SD). Pearson correlation analysis was performed to evaluate associations between genital measurements and neonatal anthropometric parameters.

Results

The mean gestational age of participants was 38.95 ± 1.21 weeks. The mean (± SD) CL, CW, AFD, and ACD were 9.27 ± 1.60 mm, 4.11 ± 0.97 mm, 10.60 ± 1.58 mm, and 31.51 ± 4.11 mm, respectively. The corresponding reference intervals were 6.06–12.47 mm for CL, 2.17–6.05 mm for CW, 7.44–13.76 mm for AFD, and 23.29–39.73 mm for ACD. ACD showed significant positive correlations with birth weight ($r = 0.218$, $p < 0.001$) and birth length ($r = 0.222$, $p < 0.001$). No significant associations were observed between clitoral dimensions and neonatal anthropometric characteristics.

Conclusions

This study establishes the first population-specific reference intervals and gestational age-specific reference curves for clitoral dimensions and AGD among healthy term female neonates in Ethiopia.

These findings provide clinically relevant tools to support newborn genital assessment and early recognition of infants who may require evaluation for DSD, particularly in settings where biochemical screening and genetic testing are not routinely available. Further multicenter studies across diverse Ethiopian populations are needed to validate and refine these reference standards.

Introduction

The neonatal period represents a critical window for identifying congenital conditions that may have significant implications for survival, long-term health, and psychosocial well-being. A meticulous physical examination at birth, including careful assessment of external genitalia, remains an essential component of newborn care. Abnormal genital appearance may be the first clinical indication of underlying disorders requiring urgent evaluation, including disorders of sex development (DSD) and life-threatening endocrine conditions such as salt-wasting congenital adrenal hyperplasia (CAH)(1). Early recognition of these conditions allows timely diagnostic evaluation, appropriate management, prevention of adrenal crises, and provision of appropriate medical and psychosocial support for affected families.

Disorders of sex development (DSD) comprise a heterogeneous group of congenital conditions characterized by atypical development of chromosomal, gonadal, or anatomical sex(2). Among these conditions, 46, XX DSD due to CAH remains one of the most important causes of atypical genital development in newborn girls(3). In settings where newborn screening programs, hormonal assays, and molecular diagnostic facilities are routinely available, early identification and confirmation of DSD can be achieved through biochemical and genetic evaluation. However, in many low-resource settings, including much of sub-Saharan Africa, access to these diagnostic services remains limited or unavailable. Consequently, careful clinical examination at birth becomes particularly important as the initial step in recognizing infants who require further endocrine and genetic assessment.

Clitoral dimensions and anogenital distance (AGD) are simple, non-invasive anthropometric measurements that provide objective assessment of external genital development. Increased clitoral size may reflect prenatal androgen excess and is an important clinical feature of virilization, particularly in CAH and other causes of 46, XX DSD(1). Similarly, AGD, including anus–fourchette distance (AFD) and anus–clitoris distance (ACD), has been proposed as a marker of prenatal androgen exposure and fetal genital differentiation(4, 5). These measurements may therefore serve as valuable clinical tools for identifying newborns who require further evaluation, especially in resource-limited environments where laboratory confirmation is delayed or inaccessible.

Several studies from different geographical regions, including Europe, Asia, and Africa, have established reference values for neonatal clitoral measurements and AGD(6–8). However, considerable variability has been observed between populations. Differences in genetic background, fetal growth patterns, environmental exposures, maternal factors, gestational age distribution, and measurement methodology may contribute to this variation. Therefore, applying reference values derived from other populations may

result in inaccurate interpretation of neonatal genital measurements, potentially leading to unnecessary investigations or failure to recognize clinically important abnormalities.

The establishment of population-specific reference standards is therefore essential to support accurate clinical assessment. In countries without universal newborn screening programs for CAH or widespread access to endocrine and genetic investigations, locally derived reference values can provide clinicians with an objective framework to distinguish normal variation from findings suggestive of genital atypia. Such reference data can facilitate early identification of infants requiring further evaluation for DSD, while reducing reliance on potentially inappropriate international cutoff values.

Despite the importance of neonatal genital assessment, Ethiopia currently lacks population-specific reference values for clitoral dimensions and AGD among newborn girls. In the absence of locally derived standards, healthcare providers must rely on reference data generated from other populations, which may not accurately reflect Ethiopian neonates. Establishing Ethiopian normative data is therefore an important step toward improving clinical recognition of genital abnormalities and strengthening early detection pathways for endocrine disorders in newborn care.

This study aimed to establish population-specific normative reference values for clitoral length (CL), clitoral width (CW), anus–fourchette distance (AFD), and anus–clitoris distance (ACD) among healthy term female neonates delivered at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. Additionally, we evaluated the relationship between genital measurements and neonatal anthropometric characteristics to identify factors contributing to normal variation and to develop gestational age-specific reference curves for clinical interpretation.

Methods

Study design and setting

A hospital-based cross-sectional study was conducted among healthy term female neonates delivered at Saint Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia, from 1 July to 31 August 2021. SPHMMC is one of the largest tertiary referral and teaching hospitals in Ethiopia, providing obstetric, neonatal, and specialized pediatric services to patients from Addis Ababa and surrounding regions. The Department of Obstetrics and Gynecology conducts approximately 320 term female deliveries per month.

Study population and sampling technique

The study population consisted of healthy term female neonates born at SPHMMC during the study period. A consecutive sampling technique was employed. All eligible neonates delivered during the study period were assessed for eligibility and enrolled until the required sample size was achieved.

Term birth was defined as delivery at ≥37 completed weeks of gestation.

Neonates were included if they:

- were female and born at ≥37 completed weeks of gestation;
- underwent examination within the first 72 hours after birth; and
- had mothers who provided written informed consent.

Neonates were excluded if they had:

- ambiguous genitalia or clinically apparent genital abnormalities;
- major congenital malformations or severe neonatal illness;
- preterm birth (<37 completed weeks of gestation); or
- incomplete clinical, anthropometric, or genital measurement data.

Sample size

The sample size was calculated using the single population mean formula to estimate normative reference values for neonatal genital measurements. The calculation considered the continuous nature of the study outcomes, including clitoral length, clitoral width, anus–fourchette distance, and anus–clitoris distance.

Previously published neonatal genital measurement studies were used to obtain the expected variability of these parameters. The sample size was calculated assuming a 95% confidence level and a 5% margin of error. Separate sample size estimations were performed for each genital measurement, and the largest calculated sample size was selected to ensure adequate precision for all measured parameters.The maximum required sample size was determined to be 284 neonates; therefore, a total of 284 healthy term female neonates were enrolled in the study.

Data collection procedures

Maternal and neonatal characteristics were collected using a structured data collection form developed based on previous neonatal genital measurement studies.

Maternal variables included:

- maternal age;
- ethnicity;
- parity;
- pregnancy characteristics; and
- mode of delivery.

Neonatal variables included:

- gestational age at birth;
- postnatal age at examination;
- birth weight;
- birth length; and
- head circumference.

Gestational age was determined from available obstetric records, including early pregnancy ultrasound where available.

Measurement of neonatal genital parameters

External genital examinations were performed within the first 72 hours of life by two trained physicians using a calibrated digital vernier caliper.

Measurements were performed according to standardized anatomical landmarks:

- **Clitoral length (CL):** distance from the pubic ramus to the tip of the glans clitoris.
- **Clitoral width (CW):** maximum transverse diameter of the clitoral glans.
- **Anus–fourchette distance (AFD):** distance from the center of the anus to the posterior fourchette.
- **Anus–clitoris distance (ACD):** distance from the center of the anus to the base of the clitoris.

Each measurement was obtained twice independently, and the average of the two measurements was used for analysis.

Birth weight, birth length, and head circumference were measured using calibrated equipment according to standard neonatal anthropometric procedures.

Quality assurance

Data collectors received standardized training before study initiation regarding neonatal examination procedures, anthropometric measurements, and genital measurement techniques. The study protocol and measurement procedures were pretested at Ras Desta Damtew Memorial Hospital before commencement of data collection.

Measuring instruments were calibrated regularly throughout the study period. Duplicate genital measurements were performed to reduce observer variability. Completed data collection forms were reviewed daily for completeness and accuracy.

Statistical analysis

Data were entered into EpiData version 3.1 and analyzed using IBM SPSS Statistics version 26. Continuous variables were assessed for distribution and summarized as means and standard deviations

(SD) or medians and interquartile ranges where appropriate. Categorical variables were summarized using frequencies and percentages.

Descriptive statistics were calculated for clitoral length, clitoral width, anus–fourchette distance, and anus–clitoris distance. Population-specific reference intervals were generated using the mean ± 2 SD approach. Gestational age-specific reference values were calculated across the term gestational age range (37–42 weeks), and reference curves (nomograms) were developed for all four genital measurements.

Pearson correlation analysis was used to assess relationships between genital measurements and neonatal anthropometric characteristics, including birth weight, birth length, head circumference, and gestational age. Scatter plots with fitted regression lines were generated to demonstrate significant associations between genital measurements and anthropometric parameters. A two-sided p-value <0.05 was considered statistically significant.

Ethical considerations

Ethical approval was obtained from the Institutional Review Board of Saint Paul's Hospital Millennium Medical College before initiation of the study. Written informed consent was obtained from mothers of all participating neonates before enrolment.

Participant confidentiality was maintained through anonymized study identification numbers and secure handling of collected information. All study procedures were conducted in accordance with the principles of the Declaration of Helsinki and relevant institutional guidelines.

Results

Participant characteristics

A total of 284 healthy term female neonates were included in the analysis. The mean maternal age was 28.28 ± 4.92 years (range: 18–41 years). The study population represented the two largest ethnic groups in Ethiopia, with Oromo and Amhara mothers accounting for 37.7% and 37.3% of participants, respectively. Most pregnancies were singleton (93.3%), and cesarean delivery was the predominant mode of birth (84.2%).

The mean gestational age at delivery was 38.95 ± 1.21 weeks (range: 37–42 weeks). Neonatal genital measurements were performed at a mean postnatal age of 27.10 ± 15.80 hours after birth. The mean birth weight was 3074.44 ± 482.45 g, with a mean birth length of 48.64 ± 1.90 cm and head circumference of 34.40 ± 1.19 cm. Detailed maternal and neonatal characteristics are presented in Table 1.

Table 1: Maternal, postnatal, and anthropometric characteristics of study participants at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2021 (N = 284)

Characteristics	Mean ± SD	Minimum–Maximum
Maternal characteristics		
Maternal age (years)	28.3 ± 4.9	18–41
Neonatal characteristics		
Postnatal age at assessment (hours)	27.1 ± 15.8	1–72
Anthropometric measurements at birth		
Birth weight (g)	3074.4 ± 482.5	2300–5000
Birth length (cm)	48.6 ± 1.9	44–55
Head circumference (cm)	34.4 ± 1.2	33–37

Clitoral size and anogenital distance

The mean clitoral length among the 284 term female neonates was 9.27 ± 1.60 mm, with individual measurements ranging from 3.50 to 15.30 mm. The mean clitoral width was 4.11 ± 0.97 mm (range: 1.40–9.90 mm). Measurements of anogenital distance showed a mean anus–fourchette distance (AFD) of 10.60 ± 1.58 mm and a mean anus–clitoris distance (ACD) of 31.51 ± 4.11 mm (Table 2).

Table 2. Characteristics of clitoral measurements and anogenital distance among study participants at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2021 (N = 284)

Anatomical measurement	Mean ± SD (mm)	Minimum–Maximum (mm)
Clitoral measurements		
Clitoral length (CL)	9.27 ± 1.60	3.50–15.30
Clitoral width (CW)	4.11 ± 0.97	1.40–9.90
Anogenital measurements		
Ano-fourchette distance (AFD)	10.60 ± 1.58	7.10–18.00
Ano-clitoral distance (ACD)	31.51 ± 4.11	14.30–42.00

Gestational age-specific distributions of clitoral dimensions and anogenital distances are presented in Table 3. Across the term gestational age range (37–42 weeks), mean values demonstrated modest variation, with overlapping distributions between gestational age groups. Clitoral length, clitoral width, AFD, and ACD did not demonstrate a clear linear increase or decrease with advancing gestational age. The observed variability within each gestational age category highlights the importance of using gestational age-specific reference ranges rather than relying on a single cutoff value for neonatal genital assessment.

Table 3. Clitoral measurements and anogenital distance according to gestational age among study participants at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2021 (N = 284)

Gestational age (weeks)	n	Clitoral length (mm), Mean ± SD	Clitoral width (mm), Mean ± SD	Ano-fourchette distance (mm), Mean ± SD	Ano-clitoral distance (mm), Mean ± SD
37	14	9.18 ± 1.22	4.44 ± 0.67	10.37 ± 1.96	30.16 ± 5.63
38	104	9.15 ± 1.65	4.05 ± 1.09	10.67 ± 1.69	31.50 ± 3.67
39	100	9.45 ± 1.53	4.26 ± 0.83	10.36 ± 1.34	31.49 ± 4.16
40	33	9.20 ± 1.82	3.90 ± 0.99	10.59 ± 1.53	32.29 ± 4.46
41	15	9.07 ± 1.49	3.85 ± 1.07	11.40 ± 2.16	30.36 ± 4.71
42	18	9.41 ± 1.72	3.94 ± 0.91	11.00 ± 1.27	32.23 ± 3.84

Normative reference values and gestational age-specific nomograms

Reference intervals for neonatal genital measurements were calculated using the mean ± 2 standard deviations, representing the expected range among healthy term female neonates in this population. The resulting reference interval for clitoral length was 6.06–12.47 mm, with corresponding values for clitoral width ranging from 2.17–6.05 mm.

For anogenital measurements, the calculated reference interval for anus–fourchette distance (AFD) was 7.44–13.76 mm, while the reference interval for anus–clitoris distance (ACD) was 23.29–39.73 mm. These intervals represent the distribution of external genital measurements observed among healthy term Ethiopian female neonates and provide population-specific reference ranges for clinical assessment.

Gestational age-specific nomograms were generated for clitoral length, clitoral width, AFD, and ACD to demonstrate the expected variation across the term gestational age spectrum (37–42 weeks). The nomograms provide visual reference curves to assist clinicians in interpreting individual neonatal measurements according to gestational age and are presented in Figures 1–4.

Association between genital measurements and neonatal anthropometric characteristics

The relationship between neonatal genital measurements and anthropometric parameters was assessed using Pearson correlation analysis. A significant positive correlation was observed between anus–clitoris distance (ACD) and birth weight ($r = 0.218$, $p < 0.001$) and between ACD and birth length ($r = 0.222$, $p < 0.001$), indicating that greater ACD measurements were associated with larger neonatal size parameters.

Anus–fourchette distance (AFD) demonstrated weak positive correlations with selected anthropometric measurements, including birth weight and head circumference; however, these associations were

modest. No significant correlations were identified between clitoral length or clitoral width and neonatal anthropometric characteristics, gestational age, or maternal factors.

The associations between ACD and neonatal anthropometric parameters are illustrated using scatter plots with fitted regression lines in Figures 5 and 6, demonstrating the relationship between ACD and birth weight and between ACD and birth length, respectively.

Discussion

This study established the first population-specific normative reference values for clitoral dimensions and anogenital distance (AGD) among healthy term female neonates in Ethiopia. The generated gestational age-specific nomograms provide clinically relevant reference ranges that may support standardized newborn genital assessment and improve recognition of disorders of sex development (DSD), particularly congenital adrenal hyperplasia, in settings where hormonal evaluation, genetic testing, and newborn screening programs are not routinely available.

The mean clitoral length observed in our Ethiopian cohort was 9.27 mm, which is higher than values reported from several previously studied populations, including Turkey and Iran, while being broadly comparable with findings from Nigeria(9, 10). Adekoya et al. reported a mean clitoral length of approximately 8.6 mm among healthy term Nigerian female neonates, making this population one of the closest comparisons to our findings(7). In contrast, studies from Iran reported lower mean values, with clitoral length generally ranging around 7–8 mm, while Turkish studies have reported values closer to 6–7 mm(9, 10). These differences highlight substantial population variability in neonatal external genital measurements.

Several factors may contribute to the relatively higher mean clitoral length observed in our study. First, neonatal genital development is influenced by complex interactions between genetic background, fetal androgen exposure, androgen receptor sensitivity, placental function, and environmental factors. Differences in these biological factors between populations may contribute to variation in genital measurements. Second, methodological differences between studies, including measurement technique, degree of clitoral stretching, examiner experience, timing of measurement after birth, and inclusion criteria, may influence reported values. Although our study used standardized measurements performed by trained examiners with duplicate assessment, differences in methodology remain an important consideration when comparing international reference datasets. Therefore, the higher mean clitoral length observed in Ethiopian neonates should be interpreted as evidence of population-specific variation rather than increased androgen exposure or abnormal genital development.

The mean clitoral width observed in our cohort was within the range reported in previous international studies. Compared with clitoral length, fewer studies have evaluated neonatal clitoral width; however, available evidence suggests that width demonstrates similar variability across populations(6, 9). These findings support the importance of evaluating multiple external genital measurements rather than relying on a single parameter when assessing newborns with suspected genital atypicality.

The anogenital distance measurements in our study were comparable with those reported among Turkish newborns but differed from several African and European cohorts(8, 11, 12). Variation in AGD between populations has been described previously and may reflect differences in genetic background, fetal growth patterns, prenatal environmental exposures, and measurement methodology. AGD is considered a marker of prenatal androgen action because genital differentiation is strongly influenced by androgen exposure during critical periods of fetal development. However, AGD is also influenced by overall fetal growth and body size parameters.

In our study, ano-clitoral distance (ACD) demonstrated a modest positive association with birth weight and birth length, suggesting that fetal growth contributes to variation in AGD measurements. This observation is consistent with previous reports demonstrating associations between AGD and neonatal anthropometric characteristics. In Nigerian term neonates, Akusu et al. reported significant correlations between anogenital distances and birth weight, length, and head circumference(7). Similarly, other population-based studies have demonstrated that AGD reflects both prenatal androgen exposure and aspects of fetal growth(4, 5). However, the magnitude of these associations differs between populations, suggesting that AGD is determined by a complex interaction between endocrine regulation, fetal growth, and genetic factors.

In contrast, clitoral dimensions in our study were not associated with neonatal anthropometric characteristics. This finding suggests that clitoral development may be regulated by additional biological mechanisms beyond general fetal growth. Similar findings were reported by Adekoya et al. among Nigerian term neonates, where clitoral length and width were not significantly correlated with birth weight, length, or head circumference, despite significant associations between AGD and anthropometric parameters. However, this finding is not universal(7). Alaei et al. reported associations between clitoral dimensions and neonatal anthropometric characteristics among Iranian neonates, with birth weight, length, and head circumference contributing to prediction models for clitoral length and width(9). Differences between studies may be explained by variation in ethnicity, sample characteristics, gestational age distribution, measurement methodology, and differences in prenatal hormonal influences. Further studies across diverse populations are needed to better understand the determinants of neonatal clitoral development.

An important strength of this study is the relatively large sample size of healthy term neonates, standardized measurement procedures, duplicate measurements by trained examiners, and development of gestational age-specific nomograms. These features improve the reliability and clinical applicability of the reference values. In addition, this study provides locally relevant data for Ethiopian clinicians, which may be particularly valuable in resource-limited settings where access to endocrine investigations and genetic testing remains limited.

This study has several limitations. First, it was conducted at a single tertiary hospital, which may limit generalizability to all Ethiopian populations with different ethnic and geographic backgrounds. Second, preterm neonates and infants with congenital anomalies were excluded; therefore, these reference

values cannot be extrapolated to these groups. Third, maternal hormonal status, prenatal medication exposure, environmental endocrine disruptors, and genetic factors that may influence genital development were not assessed.

Conclusion

This study provides the first population-specific normative reference values and gestational age-specific nomograms for clitoral length, clitoral width, anus–fourchette distance, and anus–clitoris distance among healthy term female neonates in Ethiopia. The observed differences between Ethiopian neonatal genital measurements and previously reported international reference values emphasize the importance of developing locally derived standards rather than relying solely on universal cutoff values. These findings provide a practical clinical tool to support newborn genital assessment and may facilitate earlier recognition and referral of infants with suspected disorders of sex development, particularly in settings where hormonal and genetic investigations are limited. Future multicenter studies involving diverse Ethiopian populations, including preterm infants and longitudinal follow-up cohorts, are needed to validate these findings and establish comprehensive national reference standards.

Abbreviations

ACD: Anus–clitoris distance

AFD: Anus–fourchette distance

AGD: Anogenital distance

CAH: Congenital adrenal hyperplasia

CL: Clitoral length

CW: Clitoral width

DSD: Disorders of sex development

SPHMMC: Saint Paul's Hospital Millennium Medical College

Declarations

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Authors' contributions

FMA (Dr Fikir M. Adinew) conceptualized the study, developed the research idea and methodology, supervised the overall scientific direction of the project, contributed to data analysis and interpretation of findings, and substantially revised and developed the manuscript into its final scientific form.

AA (Dr Aniley Assab) contributed to data collection, trained and supervised data collectors, performed data management and analysis, and contributed to the initial drafting of the manuscript.

All authors reviewed and approved the final version of the manuscript.

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Availability of data and materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. Written informed consent was obtained from the mothers of all participating neonates before enrolment. All study procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and relevant institutional guidelines. The IRB approval documentation is available from the corresponding author upon reasonable request.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

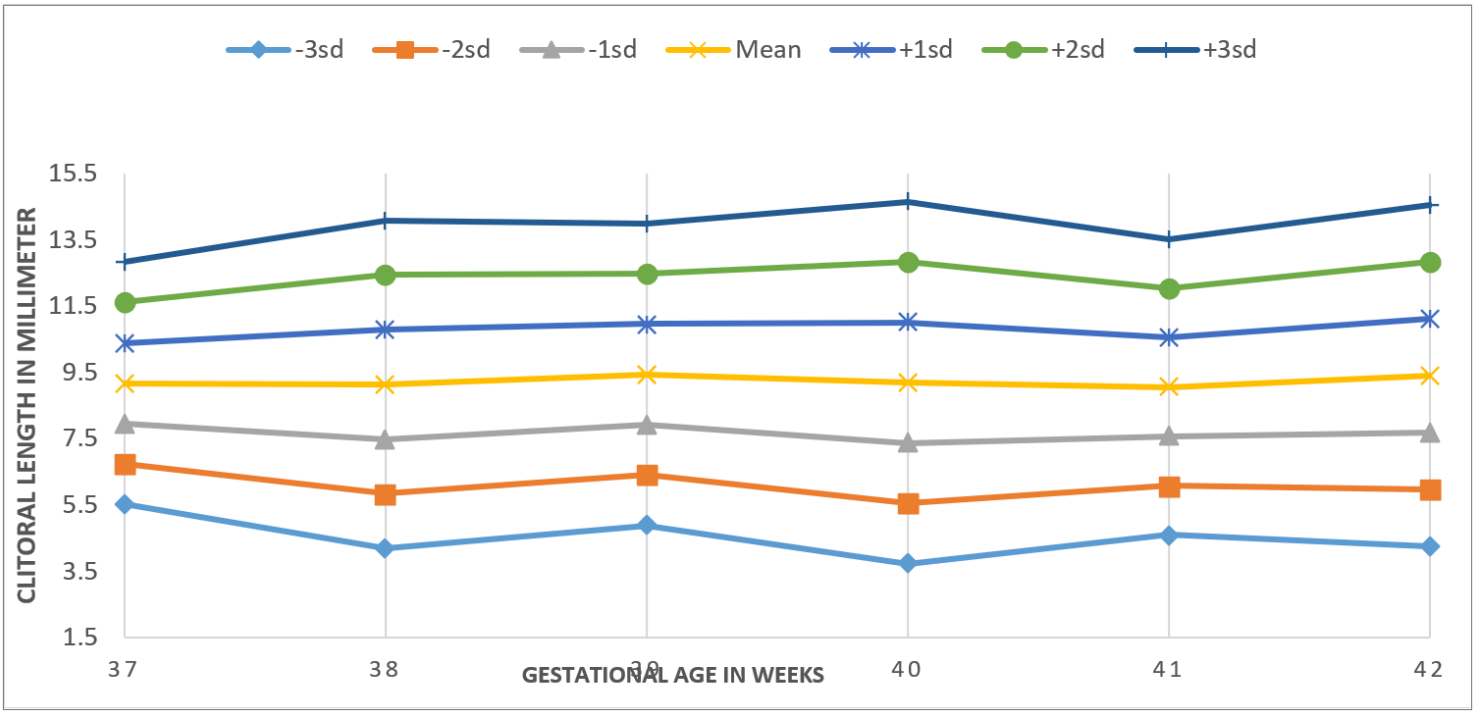


Figure 1

Gestational age-specific reference curve for clitoral length among healthy term female neonates (n = 284) at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (July–August 2021).

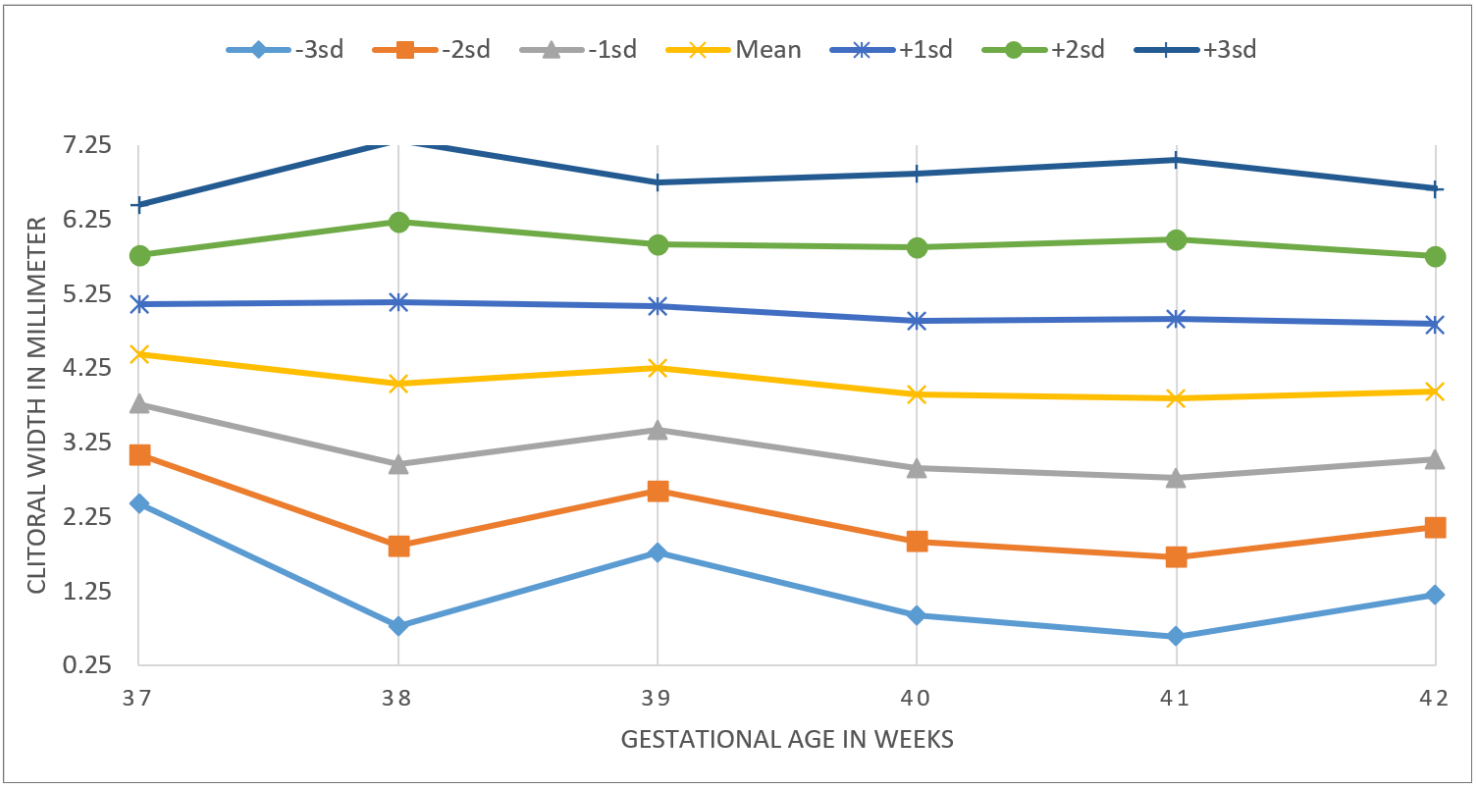


Figure 2

Gestational age-specific reference curve for clitoral width among healthy term female neonates (n = 284) at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (July–August 2021).

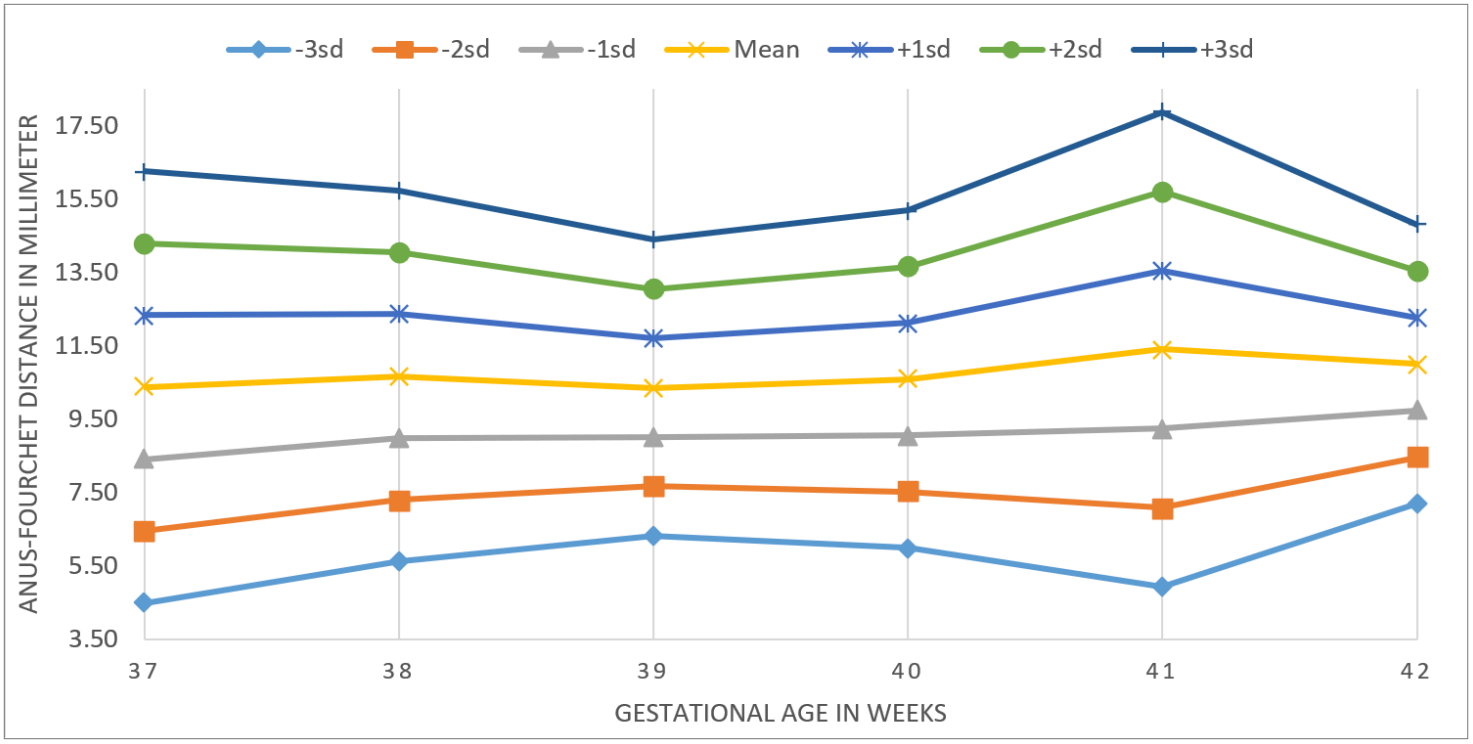


Figure 3

Gestational age-specific reference curve for anus–fourchette distance among healthy term female neonates (n = 284) at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (July–August 2021).

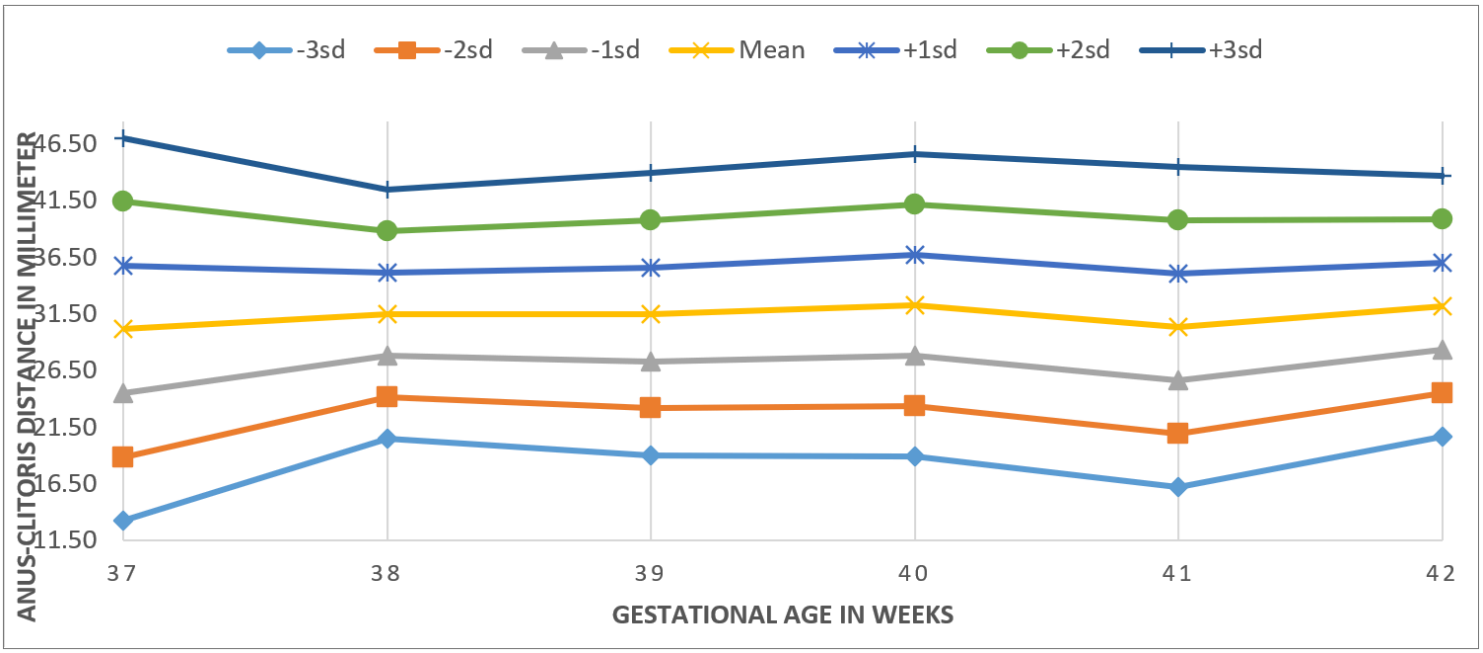


Figure 4

Reference chart for ano–clitoral distance by gestational age among healthy term female neonates (n = 284) assessed at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, from July 1 to August 31, 2021.

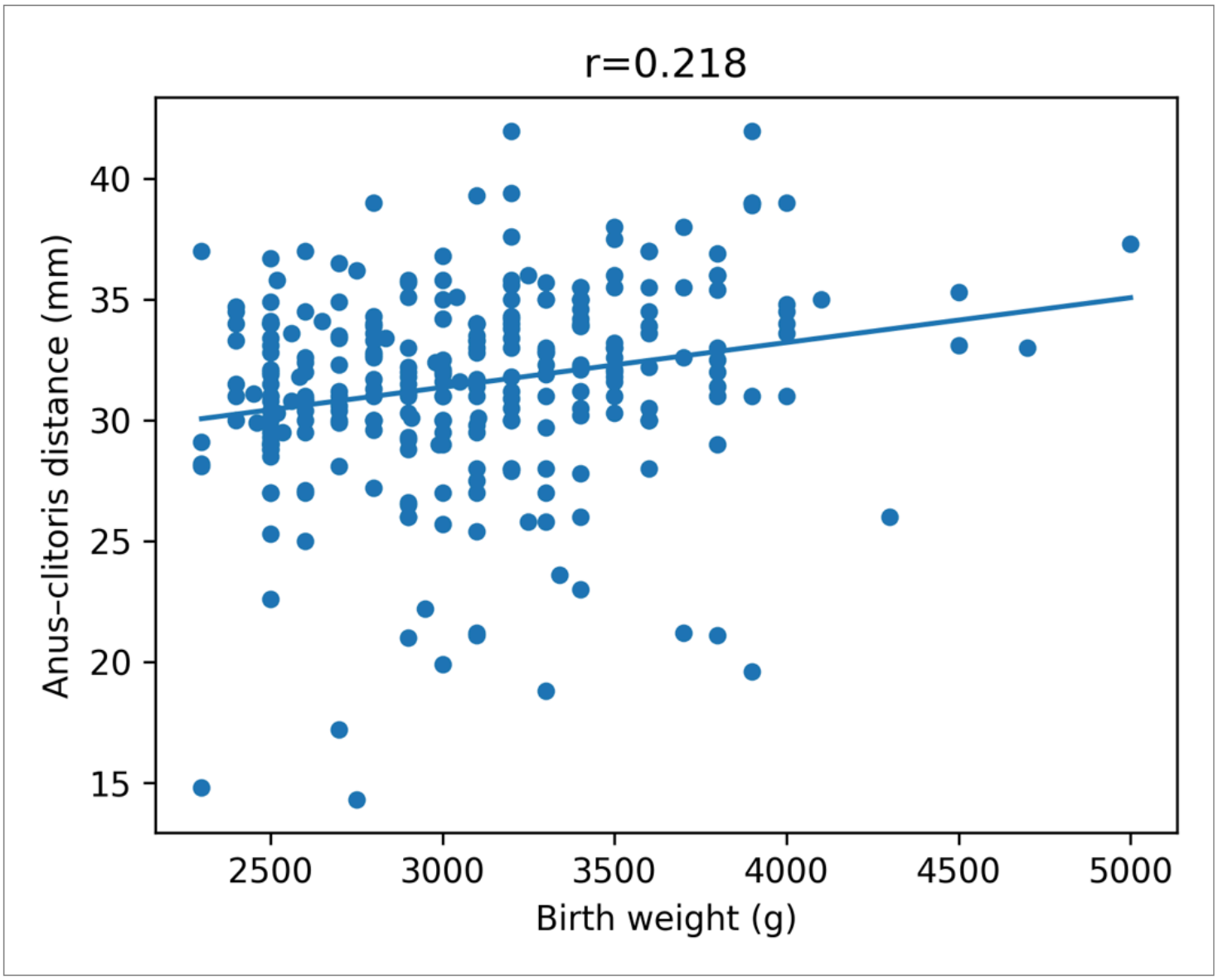


Figure 5

Relationship between birth weight and anus–clitoris distance among healthy term female neonates.

Scatter plot illustrating the relationship between birth weight and anus–clitoris distance (ACD) in 284 healthy term female neonates. Each point represents an individual participant, and the solid line represents the fitted linear regression line. A weak positive correlation was observed between birth weight and ACD (Pearson's r = 0.218, p< 0.001), indicating that neonates with higher birth weights tended to have slightly greater ACD measurements.

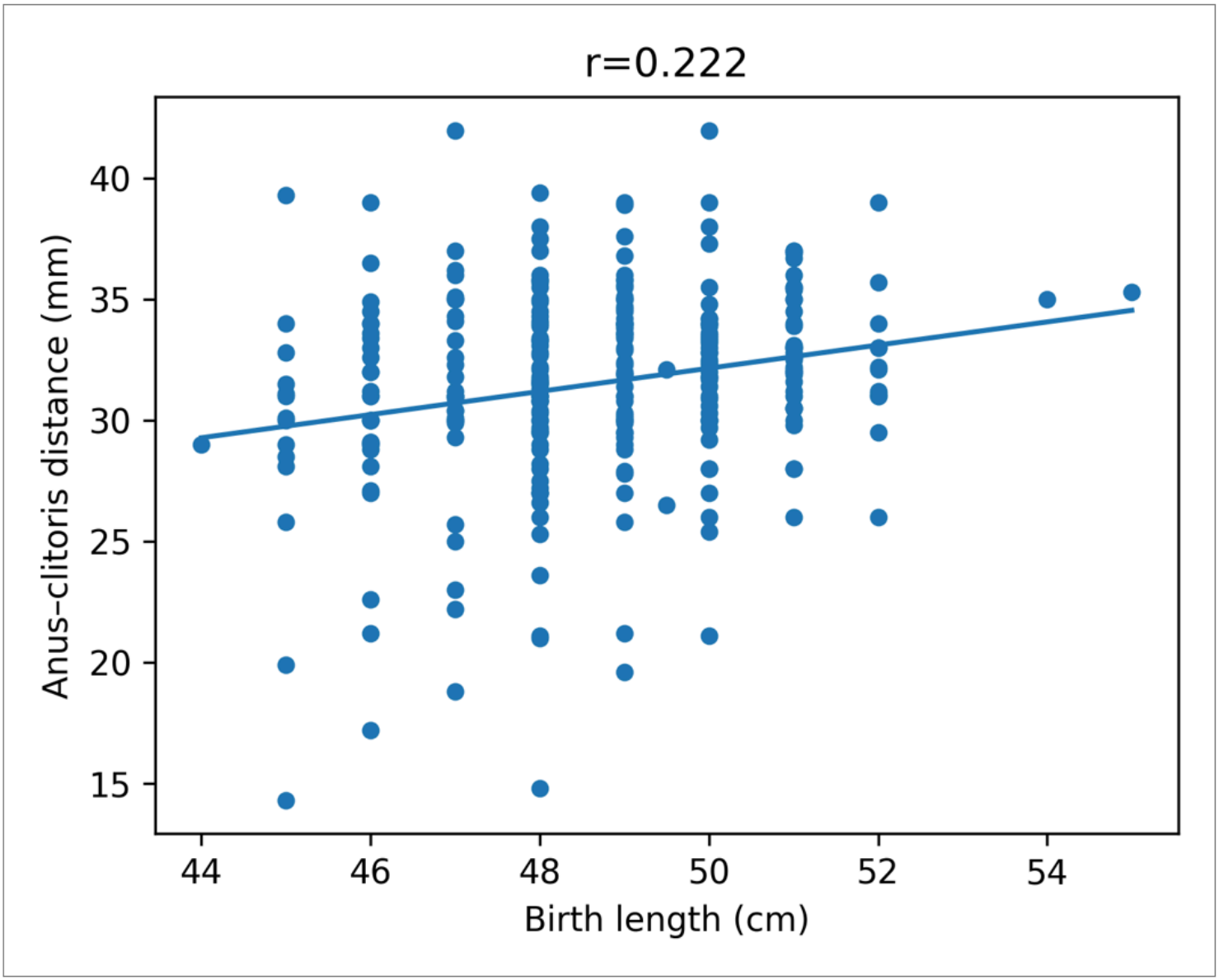


Figure 6

Relationship between birth length and anus–clitoris distance among healthy term female neonates.

Scatter plot illustrating the relationship between birth length and anus–clitoris distance (ACD) in 284 healthy term female neonates. Each point represents an individual participant, and the solid line represents the fitted linear regression. A weak positive correlation was observed between birth length and ACD (Pearson's r = 0.222, p< 0.001), indicating that longer neonates tended to have slightly greater ACD measurements.