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CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

Health can be defined as the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person's mind, body and spirit, free from illness, injury or pain (as in “good health” or “healthy”). The World Health Organization (WHO) defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

1.2 HEALTH IN MODERN AGE

In this scientific era, the importance of health and healthy life secures absolute attention of humanity. Since the dawn of the industrial revolution, technology has advanced at an astounding rate. We have seen the transformation of a basically hard working, physically active, rural based society into a population of anxious and troubled city dwellers and sub – urbanites. Advancement in modern technology has enabled our present day society to exist in a world where the concept of hard work, even moderate physical work is obsolete and unfashionable. But in this troubled juncture also there is a growing area of knowledge that demonstrates that physical inactivity and the sedentary nature of our daily living habits are serious threat to the body causing serious medical problems.

These stresses and strains of daily life and the pollution is a significant risk factor for multiple health conditions including respiratory infections, heart disease, and lung cancer, according to the WHO. The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication use, increased doctor or emergency room visits, more hospital admissions and premature death. The human health effects of poor air quality are far reaching, but principally affect the body's respiratory system and the cardiovascular system.
India, there is a median prevalence of about 2.4 percent in adults of over 15 yr of age 7. The prevalence is higher in children. The total burden of asthma in India at an overall prevalence of 3 percent is estimated at over 30 million patients. The term asthma was applied in the past for all types of breathlessness, nowadays this term is used only to denote bronchial asthma. Asthma can be categorized according to etiological mechanisms involved and the severity of the disease.

The most dangerous gases are ozone, nitrogen dioxide, and sulfur dioxide. Both indoor and outdoor air pollution have caused approximately 3.3 million deaths in the worldwide. The World Health Organization states that 2.4 million people die every year due to attributable air pollution, 1.5 million of these deaths are attributable to indoor air pollution. Pollution created the respiratory disease.

Before the Second World War the people were not affected by the air pollution. They maintained physical fitness and overall health and wellness. They followed traditional habits and behaviors such as yogic practices and physical exercises. It is performed for various reasons including strengthening of muscles and the cardiovascular system, honing athletic skills, weight loss or maintenance, as well as for the purpose of enjoyment. Frequent and regular physical exercise and yogic practices boosts the immune system, and helps to prevent the "diseases of affluence" such as heart, cardiovascular disease, respiratory disease and obesity.

A rehabilitation program including regular physical exercises training and yogic practices is an important component in the management of asthma. Persons with asthma and healthy individuals need regular physical exercises training and yogic practices to maintain their level of health. All asthmatic persons, both active and inactive, should be made aware of the benefits of regular physical exercises training and yogic practices. Inactive asthmatic subjects should get advice and help in how to exercises more often and the training should be prescribed by the patient’s physician. The goal of the treatment of asthma is to help the individual to lead a normal life without restrictions.

Merely providing advice and information to persons, with asthma is not enough. They also need experience of regular physical exercises training. We consider that this rehabilitation program fulfils the criteria for useful and suitable rehabilitation of persons
with asthma and we have shown that the participants felt better and were motivated to continue regular physical exercises training and yogic practices.

Thus the researcher has taken the present study the effects of concurrent yogic practices and physical exercises training on health related physical fitness and pulmonary parameters among asthmatic patients.

1.3 ASTHMA

Bronchial asthma is defined as complex respiratory disease characterized by airways inflammation and hyper responsiveness of bronchial smooth muscles leading to reversible bronchospasm (Bellia and Augugliaro, 2007)

Bronchial asthma leads to impairment of ventilator function that results in deterioration in functional capacity and quality of life and this impairment is influenced by age, duration and severity of the disease. Asthma is a variable chronic disease of the respiratory system characterized by the constriction of the smaller bronchi and bronchioles (three to five millimeter diameter), increased bronchial secretions or mucus and mucosa swelling or inflammation, often in response to one or more triggers. Asthma is characterized by paroxysmal attacks of dyspnea, chest tightness, coughing and wheezing due to airway obstruction. Due to the high and ever-increasing incidence and cost of asthma, this disease has become a new so-called epidemic with approximately 150 million individuals diagnosed with asthma world-wide (Cibella et al., 2002)

Pulmonary function abnormalities can be grouped into two main categories: obstructive and restrictive defects. This grouping of defects is based on the fact that the routine spirogram measures two basic components – air flow and volume of air out of the lungs. Generally the idea is that if flow is impeded, the defect is obstructive and if volume is reduced, a restrictive defect may be the reason for the pulmonary disorder. The researcher was taken obstructive airflow defects.

1.3.1 RESTRICTED AIRFLOW

Restricted Airflow defects is a lung disorders always means a decrease in lung volumes. This term can be applied with confidence to patients whose total lung capacity has been measured and found to be significantly reduced. Total lung capacity is the
volume of air in the lungs when the patient has taken a full inspiration. You cannot measure TLC by spirometry because air remains in the lungs at the end of a maximal exhalation the residual volume or RV. The TLC is therefore the summation of FVC+ RV. There are a variety of restrictive disorders.

1.3.2 OBSTRUCTIVE AIRFLOW

The patency (dilatation or openness) is estimated by measuring the flow of air as the patient exhales as hard and as fast as possible. Flow through the tubular passageways of the lung can be reduced for a number of reasons:

Narrowing of the airways due to bronchial smooth muscle contraction as is the case in asthma. Narrowing of the airways due to inflammation and swelling of bronchial mucosa and the hypertrophy and hyperplasia of bronchial glands as is the case in bronchitis material inside the bronchial passageways physically obstructing the flow of air as is the case in excessive mucus plugging, inhalation of foreign objects or the presence of pushing and invasive tumors. Destruction of lung tissue with the loss of elasticity and hence the loss of the external support of the airways as is the case in emphysema.

The physicians used to determine the severity of disease normal PFT outcomes - >85% of predicted values, mild disease - > 65% but < 85% of predicted values, moderate disease - > 50% but < 65% of predicted values and severe disease - < 50% of predicted values.

1.3.3 EXTRINSIC ATOPIC ASTHMA

This category includes patients who have an inherited (genetic) liability to develop a group of allergic disorders, such as infantile eczema seasonal or perennial allergic cold (rhinitis ) and asthma precipitated by contact with environmental allergens such as pollen, dust, dander’s, fungal spores etcetera. They may exhibit all the three disorders (asthma, rhinitis, eczema) at the same time or one or the other at a particular time.

This inherited liability leads to the development of the antibody immunoglobulin E (IgE) in this IgE gets fixed to the target cells (mast cells or basophiles) of the
airways, nostrils or skin. Allergen stimulates the production of IgE specific to that particular allergen. Target cell on which the immunoglobulin is fixed is called a sensitized cell.

When further exposure to the same allergen occurs these allergens are trapped by the molecules of IgE fixed on the target cell. The allergen antibody reaction leads to the liberation of certain chemical materials from these cells, which produce, It occurs in the airways, contraction of bronchial smooth muscle and swelling of the inner lining (mucosa) resulting in obstruction to airflow and consequently, wheezing; if it occurs in the nostrils, it produces sneezing; nostrils blocks and colds and in the skin, itching, swelling etcetera.

The liability to produce IgE antibodies as a result of minor exposure to common environmental allergens has been estimated to affect about fifteen percent of the world population. This liability is called Atopy. The term extrinsic is used because there is a detectable external agent who precipitates attacks of asthma in these patients (Allan knight, 1981)

1.3.4 EXTRINSIC NON – ATOPIC ASTHMA

These patients develop asthma when exposed to chemicals, dust etcetera. They do not have atopy. But the antibody involved is Ig G (Immunoglobulin G). These people show allergy to a single allergen. This may occur at any age. Both categories (A and B) are also called allergic asthma (Allan knight, 1981).

1.3.5 IDIOPATHIC (intrinsic) ASTHMA

This type of asthma usually develops in later life after the age of forty. This is non-allergic. The attacks are usually difficult to control. The exact cause of this type of asthma is not known (Allan knight, 1981).

1.3.6 EXERCISE INDUCED ASTHMA (E.I.A)

These patients develop asthmatic attacks whenever they exercise. There are two main types of asthma. One is the kind which is triggered off by hyper sensitivity to some specific factor such as pollen or animal fur. This is allergic asthma. The other, which is not allergic, does not have any such easily recognizable trigger. Thus within the broad
spectrum of individual differences asthmatics may be hypersensitive to cigarette smoke, alcohol, changes in weather, changes in body temperature, air pollutants etcetera (Allan knight, 1981).

**1.4 RESPIRATORY SYSTEM**

The respiratory system of man has two portions namely the conducting portion and the respiratory portion. The conducting portion conducts air to the respiratory surface. It consists of nostrils cavity, larynx, trachea, the bronchi and the bronchioles. The respiratory portion is formed of the lung proper and its alveoli (Venkataraman PR, 1992).

**1.5 MECHANISM**

Respiration involves rhythmic inhalation and exhalation during which air moves into and out of the lungs. The thoracic cavity is an air tight chamber. It is bounded in front by the sternum, in the back by the vertebral column and at the sides by the ribs which are supported by external and internal inters – costal muscles. Floor of the thoracic cavity is demarcated by the muscular diaphragm which is dome shaped at rest and is attached to the lumbar vertebrae and ribs. Respiration is brought about the change in the volume of the thoracic cavity. When the thoracic cavity expands lungs also expand as the visceral parietal pleura cannot part with each other. The expansion of the lungs creates a fall in pressure inside the lungs and the atmospheric air rushes in. This is termed inspiration. The opposite changes take place during expiration. All these processes are controlled by medulla oblongata of the brain (Venkataraman PR, 1992).

**1.6 PULMONARY FUNCTION TESTS**

Pulmonary function tests were systematic way to interpretation. There was a systematic way to read the PFT. It is able to evaluate it in the presence of obstructive or restrictive disease. The doctor was followed this method of diagnosed the obstructed disease or restricted lung disease. Step one looked at the forced vital capacity (FVC) to see if it is within normal limits. Step two, looked at the forced expiratory volume in one second (FEV1) and determine if it is within normal limits. Step three, if both FVC and FEV1 are normal, and then do not have to go any further the patient has a normal PFT test. Step four; if FVC and /or FEV1 are low, then the presence of disease is highly likely.
Step five; if step four indicated that there is disease then need to go to the % predicted for FEV1 /FVC. If the % predicted for FEV1 /FVC is 88% -90% or higher, then the patient has restricted lung disease. If the % predicted for FEV1 /FVC is lower then the patient has an obstructed lung disease. If the FVC did not change, it suggests the FVC was possibly low due to restrictive diseases.

1.7 TRAINING

The work ‘Training’ has been a part of human language since ancient times. It denotes the process of preparation for some task. This process invariably extends to a number of days and even months and years. The term ‘Training’ is widely used in sports. Some experts especially belonging to sports medicine understand sports training as basically doing physical exercise. Training aims at improving the fitness of persons. Tudor O. Bompa (1994), Training is not a novelty or a recent discovery. It existed in both ancient Egypt and later in Greece where people were systematically trained for both military and Olympic endeavors. Today, through training, as in ancient times, the athlete prepares himself for a definite goal. In physiological terms, the goal is to improve the body’s systems and functions in order to optimize athletic performance. Training is led, organized and planned by a coach whose task is very complex since they deal with many physiological, psychological and sociological variables. Training is a systematic athletic activity of long duration, progressively and individually graded, aiming at modeling the human’s physiological and psychological functions to meet the demanding tasks.

1.7.1 PRINCIPLE OF TRAINING

The very purpose of the training program is an aid in the development of acceptable levels of health-and health related physical fitness and promote the acquisition of basic movement skills. To achieve these things, training should have some basic principles. Of these the most basic principle of training is overload. Most physiological systems can adapt various functional demands that would exceed these encounters in our normal daily life. Training often systematically exposes to selected physiologic systems to intensities of work or function that exceeds to those which the system is already adapted. To avoid excessive overload due to physiologic systems cannot adapt to stresses to extreme consistency refers to most physiologic systems require exposure to
overloading activities three times a week or more. The required frequency of training however depends on the season, the athlete, activity and the specific component of fitness. There is no substitute for consistency in a training programme. The athlete might participate in the endurance training six times a week and resistance training three times a week. Specificity means the effects of training are highly specific to the participation physiologic system overloaded, to the particular muscle groups used, and to the particular muscle fibers performing the work progression over a long period.

The athlete has to improve over several years of participation; the training program must progress so that the appropriate physiologic systems continue to be overloaded. However, too rapid an increase of the training stress may lead to exhaustion and impaired performance. Individuality means factors such as age, sex, maturity, current fitness level, and years of training, body size, somato type and psychological characteristics should be considered by the coach in designing each athlete’s training regime. In large groups in which absolute individualization of training programs may be impractical, the coach should strive for individualization by homogenously grouping athletes.

1.7.2 PHYSICAL EXERCISE

Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons including strengthening of muscles and the cardiovascular system, honing athletic skills, weight loss or maintenance, as well as for the purpose of enjoyment. Frequent and regular physical exercise boosts the immune system, and helps prevent the “diseases of affluence” such as heart, cardiovascular disease, diabetes, and respiratory disease.

1.7.3 PHYSICAL EXERCISES TRAINING FOR ASTHMA

A rehabilitation program including regular physical training is an important component in the management of asthma. Persons with asthma and healthy individuals need regular physical activity to maintain their level of health (Bannister R., 1972).

Currently there is conflicting evidence on the effectiveness of physical activity on asthma with some studies having demonstrated no improvements in asthma symptoms.
Probable reasons for these findings are that many studies report on unrelated asthma variables and/or a limited number of variables, lack in controlling for extraneous variables (i.e. disease severity, age, body composition, pharmacology, smoking status and/or stress). On the contrary, there are those studies that have demonstrated significant improvements in asthmatic symptoms following a period of exercise training stemming from exercise’s role in reducing minute ventilation (VE) at high workloads, by stabilizing the variability in expiratory airflow parameters and improve broncho constriction, dyspnea, airway resistance and airway sensitivity (Hass F et al., 1987).

Other general benefits from exercise training that improve asthmatic symptomology include increases in maximum heart rate (thus an increased oxygen pulse), improvements in anaerobic thresholds (thus an increase in metabolic levels), decreases in airway inflammation and an increased usage of the ventilator reserve. It also appears that exercise training has more physical, social, emotional and mental benefits than actual lung function benefits. This is since the sparse amount of studies done on asthmatic subjects that have specifically focused on spirometry changes following exercise management have mainly come from aerobic exercise programmes (Bugaard A., 1992).

All asthmatic persons, both active and inactive, should aware of the benefits of regular physical training. Inactive asthmatic subjects should get advice and help in how to exercise. They should be encouraged to exercise more often and the training should be prescribed by the patient’s physician (Garfinkel S., 1992).

The physical exercise training can increase physical endurance, maximal oxygen consumption, exercise efficiency and anaerobic threshold, decreasing ventilation at submaximal workloads and oxygen consumption and heart rate at submaximal workloads. Other potential benefits include, increased sense of well-being, clearance of secretions, hypoxic drive and left ventricular function. Atypical benefits could encompass increased survival rate, improved pulmonary function values (i.e. increased forced vital capacity (FVC), forced expiratory flow (FEF), forced residual capacity (FRC), forced expiratory volume in one second (FEV1), peak inspiratory flow (PIF) and decreased residual volume (RV)), increased arterial blood gas results and muscle oxygen extraction
and improve step desideration and decreased pulmonary arterial pressure. Merely providing advice and information to persons with asthma is not enough. They also need experience of regular physical training (Strunk, 1991).

1.7.4 AEROBIC EXERCISE TRAINING

Aerobic training has become the prominent mode of exercise treatment for asthmatics. This is probably justified since aerobic exercise training has been found to cause a decrease in ventilatory demand for a given workload, thus blunting the exercise-induced asthmatic response. Further, aerobic training can decrease airway sensitivity despite no change in airway reactivity and has been found to enhance exercise-induced bronchodilation (Haas F et al., 1987).

Aerobic training has also been found to reduce medication use and air trapping in the asthmatic individual, which effectively places the diaphragm in a more advantageous position mechanically. If the diaphragm is placed in a more advantageous position mechanically, an improved excursion of the diaphragm occurs and the diaphragm’s contractions will be less spasmodic which ultimately improves airway reserve, VC and alveolar gas exchange, all of which serve to improve inspiration (Goyeche JRM et al., 1980).

Aerobic training can induce a two to four times increase in oxidative capacity and maximal oxygen consumption (VO2max) in asthmatics over a period of four to eight weeks due to their diminished initial levels. As with non-asthmatics, this oxidative capacity increase is mainly due to the changes that occur in the length, number, tortuosity and diameter of the muscular capillaries and increases in the mitochondrial quantity and mitochondrial enzymes in not only the skeletal muscles but also the respiratory muscles (Crystal et al., 1997).

The other benefits which could be derived from aerobic training are decreased ventilation at submaximal workloads, decreased oxygen consumption at submaximal workloads and an increased clearance of secretions. Aerobic training have further been indicated in improving the pulmonary function by increasing FVC, FEV, forced expiratory flow at 25% (FEF-25), forced expiratory flow at 75% (FEF-75), maximal voluntary ventilation (MVV), VC, maximal voluntary ventilation (VEmax), tidal volume (VT) and VO2max (Ramazanoglu YM et al., 1985).
A problem with prescribing aerobic training is that it does not benefit all the asthmatics due to its variant influences. Even though research has focused mainly on aerobic exercise, the optimum mode, duration, time of sessions, intensity and frequency still elude researchers. Other problems that were identified are that the majority of research studies that might have illustrated positive changes in the asthmatic’s condition report on such an array of findings that do not necessarily demonstrate the impact on the total asthmatic’s condition and once findings are reported statistically, the reporting is unclear (Fitch et al., 1996).

1.7.5 CALLISTHENIC TRAINING

Calisthenics before exercise training resulted in maximal expiratory flow rate diminution. This diminution is significant in that it can act as a preventive method in the development of exercise induced asthma and as such allows the asthmatic to optimally benefit from training (Perez et al., 2003).

Calisthenics as part of their exercise prescription found improvements in asthma symptomology (Fitch et al., 1986).

1.7.6 RESISTANCE TRAINING

Inspiratory muscles trainer: - it is an inspiratory muscle trainer that helps to increase respiratory muscles strength and endurance through conditioning. This is similar to muscle conditioning used in weight training. It works by placing a specific constant resistance on respiratory muscles regardless of how quickly or slowly the patient breathes. This resistance is provided by aspiring loaded valve which exercises the respiratory muscles when inhalation occurred (Lima et al., 2008).

The goal is that the patient should be able to inhale with enough force to open the valve. He should know that he is taking up training correctly and using the proper force when the air is heard flowing through the device. Inspiratory Muscle Trainer device consisted of a portable handheld device through which patients would inspire only when they overcome the threshold of resistance of the device. Inspiratory muscle training appeared to consistently improve ventilatory muscle strength, endurance, and dyspnea (Deturk and Cahalin, 2004).
1.8 YOGA

Hoare (1984) stated that yoga was first summarized and systematized around the second century A.D by Patanjali and his yogasutra is still regarded as the classic work on the subject. Hence patanjali is known as the father of yoga. He discussed the nature of enlightenment, the means of attaining it, the obstacles and problems of practice and the way of overcoming them. He has formed a number of yoga sutras regarding yoga. Patanjali enumerates the means of yoga as the eight limbs or ashtanga yoga or stages of yoga for the quest of the soul.

1.8.1 BENEFITS OF YOGA IN EVERYDAY LIFE

Yoga helps to cure insomnia. Regular yoga practice leads to better and deeper sleep. Yoga helps to fight against fatigue and maintain energy throughout the day. It is an effective treatment for a variety of autoimmune diseases because it reduces the symptoms of these diseases such as stiffness, malaise, fatigue, and weakness. Yoga is a science that has been practiced for thousands of years. It consists of Ancient Theories, observations and principles about the mind and body connection which is now being proven by modern medicine. Substantial research has been conducted to look at the Health Benefits of Yoga-from the Yoga Postures (Asanas), Yoga Breathing (Pranayama), and Meditation (Nirmala N et al., 2004).

1.8.2 ASANAS

Netz and Lidor (2003) Yoga is an ancient Indian philosophy based on diverse breathing, stretching, and meditation exercises. The "physical" part of Yoga (Hatha) consists of several stretching and strength-building exercises of varying degree of difficulty called asanas. In complementary alternative medicine, Hatha Yoga (HY) has proved to reduce stress and pain (muscle and systemic).

Yoga Sutra defines asana as that which is comfortable and easy, as well as firm. It is a dynamic position, in which the practitioner is perfectly poised between activity and non-activity, being doing and "being done by" the posture. A corresponding mental balance exists between movement and stillness. Yoga teaches that each posture reflects a mental attitude, whether that attitude be one of surrender, as in a forward bending asana,
or the strengthening of the will, through backward bending postures, or the creation of a physical prayer or meditation with the body, as in the practice of Padmasana (Lotus Posture). A posture or asana can be used for rejuvenating specific organs and glands as well as the spine.

The practice of asana (yogic postures) muscle strength and flexibility, which facilitates diaphragmatic breathing. Similarly, relaxation and meditation help with diaphragmatic breathing by releasing physical and emotional tension. The asana invigorate and regulate the working of muscles; viscera; glands; and vascular, nervous, and lymphatic systems. 1. Yoga promotes postures to facilitate lung expansion. 2. Yoga breathing techniques help to calm anxiety and facilitate muscle relaxation. 3. Meditation is believed to improve oxygen use. 4. sarvangasana – shoulder stand, which achieves the head – low posture for increasing the range of diaphragmatic movement and for pulmonary drainage 5. Savasana which achieves total body relaxation. 6. dhanurasana 7. Matyasana, 8. Salbhasana, 9. Janu sirsasana. 10. Sirsasana theses asana help control the asthma disease and other disease (Nirmala N et al., 2004).

1.8.3 PRINCIPLES OF ASANAS

The inverted postures such as the headstand, shoulder stand and the reverse posture take advantage of gravity to increase the flow of blood to the desired part of the body; in the headstand to the brain, in the shoulder stand to the thyroid gland and in the reverse posture to the gonads (sex glands). The position of the asana causes a squeezing action on a specific organ or gland, resulting in the stimulation of that part of the body. This causes an increase in blood supply to the muscles and ligaments as well as relaxing them. It also takes pressure off nerves in the area. This stretching is involved in all the asanas, since it has such a beneficial effect on the body. While holding the yoga posture we breathe slowly and deeply, moving the abdomen only (abdominal or low breathing). This increases the oxygen and prana supply to the target organ or gland, thereby enhancing the effect of the asana. As well as breathing slowly and deeply, we also focus our attention on the target organ or gland. This brings the mind into play, and greatly increases the circulation and prana supply to the organ or gland.
Yoga improves strength and flexibility, and may help control such physiological variables as blood pressure, respiration and heart rate, and metabolic rate to improve overall exercise capacity. Yoga’s stretching and breathing exercises improve our flexibility, helping joints, tendons, and muscles stay limber. People suffering from osteoarthritis or rheumatoid arthritis will see a noticeable improvement in their stiffness, pain, and other arthritic symptoms by practicing yoga poses and postures. It relieves chronic back and neck pain, since the poses and postures gently stretch and strengthen the back and neck muscles. Yoga is often prescribed to help heal various injuries, including repetitive strain injuries, knee and back injuries and pulled hamstrings. It is an excellent weight-bearing exercise that can improve bone density and it helps ward off osteoporosis, or thinning of the bone (Raub JA., 2002).

The finding of Muralidhara and Ranganathan (1982), that yoga training improves physical efficiency as indicated by significant increase in cardiac recovery. The gentler forms of yoga lower our blood pressure because the asanas (yoga poses, postures, and yoga positions keep blood flowing evenly throughout body while focus on breathing. People suffering from hypertension can benefit from yoga tremendously, as hatha yoga can lower the heart rate and blood pressure. Many practitioners claim that yoga has also lowered their cholesterol. Power yoga is an excellent form of cardio conditioning, which strengthens core muscles while it keeps blood and oxygen circulating throughout body.

Asanas exercises have proved significantly effective in Improving. Lungs capacity, reaction time. Pulse rate blood pressure. Savasana, sarvangasana and pranayama have proved to be the best for removal of Stress and tension Yoga reduces anxiety and stress, resulting in better health, better mood, and better concentration throughout the day. Yoga has been used to help heal victims of torture or other trauma (Rakesh Dubey and Alka Nayak, 2003).

Yoga reduces tension, headaches and migraines because yoga circulates blood and oxygen to head, which prevent headaches from starting. A regular yoga practice helps boost antioxidants throughout our body, resulting in a stronger immune system and improved ability to heal quickly from disease or injury. It helps to lose weight and maintain a healthy weight throughout our life. Power yoga is a vigorous form of yoga that burns calories, resulting in weight loss (Khanam AA et al., 1996).
1.8.4 YOGIC PRACTICES FOR ASTHMA

Yogic practices are a preferred method of practice in older adults and the active or fitness-based yoga that emphasizes cardiovascular fitness, resistance training, flexibility and relaxation is an effective treatment for asthmatics. The yogic techniques benefits asthmatics by reducing psychological over activity and emotional instability and thereby reducing efferent discharge while decreasing vagal outflow to the lung which causes bronchodilator and a small decrease in bronchial reactivity. Yoga also increases endogenous corticosteroid release, possibly decreasing bronchial reactivity (Nagenthra and Nagarathna, 1985).

Breathing exercises have been found to decrease anxiety during an asthma attack and also prevent the onset of an attack. Breathing exercises have resulted in clinical improvements which translated into improved exercise tolerance, asthma control and self-confidence. Improvements have also been observed in breathing capacity. The combination of physical conditioning and breathing exercises can improve Vital Capacity reduce the severity of asthma attacks and the need for symptomatic medication. Up to twelve weeks of breathing exercises can result in improved pulmonary function, decreased absenteeism and improved sociability, self-assertion and peer relationships. Subjectively, the subjects reported an improvement in their control of asthma, exercise tolerance and emotional stability (Sly et al., 2009).

1.8.5 BREATHING EXERCISE

Diaphragmatic breathing exercises could benefit an asthmatic’s condition since they compress the abdominal contents which increase intra-abdominal pressure that causes lateral transmission of pressure to the lower ribs laterally, upward and outward motion of the lower ribs and anterior/posterior motion of the upper ribs. This results in an increase in thoracic volume that decreases intrathoracic pressure which facilitates inspiration (Cahalin LP et al., 2002).

Breathing training is essential to an asthmatic since, breathing in an asthmatic is of the thoracic type and since dyspnea can cause the asthmatic to increase inspiration
further leading to further overextension of the already over-inflated lungs. This is then worsened by the increased dead-space ventilation, metabolic requirements and a tendency to maintain a low arterial partial pressure of oxygen.

Asthmatics can have a decreased chest expansion and chest deformity as a result of a shortened diaphragm, intercostals and accessory muscles from prolonged spasm. With asthma, the accessory respiratory muscles are fully contracted and the diaphragm is maximally depressed. The accessory muscles are overactive during inspiration which causes stenosis of the major airways leading to an abnormal respiratory pattern. During an asthma attack, the diaphragm is maximally extended and either contracts spasmodically or not at all. This poor excursion of the diaphragm negatively affect airway reserve, vital capacity (VC) and alveolar gas exchange.

The physiological effects of diaphragmatic breathing are varied and it is claimed that diaphragmatic breathing corrects abdominal chest wall motion, decrease the work of breathing and dyspnea and improve ventilation distribution. The purpose of breathing exercises is to empty the lungs by prolonging the expiratory phase, retrain normal breathing patterns, and increase expansible forces in hypo ventilated areas, increase lung volume, dilate airways, force mucus into larger airways, re-educate the autonomic diaphragmatic movements, reduce the thoracic type breathing, relax spasmodic muscle contractions, mobilize the ribs and chest wall and correct kyphosis (Goyeche et al., 1980).

These benefits are achieved by shortening inspiration and lengthening expiration, by performing expiration via the pulling in of the abdominal muscles dorsally towards the spine while relaxing the abdominal, intercostals and neck musculature. This is achieved by using special weights or belts to increase intra-abdominal pressure, by applying compression to the lower ribs to facilitate expiratory ascent of the diaphragm during expiration which can increase the movement of secretions from the small bronchi into the respiratory passages, by exhaling through a resistive breathing device or by breathing while creating a hissing noise in order to reduce bronchial constriction. These techniques have led to symptom-free and medication-free asthma, an improved ability to halt an imminent attack, improved loosening and expulsion of mucus, enlargement of the diaphragm excursion, improved chest expansion at the epigastria, improved maximum breathing capacity and VC (Cahalin et al., 2002).
Patients with elevated respiratory rates, low tidal volumes and abnormal arterial blood gases have been identified as those who will benefit the most from diaphragmatic breathing exercises. Diaphragmatic breathing exercises have also been proven to reduce patients’ anxiety levels and to alter their attitude towards work while breathing training has been shown to decrease bronchodilator use and acute exacerbations and to improve quality of life (Holloway, 2004).

Additional benefits of breathing exercises are to correct deviant posture, strengthen abdominal muscles, teach diaphragmatic and lower costal breathing and increase chest expansion. The breathing exercises have been found to increase FEV1, VC and to reduce RV. Significantly indicated that breathing exercises decreases the work of breathing, improve ventilation, and decrease oxygen consumption and decrease psychological anxiety (Fluge et al., 2006).

1.8.6 PRANAYAMA

Pranayama is an essential part of yoga postures. It is the science of breath. Prana means “breath, life, vitality, wind, and energy, Ayama means length, Expansion stretching or restraint”. There are several techniques of pranayama. One of the optimal breathing patterns is diaphragmatic – deep, smooth, even quiet, free of pauses, involving exhalation and inhalation. In yogic tradition, voluntary control of breathing has long been used to foster self awareness and reduce autonomic reactivity. The diaphragm is the primary muscle of respiration, and when the diaphragm contracts and its dome descends, pressure within the thorax falls enough to draw air into the lungs, simultaneously altering the shape of the abdomen and the rib cage, causing the anterior abdominal wall, the sides, and the lower back to expand. By regular practice, misuse of accessory muscles is eliminated. Examples of pranayama are as follows:

Kapala bhati is a fast, rhythmic breathing using abdominal muscles. Kapala means “brain,” and bhati means “shine.” Kapala bhati flushes out stale residual air in the lungs, and with a fresh air supply, ventilation is increased, and elasticity of the diaphragm is increased. Ujjayi is a slow, rhythmic breathing (3-4 times/min), with retention of breath in each cycle. Ujjayi increases pulmonary function and helps to establish a natural rhythm of the breath. Bhastrika is a Sanskrit word which means bellows. In Bhastrika

Anuloma Viloma (Alternate Nostril breathing) or Nadi Shodhan (Without Retention or Kumbhaka) At any time, we only breath through one nostril, left nostril is active for about 90 minutes, and after that it changes to right nostril and it remains active for another 90 minutes. This is a healthy pattern. But due to imbalances in physical and mental energies, the rhythm is imbalanced. Yoga says that left nostril is IDA Nadi which represents mental energy and mind, and right nostril is Pingala Nadi, which represents physical energy and body. If there is imbalance between Ida and Pingala then body and mind are imbalanced.

The purpose of the alternate nostril breathing is to balance these 2 forces, the mental energy and physical energy, to bring harmony between Body and Mind. Beginners can start with deep breathing practice in sitting position (Padmasana - Lotus, Swastikasana- Auspicious, Vajrasana - Thunderbolt, Any Cross legged position in which the body can be relaxed and spine is erect.) 1. Anuloma Viloma cleanses and strengthens the lungs and entire respiratory system.2.During retention; there is the highest rate of gaseous exchange in the lungs. Because of the increase in the pressure, more oxygen goes from the lungs into the blood and more CO2 (and other waste products) pass from the blood into the lungs for elimination during exhalation.3.As exhalation is twice the time of inhalation, stale air and waste products are drained from the lungs. Anuloma Viloma helps to calm the mind, making it lucid and steady..It makes the body light and the eyes shiny (Ranjini Kumaran, 1993).

1.9 NEED FOR THE STUDY

Although Yogic practices and physical exercises training have been shown to increase improved variables, little scientific information is available to determine if yogic practices and physical exercises training programs actually enhance health related physical fitness and pulmonary function of asthmatic patients, and to determine among the yogic practices and physical exercises training programmes which one is the best to increase improvements variables of asthmatic patients.
To our knowledge, no recent authors have compared yogic practices and physical exercise training on health related physical fitness and pulmonary parameters of asthmatic patients. Thus, given the lack of literature on the effects of yogic practices, physical exercises and concurrent training in asthma. The aims of this study were to understand how asthmatic patients respond to yogic practice, physical exercise and to concurrent training routine and to determine the changes induced by this kind of training on health related physical fitness components and pulmonary parameters of asthmatic patients.

1.10 STATEMENT OF PROBLEM

The main purpose of this study was to find out the effects of yogic practices alone physical exercises training alone and combination of yogic practices and physical exercises training on health related physical fitness components and pulmonary parameters among moderate asthmatic patients.

1.11 OBJECTIVES OF THE STUDY

To find out whether the yogic practices improve the health related physical fitness components among moderate asthmatic patients.

To find out whether the yogic practices improve the pulmonary parameters among moderate asthmatic patients.

To find out whether the physical exercises training improve the health related physical fitness components among moderate asthmatic patients.

To find out whether the physical exercises training improve the pulmonary parameters among moderate asthmatic patients.

To find out whether the combination of yogic practices and physical exercises training improve the health related physical fitness components among moderate asthmatic patients.

To find out whether the combination of yogic practices and physical exercises training improve the pulmonary parameters among moderate asthmatic patients.
To compare the effect of yogic practices, physical exercises training and combination of yogic practices and physical exercises training on health related physical fitness components among moderate asthmatic patients.

To compare the effect of yogic practices, physical exercises training and combination of yogic practices and physical exercises training on pulmonary parameters among moderate asthmatic patients

1.12 HYPOTHESES

The following hypotheses were formulated in the present study:

It was hypothesized that yogic practices would provide significant improvements in the health related physical fitness components and pulmonary parameters among moderate asthmatic patients.

It was hypothesized that practice of Physical exercise training would significantly improve the selected health related physical fitness and pulmonary parameters among moderate asthmatic patients

It was hypothesized that the practice of concurrent yogic practices and physical exercises would significantly improve the selected health related physical fitness and pulmonary parameters among moderate asthmatic patients.

It was hypothesized that Concurrent training would significantly improve the selected health related physical fitness and pulmonary parameters better than Yogic practices and Physical exercise among moderate asthmatic patients.

It was hypothesized that Yogic practices would significantly improve the selected health related physical fitness and pulmonary parameters better than Physical exercises among moderate asthmatic patients.

It was hypothesized that concurrent, yogic practices and physical exercises would significantly improve the selected health related physical fitness and pulmonary parameters better than control group among asthmatic patients.
1.13 DELIMITATION

The study was delimited to the following aspects:

The study was delimited to 60 moderate asthmatic patients.

The subjects were assigned at random to one of the three groups, in which the Group I (n=15; YP), Group II (n=15; PET), Group III (n=15; CYPPET) and the Group IV was (n=15; CG).

The age of the selected male moderate asthmatic patients ranged from 25-50 years.

The study was delimited to the health related physical fitness components like muscular strength and endurance, flexibility, cardio respiratory endurance, percent body fat, pulmonary parameters, forced vital capacity, forced expiratory volume in one second and forced expiratory volume in one second / forced vital capacity

The training period was delimited to 12 the weeks.

1.14 LIMITATIONS

The study was limited to the following aspects:

Certain factors like life style, daily routine work, and other factors which may have an effect on the results of the study were not taken into consideration.

The difference in socio – economic status and educational back ground of the asthma patients were not taken into consideration.

The heredity of the subjects and its influence on the selected criterion variables were not taken into consideration.

The subjects’ previous experience in physical exercises activities and yogic practices were not taken into consideration.

1.15 SIGNIFICANCE OF THE STUDY

The significance of the study was as follows.

The research would add to the quantum of knowledge in the area of the yogic practices and physical exercises training.
The research results permit us to draw satisfactory conclusion regarding Health related physical fitness components and cardio pulmonary parameters.

The research would be great importance, if it proves to be beneficial. And it would provide opportunities for the common man to design new training programmes.

The research would reveal that extend to which the yogic practice and physical exercise training would influence beneficial effects on the selected variables, in the light which that necessary attention can be given to those

This study would be useful to increase lung capacity and helps to establish a natural rhythm of breathing.

This study would be performed synchronized with rhythmic breathing, which helps to concentrate on the movements.

This study would be useful for the development of muscle strength and flexibility, which facilitates diaphragmatic breathing. Similarly, relaxation and meditation help with diaphragmatic breathing by physical and emotional tension.

### 1.16 DEFINITIONS OF RELATED TERMS

**Health Related Fitness**

Health related fitness concerns with the development of qualities necessary to function efficiently and maintain a healthy lifestyle; cardio respiratory endurance, muscular strength, flexibility and body composition contribute the components of health related fitness. (Bill Tancred)

**Physical Exercise**

Adolphe defines “Exercise is any bodily exertion for the sake of keeping the organs and their functions in a healthy state”.

**Yogic practice**

Gore (1985) explains, “Yogic practices are generally looked up as exercise and many time interpreted in the light of exercise physiology. The physiology of yogic practices differs greatly from that of exercise physiology. The nature of every yogic practice is psycho physiological.”
Muscular Strength and Endurance

Endurance is the ability of the person to perform movement of moderate (Sub-maximum) contractions over prolonged period of time under conditions of fatigue or tiredness. It is the product of all psychic and physical energy of human body.

Flexibility

The degree of range of movement at specific joints and in total body movement.

(Barrow Harold)ER

Percent Body Fat

The amount of body fat a soldier has in comparison to his total body mass.

Cardio Vascular Endurance

Cardio vascular endurance is defined as the ability to continue or persist in strenuous task involving large muscle group for longer period of time.

Forced Vital Capacity

The amount of air which can be forcibly exhaled from the lungs after taking the deepest breath possible.

Forced expiratory volume in one second

The amount of air which can be forcibly exhaled from the lungs in the first second of a forced exhalation.

FEV 1 /FVC

The ratio of FEV1 to FVC and tells the clinician what percentage of the total amount of air is exhaled from the lungs during the first second of forced exhalation.