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Cardiological Society of India

Yearbook of CARDIOLOGY 2023

Heart Failure

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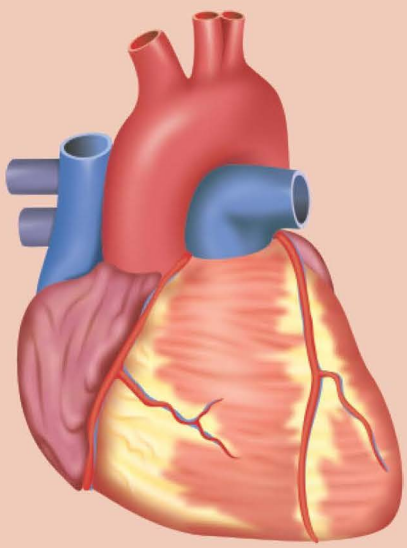

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SECTION 8

Heart Failure in Women

***Section Editor*: Justin Paul**

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ARTICLE 1

Infertility and Risk of Heart Failure in the Women's Health Initiative

Lau ES, Wang D, Roberts M, Taylor CN, Murugappan G, Shadyab AH, et al. Infertility and Risk of Heart Failure in the Women's Health Initiative.
J Am Coll Cardiol. 2022;79(16):1594-603.

Abstract

Background: Previous known information indicated that there is an association of reproductive factors with an increased risk of future cardiovascular (CV) disease. However, emerging data support its association with increased risk of CV disease and infertility but not enough is well-known about the same. The association of infertility with future risk of heart failure (HF) is not fully understood and is presently the current research interest topic.

Objectives: In women with and without a history of infertility present study aimed to examine the development of HF and HF subtypes.

Methods: Postmenopausal women were followed by the Women's Health Initiative prospectively for the development of HF. At the study baseline, infertility was self-reported. To evaluate the association of infertility with incident overall HF and HF subtypes [heart failure with preserved ejection fraction (HFpEF): left ventricular ejection fraction of ≥50% vs. heart failure with reduced ejection fraction (HFrEF): left ventricular ejection fraction of <50%] multivariable cause-specific Cox models were used.

Results: Among 38,528 postmenopausal women (mean age: 63 ± 7 years), a history of infertility was reported by 5,399 (14%) participants. A total of 2,373 participants developed HF incidents, including 807 with HFrEF and 1,133 with HFpEF over a median follow-up of 15 years. Also, observed that there was an independent association of infertility with future risk of overall HF (HR 1.16; 95% CI 1.04–1.30; $p = 0.006$). Remarkably, on examining subtypes of HF, infertility was found to be associated with future risk of HFpEF (HR 1.27; 95% CI 1.09–1.48; $p = 0.002$) but not with HFrEF (HR 0.97; 95% CI 0.80–1.18).

Conclusion: Infertility was significantly associated with incident HF. This was driven by an increased risk of HFpEF, but not HFrEF, and appeared independent of traditional CV risk factors and other infertility-related conditions. Future research should investigate mechanisms that underlie the link between infertility and HFpEF.

ARTICLE COMMENTARY

This study examines the association of infertility with the risk of heart failure (HF) and HF subtypes among women enrolled in the Women's Health Initiative (WHI). WHI is a national prospective study of 161,808 postmenopausal women recruited across 40 clinical centers between 1993 and 1998. The present study analyzed 38,528 postmenopausal women with centrally adjudicated HF outcomes from the HF subcohort of WHI. Infertility was self-reported at the study baseline. Multivariable cause-specific Cox models were used to evaluate the association of infertility with incident overall HF and HF subtypes [heart failure with preserved ejection fraction (HFpEF) vs. heart failure with reduced ejection fraction (HFrEF)]. The association of infertility with established congenital heart defect (CHD) risk factors [age, body mass index (BMI), race/ethnicity, systolic blood pressure, hypertension treatment, diabetes mellitus (DM), smoking status, and hyperlipidemia] was also evaluated. The association of infertility-related risk factors (irregular menses, thyroid disease, waist circumference, and early menopause) with HF was analyzed.

About 5,399 (14%) of the 38,528 postmenopausal women reported a history of infertility. Over a median follow-up time of 15 years [interquartile range (IQR) 8–20], 2,373 women developed incident HF, including 807 HFrEF cases and 1,133 HFpEF cases. Infertility was independently associated with future risk of HF. Women with infertility had a nearly 20% increased risk of developing HF compared with those without infertility. This association was primarily for HFpEF (HR 1.27; $p < 0.002$) but not HFrEF (HR 0.97). Infertility was not associated with 10-year atherosclerotic cardiovascular disease (ASCVD) risk.

The statistical model demonstrated significant associations between irregular menses, early menopause, and thyroid disease with infertility. Thyroid disease and early menopause were also associated with future risk of overall HF (HR 1.11). The relationship between infertility and future risk of HF and HFpEF persisted even after further adjustment for irregular menses, early menopause, and thyroid disease.

Women with infertility had a higher risk of developing HF. This was driven primarily by an increased risk of future HFpEF, but not HFrEF.

The increased risk of HF in women with a history of infertility was not explained by traditional atherosclerotic cardiovascular (CV) risk factors such as hypertension, obesity, and DM or a greater risk of ischemic heart disease. This increased risk was not also explained by the risk factors for infertility like menstrual cycle irregularity, premature menopause, and hypothyroidism.

Taken together, these findings support the novel association of infertility with incident HFpEF, which appears independent of traditional CV risk factors, ischemic heart disease, or infertility-associated factors. The findings suggest that the mechanisms mediating HF risk in infertility are orthogonal

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to traditional ASCVD. Future research should investigate mechanisms that underlie the link between infertility and HFpEF. A potential limitation of the study is the reliance on self-reported infertility status, which introduces the possibility of misclassification.

Key messages

- ***A woman's reproductive period is becoming an increasingly important window into her lifetime CV risk. Premature menopause and adverse pregnancy outcomes, including hypertensive disorders of pregnancy and gestational diabetes, are well-recognized as independent risk factors for future ASCVD.***
- ***This study has presented evidence supporting infertility as an independent risk factor for the development of HF among women without previous history of HF.***

ARTICLE 2

Distinct Pathophysiological Pathways in Women and Men with Heart Failure

Ravera A, Santema BT, de Boer RA, Anker SD, Samani NJ, Lang CC, et al. Distinct Pathophysiological Pathways in Women and Men with Heart Failure.
Eur J Heart Fail. 2022;24(9):1532-44.

Abstract

Aims: In heart failure (HF), the clinical differences between women and men have been described widely. Still, limited knowledge is known about the underlying pathophysiological mechanisms. Hence, in this present study, comparisons of multiple circulating biomarkers were planned to gain better insights into differential HF pathophysiology between women and men.

Methods and results: Compared differential expression of a panel of 363 biomarkers in 537 women and 1,485 men with HF. To identify differential biological pathways in women and men, performed a pathway overrepresentation analysis. In an independent HF cohort (575 women and 1,123 men) all findings were validated. Women were older and had higher left ventricular ejection fraction (LVEF) observed in both cohorts. Found 14/363 and 12/363 biomarkers that were relatively upregulated in women, while 21/363 and 14/363 were upregulated in men in the index and validation cohorts, respectively. Leptin and fatty acid binding protein-4 were the strongest upregulated biomarkers in women in both cohorts, compared to matrix metalloproteinase-3 in men. In a subset of patients from both cohorts matched by age and LVEF similar findings were pretended. In women, pathway overrepresentation analysis showed increased activity of pathways associated with lipid metabolism and in men neuroinflammatory response (all $p < 0.0001$).

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Conclusion: Biomarkers associated with lipid metabolic pathways were detected in women, while biomarkers associated with neuroinflammatory response were more active in men in two independent cohorts of HF patients. In clinical phenotype observed in HF patients, differences in inflammatory and metabolic pathways may contribute to sex differences and give useful insights toward the development of personalized HF therapies.

ARTICLE COMMENTARY

Clinical differences between women and men have been well defined in heart failure (HF). Though, the gender differences in the underlying pathophysiological mechanisms have not been well elucidated. The authors ventured to understand the sex differences in pathophysiological pathways of heart failure by comparing differential expression of circulating biomarkers in men and women.

The BIOSTAT-CHF (Systems Biology Study to Tailored Treatment in Chronic Heart Failure) was a European project. This project includes two prospective, observational, multinational cohorts. To inspect the biomarker profiles in both BIOSTAT-CHF indices, about 363 distinctive proteins from different pathophysiological domains were used and validated in the present planned cohorts.

The index cohort consisted of 2,516 patients with signs and symptoms of deteriorating HF and either a left ventricular ejection fraction (LVEF) ≤ 40%, or plasma concentrations of N-terminal pro-B-type natriuretic peptide (NT-pro BNP) >2,000 ng/L, from 11 centers in Europe of the BIOSTAT-CHF project. At the time of enrollment, these patients were either receiving <50% of the target dose of angiotensin-converting enzyme inhibitors (ACEIs)/angiotensin receptor blockers (ARBs) or treatment naïve and were receiving β-blockers.

The validation cohort consisted of 1,738 patients from a second independent cohort from six centers in Scotland, with HF and a previous documented HF admission requiring diuretic treatment, not previously treated or receiving ≤50% of target doses of ACEI/ARBs and/or β-blockers.

In the present cohort, it was observed that as compared to men 14 biomarkers were found to be upregulated in women, and in the other hand, compared to women in men a total of 21 biomarkers were found to be upregulated. Leptin and fatty-acid binding protein-4 (FABP-4) was the most prominently upregulated biomarkers in women as compared with men. Matrix metalloproteinase-3 (MMP-3) was found to be the most significantly upregulated biomarker in men as compared with women. Similar findings were obtained in the validation cohort too.

Four pathways that were specifically enhanced in women with HF revealed by pathway overrepresentation analysis of the 14 upregulated biomarkers in women in the index cohort: (1) triglyceride catabolic process, (2) glycerolipid catabolic process, (3) plasma lipoprotein assembly, remodeling, and clearance, and (4) cellular response to low-density lipoprotein (LDL) particle stimulus. Similar findings were observed in the validation cohort too.

In men in the index cohort exposed, two overexpressed pathways in men, revealed by pathway overrepresentation analysis of the 21 upregulated biomarkers these are: (1) neuroinflammatory response and (2) regulation of neuroinflammatory response.

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However, in the validation cohort, the upregulated biomarkers in men were less and not that enough to yield results from pathway overrepresentation analysis.

With all-cause mortality, most of the differentially expressed biomarkers showed a significant association on performing regression analysis, before and after adjustment for selected covariates.

Out of the 363 biomarkers that were evaluated 14 and 12 were relatively upregulated in women in the index and validation cohorts respectively, while 21 and 14 were upregulated in men.

Most of the differentially expressed biomarkers were significantly associated with all-cause mortality, after adjustment for selected covariates. Growth hormone-1, FABP4, and as compared to women myoglobin revealed a stronger association with adverse prognosis in men.

In women observed that some biomarkers are associated with lipid metabolic pathways were more active, although biomarkers associated with neuroinflammatory response were found to be more active in men. This could contribute to the observed differences in the clinical phenotype of HF.

Key messages

- ***There are sex differences in the expression of biomarkers involved in heart failure pathophysiology.***
- ***This study has the potential to trigger more research in the field of heart failure by harnessing the possible differences in pathophysiology in men and women.***

ARTICLE 3

Heart Failure Subtypes and Cardiomyopathies in Women

DeFilippis EM, Beale A, Martyn T, Agarwal A, Elkayam U, Lam CSP, et al. Heart Failure Subtypes and Cardiomyopathies in Women.
Circ Res. 2022;130(4):436-54.

Abstract

In the United States, heart failure affects over 2.6 million women and 3.4 million men with known sex differences in epidemiology, management, and response to treatment. The outcomes across a varied spectrum of cardiomyopathies mainly contain peripartum cardiomyopathy, hypertrophic cardiomyopathy, stress cardiomyopathy, cardiac amyloidosis, and sarcoidosis. Among, these determined sex-specific considerations by the cellular effects of sex hormones on the renin–angiotensin–aldosterone system, endothelial response to injury, vascular aging, and left ventricular remodeling. In clinical trials, other sex differences are sustained by inferred bias leading to undertreatment and underrepresentation. Examining systematically the published literature over the last decade is the main aim of this narrative review.

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ARTICLE COMMENTARY

Objective: Present study was designed to find out the sex differences in respect with factors like pathophysiology, epidemiology, treatment, and prognosis in heart failure (HF).

Methods: The article discusses the reported sex differences in the literature in heart failure with reduced ejection fraction (HFrEF), heart failure with preserved ejection fraction (HFrEF), and specific cardiomyopathies.

HFrEF: Women are more expected to experience nonischemic cardiomyopathy in comparison to men who are more likely to have an ischemic cardiomyopathy. Among hospitalized duration of HFrEF patients, it was observed that women when compared with men are more likely to have hypertension.

Data on sex differences in response to given therapy are frequently seen in retrospective or post hoc subgroup analyses of landmark, HF clinical trials, where data of women were not well defined and widely represented. There are the suggestions that not every HF medications benefits men and women similarly. In HF medical therapies, mostly sex hormones play an important role for some of these observed differences. It was observed that plasma renin levels are lesser in women compared with men. Furthermore, angiotensin-converting enzyme (ACE) activity, vascular response to angiotensin II, and aldosterone secretion are decreased by estrogen and increased by androgen levels. In addition, the upregulation of the angiotensin type II receptors with response to injury is significantly higher in women compared to men.

Meta-analysis of ACE inhibitors (ACEIs) trials has suggested that these drugs may not benefit women. For example, in the DIG trial, women had a higher risk of mortality without a reduction in HF hospitalizations. Women had higher serum digoxin levels despite similar doses. Newer therapies like ivabradine and sodium-glucose cotransporter-2 inhibitors (SGLT-2Is) have limited sex-specific data. The SHIFT, DAPA-HF and EMPEROR-Reduced studies have shown some benefit in spite of the underrepresentation of women in HFrEF trials.

The landmark primary prevention of implantable cardiac defibrillator (ICD) trials included few women and the meta-analysis of these trials (DEFINITE, SCD-HeFT, DINAMIT, MUSTT, and MADIT-II) showed no survival benefit for women.[1-8] Women compared to men were less likely to receive ICDs or mechanical cardiac support when indicated.

HFpEF: The prevalence of HFpEF was higher in women. AF is associated with higher morbidity and mortality in women compared with men. At all levels of CHADS-VASc score it was noted that women were less expected to take anticoagulation with direct oral anticoagulants (DOACs) for atrial fibrillation (AF) than men.

The leading cause of HF in pregnancy is peripartum cardiomyopathy (PPCM) and a crucial nonobstetric cause of maternal mortality. Successive pregnancy in women with a history of PPCM can be a big factor for relapse, particularly in those with nonrecovered left ventricular (LV) systolic function. ICD, cardiac resynchronization therapy (CRT), mechanical cardiac support, and cardiac transplantation should be offered to those beyond the usual window for recovery of LV function.

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ARTICLE 4

Pregnancy Outcomes in Women with Heart Disease: The Madras Medical College Pregnancy and Cardiac (M-PAC) Registry from India

Justin Paul G, Anne Princy S, Anju S, Anita S, Mary MC, Gnanavelu G, et al. Pregnancy Outcomes in Women with Heart Disease: The Madras Medical College Pregnancy and Cardiac (M-PAC) Registry from India.
Eur Heart J. 2023;44(17):1530-40.

Abstract

Aims: The present study planned to assess the fetomaternal outcome, identify the adverse outcome predictors and test the applicability of modified WHO (mWHO) classification in pregnant women with heart disease (PWWHD) from Tamil Nadu, India.

Methods and results: In the Madras Medical College Pregnancy and Cardiac (M-PAC) Registry, 1,154 pregnant women (mean age: 26.04 ± 4.2 years) with 1,029 consecutive pregnancies were prospectively enrolled from July 2016 to December 2019. For the first time during pregnancy, the majority of women (60.5%; 623/1,029) were diagnosed with heart disease (HD). The most common was rheumatic HD (42%; 433/1,029). One-third (34.2%; 352/1,029) presented with pulmonary hypertension (PH). The primary outcomes were maternal mortality and composite maternal cardiac events (MCEs). Secondary outcomes involve fetal loss and composite adverse fetal events (AFEs). In 15.2% (156/1,029; 95% CI 13.0–17.5) pregnancies MCEs occurred. Heart failure was the most common MCE (66.0%; 103/156; 95% CI 58.0–73.4). Maternal mortality was observed to be 1.9% (20/1,029; 95% CI 1.1–2.8) with the highest rates in patients with prosthetic heart valves (PHVs) (8.6%; 6/70). Independent predictors of MCE were left ventricular systolic dysfunction (LVSD), PHVs, severe mitral stenosis, PH, and current pregnancy diagnosis of HD. The c-statistic of mWHO classification for predicting MCE and maternal death were 0.794 (95% CI 0.763–0.826) and 0.796 (95% CI 0.732–0.860). 91.2% (938/1,029; 95% CI 89.392.8) of pregnancies resulted in live births. 33.7% (347/1,029; 95% CI 30.8–36.7) of pregnancies reported AFEs.

Conclusion: In PWWHD from India, high maternal mortality was observed. In women with PHVs, PH, and LVSD highest death rates occurred. In India, the mWHO classification for risk stratification may necessitate further adaptation and validation.

ARTICLE COMMENTARY

About 1–4% of all pregnancies are burdened by heart diseases, and the numbers are on the rise in the last few decades. Maternal predisposing factors include advanced age, poor lifestyle, and better survival in women with heart diseases to reach child-bearing age. Heart disease in pregnancy not only increases morbidity and mortality in pregnant women with heart disease (PWWHD), but also is associated with worse outcomes in fetus, including abortion, stillbirth, low birth weight (LBW), and preterm delivery.

This study assesses the fetomaternal outcomes in PWWHD and tests whether the

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modified WHO (mWHO) classification is applicable in this patient population.

The study was a prospective observational registry conducted at Madras Medical College, from July 2016 to December 2019. They included all pregnant women during the antenatal and 1-week postpartum period [6 months in peripartum cardiomyopathy (PPCM)] and have established or newly diagnosed structural heart disease, pulmonary vascular disease, aortic disease, or rhythm disturbances (sustained symptomatic tachy- or bradyarrhythmia needing treatment before pregnancy). All enrolled patients filled out detailed questionnaire, and underwent clinical examinations, ECG, and echocardiography, categorized as per Modified WHO (mWHO) classification, and followed up during pregnancy and 1-week postpartum, with routine cardiac and obstetric care.

Out of 152,415 registered pregnancies, 1,029 PWWHD were included. Mean age was 26.04 ± 4.2 years and 86% were ≤30 years. 60.5% were diagnosed with heart disease for the first time during the current pregnancy. 66.4% of patients had acquired heart disease, of which rheumatic heart disease (RHD) was the most common (42.1%) followed by mitral valve prolapse (MVP), cardiomyopathies, arrhythmias, and PPH. 30.5% had acyanotic congenital heart disease (CHD) and 3.1% had cyanotic CHD. 91.4% of patients were in the New York Heart Association (NYHA) I–II classes. High-risk mWHO (II–III, III, and IV) categories were present in 63.8% of pregnancies. One-third of patients had pulmonary hypertension and 20% had undergone intervention or surgery prior to conception. 39% were delivered by lower segment cesarean section (LSCS), remaining were vaginal deliveries.

Maternal cardiac events (MCEs) were observed in 15.2% (the most common heart failure followed by thromboembolic events, arrhythmias, bleeding, and infective endocarditis) with maternal mortality was seen in 20 (1.9%), of which 6 had prosthetic heart valves, 5 had heart failure with reduced ejection fraction (HFrEF), 3 each had severe pulmonary hypertension (PH) and infective endocarditis (IE), and 2 had severe multiple sclerosis (MS). In multivariable analysis, prosthetic valve, left ventricular (LV) dysfunction, and pulmonary hypertension predicted MCEs and maternal deaths. Severe MS predicted MCEs but not maternal mortality.

Adverse fetal events (AFEs) occurred in 33.7% and fetal loss in 8.8% of pregnancies [abortion/medical termination of pregnancy (MTP) in 7% and intrauterine fetal demise (IUFD)/stillbirth in 1.9%]. Univariable predictors of AFEs and fetal loss were current pregnancy diagnosis, NYHA class III–IV, mWHO > II, PH, significant MS [mitral valve area (MVA) ≤1.5 cm^2], prior cardiac procedures, and drug use and cyanosis. In multivariable analysis, prosthetic heart valve, severe MS, and maternal cyanosis predicted AFEs and fetal loss while PH only predicted AFEs and not fetal loss.

The mWHO score predicted MCEs and maternal mortality with moderate discriminative power and AFEs and fetal loss with low discriminative power.

CONCLUSION

Pregnancy in patients with heart disease is associated with high morbidity and mortality. The mWHO classification needs to be adapted for India.

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Key messages

- ***Pregnant patients with heart disease are at high risk for MCEs and maternal mortality, particularly those with prosthetic valves, LV dysfunction, severe MS, significant PH, NYHA class > II, and first diagnosis of heart disease during pregnancy.***
- ***Majority of women were diagnosed for the first time with cardiac disease during pregnancy. Preconception counseling in females planning pregnancy and better screening for heart disease in the antenatal period may help in improving maternal and fetal outcomes.***

ARTICLE 5

Focused Cardiac Ultrasound to Guide the Diagnosis of Heart Failure in Pregnant Women in India

Alsharqi M, Ismavel VA, Arnold L, Choudhury SS, Solomi V C, Rao S, et al. Focused Cardiac Ultrasound to Guide the Diagnosis of Heart Failure in Pregnant Women in India.
J Am Soc Echocardiogr. 2022;35(12):1281-94.

Abstract

Background: The leading causes of maternal death are cardiac complications. For prompt diagnosis cardiac imaging with echocardiography is important, but in many low-resource settings, it is not available. The aim of this current study was to identify cardiac abnormalities in pregnant women in low-resource settings and the role of focused cardiac ultrasound performed by trained obstetricians and interpreted remotely by experts.

Methods: Among 301 pregnant and postpartum women recruited from 10 hospitals a cross-sectional study was conducted across three states in India. About 22 obstetricians were trained in image acquisition using a portable cardiac ultrasound device following a simplified protocol adapted from focus-assessed transthoracic echocardiography (TTE) protocol. It involved parasternal long-axis, parasternal short-axis, and apical four-chamber views on two-dimensional and color Doppler. In the United Kingdom and India, using a standard semiquantitative assessment protocol two exerts performed independent image interpretation. Using Cohen's κ interrater agreement between the experts was examined. In women available with both focused and conventional scans diagnostic accuracy of the method was examined.

Results: Using the focused method cardiac abnormalities were identified, including valvular abnormalities (27%), rheumatic heart disease (6.6%), derangements in left ventricular size (4.7%), and function (22%), atrial dilatation (19.5%), and pericardial effusion (30%). Between the two experts, there was substantial agreement on the cardiac parameters, ranging from 93.6% ($\kappa = 0.84$) for left ventricular ejection fraction to 100% ($\kappa = 1$) for valvular disease. In 79% of the parasternal long-axis, 77% of the parasternal short-axis, and 64% of apical four-chamber views image quality was rated good. For the image quality parameters, the chance-corrected κ coefficients

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showed fair to moderate agreement (κ = 0.28–0.51). Compared to 36 participants there was good agreement on diagnosis between the focused method and standard echocardiography (78% agreement).

Conclusion: The simplified focused method could be used for screening cardiac problems in obstetric settings and in pregnant women can accurately identify cardiac abnormalities.

ARTICLE COMMENTARY

The estimated incidence of heart failure is 2 per 1,000 hospital births in pregnant and postpartum women in India, with a case fatality rate (CFR) of 40%. However, there is a dearth of cardiologists and echocardiography facilities in low-resource settings. Focused cardiac ultrasound (FoCUS) is performed by nonexpert healthcare providers using portable devices, and images so obtained can be interpreted by experts remotely.

In this study, authors have evaluated whether FoCUS done by trained obstetricians and interpreted remotely by experts can identify heart disease in pregnant and postpartum women in low-resource settings in India, and to study the reliability of interpretation by assessing agreement between two experts remotely reading the images independently.

It is a cross-sectional study done at 10 hospitals in India between 2019 and 2021. Subjects included pregnant or postpartum (≤12 months) females with suspected heart failure [respiratory rate ≥15 breaths/min with or without ≥1 of—raised jugular venous pressure (JVP), murmur, gallop rhythm, or lung-crackles/pink-frothy sputum]. The control group had pregnant/postpartum women (≤2 days) without heart failure. Obstetricians were trained to perform FoCUS study independently. Three echo views were obtained—PLAX, PSAX (papillary muscle), and apical 4 chamber, along with color flow Doppler at mitral, tricuspid, and aortic valves. The images were assessed for pericardial effusion, valve abnormalities, chamber enlargement, ventricular dysfunction, and thrombus by two experts remotely.

A total number of 302 patients were recruited, 116 pregnant and 180 postpartum. 172 patients were in the study group and 129 in the control group. Images of 109 participants were interpreted by two experts and standard transthoracic echocardiography (TTE) was done in 36 participants. The mean age was 25.4 years in cases and 23.7 years in controls. 54.1% of cases and 69.8% of controls were primiparous. 32.5% of cases and 2.3% of controls had hypertensive disorder. Among the cases, 58.6% had NYHA class IV symptoms, 33.6% were NYHA II–III and the remaining NYHA I. Heart failure onset was in the postpartum period in 30%, while two-thirds presented with heart failure in the antenatal period, and only 1.8% during labor. 10 patients died during the study.

Around 181 subjects were identified to have cardiac abnormality (60% of cases and 33% of controls), 154 of whom had significant disease, requiring treatment and follow-up. Among valvular pathologies, mitral valve disease (81 patients) was the most common [64 had mitral regurgitation (MR) and 17 had multiple sclerosis (MS), only 20 were diagnosed as rheumatic heart disease (RHD)]. 59 participants had tricuspid regurgitation (TR), 2 tricuspid stenosis (TS), 1 aortic stenosis (AS), and 15 had AR. 65 participants had decreased LVEF [40 had ejection fraction (EF) below 45% and the rest

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45–54%]. One or more chamber enlargement was present in 118 patients, most commonly left atrium (LA) (57), followed by right atrium (RA) (28), right ventricle (RV) (19), and left ventricle (LV) (14). Regional wall motion abnormalities (RWMA) in RV was seen in six cases. Pericardial effusion was present in 89 (30%) and thrombus in four participants.

Image quality was acceptable in 92.4%, good quality images were obtained more in PLAX view (79%), followed by PSAX (75%) and A4C views (62%). Agreement between both reviewers was >90% for most parameters and agreement between FoCUS and TTE was 78%, the difference attributable to the difference in LVEF.

The focused method by obstetricians was able to identify cardiac abnormalities in pregnant women with good accuracy. This study has showed that FoCUS examination protocols and method can be adapted to use in obstetric settings to accurately identify cardiac abnormalities in pregnant women in low-resource settings.

Key messages

- ***Trained obstetricians in India were able to acquire high-quality cardiac images using portable cardiac ultrasound devices following a simple protocol, which were interpreted remotely by experts following an image interpretation protocol.***
- ***Extension of this type of focused cardiac ultrasound in obstetric settings, for early identification of hitherto unidentified cardiac ailments in pregnancy, is a potential implication of this study.***

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Yearbook of CARDIOLOGY 2023

Heart Failure

Salient Features

This "CSI Yearbook of Cardiology 2023: Heart Failure" is a collection of articles that delve into the latest discoveries and developments, aiming to provide readers with a comprehensive overview of heart failure research and care.

The research articles on heart failure published in 2022–2023, which will have a long-term effect on our practice, are included. There are 12 Sections, each with approximately six articles from high-impact factor journals. The diverse range of topics explored by experts in the field, from cutting-edge diagnostic techniques and novel therapeutic interventions to the growing significance of digital technology in managing heart failure are included. The abstract provides the original data, and its interpretation is given by the experts in the commentaries. The commentary discusses the article and relevant issues, emphasizing the current evidence-based thinking on the subject. We hope these articles serve as a valuable resource for cardiology fellows and practicing physicians seeking to enhance their understanding of heart failure and its management.

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