PAKISTAN BIOMEDICAL JOURNAL
https://www.pakistanbmj.com/journal/index.php/pbmj/index
ISSN (E): 2709-2798, (P): 2709-278X
Volume 8, Issue 10 (October 2025)

OPEN ACCESS

Original Article

Prediction of Fetal Gender Through Fetal Biometry

Muhammad Naveed Akbar[1], Muhammad Uzair[1*], Syed Muhammad Yousaf Farooq[1,2], Muhammad Irshad Ul Haq[2], Samra Mubeen[1], Zaryab Noor[1] and Anam Majeed[1]

[1]Department of Radiography and Imaging Technology, Green International University, Lahore, Pakistan
[2]Office of Research Innovation and Commercialization, Green International University, Lahore, Pakistan

ARTICLE INFO

Keywords:
Fetal Biometry, Ultrasonography Prenatal, Fetal Development, Sex Determination Analysis, Fetal Weight, Femur, Abdominal Circumference

How to Cite:
Akbar, M. N., Uzair, M., Farooq, S. M. Y., Haq, M. I. U., Mubeen, S., Noor, Z., & Majeed, A. (2025). Prediction of Fetal Gender Through Fetal Biometry: Fetal Gender Through Fetal Biometry. Pakistan BioMedical Journal, 8(10), 21-26. https://doi.org/10.54393/pbmj.v8i10.1305

***Corresponding Author:**
Muhammad Uzair
Department of Radiography and Imaging Technology, Green International University, Lahore, Pakistan
muzair477@gmail.com

Received Date: 12th August, 2025
Revised Date: 13th October, 2025
Acceptance Date: 21st October, 2025
Published Date: 31st October, 2025

ABSTRACT

An important part of prenatal care is gender determination, which shows expectant parents and medical professionals significant personal and medical insights. It becomes extremely important to determine early fetal gender for enhancing treatment approaches for sex-chromosome-related illnesses, like X-linked disorders. **Objectives:** To investigate the relationship between fetal gender determination during the second and third trimesters of pregnancy and ultrasound-based fetal biometric parameters, including estimated fetal weight (EFW), femur length (FL), abdominal circumference (AC), head circumference (HC), and biparietal diameter (BPD). **Methods:** This cross-sectional comparative study was conducted at the Radiology Department of Meer Khan Children and Family Hospital. Women between 14-40 weeks of gestation undergoing ultrasound for fetal assessment were included. Data were analyzed using SPSS version 26.0, applying an independent samples t-test and one-way ANOVA with a significance level set at $p<0.05$. The Shapiro-Wilk test was used in order to evaluate the data distribution normality. **Results:** The study found biometric ultrasound measurements of 125 fetuses (63 male and 62 female). Three important metrics showed higher values were found in male fetuses: Male had significantly higher FL ($p=0.002$, 95% CI: 3.16-14.28 mm). The test also indicated male with significantly higher AC, $p=0.005$, 95% CI: 10.77-58.44 mm, also significantly higher HC ($p=0.016$), 95% CI: 5.06-48.10 mm, in male was observed. **Conclusions:** Male fetuses had increased BPD and EFW compared to the female fetuses, whereas EFW and BPD showed non-significant trends toward higher values in male. Moreover, male fetuses have significantly greater AC, FL, and head circumference HC than female fetuses.

INTRODUCTION

An essential part of prenatal care is identifying the fetus's gender, which offers both expectant parents and medical professionals important personal and medical insights [1]. For diseases linked to sex chromosomes, like X-linked disorders, early evaluation of fetal sex can enhance treatment planning. Clinicians can also foresee and handle possible issues linked to sex-specific health risks when they can accurately predict the gender of the fetus. In addition, a lot of parents say they want to know the gender of the fetus for cultural and family planning reasons. Psychologically speaking, knowing the baby's gender could improve parental bonding and emotional readiness for the baby's birth [2]. Cultural and religious beliefs greatly influence how much weight is given to fetal gender determination in nations like Pakistan. Long-standing social traditions frequently influence family planning decisions, cultural preferences for male children in particular communities, and preparations for the child's upbringing. Healthcare providers must be aware of these cultural considerations to deliver prenatal care services that are appropriate, considerate, and sensitive [3, 4]. When it comes to treating gender-influenced medical conditions and complications, knowing the fetal sex is helpful. Given that male fetuses are occasionally linked to particular risks, early detection is especially crucial. Fetal sex is ascertained using a variety of ultrasound techniques.

DOI: https://doi.org/10.54393/pbmj.v8i10.1305

Fetal heart rate (FHR) may provide early indicators, but its precision and reliability are still restricted [5]. The treatment of genetic disorders also heavily relies on the early identification of fetal gender. While ultrasound examinations in the later trimesters can visualize fetal genital anatomy for more precise gender determination, the orientation of the genital tubercle can be used to determine the fetal gender as early as the eleventh week of gestation [6]. The potential of biometric parameters in predicting fetal gender has been highlighted by studies showing that male fetuses typically have significantly larger biparietal diameter (BPD) measurements than female fetuses during ultrasounds performed between 16–21 weeks and 31–35 weeks of gestation [7, 8]. With advancements in medical technology, non-invasive and highly accurate techniques (i.e., ultrasound imaging, Magnetic Resonance Imaging (MRI)) have become increasingly popular for determining fetal gender. Genetic testing is still the most accurate method, but it can be expensive and has risks, such as the potential to cause miscarriage. On the other hand, ultrasound evaluations are generally considered to be safer, more accessible, and less expensive methods of determining a person's gender, especially in the second and third trimesters [9, 10]. Accurate determination of the fetal gender is extremely necessary to treat many medical disorders. Yet some techniques as chorionic villus sampling, the transabdominal method, or the transcervical method, which are employed at 11–12 weeks, provide quick results, being invasive with procedural risks. The early gender identification precision has increased with the advancement of the technology of two-dimensional ultrasound, although this method is not fully sufficient to replace invasive techniques fully. With the development of three-dimensional ultrasound imaging, reliability has been further improved, which makes it analysable volumetric, fully detailed data from multifarious viewing angles [11, 12]. Fetal gender identification, beyond parental curiosity, is important in prenatal care. The precise and early detection enhances health results both for mother and child, with great support to the congenital abnormalities diagnosis and treatment, fetal growth variations, and sex-linked genetic disorders [13, 14]. Early and accurate prediction of fetal gender using non-invasive ultrasound techniques can support prenatal assessment and enhance understanding of fetal growth patterns. Since limited local data exist regarding gender-based variations in fetal biometric parameters in the Pakistani population, this study was conducted to determine whether routine ultrasound measurements can reliably predict fetal gender.

This study aimed to assess whether routine fetal biometric measurements can accurately predict fetal gender through ultrasound.

METHODS

In this case control cross-sectional comparative study, pregnant women between 14 and 39 weeks of gestation who underwent ultrasound examinations at the Radiology Department of Meer Khan Children and Family Hospital in Lahore, from October 2024 to June 2025 (MKCFH/LHR/2024-235), who had participated in this research. The ethical approval was taken from Green International University with Ref no: GIU/REC/25-09. The research team first conducted a detailed, pertinent literature review to find out prenatal biometric markers pertinent to gender prediction. The five ultrasound-based fetal measurements were chosen for examination in light of the review, such as abdominal circumference (AC), biparietal diameter (BPD), estimated fetal weight (EFW), femur length (FL), and head circumference (HC). The sample size was determined by using Open Epi software (Version 3.01), with 80% power and a 95% confidence level. Using Galjaard *et al.* research, conducted on mean BPD differences between male and female fetuses, considering it as a guiding study, a minimum sample size of 120 was required for this pertinent study [7]. Yet, the researchers recruited a total of 125 participants for this research to consider potential dropouts. The purposive sampling technique was used to collect the data for the specific purpose of the research. For this purpose, the researchers considered pregnant women with an age between 14 and 40 weeks of gestation willing to undergo standard prenatal ultrasound examination. The pregnant women who were undergoing routine ultrasounds were taken as the general population, and served as controls, while the researchers designated the cases as fetuses with proven gender (male or female) the considering either at birth or through a second-trimester anatomy examination. Before the sample was included in the research, all the respondents were given a briefing about the study and were provided verbal informed consent. Also, women with known fetal anomalies or with multiple pregnancies were excluded from the study. The data were collected by qualified sonographers, with a follow-up of established ultrasonography protocols. Whereas the fetal biometric data were collected according to the recognized clinical procedures. Biparietal diameter (BPD), which was assessed at the level of thalami and cavum septum pellucidum, was measured following the same level protocol as the head circumference (HC). At the level of the fetal stomach and umbilical vein, abdominal circumference (AC) was measured, but the femur length (FL), considering the largest axis, was measured for the ossified femoral diaphysis. The estimated fetal weight (EFW) was calculated using Hadlock's method, in which

DOI: https://doi.org/10.54393/pbmj.v8i10.1305

BPD, HC, AC, and FL were taken into consideration. The researchers documented both breech and cephalic fetal presentations. The researchers used Statistical Package for the Social Sciences (SPSS) version 26.0 for the analysis of the data collected from the pregnant female. Descriptive statistics of all the variables were calculated in the study to find frequencies, percentages, and other descriptive details. The researchers presented categorical variables with frequencies and percentages; whereas, for the measurement of the continuous variables were measured with their Mean and SD (i.e., mean ± standard deviation). To check the normality of the data, the Shapiro-Wilk test was used. Independent samples t-tests were utilized to compare mean biometric measurements between male and female fetuses; while One-way ANOVA was utilized to find differences between fetal presentation groups, more than 2. Before the performance of parametric tests, Levene's test was used to verify the homogeneity of variances; while, for all comparisons, 95% CIs were used at a level of significance, p<0.05. No post-hoc test was required, as group comparisons did not involve more than two categories.

RESULTS

Out of 125 participants was almost equal, with 62 male (49.6%) and 63 female (50.4%). The breech presentation accounted for 12.8%, whereas, majority of fetuses were in cephalic presentation (87.2%). The findings reflect a mean maternal age reported 28.50 ± 6.75 years, with the indication of women in their late twenties. An average biparietal diameter (BPD) of 71.54 ± 17.47 mm was shown by Fetal biometric parameters, reflecting femur length (FL) as 55.28 ± 16.24 mm. The HC averaged 270.46 ± 61.98 mm, whereas, average abdominal circumference (AC) was 248.40 ± 69.25 mm. With the coverage of both early and later stages of pregnancy, the gestational age (GA) had a broad range, with having mean of 29.02 ± 6.64 weeks, and with a mean of 1778.61 ± 1234.27 grams, the EFW showed marked variation, by showing growth differences among gestational periods (Table 1).

Table 1: Baseline Demographic Variables with Fetal Biometric Characteristics (n=125)

Variables	Category	Descriptive Statistics
Gender	Female	63 (50.40%)
	Male	62 (49.60%)
Presentation	Breech	16 (12.80%)
	Cephalic	109 (87.20%)
Age (Years)	—	28.50 ± 6.75
BPD (mm)	—	71.54 ± 17.47
FL (mm)	—	55.28 ± 16.24
AC (mm)	—	248.40 ± 69.25
HC (mm)	—	270.46 ± 61.98
GA (Weeks)	—	29.02 ± 6.64
EFW (Grams)	—	1778.61 ± 1234.27

Results show 125 fetuses, by reflecting 62 female and 63 male in the above analysis. Although, non-significant statistically significant difference was found, the results show mean females' greater biparietal diameter (BPD) (68.55 ± 17.59 mm) (t (123) = 1.92, p = 0.057, 95% CI: -0.19 to 12.05), as compared to male fetuses (74.49 ± 16.97 mm). Conversely, the average femur length (FL) reported to be longer as 8.72 mm, in males (59.61 ± 14.69 mm), compared with females (50.89 ± 16.68 mm). Also, there was found a significant difference (t (123) = 3.10, p=0.002, 95% CI: 3.16–14.28) was found in the t-test while comparing both genders. There was also a larger abdominal circumference (AC) in male than female (265.57 ± 64.91 mm vs. 230.96 ± 69.66 mm), showing a mean difference of 34.61 mm (t (123)= 2.87, p=0.005, 95% CI: 10.77–58.44). Female had lower HC values (257.06 ± 66.60 mm), compared with male with higher values 283.64 ± 54.43 mm which resulting in a mean difference (26.58 mm (t (123) = 2.45, p=0.016, 95% CI: 5.06–48.10). Yet, males reported a higher EFW (1984.04 ± 1249.23 g) as compared to female (1569.87 ± 1192.80 g). Furthermore, the analysis did not show a statistically significant difference (t (123)= 1.90, p=0.060, 95% CI: -18.39 to 1984.74) (Table 2).

Table 2: Comparison of Fetal Biometry Between Male and Female Fetuses

Parameters	Gender	N	Mean ± SD	Mean Diff. (Male and Female)	t (df)	p-Value	95% CI of Difference
BPD (mm)	Male	63	74.49 ± 16.97	5.93	1.92 (123)	0.057	-0.19 to 12.05
	Female	62	68.55 ± 17.59				
FL (mm)	Male	63	59.61 ± 14.69	8.72	3.10 (123)	0.002*	3.16 to 14.28
	Female	62	50.89 ± 16.68				
AC (mm)	Male	63	265.57 ± 64.91	34.61	2.87 (123)	0.005*	10.77 to 58.44
	Female	62	230.96 ± 69.66				
HC (mm)	Male	63	283.64 ± 54.43	26.58	2.45 (123)	0.016*	5.06 to 48.10
	Female	62	257.06 ± 66.60				
EFW (g)	Male	63	1984.04 ± 1249.23	414.18	1.90 (123)	0.060	-18.39 to 846.74
	Female	62	1569.87 ± 1192.80				

*p<0.05 considered statistically significant

DOI: https://doi.org/10.54393/pbmj.v8i10.1305

There was no significant difference between breech and cephalic presentations regarding fetal biometric parameters. Almost identical values were shown by the femur length (FL) (55.59 mm in breech vs. 55.24 mm in cephalic, p=0.94), and in both groups, the mean BPD was reported to be similar (71.54 mm, p=1.00). Also, similar results were shown in both groups regarding HC averaged 261.71 mm in breech and 271.74 mm in cephalic fetuses (p=0.55) and AC (254.76 mm vs. 247.47 mm, p=0.70 impacted by fetal presentation (Table 3).

Table 3: ANOVA Results by Fetal Position and Fetal Biometric Parameters

Variables	Fetal Position	N	Mean ± SD	F (df=1, 123)	Sig. (p-Value)
BPD (mm)	Breech	16	71.54 ± 22.47	0	1.00
	Cephalic	109	71.54 ± 16.74		
	Total	125	71.54 ± 17.47		
FL (mm)	Breech	16	55.59 ± 18.47	0.01	0.94
	Cephalic	109	55.24 ± 15.99		
	Total	125	55.28 ± 16.24		
HC (mm)	Breech	16	261.71 ± 76.40	0.36	0.55
	Cephalic	109	271.74 ± 59.89		
	Total	125	270.46 ± 61.98		
AC (mm)	Breech	16	254.76 ± 83.93	0.15	0.70
	Cephalic	109	247.47 ± 67.24		
	Total	125	248.40 ± 69.25		
EFW (g)	Breech	16	1795.59 ± 1397.80	0	0.95
	Cephalic	109	1776.12 ± 1215.60		
	Total	125	1778.61 ± 1234.27		

DISCUSSION

Fetal gender determination during prenatal care has significantly improved with the continuous growth in Ultrasound Imaging Technology. The accuracy of first-trimester gender prediction varies compared with the previous research's reflection, with influenced gestational age success rates, primarily, and by means of imaging methods [15, 16]. The present study aimed at investigating the association between gender (calculated by ultrasound) and fetal biometric parameters in the second and third trimesters of pregnancy. In many countries, ultrasonography and imaging technology have become popular techniques to determine fetal gender [17]. Generally, it allows High-resolution visualization of the fetal genitalia between 16 and 20 weeks of gestational age. Determination of fetal gender has become a very popular clinical implication, particularly in genital abnormalities, X-linked genetic disorders, and presumed ovotesticulars are included. Also, BPD keeps a close association with gestational age; according to research, including crown-rump length (CRL) is considered the most effective way of gestational age estimation during the first trimester. Following the discussion, BPD readings are obtained between 12 and 18 weeks of gestation age for the prediction of the estimated delivery date. Such readings are considered statistically beneficial than those of CRL measurements, which are obtained 14 weeks before [18, 19]. Khalid *et al.* found a significant correlation between fetal gender and placental location, reporting posterior placentas more common in male fetuses (p<0.05). Whereas, in female fetuses, anterior placentas were reported to be significantly more common [4]. Subtle anatomical and physiological differences are implied through these results, beyond genital visualization that may show fetal gender, excluding placental position in this research. Gender prediction models' accuracy can be enhanced by combining placental positioning by means of biometric indicators. Anogenital distance (AGD) and genital tubercle angle (GTA) were identified as trustworthy early indicators for fetal gender identification in research by Alfuraih *et al.* and Elanwar *et al.* [14, 20]. For early and precise gender determination, these indicators are considered supplementary techniques, even though they are different from growth-based metrics like FL, HC, and AC. AGD's predictive value in early gestational assessments has been reinforced by studies that continuously demonstrate male fetuses with longer AGD measurements than female. Fetal gender and biometric measurements were found to be significantly correlated in this 125-person study. The biometric values of male fetuses were consistently higher than those of female fetuses. Abdominal circumference (AC) (male > female, p=0.005), head circumference (HC) (male > female, p=0.016), and femur length (FL) (male > female, p=0.002) all showed statistically significant differences. Males also had higher estimated fetal weights (EFW) and biparietal diameters (BPD), but these differences were not statistically significant (p=0.057 and p=0.060, respectively). Male fetuses showed larger biometric parameters during the second and third trimesters, which is in line with the findings of Broere-Brown *et al.* who also reported sex-specific growth variations [3]. It is also indicated by the studies that ultrasound-based gender determination achieved 100% sensitivity in accurately identifying fetal gender, during the second and third trimesters, especially having direct visualization pertains to the genitalia is possible, ultrasound-based gender determination achieves 100% sensitivity by precisely identifying fetal gender [1, 10]. Additionally, the observed biometric trends reinforce the value of objective fetal measurements as complementary tools for gender determination, particularly in cases where suboptimal fetal positioning obscures genital visualization.

DOI: https://doi.org/10.54393/pbmj.v8i10.1305

CONCLUSIONS

The current research extends the effective use of routine ultrasound biometry as a reliable, non-invasive, and cost-efficient approach in the prediction of fetal gender, especially during the later stages. Significantly greater femur length was shown by male foetuses' head circumference, and abdominal circumference compared to female fetuses, while estimated fetal weight and biparietal diameter were higher in males without being statistically significant. Adopting standardized ultrasound protocols by continuously investigating biometric indicators can improve prenatal care planning, which relies on less invasive diagnostic methods, and early gender prediction is precisely improved. Finally, significant differences in AC, FL, and HC between male and female fetuses emphasize the significance of biometric parameters as valuable predictors of fetal gender.

Authors Contribution

Conceptualization: MIUH
Methodology: MNA, SMYF, ZN
Formal analysis: MU
Writing review and editing: MNA, MU, SMYF, MIUH, SM, ZN, AM

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Amankona E, Donkor A, Agyei BA, Anyitey-Kokor I, Odoi AT, Wiafe YA. Effectiveness of Prenatal Ultrasound in Fetal Sex Identification: A Systematic Review and Meta-Analysis. Journal of Ultrasound. 2025 Jan: 1-2. doi: 10.1007/s40477-024-00977-7.

[2] Kumar N and Yadav A. Influence of Fetal Gender on Overall Perinatal Outcome: A Prospective Observational Study. Minerva Paediatrics. 2023 Dec; 75(6): 795-802. doi: 10.23736/S2724-5276.20.05650-9.

[3] Broere-Brown ZA, Adank MC, Benschop L, Tielemans M, Muka T, Gonçalves R *et al.* Fetal Sex and Maternal Pregnancy Outcomes: A Systematic Review and Meta-Analysis. Biology of Sex Differences. 2020 May; 11(1): 26. doi: 10.1186/s13293-020-00299-3.

[4] Khalid NH, Babiker JI, Fathelrahman SA. Relationship Between Placental Location and Fetal Gender Using Ultrasonography: A Prospective Study from the Maternity and Children's Hospital, Najran, Saudi Arabia. African Journal of Reproductive Health. 2023; 27(12): 36-42.

[5] Nouri S, Kalantar MH, Safi F, Almasi-Hashiani A. The Role of Fetal Heart Rate in First Trimester Sonograms in Prediction of Fetal Sex: A Systematic Review and Meta-Analysis. BioMed Central Pregnancy and Childbirth. 2023 Aug; 23(1): 582. doi: 10.1186/s12884-023-05908-8.

[6] Schaefer EC, McKenna DS, Sonek JD. First Trimester Identification of Fetal Sex by Ultrasound. Archives of Gynecology and Obstetrics. 2024 Apr; 309(4): 1453-8. doi: 10.1007/s00404-023-07046-0.

[7] Galjaard S, Ameye L, Lees CC, Pexsters A, Bourne T, Timmerman D *et al.* Sex Differences in Fetal Growth and Immediate Birth Outcomes in A Low-Risk Caucasian Population. Biology of sex Differences. 2019 Sep; 10(1): 48. doi: 10.1186/s13293-019-0261-7.

[8] Nagasaki S, Ishii K, Murakami Y, Tsutsui A, Hidaka N, Takahashi H *et al.* New Reference Values for Ultrasound Fetal Biometry in Japanese Population and Comparison with Other Studies. Scientific Reports. 2025 Aug; 15(1): 30560. doi: 10.1038/s41598-025-14508-9.

[9] Kurban Y, Uyar I, Alan M, Hacifazlioglu C. Fetal Sex Prediction Measuring Yolk Sac Size and Yolk Sac-Fetal Pole Distance in the First Trimester Via Ultrasound Screening. Journal of Ultrasound. 2021 Dec; 24(4): 489-92. doi: 10.1007/s40477-020-00516-0.

[10] Borowski J, Walaszczyk A, Szczepańska-Przekota A, Bulsa M, Borowska J. Fetal Sex Identification in Early Pregnancy. Pomeranian Journal of Life Sciences. 2024 Mar; 70(1). doi: 10.21164/pomjlifesci.944.

[11] Lubusky M, Studnickova M, Skrivanek A, Vomackova K, Prochazka M. Ultrasound Evaluation of Fetal Gender at 12-14 Weeks. Biomed Pap Med Fac Univ Palacky Olomouc, Czech Repub. 2012 Dec; 156(4): 324-9. doi: 10.5507/bp.2012.022.

[12] Lev-Toaff AS, Ozhan S, Pretorius D, Bega G, Kurtz AB, Kuhlman K. Three-Dimensional Multiplanar Ultrasound for Fetal Gender Assignment: Value of the Mid-Sagittal Plane. Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynaecology. 2000 Sep; 16(4): 345-50. doi: 10.1046/j.1469-0705.2000.00179.x.

[13] Alfuraih AM, Almajem BM, Alsolai AA. The Predictive Accuracy of Anogenital Distance and Genital Tubercle Angle for First-Trimester Fetal Sex Determination. Diagnostics. 2024 Aug; 14(16): 1811. doi: 10.3390/diagnostics14161811.

DOI: https://doi.org/10.54393/pbmj.v8i10.1305

[14] Alfuraih AM, Alotaiby SA, Alsaadi MJ, Bukhari HA, Aldhebaib AM, Mohtasib RS. Predictive Value and Reference Ranges of Anogenital Distance for Determining Fetal Gender in the First Trimester: A Retrospective Cohort Study. Saudi Medical Journal. 2021 Oct; 42(10): 1057. doi: 10.15537/smj.2021.42.10.20210468.
[15] Kearin M, Pollard K, Garbett I. Accuracy of Sonographic Fetal Gender Determination: Predictions Made by Sonographers During Routine Obstetric Ultrasound Scans. Australasian Journal of Ultrasound in Medicine. 2014 Aug; 17(3): 125-30. doi: 10.1002/j.2205-0140.2014.tb00028.x.
[16] Hsiao CH, Wang HC, Hsieh CF, Hsu JJ. Fetal Gender Screening by Ultrasound at 11 To 13 + 6 Weeks. Acta Obstetricia Et Gynecologica Scandinavica. 2008 Jan; 87(1):8-13. doi: 10.1080/00016340701571905.
[17] Gharekhanloo F. The Ultrasound Identification of Fetal Gender at the Gestational Age of 11–12 Weeks. Journal of Family Medicine and Primary Care. 2018 Jan; 7(1): 210-2. doi: 10.4103/jfmpc.jfmpc_180_17.
[18] Hadlock FP, Harrist RB, Sharman RS, Deter RL, Park SK. Estimation of Fetal Weight with the Use of Head, Body, and Femur Measurements—A Prospective Study. American Journal of Obstetrics and Gynaecology. 1985 Feb; 151(3): 333-7. doi: 10.1016/0002-9378(85)90298-4.
[19] Bromley B, Frigoletto Jr FD, Harlow BL, Evans JK, Benacerraf BR. Biometric Measurements in Fetuses of Different Race and Gender. Ultrasound in Obstetrics and Gynaecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynaecology. 1993 Nov; 3(6): 395-402. doi: 10.1046/j.1469-0705.1993.03060395.x.
[20] Elanwar AM, Shazly SA, Attia NA, Heraiz AI. Anogenital Distance for Detection of Fetal Sex in First Trimester of Pregnancy. The Egyptian Journal of Hospital Medicine. 2023 Jan; 90(2): 3035-40. doi: 10.21608/ejhm.2023.288384.