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Effectiveness of Pulmonary Rehabilitation on Malignant Respiratory Diseases

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Abstract

Justification: At present, lung cancer has been diagnosed with about 1.6 million people in the world and each year there are 1.3 million cancer-related deaths worldwide, which is a major health threat that increases treatment and health costs. It is also one of the deadly causes of functional biological mustard, namely, sulfur mustard (SM), in various wars since First World War, and more than 80% of all recorded losses of chemical gases. It should be noted that when treating patients with possible injury to the respiratory tract, you will be aware of the relevant risk factors. This includes closed-air fire, carbon smoke; increased carbon monoxide levels (CO) and severe coughs and, eventually, burns. Acute respiratory conditions are usually highly responsive to the invasive severity, and this event is performed in all malignant respiratory diseases.

Methodology: This article is a descriptive study, all data and scientific information calculated *via* high value scientific resources according to final achievements of pulmonary rehabilitation on malignant respiratory patients. Also, methodology on this article to be bibliographic and descriptive. Some scientific sites for extract newest articles include: PubMed, web of science, EBSCO host, Science direct, Elsevier, Google scholar and Scopus. In this study with style of Theoretical basic research and data calculate of digital resources (PubMed, Science direct, and Scopus) and, Guidelines of ERS/ATS with Bibliographic method.

Discussion: Accordingly, the efficacy of pulmonary rehabilitation in patients with COPD, obstructive sleep apnea, asthma, metastatic lung cancer, and in patients requiring one or two lung transplants are observed. Pulmonary rehabilitation planners have been somewhat effective in terms of family and community conditions to improve functional capacity, and assessment by 6MWT and quality of life questionnaires. Pulmonary rehabilitation is leading to significant improvement in the quality of life, exercise capacity and shortness of breath. Other effects of pulmonary rehabilitation are the reduction of the number of days in the hospital after the successful completion of this program compared with the previous year for these patients. Further study of the biological causes of COPD, lung cancer, inhalation injury caused by smoking and, lastly, chemical damage, indicates that patients with COPD or other types of patients exhibit appropriate screening for pulmonary radiography?

Keywords: Pulmonary rehabilitation; Malignant respiratory diseases; Lung cancer; COPD; Chemical injuries; Fibrosis; Quality of life

Introduction

We should not forget that air pollution, industries and chemical warfare in the world can be important for the prevalence of many malignant respiratory diseases in all countries and populations. COPD patients are around 210 million people worldwide, with more people fever under the age 65 years. At present, lung cancer has been diagnosed with about 1.6 million people in the world and each year there are 1.3 million cancer-related deaths worldwide, which is a major health threat that increases treatment and health costs. By 2020, 2 million people are expected to be diagnosed with lung cancer [1-3]. In addition, during a survey of 5 years' mortality in 90-85% of them, lung cancer is responsible for more than a quarter of total cancer deaths [4].

Methodology

This article is a descriptive study, and all data and scientific information calculated via high value scientific resources according to final achievements of pulmonary rehabilitation on malignant respiratory patients. Also, methodology on this article to be bibliographic and descriptive on based of a meta-analysis research. Some scientific sites for extract newest articles include: PubMed, web of science, EBSCOhost, Science direct, Elsevier, Google scholar and Scopus. In this study with style of the Theoretical basic on meta-analysis research and data calculate of digital resources (PubMed, Science direct, and Scopus), also final updated guidelines of European Respiratory Society - ERS/ American Thorax Society - ATS.

Chemical injuries

One of the deadly chemical agents is a biophysical neutral matter, that is, sulfur mustard (SM), which has been used in various wars since

the First World War, and accounts for more than 80% of all casualties and chemical injuries in the war [5,6]. Sulfur mustard (SM) is a powerful chemical weapon widely used in warfare and toxic effects of SM include the eyes, skin, nervous system, immune system and especially the respiratory system. One of the most important toxic effects of SM is pulmonary dysfunction, in which the major pathology is based on obliterans bronchiolitis (BO). In the long run, cough, sputum, and shortness of breath have been reported in 80% of patients after exposure to the SM. Hemoptysis, chest tightness, chest pain, and nightly sore throat are also common side effects. Clinical findings often lead to the diagnosis of wheezing, cracking, cloying and cyanosis. Pulmonary function tests indicate that chronic obstructions are the most common abnormal patterns, and half of the obstruction cases are reversible after use of inhaled bronchioles. Spirometry findings increase in disruptive factors over time [7-9]. One of the best pathways of medicine is Thiotropium bromide, which is a long-acting anticholinergic agent and can improve lung function and exercise tolerance. It also reduces dyspnea and mortality although the severity of respiratory attacks in COPD patients. Temel et al. first examined the effectiveness of exercise tests interventions, especially in patients with new advanced cell lung cancer diagnosed. In this study, 25 patients who used anticancer drugs participated in a 12-week pulmonary rehabilitation program, with only 7 (44%) of these subjects completed all prescriptive sessions. However, those who were able to complete the program had significant progress in their lung cancer symptoms (cough, shortness of breath, and chest discomfort), and there was no doubt about their 6MWT rate, which could be seen as a positive finding in this group that whom deterioration of exercise tolerance would have been observed without intervention [10-12].

Lung cancer

Lung cancer is the second most common type of cancer that is the leading cause of cancer deaths and is expected to account for 13% of new cancer diagnosis with death of 159,260 peoples in 2014 [13,14]. With a better understanding of the cancer biology and the use of targeted therapies, the disease has improved, while survival rates of 1 year and 5 years old are 43% and 17% lower. In addition, patients with lung cancer have symptoms such as sore throat, cough, chronic fatigue, anxiety, depression, insomnia, and general pain in the body. Even survivors of lung cancer who have been diagnosed for more than 5 years have experienced quality of life impairment in 35% of cases and reported lower physical and health scores than healthy people [15]. Interestingly, patients who experience improved quality of life after treatment (15%) do not change the symptoms of the disease, indicating an adaptation to chronic symptoms. Patients with lung cancer are in a unique condition where their illness, their combination and their treatment may worsen the symptoms of the disease [16]. Chronic obstructive pulmonary disease (COPD) is diagnosed in 73% of men and 53% of women with primary lung cancer. The various causes of activity limitations in these patients are listed by the American Respiratory Society (ATS) on Pulmonary Rehabilitation (PR), which include restrictions on respiratory gas transmissions, heart congestion, lower limb disorder, or respiratory muscles, anxiety, depression, and Motivation is weak [17,18]. Across the world, pulmonary rehabilitation programs are an essential tool in managing respiratory patients. Pulmonary rehabilitation is presently a valid standard method for the care of patients with malignant respiratory illness that preserves its symptoms, regardless of the treatment of bronchodilators, and may indicate improvement in symptoms with cardio-pulmonary exercise protocols. Thousands of these patients are without treatment with severe respiratory symptoms. However, the results of Tiotropium bromide and respiratory rehabilitation in patients with BO have not yet been determined [19,20].

Mechanisms between COPD and lung Cancer

COPD-associated inflammation may play a role in the pathogenesis of lung cancer, as chronic inflammation contributes to malignant changes in other organs. Inflammation in COPD may cause epithelial damage, which can increase the effects of carcinogens in smoking [21,22]. Although all types of lung cancer cells occur in COPD, airflow obstruction is associated with an increased risk of squamous cell carcinoma [23]. In developing countries, air pollution, due to the use of biomass fuels for heating and cooking, can form significant pathogens and contribute to COPD, especially in women [24]. Given the current hypothesis, the risk of cancer in COPD is related to chronic inflammation in airways, and in these patients, inhaled corticosteroids are considered as effective factors in the prevention of chemotherapy. A meta-analysis of a clinical trial that also examines the benefits of inhaled corticosteroids in COPD also shows a trend toward lowering the risk of lung cancer in inhaled corticosteroid patients [25,26].

Tobacco smoke inhalation injury

When treating patients with possible inhalation by smoke, learn about the risk factors in the person's medical history. These include closed-door fire, which includes carbon sputum, increased carbon monoxide (CO), and central facial burns. Acute respiratory distress usually responds to the aggressive initial management [27,28]. Natural testing values and imaging studies, along with clinical improvements, can lead to proper health care delivery. After that, the patient may recover and not get worse because the pulmonary edema has been postponed. Each patient should be monitored for chest radiography within 24-48 h after being exposed to toxic signals.

It is difficult to define exposure because the clinical response is very diverse. In this condition, provide access to intravenous (IV), heart monitoring, and oxygen supplementation in hypoxia regulation. In some patients, bronchus is a spasm that may benefit from the use of bronchodilators, although this has not been well documented. This is especially true for patients with chronic obstructive pulmonary disease (COPD) and asthma in severe conditions of obstruction [29,30]. Treatment of respiratory tract poisoning is based on clinical presentation and includes primary care in the heart and lung system. Sometimes, special antidotes are available. One of the cases is that subcutaneous epinephrine is exposed to zinc oxide (HC). Corticosteroids are interesting for suppressing inflammation and reducing edema, but they do not support any intake of inhalation cigarette smoke. Due to the increased risk of lung infection and delayed wound healing, prolonged use of steroids is not appropriate. However, consider a brief period of taking steroids in people with severe airway obstruction. Additionally, patients who receive steroids before the injury that may experience high adrenal insufficiency should receive a proper dose of stress [31,32]. Inhalation damage due to cell damage can lead to decreased mucosal secretion and poor macrophage performance in airways. Acute bacterial and invasion peak in 2-3 days after inhalation of smoke. Preventive antibiotics should not be used too much because they are not only ineffective, but also increase the risk of resistant organisms [33,34]. The diagnosis of secondary infection from the effects of inhalation injury can be very difficult because it may be associated with fever, reduced white blood cell count and abnormal findings of radiography. Antimicrobial

therapy should be maintained for patients who have definite microbiological evidence of infection and do not respond to aggressive protective therapies or when their clinical deterioration occurs within the first 72 h [35,36].

Idiopathic pulmonary fibrosis

The idiopathic pulmonary fibrosis (IPF) is a progressive chronic disease with unknown symptoms with a low survival rate in these patients [37]. In the case of this disease, the safety and efficacy of treatment with bosentan, an antagonist of dual endothelial-1 receptors, has been reported in patients with confirmed PH with pulmonary fibrosis (IIP) [38,39]. This difference in hemodynamic risk of invasive risk, capacity of function or symptoms between bosentan and placebo groups is not greater than 16 weeks, thus causing Boston to be misused in these patients. Identifying the hidden IPF in patients with idiopathic IPF may be challenging and complex and requires a comprehensive, often multidisciplinary, assessment. There is a lot of uncertainty and disagreement about the forms of diagnosis of IPF, and prospective studies are still needed to better understand the natural history of this group of diseases. In the regulation of the IPF, some of the patient's organs and the effects of the severity of the illness may be impaired by non-pulmonary compounds. A series of specific measures in the fields of lung physiology, lung imaging, survival, dyspnea, cough and quality of life linked to health have been suggested, which is suitable for use in clinical trials for each IPF patient [40-42]. A prospective study was performed on 104 patients with type 2 diabetes and newly diagnosed IPF with corticosteroid therapy [43,44]. The result of this study showed that the typical pattern of interstitial pneumonia (by HRCT) and lower performance status are important prognostic consequences in patients with IIPs (Table 1) [45].

Patients	Regimen, review type	N	Result
Left upper lobe malignant nodule and lung cancer	Nodule with resection and emphysematous left lower lobe	1	Improvement FEV1 0.70 L
Severe emphysema	Lobectomy, without lung volume reduction in a lobe, and tumour	21	Improvement FEV1 at postoperative 1.0 L (40% predicted)
Lung cancer	Non-invasive causes, systematic literature and review	833 Patients	Reduced breathlessness, follow-up provided equal satisfaction and symptom control, improved Qol, exercise capacity improved.
Interferon Gamma-1b+ Prednisolone	Exposed to chemical warfare (Group 1:18 & Group 2:18)	36	More effective on cellular metabolism with exercise training.
Lung cancer, preoperative	Pulmonary Rehabilitation (4 weeks)	8	Improved quality of life
NSCLC (stage I or II), COPD, and VO2<15	Pulmonary Rehabilitation (4 weeks)	12	Improved VO2 >15 ml/kg/min Increased heart rate exercise
N-acetyl cysteine (NAC)	Intercellular macrophages	56	Effects on improvement of metabolic system of skeletal muscles.
N-acetyl cysteine (NAC)	Mustard gas-exposed patients with normal pulmonary function test	144	Effects on lung function and improvement of muscle endurance
Lung cancer	Pulmonary rehabilitation , systemic review	N/A	Pulmonary rehabilitation may improve performance status, VO2, Qol, and exercise tolerance
Azithromycin, clarithromycin, erythromycin, roxithromycin	Alveolar macrophages	80	Effects on improvement of defence system of the body patients
Oxygen, Helium	Mustard gas-exposed patients	24	Less and More effective on lung functions and muscle respiratory
Nigella sativa	Guinea pigs	35	Effects on aerobic exercise training
Lung cancer, stage (able to walk>50 m)	7 weeks of 2 sessions per week, Pulmonary rehabilitation.	45	<50% completed regimen. Improved incremental and endurance shuttle walk tests and 6MWT
Lung cancer and severe COPD	Pulmonary Rehabilitation (10 sessions)	19	4 weeks of Pulmonary Rehabilitation difficult to implement; long breaths with times and significant reduced fatigue
Zero-valent iron nanoparticles ferrate (VI)	In vitro	50	Effects of improvement of enzymatic activities in these patients
Adult undergoing lung cancer	Pulmonary Rehabilitation, as once daily inpatients and weekly sessions (8 weeks)	15	Exercise was safe and low resistance. 57% patients as outpatients
Lung cancer curative surgery	Preoperative and postoperative pulmonary rehabilitation	58	Feasible. Improvement in 6MWT and FEV1 (Preoperative), 54% stop smoking
Cancer patients	Physical activity before operation, systemic review	966 patients	It may increase exercise capacity, improve Qol, and reduce LOS
Stage IV cancer (lung and colon)	Incremental walking and strength training; 8 weeks, Pulmonary rehabilitation	66	Improved exercise tolerance, low fatigue, and increase sleep quality
Lung cancer (all stages)	Outpatients, 2 sessions per week, (9 weeks total)	51	51% completed training, 69% continued daily physical activity. Not change in VO2
Lung cancer (all stages)	6MWT for 6 months	107	Walking stopped in 36% of patients. Improved Qol

Metastatic cancer	Therapist evaluation of appropriate exercise	528	Exercise and feasible in >90% of patients
Lung cancer	Pulmonary rehabilitation (4-7 weeks), systemic review and literature's	N/A	Pulmonary rehabilitation and increase exercise endurance, VO2, strength and may reduce LOS. In patients with chemotherapy, increase strength, endurance, and Qol
Lung cancer patients	postoperative Pulmonary rehabilitation	599 patients	Pulmonary rehabilitation improves exercise capacity and postoperative morbidity
Lung cancer patients after chest operation	Rehabilitation weekly 2 sessions for 10 weeks	78	Symptom improved after 1 year (pain at 4 months)
NSCLC: Non-Small-Cell Lung Cancer; PR: Pulmonary Rehabilitation; Qol: Quality of life; LOS: Length of Stay; COPD: Chronic Obstructive Pulmonary Disease; LC: Lung Cancer.			

Table 1: Analysis Reviewing of Authors on Malignant respiratory diseases and research parameters in these patients.

Pulmonary rehabilitation (PR)

In 2013, the ATS/ERS statement on pulmonary rehabilitation was redefining the program's goals. While professionals focused on a multidisciplinary approach to improving symptoms and function in patients with chronic respiratory illnesses in 2006, they would prefer "patient treatment" in 2013, including exercise education, training and behavior change to promote Long term in these patients [46,47]. In 2004, in a study, VO_{2Max} showed an increase in lung rehabilitation compared to pre-rehabilitation and after a 4-week regimen in patients with lung cancer and COPD. An HRCT shot at a subsequent stage showed that improved oxygen consumption was maintained after Rehabilitation [48]. In 2005, a group of patients under lumpectomy received chest physiotherapy before and after surgery. This treatment program was associated with a shorter stay, improved postoperative pulmonary volume and reduced pulmonary complications. Significant advances in pulmonary rehab are indicative of its significant benefits in key contexts such as performance capacity, symptoms, quality of life associated with health and the use of health care. Accordingly, evidence of the effectiveness and feasibility of pulmonary rehabilitation in patients with COPD, sleep apnea, asthma, metastatic lung cancer, or chronic mesothelioma pleural effusion and interstitial lung disease (ILD), and in patients undergoing single lung or dual lung It was clearly seen [49]. Family and community-based rehabilitation planners consider improving functional capacities, assessing with 6MWT and effective life quality. Many studies conducted in a conventional environment confirmed the positive effects of daily physical activity using a 3D accelerometer. The least significant clinical difference (MCID) is reported in essential amounts of pulmonary rehabilitation, such as daily physical activity, chronic myocardial infarction, and shuttle walk test (ISW) [50]. In this regard, in a retrospective analysis, Moy ML et al. examined the effects of pulmonary rehabilitation in 550 patients with COPD and ILD immediately after single or double lung transplantation. While health-related quality of life improved to a similar level in patients after single-and double-lung transplantation, exercise capacity in the second population that was rehabilitated increased. Another study by Granger et al. 71 patients undergoing lung cancer or chronic mesothelioma pneumonia with chemotherapy with a rehabilitation training program accompanied by electro-exercise or exercise training with therapeutic and psychosocial care combined with a remarkable improvement in Quality of life and performance ability were able to reduce their symptoms. Interesting results are also presented about abnormal rehabilitation strategies in pulmonary rehabilitation. As in pulmonary rehabilitation, they often ignore the potential role of the family Temel et al. examined the role of family members in psychoanalysis with COPD patients. This family-based program shows that increasing family-based barriers to COPD management and its possible interference with conventional rehabilitation and is a well-known benefit to patients. A community-based rehabilitation program in its management plan showed a sharp increase in daily physical activity despite a decline in maximum exercise capacity in more than two years. Benzo et al. showed preoperative pulmonary rehabilitation in patients with lung cancer, and in COPD patients, reduced chest tube usage time and decreased significantly. A new experiment, which in the future will be performed as a group, by Wang et al. showed improvement in FEV1, vital capacity, 6MWD, and post-pulmonary obstruction shortly before surgery. The most important achievements were in patients with the worst preoperative capacity. In other words, the most benefit may occur in patients who are less likely to recover, otherwise they will not participate in exercise. Pulmonary rehabilitation improves performance, decreases fatigue due to chemotherapy, and increases exercise tolerance by verifying the improvement in endurance, oxygen uptake, strength, endurance, and Qol. A multidisciplinary program that helps to quit smoking by up to 54% [33]. In short, pulmonary rehabilitation in patients with lung cancer increases lung volume, oxygen uptake, and increases tolerability in the exercise, while reducing postoperative complications. On the other hand, pulmonary rehabilitation involves multidisciplinary planning, including physical education, disease education and nutrition, psychological and behavioral interventions to optimize the social and physical independence of respiratory patients. Outpatient programs include a minimum of six weeks and a maximum of 12 weeks of rehabilitation interventions. The proposal is in the moderate to severe COPD and aims to prevent mortality so that the patient can cope with the illness [51]. It is further planned that a hospital or community-based respiratory patient has conditions for individual training, and special talks. Pulmonary rehabilitation should be performed for all remaining patients (MRC Grade 3 and above), including those who were recently admitted to the hospital, and for patients with high exacerbations and high sensitivity. There is good evidence the benefits of pulmonary rehabilitation, but most developers in this field need to optimize medical treatment facilities before they are registered [52]. Pulmonary rehabilitation is not suitable for patients who are unable to walk, and have unstable angina, or those who have recently had myocardial infarction. Pulmonary rehabilitation results in significant improvement in quality of life, exercise capacity and decreased obstruction. Also, after the successful completion of pulmonary rehabilitation from the previous year, it leads to a decrease in the number of hospital days, although the duration of these benefits varies in different studies [53]. Additionally, there is evidence that pulmonary rehabilitation courses lead to a more temporary recovery in reducing exercise intensification. The program of rehabilitation exercises has been shown to improve exercise performance in non-surgical patients with COPD. Several preoperative exercise training may improve enough VO_2 to turn a patient from an uncontrolled physiologic class (maximum VO_2, 10

mg/kg/min) into a potentially controllable condition. In preoperative rehabilitation, patients who had never participated previously in the program received the most benefit, although changes after rehabilitation did not predict mortality or improvement in post-surgical practice. There is no definitive evidence that pulmonary rehabilitation is likely to result in short or long-term outcomes after lung cancer [52,53]. In the study of 22 patients with lung cancer and COPD under lumpectomy, examined postoperative results, 2 weeks after aesthetic and preoperative surgery as well as chest physiotherapy. These patients needed less oxygen and tracheotomy supplements, and were also hospitalized for a short time after surgery, compared with 60 non-treated controls [54]. These results are limited by single-center experience, small sample size, and clinical use. However, with regard to lung immunity as well as the benefits of registered rehabilitation in non-surgical patients with COPD, it is recommended to use pulmonary rehabilitation before and after withdrawal of lung cancer cells in moderate to severe COPD patients. Similar to COPD, functional capacity in Advanced NSCLC (small non-cell lung cancer) an independent prediction is that a 13% drop in death per 50 m increase in 6MWD occurs. As expected, patients with advanced complications with lower pulmonary function, strength, walks, and QoL are compared with patients with milder conditions (I and II). Like all studies, the diet for these patients is diverse and results are unpredictable [51,52]. Hung et al. a group training program with physiotherapists in the hospital as well as home-based training for advanced NSCLC patients and small lung cancer cells has been created. It was reported that exercise with low homework (<10%) had the benefits of oxygen absorption, exercise tolerance, and emotional well-being of group sessions. Hicks and colleagues performed RCT in patients with advanced lung cancer who receive outpatient chemotherapy; improvements in daily exercise, physical activity scores, self-reported reports (pain, neuropathy, cognitive function), and recovery in exercise tolerance Has brought. One of the best practices in replacing regular training, often for practice-based pulmonary rehabilitation, is in patients who are interested in the use of alternatives such as neuromuscular electrical stimulation (NMES) as a new training strategy for patients with advanced COPD and lung cancer Is [54-56]. NMES is a technology that stimulates skeletal muscles of the body in the nerve or motor unites. This can be a type of self-care and causes muscle contraction of 20 to 40 percent of maximum voluntary muscle contraction in the patient. Because NMES is an interactive therapy, the potential impetus and motivation for this lifestyle are substantially less than cardio-pulmonary resistance exercises.

Conclusion

Historical evidence suggests that exercise can be effective at all stages of lung cancer, survivors of lung cancer and other types of malignant respiratory illnesses. However, the ideal mechanism for exercise implementation has not yet been identified in these patients. We can also imagine this approach to the chemical damage suffered by mustard gas and fibrosis that suffer in their own right, so that we can review the exercise mechanism, and then planning the pulmonary rehabilitation to manage these diseases. Exercise barriers are remarkable in these patients, but studies have shown the patient's desire for counseling before starting rehabilitation and recommendations on the subject. Exercise based on low intensity exercises has been successful and shows a role in monitoring and implementing their rehabilitation plans using COPD population and studies of lung cancer patients. This review shows that exercise and physical activities are effective in pulmonary rehabilitation of lung cancer and all malignant respiratory illnesses, specific malignant patients are requesting increased activity, and studies show that clinical practices in QoL and endurance exercise after Surgery severely reduces side effects. Additionally, we know that inactivity in cancer patients is relevance with worse outcomes. In addition to preoperative standard assessment, patients with COPD with adjustable lung cancers should be evaluated by predicting how the effect of this micro-leakage on the function of the lungs after a specific operation, in particular emphysema. Such a possibility may help increase the number of surgical candidates and improve the prognosis of patients with lung cancer with severe COPD. Also, drug therapy for COPD patients should be optimized to improve complications during surgery and improve the quality of life. Stop smoking, pulmonary rehabilitation and optimal medical treatment can increase lung function, manage symptoms, and allow respiratory patients to play an important role in improving their outcomes. Further examining the biological links between COPD, lung cancer, inhalation injury, smoking, and ultimately chemical damage, as well as considering whether patients with COPD or other types of respiratory patients show a suitable group for screening lung radiography, or No, as well as the amount of lung load that causes lung cancer in patients with COPD. I hope we can create comfortable conditions for all malignant respiratory illnesses to go to pulmonary rehabilitation by reducing hospitalization, low cost, high motivation and improving the quality of life.

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