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The Effect of Cardiopulmonary Physiotherapy and Sports Physiotherapy on Asthma Control: Case Study

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Abstract

Introduction: The World Health Organization estimations show 235 million people who currently suffer from asthma, and the numbers of asthma deaths are increasing in the next 10 years. Asthma is a chronic disease characterized by intermittent attacks of breathlessness that is triggered by the allergies and cold air commonly. Asthma is well known disease to restrict physical activity, although exercising is one of the ways to manage the disease and minimize the symptoms and attacks.

Methods: Twelve weeks program and each week consist of aerobic training twice, a swimming session, Inspiratory Muscle Training session, breathing exercises and Yoga session in every second week, the patient was introduced to Buteyko Technique as home exercises. The patient was asked to avoid all the allergies (Triggers). The patient was assessed on baseline and on the end of the program using the lung function test and Asthma Control Questionnaires (ACQ).

Discussion: The patient completed the entire program chosen for him and the baseline assessment showed that the patient suffered from symptoms such as coughing and chest tightness especially at night. The lung function test showed improvement on the FEV1 predicted from the baseline (85%) and after the program assessment (92%) with an increase of 7%. The asthma control questionnaires showed also an improvement as the score at the baseline was 2.28 and after the program it is 1.14, which considered as borderline of adequate asthma control.

Conclusion: Twelve-week supervised program of interventions can lead to improvement of lung function test parameter, control and quality of life in asthmatic motivated patients. From the findings a well-structured program influenced from the patient hobbies will keep the patient motivated and will increase the patient physical activities without any restrictions.

Introduction

Asthma is very common disease and the idea of helping patient to manage it and push away as far as possible all the restriction on physical activity and sport is by itself the biggest motivation for me, imagining the patient life with limited sports activity motivate me as well. And by educating the patient to the view of physiotherapy to this disease and the ability to manage it by training programs is my goal. By managing the disease the patient productivity will increase in the levels of work, his or her favorite sports or even simple task of the day like using the stairs. And to give an example there are athletes who have asthma like the American football star player named Jerome Bettis. If they can do it so any patient can. First of all the asthma as defined on WHO (World Health Organization) is “a disease characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person. In an individual, they may occur from hour to hour and day to day”. Asthma is a widely common disease among almost every society and the numbers are getting higher every year, internationally an estimated 300 million patient who suffer of asthma with an annual 25000 deaths, and by 2025 the number will increase 100 million, and studies shows the increase in the incidence of asthma over the last 20-30 years. And as far as I was growing up in my hometown the majority of the people think the treatment is only by inhalers. The risk factors of asthma are Genetics or environmental and the Causes of the symptoms are facing the patient in everyday life and the patient need to manage it to provide the patient much easier, happy and symptoms free life. To achieve that we as physiotherapist have to convince the patient that by exercising (which is a trigger) will improve controlling the symptoms.

The topic is physiotherapy management of asthmatic patients in an adult age, physiotherapy approach to the lung diseases is sufficient by all level and it can manage and decrease the symptoms such as coughing, wheezing, shortness of breath, chest tightening and trouble in sleeping. The leading causes of symptoms are the infections, allergies, smoking (primary of even secondary), air pollutions and Exercises. By controlling asthma, the patient should have few or no symptoms and minimal usage of medications.

The objectives are to achieve well-controlled asthma the patient has to go through training program and control by spirometer it every week for 10 supervised weeks and 2 unsupervised weeks. By the end of the program my patient should have the characteristics of the well-controlled asthma. And gradually returns to his favorite hobbies and sports. Respiratory diseases are common because of the higher rates of pollutions in the air. Asthma and heart disease have a relationship according to a study found that a patient who have to take daily medications are 60% more likely to have a heart attack in 10 years. So by treating and managing asthmatic patients it is already preventing the patients from having heart problems in the future. In this research these questions will answered precisely and detailed:

1. What is asthma?
2. What is the different between asthmatic lung and healthy lung?
3. What is the pathophysiology of the asthma?
4. What are the signs and symptoms of asthma?
5. What are the diagnostic methods?
6. What are the classifications between the asthmatic patients?
7. What are the risk factors and the triggers?
8. Is there relationship between asthma and other disease?
9. What are the pharmacological treatment options for the patients?
10. How can the physiotherapist help the patient reduce the symptoms?

The levels of asthma control are less than what it should, a research was done on 12 weeks showed that there is a significant effect on the patient's symptoms, as measured and controlled by the Asthma Control Questionnaire (ACQ) in the beginning and at the end of the program, and it led to improve the quality of life and motivate even more patients to control their symptoms. I will follow up this research on a patient who has a mild asthma done by the same methods and questionnaires and hopefully it will have the same results [1].

Theoretical Background

The thoracic wall is formed from the spinal column and twelve thoracic vertebrae from the posterior side and from the anterior side the sternum and twelve pairs of ribs and costal cartilages. From the anterior side the first seven pairs of ribs are connected to sternum, and from the 8^{th} to the 10^{th} are connected to each other by the costal cartilage, and the 11^{th} and 12^{th} ribs are floating ribs to allow the full chest expansion.

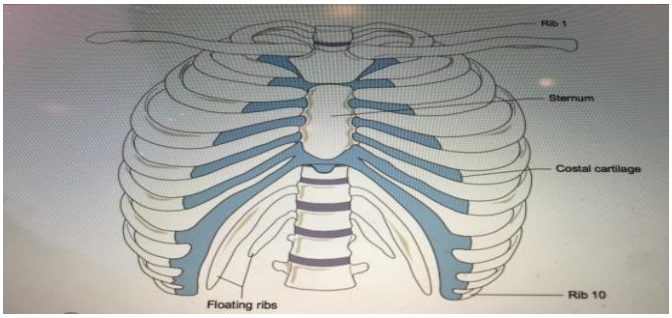


Figure 1: The thoracic wall [2].

The main blood supply to the sternum it supplied from the superior side by pair internal thoracic arteries that connecter with the lateral thoracic, the acromio-thoracic and the transverse cervical arteries. The internal thoracic artery is branched from the sub clavian artery and it goes posterior to the costal cartilage with the sternum. Ventral skin and muscles are supplied from the superior side by sub claivian vessels.

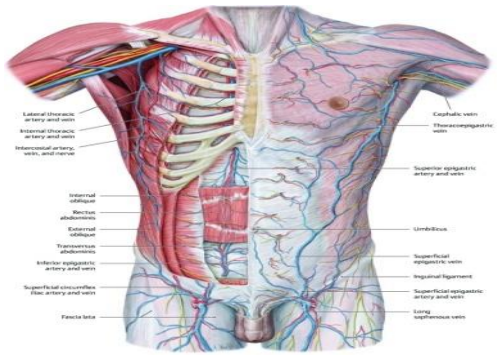


Figure 2: The main blood supply [2].

There is to mail groups of muscles in the chest wall, inspiratory and expiratory, and that classification comes from the functions. The inspiratory muscles (e.g. sternocleidomastoid and scalene muscles) expand the chest volume by pulling up the superior side of the rib cage. The Expiratory Muscles (e.g. rectus abdominis, internal oblique and external oblique muscles) decrease lung volumes pulling or narrowing the rib cage by downward motion.

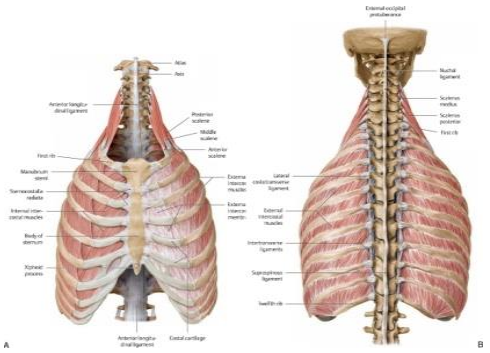


Figure 3: Muscles in the chest wall, Inspiratory and Expiratory [2].

The diaphragm divides the thoracic and the abdominal cavities and it has a dome shape and supplied by the phrenic nerve. Pass through it the aorta, inferior vena cava, esophagus, vagus nerve and the gastric vessels. The diaphragm movements are concentric (by deep and slow inspiration) and controlled eccentric (exhaling “speaking”).

There are other muscles, which help the breathing and they are attached to the clavicle, scapula and the humarus such as pectoralis major, latissimus dorsi, serratus anterior and trapezius muscle. The movements of the thorax go on 3 planes: antero-posterior, supero-inferior and transversal. During the Inspiration there is trunk extension and during Expiration there is trunk flexion. During rest the

diaphragm works (75%) and the intercostal (25%). The movements of the chest cavity seen in breathing during the inspiration and expiration. In inspiration, the inspiratory muscles contract and the diaphragm descends and that makes the rib cage elevate. Elevation of the rib cage increases the volume of thoracic cavity. With that the lung gets stretched and the intrapulmonary volume increases that makes the pressure drops to -1 mmHg. With that the air flows into the lungs until the intrapulmonary pressure equals to the atmospheric pressure, and that is the end of the inspiration and the start of the expiration which the muscles will act the opposite and relax so the diaphragm will raise and the rib cage will descend due the recoil of the costal cartilages. That will lead decreasing of the thoracic cavity volume and due that the intrapulmonary pressure raises to +1 mmHg. Then the air flow out of the lung until the intrapulmonary pressure is zero.

Upper and lower airways (23 generations). The upper starts from the nose until the larynx, and it consist of the nose (which warms and filters and humidifies the air) and sinuses, glottis, pharynx and larynx. The lower airways starts from the Trachea which is 16-20 cartilaginous c-shaped rings opened from the posterior side then 2 main bronchi then it branches more to 5 labor bronchi the top 10 segmental bronchi then to primary and terminal bronchioles which does not have cartilage, so far all the above is called the conducting system (1-16 generation) which has no gas exchange at all. After that comes the exchange surfaces (17-23 generations) which is the respiratory bronchioles and alveolar ducts and the alveolar sacs, and what connects the alveoli to another alveoli is called pores of kohn, and from alveoli to bronchioles is channels of Lambert. And a section of the airway walls consist of the epithelium, goblet cells, ciliated cells, glands, hyaline cartilage, smooth muscles and elastic fibers.

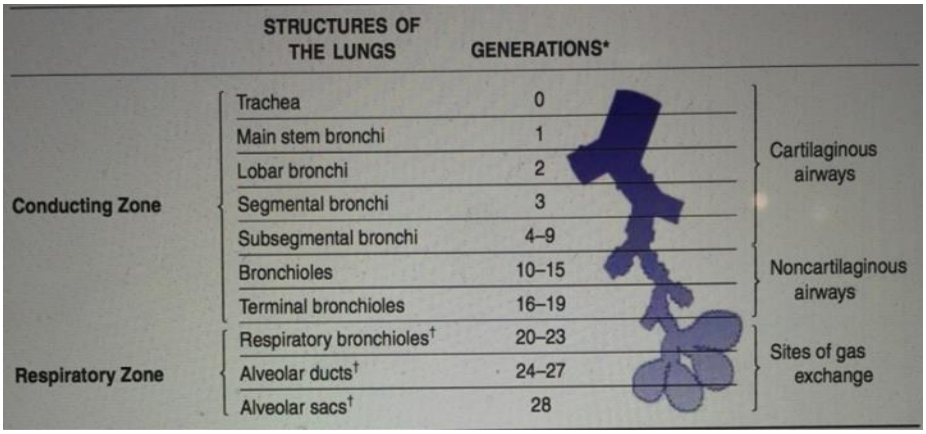


Figure 4: The lower airways [2].

The chest cavity consists of two lungs one on each side. The right lung has three lobes (upper, lower and middle) and the left lung has two lobes (upper and lower). The bronchopulmonary segments of the upper lobe (apical, posterior and anterior), the Right middles lobe (lateral and medial) and the left Lingular lobe (superior and inferior) and the Lower lobe (apical, anterior basal, posterior basal, lateral basal and subapical). The lungs are covered by the pleural cavity, which are two layers (visceral and parietal) to allow the negative pressure of breathing stay with no friction [2]. The respiratory system is where the exchange of the O_2 and CO_2 between the air lungs and blood in the pulmonary circulation (external respiration) and between the blood, cells and tissues (internal respiration) Figure 1 to Figure 4

[1-25].

Disorders of the Respiratory System

Restrictive Disorders: which means the restriction of the lung expansion resulting in decreasing of the lungs volumes (FVC, FEV_1, TLC, VC, RV). And it localization is extrapulmonary (rib fracture, kyphoscoliosis and neuromuscular diseases) or Pleural (pleuritis and pleural disorder and effusion) or Parenchymal (pulmonary fibrosis, alveolar oedema and rheumatic diseases). Obstructive Disorders: it is characterized by abnormal low airflow. The airflow decreased always and volumes decreased frequently (FEV_1 and FEF25-75). Some examples of the disorders (Asthma, COPD, Bronchiolitis).

Asthma

Is a chronic disease, which the pulmonary airways and the bronchioles are inflamed that lead to obstruction and usually the obstruction is reversible. The decreased bronchial flow after the bronchoprovocation is called bronchial hyperresponsiveness. And there is other triggers which provoke the airway obstruction such as cold air, exercise, infection, cigarette smoke and allergies. The pathology of asthmatic airways displays lung hyperinflation, smooth muscles hypertrophy and lamina reticularis thickening, mucosal edema, epithelial cell sloughing, cilia cell disruption and mucus glands hypersecretion [3]. Most attacks are short, without any symptoms between episodes. But airway inflammation is present in asymptomatic individuals. Asthma occurs in all ages, which nearly half of the patients develop asthma from childhood and the other third before the age 40, it has been estimated that 5% of adults have asthma and 7-10% of children in United states have asthma. Asthma Morbidity and mortality have risen in last two decades despite the increase number of antiasthma drugs. The etiology of asthma is believed to be genetic because asthma considered as familial disorder and that is strong evidence. Environmental factors also play a major role with the inherited factors to increase the risk of asthma and to cause bronchospasm attacks.

Childhood exposure to environment which has high levels of allergens, cigarette smoke, air pollution or respiratory viruses has increased chance to develop asthma, especially those children who has family history with asthma. The severity of the asthma acute attack is different from a patient to another, over time and the amount of exposure to inciting factors [4]. Asthma has two major components. When the immune system becomes sensitized to an allergen, usually through big exposure in childhood. The lungs became hyper reactive and this cause the muscles to contract making it very difficult to the patient to breath. The second component is inflammation, which makes the airway narrow, and swell and the cells produce more mucus. Asthma may be categorized as conventional asthma, occupational asthma, or exercise induced asthma. But the pathophysiology is the same; since the triggers and allergens are vary from a patient to another, each person react differently.

Asthma Classification

The classification of asthma is based on the severity, which can be seen in symptoms and the functional tests. Which are**?**

1. **Intermittent mild asthma:** without treatment the symptoms are (difficulty in breathing, wheezing, chest tightness and coughing), and occur less than two days a week and the

symptoms do not interference the day activity life, and nighttime symptoms comes less than two days a month.

2. **Mild persistence asthma:** without treatment the symptoms occur more than 2 days a week but not every day, the attacks happen in the daily life activity, nighttime symptoms happen 3-4 times a month.
3. **Moderate persistence asthma:** without treatment the symptoms happen every day, nighttime symptom happen more than once a week but not every night.
4. **Sever persistence asthma:** without treatment the symptoms happen every day and there is severing limitation of the daily physical activity, the nighttime symptoms happen often and some cases every night [5].

Diagnosis

Asthma is a complex disease it comes with airway inflammation, hyper-responsiveness and variable obstructions of the airflow that may not all co-exist in many patients. The lung function test is done by Spirometry, which is a simple device can be used in the physician office and it provides the very important information about the relationship between the flow and volume. The test accuracy depends highly on the patient effort. The patient must listen and do exactly as the assessor coach and in the other hand the assessor must coach the patient with the correct understandable language and can identify the unacceptable effort as poorly performed maneuvers can lead to several of diseases patterns. There are more possible ways for diagnosis of asthma but the recommended approach in spirometry device is measuring the improvement in forced expiratory volume in 1s (FEV_1) of 12% and 200 ml after taking the bronchodilator challenge. The spirometry shows the increase of FEV_1 then it is a positive diagnosis, and if there is no increase it is a negative diagnosis.

Measurement of the peak expiratory flow rate (PEFR) is simple and convenient the patient can do it in the clinic or even in the house. PEFR has been linked with airway hyper-reactivity and it is useful diagnostic method. There are other methods such as Methacholine challenge, which is recommended for patient who has all the clinical features of asthma but normal spirometric testing measurements. Methacholine challenge testing (MCT) is in the beginning a safe test even on sever obstructed patients, MCT starts with inhaling methacholine, a substance that induce bronchoconstriction in susceptible airways, to their knowledge there were no deaths reported from MCT. And then measure the lung functions if the FEV_1 is decreased > 10% that's a positive diagnosis. And in the other hand if there is no limitation (airflow limitation: FEV_1<80%, FEV_1/FVC<65%) after inhaling the bronchospasm provocation then it is a negative diagnosis.

Peak flow can be measured by the Peak flow meter and it is used to monitor the disease. It shows the peak expiratory flow (L/sec) and it should be used 2-3 times a day. It is not expensive and portable that makes it easier to check up everywhere and ever time. The diagnostic testing for patient who is over six years old is the same as adults, which is the lung function test and allergy tests. And for patients less than six years old it is difficult because they are not able to perform conventional lung function test [5].

Signs and Symptoms

Asthma signs and symptoms may vary from a patient to another but the most common ones are:

1. Shortness of breath
2. Coughing
3. Chest tightness
4. Wheezing
5. Trouble of sleeping

And there are causes to the symptoms (triggers) such as:

1. Viral infections
2. Allergens: dust mites, pet dander and pollen
3. Tobacco smoke

Exercises

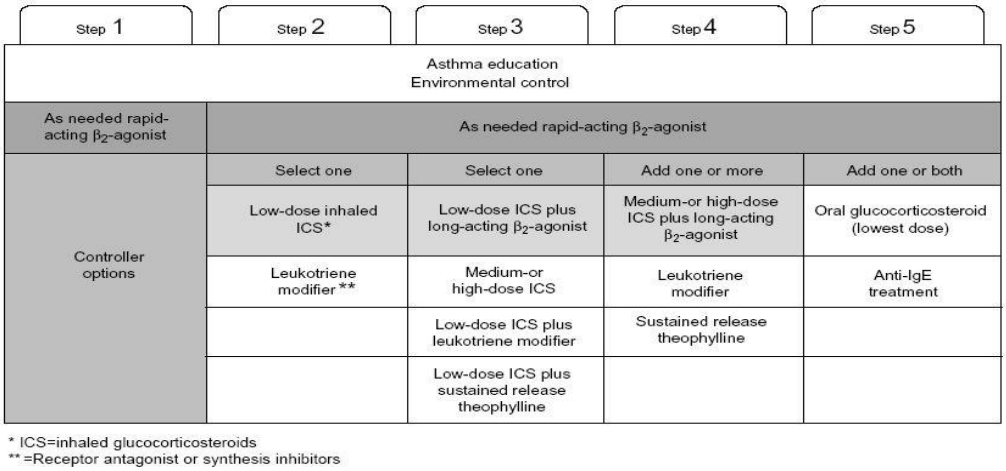
Weather changes or cold air to monitor the patient severity the patient usually uses a timetable to check whenever he had the symptoms on each day in day or night. That helps with the management and check if the treatment option is suitable for the patient or the physician should change it to other option. And especially it is very helpful for the physiotherapist during the physical training treatment plan. Trying to avoid these causes is part from the treatment [6].

Treatment

The goal is controlling the asthma. A well-controlled asthma must have minimal or no symptoms, few or no asthma flare-ups, no limitations in physical activity, minimal usage of medications and few or no side effects of medications. Drugs that are used as preventive medications or long-term medications (Long acting beta-agonists, immune modulator) are used for reducing the inflammation. Then the quick-relief (short acting beta-agonists, systemic corticosteroids) or rescue medication to quickly open the airways during the attacks (2-5 min). Allergy-desensitization or immunotherapy diminishes the symptoms in 3-5 years.

The physicians confuse often asthma control with asthma severity. The concept of asthma control has been always used in the treatment guidelines. There was a thought that the well-controlled asthma was the same concept as mild asthma, and the poorly controlled asthma like the severe asthma this concept is not correct. Severity is the intensity of the disease process before the treatment takes a place. For example patient with severe asthma if they were treated and managed appropriately can be controlled, and the opposite is true, patients with mild asthma if they did not follow the treatment plan they will have a poorly controlled asthma. The goals of treating and managing all levels of asthma are the same, but patients with severe asthma the treatment will be more difficult to achieve a controlled asthma. The meaning of controlled asthma requires the patient to have no symptoms in the daytime or the night-time, also a very infrequent rescue beta2-agonist use, and have no limitation in physical activity and lung function values close to normal. The Global Initiative for Asthma (GINA) suggests 5 steps for treatment. For each step there is a preffered option and other alternetive. Step 1 is rapid-acting inhaled beta2-agonist. The other 4 steps has other controlled options with the low-dose inhaled corticosteriods (ICSs) as the preffered option in Step 2 to long-acting inhaled beta2-agonist and high-dose of ICSs together and oral corticosteriods at Step 5. If the asthma is controlled the treattment should be reduced and consider

other treatments to manage the disease. If the controling of asthma has not been established then the treatment advance to the next step. And the study suggest that the most effective control therapy for asthma is ICSs in low-doses in both children and adults.



Step 1	Step 2	Step 3	Step 4	Step 5
Asthma education Environmental control				
As needed rapid-acting β_2-agonist	As needed rapid-acting β_2-agonist			
Controller options	Select one	Select one	Add one or more	Add one or both
	Low-dose inhaled ICS*	Low-dose ICS plus long-acting β_2-agonist	Medium-or high-dose ICS plus long-acting β_2-agonist	Oral glucocorticosteroid (lowest dose)
	Leukotriene modifier**	Medium-or high-dose ICS	Leukotriene modifier	Anti-IgE treatment
		Low-dose ICS plus leukotriene modifier	Sustained release theophylline	
		Low-dose ICS plus sustained release theophylline		

* ICS=inhaled glucocorticosteroids
** =Receptor antagonist or synthesis inhibitors

Figure 5: The Global Initiative for Asthma [7].

Other Therapy control options are well known such as:

- Breathing Exercises: the aim of these exercises is to normalize the breathing pattern by teaching the patient slower respiratory rate and longer expiration and reducing of hyperventilation and hyperinflation. And with the assumption that the asthmatic patients have an abnormal breathing pattern the physio should encourage the nasal breathing and diaphragmic breathing pattern.
- Inspiratory Muscle Training: the inspiratory muscles can be trained by external device to achieve strength and endurance. The reason for suggesting that exercising these muscles may reduce the intensity of the dyspnea and increase the exercise tolerance. It is possible that the effect of the corticosteroid treatment is to loss some muscles mass including the respiratory muscles.
- Physical Training: the fear of physical aerobic training as a treatment and the same time symptoms provocator inhibits many patients from taking part of this treatment option. The aim of the physical training programmes to improve physical fitness and neuromuscular coordination and self-confidence and it is the important component for a better management of asthma [8].

As a study shows which specific exercise is preferred for the asthmatic patients, between the fallowing (swimming, cycling, running). All the functional values were monitored, especially FEV_1- FVC- $FEV_{T\%}$. This study confirms that the best results are seen in swimming. Because exercise-induced asthma present in swimming is less than running or cycling [9]. Therefore another study states that there are huge influences in the temperature of the air and also on the high interval exercises. The study results suggest that patients should avoid high intensity exercises (95% of Maximal heart rate) in the extremely low temperature (winter) and in extremely high temperature (summer) as a preventive option of exercise-induced asthma [10]. The study results suggest that patients should avoid high intensity exercises (95%

of Maximal heart rate) in the extremely low temperature (winter) and in extremely high temperature (summer) as a preventive option of exercise-induced asthma [10]. The program was once in a week training on moderate intensity for 60 minutes. And doing the assessment before and after the 12 months by using questionnaires. The results showed that moderate intensity for long-term program could show clinical relevant improvements in exercise capability and the quality of life in the motivated adult patients [10]. As my opinion, every patient is different from another, by the age, gender, life-style, and even psychological factors are important. The physiotherapist should choose the best program depending on all the factors seen in the patient.

For example asthmatic patient who loves swimming will be always motivated for the program that involve swimming, and in the other hand we must introduce new treatment exercise methods and without any restriction we prepare the patient for any sport the patient desires. After giving the program for patient and after adding his interests in it to keep him always motivated, the physiotherapists should explain always to carry his or her inhaler and when and how to use it. The period of the treatment is an important factor; if it's a long periods the program should be moderate intensity and increasing gradually the intensity first and session time. The physiotherapist should encourage the patient to increase the quality and intensity of the exercises gradually, in order to adapt the body for the new training load. By doing all of that and making the preferred program for each patient and encouraging for higher intensity the patient can reach the well managed asthma with fewer asthma attacks and better life quality.

Physiotherapy Interventions

Breathing Techniques

By using a big number of asthmatic patients to experiment the breathing techniques, a study had been done on the interventions of the physiotherapy in asthma. It was a systematic review to try the effectiveness of these interventions. The study used interventions such as slow deep breathing with the Pink City Lung Exerciser 15 min a session and twice a week for the mild conditioned asthma patients. And another physiotherapy intervention for patient with acute sever cases which are hospitalized to establish chest physiotherapy after 6-24 the admission patients given the inhaled salbutamol comes after it physiotherapy breathing exercises. And some other stable conditioned patient with different intervention such as, a 16 weeks program strengthening the respiratory muscles to maximize the efficiency of the lung capacity, yoga breathing exercises; physiotherapy breathing exercises both of them 15 sessions of 3 hours over 3 weeks. The patients were monitored by lung function tests and spirometry values were taken before and after the programs for all the groups. And the results advice that on sever cases of acute asthma may not profit from physiotherapeutic breathing techniques. But in the other hand cases with mild-to-moderate may offer some assistance to the patient life. the breathing exercises and the strengthening of the respiratory muscles showed a significant result on mild-to-moderate asthmatic patients [10].

Swimming

Swimming can improve the aerobic capacity to patients with asthma. That's the results of several study on of them was done on Two groups. One group consists of eight patients, was training with 125% of the

lactate threshold (LT), and monitored using a swimming ergometer. Another group with the same number of patients served as a control group subjects. As a result of the six weeks swimming training program, the patients showed a beneficial effect on the aerobic capacity (Matsumoto I. 2001). In this study they analyzed the effect of swimming on lung functions and (BHR) Bronchial hyperresponsiveness in mild asthmatic patients. The study was done on 70 mild persistent asthmatic patients selected according to GINA. The method was to have two sessions a week for one hour, for the following 6 months. There were two groups one had the asthma education and the swimming sessions and the other had drugs. The sessions were held on an indoor pool with natural warm water without chlorination. For assessment they measured the lung functions with spirometry, broncho provocative test and skin tests. The Conclusion was that patients with mild persistent asthma going to swim in non-chlorinated pools combined with asthma regular medicine and asthma education can cause better improvements of their parameters of the lung functional test. And more significant decrease of their airway hyperresponsiveness compared to traditionally treated patients with medicine [11].

CART and SLOW

Study experimenting on the raising of Pco2 level compared with slow breathing is linked with improvements in asthma control. The method of the study was testing one hundred twenty patients with asthma. With assigning the patients to Capnometry-Assisted Respiratory Training (CART) for raising Pco2 or Slow Breathing and Awareness Training (SLOW). Patients received five sessions a week and completed the home exercises over 4 weeks. Post-treatment and baseline assessments were made with monthly follow ups and measuring the pulmonary function tests such as spirometry, forced oscillations and quality of life and symptoms and drugs use. As a result improvements are seen in the lung function tests and quality of life and drugs use. The improvements were persistent on the 6th month follow up [12]. This study was done on 33 patients between the ages of 17-65 years, with diagnosis of asthma and had at least one prescription for an inhaler or oral bronchodilator. They were managed by Nijmengen questionnaires and hit the score less than or equal to 23 to be diagnosed with dysfunctional breathing. The interventions of the physiotherapists were on groups of 4-5 patients for 45 minutes a session once or twice a week. In these sessions the physiotherapists explained the several symptoms such as breathlessness could be produced. The physiotherapists taught the patients diaphragmatic breathing exercise by using physiotherapy methodology. Emphasizing the slow and regular breathing is the main use of the diaphragmatic respiratory effort. The results and the data analyzing and the questionnaires showed that over the half of the asthmatic patients treated for dysfunctional breathing are clinically significant improvements in quality of life following the brief physiotherapy intervention. And this increased improvement is sustained in over 25% after 6 months of the interventions [13].

Pulmonary Rehabilitation

Patients with lung diseases are closer to present decreasing in the exercise tolerance and muscle strength, and the cause is the pulmonary limitations and the systematic repercussions of the pulmonary disease. The goals of this study are to evaluate and increase the physical capacity, peripheral muscle function, physical activity in daily life and the inflammatory markers after pulmonary rehabilitation. The study involved visits: the 1st was Evaluation, in this visits they asked quality of life and asthma control

questionnaires, lung function tests, blood inflammation, cardiopulmonary exercise test. The 2nd visit was skeletal muscle function assessment. On the 3rd visit they did incremental shuttle walk test and physical activity (accelerometer) and then divided and randomization to two groups on was intervention group, which was supervised rehabilitation program. The program was twice a week and the duration of each session was 60 minutes for 8 weeks. Each session includes of three parts: aerobic exercise (10 minutes warm up 20 minutes on target load and 5 minutes cool down), strength muscles exercises (40-70% of maximal repetition), and chest physiotherapy (Flutter will be used for 5 minutes). The second group is Control group. This program includes chest physiotherapy (Flutter for 10 minutes) and stretching exercises (for upper and lower limbs for 40 minutes) twice a week. Each session will be held for 60 minutes for 8 weeks. And after 8 weeks the study reevaluated the patients as the same method on the 1st visit. And the results were both groups had controlled the asthma and with the evaluation and reassessment it can be seen in quality of life and the usage of drugs. Pulmonary rehabilitation is recommended for patients with chronic diseases with increased aerobic capacity [14].

Buteyko Technique

It is the most effective approach to management of asthma without using any drug, it can be applied to any age and any severity and it will give up quick and consistent results. Which emphasize the importance of nasal breathing? Nasal breathing humidify, warm, and clean the air which enters the lung. By encouraging the nasal breathing the night symptoms can improve. In that fact a study was made on the Buteyko technique to assess the effectiveness in asthmatic patient. A randomized controlled group of adult asthmatic patient did the buteyko technique, and other group was trained by physiotherapists to perform breathing and relaxing techniques. The measurements were composed by a score based on the Canadian asthma consensus reporting after six months of the intervention. And the results show both groups showed significant and similar improvements. And the Buteyko group the proportion with controlling the asthma increases from 40% to 70%. And in addition to the Buteyko group they showed a substantially reduced in their inhaled corticosteroid therapy comparing to the controlled group. As a conclusion of this study, after six months completing the intervention, a large majority of both groups showed control on their asthma with an additional benefit of reduction of the inhaled corticosteroids use in the Buteyko group. Therefore we may say that the Buteyko technique appear to provide benefits on adult asthmatic patient along with the chest physiotherapy in patients who are being treated with corticosteroid inhaled therapy [15].

Yoga

Yoga treatment to improve the quality of life in asthmatic patients has its own popularity. Therefore a study was made to determine the effectiveness of yoga in patients with asthma. The study included 120 patients diagnosed with asthma. The patients were randomized to follow two groups. Group A was Yoga training group and group B was the control group. Group A included deep breathing exercises, Kapalabhati (cleaning breath), Bhastrika (rapid and deep respiratory movements), Ujjayi (loud sound producing pranayama) and sukha purvaka pranryama (easy comfortable breathing). The Yoga sessions were 24 minutes duration per week under supervision. And the patients were instructed to practice at home. Both groups had to answer the asthma quality of life Questionnaires (AQLQ) at baseline and 8

weeks after the baseline. The results were based on the (AQLQ), scores of Group B showed no significant changes from the baseline after eight weeks. Group A score showed an increase in the QOL after eight weeks. Means that the score of Group A was significantly higher than Group B score. From the results we know that Yoga may be beneficial for patients with asthma after practicing Yoga exercises [16].

Aerobic Exercises vs Breathing Exercises

Both of the exercises has major rule on management of asthmatic patients conditions. Therefore a study was done to compare the effectiveness of these treatments. The method was to choose randomly, comparative, blinded clinical trials with two groups will receive different interventions. Forty-eight patients with diagnosed asthma will be divided into two groups, Group A was the aerobic and Group B was the breathing exercises. First they evaluated the two groups on two visits; the first had clinical control, anxiety evaluation, hyperventilation syndrome, pulmonary and systematic inflammations and daily life physical activity. The second visit had the pulmonary function tests, maximal exercise capacity, thoracoabdominal kinematics and autonomic control. After their two visits the groups had two educational programs, which included pathophysiology, medical skills, medications skills, self-monitoring techniques, environmental control, avidness strategies and the use of the peak flow meter. After the educational programs the study randomized the two groups into aerobic training and breathing exercises. The aerobic training has been done on the treadmill with 60% of the maximum intensity and reaching to 80%. The breathing exercise group has been done yoga breathing techniques, nasal and diaphragmic breathing, increasing the expiratory time and slowing the respiratory flow. Breathing exercises had been divided into 3 phases lasting each phase one month. The study has showed a significant improvement on both groups in the functional respiratory. The aerobic exercises showed improvements in the daily life activity. And breathing exercises showed improvements in the peak expiratory flow and decrease anxiety and depressing and medical consumption. The study is undergoing and the data in being analyzed with encouraging improvements from the baseline tests. The results will show us the benefits of each intervention to optimize its effect to the asthmatic patients [17].

Inspiratory Muscles Trainings

A study was done to evaluate the effectiveness of Inspiratory Muscle Training (IMT) and respiratory exercises on the strength of muscles. The study was done on a randomized analytical including 50 patients of asthma. They were put in two groups: an IMT group, involving of 25 patients with a program includes an IMT and both education about asthma, treatment programs. The second group called a control group that includes also 25 patients, which had the usual monthly medical visits and education about asthma. The IMT was done by using a pressure threshold of 40% of the maximal inspiratory pressure. IMT was performed using of the threshold IMT (Respironics, Cedar Grove). The respiratory therapy includes IMT and breathing exercises, twice a week for a 50 minutes session, for 7 consecutive weeks. 25 minutes of it was IMT, during the first 20 minutes the IMT threshold used for sixty seconds of practice separated by sixty seconds of rest, in order to develop muscle strength. And on the last 5 minute, the equipment was used uninterruptedly to gain and develop the endurance.Both groups

compared in terms of PEF and respiratory muscles strength and as well as the severity variables, by using equipment like Peak Flow device. The Conclusion of the study was: the program that involved IMT and respiratory exercises (IMT group) showed increase of the efficiency of the respiratory muscles, and in addition to improving of PEF and severity variables [18].

Discussion

Objectives

The estimates of the global burden of asthma of 2014 are rising to 334 million people suffer from asthma. An estimated 14% of the world's children have symptoms of asthma and 8.6% of adults (18-45 years old) experience asthma symptoms. Asthma is the 14th most important disorder in the world in terms of extent and duration of disability. As a result of that, it is highly recommended to do research, interventions and managing to decrease the asthma burden in the world [19]. Objectives of the research:

1. Better understanding of management of asthma.
2. Describe the Physiotherapy interventions towards asthmatic patients in details and the benefits.
3. Improving the lung function measurements.
4. Achieve the well-controlled asthma.
5. Prevent asthma attacks or at least minimize it.
6. Minimal usage of Medicine.
7. Increase the quality of life and the physical activity of the patient so he/she can do whatever sport they like with no limitation.

In order to reach these objectives, the patients needs in the beginning the education about asthma and in most cases the physiotherapy approach about management of asthma and the variety of interventions it has to help the patient health and quality of life. After that the patient has to learn how to use the medicine giving as an inhaled substance in case the patient needs to use it during the physiotherapy interventions. Then the patient must do a lung function test (spirometry) and fill Questionnaires to assess how the interventions improving. To choose the best intervention for the patient is a matter of evidence-based treatment, although of that we should also choose the best intervention method to keep the patient motivated and encouraged to do more. Then we prepare the perfect specified program for the patient and in end of it we assess the same way as the baseline and we compare the results and hopefully we will reach all the objectives that we set with the patient.

Subject

There is no cure for asthma, in another hand pharmacological interventions showed a good improvement in symptoms. The physiotherapy interventions showed also substantial improvements in managing asthma. Poorly managed asthmatic patient have a very restrictive life, and with the physiotherapy interventions the patient will be free of the restrictions and can practice all the physical activities symptoms-free. Physical activity is widely known as the enemy of the asthmatic patients and by this research I will be able to prove that with physical activity the asthmatic patients well have a better life quality. So the physical activity is the subject I chose.

Hypotheses

The literature review I have made about asthma and the different intervention and from all the articles I listed above that:

- I assume that the aerobic training will improve the lung functions parameters [20].
- I assume that with the swimming session the lung function parameter will increase [11,9].
- I assume that Yoga sessions will improve the quality of life to asthmatic patient.
- I assume that the Inspiratory Muscle Training (IMT) will improve the efficiency of the respiratory muscles and the PEF value.
- I assume by the breathing exercises the patient quality of life will improve.
- I assume that the breathing exercises will improve the patient's anxiety.
- I assume that the Buteyko technique will help the patient to control the asthma and it will help also the patient's night symptoms.
- I assume that every patient needs unique program depending on his hobbies to keep him motivated.

And to prove my hypotheses I will make a scientific-based program to an adult asthmatic patient.

Patient's Clinical Findings

The patient is 29 years old and diagnosed with mild asthma through his physician. The lung function test showed a mild obstruction, and the patient did an allergy test as well to determine the triggers. He suffers from variety of symptoms. Symptoms seen in the patient:

- Cough, more than 2 days per week.
- Wheezing.
- Chest tightness especially at night, awakening symptoms 3 to 5 times per month.
- Minor limitation of daily activities.
- Anxiety.

The patient also did an allergy test that showed the inhaled triggers. The physician gave the patient the suitable medication and the patient has been advised to stay away from the triggers as much as possible to avoid the attacks. The patient has been educated about the relation between the triggers and the attacks [Appendix 3]. Patient's triggers (Allergies):

- Cold air.
- Dust mites, mugwort and ragweed.
- Pet dander specially dogs and cats.

The patient complained about tobacco smoke also leads to the attack.

Medications

The patient used for two years a medication (inhaler) named Seretide, twice a day.

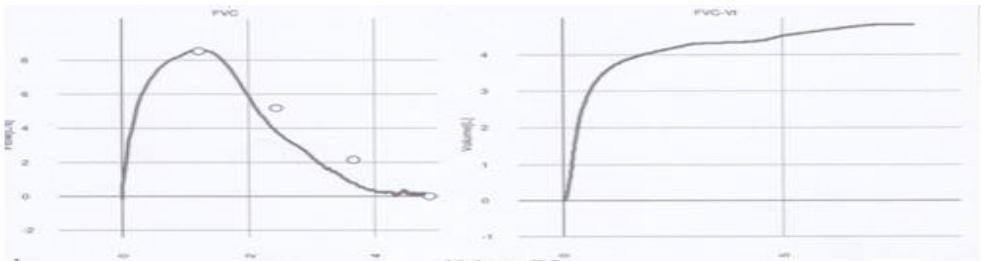
Assessments

Before the patient starts the Treatment plan. I did a baseline assessment using the lung function test

and Asthma Control Questionnaire 7 (ACQ-7).

Lung Functional (Spitometry) Test

The most important parameter of the spirometry for asthmatic patients is the FEV_1 expressed as percent of the predicted value [21]. Baseline assessment (appendix 1).



Param.	Unit	Predicted	%PRED	BEST
FEV1	L	4.08	85%	3.46
FVC	L	4.87	99%	4.81
FEV1%FVC	%	83.69	86%	71.93
PEF	L/s	9.16	94%	8.59
FET	s	0.00	0%	7.14
FEV3	L	0.00	0%	4.11
FEV3%FVC	%	0.00	0%	85.45
FEV05	L	0.00	0%	2.74
FEV075	L	0.00	0%	3.20
FEV075%FVC	%	0.00	0%	0.00
FEV6	L	0.00	0%	4.49
FEV1%FEV6	%	0.00	0%	77.06
FEF25	L/s	8.50	101%	8.59
FEF50	L/s	5.16	76%	3.93
FEF75	L/s	2.18	40%	0.87
MMEF2550	L/s	0.00	0%	6.33
MMEF2575	L/s	4.39	68%	2.97
PEFT	s	0.00	0%	0.14
FEV1%FIVC	%	83.69	0%	0.00
FIF25	L/s	0.00	0%	0.00
FIF50	L/s	0.00	0%	0.00
FIF75	L/s	0.00	0%	0.00
FIV1	L	4.08	0%	0.00
FIV1%FIVC	%	83.69	0%	0.00
FIVC	L	4.87	0%	0.00
PIF	L/s	9.16	2%	0.15
ELA	year	29.00	172%	50.00
EOTV05	L	0.00	0%	0.05
EOTV1	L	0.00	0%	0.12
EV	L	0.00	0%	0.20
ZeroTime	s	0.00	0%	0.10

Appendix 1: Before treatment lung functional (Spitometry) baseline test.

Asthma Control Questionnaire 7 (ACQ-7)

All the guidelines in the world to treat asthma share the same goal of asthma management that is the patient will obtain control on asthma. That is why Asthma Control Questionnaire 7 (ACQ-7) was established to evaluate if the patient has a well-controlled asthma or poor-controlled asthma. It measures both capability of asthma control and the change of asthma control, which happens unexpectedly or a result of treatment program. The patient asked these questions and sum up the points and divide it on 7 and the score will determine if the patient has a controlled asthma or not. The patients who have score less than 1.0 will have a well-controlled asthma and the patients who have above 1.0 will have poor-controlled asthma. However there is a grey area between 0.75-1.25 where the patients are in the borderline of adequate control [22]. The patient had answered these questionnaires weekly. And the score for his baseline assessment (before the program started) was 2.28 which means poor-controlled asthma (Appendix 2).

Appendix

ASTHMA CONTROL QUESTIONNAIRES

Please answer questions 1=6.

Circle the number of the response that best describes how you have been during the past week

1. On average, during the past week, how often were you woken by your asthma during the night?	0	Never
	1	Hardly ever
	2	A few minutes
	3	Several times
	4	Many times
	5	A great many times
	6	Unable to sleep because of asthma
2. On average, during the past week, how bad were your asthma symptoms when you woke up in the morning?	0	No symptoms
	1	Very mild symptoms
	2	Mild symptoms
	3	Moderate symptoms
	4	Quite severe symptoms
	5	Severe symptoms
	6	Very severe symptoms
3. In general, during the past week, how limited were you in your activities because of your asthma?	0	Not limited at all
	1	Very slightly limited
	2	Slightly limited
	3	Moderately limited
	4	Very limited
	5	Extremely limited
	6	Totally limited
4. In general, during the past week, how much shortness of breath did you experience because of you asthma?	0	None
	1	A very little
	2	A little
	3	A moderate amount
	4	Quite a lot
	5	A great deal
	6	A very great deal
5. In general, during the past week, how much of the time did you wheeze?	0	Not at all
	1	Hardly any of the time
	2	A little of the time
	3	A moderate amount of the time
	4	A lot of the time
	5	Most of the time
	6	All the time
6. On average, during the past week, how many puffs of short-acting bronchodilator (eg. Ventolin) have you used each day?	0	None
	1	1=2 puffs most days
	2	3=4 puffs most days
	3	5=8 puffs most days
	4	9=12 puffs most days
	5	13=16 puffs most days
	6	More than 16 puffs most days
To be completed by a member of the clinic staff		
7. FEV1 pre-bronchodilator:	0	>95% predicted
FEV1 predicted	1	95=90%
	2	89=80%
	3	79=70%
FEV1 % predicted	4	69=60%
(Record actual values on the dotted lines and score the FEV1 % predicted in the next column)	5	59=50%
	6	<50% predicted

Appendix 2: Asthma control questionnaires.

Treatment Plan

The program was made based on the scientific articles. Patient's symptoms is major key for the suitable program to the patient, and to know what the patient like from sports and add it to the program to keep him motivated. First I educated the patient about his condition and asthma in general, and about our goal to have a well-managed asthma, and I explained to him that the well-managed asthma consists of (less or no symptoms, full active life, and minimal usage of medication). Then I established for the patient the relation between the attacks and his triggers (Allergies). Finally the Program and how important to keep it to have a well management over the asthma, which consists of:

Aerobic training

The patient had aerobic training twice a week, using the treadmill. First assessed the patient maximum level of exercises and initialed the suitable intensity (just below the aerobic threshold). The estimated maximum heart rate was measured using the equation "208- (0.7×Age)". The maximum heart rate was 187 beats per minute and the training was targeting just below it [23]. Then the intensity is increased by 5% with each session. When the patient reached the maximum level of intensity increases the duration by 5%. The patient started with 5 min warm up and ended up the session with a 5 min cool down. And the duration of the training was 30 minutes as starter Table 1.

Date	Average HR	Speed	Duration
12-Oct	158 bpm	6 MPH	30 Minutes
14-Oct	154 bpm	6 MPH	30 Minutes
19-Oct	160 bpm	6 MPH	30 Minutes
21-Oct	153 bpm	6 MPH	30 Minutes
26-Oct	158 bpm	6 MPH	30 Minutes
28-Oct	155 bpm	6 MPH	30 Minutes
2-Nov	167 bpm	7 MPH	30 Minutes
4-Nov	165 bpm	7 MPH	30 Minutes
9-Nov	159 bpm	7 MPH	30 Minutes
11-Nov	162 bpm	7 MPH	30 Minutes
16-Nov	166 bpm	7 MPH	30 Minutes
18-Nov	165 bpm	7 MPH	30 Minutes
23-Nov	169 bpm	8 MPH	30 Minutes
25-Nov	171 bpm	8 MPH	30 Minutes
30-Nov	177 bpm	8 MPH	30 Minutes
2-Dec	176 bpm	8 MPH	30 Minutes
7-Dec	178 bpm	8 MPH	30 Minutes
9-Dec	178 bpm	8 MPH	30 Minutes
14-Dec	181 bpm	8 MPH	32 Minutes
16-Dec	177 bpm	8 MPH	32 Minutes
21-Dec	179 bpm	8 MPH	35 Minutes
23-Dec	179 bpm	8 MPH	35 Minutes
28-Dec	177 bpm	8 MPH	35 Minutes
30-Dec	8 MPH	8 MPH	35 Minutes

Table 1: Aerobic Training.

Swimming

The patient had a swimming session once a week for 25 min. In which we have to monitor that the swimming pool is not chlorinated and the temperature of the water is a room temperature [11].

Yoga

The patient had a Yoga session once on every other week. The duration was 25 minutes. The techniques were Bhastrika (rapid and deep respiratory movements), Kapalabahati (cleaning breath), and Ujjayi (Loud sound producing pranayama). And the Patient was advised to practice those techniques also at home [16].

Inspiratory Muscle Training

The patient had an IMT (figure 7) once a week. The duration of the session was 25 minutes. The intensity was chosen by 40% of the maximal inspiratory pressure. The first 20 minutes the patient the IMT threshold was used for one minute and rest for a minute, in order to obtain muscle strength. And on the last 5 minutes the equipment was used uninterruptedly to obtain the endurance [24].

Figure 6: Threshold Inspiratory Muscle Training [13].

Breathing Exercises

The patient had the breathing exercises once on every second week. The duration was 45 minutes per session. During this session I taught the patient the diaphragmatic breathing and why is it important to us. Emphasizing the main use of the diaphragmatic breathing is the slow and regular use [14].

Abdominal breathing:

1. Lying positing or sitting position, what is comfortable for the patient.
2. I asked the patient to place his hand on his abdomen.
3. I asked the patient to breath with his nose and focus to push his hand.
4. Exhale slowly and repeat from the beginning.

Pursed lip technique:

It is useful during attacks if the patient does not or cannot take his rescue medication.

1. Sitting or lying position, depending on the comfort for the patient.
2. Inhale slowly and deeply through the nose.
3. Exhale slowly through lips, which are open slightly (almost closed like whistling) until the end and relax and repeat from the beginning.

Buteyko Technique

The patient was advised to perform this technique on daily bases and once or twice a day. The concept of this technique is due the chronic hyperventilation in asthmatic patients we will find decreased carbon dioxide (CO_2) in the blood (hypocapnia). The patient had been educated on the benefits of the nasal breathing. The patient was advised to do the technique by these steps:

1. Sit down and control the correct posture.
2. Take away all the noisy distracting devices such as Television and Phone.
3. Close your mouth.
4. Inhale deeply and slowly.
5. Exhale slowly and completely from your mouth.

6. Hold it as long as possible and then repeat from the beginning.

The Program duration is 12 weeks (3 months). Ten weeks supervised and the last two weeks unsupervised. The Program was consisting of Aerobic training sessions twice a week, swimming session once a week, inspiratory Muscle Strengthening session once a week. The Yoga sessions were on the odd weeks and the breathing exercises sessions were on the even weeks. The patient was asked to perform Buteyko Techniques as a home exercises on daily bases.

Results

The Patient was introduced to the intervention and educated on the needs of these particular interventions and the importance of keeping the program on point (Table 1). The patient had strong difficulties to continue through some of the training sessions in the beginning (first two weeks), so he had a break of 3-4 minutes then continued the remaining of the session. In the beginning of the session I started with 5 warming up with a speed of 4 km walking and in the end I ended the session with cooling down phase, which was 4 km speed walking and gradually decreasing. The patient completed the whole 12 weeks successfully.

First month

- Asthma Control Questionnaires 7 (ACQ-7) scores for the first 4 weeks were:
  - 1st week: The score was (15), Divided on 7 equals **2.28**
  - 2nd week: The score was (16), Divided on 7 equals **2.42**
  - 3rd week: The score was (15), Divided on 7 equals **2.28**
  - 4th week: The score was (14), Divided on 7 equals **2.14**
- The average heart rate of the swimming sessions were:
  - 1st session: 138 bpm
  - 2nd session:135 bpm
  - 3rd session: 138 bpm
  - 4th session: 129 bpm
- Inspiratory Muscle strength for the first month the intensity was:
  - 1st week: 8 cm
  - 2nd week: 9 cm
  - 3rd week: 10 cm
  - 4th week: 10 cm

Yoga sessions were introduced and were difficult to the patient to perform. Fortunately because of the excellent instruction of the professionals, the patient was able to perform it completely. Breathing exercises were introduced to the patient. The patient was mainly breathing from his chest and he performed the abdominal breathing correctly and repeatedly.

Second Month

- Asthma Control Questionnaires 7 (ACQ-7) scores for the second 4 weeks:
  - 1st week: The score was (12), Divided on 7 equals **1.85**
  - 2nd week: The score was (13), Divided on 7 equals **1.71**

- 3rd week: The score was (12), Divided on 7 equals **1.85**
- 4th week: The score was (10), Divided on 7 equals **1.57**

- The average heart rate of the swimming sessions were:
  - 1st session: 131 bpm
  - 2nd session: 133 bpm
  - 3rd session: 135 bpm
  - 4th session: 131 bpm
- Inspiratory Muscle strength for the first month the intensity was:
  - 1st week: 11 cm
  - 2nd week: 12 cm
  - 3rd week: 13 cm
  - 4th week: 14 cm

Yoga sessions were performed and progressed to longer time.

- Breathing Exercises were performed repeatedly and advised to practice more at home.

Third month

- Asthma Control Questionnaires 7 (ACQ-7) scores for the third 4 weeks were:
  - 1st week: The score was (9), Divided on 7 equals **1.28**
  - 2nd week: The score was (9), Divided on 7 equals **1.28**
  - 3rd week: The sore was (7), Divided on 7 equals **1**
  - 4th week: The score was (8), Divided on 7 equals **1.14**

- The average heart rate of the swimming sessions were:
  - 1st session: 127 bpm
  - 2nd session: 130 bpm
  - 3rd session: 129 bpm
  - 4th session: 131 bpm

- Inspiratory Muscle strength for the first month the intensity was:
  - 1st week: 15 cm
  - 2nd week: 16 cm
  - 3rd week: 17 cm
  - 4th week: 17 cm
  - Yoga sessions were completed the patient had done all the exercises in longer duration and more repetitions at the gym and at home.
  - Breathing Exercises was comfortably completed and the patient had repeated the exercises at home in a daily bases.

And from the patient Medical Report the Physician changed the medication after the patient did not feel the need of using the inhalator from Seretide to an antihistamine Ariusonce a week [appendix 4]. The effect of the 12-week supervised interventions on asthma control was assessed using the ACQ and

Spirometry. The goal is proving that the 12-week unique intervention will show improvement in both parameters and the quality of patient life, and it will improve the management (control) of asthma. As the results showed that the patient has almost no restrictions of the activity. Especially with the aerobic training, which statically showed improvement with the heart rate and the times he had to stop during the exercise because of the shortness of breath. The patient had the symptoms in the speed 6 km in the beginning and he started to improve in weekly with less symptoms. He improved to 8 km speed in the end with the control of the heart rate and the symptoms, and when the speed was comfortable for him with nearly no symptoms the time increased 5% and the patient showed no symptoms in the end. The patient after the 12 weeks aerobic training showed that the minor restriction he had is no longer fear he face daily. I assumed that the aerobic training and swimming will improve the parameter of lung function test, so the patient in the beginning had 85% predicted FEV_1 and after the program he had 92% predicted FEV_1. And the change of FEV_1 will have important change on the ACQ questionnaire results, (The ACQ last question '7' is to measure the FEV_1, so the change of the FEV_1 has direct effect on the ACQ score).And also change of the asthma control on the symptoms appearance during the daily activities. The baseline questionnaire score was 2.28 and from the first week the patient had some difficulties such as symptoms appeared during the nighttime and a little bit more than usual but after the patient was determined to complete the program his ACQ score kept getting better (Appendix 4, Appendix 5).

09 November 2015 SOAP NOTES 1
12:16:41

Drégely u. 6-8. 2/8.

Budapest
1097
Hungary

Home Phone#:
Work Phone#:

Last Visit: Oct-27-2015
Date of Visit: Oct-14-2015
Date of Birth: Mar-11-1986

Physician: 92. LABORATORY

Complaint:
Subjective:

Objective:
IgE NORMAL: 0-0.35 kU/l
Hazel:11,40
Black alder: 13,00
Elm:8,24
Willow: 5,78
Birch: > 100
Beech: 28.00
Walnut: 3.20
Oak: negative
Poplar mix: negative
Maple: negative
Grass mix 1(Dactylis glomerata,Meadow grass,
Ryegrass,Timothy,Tall fescue): 14.20
Grass mix 2 (Anthoxanthum odoratum,
Lolium perenne,Holcus lanatus, Rye): 10.80
Saltwort:10.30
Lambsquarters: 2.89
Solidago canadensis: 4.75
Ragweed: 89.50
Mugwort: 3.46
Daisy meadow: 6.88
Plantain: 6.76
Dandelion: 3.26
Sheep`s sorrel: 10.80
Guinea pig epidermis: negative
Rat epidermis: 1.81
Mouse epidermis:negative
Dog epidermis: 2.01
Cat epidermis: 1.10
Horse epidermis: negative
Cow epidermis: 0.64
Hamster epidermis: negative
Rabbit epidermis: negative
Poultry feather: negative
Mite pterony: 5.95
Mite farinae: 10.40
Dust: 1.96
Cockroach mix: negative

Appendix 3: Before treatment medical report from physician.

24 February 2016 **SOAP NOTES** 1
12:38:25

Drégely u. 6-8. 2/8.
Budapest
1097
Hungary

Home Phone#:
Work Phone#:

Physician:

Last Visit: Feb-23-2016
Date of Visit: Feb-23-2016
Date of Birth: Mar-11-1986

Complaint: asthma FU

Subjective:
Patient came back for follow up on his asthma.
He feels well since taking aerius, does not uses his inhalator on regular basis, does not need it for exercise,no night time attacks.
Only used ventolin for a few occasion when spent time with friends who were smoking around him.

meds: Arius 1x5 mg

Objective:

Assessment:
Spirometry done- normal result, no obstruction.
Continue taking antihistamin,review if unwell.

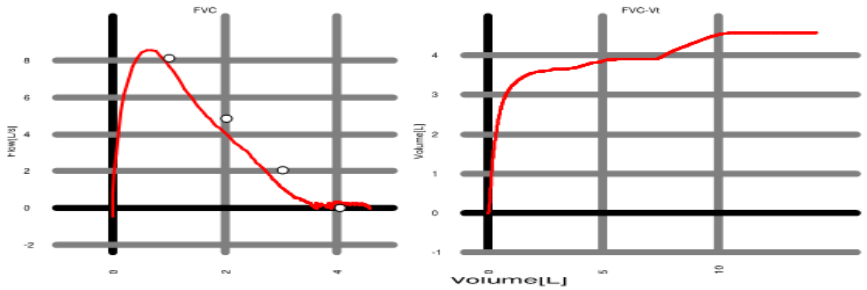
Blood Pressure: 114 **over** 68 **ICD9 :** J45-asthma
Pulse: 64
Temperature: 36.0 **'C** 96.8 **'F**
Height: **cm** **in**
Weight: **kg** **lbs**
BMI: **kg/m2**
Recommended Weight Loss: **kg** **lbs**

Problem : asthma stabile

Plan :

Medications :

Appendix 4: After treatment medical report from physician.



Param.	Unit	Predicted	%PRED	BEST
FEV1	L	3.40	92%	3.13
FVC	L	4.05	113%	4.58
FEV1%FVC	%	83.97	81%	68.34
PEF	L/s	8.75	98%	8.54
FET	s	0.00	0%	10.77
FEV3	L	0.00	0%	3.55
FEV3%FVC	%	0.00	0%	77.51
FEV05	L	0.00	0%	2.52
FEV075	L	0.00	0%	2.92
FEV075%FVC	%	0.00	0%	0.00
FEV6	L	0.00	0%	3.81
FEV1%FEV6	%	0.00	0%	82.15
FEF25	L/s	8.12	87%	7.06
FEF50	L/s	4.85	67%	3.23
FEF75	L/s	2.04	18%	0.36
MMEF2550	L/s	0.00	0%	4.58
MMEF2575	L/s	4.12	43%	1.76
PEFT	s	0.00	0%	0.07
FEV1%FIVC	%	83.97	0%	0.00
FIF25	L/s	0.00	0%	0.00
FIF50	L/s	0.00	0%	0.00
FIF75	L/s	0.00	0%	0.00
FIV1	L	3.40	0%	0.00
FIV1%FIVC	%	83.97	0%	0.00
FIVC	L	4.05	0%	0.00
PIF	L/s	8.75	5%	0.45
ELA	vear	30.00	173%	52.00
EOTV05	L	0.00	0%	0.02
EOTV1	L	0.00	0%	0.08
EV	L	0.00	0%	0.10
ZeroTime	s	0.00	0%	0.05

Appendix 5: After treatment lung functional (Spitometry) baseline test.

The first month ended with 2.14, which was a complete relief for the patient that he felt and saw the

progress. Yoga sessions and breathing exercises were introduced to help the patient's anxiety and the nighttime symptoms. And from the end of the third month the FEV_1 increased to 92% [Appendix 5]. And to improve the efficiency of the inspiratory muscles and the control of the symptoms from the severity variables frequent asthma attacks, IMT showed improvement from the baseline he the patient started with the intensity of 8 cm and improved to the final assessment 17 cm comfortably and several repetitions, which mean the inspiratory muscles, are more efficient and stronger than before the program. The chosen Interventions helped the patient symptoms, and the Buteyko technique introduced to teach the importance of the nasal breathing. The influence of the interventions on the ACQ score is seen on the changing on from the baseline and the final assessment which showed improve from 2.28 to 1.14 which considered as "grey area" that referred that the patient in the borderline of adequate control of asthma [22]. The patient showed improvement in the quality of life depending on the ACQ and this is due from the results of the intervention and also from also the patient big effort to complete the program and his effort to practice interventions in his private time at home (yoga exercises and breathing exercises and buteyko techniques).

Conclusion

The patient completed the program successfully and he showed improvements on both of parameter of the lung function test and the ACQ score. The goal of the research was to provide the patient with a better control of asthma. Well control asthma consist of minimal usage of the medications, which was achieved with the patient help and understanding. It is important to clarify the important of the rescue drugs. Well-controlled asthma also consists of less or no restriction of the daily activity, which was achieved with the help of the aerobic training. With the interventions effects the patient had fewer symptoms. The interventions chosen to the patient helped him control his symptoms. The aerobic training, swimming sessions (in non-chloride room temperature water), Buteyko technique, Yoga sessions, breathing exercises and IMT can improve the lung function test and the control of asthma.

The patient was motivated to complete the 12 weeks and the reasons for that were his hobby (swimming) and the better understanding of asthma and exercises as a solution not as trigger. I suggested to the patient to continue his aerobic training to keep the asthma controlled. And to help the patient motivation I suggested exploring all the sports for new hobbies in healthy environments. Asthma is a very common disease among all societies and the statics are increasing year by year, internationally as estimated 300 million patients suffer from asthma with annual 2500 deaths. Asthma is risk factors are genetics or environmental and the triggers of the asthma attacks could face the patient in daily routine and one of the factor is exercises which in the same time is a way to control asthma.

Patients with asthma suffer daily and my goal to prevent that with the help of the patient. The patient was diagnosed with mild asthma and his symptoms were coughing, wheezing, sleeping difficulties with chest tightness in the nighttime and these symptoms wakes him up, and anxiety. An allergy test was done to determine the triggers of the patient, which are ragweed, cold air, pet dander specially dogs and cats, tobacco smoke. The patent was asked to avoid all the triggers. And then I did program influenced on the patient hobbies to keep him motivated, which is 12 weeks program scientifically based interventions to improve his control of asthma. The patient was educated on asthma generally

and his condition specially and knowing the importance of the intervention. The patient was educated on the different of well-controlled asthma and poor-controlled asthma, so with tests and questionnaires we established that the patient suffer from poor-control asthma.

The patient had done lung function test and answered questionnaire to determine the baseline. The questionnaire that was used called Asthma Control questionnaires (ACQ). The interventions on the program were aerobic training twice a week, swimming once a week, inspiratory muscle strength once a week and breathing exercises and Yoga sessions on every second week. Buteyko technique was also introduced to the patient and asked to do it at home. The questionnaires were asked weekly as an assessment.

The results showed an improvement of the lung function parameter and asthma control questionnaires and the patient symptoms decreases starting with chest tightness on night time. The baseline FEV_1 was 85% and at the end of the 12^{th}week on the reassessment the FEV_1 improved to 92% (Appendix 5). The baseline score of the questionnaires was 2.28 and on the reassessment it improved to 1.14. The patient was motivated to the program and completed it with some difficulties in the beginning. The patient was suggested to find sports that fit him to continue his physical activity. The conclusion is asthma control and lung function parameter can be improved with the right interventions giving to the patient with the influence of his hobbits to keep him motivated through the whole program.

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