Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

The Role of Echocardiography in Community-Based Health Campaigns: A Cross-Sectional Experience

Alsrur[1], Hamad Hamoud H[2]

[1]Student in MSc of Medical Science, Lincoln University College

[2]Student in MSc of Medical Science, Lincoln University College

Cite this paper as: Alsrur, Hamad Hamoud H, (2025) The Role of Echocardiography in Community-Based Health Campaigns: A Cross-Sectional Experience. *Journal of Neonatal Surgery*, 14 (32s), 6913-6922.

ABSTRACT

Background: Transthoracic echocardiography (TTE) is a non-invasive, widely available diagnostic tool for cardiovascular assessment. Its utility in community screening, especially in resource-limited settings, remains underexplored.

Objective: To assess the feasibility, echocardiographic findings, and clinical impact of portable TTE during community-based health campaigns in Hail, Saudi Arabia.

Methods: This cross-sectional study was conducted involving 100 adult participants (≥18 years) screened in public areas using portable echocardiography. Basic parameters including LVEF, LVMI, and wall thicknesses were measured. Participants were categorized into normal, follow-up, or referred based on findings.

Results: The mean age was 48.9±11.6 years; 81% were male. Most participants (71%) had normal echocardiograms, while 29% showed abnormalities. Valvular dysfunction (12%), left ventricular hypertrophy (6%), and reduced LVEF (<50%) (4%) were the most common findings. Significant congenital conditions such as VSD and bicuspid aortic valve were detected in 1% each. Among those with abnormal findings, 15% were referred for further care, and 14% advised follow-up. Age, BMI, and comorbidities (particularly DM+HTN) were strong predictors of abnormal findings ($p<0.01$).

Conclusion: Community-based echocardiographic screening using portable devices is feasible and valuable in detecting subclinical cardiac disease. It enables early identification and referral in underserved populations. Targeting high-risk groups such as older adults and those with chronic diseases can enhance screening efficiency.

Keywords: *Transthoracic echocardiography, cardiovascular screening, portable ultrasound, valvular disease, left ventricular mass*

1. INTRODUCTION

The widespread availability, negligible risk, and versatility of transthoracic echocardiography (TTE) make it a powerful and appealing diagnostic tool. However, these same characteristics may encourage overuse. In fact, the use of TTE has doubled during the past decade, constituting approximately half of all cardiac imaging services among Medicare beneficiaries (1).

Transthoracic echocardiography accounted for 11% and more than $1.1 billion of total Medicare diagnostic imaging spending in 2010. Moreover, more than half of Medicare beneficiaries who undergo a TTE will have a second TTE within 3 years. To respond to the dramatic increase in the use of diagnostic imaging during the past decade, the American College of Cardiology Foundation collaborated with the American Society of Echocardiography and other imaging subspecialty societies to develop appropriate use criteria (AUC) for TTE (2).

The AUC were initially published in 2007 and later updated in 2011 to “respond to the need for the rational use of imaging services in the delivery of high-quality care” and potentially “impact physician decision making,” with an ultimate objective to “improve patient care and health outcomes (3).

Most TTEs performed in a wide variety of clinical settings have been judged appropriate based on AUC. Less is known, however, about the clinical impact of TTE and its relationship with appropriateness (4).

This study aimed to evaluate the feasibility, findings, and clinical impact of transthoracic echocardiography (TTE) performed during mobile health campaigns conducted in various public settings including schools, villages, and marketplaces in the Hail region of Saudi Arabia.

2. PATIENTS AND METHODS

Study Design and Setting: This was a cross-sectional study conducted as part of a mobile community-based health campaign in the Hail region, Saudi Arabia. The campaign aimed to offer cardiovascular screening using transthoracic echocardiography (TTE) to adults in public settings, including schools, villages, and marketplaces.

Study Population: A total of 100 adult participants aged 18 years and above were enrolled. The majority were male (81%), reflecting typical participation patterns in public outreach events in the region. Most participants had no previous cardiac diagnosis and were asymptomatic at presentation. The sample was expected to represent a generally healthy population, although some cases had known comorbidities such as diabetes mellitus (DM) and hypertension (HTN).

Data Collection: Participants underwent a brief clinical assessment followed by echocardiographic examination. Data on age, gender, BMI, smoking status, comorbidities, cardiac symptoms (if any), and prior cardiac evaluations were collected. Consent was obtained verbally prior to examination.

Echocardiographic Assessment: Echocardiography was performed using a portable ultrasound device suitable for field use. The scan protocol focused on basic but essential parameters, including: Left Ventricular Ejection Fraction (LVEF), Interventricular Septal Thickness in Diastole (IVS), Posterior Wall Thickness in Diastole (PWd), Left Ventricular Internal Diameter in Diastole (LVIDd), Left Ventricular Mass (LVM) and Left Ventricular Mass Index (LVMI). In addition to standard measurements, qualitative observations were made for valvular abnormalities (e.g., mitral or aortic regurgitation), reduced systolic function (EF <50%), congenital anomalies (e.g., VSD, bicuspid aortic valve), and pericardial effusion.

Outcome Classification: Based on echocardiographic findings, participants were classified into three outcome categories:

Normal findings: No further action required, reassurance provided.

Abnormal but non-urgent: Recommended for outpatient follow-up.

Significant findings: Referred to specialized cardiac centers for further evaluation or intervention (e.g., catheterization).

Ethical Considerations: This campaign-based study was part of a public health outreach effort. All examinations were voluntary, and participants were informed about the nature and purpose of the screening. Data were anonymized and handled confidentially.

3. RESULTS

Table (1) demographic data among studied cases

	Descriptive statistics (N=100)
Age	
Mean ±SD	48.9±11.6
Range	22-73
Age	
< 30 years	6 (6%)
30-40 years	20 (20%)
41-50 years	23 (23%)
51-60 years	31 (31%)
>60 years	20 (20%)
Gender	
Males	81 (81%)
Females	19 (19%)
Education level	
No formal education	8 (8%)
Primary education	7 (7%)
Secondary education	32 (32%)

Diploma	17 (17%)
Bachelor's degree	30 (30%)
Master's degree	6 (6%)
Smoking status	
Never	59 (59%)
Ex-smoker	19 (19%)
Current smoker	22 (22%)
Number of Cigarettes per Day	
NA	59 (59%)
<5	8 (8%)
5-10	9 (9%)
11-20	15 (15%)
>20	9 (9%)
Weight (kg)	
Mean ±SD	81.7±15
Range	57-113
Height (cm)	
Mean ±SD	171.9±7.7
Range	157-192
BMI	
Mean ±SD	27.5±5.05
Range	19.3-39.6
BMI category	
Underweight	0 (0%)
Normal weight	39 (39%)
Overweight	27 (27%)
Obese	34 (34%)
BSA (m^2)	
Mean ±SD	2.04±0.21
Range	1.65-2.46
Comorbidities	
No	70 (70%)
DM	12 (12%)
HTN	12 (12%)
DM+HTN	6 (6%)
Known cardiac disease	7 (7%)
Previous cardiac evaluation	16 (16%)
Complain	
Asymptomatic	82 (82%)

Chest pain	1 (2%)
Dyspnea	10 (10%)
Palpitation	5 (5%)
Chest pain and dyspnea	2 (2%)

The study population comprised 100 participants with a mean age of 48.9 ± 11.6 years (range 22–73), predominantly in the middle-aged group (31% aged 51–60 years and 23% aged 41–50). Males were the majority (81%), likely reflecting higher public participation or gender roles in health-seeking behavior in the setting. Participants had a mean weight of 81.7 ± 15 kg and average height of 171.9 ± 7.7 cm. The mean BMI was 27.5 ± 5.05, categorizing the group overall as overweight. Notably, 34% of participants were obese and 27% overweight, leaving only 39% within the normal weight range and none underweight. The mean body surface area (BSA) was 2.04 ± 0.21 m², an important metric used for indexing left ventricular mass. The high prevalence of overweight and obesity underscores the cardiovascular risk burden in the community and its potential influence on echocardiographic findings. Most participants (70%) had no documented comorbidities, while 12% had diabetes mellitus (DM), another 12% had hypertension (HTN), and 6% had both. Only 7% had known cardiac disease, and 16% had previously undergone cardiac evaluation, suggesting that most were naïve to cardiac workups. Remarkably, 82% were asymptomatic at presentation, highlighting the value of echocardiographic screening in detecting silent cardiovascular disease. Chest pain and dyspnea were reported in 2–10% of participants, with only a small fraction presenting with both or with palpitations.

Table (2) echocardiographic information pattern among studied cases

	Descriptive statistics (N=100)
Echo finding	
Normal	71 (71%)
Abnormal	29 (29%)
Findings related to Left Ventricular Hypertrophy	
Normal LV function	
LV hypertrophy	71 (71%)
LV dilatation	6 (6%)
Valvular dysfunction	3 (3%)
• **MR**	12 (12%)
• **AR**	• 8 (8%)
Pericardial effusion	• 4 (4%)
Suspected cardiomyopathy	1 (1%)
Congenital (VSD)	1 (1%)
Congenital (bicuspid aortic valve)	1 (1%)
Reduced LV function less than 50%	1 (1%)
	4 (4%)

Echocardiography revealed normal results in 71% and abnormal findings in 29% of participants. The most common abnormalities included valvular dysfunction (12%), with mitral regurgitation (8%) and aortic regurgitation (4%) being the primary defects. Left ventricular hypertrophy was present in 6%, LV dilatation in 3%, and reduced ejection fraction (<50%) in 4%, indicating a subset with potential cardiomyopathy or volume/pressure overload. Rare findings included pericardial effusion, congenital bicuspid aortic valve, and ventricular septal defect (each in 1%). Overall, echocardiography effectively identified previously undetected structural and functional heart disease in nearly one-third of cases.

Table (3) echocardiographic parameters among studied cases

	Descriptive statistics (N=100)	
	Mean ±SD	**Range**
Left Ventricular Ejection Fraction (LVEF) (%)	62.7±7.5	46-73.5
Inter ventricular Septum Thickness IVST (in Diastole) (mm)	10.9±1.07	9-14
Posterior Wall Thickness PWd (in Diastole) (mm)	10.6±1.03	9-13
Left Ventricular Internal Dimension LVIDd (in Diastole) (mm)	39.1±7.5	28-56
Calculated LVM (g)	149.1±38	102.7-278
Left Ventricular Mass Index LVMI (g/m)	75.6±24	44.9-158

The mean LVEF was 62.7 ± 7.5%, indicating preserved systolic function in most participants. The mean IVS and PWd thicknesses were 10.9 ± 1.07 mm and 10.6 ± 1.03 mm respectively, slightly above the normal cut-off, suggesting mild concentric remodeling in some individuals. LVIDd averaged 39.1 ± 7.5 mm. Mean calculated LVM was 149.1 ± 38 g, and indexed LVMI was 75.6 ± 24 g/m². These values show variability but remained within reference ranges for most, though elevated LVMI in a subgroup supports the detection of subclinical LVH in certain cases.

Table (4) clinical impact and outcome among studied cases

	Descriptive statistics (N=100)
Reassurance and nothing done	71 (71%)
Follow up	14 (14%)
Referral decision	15 (15%)

Of the screened individuals, 71% required no further action beyond reassurance, while 14% were advised follow-up, and 15% were referred for further cardiology assessment. This reflects that approximately one in seven individuals benefited directly from echocardiographic screening, reinforcing its practical value in community detection of early or silent cardiac disease and directing those at risk toward appropriate care.

Table (5) comparison of echocardiographic parameters between males and females

	Gender		P value
	Males (n=81)	**Females (n=19)**	
Left Ventricular Ejection Fraction (LVEF) (%)	62.4±7.9	63.9±5.9	0.44
Inter ventricular Septum Thickness IVST (in Diastole) (mm)	10.89±1.1	11.2±0.76	0.15
Posterior Wall Thickness PWd (in Diastole) (mm)	10.6±0.99	10.9±1.1	0.21
Left Ventricular Internal Dimension LVIDd (in Diastole) (mm)	39±7.4	39.9±8.4	0.61
Calculated LVM (g)	145.9±36.1	162±43.6	0.08
Left Ventricular Mass Index LVMI (g/m)	73.8±24.2	83.2±22.5	0.12

_* significant at p value <0.05

Although females had slightly higher LVEF (63.9% vs. 62.4%), greater IVS (11.2 mm vs. 10.89 mm), and higher LVMI (83.2 vs. 73.8 g/m²), none of these differences reached statistical significance ($p > 0.05$). This indicates that echocardiographic measurements were largely similar across genders in this cohort, and that structural cardiac changes were not disproportionately represented in either sex.

Table (6) comparison of echocardiographic parameters regarding echo finding

	finding related to echocardiography		P value
	Normal function (n=71)	**Abnormal LV function (n=29)**	
Left Ventricular Ejection Fraction (LVEF) (%)	64.4±7.2	58.5±6.8	<0.001*
Inter ventricular Septum Thickness IVST (in Diastole) (mm)	10.6±0.83	11.8±1.06	<0.001*
Posterior Wall Thickness PWd (in Diastole) (mm)	10.3±0.92	11.5±0.74	<0.001*
Left Ventricular Internal Dimension LVIDd (in Diastole) (mm)	38.7±7.4	40.2±7.9	0.38
Calculated LVM (g)	140±24.5	171.6±53.8	0.005*
Left Ventricular Mass Index LVMI (g/m)	70.8±16.2	87.5±34.3	0.01*

_* significant at p value <0.05

Participants with abnormal echocardiographic findings had significantly lower LVEF (58.5% vs. 64.4%, $p < 0.001$), greater IVS (11.8 mm vs. 10.6 mm, $p < 0.001$), thicker PWd (11.5 mm vs. 10.3 mm, $p < 0.001$), higher LVM (171.6 g vs. 140 g, $p = 0.005$), and elevated LVMI (87.5 vs. 70.8 g/m², $p = 0.01$). These findings strongly support the presence of structural cardiac remodeling and dysfunction in those with abnormal echo, highlighting the sensitivity of these measures in screening.

Table (7) comparison of demographic data regarding echo finding

	Finding related to echocardiography		P value
	Normal echo (n=71)	**Abnormal echo (n=29)**	
Age			
Mean ±SD	46.9±11.2	53.8±11.3	0.006*
Range	22-65	26-73	
Gender			
Males	56 (78.9%)	25 (86.2%)	0.39
Females	15 (21.1%)	4 (13.8%)	
Smoking status			
Never	42 (59.2%)	17 (58.6%)	0.92
Ex-smoker	14 (19.7%)	5 (17.2%)	
Current smoker	15 (21.1%)	7 (24.1%)	
Number of Cigarettes per Day			
NA	42 (59.2%)	17 (58.6%)	0.08

<5	7 (9.9%)	1 (3.4%)	
5-10	7 (9.9%)	2 (6.9%)	
11-20	12 (16.9%)	3 (10.3%)	
>20	3 (4.2%)	6 (20.7%)	
BMI			
Mean ±SD	26.5±4.5	29.9±5.4	0.002*
Range	19.3-37.2	20.1-39.6	
Comorbidities			
No	58 (81.7%)	12 (41.4%)	<0.001*
DM	6 (8.5%)	6 (20.7%)	
HTN	6 (8.5%)	6 (20.7%)	
DM+HTN	1 (1.4%)	5 (17.2%)	
Known cardiac disease	0 (0%)	7 (24.1%)	<0.001*
Previous cardiac evaluation	12 (16.9%)	4 (13.8%)	0.70

Patients with abnormal echocardiography were significantly older (53.8 vs. 46.9 years, p = 0.006), had higher BMI (29.9 vs. 26.5, p = 0.002), and more frequent comorbidities (58.6% vs. 18.3%, p < 0.001). Known cardiac disease was also significantly more common in the abnormal group (24.1% vs. 0%, p < 0.001). However, there were no significant differences in gender distribution, smoking status, or history of prior cardiac evaluation, suggesting that age, BMI, and comorbidities are stronger predictors of echocardiographic abnormalities.

Table (8) comparison of echocardiographic parameters regarding comorbidities

	Comorbidities				**P value**
	No (n=70)	**DM (n=12)**	**HTN (n=12)**	**Diabetic and HTN (n=6)**	
Left Ventricular Ejection Fraction (LVEF) (%)	63.2±7.7	60.3±6.7	62.5±7	61.5±8.9	0.42
Inter ventricular Septum Thickness IVST (in Diastole) (mm)	10.7±1.01	11.3±0.64	11.8±1.2	11.4±1.08	0.002*
Posterior Wall Thickness PWd (in Diastole) (mm)	10.4±0.96	11.04±0.99	11.4±1.04	11.35±0.80	0.002*
Left Ventricular Internal Dimension LVIDd (in Diastole) (mm)	38.8±7.4	40.8±7.2	38.6±8.4	41.1±9.2	0.62
Calculated LVM (g)	141.2±29.2	162.2±42.6	167.3±49	179.2±65.5	0.002*
Left Ventricular Mass Index LVMI (g/m)	71.6±20.6	82.3±23	85.9±30.8	88±39.3	0.02*

_* significant at p value <0.05

Participants with diabetes and/or hypertension had significantly thicker IVS and PWd walls compared to those without comorbidities (e.g., IVS: 11.8 mm in HTN vs. 10.7 mm in healthy, p = 0.002), and elevated LVM and LVMI (e.g., LVMI: 88 g/m² in DM+HTN vs. 71.6 in healthy, p = 0.02). These findings confirm the established relationship between metabolic/cardiovascular comorbidities and structural LV remodeling detectable by echo.

Table (9) binary logistic regression analysis for predictors of abnormal echo

Variables	OR	95% CI	P value
Age	1.05	1.04-1.1	**0.009***
Gender (female)	0.59	0.18-1.98	0.40
BMI	1.14	1.04-1.25	**0.004***
Smoking			
Never	1		
Ex-smoker	0.88	0.27-2.8	0.83
Current	1,15	0.40-3.3	0.79
Comorbidities			
No	1		
DM	4.833	1.3-17.5	**0.01***
HTN	4.833	1.3-17.5	**0.01***
DM+HTN	24.167	2.5-225	**0.005***

Regression analysis revealed that age (OR = 1.05, p = 0.009), BMI (OR = 1.14, p = 0.004), and presence of comorbidities (especially DM+HTN: OR = 24.17, p = 0.005) were statistically significant independent predictors of abnormal echocardiographic findings. Gender and smoking were not significant predictors. This emphasizes the clinical relevance of age, body weight, and chronic disease in predicting structural cardiac changes, and further supports the need for targeted screening in high-risk subgroups.

4. DISCUSSION

Our results showed that the mean age of the studied cases was 48.9 ± 11.6 years (range 22–73), predominantly in the middle-aged group (31% aged 51–60 years and 23% aged 41–50). Males were the majority (81%), likely reflecting higher public participation or gender roles in health-seeking behavior in the setting. Educational attainment varied, with 32% having secondary education, 30% bachelor's degrees, and only 8% having no formal education, suggesting a generally literate population. Regarding smoking, 41% were current or former smokers, with 15% smoking 11–20 cigarettes per day and 9% exceeding 20, indicating a substantial proportion at risk for cardiovascular disease.

Participants had a mean weight of 81.7 ± 15 kg and average height of 171.9 ± 7.7 cm. The mean BMI was 27.5 ± 5.05, categorizing the group overall as overweight. Notably, 34% of participants were obese and 27% overweight, leaving only 39% within the normal weight range and none underweight. The mean body surface area (BSA) was 2.04 ± 0.21 m^2, an important metric used for indexing left ventricular mass. The high prevalence of overweight and obesity underscores the cardiovascular risk burden in the community and its potential influence on echocardiographic findings.

Our results supported by Bedeker et al, (5) who reported that the median age of the studied cases was 53 years. Otherwise, 108 (51.4%) were males and 46 (21.9%) were current smokers.

Also, Ejim et al, (6) who reported that the mean age of the studied patients was 46.4 ± 21.4 years. Otherwise, there were 342 males (56%) and 257 females (42%)

In the present study, Echocardiography revealed normal results in 71% and abnormal findings in 29% of participants. The most common abnormalities included valvular dysfunction (12%), with mitral regurgitation (8%) and aortic regurgitation (4%) being the primary defects. Left ventricular hypertrophy was present in 6%, LV dilatation in 3%, and reduced ejection fraction (<50%) in 4%, indicating a subset with potential cardiomyopathy or volume/pressure overload. Rare findings included pericardial effusion, congenital bicuspid aortic valve, and ventricular septal defect (each in 1%). Overall, echocardiography effectively identified previously undetected structural and functional heart disease in nearly one-third of cases.

The mean LVEF was 62.7 ± 7.5%, indicating preserved systolic function in most participants. The mean IVS and PWd thicknesses were 10.9 ± 1.07 mm and 10.6 ± 1.03 mm respectively, slightly above the normal cut-off, suggesting mild concentric remodeling in some individuals. LVIDd averaged 39.1 ± 7.5 mm. Mean calculated LVM was 149.1 ± 38 g, and indexed LVMI was 75.6 ± 24 g/m^2. These values show variability but remained within reference ranges for most, though elevated LVMI in a subgroup supports the detection of subclinical LVH in certain cases.

In the same line, Bedeker et al, (5) who reported that there were 8 (3.8%) with aortic regurgitation. Otherwise, there were 73 (34.8%) with evaluation of valvular function, 61 (29.0%) with Mitral regurgitation and 43 (20.5%) with LV hypertrophy

While, Ejim et al, (6) who reported that there were 2.8% with abnormal ECG. The commonest echocardiographic diagnoses were degenerative aortic valve disease (18%), left ventricular diastolic dysfunction (15%), degenerative mitral valve disease (13%) and hypertensive heart disease (7%)

Our results showed that, of the screened individuals, 71% required no further action beyond reassurance, while 14% were advised follow-up, and 15% were referred for further cardiology assessment. This reflects that approximately one in seven individuals benefited directly from echocardiographic screening, reinforcing its practical value in community detection of early or silent cardiac disease and directing those at risk toward appropriate care.

We found that, although females had slightly higher LVEF (63.9% vs. 62.4%), greater IVS (11.2 mm vs. 10.89 mm), and higher LVMI (83.2 vs. 73.8 g/m²), none of these differences reached statistical significance ($p > 0.05$). This indicates that echocardiographic measurements were largely similar across genders in this cohort, and that structural cardiac changes were not disproportionately represented in either sex.

Our results matched with Salton et al, (7) who reported that there were no gender differences in global LVEF (men = 0.69; women = 0.70).

On the other hand, Chung et al, (8) who reported that the median LVEF was higher in women than in men (P<0.001)

Similarly, Escudero et al, (9) who reported that Men (n = 25) exhibited greater LVMI than women (n = 25) (77.4 ± 3.2 g/m2 vs. 63.3 ± 1.8 g/m2, $p < 0.01$

In the present study, Participants with abnormal echocardiographic findings had significantly lower LVEF (58.5% vs. 64.4%, $p < 0.001$), greater IVS (11.8 mm vs. 10.6 mm, $p < 0.001$), thicker PWd (11.5 mm vs. 10.3 mm, $p < 0.001$), higher LVM (171.6 g vs. 140 g, $p = 0.005$), and elevated LVMI (87.5 vs. 70.8 g/m², $p = 0.01$). These findings strongly support the presence of structural cardiac remodeling and dysfunction in those with abnormal echo, highlighting the sensitivity of these measures in screening.

Patients with abnormal echocardiography were significantly older (53.8 vs. 46.9 years, $p = 0.006$), had higher BMI (29.9 vs. 26.5, $p = 0.002$), and more frequent comorbidities (58.6% vs. 18.3%, $p < 0.001$). Known cardiac disease was also significantly more common in the abnormal group (24.1% vs. 0%, $p < 0.001$). However, there were no significant differences in gender distribution, smoking status, or history of prior cardiac evaluation, suggesting that age, BMI, and comorbidities are stronger predictors of echocardiographic abnormalities.

Age (OR = 1.05, $p = 0.009$), BMI (OR = 1.14, $p = 0.004$), and presence of comorbidities (especially DM+HTN: OR = 24.17, $p = 0.005$) were statistically significant independent predictors of abnormal echocardiographic findings. Gender and smoking were not significant predictors. This emphasizes the clinical relevance of age, body weight, and chronic disease in predicting structural cardiac changes, and further supports the need for targeted screening in high-risk subgroups.

Our results matched with Hennessey et al, (10) who reported that older age a history of chronic hypertension are associated with a higher likelihood of echocardiographic abnormalities

As well, Nimpum et al, (11) who reported that Significant differences in BMI detected between cases with abnormal and normal IVS diastolic (IVSd) ($P = 0.016$).

Meanwhile, Aljaroudi et al, (12) who reported that, as BMI increased, the prevalence of normal diastolic function decreased (P<0.0001)

Another study by Alam et al, (13) who reported that, when the ECG was normal there was a lower but significant (30%) incidence of echocardiographic abnormalities

Our results showed that participants with diabetes and/or hypertension had significantly thicker IVS and PWd walls compared to those without comorbidities (e.g., IVS: 11.8 mm in HTN vs. 10.7 mm in healthy, $p = 0.002$), and elevated LVM and LVMI (e.g., LVMI: 88 g/m² in DM+HTN vs. 71.6 in healthy, $p = 0.02$). These findings confirm the established relationship between metabolic/cardiovascular comorbidities and structural LV remodeling detectable by echo.

Our results agreed with Saad et al, (14) who reported that LVM values were significantly higher in normotensive patients with type 2 DM compared to group normotensive non-diabetic patients (187.11 ± 60.83 vs. 119.15 ± 41.87, $p < 0.001$). Also, LVMI values were significantly higher in normotensive patients with type 2 DM in comparison to normotensive non-diabetic patients (96.64 ± 29.84 vs. 63.17 ± 20.38, $p < 0.001$)

Furthermore, Grossman et al, (15) who reported that subjects with hypertension during follow-up had thicker IVS and PW, as well as larger LVM at baseline than those who were normotensives during follow-up.

5. CONCLUSION

Regarding to our results we concluded that participants with diabetes and/or hypertension had significantly thicker IVS and PWd walls compared to those without comorbidities. Age, BMI and presence of comorbidities (especially DM+HTN were statistically significant independent predictors of abnormal echocardiographic findings. Participants with abnormal echocardiographic findings had significantly lower LVEF, greater IVS, thicker, higher LVM and elevated LVMI

REFERENCES

[1] Fitzsimons S, Doughty RN. Role of transthoracic echocardiogram in acute heart failure. Rev Cardiovasc Med. 2021;22(3):741–54.

[2] El-Alali EA, Maali LN. Improving the diagnostic yield of echocardiography in acute ischemic stroke: A quality improvement project in a community hospital in Maryland, USA. Casp J Intern Med. 2023;14(4):640.

[3] Brugger N, Lichtblau M, Maeder MT, Müller H, Pellaton C, Yerly P. Two-dimensional transthoracic echocardiography at rest for the diagnosis, screening and management of pulmonary hypertension. Swiss Med Wkly. 2021;151: w20486.

[4] Corbett L, Forster J, Gamlin W, Duarte N, Burgess O, Harkness A, et al. A practical guideline for performing a comprehensive transthoracic echocardiogram in the congenital heart disease patient: consensus recommendations from the British Society of Echocardiography. Echo Res Pract. 2022;9(1):10.

[5] Bedeker WF, Lachman AS, Borkum M, Hellenberg D, Cupido CS. Impact of transthoracic echocardiography at district hospital level. South African Med J. 2015;105(10):817–22.

[6] Ejim EC, Ubani-Ukoma BC, Nwaneli CU, Onwubere BJC. Two years of transthoracic echocardiography at a private echocardiographic laboratory in Enugu, South East Nigeria. Int J Med Heal Dev. 2011;16(2):48–56.

[7] Salton CJ, Chuang ML, O'Donnell CJ, Kupka MJ, Larson MG, Kissinger K V, et al. Gender differences and normal left ventricular anatomy in an adult population free of hypertension: a cardiovascular magnetic resonance study of the Framingham Heart Study Offspring cohort. J Am Coll Cardiol. 2002;39(6):1055–60.

[8] Chung AK, Das SR, Leonard D, Peshock RM, Kazi F, Abdullah SM, et al. Women have higher left ventricular ejection fractions than men independent of differences in left ventricular volume: the Dallas Heart Study. Circulation. 2006;113(12):1597–604.

[9] Escudero EM, Orlowski A, Díaz A, Pinilla OA, Ennis IL, Aiello EA. Gender differences in cardiac left ventricular mass and function: Clinical and experimental observations. Cardiol J. 2014;21(1):53–9.

[10] Hennessey KC, Ali TS, Choi E, Ortengren AR, Hickerson LC, Lee JM, et al. Association between abnormal echocardiography and adverse obstetric outcomes in low-risk pregnant women. J Cardiovasc Dev Dis. 2022;9(11):394.

[11] Nimpum D, Jittham W. Echocardiographic assessment of cardiac function abnormalities and related risk factors in Thai overweight and obese children. Ann Pediatr Cardiol. 2023;16(6):413–21.

[12] Aljaroudi W, Halley C, Houghtaling P, Agarwal S, Menon V, Rodriguez L, et al. Impact of body mass index on diastolic function in patients with normal left ventricular ejection fraction. Nutr Diabetes. 2012;2(8):e39–e39.

[13] Alam S, Docherty A, Mackle I, Gillies M. The introduction of intensive care-led echocardiography into a tertiary care unit. J Intensive Care Soc. 2013;14(1):15–9.

[14] Saad MKEIK, Gomaa MS, Ewais AA, Alamir MA, Mahmoud MSH. Increased left ventricular mass as a marker of left ventricular hypertrophy in normotensive type 2 DM patients. Egypt J Intern Med. 2025;37(1):42.

[15] Grossman C, Grossman A, Koren-Morag N, Azaria B, Goldstein L, Grossman E. Interventricular septum thickness predicts future systolic hypertension in young healthy pilots. Hypertens Res. 2008;31(1):15–20.