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### PULMONARY ARTERIAL HYPERTENSION IN PATIENTS OF HEALED PULMONARY TUBERCULOSIS AND ITS ASSOCIATION WITH QUALITY OF LIFE

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#### ABSTRACT

**Background:** pulmonary tuberculosis leads to pulmonary impairment after tuberculosis leads to pulmonary impairment (obstructive, restrictive, and mixed) which changed the quality of life of these patients.

**Objective:** To study the Pulmonary arterial hypertension in patients of healed pulmonary tuberculosis and its association with quality of life

**Material and Methods:** Sputum for AFB under NTEP, X-ray chest PA view, ECG, 2d-echocardiography, six-minute walk test, Saint George's Respiratory Questionnaire.

**Results:** Symptoms score, Activity score, Impact score, total score were compared among cases those developed PAH and those who not developed and interpretation was p-value of .018, .0349, .0969, .0369 respectively.

**Conclusion:** Pulmonary impairment after tuberculosis is a major health-related problem. We should not focus only on managing active cases of pulmonary tuberculosis but should consider pulmonary impairment after tuberculosis that means post tubercular lungs need a relook. These patients should undergo proper and early screening, diagnosis, and correct recognition of the pattern of pulmonary impairment (obstructive, restrictive, and mixed) which will provide proper guidance for comprehensive management of these patients and thereby improving quality of life.

#### ORIGINAL RESEARCH ARTICLE

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#### INTRODUCTION:

Tuberculosis (TB), which is one of the oldest diseases known to affect humans and is

likely to have existed in pre-hominids, is a major cause of death worldwide. This disease is caused by bacteria of the Mycobacterium

tuberculosis complex and usually affects the lungs, although other organs are involved in up to one-third of cases. If properly treated, TB caused by drug-susceptible strains is curable in virtually all cases. If untreated, the disease may be fatal within 5 years in 50–65% of cases. Cor-pulmonale is right ventricular dysfunction (enlargement) due to pulmonary hypertension secondary to diseases of the lung, bony thorax, lung ventilation, or pulmonary circulation<sup>1</sup>.

In patients infected with M. tuberculosis, whether treated or untreated, a variety of pulmonary and extrapulmonary sequelae and complications can occur, categorized as follows: parenchymal lesions, which include tuberculoma, thin-walled cavities, scarring, and end-stage lung destruction; or airway lesions, which include bronchiectasis, tracheobronchial stenosis, and broncholithiasis<sup>2</sup>. Structural changes lead to obstructive, restrictive, or mixed patterns of impaired pulmonary function. Studies in patients with pulmonary tuberculosis (PTB) have demonstrated that 33.3-94.0% of such patients develop impaired pulmonary function<sup>3</sup>. Although it is unknown how many PTB survivors are living today, when the incidence of tuberculosis and the success of therapy are considered, the number of PTB survivors appears to be substantial and increasing<sup>4</sup>. There have been few studies on the topic of impaired pulmonary function in PTB survivors, and most such studies have involved highly selected populations. The patients in those populations do not fully represent the populations affected by tuberculosis.<sup>4,5,6,7,8</sup> breathlessness PAH causes a range of nonspecific symptoms (including, fatigue, chest pain, and weakness) 9-10 and is associated with significant morbidity and mortality triggered by the debilitating progressive nature of the disease, which eventually leads to right heart failure and death<sup>9,11-14</sup>. The effect of disease symptoms on the patient's physical mobility

and emotional state adversely affects health-related quality of life (HRQoL) 15,16

**Objectives:** To study the Pulmonary arterial hypertension in patients of healed pulmonary tuberculosis and its association with quality of life

#### **MATERIAL AND METHODS:**

Tools for Assessing Healed TB 1. Sputum for AFB staining under NTEP. 2. Sputum for culture sensitivity under JALMA. 3. Sputum for CBNAAT at IRL  
Tools for Assessing Pulmonary Arterial Hypertension

1. CHEST X-RAY P-A VIEW: a. Elevated cardiac apex due to right ventricular hypertrophy b. Enlarged right atrium c. Prominent pulmonary outflow tract d. Enlarged pulmonary arteries e. Pruning of peripheral pulmonary vessels

2. ECG: a. Tall, vertically oriented p wave b. Right axis deviation c. Dominant r wave in v1 d. T wave inversion in anterior chest lead

3. 2 D -ECHOCARDIOGRAPHY a. Right ventricular enlargement b. Right ventricular hypertrophy c. Right atrial enlargement d. Functional tricuspid regurgitation e. Paradoxical septal wall movement f. Tricuspid annular plane systolic excursion(TAPSE) g. Pulmonary arterial systolic pressure

4. TOOL FOR EVALUATING PHYSICAL QUALITY OF LIFE: St. George's Respiratory Questionnaire (SGRQ) The SGRQ is designed to measure health impairment in patients with asthma and COPD. It is also valid for use in bronchiectasis and has been used successfully in patients with kyphoscoliosis and sarcoidosis. We used the SGRQ to measure the quality of life of patients with PIAT after seeking permission from the concerned personnel. SGRQ is in two parts. Part 1 produces the Symptoms score and Part 2 the Activity and Impacts scores. A total score is also produced. Part 1(Questions 1 to 8) Covers the patients' recollection of their symptoms over a preceding period that may range from 1 month to 1 year. It is not designed to be an

accurate epidemiological tool. Its purpose is to assess the patients' perception of their recent respiratory problems. The original version was validated using a 12-month recall period. More recently a 1-month recall version (appropriately worded) has been validated. This has slightly weaker psychometric properties than the 12-month version and produces a marginally lower symptom score and Total score. A 3-month recall period has been used very satisfactorily. Part 2 (Questions 9 to 16) Addresses the patients' current state (i.e. how they are these days). The Activity score just measures disturbances to patients' daily physical activity. The Impacts score covers a wide range of Material and Methods [ 19] of disturbances of psycho-social function. Validation studies showed that this component relates in part to respiratory symptoms, but it also correlates quite strongly with exercise performance (6-minute walk test), breathlessness in daily life (MRC breathlessness score), and disturbances of mood (anxiety and depression). The Impacts score is, therefore, the broadest component of the questionnaires, covering the whole range of disturbances that respiratory patients experience in their lives. According to St. George's Respiratory Questionnaire Manual, the questionnaire should be completed in a quiet area, free from distraction and the patient should ideally be sitting at a desk or table. The patient has to be explained why they are completing it, and how important it is for clinicians and researchers to understand how their illness affects them and their daily life. Patients should be asked to complete the questionnaire as honestly as they can and stress that there are no right or wrong answers, simply the answer that they feel best applies to them. It should be explained that they must answer every question and that someone will be close at hand to answer any queries about how to complete the questionnaire. The patients should complete the questionnaire themselves, but someone should be available

to advise if required. It is designed to elicit the patient's opinion of his/her health, not someone else's opinion of it. So family, friends, or members of staff should not influence the patient's responses. If the spouse or partner has accompanied the patient, they should be asked to wait in a separate area. Similarly, do not allow patients to take the SGRQ-C home to be completed since you cannot be sure that it will be completed without the help of family or friends. Material and Methods [ 20] Once the patient was done filling the questionnaire, we used to check the questionnaire to make sure a response has been given to every question. If they had missed an item, the questionnaire was returned to the patient for completion, before they left. Three-component scores are calculated for the SGRQ: Symptoms- This component is concerned with the effect of respiratory symptoms, their frequency, and severity. Activity – This component is concerned with activities that cause or are limited by breathlessness Impacts-This component covers a range of aspects concerned with social functioning and psychological disturbances resulting from airways disease. A total score is also calculated which summarizes the impact of the disease on overall health status. Scores are expressed as a percentage of overall impairment where 100 represents the worst possible health status and 0 indicates the best possible health status. The validated Hindi translated version of St. George's Respiratory Questionnaire was used in our study

**Inclusion criteria:** 1-Patients enrolled in the study Were either those who came to the hospital as previously adequately treated or those who were diagnosed as active pulmonary TB cases and went on to complete the treatment and declared as cured according to RNTCP guidelines during our study period. In either case, confirmation of healed pulmonary TB will have done by getting sputum smear-negative & sputum culture on Lowenstein-Jensen medium performed in

"National Jalma Institute of Leprosy and other Mycobacterial Diseases, Agra.

2- Those patients who were confirmed as healed tuberculosis with some degree of respiratory discomfort and symptoms were enrolled in this study.

3- Those symptomatic healed Tuberculosis patients having pulmonary function loss as per levels of impairment determined via spirometry using the American Medical Association's Guide to Evaluations on Permanent Impairment (fifth edition) were defined as patients of pulmonary impairment after tuberculosis (PIAT).

**Exclusion criteria:** Symptomatic healed Tuberculosis patients having

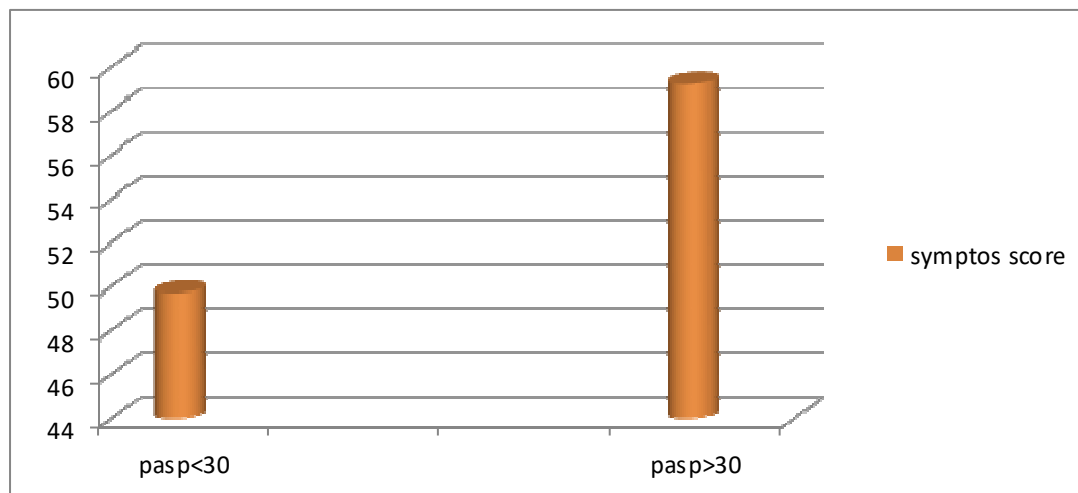
pulmonary function loss with a history of COPD and Bronchial Asthma, Coronary artery diseases, Systemic hypertension, Diabetes Mellitus, Bone, and Joint Disease, Cognitive impairment, Neuromuscular Disorder, Rheumatic Bone and joint disease, History of recent surgery (major) or trauma (major) was excluded from this study. Patients excluded from the study as those with other significant comorbidities such as cor-pulmonale (due to other causes), diabetes mellitus, COPD, bronchial asthma, or pulmonary impairment not as a result of TB

**STATISTICAL ANALYSIS:**

Sent George Respiratory Questionnaire

**Table 1:** Association between PASP and symptoms score of SGRQ

Pulmonary arterial systolic pressure	Symptoms score				
	N	Mean	SD	t-value	p-value
≤30	51	49.71	20.76	2.400	0.0184
>30	43	59.22	17.01		

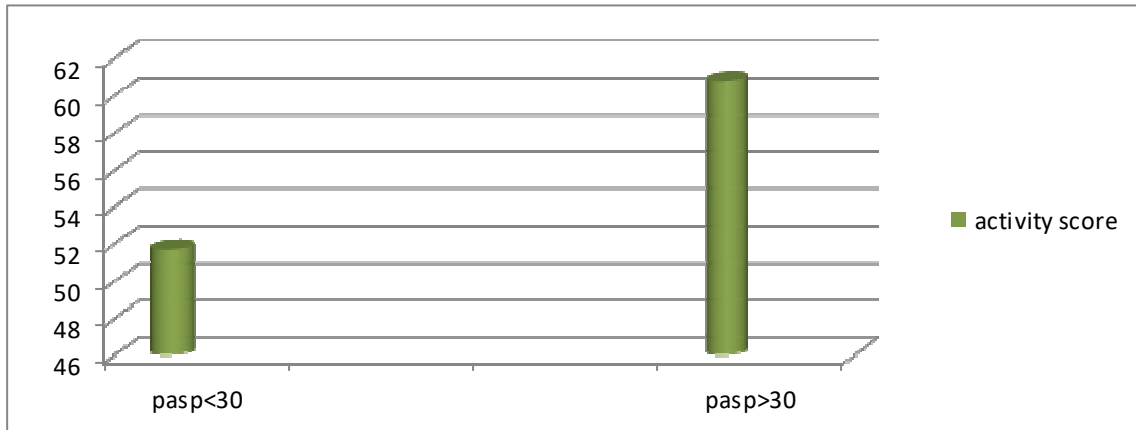


**Figure 1:** Association between PASP and symptoms score of SGRQ

**Table 2:** Association between PASP and activity score of SGRQ

Pulmonary arterial	Activity score
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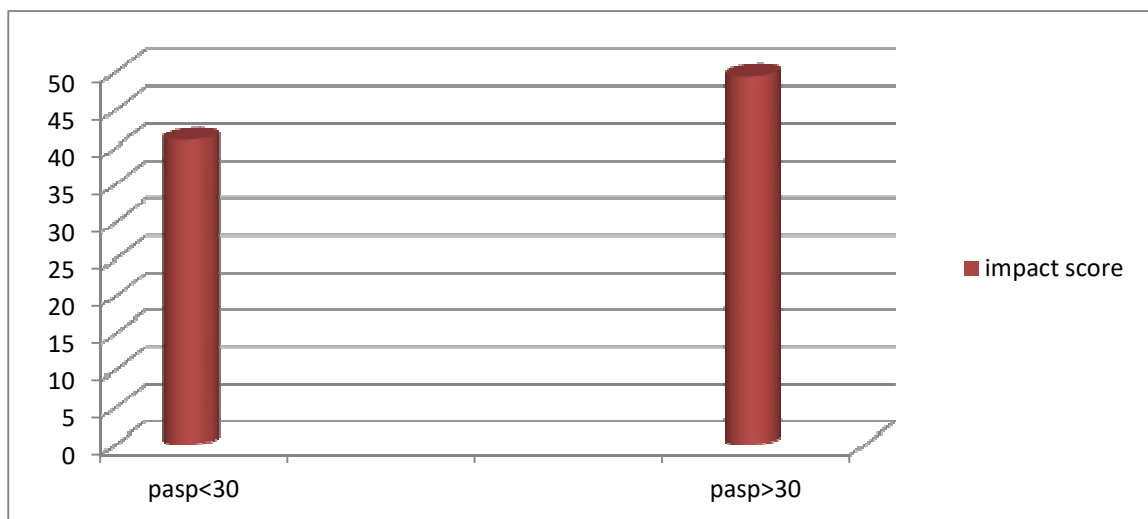
systolic pressure	N	Mean	SD	t-value	p-value
≤30	51	51.68	22.91	2.141	0.0349
>30	43	60.80	17.40		



**Figure 2:** Association between PASP and activity score of SGRQ

**Table 3:** Association between PASP and impact score of SGRQ

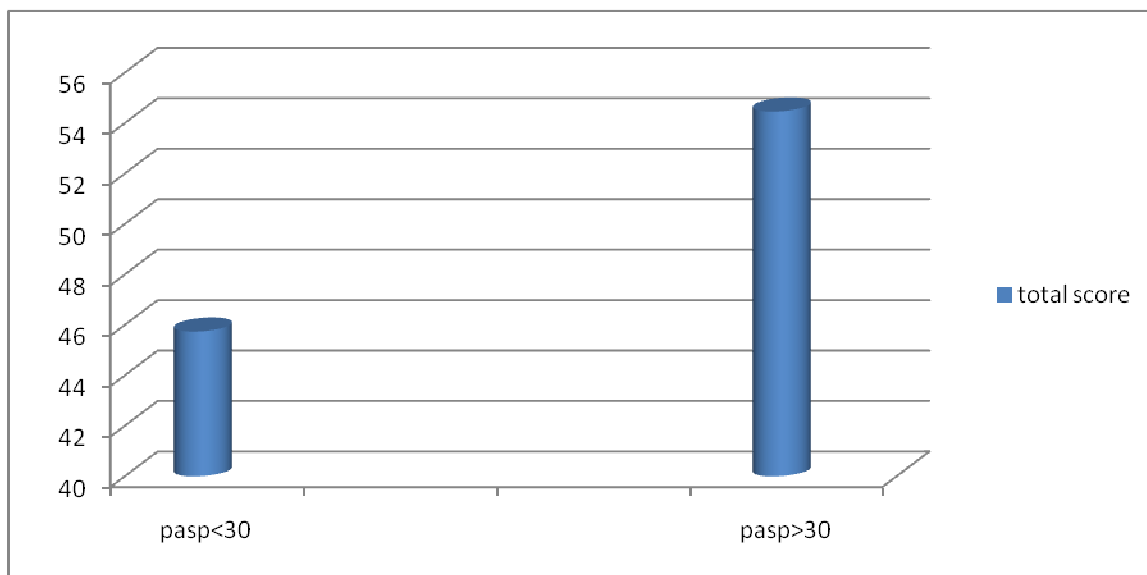
Pulmonary arterial systolic pressure	Impact score				
	N	Mean	SD	t-value	p-value
≤30	51	40.88	26.46	1.677	0.0969
>30	43	49.35	21.67		



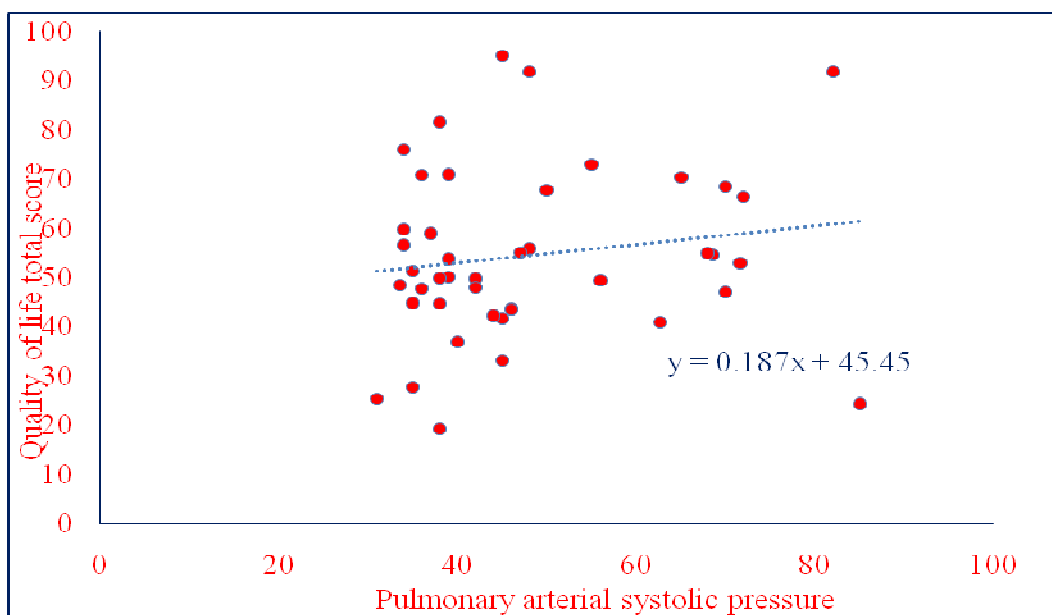
**Figure 3:** Association between PASP and impact score of SGRQ

**Table 4:** Association between PASP and total score of SGRQ

Pulmonary arterial systolic pressure	Total Score				
	N	Mean	SD	t-value	p-value
≤30	51	45.74	21.61	2.118	0.0369
>30	43	54.46	17.61		



**Figure 4:** Association between PASP and total score of SGRQ



**Figure 5:** Scatter diagram depicting correlation between PASP and Quality of life.

Relationship Between Quality of Life and Pulmonary Arterial Systolic Pressure

**RESULTS:**

Our study entitled “Prevalence of pulmonary arterial hypertension in patients of

healed pulmonary tuberculosis and its association with quality of life and exercise capacity” was a prospective study conducted in the Department of Tuberculosis and Respiratory Diseases S. N. Medical College Agra. In our study finally, 94 cases were studied among them 48 were males and 46 were females. Out of 94 patients, 43 patients had PAH. The prevalence of PAH among cases of healed pulmonary tuberculosis was 45.6%. PAH cases had a high grade of borg’s scale of dyspnoea as compared to those who were not developed. PAH cases had a low mean of SPO<sub>2</sub> at the baseline as well as at the end of a total of 6MWD as compared to those who were not developed. PAH cases showed more decrease in mean SPO<sub>2</sub> at the end of 6MWT as compared to the mean of baseline SPO<sub>2</sub> than those who were not developed. When the severity of PAH increases SGRQ total score increases means the quality of life becomes poorer. PAH patients had poor exercise intolerance measured by six-minute walked a distance as compared to those who were not developed, PAH patients had poor quality of life and exercise intolerance (6MWD) as compared to those who were not developed

#### **DISCUSSION:**

In this study mean score for symptoms, activity, impact, and total score of SGRQ were calculated and compared among cases those developed PAH and those who not developed and interpretation was as followed Regarding symptoms score mean of 51 cases those not developed PAH was 49.71 and mean of 43 cases that developed PAH was 59.22 and comparison was done we found a p-value of .0184 which signified that there is an association between PAH and symptoms score of SGRQ in our study. Regarding the activity score mean of 51 cases that not developed PAH was 51.68 and the mean of 43 cases that developed PAH was 60.80 and comparison was done we found a p-value of .0349 which signified that there was an association between

PAH and activity score of SGRQ in our study. Regarding the impact score mean of 51 cases, those not developed PAH was 40.88 and the mean of 43 cases for those who developed PAH was 49.35 and comparison was done we found a p-value of .0969 which signified that there is no association between PAH and impact score of SGRQ in our study. Regarding the total score mean of 51 cases, those not developed PAH was 45.74 and the mean of 43 cases that developed PAH was 54.46 and comparison was done we found a p value of .0969 which signified that there is no association between PAH and the total score of SGRQ in our study. In my study in pulmonary arterial hypertension quality of life was poor as compared to those patients of healed pulmonary tuberculosis who have not developed PAH. There was one study conducted by Darren B Taichman, Jennifer Shin et al<sup>17</sup> conducted a study on health-related quality of life in patients with pulmonary arterial hypertension, and Quality of life was also assessed using a respiratory-disease specific instrument for comparison. Scores of patients with PAH were similarly abnormal on each component of the Saint George’s Respiratory Questionnaire HRQoL were seen in assessments of patient symptoms, activity, and the impact of disease on social and psychological function ( $p < 0.0001$  for the comparison of each with normal) which was comparable to our study.

#### **REFERENCES:**

- 1 Gandhi MJ. Cor-pulmonale and pulmonary hypertension. In: Shah SN, editor. API Text Book of Medicine. 7th ed. Mumbai: The Association of Physicians of India, 2003, 487-490
2. Kim HY, Song KS, Goo JM, Lee JS, Lee KS, Lim TH. Thoracic sequelae and complications of tuberculosis. Radiographics. 2001; 21(4):839-58; discussion 859-60. <https://doi.org/10.1148/radiographics.21.4.g01jl06839> [Links]

3. Stepanian IE. Bronchial impotence in patients with pulmonary tuberculosis Article in Russian. *Tuberk Biolezhni Legkih*. 2013;4(1): 6-11. [Links]
4. Pasipanodya JG, Miller TL, Vecino M, et al. Pulmonary impairment after tuberculosis. *Chest*. 2007; 131:1817–24.
5. Hnizdo E, Singh T, Churchyard G. Chronic pulmonary function impairment caused by initial and recurrent pulmonary tuberculosis following treatment. *Thorax*. 2000;55(1):32- 8. <https://doi.org/10.1136/thorax.55.1.32> [Links]
6. Lee SW, Kim YS, Kim DS, Oh YM, Lee SD. The risk of obstructive lung disease by previous pulmonary tuberculosis in a country with intermediate burden of tuberculosis. *J Korean Med Sci*. 2011;26(2):268- 73. <https://doi.org/10.3346/jkms.2011.26.2.268> [Links]
7. World Health Organization. Global tuberculosis control: epidemiology, strategy, financing WHO/HTM/TB/2009.411. Geneva, Switzerland: WHO. 2009:314
8. Willcox PA, Ferguson AD. Chronic obstructive airways disease following treated pulmonary tuberculosis. *Respir Med*. 1989;83(3):195-8. [https://doi.org/10.1016/S0954-6111\(89\)80031-9](https://doi.org/10.1016/S0954-6111(89)80031-9) [Links]
9. Galiè N, Humbert M, Vachiery JL, et al. 2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension). *Eur Heart J* 2015 [in press; DOI: 10.1093/eurheartj/ehv317]. Bibliography [53]
10. European Pulmonary Hypertension Association (PHA). The impact of pulmonary arterial hypertension (PAH) on the lives of patients and carers: results from an international survey. [www.phaeurope.org/wp-content/uploads/PAHpatient-and-Carer-Survey-Report-FINAL1.pdf](http://www.phaeurope.org/wp-content/uploads/PAHpatient-and-Carer-Survey-Report-FINAL1.pdf) Date last updated: September 2012. Date last accessed: June 29, 2015.
11. Humbert M, Sitbon O, Chaouat A, et al. Survival in patients with idiopathic, familial, and anorexigen-associated pulmonary arterial hypertension in the modern management era. *Circulation* 2010; 122: 156–163
12. Verma S, Cardenas-Garcia J, Mohapatra PR, et al. Depression in pulmonary arterial hypertension and interstitial lung diseases. *N Am J Med Sci* 2014; 6: 240–249.
13. Ulrich S, Fischler M, Speich R, et al. Wrist actigraphy predicts outcome in patients with pulmonary hypertension. *Respiration* 2013; 86: 45–51.
14. Corris P, Degano B. Severe pulmonary arterial hypertension: treatment options and the bridge to transplantation. *Eur Respir Rev* 2014; 23: 488–497.
15. Matura LA, McDonough A, Carroll DL. Health-related quality of life and psychological states in patients with pulmonary arterial hypertension. *J Cardiovasc Nurs* 2014; 29: 178–184.
16. Buys R, Avila A, Cornelissen VA. Exercise training improves physical fitness in patients with pulmonary arterial hypertension: a systematic review and meta-analysis of controlled trials. *BMC Pulm Med* 2015; 15: 40. Marion Delcroix1 and Luke Howard et AL SEP.2015
17. Taichman DB, Shin J, Hud L, Archer-Chicko C, Kaplan S, Sager JS, Gallop R, Christie J, Hansen-Flaschen J, Palevsky H. Health related quality of life in patients with pulmonary arterial hypertension. *Respiratory research*. 2005 Dec 1;6(1):92.