

---

---

## *List Of Contents*

<b>Item</b>	<b>No of page</b>
<b>List Of Contents</b> .....	I
<b>Abbreviations</b> .....	II-III-IV
<b>List of tables</b> .....	V-VI
<b>List of figures</b> .....	VII-VIII
<b>Introduction</b> .....	1
<b>aim of the work</b> .....	3
<b>Review of literature:</b>	
□ <i>Chapter 1</i> :Chronic Obstructive Pulmonary Disease	4
□ <i>Chapter 2</i> :Pulmonary hypertension	12
□ <i>Chapter 3</i> :Pulmonary Hypertension in chronic obstructive pulmonary disease	17
□ <i>Chapter 4</i> :Right Ventricular Failure in COPD	37
□ <i>Chapter 5</i> : Assessment of pulmonary hypertension in chronic obstructive pulmonary disease	39
□ <i>Chapter 6</i> : Utility Of Echocardiography In Assessment Of Pulmonary Hypertension Secondary To COPD	47
□ <i>Chapter 7</i> :Tissue Doppler Imaging	50
<b>Patients &amp; Methods</b> .....	57
<b>Results</b> .....	63
<b>Discussion</b> .....	89

---

---

<b>conclusion, Recommendation and limitations</b> .....	97
<b>Summary</b> .....	98
<b>References</b> .....	101

---

---

## *List Of Abbreviations*

Am	: Late diastolic myocardial velocity
ANCA	: Antineutrophil cytoplasmic antibody.
ATS	: American thoracic society .
BTS	: British thoracic society.
COPD	: Chronic obstructive pulmonary disease.
CREST	: Calcinosis cuits, Raynaud's phenomenon, esophageal dysfunction, sclerodactyly and telangiectasia.
CT	: Computed tomography.
CWD	: Continous – wave Doppler ultra sound.
DLCO	: Diffusion Capacity for Carbon monoxide.
DTm	: Decederation time of early diastolic myocardial velocity.
ECG	: Elctrocardiogram.
EF	: Ejection fraction.
Em	: Early diastolic myocardial velocity.
ENOS	: Endothelial nitric oxide synthase.
ERS	: European Respiratory society.
ET	: Endothlin.
FEVI	: Forced expiratory volume in 1 second.
FHCM	: Familial hyperytrophic cardiomyopathy.
FPAH	: Familial pulmonary arterial hypertension.
FS	: Fractional shortening.

---

---

FVC	: Forced vital capacity.
GOLD	: Global initiative for chronic obstructive lung disease .
HCM	: Hypertrophic cardiomyopathy .
HDL	: High Denesity Lipoprotein.
HIV	: Human immunodeficiency virus.
ICTm	: Isovolumic contraction time .
IPF	: Interstitial pulmonary fibrosis.
IVRTm	: Isovolumic relaxation Time.
LDL	: Low density Lipoprotein.
LTOT	: Long-term oxgen threrapy.
LVEDD	: Left ventricular End diastolic dimension.
LVESD	: Left ventricular End systolic dimension.
LVH	: Left ventricular hypertrophy .
LVRS	: Lung volume reduction surgery.
NO	: Nitric oxide.
PAH	: Pulmonary arterial hypertension.
PAO2	: Arterial oxygen tension.
PASP	: Pulmonary artery systolic pressure.
PCH	: Pulmonary Capillary hemangiomatosis.
PDGF	: Platelet derived growth factor.
PHT	: Pulmonary hypertension.
Ppcw	: Pulmonary Capillary wedge pressure.

---

---

---

---

PPH	: Primary pulmonary hypertension.
PT	: Prothrombin Time.
PVR	: Pulmonary vascular resistance.
RVDD	: Right ventricular Diastolic dimension .
RVEF	: Right Ventricular ejection fraction.
Sm	: Systolic myocardial velocity.
Sm VTI	: Velocity time integral of sm.
TDI	: Tissue Doppler Imaging.
TGF	: Transforming growth factor.
TR	: Tricuspid regurge
WHO	: World Health Organization.

---

---

## *List Of Tables*

<i>Table No.</i>	<i>Title</i>	<i>Page</i>
1	Classification of COPD serverity .	10
2	Clinical classification of pulmonary hypertension.	14
3	New York Heart Association functional classification for heart disease.	16
4	Comparison between the studied groups as regards age and sex.	64
5	Comparison between the studied groups as regards to pulmonary function.	66
6	Comparison between the studied groups as regards to echocardiographic parameters.	66
7	Comparison between the studied groups as regards to right ventricular end diastolic diameter.	67
8	Comparison between control group and group I as regards to systolic myocardial velocity.	68
9	Comparison between control group and group II as regards to systolic myocardial velocity.	69
10	Comparison between group I and group II as regards to systolic myocardial velocity.	70
11	Comparison between control group and group I as regards to velocity time integral of sm.	71
12	Comparison between control group and group II as regards to velocity time integral of sm.	72
13	Comparison between group I and group II as regards to velocity time integral of sm.	73
14	Comparison between the studied groups as regards to Isovolumic contraction time .	74

---

---

15	Comparison between control group and group I as regards to myocardial Isovolumic relaxation time.	75
16	Comparison between control group and group II as regards to myocardial Isovolumic relaxation time.	76
17	Comparison between group I and group II as regards to Isovolumic relaxation time.	77
18	Comparison between control group and group I as regards to early diastolic myocardial velocity.	78
19	Comparison between control group and group II as regards to early diastolic myocardial velocity.	79
20	Comparison between group I and group II as regards to early diastolic myocardial velocity.	80
21	Comparison between control group and group I as regards to early diastolic myocardial velocity to diastolic myocardial velocity.	81
22	Comparison between control group and group II as regards to early diastolic myocardial velocity late diastolic myocardial velocity.	82
23	Comparison between group I and group II as regards to early diastolic myocardial velocity to late diastolic myocardial velocity.	83
24	Comparison between the studied groups as regards to late diastolic myocardial velocity (Am), Descerelation time of Em (DTm) and isovolumic contraction time.	85

---

---

---

---

## *List Of Figures*

<i>Fig No.</i>	<i>Title</i>	<i>Page</i>
1	Histological section through emphysematous lung .	7
2 a,b	Immunostaining of pulmonary muscular artery from COPD .	23
3	Photo micro graph of pulmonary muscular artery from COPD .	27
4	Immunohistochemical expression of endothelial nitric oxide synthase in smoker lung.	29
5	Pathophysiology of pulmonary hypertension in COPD.	30
6	Pathogenesis of cor-pulmonale in COPD.	38
7	Estimation of pulmonary artery pressure in COPD patient with tricuspid regurg by Doppler echo cardiography using Bernoulli equation.	49
8	Measurement of different Tissue Doppler parameters.	61
9	Comparison between control group and group I as regards to systolic myocardial velocity.	68
10	Comparison between control group and group II as regards to systolic myocardial velocity	69
11	Comparison between group I and group II as regards to systolic myocardial velocity.	70
12	Comparison between control group and group I as regards to velocity time integral of sm.	71
13	Comparison between control group and group II as regards to velocity time integral of sm.	72
14	Comparison between the studied groups as regards to Isovolumic contraction time .	73
15	Comparison between the studied groups as regards to Isovolumic contraction time .	74
16	Comparison between control group and group I as regards to myocardial isovolumic relaxation time.	75



---

---

17	Comparison between control group and group II as regards to myocardial isovolumic relaxation time.	76
18	Comparison between group I and group II as regards to myocardial isovolumic relaxation time.	77
19	Comparison between control group and group I as regards to early diastolic myocardial velocity.	78
20	Comparison between control group and group II as regards to early diastolic myocardial velocity.	79
21	Comparison between group I and group II as regards to early diastolic myocardial velocity.	80
22	Comparison between control group I and group I as regards to early diastolic myocardial velocity to late diastolic myocardial velocity.	81
23	Comparison between control group and group II as regards to early diastolic myocardial velocity to late diastolic myocardial velocity.	82
24	Comparison between group I and group II as regards to early diastolic myocardial velocity to late diastolic myocardial velocity.	83
25	Comparison between the studied groups as regards to late diastolic myocardial velocity.	85
26	Comparison between the studied groups as regards to deceleration time of Em.	86
27	Correlation between systolic myocardial velocity (Sm) and level of pulmonary artery systolic pressure (PASP) .	87
28	Correlation between velocity time integral of sm (SmVTI) and level of pulmonary artery systolic pressure (PASP).	87
29	correlation between myocardial isovolumic relaxation time (IVRT m) and level of pulmonary artery systolic pressure (PASP)	88

---

---

---

---

## ***Acknowledgments***

Thanks first and last to ***Allah***, for his great care, support and guidance in every step in our life.

I would like to express my deep appreciation and profound gratitude to ***Prof. Hesham Abou El-Enien*** professor of cardiology, Benha Faculty of Medicine, Benha University for his guidance, great help and constructive criticism.

Indeed, words do fail me when I come to express my deep respect to ***Dr. Reda Biomy*** Assistant professor of Cardiology, Benha Faculty of medicine, Benha University for his extra ordinary honest effort and help. I was much impressed by his noble character, patience and sympathy.

Special acknowledgement is given to ***Dr. Tarek Abou- El-Azm.*** Assistant professor of cardiology- Benha Faculty of Medicine, Benha University, for his advice and generous help.

I am indeed grateful to ***Dr. Neama El-Melegy*** Assistant consultant of cardiology Benha hospital. Faculty of Medicine Benha University, for her generous guidance, faithful encouragement and sincere help.

---

---