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Fetal Echocardiography: What Is Next? Can We Save Baby Life?

Iman Al-Obaidi, Ruaa Baha Aldeen Al-Baghdadi, Ali Abed Saadoon, Ahlam Al-Bayati, Ahlam Al-Wakil,Alhan Hussein Altimimy, Ann Sabah Bahiah, Areej And Almutalb Kanbar, Atyaf Hasan, Ban Azeez Al Ma'moori, Deniz Rashad Mandan, Eaman Hussein Raoof, Enas Ibrahim Mehdi, Eshrak Abdul Abass, Faris Anwar Farkad Abid Hassan Al-Jubouri, Faten ShalalHanin Daye', Hiyam Sabbar Sabti, Ikhlas Al-Rawi, Inas Taha Ahmed,, Inas Yaseen Mahdi, Kholoud Younis, Lamees Abd Ali Mohsen Alyousuf, Lamya'a Abdulateef Al-Azawi, Maad Mehdi Shallal, Mohammed Ghani Jabak, Nada Saeed Al Haddad, Nadia Khaleil Ismail, Najah Shakir Yaseen, Rasha Al-Baaj , Rana Abdulkareem Abdulkadeer Aldalw, Saba Al Bayati, Sahar H. Abdulrazzaq, Sallama Hamid Abbas, Samar Dawood Sarsam, Samia A. Eleiwe, Sarab Adnan Waseen, Shaymaa Raheem Mohammed, Shighaf Ibrahim Mohammed, Suha Abdel Jalil ,Sura Momen, Taghreed Alhaidari, Tagreed H. Hatem, Taghreed Qaddouri,Tayseer Atta Al-Rimawi, Thyria Husam, Wameedh Abduljabbar Abdulabbas Alra, Yosra Tahir Jarjees, Zahid Ali Abdullah*

Private fetal echocardiography practice, Ibn Al-Bitar Cardiac Center, Private obstetrics and gynecology practice, Baghdad, Iraq

Abstract:

Objective: This study aimed to establish scientific criteria and identify an appropriate battery of specific physical fitness tests with adequate reliability and validity for Vietnamese university students enrolled in elective basketball courses.

Methods: The study employed document analysis, expert consultation using a two-round Delphi process involving 30 experts, and a pedagogical experiment with 120 university students, comprising 60 males and 60 females. Test–retest reliability was evaluated using Pearson's correlation coefficient (*r*), while empirical validity was examined through correlations between test performance and actual game performance. Exploratory Factor Analysis (EFA) was used to optimize the test battery.

Results: Five fundamental criteria for test selection were identified: specificity, reliability, validity, feasibility, and safety. From an initial pool of 24 basketball-specific tests, seven tests met the predefined expert-consensus criterion and were subsequently evaluated for reliability and validity. Six tests demonstrated acceptable test–retest reliability, whereas the 20-m single-leg hop test showed insufficient reliability and was excluded. Of the remaining six tests, five demonstrated satisfactory empirical validity, while the 4 × 10-m shuttle run failed to meet the predefined validity criterion. The final battery therefore comprised five tests: (1) 30-s defensive shuffle; (2) 20-m variable-speed dribble sprint; (3) standing vertical jump to touch the backboard; (4) 20-s wall pass test; and (5) 1-min self-rebounding shooting test. The selected tests demonstrated high reliability ($r > 0.80$) and validity ($r > 0.60$). A 10-point evaluation scale based on the normal distribution ($M \pm SD$) was also established.

Conclusion: The five-test battery satisfies the predefined scientific and practical criteria and provides a feasible approach for assessing basketball-specific physical fitness among university students participating in elective basketball courses in Vietnam.

Keywords: Basketball; physical education; university students; specific physical fitness; test battery; reliability; validity.

Corresponding Author: Zahid Ali Abdullah†, Private fetal echocardiography practice, Ibn Al-Bitar Cardiac Center, Private obstetrics and gynecology practice, Baghdad, Iraq

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1. INTRODUCTION

Congenital heart disease (CHD) is among the most frequent congenital anomalies and remains a major contributor to fetal, neonatal, and infant morbidity and mortality. Prenatal identification of CHD is clinically important because it enables risk stratification, parental counseling, selection of the delivery site, immediate postnatal stabilization, and early referral to pediatric cardiology, cardiac surgery, or catheter-based intervention when indicated.[1,2]

Fetal echocardiography is the principal modality for detailed prenatal assessment of fetal cardiac anatomy, rhythm, function, and hemodynamics. The 2023 American Society of Echocardiography (ASE) guideline describes fetal echocardiography as the gold standard test for diagnosing fetal CHD. It emphasizes its role in detection, classification, risk assessment, and perinatal care planning [1]. Comprehensive transabdominal fetal echocardiography is optimally performed at 18-22 weeks of gestation, with earlier targeted assessment for selected high-risk pregnancies and repeat assessment later in gestation when clinically needed [1,2].

Despite its clinical value, fetal echocardiography is not a perfect screening or diagnostic test. Its performance depends on lesion type, gestational age, fetal position, image quality, equipment, and examiner expertise. Major structural lesions such as tetralogy of Fallot, complete atrioventricular canal, double outlet right ventricle, and transposition of the great arteries are generally more detectable than small ventricular septal defects, atrial septal defects, patent ductus arteriosus, and abnormalities affected by fetal transitional physiology [3,4].

Referral patterns influence diagnostic yield significantly. A suspected cardiac abnormality on a routine obstetric ultrasound should prompt fetal echocardiography to confirm and refine the diagnosis, while maternal, fetal, and familial risk factors may justify referral even when the screening scan appears normal [1]. Understanding how local referral indications affect diagnostic yield is therefore essential for optimizing fetal cardiology services.

Published information from Iraq and similar regional private-sector referral settings remains limited. This study addresses a practical clinical question: can fetal echocardiography be relied upon in referred pregnant patients in Baghdad when results are compared with available postnatal findings and clinical outcomes?

Objective

The objective was to evaluate the diagnostic yield, postnatal correlation, referral indications, lesion spectrum, and management outcomes of fetal echocardiography in pregnant patients referred in Baghdad, Iraq, from 2018 to 2023.

Patients and Methods

Study design and setting

This was a cross-sectional study in whichfetal echocardiography referrals performed in Baghdad, Iraq, between December 2018 and August 2023 were reviewed. Examinations were performed through Ibn Al-Bitar Cardiac Center and private fetal echocardiography practice settings.

Study population and referral sources

The study included 1,062 pregnant patients referred for fetal echocardiography. Referrals were received from mixed private-sector and hospital-based sources, including obstetricians, radiologists, fetal medicine practitioners, pediatric cardiology-related referrals, and other physicians involved in antenatal care. Referring physicians contributed to patient referrals and postnatal follow-up communication; no individual-physician diagnostic performance comparison was performed.

Inclusion criteria

- Pregnant patients referred for fetal echocardiography during the study period.
- Maternal, fetal, familial, or obstetric history risk factors recorded as the main indication for referral.
- Available fetal echocardiography record with prenatal diagnosis or normal fetal cardiac assessment.

Fetal echocardiography protocol

All examinations were performed using a GE Vivid 7 echocardiography machine with a 2.5 MHz sector probe. The recorded fetal cardiac assessment protocol included the four-chamber view and the left ventricular outflow tract (LVOT), right ventricular outflow tract (RVOT), ductal arch, and aortic arch views. (Figure 1) Color Doppler, rhythm assessment, and additional views were used when clinically indicated. This approach is consistent with the principle of a systematic, multi-view fetal cardiac examination recommended by current fetal echocardiography guidance [1].

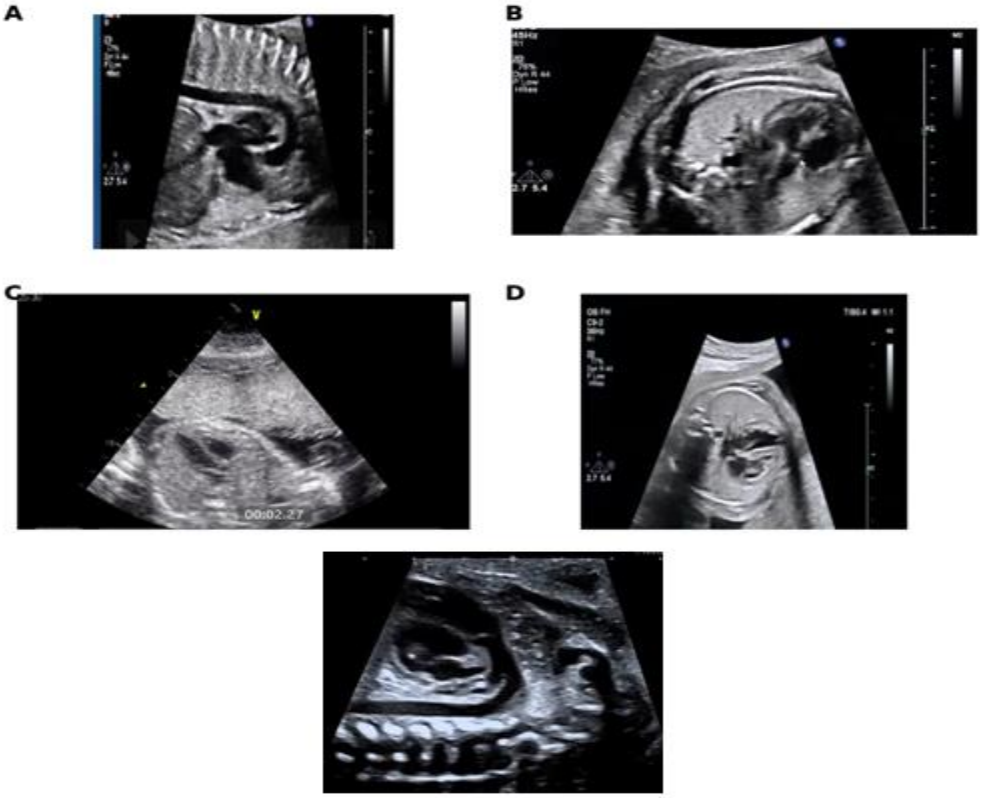


Figure 1. Representative de-identified fetal echocardiography images from the study material. Images illustrate the types of fetal cardiac ultrasound views used in clinical assessment

The original dataset recorded fetal echocardiography at approximately 20, 24, 28, 32, and 36 weeks of gestation, with most referrals occurring around 24 weeks. Because the raw gestational-age counts in the uploaded source file did not sum to the total sample size, the manuscript reports the internally consistent percentage distribution recorded in the working draft.

Postnatal correlation and outcomes

Prenatal findings were compared with available postnatal echocardiography and clinical outcome records. Postnatal confirmation was available for most abnormal cases, according to the source manuscript and the authors' clarification; however, detailed follow-up was incomplete for some patients. Cases without complete outcome documentation were recorded as lost to follow-up or unavailable detailed postnatal follow-up.

Statistical analysis

Data were summarized using frequencies and percentages. Diagnostic yield was calculated as the proportion of referred pregnancies with CHD. Prenatal detection among CHD cases was calculated as the proportion of ultimately recorded CHD cases detected before delivery. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy were calculated from the documented 2 x 2 table: true positive = 142, false negative = 20, false positive = 0, and true negative = 900. These estimates should be interpreted cautiously because postnatal follow-up was not uniformly complete.

Ethics

Verbal informed consent was obtained from pregnant patients before fetal echocardiographic assessment. Examinations were performed after referral by treating physicians, and permission/consent from referring physicians was documented in clinical practice, including consent for authorship/contribution as applicable. Patient-identifying information was removed during manuscript preparation.

Results

Study population and diagnostic yield

A total of 1,062 referred pregnant patients underwent fetal echocardiography. CHD was recorded in 162 cases (15.25%), while 900 cases (84.75%) had no recorded postnatal CHD. Prenatal fetal echocardiography detected 142 of the 162 CHD cases (87.65%). Twenty cases (12.35% of CHD cases) were diagnosed after delivery and were mainly minor or non-cyanotic lesions, including PDA, ASD, and restrictive/small VSD.

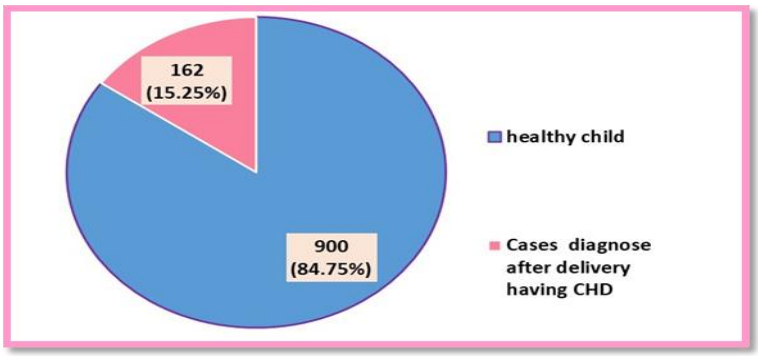


Figure 2: Distribution of children enrolled in the study (n=1062)

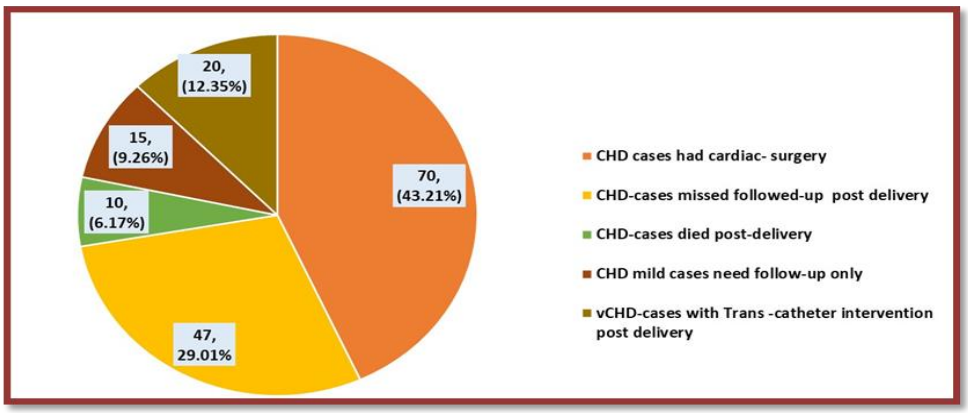


Figure 3: Distribution of CHD cases according of their end-result (N = 162).

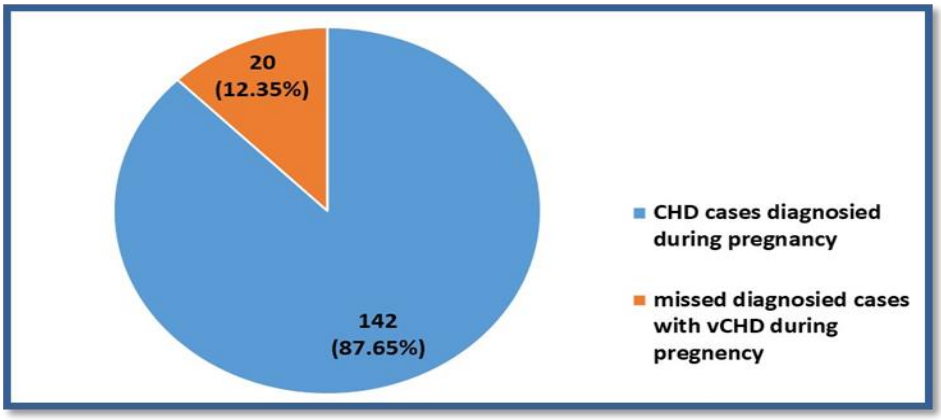


Figure 4: Distribution of CHD according to Prenatal detection versus postnatal diagnosis (n = 162).

Referral timing

The recorded gestational age distribution for referral was as follows: 20 weeks in 21%, 24 weeks in 40%, 28 weeks in 17%, 32 weeks in 16%, and 36 weeks in 6% of patients. Thus, approximately 61% of examinations occurred between 20 and 24 weeks, while a substantial minority were performed later in pregnancy.

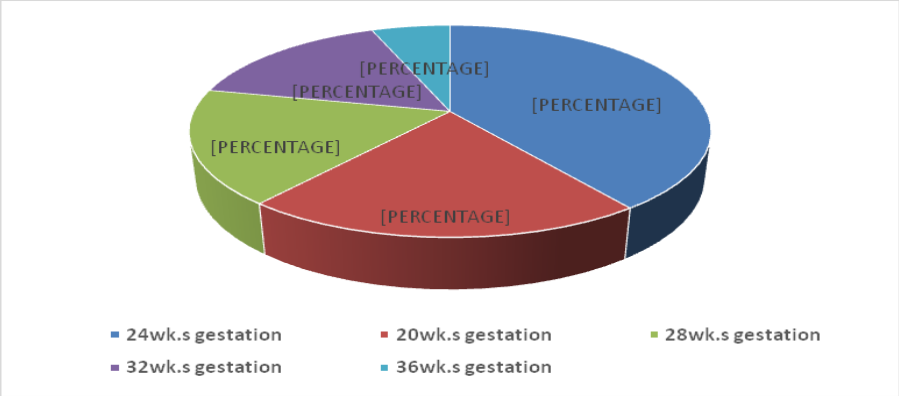


Figure 5: Distributionof gestational age at fetal echocardiography referral.

Referral indications and yield

The highest recorded diagnostic yields were seen in recurrent abortion, hydrops, previous intrauterine death, previous neonatal death, family history of CHD, and maternal CHD. Several indications, including abnormal fetal Doppler, polyhydramnios, oligohydramnios, IUGR, fetal bradycardia, drug history, extracardiac malformation, fetal tachycardia, and multiple pregnancy, had no CHD cases recorded in the source table. These findings suggest that local referral criteria should be refined, while recognizing that referral indications may have overlapped and been documented retrospectively.

Table 1. Referral indications, diagnostic yield, selected CHD types, and management notes.

Referral indication	Referred cases, n	CHD cases, n	CHD yield, %	Selected CHD types recorded in the source table	Management/referral notes
Recurrent abortion	67	47	70.1	Tricuspid/pulmonary valve atresia; Ebstein anomaly; DORV; d-TGA; coarctation; TOF; pulmonary stenosis; ASD	Referred to the Ministry of Health committee and cardiologist
Hydrops	25	14	56.0	Complete AV canal; DORV; single ventricle; d-TGA; ectopic chords	Referral to the Ministry of Health committee; one death recorded
Previous intrauterine death	75	25	33.3	VSD; TOF	Referred to pediatric cardiologist and committee
Previous neonatal death	60	20	33.3	Aortopulmonary window; d-TGA; AV canal; pulmonary stenosis; ASD; VSD	Referred to pediatric cardiologist and committee
Family history of CHD	65	20	30.8	VSD; partial/complete AV canal; d-TGA; PDA; pulmonary stenosis; ASD	Referred to a pediatric cardiologist
Mother with CHD	20	6	30.0	-	-
Previous child/baby with CHD	44	10	22.7	d-TGA; VSD; pulmonary stenosis; TOF	Referred to the committee and a pediatric cardiologist
Maternal systemic lupus erythematosus	6	1	16.7	L-TGA	Referred to a pediatric cardiologist
IVF pregnancy	77	10	13.0	TOF; VSD; complete AV canal	Referred to a pediatric cardiologist
Abnormal four-	110	8	7.3	Coarctation; premature	Balloon intervention

chamber view				foramen ovale closure; premature ductus arteriosus closure	after delivery or premature cesarean section at 35-37 weeks when indicated
Tricuspid regurgitation	15	1	6.7	Ebstein anomaly	Termination recorded in the source table
Abnormal fetal Doppler	64	0	0	-	-
Polyhydramnios	93	0	0	-	-
Oligohydramnios	85	0	0	-	-
Intrauterine growth restriction	65	0	0	-	-
Drug history	55	0	0	-	-
Fetal bradycardia	35	0	0	-	-
Fetal tachycardia	32	0	0	-	-
Multiple fetus	30	0	0	-	-
Pericardial effusion	24	Not recorded	Not recorded	Not recorded	Not recorded
Extracardiac malformation	15	0	0	-	-
Overall total	1062	162	15.25	All recorded CHD	Overall referred cohort

CHD, congenital heart disease; IVF, in vitro fertilization; IUGR, intrauterine growth restriction; SLE, systemic lupus erythematosus; AV, atrioventricular; DORV, double outlet right ventricle; d-TGA, d-transposition of the great arteries; TOF, tetralogy of Fallot; VSD, ventricular septal defect; ASD, atrial septal defect; PDA, patent ductus arteriosus.

Postnatal correlation and diagnostic performance

Using the documented 2 x 2 diagnostic table, fetal echocardiography showed high diagnostic performance in this referred cohort. Prenatal fetal echocardiography identified 142 CHD cases, while 20 CHD cases were diagnosed postnatally. No false-positive prenatal CHD diagnosis was documented in the available records, and 900 pregnancies were classified as true negatives. Accordingly, sensitivity was 87.65%, specificity 100%, PPV 100%, NPV 97.83%, and overall accuracy 98.12%. These values reflect available documentation and postnatal correlation, not absolute population-level test performance.

Table 2. Diagnostic performance of fetal echocardiography compared with available postnatal diagnosis.

Parameter	Numerator/denominator	Value	Interpretation/confirmation note
Sensitivity	142 / (142 + 20) = 142 / 162	87.65%	Proportion of ultimately recorded CHD cases detected prenatally.
Specificity	900 / (0 + 900) = 900 / 900	100%	No false-positive prenatal CHD diagnosis was documented in available records.
Positive predictive value (PPV)	142 / (142 + 0) = 142 / 142	100%	Probability of postnatal CHD after a positive fetal echocardiography result in available records.
Negative predictive value (NPV)	900 / (900 + 20) = 900 / 920	97.83%	Probability of no postnatal CHD after a negative fetal echocardiography result in available records.
Overall accuracy	(142 + 900) / 1,062 = 1,042 / 1,062	98.12%	Overall agreement with the available postnatal classification.

TP, true positive; FN, false negative; FP, false positive; TN, true negative; PPV, positive predictive value; NPV, negative predictive value.

Spectrum of lesions

The most frequently recorded lesion groups were ventricular septal defect, tetralogy of Fallot, complete atrioventricular canal/pulmonary hypertension, PDA, ASD, and d-TGA. Other recorded anomalies included tricuspid or pulmonary valve atresia, partial AV canal, DORV/VSD, coarctation, L-TGA, Ebstein anomaly, and aortopulmonary window.

Table 3. Lesion-specific distribution recorded in the source dataset.

Lesion group	Prenatal fetal echo count recorded	Postnatal/neonatal count recorded
VSD	25	32
TOF	28	28
Complete AV canal / pulmonary hypertension	16	18
PDA	0	16
ASD	12	15
d-TGA	12	12
Tricuspid/pulmonary valve atresia	10	10
Partial AV canal	8	8
DORV/VSD	6	7
Coarctation	5	6
L-TGA	4	4
Ebstein anomaly	4	4
Aortopulmonary window	0	2
Prenatally detected CHD not assigned to a lesion category in the source chart	12	0

The postnatal/neonatal lesion counts sum to 162.

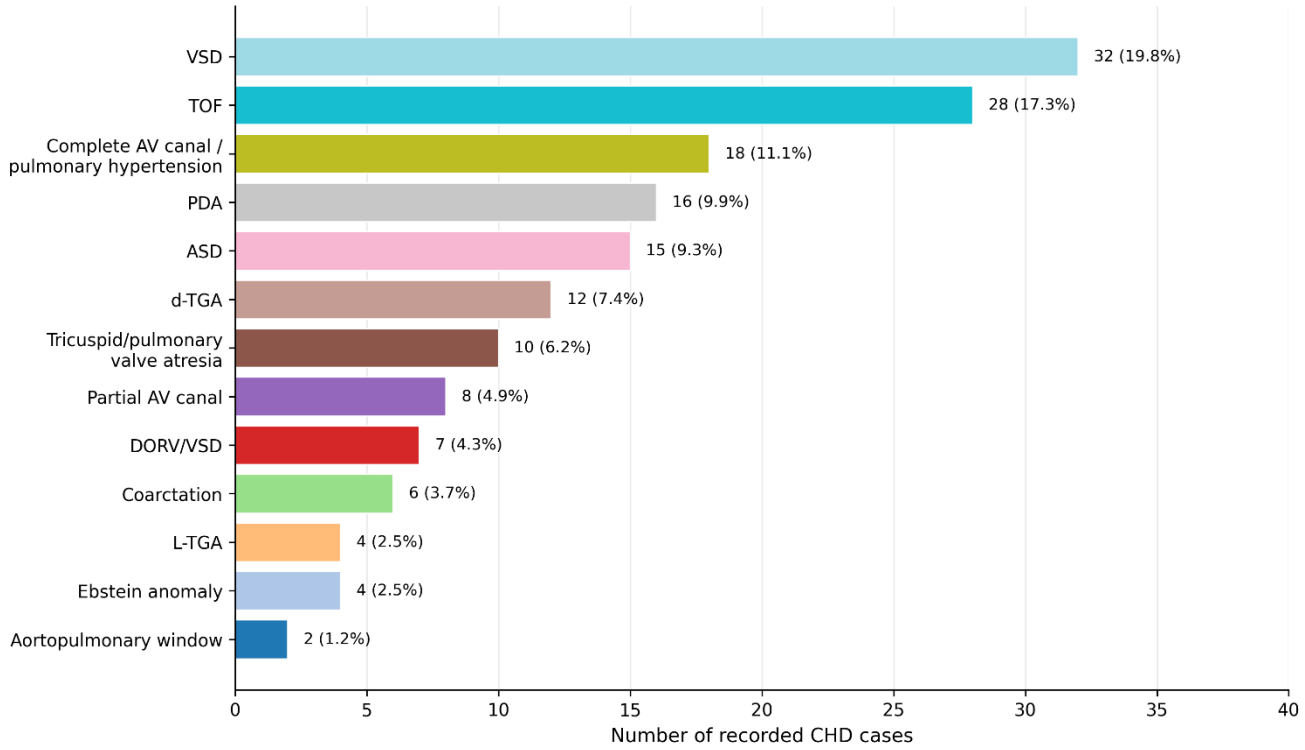


Figure 6: Postnatal/neonatal CHD lesion distribution among recorded CHD cases (n = 162).

Postnatal management, outcome, and delivery mode

According to the internally consistent source figure dataset, 70 CHD cases underwent cardiac surgery, 20 underwent transcatheter intervention, 15 remained under follow-up for mild disease, 47 had unavailable or missed detailed postnatal follow-up, and 10 deaths were recorded. The source file elsewhere reported 49 missed follow-up cases and 8 deaths; the internally consistent 47/10 version is used here because it sums to 162 CHD cases.

Table 4. Postnatal management and outcome categories among recorded CHD cases.

Outcome category	Cases, n	Percentage of CHD cases, %
Cardiac surgery	70	43.2
Lost to follow-up / unavailable detailed postnatal follow-up	47	29.0
Transcatheter intervention	20	12.3
Mild CHD requiring follow-up only	15	9.3
Death recorded after fetal/neonatal CHD diagnosis	10	6.2

Values sum to 162 CHD cases.

Table 5. Mode of delivery among CHD cases.

Mode of delivery	Cases, n	Percentage of CHD cases, %
Cesarean delivery	115	71.0
Vaginal delivery	47	29.0

Discussion

This study supports fetal echocardiography as a clinically valuable diagnostic and triage method in referred pregnant patients. Of 1,062 referred pregnancies from Baghdad, CHD was detected in 15.25%, consistent with the high diagnostic yield expected in referred or enriched populations rather than unselected obstetric populations. The observed yield is close to the 14.5% abnormal echocardiography rate reported in a large referral study from Shiraz, South Iran, and within the broad range reported by referral-center studies [9].

The diagnostic-performance profile in this dataset was high. Based on the documented 2 x 2 table, sensitivity was 87.65%, specificity 100%, PPV 100%, NPV 97.83%, and overall accuracy 98.12%. The 100% specificity and PPV reflect the absence of documented false-positive fetal echocardiography diagnoses in the available records; they should not be interpreted as proof that false-positive diagnoses cannot occur. The observed sensitivity is lower than the 97.03% sensitivity and 99.07% specificity reported by Rakha and El Marsafawy in a tertiary Egyptian high-risk cohort. Still, it remains clinically strong for a regional referral practice [3].

The missed lesions were mainly PDA, ASD, and restrictive or small VSD according to the source manuscript. This pattern is clinically plausible because small septal defects and lesions involving the fetal transitional circulation are among the most difficult to define prenatally. Previous accuracy studies have emphasized similar caution for minor lesions and lesions whose hemodynamic expression evolves after delivery [3,4]. Therefore, fetal echocardiography should be presented as highly useful but not as an absolute replacement for postnatal echocardiography.

The ASE 2023 guideline strengthens the interpretation of these findings. It emphasizes fetal echocardiography for detection, classification, risk assessment, and perinatal care planning in pregnancies affected by fetal cardiovascular disease [1]. In this study, the use of multiple cardiac views and the high prenatal detection of clinically significant CHD support the practical value of a systematic examination. However, the local protocol did not explicitly document every element of a complete contemporary fetal echocardiogram, and this should be improved in future prospective data collection.

The data also show that fetal echocardiography should not be considered only a diagnostic test; it is also a care-planning tool. Prenatal recognition of major CHD allows counseling, selection of delivery site, preparation for prostaglandin-dependent circulation, early catheter-based intervention, surgical planning, and multidisciplinary neonatal care. Studies of critical CHD have shown that fetal diagnosis can improve timing of presentation and immediate postnatal management, although survival effects vary by lesion type and health-system context [5,6].

The referral-pattern findings are particularly important. Recurrent abortion, hydrops, previous intrauterine death, previous neonatal death, family history, and maternal CHD showed high recorded yields in this study. In contrast, several indications yielded no recorded CHD cases. These findings suggest that local referral criteria should be refined, but they should not be interpreted as proof that low-yield indications are never appropriate. Some indications may still justify fetal echocardiography because of fetal rhythm risk, progressive lesions, maternal disease, extracardiac abnormalities, counseling needs, or local medicolegal considerations.

The low recorded yield for an abnormal four-chamber view in this dataset differs from several published referral studies, in which suspected cardiac abnormality on routine ultrasound is often among the highest-yield indications [7,8,11]. This discrepancy may reflect differences in referral documentation, the broad use of the term "abnormal four-chamber view," limitations in image quality, or overlap with other indications. It supports the need for standardized referral forms that distinguish a suspected structural cardiac defect from nonspecific screening concerns.

Timing remains a practical issue. Approximately 61% of examinations were performed between 20 and 24 weeks, but a significant proportion occurred later, at 28-36 weeks. Current guidance favors comprehensive transabdominal fetal echocardiography at 18-22 weeks, with earlier targeted assessment in selected high-risk cases and repeat examinations when clinically needed [1,2]. Late referral reduces time available for counseling, genetic evaluation, pregnancy decision-making, where legally and ethically relevant, and delivery planning. Studies from neighboring and regional settings have similarly emphasized delayed referral as a barrier to the full benefit of fetal cardiology [9,12].

Mode of delivery should not be dictated by fetal CHD alone unless obstetric indications or lesion-specific neonatal planning require it. The source dataset recorded a high cesarean-section rate among CHD cases. Published evidence suggests that routine elective cesarean delivery for fetal CHD does not necessarily improve neonatal outcome and may increase maternal morbidity; therefore, delivery mode should be individualized through obstetric, neonatal, and pediatric cardiology collaboration [13].

The central answer to the study question is therefore conditional. Fetal echocardiography can be relied upon for the detection and perinatal planning of clinically significant CHD in referred pregnant patients when performed by experienced operators using standardized views and followed by postnatal confirmation. It should not be presented as a test capable of excluding all minor lesions. Its value is strongest when referral criteria, examination timing, reporting structure, and follow-up systems are standardized.

Limitations

This study has several limitations. First, cross-sectional design makes the analysis dependent on the quality and completeness of clinical documentation. Second, the study population was a referred cohort, so the diagnostic yield cannot be generalized to all pregnancies in Baghdad or Iraq. Third, detailed postnatal follow-up was incomplete for a subset of patients. Although the documented 2 x 2 diagnostic table supports high sensitivity, specificity, PPV, NPV, and accuracy, these values should be recalculated if additional postnatal confirmation data become available.

Fourth, some source data were inconsistent. The gestational-age raw counts did not sum consistently to the total sample; outcome counts differed between 47/10 and 49/8 versions for lost follow-up and deaths; and the pericardial effusion row did not record a CHD count. Fifth, referral indications may have overlapped, but the available table treated each case under a single main indication. Sixth, long-term outcomes after surgery, catheter intervention, conservative follow-up, or death were not systematically analyzed.

Conclusion

Fetal echocardiography can be relied upon as a high-value diagnostic and perinatal planning tool in referred pregnant patients in Baghdad, particularly for major and clinically significant CHD. In this 2018-2023 study, fetal echocardiography showed a high diagnostic yield, detecting most ultimately recorded CHD cases before delivery. However, reliance should be understood as conditional rather than absolute: minor lesions may be missed, late referral reduces clinical utility, and postnatal echocardiographic confirmation remains necessary. The findings support earlier and more structured referral criteria, standardized fetal cardiac reporting, and stronger postnatal follow-up pathways.

Ethics statement

Verbal informed consent was obtained from pregnant patients before fetal echocardiographic assessment. The examinations were performed after referral by treating physicians, with permission/consent from referring physicians documented in clinical practice, including consent for authorship/contribution as applicable. Patient-identifying information was removed during manuscript preparation.

Conflict of interest

The authors declare no conflicts of interest. All authors should confirm this statement before submission.

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References

1. Moon-Grady AJ, Donofrio MT, Gelehrter S, Hornberger L, Kreeger J, Lee W, et al. Guidelines and recommendations for performance of the fetal echocardiogram: an update from the American Society of Echocardiography. J Am SocEchocardiogr. 2023;36(7):679-723. doi:10.1016/j.echo.2023.04.014.
2. Donofrio MT, Moon-Grady AJ, Hornberger LK, Copel JA, Sklansky MS, Abuhamad A, et al. Diagnosis and treatment of fetal cardiac disease: a scientific statement from the American Heart Association. Circulation. 2014;129(21):2183-2242. doi:10.1161/01.cir.0000437597.44550.5d.
3. Rakha S, El Marsafawy H. Sensitivity, specificity, and accuracy of fetal echocardiography for high-risk pregnancies in a tertiary center in Egypt. Arch Pediatr. 2019;26(6):337-341. doi:10.1016/j.arcped.2019.08.001.
4. Bakiler AR, Ozer EA, Kanik A, Kanit H, Aktas FN. Accuracy of prenatal diagnosis of congenital heart disease with fetal echocardiography. Fetal DiagnTher. 2007;22(4):241-244. doi:10.1159/000100782.
5. Colaco SM, Karande T, Bobhate PR, Jiyani R, Rao SG, Kulkarni S. Neonates with critical congenital heart defects: impact of fetal diagnosis on immediate and short-term outcomes. Ann Pediatr Cardiol. 2017;10(2):126-130. doi:10.4103/apc.APC_125_16.
6. Levey A, Glickstein JS, Kleinman CS, Levasseur SM, Chen J, Gersony WM, Williams IA. The impact of prenatal diagnosis of complex congenital heart disease on neonatal outcomes. PediatrCardiol. 2010;31(5):587-597. doi:10.1007/s00246-010-9648-2.
7. Nair A, Radhakrishnan S. Evaluation of referral pattern for fetal echocardiography at a tertiary care center in Northern India and its implications. J ObstetGynaecol India. 2016;66(Suppl 1):258-262. doi:10.1007/s13224-016-0872-4.
8. ThulasiAmmal M, Chidambarathanu S, Suresh I, Seshadri S. Referral pattern for fetal echocardiography over 10 years in a single fetal imaging center from Southern India. J Fetal Med. 2020;7:133-138. doi:10.1007/s40556-020-00250-x.
9. Amoozgar H, Sadeghi P, Edraki M, Mehdizadegan N, Mohammadi H, Naghshzan A, et al. Referral pattern of pregnant mothers for fetal echocardiography in Shiraz, South Iran. BMC CardiovascDisord. 2024;24:679. doi:10.1186/s12872-024-04363-3.
10. Nayak K, Chandra GSN, Shetty R, Narayan PK. Evaluation of fetal echocardiography as a routine antenatal screening tool for the detection of congenital heart disease. CardiovascDiagnTher. 2016;6(1):44-49. doi:10.3978/j.issn.2223-3652.2015.12.01.
11. Wright L, Stauffer N, Samai C, Oster ME. Who should be referred to? An evaluation of referral indications for fetal echocardiography in the detection of structural congenital heart disease. PediatrCardiol. 2014;35(6):928-933. doi:10.1007/s00246-014-0877-7.
12. Kanwal A, Sheik AM, Saher T. Determining the factors causing delayed referral for fetal echocardiography at a tertiary care hospital. J Saudi Heart Assoc. 2018;30(3):205-210. doi:10.1016/j.jsha.2017.12.001.
13. Zloto K, Hochberg A, Tenenbaum-Gavish K, Berezowsky A, Barbash-Hazan S, Bardin R, et al. Fetal congenital heart disease - mode of delivery and obstetrical complications. BMC Pregnancy Childbirth. 2022;22:578. doi:10.1186/s12884-022-04910-w.