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Accuracy of Cardio-Pulmonary Ultrasound (CPU) in Diagnosing Acute Dyspnea Patients

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Abstract

Aims

To study the accuracy of Cardio-Pulmonary Ultrasound (CPU) in diagnosing acute dyspnea patients.

Methods

175 patients were admitted in the Emergency Medicine (EM) unit of Sri Ramachandra Medical College & Research Institute were tested with cardio-pulmonary ultrasound within 15 minutes of the patient arriving at the EM from April 2022 to June 2022, and the results were recorded.

Using the parameters, with the help of an algorithm, the Left Ventricular Filling Pressure (LVFP) was calculated which directly diagnoses Acute Left-Sided Heart Failure (ALSHF). For patients with elevated LVFP, the diagnosis is ALSHF. If the LVFP is normal or inconclusive, Lung Ultrasound is done. Presenting with ≥3 B lines (anterior/lateral thoracic-or both) by lung field the patients were diagnosed as B profile.

We have checked the accuracy of clinical markers of Cardio-Pulmonary Ultrasound using statistical variables such as sensitivity, specificity, ppv, npv and checked the statistical significance also. We have done a statistical comparison of parameters of ALSHF based on mean ± SD and we have also done ROC curve for ALSHF markers.

Statistical significance was done using SPSS version 20.0. Frequencies with percentages, mean, standard deviation, Chi-square, and Unpaired t-tests were done. <0.05 was considered statistically significant.

Results

175 patients admitted for dyspnea were tested with cardio-pulmonary ultrasound and the results were recorded. Males (n=91, 52.0%) were more than females (n=84, 48.0%). A higher number of patients with dyspnea was identified in the age group of >61 (n=75, 42.9%) years. Among 175 patients using cardio-pulmonary ultrasound, 115 patients were diagnosed with elevated Left Ventricular Filling Pressure (LVFP) directing the diagnosis to ALSHF. Among 115 ALSHF patients, 114 (99.1%) were identified as B-Profile present patients. Clinical markers such as lung ultrasound were found in 8 (6.9%), Coronary Artery Disease (CAD) was in (n=72, 62.6%), Non-Coronary Artery Disease (Non-CAD) was in (n=43, 37.4%), STEMI was in (n=22, 19.1%), and NSTEMI was in (n=93, 80.9%) patients.

In the comparison of gender, LVFP, and B-Profile, the LVFP variables such as inconclusive was in (n=57, 49.6%), elevation was found in (n=53, 46.1%), and normal was in (n=5, 4.3%) patients with statistical significance of **(Chi-square value-141.948, P value-0.005).** B-Profile was present in (n=114, 99.1%) patients, and absent in (n=1, 0.9%) patients with statistical significance of **(Chi-square value-19.0763, P value-0.00007).**

Checking the accuracy of cardio-pulmonary ultrasound, the ALSHF and lung ultrasound were identified in 107 patients and 8 patients respectively with sensitivity as -88.43%, specificity as 85.19%, ppv as 93.04%, npv as 76.675, and accuracy was 86.08% with statistical significant value of **0.0005**, and the CAD and Non-CAD were identified in 72 and 43 patients respectively with sensitivity as 86.75%, specificity as 53.26%, positive predictive value as 62.61%, negative predictive value as 81.67%, and accuracy as 70.00% with statistical significant value as **0.0005**. Checking the accuracy of cardio-pulmonary ultrasound, the STEMI and NSTEMI were identified in 22 and 93 patients respectively with (sensitivity-88.00%, specificity-38.00%, ppv-19.13%, npv-95.00%, and accuracy of 63.00% with statistical significant value as **0.038**.

ALSHF variables were compared based on mean±SD values, and Ejection Fraction (EF), E(cm/s), e'(cm/s), A(cm/s), DTE(ms), and E/e' were found with statistically significant values of **0.0005**, and E/A was also found with statistical significance **(0.022)**. The ROC curve of ALSHF and lung ultrasound, CAD and Non-CAD, and STEMI and NSTEMI were reported.

Conclusions

Cardio-Pulmonary Ultrasound provided immediate results of dyspnea patients, without ionizing radiation, used in the rural area at the bedside of patients, results are accurate with good sensitivity and specificity, and hence the Cardio-Pulmonary Ultrasound is the best choice of diagnostic tool for dyspnea patients.

Keywords: Acute Non-Traumatic Dyspnea, Left Ventricular Filling Pressure (LVFP), Acute Left-Sided Heart Failure (ALSHF), Coronary Artery disease (CAD), ST-Elevation Myocardial Infarction (STEMI).

Introduction

Acute non-traumatic dyspnea (shortness of breath) is caused by several clinical factors such as cardiac tamponade, myocardial ischemia, bronchospasm, pulmonary embolism, heart failure, and many more unknown reasons. Dyspnea can vary from mild to severe, temporary to long-lasting, and screening dyspnea is the leading causes for patients to visit, admission, and ia a critical diagnosis in the Emergency Department.

Clinical finding alone is not sufficient for the diagnosis of dyspnea, cardiopulmonary ultrasound plays a vital role in diagnosing dyspnea. As per Barman, B et al and Smit, J. M et al studies that cardiopulmonary ultrasound is 84%, and 68% accurate in diagnosing acute respiratory failure[1, 2]. Acute dyspnea is the commonest symptom that makes any patients to visit to Emergency Department, and in the United States, 4-5 million patients visit EM annually[3].

The publication by Tierney, D. M et al described that cardiopulmonary ultrasound outperformed portable chest radiographs in diagnosing acute respiratory failure[4]. In suspected community-acquired pneumonia also ultrasound showed an excellent accuracy[5].

Javali, R. H et al describes that cardiac and lung ultrasound diagnosing dyspnea is the appropriate, accurate, and faster diagnostic tool that aids in the swift initiation of the appropriate therapy for dyspenea[6]. Leroux, P et al reported that the cardiac and lung ultrasound is best for non-traumatic hypotension, and the accuracy is around 84% in their study[7].

Atkinson, P. R et al study shows that cardiac and lung ultrasound supports guiding the treatment plan in 40% of the patients in directing IV administration[8]. In Li, L et al study, they used cardiac and lung ultrasound for recommendations of IV fluids, and administration of inotropes, and they found CPU showed positive significant changes in 10% in (28-days) survival, showed lesser stage 3 kidney diseases, renal transplant, lesser fluid prescription, and high usage of inotropic agents[9].

Cardiac and lung ultrasound can be a very good predictive tool for fluid score calculation and helpful in predicting the hospital stay in dyspnea patients says Balderston, J. R et al study[10].

As per Chandy, G. M et al study, cardiac and lung ultrasound involves testing organs like heart, lungs, and the circulation system, the diagnosis helps to differentiate the potential cause of diseases is either heart (ADHF) or lungs (pulmonary), thus cardiac and lung ultrasound provides an excellent supports in diagnosing dyspenea[11].

Shafi, M.et al explain that the cardiac and lung ultrasound is a multisystem examination, reliable, portable, has less learning curve, prevents patients from transporting to the radiology department, and supporting guide for fluid administration[12].

Sørensen, S. F et al and Lindskou, T. A et al studies reported that dyspnea is a disease that has a high rate of 30 days mortality rate, and around 8-13% high incidence rate[13, 14]. Rui, L. I. A. N et al describes that choosing differential diagnostic tools for any disease are the key elements that every physician must be well trained[15]. Cid-Serra, X et al report that cardiac and lung ultrasound or Point Of Care Ultrasound (POCUS) has proved to be the best choice of diagnostic tool[16].

Based on the above literature, it is very clear that we require the best choice of diagnostic tool for dyspnea patients, and the tools must have a good specificity and sensitivity to prove the diagnostic purpose, hence this present study is conducted to enlighten the insights of the efficacy of cardiac and lung ultrasound in diagnosing dyspnea.

Ethical clearance

The study was approved provided with a clearance certificate by Ethical Committee of the Institution to conduct this study.

Inclusion criteria

1. Patients with age ≥18 years willing to give consent.
2. Patients with Acute Non-Traumatic Dyspnea.

Exclusion criteria

1. Patients who received pre-hospital medical care (except oxygen therapy).
2. Very unstable patients requiring mechanical ventilation.

Materials And Methods

Methodology

Study Subjects

This study conducted in the Emergency Medicine (EM) unit, of Sri Ramachandra Medical College & Research Institute and was an observational study in 175 patients after their inclusion criteria were fulfilled.

Informed consent Form

Informed consent received from the patients caretakers before including them in this study. Patient details were collected in a verified Proforma.

Clinical History and Data collection

All of the study patient's demographic details and cardiac ultrasounds were done within 15 minutes of the patient arriving at the EM, and the parameters were recorded. Using the parameters, with the help of algorithm[17] the LVFP [18] was calculated. The results were interpreted as Normal, Inconclusive, and Elevated.

The SONOSITE Fujifilm M Turbo (Bothell, WA)[19] fit out with sector probe (3 -5 MHz) for cardiac ultrasounds and with the help of abdominal probe (3 -5 MHz) the pulmonary ultrasounds were tested.

Interpretation of Cardiac Ultrasound

Step 1: Initially the Ejection Fraction (EF) [20] is interpreted. By Simpsons method [21] in Apical 4 chamber view, the ejection fraction is calculated as > 45 or <45 and recorded.

Step 2:

Mitral doppler[22] in pulsed mode is done on the apical 4-chamber view for all the study patients to get values of, E, A, E/A, DTE, and results were recorded.

1. E: E wave represents the velocity of blood flow across the mitral valve due to the passive filling of the ventricle (early [E] wave) Normal range: 44 – 100 cm/sec.
2. A: A wave represents the velocity of blood across the mitral valve due to active filling with atrial systole (atrial [A] wave) Normal range: 20-60 cm/sec.
3. E/A Ratio: Normal range: > 0.8 or between 1to2.
4. DTE: Normal range: 139 -219 milliseconds.

Step 3:

Tissue Doppler[23] of the lateral edge of the mitral ring is done on the apical 4-chamber view for all the study patients to get values of, e', E/e', and results were recorded.

Volume 6, Issue 2; March-April 2023; Page No 387-398

1. e’: Peak modal velocity in early diastole at the leading edge of the spectral waveform. Normal value: >10 cm/sec (at later annulus)
2. E/e’ :Normal value :≤8 (at lateral annulus)

Reporting and Diagnosis

1. Patients with elevated LVFP, the diagnosis is ALSHF.
2. If the LVFP is normal or inconclusive, Lung Ultrasound is done.
3. Presence of ≥3 B lines in the anterior or lateral thoracic region or both by lung field is diagnosed as patients with B profile.

Analysis

All the 175 study subjects were observed, cardiac and lung ultrasound was done, and the results were recorded. The recorded results were compared within gender, LVEP, and B-Profile, and analyzed for statistical significance. We have checked the accuracy of clinical markers of Cardio-Pulmonary Ultrasound using statistical variables such as sensitivity, specificity, ppv, npv and checked the statistical significance also. We have done a statistical comparison of parameters of ALSHF done by echocardiogram based on mean ± SD and we have also done Receiver Operating Characteristic (ROC) curve for ALSHF markers and reported.

Statistical Analysis

The data was analyzed using SPSS version 20.0. For quantitative variables, mean ± SD were done, and for categorical variables, frequency and proportion were done. Unpaired t-test used for statistical significane. Significance was calculated between the bivariate samples in independent groups, the Receiver Operator Characteristic (ROC) curve analysis was also done to find out the efficacy to screen the Sensitivity, Specificity, PPV, and NPV of echo. Chi-square was done to analyze the categorical variable. Fisher's Exact was also used to calculate similarity.

Results

A total of 175 patients with acute non-traumatic dyspnea were observed for this study, and the basic profile of the patients were described in **Table 1**. Among 175 patients males were 91 (52.0%) and females were 84 (48.0%). In the age categories the patients in the ≤30 years of age groups were 7 (4.0%), 31-40 years were 13 (7.4%) patients, 41-50 years were 35 (20.0%) patients, 51-60 years were 45 (25.7%), and ≥61 years of age groups of patients with acute non-traumatic dyspnea were 75 (42.9%).

Among 175 study patients, using cardio-pulmonary ultrasound, LVFP was diagnosed for 115 patients and 60 patients were un-diagnosed. Among 115 diagnosed LVFP patients normal was found in 5 (4.3%) patients, inconclusive in 57 (49.6%) patients, and elevated LVFP was found in 53 (46.1%) patients, directing the diagnosis to Acute Left-Sided Heart Failure (ALSHF), among the diagnosed ALSHF, males were 64 (56.8%), and females were 51 (53.3%). Among the ALSHF patients, B-Profile was present in 114 (99.1%) patients and the B-Profile was absent in 1 (0.9%) **(Table 1)**.

Using cardio-pulmonary ultrasound with an abdominal probe the pulmonary ultrasound was identified in 8 (6.9%) patients, CAD is diagnosed n= 72 (62.6%) patients, Non-CAD in 43 (37.4%) patients, STEMI was found in 22 (19.1%), and NSTEMI was diagnosed in 93 (80.9%) patients **(Table1)**.

Table 1 Basic Profile of Patients with Acute Non-Traumatic Dyspnea

Variables	No (%)
Gender (n=175)	
Males	91 (52.0)
Females	84 (48.0)
Age Categories (in years) (n=175)	
≤30 years	7 (4.0)
31-40 years	13 (7.4)

Volume 6, Issue 2; March-April 2023; Page No 387-398

41-50 years	35 (20.0)
51-60 years	45 (25.7)
≥61 years	75 (42.9)
Left Ventricular Filling Pressure (LVEP) (n=175)	
Diagnosed	115 (67.6)
Un-Diagnosed	60 (34.3)
Left Ventricular Filling Pressure (LVEP) (Positivity) (n=115)	
Inconclusive	57 (49.6)
Elevated	53 (46.1)
Normal	5 (4.3)
Acute Left-Sided Heart Failure (ALSHF) (Positivity) (n=115)	
Males	64 (55.7)
Females	51 (44.3)
B-Profile (n=115)	
Present	114 (99.1)
Absent	1 (0.9)
Clinical Makers (Positivity) (n=115)	
Lung Ultrasound	8 (6.9)
Coronary Artery Disease (CAD)	72 (62.6)
Coronary Artery Disease (Non-CAD)	43 (37.4)
ST- Elevation Myocardial Infarction (STEMI)	22 (19.1)
Non-ST-Elevation Myocardial Infarction (NSTEMI)	93 (80.9)

We have compared clinical parameters such as gender, LVFP, and B-Profile to find out the statistical significance and the result were explained in **Table 2**. In comparison of ALSHF and gender, 64 (55.7%) males were diagnosed and 51 (44.3%) females were diagnosed with ALSHF. Comparing LVFP, inconclusive diagnoses were found in 57 (49.6%), elevation was found in 53 (46.1%), and normal LVFP was found in 5 (4.3%) patients with statistical significance of (**Chi-square value** of **141.948**, and the P value is **0.0005).** Comparing the B-profile we found that in 114 (99.1%) patients, the B-profile was present and in 1 (0.9%) patient the B-profile is absent with a statistical significance of (**Chi-square value** of **19.0763**, and the P value is **0.00007).**

Table 2 Comparison of Gender, LVEP and (B-Profile) in Patients with Acute Non-Traumatic Dyspnea

Variables	**Categories**	No (%)	**Chi square**	**P value**
Genders	Males	64 (55.7)	1.792	0.204
	Females	51 (44.3)		
LVFP	Inconclusive	57 (49.6)	141.948	0.0005*
	Elevated	53 (46.1)		

Volume 6, Issue 2; March-April 2023; Page No 387-398

	Normal	5 (4.3)		
B-Profile	Present	114 (99.1)	19.0763	0.00007*
	Absent	1 (0.9)		

*** Statistically Significant** **Chi-square**

We have checked the accuracy of clinical markers of cardio-pulmonary ultrasound using statistical variables such as sensitivity, PPV, specificity, NPV, accuracy, 95% Confidence Interval (C.I), and statistical significance (P value) and narrated in **Table 3**. ALSHF (n=107) and lung ultrasound (n=8) were found with a sensitivity of 88.43, specificity of 85.15, PPV of 93.04, NPV of 76.67, the accuracy of 86.8%, lower and upper bound of 95% C. I was 86.8% with a P value of **0.0005**.

CAD (n=72), and Non-CAD (n=43) was found with (sensitivity-86.75, specificity-53.26, PPV-62.61, NPV-81.67, accuracy-70.00%, lower bound-.622, upper bound-.778) with 95% C.I and the P value was **0.0005**. STEMI (n=22), and NSTEMI (n=93) were found with a sensitivity of 88.00, specificity of 38.00, PPV of 19.13, NPV of 95.00, the accuracy of 63.00% lower bound was .524 and upper bound was .736 of 95% C.I with a p-value of **0.038 (Table 3)**.

Table 3 Accuracy of Clinical Markers of Cardio-Pulmonary Ultrasound using Statistical Variables in Patients with Acute Non-Traumatic Dyspnea

Variables	N	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)	**95% C.I**		**P value**
							Lower Bound	Upper Bound	
ALSHF	107	88.43	85.19	93.04	76.67	86.08	86.8	86.8	0.0005*****
LUNG	8								
CAD	72	86.75	53.26	62.61	81.67	70.00	.622	**.778**	0.0005*****
Non-CAD	43								
STEMI	22	88.00	38.00	19.13	95.00	63.00	.524	**.736**	0.038*****
NSTEMI	93								

*** Statistically Significant** **Chi-square**

We have also done the statistical comparison of parameters of ALSHF done by cardio-pulmonary ultrasound with positivity and negativity based on mean ± SD of patients data and shown in **Table 4**. The positivity for ALSHF in all the age groups was n=115 with the mean±SD (57±12.09), and negativity was n=60 with the mean±SD (56±14.53). The positivity of Ejection Fraction (EF) in ALSHF was n=115 with the mean±SD (44.05±8.64), and negativity was n=60 with the mean±SD (54.28±7.14) with the P value of **0.0005.**

The positivity of E(cm/s) in ALSHF was n=115 with the mean±SD (65.63±19.16), and negativity was n=60 with the mean±SD (84.28±11.85) along with the P value of **0.0005.** The positivity of A(cm/s) in ALSHF was n=115 with the mean±SD (40.91±20.07), and negativity was n=60 with the mean±SD (59.75±10.64) with the P value of **0.0005.** The positivity of E/A in ALSHF was n=115 with the mean±SD (1.82±0.43), and negativity was n=60 with the mean±SD (1.42±0.22) with the P value of **0.022 (Table 4).**

The positivity of DTE (ms) in ALSHF was n=115 with the mean±SD (190.06±20.55), and negativity was n=60 with the mean±SD (184.30±12.30) with the P value of **0.0005.** The positivity of e' (cm/s) in ALSHF was n=115 with the mean±SD (6.55±2.33), and negativity was n=60 with the mean±SD (8.62±1.15) with the P value of **0.0005.** The positivity of E/e' in ALSHF was n=115 with the mean±SD (9.66±1.01), and negativity was n=60 with the mean±SD (8.80±1.30) with the P value of **0.0005 (Table 4).**

Volume 6, Issue 2; March-April 2023; Page No 387-398

Table 4 Statistical Comparison of Parameters of ALSHF done by Cardio-Pulmonary Ultrasound based on mean ± SD of Patients with Acute Non-Traumatic Dyspnea

ALSHF		N	Mean	S.D	P-value
AGE	Positive	115	57	12.09	0.487
	Negative	60	56	14.53	
EF(%)	Positive	115	44.05	8.64	0.0005*
	Negative	60	54.28	7.14	
E(cm/s)	Positive	115	65.63	19.16	0.0005*
	Negative	60	84.28	11.85	
A(cm/s)	Positive	115	40.91	20.07	0.0005*
	Negative	60	59.75	10.64	
E/A	Positive	115	1.82	0.43	0.022*
	Negative	60	1.42	0.22	
DTE(ms)	Positive	115	190.06	20.55	0.0005*
	Negative	60	184.30	12.30	
e'(cm/s)	Positive	115	6.55	2.33	0.0005*
	Negative	60	8.62	1.15	
E/e'	Positive	115	9.66	1.01	0.0005*
	Negative	60	8.80	1.30	

*** Statistically Significant** **Unpaired t-test**

We have done Receiver Operating Characteristic (ROC) curve for ALSHF markers and plotted it in **Figure 1** (a,b,c). The ROC curve between the identification of ALSHF and lung ultrasound was plotted in **Figure 1** (**a**), the ROC curve between the identification of CAD and Non-CAD was plotted in **Figure 1** (**b**), and the ROC curve between the identification of STEMI and NSTEMI was plotted in **Figure 1** (**c**).

Figure 1 (a,b,c) ROC curve of Clinical Markers of Patients with Acute Non-Traumatic Dyspnea

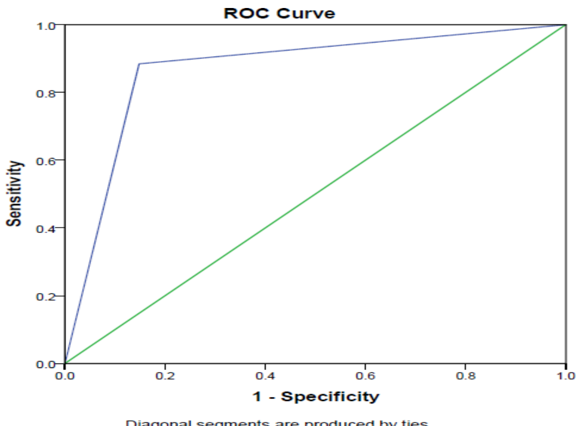

Figure 1 (a) ROC of ALSHF and Lung

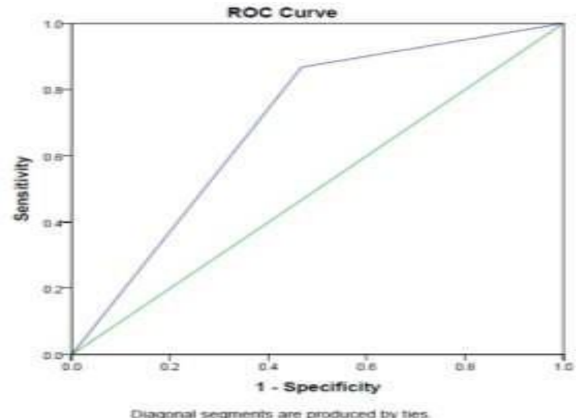

Figure 1 (b) ROC of CAD and Non-CAD

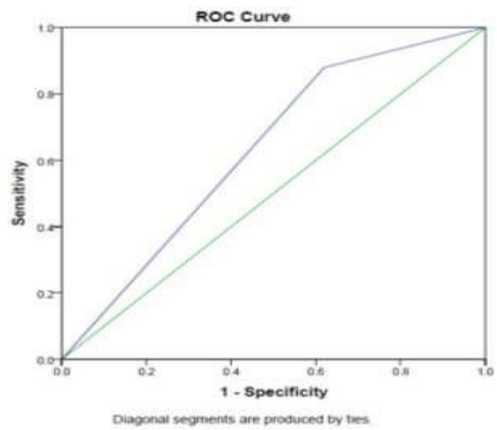

Figure 1 (c) ROC of STEMI and NSTEMI

Discussion

Cardio-Pulmonary Ultrasound is one of the best diagnostic tools as it identifies diseases in multiple organs such as the heart, lungs, and circulation. Baker, K et al[24] describe that the cardio-pulmonary ultrasound is a good, accurate diagnostic test providing the optimal result in a short time on the bedside of the patient, our present is compatible with Baker K et al study with a statistical significance of **0.0005**. Sezgin, C et al[25] also reported 77% of accuracy was found by CPU in their study, but Musikatavorn, K et al[26] reported that in their study on fluid administration, cardio-pulmonary ultrasound did not support nor guided for the number of admissions.

The study by Dehbozorgi, A et al[27] shows that the specificity of the cardio-pulmonary ultrasound was excellent, and our present study found that the specificity for (ALSHF/lung-85.19), (CAD/Non-CAD-53.26), and (STEMI/NSTEMI-38.00) were reported with the statistical significance of **0.0005** and **0.038**.

In a type 2 diabetic subject study by Jørgensen, P. G et al[28], echocardiography, E/e′ is the ratio routinely used in cardiac assessment, and the study also shows that echocardiography, E/e′ is used as hallmark diagnostic tool for diabetic cardiomyopathy, and the author Picano, E et al[29] reports that the E/e’ is one of the key parameter tested for patients with CAD, HCM, VHD, and HFpEF in >10,000 patients, we in our study found that the cardio-pulmonary ultrasound variable E/e’ was the very good diagnostic marker for identifying Acute Left-Sided Heart Failure (ALSHF) with the mean±SD (9.66±1.01), and with the P value of **0.0005.**

Rørth, R et al[30] found that echocardiography, E/e′ is a valuable cardio-vascular prognostic tool and can be used in type 1 diabetic subjects to check their risk of cardiovascular diseases, whereas, in our study in 115 dyspnea patients were diagnosed with elevated LVFP (46.1%) with Chi-square of **141.948**, and P value of **0.0005**.

Reddy, Y. N et al[31] and Morrone, D et al[32] studies explain that E/e′ is one of the best and simple markers to diagnose heart failure, and we in our study also found that the E/e′ marker of cardio-pulmonary ultrasound is the best marker to identify dyspnea.

Ramalho, S. H et al[33] studies reported that moderate-severe dyspnea was associated with clear obstructive with 95% CI, 1.28-1.99; P < .001, and the author also reported e′, cm/s 11.5 >13.3 Septal E/e′ ratio >13.3 >15.1, in our present, we have reported that the (ALSHF/lung's 95% C. I with Lower Bound was 86.8, and the Upper Bound was 86.8), (CAD/Non-CAD-95% C.I-Lower Bound.622, Upper Bound-.778), with the P value **0.0005**, and (STEMI/NSTEMI-95% C.I-Lower Bound-.524, Upper Bound-.736), with the P value **0.038**. We in our present also reported that the positivity of e' (cm/s) in ALSHF was n=115 with the mean±SD (6.55±2.33), and negativity was n=60 with the mean±SD (8.62±1.15) with the P value of **0.0005,** and the positivity of E/e' in ALSHF was n=115 with the mean±SD (9.66±1.01), and negativity was n=60 with the mean±SD (8.80±1.30) with the P value of **0.0005.**

Nilsson, T et al[34] studies shows the sensitivity of the ultrasound was 24%, specificity was 97%, NPV was 94%, and NPV was 89%, in our present study, we found sensitivity was 88.43%, specificity was 85.19%, negative predictive value was 76.67% and positive predictive value 93.04% with a p-value of **0.0005.**

Danish emergency process triage[35] describes the patient's with acute coronary syndrome with STEMI are directly sent to the cardiac catheterization unit for further process, in our present study in dyspnea, STEMI was found in 22 patients and -95% C. I – Lower Bound-.524, Upper Bound-.736), with the P value **0.038**.

Nielsen, M. K et al[36] study reports that dyspnea is the second highest disease that shows the highest 30-day mortality rate, and requires a good diagnostic tool, we also found that prompt, and timed identification of dyspnea will reduce the mortality rate in patients suspected for dyspnea, and we report that the cardio-pulmonary ultrasound is the best choice of a diagnostic tool to identify dyspnea.

Wilt, T. J et al[37] describes that cardio-pulmonary ultrasound is an important diagnostic test, Maw, A. M et al[38] reported that the cardio-pulmonary ultrasound is with many advantages such as immediate result availability, Raheja, R et al[39] reports cardio-pulmonary ultrasound is without ionizing radiation, Narula, J et al[40] reports that the cardio-pulmonary ultrasound's usage has increased in past decade, Sheppard, G et al[41] explains that the cardio-pulmonary ultrasound are used in rural area also, Altıparmak, I. H et al[42] describes that the cardio-pulmonary ultrasound's accuracy is dependent on the medical personnel, hence quality can be compromised, and Qaseem, A et al[43] reported that there is lack of evidence-based studies, and guidelines regarding the cardio-pulmonary ultrasound's advantages, usage, sensitivity, specificity, and the accuracy, hence we conducted this present study to check the accuracy, sensitivity, specificity, and we conclude that the Cardio-Pulmonary Ultrasound (CPU) is the best diagnostic tool for diagnosing dyspenea. Hence, by using Cardio-Pulmonary Ultrasound (CPU), for dyspnea, we can reduce the mortality rate of patients suffering by dyspnea.

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Volume 6, Issue 2; March-April 2023; Page No 387-398

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