Correlation between 6-minutes Walking Test and DLCO in patients with Idiopathic Interstitial Pneumonitis as an Indicator for Arterial Deoxygenation

Thesis

Submitted for Partial Fulfillment of Master Degree

In Chest Diseases & Tuberculosis

 $\mathcal{B}y$

Mona El-Morsy Soliman

M.B., B. Ch.

Supervised by

Prof. Dr. Mohammed Ali Farrag

Professor of Chest Diseases
Faculty of Medicine- Ain shams University

Ass. Prof. Hala Mohammed Salem

Assistant Professor of Chest Diseases
Faculty of Medicine- Ain shams University

Faculty of Medicine
Ain Shams University
2016



سورة البقرة الآية: ٣٢



- Tirst and foremost thanks to Allah, the most beneficent and merciful.
- I wish to express my deep appreciation and sincere gratitude to Prof. Dr. Mohammed Ali Farrag, Professor of Chest Diseases, Faculty of Medicine, Ain Shams University, to whom I owe a lot. She offered me generously his expensive time, great help, and kind encouragement.
- Hala Mohammed Salem, Assistant Professor of Chest Diseases, Faculty of Medicine, Ain Shams University. For her continuous help, and support thought this work, and for her kind supervision.

AMona El-Morsy Soliman

Contents

Subjects	Page
• List of Abbreviations	I
• List of Tables	III
• List of Figures	VII
• Introduction	1
Aim of the Work	5
• Review of literature	
- Chapter (1): Idiopathic Interstitial Pneumonia	6
- Chapter (2): 6 minutes walking test	89
- Chapter (3): Carbon Monoxide Diffusing Ca	apacity
(DLCO)	100
Patients and Methods	112
• Results	122
• Discussion	136
• Summary	144
• Conclusion	148
Recommendations	150
• References	151
Arabic Summary	

List of Abbreviations

6-MWT : 6-minute walk test

AEF : Airspace enlargement with fibrosis

AIP : acute interstitial pneumonia

ATS : American thoracic society

BALF : Broncho alveolar lavage fluid

BOOP: Bronchiolitis obliterans organizing

pneumonia

CFA : Cryptogenic fibrosing alveolitis

COP : cryptogenic organizing pneumonia

COPD : Chronic obstructive lung disease

CT : Computed tomography

CVD : Carido vascular disease

DAD : Diffuse alveolar demage

DIP : Desquamative interstitial pneumonia

DLCO: Diffusion capacity of the lung for carbon

monoxide

DPLDs : Diffuse pulmonary lung diseases

ESR : Erythrocyte sedimentation rate

FEV1 : Forced expiratory volume in 1sec

FVC : Forced vital capacity

HRCT: High-resolution computerized tomography

IIPs : Idiopathic interstitial pneumonias

E List of Abbreviations &

ILD : Interstitial lung diseases

IPF : Idiopathic pulmonary fibrosis

LAM : Lymphangioleiomyomatosis

LIP : lymphocytic interstitial pneumonia

MALT: Mucosa associated lymphoid tissue

NSIP : nonspecific interstitial pneumonia

OP : Organizing pneumonia

 $P(A-a)O_2$: Alveolar-arterial pressure difference

PLCH: Pulmonary Langerhans cell histocytosis

RB-ILD: respiratory bronchiolitis-associated

interstitial lung disease

SLB : Surgical lung biopsy

SP : surfactant protein

TBBx : Transbronchial biopsy

TLC : Total lung capacity

UIP : Usual interstitial pneumonia

VC : vital capacity

List of Tables

Table No	Title	Page
Table (1)	Ats/ers criteria for diagnosis of idiopathic pulmonary fibrosis in	10
	absence of surgical lung.	
Table (2)	Radiologic features and differential	14
	diagnosis of idiopathic interstitial pneumonias	
Table (3)	Histologic features of usual interstitial pneumonia	21
Table (4)	Clinical conditions associated with usual interstitial pneumonia pattern	21
Table (5)	Histologic features of nonspecific interstitial pneumonia	34
Table (6)	Clinical conditions associated with nonspecific interstitial pneumonia histologic pattern	36
Table (7)	Histologic features of desquamative interstitial pneumonia	45
Table (8)	Histologic features of organizing pneumonia pattern	55
Table (9)	Histologic features of diffuse alveolar damage	65

🕏 List of Tables 🗷

Table No	Title	Page
Table (10)	Clinical conditions associated with	66
	diffuse alveolar damage pattern	
Table (11)	Histologic features of lymphoid	76
	interstitial pneumonia	
Table (12)	Indications for the application of the	92
	six-minute walk test	
Table (13)	Factors associated with shorter six-	96
	minute distance	
Table (14)	Factors associated with longer six-	96
	minute distance	
Table (15)	The correlation between age, sex, Co-	122
	morbidity, Clubbing and Diffusion	
	defect in the studied group.	
Table (16)	Correlation between DLCO (mild	122
	defect) and resting Spo2 in the studied	
	group.	
Table (17)	Correlation between DLCO (mild	124
	defect) and post exertion Spo2 in the	
	studied group.	
Table (18)	Correlation between DLCO (mild	125
	defect) and difference saturation	
	(resting and post exertion Spo2) in the	
	studied group.	

🕏 List of Tables 🗷

Table No	Title	Page
Table (19)	Correlation between DLCO (moderate	126
	defect) and Resting Spo2 in the studied	
	group.	
Table (20)	Correlation between DLCO (moderate	127
	defect) and Post exertion Spo2 in the	
	studied group.	
Table (21)	Correlation between DLCO (moderate	128
	defect) and Difference saturation	
	(resting and post exertion Spo2) in the	
	studied group.	
Table (22)	Correlation between DLCO (Severe	129
	defect) and Resting Spo2 in the studied	
	group.	
Table (23)	Correlation between DLCO (Severe	130
	defect) and Post exertion Spo2 in the	
	studied group.	
Table (24)	Correlation between DLCO (Severe	131
	defect) and Difference saturation	
	(Resting and Post exertion Spo2) in the	
	studied group.	
Table (25)	Correlation between DLCO (in all	132
	patients) and Resting Spo2 in the	
	studied group.	

🕏 List of Tables 🗷

Table No	Title	Page
Table (26)	Correlation between DLCO (in all	133
	patients) and Post exertion Spo2 in the	
	studied group.	
Table (27)	Correlation between DLCO (in all	134
	patients) and Difference saturation	
	(resting and post exertion Spo2) in the	
	studied group.	
Table (28)	The cut off value of different DLCO	135
	defects, Sensitivity, Specificity in the	
	studied group.	
Table (29)	The association of clubbing in relation	135
	to the mean value of DLCO in the	
	studied group.	
Table (30)	Correlation between Mean DLCO,	135
	Mean resting spo2, Mean post exertion	
	Spo2 and Mean difference in the	
	studied group.	

List of Figures

Figure No	Title	Page
Fig. (1)	Diffuse parenchymal lung diseases	8
	(DPLDs) consist of disorders of known	
	causes.	
Fig. (2)	Idiopathic pulmonary fibrosis.	15
Fig. (3)	Progression of IPF in a 65-yr-old man.	16
Fig. (4)	A) Usual interstitial pneumonia pattern.	20
	Patchy fibrosis with remodeling of the	
	lung architecture shows a striking	
	subpleural distribution.	
Fig. (5)	Atypical usual interstitial	23
	pneumonia/idiopathic pulmonary	
	fibrosis. Computed tomography (CT)	
	features:	
Fig. (6)	Nonspecific interstitial pneumonia.	30
	HRCT through the left lower lung shows	
	extensive ground glass abnormality,	
	with associated reticular abnormality	
	and traction bronchiectasis. Histology	
	showed a combination of inflammation	
	and mild fibrosis.	
Fig. (7)	Nonspecific interstitial pneumonia,	34
	fibrosing pattern.	

Figure No	Title	Page
Fig. (8)	Nonspecific interstitial pneumonia.	38
	Computed tomography (CT) features.	
Fig. (9)	Respiratory bronchiolitis-interstitial	40
	lung disease.	
Fig. (10)	Desquamative interstitial pneumonia.	43
Fig. (11)	Desquamative interstitial pneumonia	46
	pattern.	
Fig. (12)	Cryptogenic organizing pneumonia.	53
Fig. (13)	Organizing pneumonia pattern in patient	56
	with cryptogenic organizing pneumonia.	
Fig. (14)	Cryptogenic organizing pneumonia.	58
Fig. (15)	Acute interstitial pneumonia. HRCT	63
	shows a geographic distribution of	
	ground glass abnormality with	
	consolidation in the more dependent	
	lung.	
Fig. (16)	Diffuse alveolar damage in a patient	65
	with acute interstitial pneumonia.	
Fig. (17)	Acute exacerbation of idiopathic	69
	pulmonary fibrosis (IPF). Computed	
	tomography (CT) features	
Fig. (18)	Lymphocytic interstitial pneumonia.	74
	Prone HRCT shows diffuse ground glass	
	attenuation with multiple lung cysts.	

Figure No	Title	Page
Fig. (19)	Lymphocytic interstitial pneumonia	75
	pattern. There is diffuse thickening of	
	alveolar walls by a moderately severe	
	infiltrate of lymphocytes and plasma	
	cells.	
Fig. (20)	Pleuroparenchymal fibroelastosis.	79
	Computed tomography (CT) features	
Fig. (21)	Pleuroparenchymal fibroelastosis.	80
Fig. (22)	Acute fibrinous and organizing	81
	pneumonia. Computed tomography (CT)	
	features.	
Fig. (23)	This figure shows a +ve correlation	123
	between DLCO defect and resting Spo2	
	in a group of patients with mild DLCO	
	defect.	
Fig. (24)	This figure shows a +ve correlation	124
	between DLCO defect and post exertion	
	Spo2 in a group of patients with mild	
	DLCO defect.	
Fig. (25)	This figure shows a -ve correlation	125
	between DLCO defect and difference	
	saturation Spo2 in a group of patients	
	with mild DLCO defect.	

Figure No	Title	Page
Fig. (26)	This figure shows a +ve correlation	126
	between DLCO defect and Resting Spo2	
	in a group of patients with moderate	
	DLCO defect.	
Fig. (27)	This figure shows a +ve correlation	127
	between DLCO defect and Post exertion	
	Spo2 in a group of patients of moderate	
	DLCO defect.	
Fig. (28)	This figure shows a -ve correlation	128
	between DLCO and Difference	
	saturation (resting and post exertion	
	Spo2) in a group of patients with	
	Moderate DLCO defect.	
Fig. (29)	This figure shows a + ve correlation	118
	between DLCO defect and Resting Spo2	
	in a group of patients with severe DLCO	
	defect.	
Fig. (30)	This figure shows a + ve correlation	130
	between DLCO defect and Post exertion	
	Spo2 in a group of patients with severe	
	DLCO defect.	
Fig. (31)	This figure shows a – ve correlation	131
	between DLCO defect and Difference	
	saturation (Resting and Post exertion	

Figure No	Title	Page
	Spo2) in a group of patients with severe	
	DLCO defect.	
Fig. (32)	This figure shows a + ve correlation	132
	between DLCO defect and Resting Spo2	
	in all the patients of the studied group.	
Fig. (33)	This figure shows a – ve correlation	133
	between DLCO defect and Post exertion	
	Spo2 in all patients of the studied group.	
Fig. (34)	This figure shows a + ve coreelation	134
	between DLCO defect and Difference	
	saturation (resting and post exertion	
	Spo2) in all patients of the studied	
	group.	