Effectiveness of Breathing Retraining in Asthmatics

DIPLOMA THESIS

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Physiotherapy 5th year

Supervisor of Diploma thesis

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ABSTRACT

Name: Effectiveness of Breathing Retraining in Asthmatics

Objectives: To assess the evidence for the efficacy of breathing retraining in the treatment of patients with asthma and to form and present a well-founded system of breathing and compensatory exercises with the utilization of expert literature and own knowledge.

Methods: to fulfill the mentioned goal, I proceeded following tasks:

1. studying literature from different databases
2. looking in the books for the basic information about asthma
3. searching the web for the prevalence of asthma in different countries and in the world
4. analyzing the expertise of foreign countries
5. arranging a variety of correct exercises

Results: Due to the small number of studies meeting the criteria for inclusion into this review, the small number of patients in the studies and the use of diverse interventions in the included studies, no reliable conclusions can be drawn as to the beneficial effects of breathing retraining in asthma. However with the introduction of two further studies trends for improvement in an increased number of outcomes were found. There is therefore a need for large scale trials involving breathing retraining in order to observe its effectiveness in the treatment and management of asthma.

Conclusions: Comparisons and conclusions were difficult to evaluate as treatment interventions and outcome measurements from the trials varied considerably. At present therefore no reliable conclusions can be drawn concerning the use of breathing exercises for asthma in clinical practice. However trends for improvement, notably in quality of life measurements, are encouraging and further studies including full descriptions of treatment methods and outcome measurements are required.

Herewith I declare that I worked on this thesis on my own and independently and used the list of literature as the sources of information which will be found attached.

Homa Abass

I dedicate my diploma thesis to my beloved aunt who died from lung cancer and to those people of Afghanistan who know very little knowledge about their asthma. I hope to help them with this piece of

ACKNOWLEDGEMENT

My heartfelt and deep gratitude goes firstly to my supervisor Doc. Pavel Strnad who patiently guided, encouraged and supported me throughout my whole suffering to write the diploma thesis. I would also like to thank Mgr. Miroslava Jalovcová for the very useful advices, last year how to search in the databases and this year how to design my thesis.

My special thanks also go to Doc. MUDr. František Véle, CSc. who accepted me in the last minute to read my thesis and give me lots of essential advises.

PREFACE

EFFECTIVENISS OF BREATHING RETRAINING IN ASTHMATICS

INTRODUCTION

I, myself am an asthmatic person who rarely took care of the problem. I had never thought I would have asthma; with every attack I had, I thought I have bronchitis. After a year of being often abroad and having repeated 'bronchitis" and recovering from it by returning home, I visited my GP and it was diagnosed as allergic asthma. I received some corticoids and Short-acting β2-agonists, which were helpful to a certain extent but not permanent. Then I used only the short acting β2-agonists whenever I wheezed.

I started to take my problem seriously when my aunt with lung cancer passed away and I realized that the lungs are one of the most important components and 'bricks' of vital organs. It gave me satisfaction when I chose this topic for I knew, I will be taking it very seriously and give my best to find the right sources and above all the appropriate therapy. This way I will use this knowledge and help myself, the people in need especially in Afghanistan.

Asthma is the most common chronic disease in children that accompanies them in the majority of cases throughout their whole life.

The reason for exacerbation of asthma, I think, is that not every one takes it seriously and mostly they suppress it with a medication, whereas there exist natural methods such as breathing exercises, physiotherapies and normal light tutorials which can improve the vital capacity and breathing pattern accordingly.

Exercise and Physiotherapy containing breathing methods are the regular accessories in the management of asthma next to the pharmacological treatments. Exercise and breathing methods involve the prescription on muscular contraction and bodily movement to improve the overall function of the individuals especially who suffer from asthma and are in need of better breathing.

The objective of this thesis is to study the impact of different breathing exercise therapies on patients with asthma, with a survey whether these exercises improve asthma.

Goal of the diploma work

In the first part of my work here, I will review various literatures about the prevalence of asthma, its history, factors, diagnosis, clinical picture, and treatment of it medicamentous and introduce different breathing method from expertise.

I chose the second part more 'practical' for my own use with three different breathing methods, some of them with pictures, with the thoughts to be able to use them for the people of Afghanistan.

The objective of this thesis is to evaluate the evidence that quality improvement (QI) strategies can improve the processes and outcomes of outpatient care for children and adults with asthma

Hypothesis

- dysfunctional breathing, is it identifiable and correctable
- Buteyko breathing method manages the reduction of medicine intake
- Yoga breathing is increasing the vital capacity
- Alexander technique leads to enhance respiratory muscular function

LIST OF ABBREVIATIONS

AAAAI : the American Academy of Allergy, Asthma and Immunology

AQLQ: Asthma Quality of Life Questionnaire

AT: Alexander Technique

BRFSS: Behavioral Risk Factor Surveillance System

FA: fatal asthma

FEV_1: forced expiration in one second

FEV%: percentage of FEV1 from FVC

FVC: forced vital capacity

HADS: Hospital Anxiety and Depression Scale

ISAAC: International Study of Asthma and Allergy in Childhood

MEP: maximal expiratory pressure

MIP: maximal inspiratory pressure

MVV: maximal voluntary ventilation

NAEPP: National Asthma Education and Prevention Program

NFA: near fatal asthma

NHIS: National Health Interview Survey

PEF: peak expiratory flow, spirometry

QOL: quality of life

VC: vital capacity

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1.1.1 INTRODUCTION INTO THE PROBLEMATIC

Asthma is defined as intermittent, variable, and reversible airways obstruction with a complex multidimensional etiology. It is a chronic disorder of the airways characterized by variety of recurring symptoms such as airflow obstruction, bronchial hyperresponsiveness resulting in inflammation. The interaction of these characteristics of the Symptoms determines the clinical form of appearance and severity of airway obstruction (Lemanske 2001).

Asthma is characterized by paroxysmal or persistent symptoms, such as dyspnea, chest tightness, wheezing, sputum production and cough associated with variable airflow limitation and airway hyperresponsiveness to endogenous or exogenous stimuli (Allan Becker et al 2002). It is caused by continual airway inflammation punctuated by episodes or attacks of increased inflammation often in response to specific triggers (American Lung association, Nov. 2007). Inflammation and its resultant effects on airway structure are considered the main mechanisms leading to the development and persistence of asthma (Allan Becker et al 2003).

Mast cells, lymphocytes and eosinophils all trigger inflammation in response to something the body perceives as a threat, such as allergens or irritants. Histamine and leukotriene are chemicals released by the mast cells during an allergic reaction. (*Cliff Bassett, 2007)*

Asthma is one of the most common chronic diseases of childhood, affecting more than 6 million children (National Health Interview Survey, 2005).

The prevalence of asthma in children and adolescents is estimated to be as high as 24.6% for children of age group 6 to 7 years and 29.4% for the 13-14 years age group in Australia (ISAAC, 1998; Robertson et al, 1998), 18.7% in New Zealand (Mitchell & Asher, 1994), 15.9% in England (Strachan et al, 1994). The prevalence was found to be much lower in Switzerland at 7% (Robertson, 1993),

The prevalence of asthma varies throughout the world, ranging from less then 1% in some developing countries to 25% in some developed countries (Robertson, 1995).

In the United States, asthma affects more than 22 million persons (National Health Interview Survey, 2005). Another study claim: Based on the 2006 NHIS sample, it was estimated that 34.1 million Americans, or 116.2 per 1,000 persons, had been diagnosed with asthma by a health professional within their lifetime. Between 1999 and 2006, children 5-17 years of age have had the highest prevalence rates. In 2006, 8.4 million children ages 5-17 had been diagnosed with asthma in their lifetime (Survey Raw Data, 1997-2006).

The International Study of Asthma and Allergy in Childhood (ISAAC, 1998) in their worldwide study found the highest prevalence of asthma in United Kingdom, Australia, New Zealand, and Ireland followed by USA and the lowest prevalence in some Eastern European countries, Indonesia, Greece, China, Taiwan, Uzbekistan, India and Ethiopia (ISAAC, 1998).

According to the American Academy of Allergy, Asthma and Immunology, the number of Americans with asthma cases has increased in recent years; more than 20 million people of all ages reporting having asthma, (Cliff Bassett, AAAAI, 2007). Greater numbers of children now have asthma than in the past, on one hand, poor children in urban environments have been hit particularly hard. On the other hand, Americans over age 65 make up the nation's largest group of asthmatics. Though theories for the increase abound, none has yet been proved conclusively (Kathleen A. Sheerin, June 2007).

Asthma attacks can be fatal when breathing becomes very difficult and low blood oxygen levels occur; according to the American Academy of Allergy, Asthma and Immunology about 5,000 deaths each year are attributed to asthma (AAAAI, 2005).

With the release of the first National Asthma Education and Prevention Program (NAEPP) in 1991, there was positive News concerning the number of deaths due to asthma. It showed the number has declined, even though the prevalence of the disease was increasing (NHIS 2005)

Key points: DEFINITION, PREVALENCE OF ASTHMA, DEVELOPING COUNTRIES, TRIGGER, SEVERITY, APPEARANCE, ATTACKS, MORBIDITY DECREASE

1.1.2 HISTORY OF ASTHMA

The actual term asthma is a Greek word that is derived from the verb aazein, meaning to exhale with open mouth, to pant. First written record of the word asthma appears about 2700 years ago (Dindorf G, 1906, 1908).

The expression asthma appeared for the first time in the Iliad, with the meaning of a short-drawn breath, but the earliest text where the word is found as a medical term is the Corpus Hippocraticum. However it is difficult to determine whether in referring to "asthma," Hippocrates and his school (460-360 B.C.) meant an autonomous clinical entity or simply a symptom. Examining the Hippocratic ideas about asthma, it should be kept in mind as Neuburger has pointed out, that the various types of disease recognized in Hippocratic pathology do not always correspond to the nosological entities differentiated by modern etiological and anatomical methods. This is due to the fact that the ancients based their classification on the most salient symptoms, whereby many heterogeneous diseases were grouped together into the same class (Neuburger M. 1910-1925).

The best clinical description of asthma in later antiquity is offered by the master clinician, Aretaeus of Cappadocia (1st century A.D.). The numerous mentions of "asthma" in the extensive writings of Galen appear to be in general agreement with the Hippocratic texts and to some extent with the statements of Aretaeus. Galen distinguished asthma from dyspnea clearly on several occasions. He certainly thought of asthma as a kind of dyspnea, but much more severe and more striking. Galen defined dyspnea as a disturbance both in inhalation and exhalation (Kuhn XIX 420), which was due to a thickening of the "pneuma" (Kuhn VII 957).

1.1.2.1 The natural history of childhood asthma

The transient wheezers were a big group of the patients, but when they were in grade school, they no longer wheezed. These were children born with airways a little bit smaller than their peers and they wheezed with lower respiratory infections. If one starts with small airways, it does not take much edema to induce a significant increase in airways resistance (Dr. Spahn 2004). Children were also blamed for causing their own asthma as an "attention-seeking" or "control" device.

At that time, an asthma attack was, frequently, a life and death situation (Babette Smith, 2003).

Babette Smith (2003) also declared the cure of asthma as not yet to be found, but the illness can be managed well. She said: "People with asthma no longer need to endure the coughing, wheezing, breathlessness and tightness of the chest. These debilitating symptoms can all be treated. The greatest risk remains the tendency of people with asthma to underestimate their condition and misuse their medication".

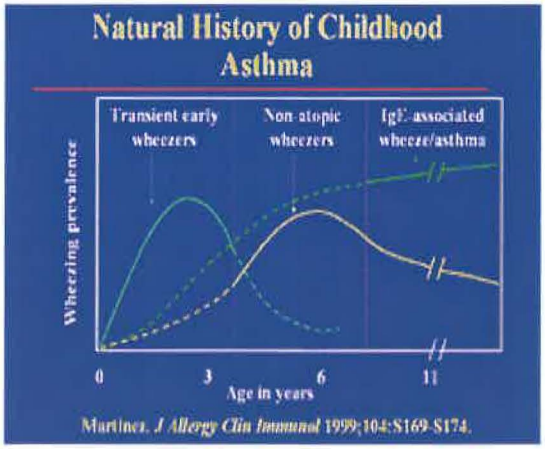


fig.1: wheezing prevalence in growing age

Key Points: AAZEIN, CORPUS HIPPOCRATICUM, ARETAEUS OF CAPPADOCIA, WHEEZERS, LOW RESPIRATORY INFECTIONS, AIRWAY RESISTANCE.

1.1.3 CLINICAL PICTURE OF ASTHMA

There are many different symptoms and signs which gives the right picture of asthma patient

- Prolonged cough ... a cough, which lasts more than 4-8 weeks, is called prolonged. A prolonged respiratory infection, e.g. sinusitis and early asthma are common causes of prolonged cough (Ball C. 1999, page 190),
- Dyspnoea, especially when it lasts from few hours to one day, but also when it develops over weeks or months means exacerbation of asthma
- Wheeze
- Chest pain
- Diurnal variation between the morning and evening (Tara Hun-Dorris,2007)
- Varying triggers that may cause many of these symptoms

- Hyperventilation which means increased alveolar ventilation causing a decrease in arterial blood pCO2 (Ball C. 1999).
- Exacerbations
- Frequency of rescue medication use (short acting beta agonists), a key feature of asthma (Erwin W. Gelfand, MD, 2007)

And the biological indicators of asthma are:

- Bronchiolar obstruction
- Airway smooth muscle bronchoconstriction
- Airway inflammation (eosinophilic)
- Bronchial hyperresponsiveness
- Airway remodeling (Erwin W. Gelfand, MD, 2007)

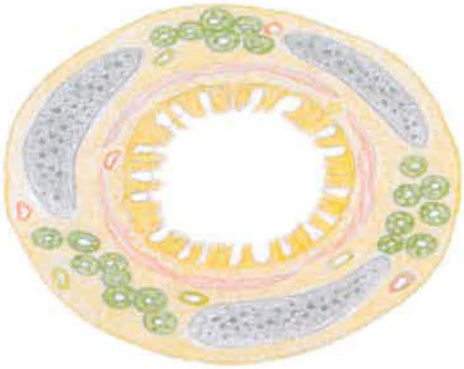
Key points: CLINICAL PICTURE, DIURNAL VARIATION, VARYING TRIGGERS, ARTERIAL BLOOD, BETA AGONISTS, BIOLOGICAL INDICATORS

1.1.4 PATHOPHYSIOLOGY OF ASTHMA

Impaired ventilation results in asthma. In impaired ventilation of perfused alveoli the blood is no longer adequately saturated with O2 and rid of CO2. In an extreme case a functional arteriovenous shunt develops, in obstructive lung disease, such as asthma and chronic bronchitis. In asthma there is an allergy to inhaled antigens (e.g., pollen). These antigens cause an inflammation of the bronchial mucosa leading to the release of histamine and leukotriene (called slow reacting substances in anaphylaxis [SRSA]). The bronchial muscles contract and mucus secretion as well as vessel permeability (mucosal edema) are increased under the influence of these mediators (FIG.A&B). In addition to the inhaled antigens, microorganisms in the mucosa may also act as antigens (infectious–allergic asthma). Here there is no clear cut distinction between asthma and bronchitis. (Stefan Silbernagl and Florian Lang, 2000). Current data seem to suggest that these factors drive the development of a Th-2 lymphocyte–predominant immune response, which has been associated with atopy and IgE-mediated inflammation. The concept of reversible airflow obstruction has also recently been

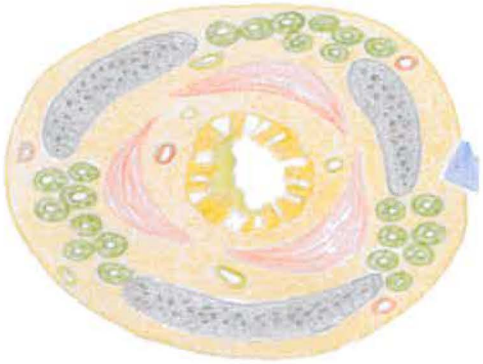
challenged. It is now clear that chronic airway changes occur, which may contribute to progressive airflow obstruction (annual review of medicine, 2002).

Picture 1A, normal Bronchioles



Color Atlas of Pathophysiology
Stefan Silbernagl, Florian Lang

Picture 1B abnormal, asthmatic



Mucosal edema and muscle contraction
→ Increased resistance to breathing

Expert Panel (2003) claims that the immunohistopathologic features of asthma include inflammatory cell infiltration:

- Neutrophils (especially in sudden-onset, fatal asthma exacerbations; occupational asthma, and patients who smoke)
- Eosinophils
- Lymphocytes
- Mast cell activation
- Epithelial cell injury

Airway inflammation contributes to airway hyperresponsiveness, airflow limitation, respiratory symptoms, and disease chronicity. In some patients, persistent changes in airway structure occur, including sub-basement fibrosis, mucus hyper secretion, injury to epithelial cells, smooth muscle hypertrophy, and angiogenesis. Gene-by-environment interactions are important to the expression of asthma. Atopy, the genetic predisposition for the development of an immunoglobulin E (IgE)-mediated response to common aeroallergens, is the strongest identifiable predisposing factor for developing asthma.

–Viral respiratory infections are one of the most important causes of asthma exacerbation and may also contribute to the development of asthma.

– Gene by environmental interactions is important to the development and expression of asthma. Of the environmental factors, allergic reactions remain important. Evidence also suggests a key and expanding role for viral respiratory infections in these processes (Expert Panel Report 3, 2007)

Key Points: IMPAIRED VENTILATION, AIRWAY INFLAMMATION, AIRWAY HYPERRESPONSIVENESS, IMMUNOHISTPATHOLOGICAL FEATURES

1.1.5 FACTORS INFLUENCING ASTHMA

There are many factors which induce, exacerbate and worsen asthma. They are put in 2 categories:

HOST FACTORS:

Here is briefly the summery of most of the factors which induce asthma or its exacerbation.

- Genetic
- Genes pre-disposing to atopy
- Genes pre-disposing to airway hyperresponsiveness
- Obesity
- Sex

ENVIRONMENTAL FACTORS:

Allergens

- Indoor: Domestic mites, furred animals (dogs, cats, mice), cockroach allergen, fungi, molds, yeasts
- Outdoor: Pollens, fungi, molds, yeasts
- Infections (predominantly viral)
- Occupational sensitizers
- Tobacco smoke
- Passive smoking
- Active smoking
- Outdoor/Indoor Air Pollution
- Diet (Vincent SD et al 2005)

Beside mentioned factors there are lots of psychosocial and medical reasons for the causing or worsening of asthma. Here is a list with some of the examples:

Medical and psychosocial features associated with a fatal or near fatal episode of asthma:

- Misuse of alcohol or drugs
- Psychiatric illness
- Denial
- Non-concordance with prescribed drugs
- Learning difficulties
- Income and employment difficulties
- Previous self discharge from hospital
- Social isolation
- Previous admission to intensive care for asthma
- Brittle asthma (British guideline on the management of asthma. 2003)

I would like to emphasize some of these factors, which are mostly present and induce asthma or worsen it:

1.1.5.1 ALLERGIES

Asthma is most of the time induced by some allergens. Different researches proved a variety of products such as food, medication, and many other products.

According to recent research from Israel, cow milk and milk products are the most common food products consumed in Israel; rates of allergy to cow milk exceed those of peanuts in infants and children. Data of children diagnosed with cow milk allergies (CMA) from 1995 to 2003, Out of 105 patients, Patients with persistent CMA had a higher rate of asthma than patients with transient CMA (61.2% vs. 18.6%,). Fifty patients with persistent CMA had 137 subsequent allergic reactions after diagnosis, 25% of the reactions were due to oral milk challenge at the clinic and 75% due to accidental exposure, of which 13% required an emergency department visit and 8%, hospitalization (Y. Levy and colleagues, March, 2007).

Jenneck and colleagues university of Bonn published their study in Annals of Allergy, Asthma & Immunology, The prevalence of Aspirin Intolerance (AI) is approximately 0.3%

to 0.9%, but AI is often overlooked. It can display a wide range of clinical pictures, such as acute asthma attacks, chronic rhinitis, myocardial ischemia, and anaphylactic shock (Jenneck et al, August 2007).

Regarding the pathogenesis of AI, modifications of eicosanoid metabolism are supposed to underlie AI, including aspirin-induced asthma and aspirin-induced urticaria. However, the pathogenesis of AI has not yet been clearly elucidated. Associations of several HLA alleles with subtypes of AI, such as aspirin- induced asthma, and single nucleotide polymorphisms in genes encoding enzymes involved in arachidonic acid metabolism have been shown. Because aspirin therapy should be avoided in AI patients, the use of alternative drugs is recommended NewsRx Scientists discuss in their guideline: aspirin provocation tests for diagnosis of aspirin hypersensitivity' new findings in allergies. According to a study from Krakow, Poland, "'Aspirin and other non-steroidal anti- inflammatory drugs (NSAIDs) are among the most common causes of adverse drug reactions. Majority of them is of the hypersensitivity type"(NewsRx, 2007)

"The two frequent clinical presentations of aspirin hypersensitivity are: aspirin-induced bronchial asthma (E. Nizankowska-Mogilnicka and colleagues, 2007).

1.1.5.2 SMOKING

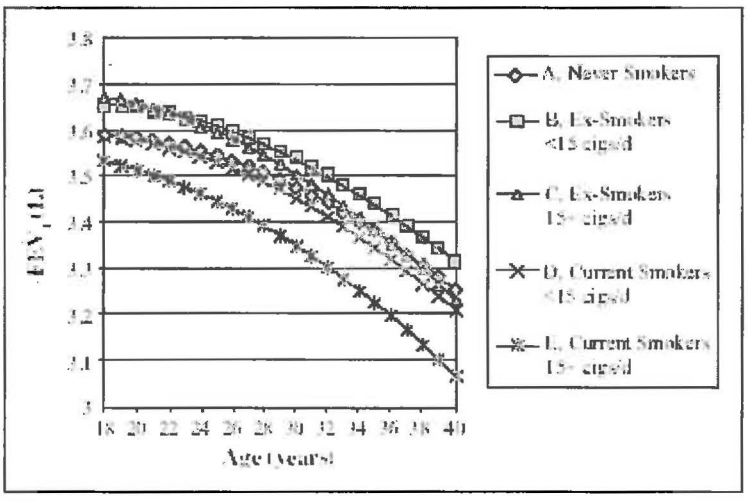
Tobacco smoke exposure is an important determinant of childhood asthma occurrence (Strachan and Colleagues 1996-2002). Second-hand smoke (SHS) is causally related to exacerbations of asthma and increased school absenteeism (Cook DG, 1999) Accumulating evidence (James Gauderman et al 1999-2001) indicates that maternal smoking is associated with new-onset asthma, which may be mediated, in part, by *in utero* exposure to maternal smoking. In previous publications from the Children's Health Study (CHS) (Gilliland et al 2001-2002), was reported that *In utero* exposure to maternal smoking was associated with increased risk for asthma diagnosed in the first 5 years of life (odds ratio [OR], 1.5; 95% confidence interval [CI], 1.0 to 2.3), and for persistent asthma (OR, 1.5; 95% CI, 1.0 to 2.3). The associations did not differ in children with early transient asthma compared to those with early persistent asthma. Relative to never-smokers, children whose mothers smoked throughout the pregnancy had an elevated risk of asthma in the first 5 years of life (OR, 1.6;

95% CI, 1.0 to 2.6). Children of mothers who quit smoking prior to the pregnancy showed no increased risk (Gilliland et al 2001, Ehrlich et al, 1996).

In the developed world approximately 25% of the general population are current cigarette smokers (Morbidity Mortality Weekly Report, 2004) and a further 25% are former smokers. Smoking rates are similar amongst adults with asthma (Siroux et al 2000) Higher levels are seen in patients with asthma that attend emergency departments with exacerbations (Silverman, 2003).

The prevalence of current smoking is also higher in the young, those that are socially deprived and in some European countries (e.g. in Germany 38% of the general population are current smokers). Smoking rates in developing countries are generally higher than in the Western world (Althuis M. et al 1999-2003).

Compared with nonsmokers with asthma, those who smoke have worse symptom control (Althuis M, 1999 & Siroux V. 2000), accelerated decline in lung function (Fig. 1) and an increased mortality rate at 6 years following a near fatal asthma attack (Apostol G, 2002),



The CARDIA study, 1995–1996. The combination of asthma and heavier smoking has a synergistic effect on the decline in FEV_1.

Figure 2: Race-sex adjusted quadratic fit for forced expiratory volume in 1 s (FEV1) for each year of age, 18-40, according to smoking status

but recent studies have highlighted that smokers with asthma have a reduced therapeutic response to corticosteroids (Chalmers et al, 2002). This review summarizes the clinical evidence for corticosteroid resistance in smokers with asthma and the possible mechanisms and management of this resistance. It also considers the effect smoking has on other drugs commonly used to treat patients with asthma (Chaudhuri et al, 2003).

Quitting smoking may have a quick pay off for people with asthma. A single smoke-free week may be all it takes to start seeing improvements in asthma patients' lung function,

researchers report in the American Journal of Respiratory and Critical Care Medicine (July 2006).

Rekha Chaudhuri, MD, and colleagues confirms the same statement by saying that in smokers with asthma, improvement in lung function occurs as early as one week after smoking cessation, with a further improvement up to six weeks." Active cigarette smoking is known to worsen the severity of asthma," the researchers point out. They studied 20 asthma patients (average age: mid- to late 40s) who were smokers. The patients had smoked for at least 28 years and currently smoked more than 20 cigarettes a day, on average. For the study, half agreed to quit smoking for at least six weeks. The others kept on smoking. Before and after the experiment, patients took lung function tests.In one of those tests, the patients forcibly exhaled as much air as possible in one second's time. When the study started, the patients' scores on that test were lower than what would be expected for normal, healthy lungs. After one week of not smoking, scores on that same lung function test, FEV1, began to improve. The gains continued for six weeks for the new nonsmokers. The quit-smoking group also showed a drop in neutrophils in the sputum of the lungs and airways. Neutrophils are part of the body's immune system, which helps fight off infection and illness. They can also be used as a measure of inflammation. Meanwhile, no such improvements were seen in the patients who kept smoking (Chaudhuri R. et al 2006).

Key Points: STRESS, COMORBID CONDITIONS, ANXIETY, SMOKING, FATAL ASTHMA ATTACK, SECOND HAND SMOKERS, MATERNAL SMOKING

1.1.5.3 OBESITY

There appears to be a link between obesity and asthma that is not yet understood. The increase in childhood asthma may be explained by the rise in obesity, a US study has suggested.Rates of both have shot up dramatically in recent decades in the West. The number of youngsters in the UK considered fat or obese has almost doubled in the last decade. Over 5million people are currently being treated for asthma, compared to 3.4m in 1999.

The researchers found the fattest children were 77% more likely to have asthma symptoms. They suggest increased weight might lead to inflammation in the respiratory tract, which

could be the key factor in inducing asthma (BBC News, Dr Warren Lenney, British Thoracic Society 2001)

Moreover, obesity may influence the development and presentation of these diseases.

The influence of obesity on asthma and obstructive sleep apnea has been well documented, and weight loss has been associated with improved symptomatic control in these diseases.(Magali Poulain et al 2006).

Glazebrook's study included 117 children age 7-14 years at British health clinics inDec.2006. Fifty-six of those kids had asthma and were treated at asthma clinics. The other 61 children didn't have asthma. Researchers checked the kids' BMI. The kids with asthma were less physically active. A third of the asthmatic children said better control of their asthma would help them be more active. The children's social and economic backgrounds don't seem to explain the results, the researchers note (Glazebrook C. pediatrics, 2006).

Out of more than 3,000 patients with asthma, obese patients were 66 percent more likely to report continuous symptoms, 36 percent more likely to miss more days of work and 52 percent more likely to be classified as having either moderate or severe persistent asthma when compared to non-overweight people," says Dr. Taylor (May, 2007). The researchers state there may be a connection with the hormone leptin, which is produced by fat cells and plays a role in body weight regulation. Previous research suggests leptin may also contribute to inflammation of airways seen in patients with asthma (Dr. Holguin, 2007).

1.1.6 PSYCHOSOMATICS OF ASTHMA

Psychosomatic correlations in patients with bronchial asthma

There is a known association between stress and asthma; in fact, asthma used to be known as "asthma nervosa" (Mark T. O'Hollaren, MD, 2005).

Dyspnoea and anxiety are the main complaints of patients with bronchial asthma. The personality profile characteristic of bronchial asthma patients includes high levels of depression, anxiety and health preoccupation. Some of the negative aspects of mood correlate with degree of dysfunction. Studies involved 60 consecutive patients with bronchial asthma

from light to severe. The author found some correlations between psychological and physiological symptoms. The levels of anxiety and depression were dependent on severity of symptoms (Pol Arch Med Wewn., 1999)

There are a number of neuroendocrine-immune relationships. First, there may be interactions between hormones, neurotransmitters, and immune solid tissue organs (eg, spleen, lymph nodes). . Gailen D. Marshall, Jr., MD, PhD, of the University of Texas-Houston Medical School, Houston, Texas, noted that there are more than 2 dozen hormone receptors that have been described on lymphocytes and monocytes; 37 children with asthma were assessed for DSM-III-R anxiety disorders with the Schedule for Affective Disorders and Schizophrenia for School-Age Children and intrafamilial stress with the Index of Family Relations. When compared with a healthy control group, the asthma group had significantly more total anxiety disorders, past school problems, past psychiatric illnesses, and intrafamilial stress (Gailen D. Marshall, Jr., MD, PhD, 2003).

Researchers from University of Ottawa, Canada, publish new studies and findings about the psychological factors and near fatal asthma and fatal asthma. Following a systematic assessment of all published studies, they couldn't conclude that psychological factors increase the risk of NFA and FA. "The researchers reviewed all of the literature found by the systematic search done of psychological factors on the risk NFA or FA. A MEDLINE search identified 423 articles between 1960 and March 2006. Seven case-controlled studies were identified following strict applications of the inclusion and exclusion criteria. Due to the significant heterogeneity in the measurement of the psychological factors, a summary statistic was not calculated. The trial characteristics were tabulated and qualitative trends were observed to explain the heterogeneity in the results of the studies. Recommendations on future studies in the field are outlined in detail," wrote G.G. Alvarez and colleagues, University of Ottawa, Ottawa Health Research Institute (Alvarez and colleagues, 2007).

Scientists in Kyoto, Japan (2007) examined the longitudinal changes in the psychological status of asthma patients, and compared them with changes in other clinical measurements. Eighty-seven outpatients with stable asthma after 6 months of treatment were enrolled in this study. The psychological status was evaluated using the Hospital Anxiety and Depression Scale (HADS), the health status using the Asthma Quality of Life Questionnaire (AQLQ).

The patient's pulmonary function, peak expiratory flow values and airway hyper responsiveness were measured at entry and every year thereafter over a 5-year period. Using mixed effects models to estimate the slopes, the HADS anxiety and depression scores did not change significantly over time (p=0.71 and 0.72, respectively). The changes in the HADS scores correlated noticeably with changes in the AQLQ a scores, but not with changes in the physiological measurements. The baseline HADS anxiety and depression scores were significantly correlated to the subsequent annual changes in each measurement. The psychological status remained clinically stable over the 5-year study period in patients with stable asthma. Changes in the psychological status were significantly correlated to changes in the health status," wrote T. Oga and colleagues, Kyoto University, Department of Respiratory Medicine. The researchers concluded: "The baseline HADS scores were a useful indicator in detecting patients who would show subsequent deterioration in their psychological status." (Oga et al 2007)

The future of Asthma:

In her discussion (1999), Rosalind J. Wright, MD, MPH, Assistant Professor of Medicine, Harvard Medical School; Respiratory and Environmental Epidemiology, Channing Laboratory, Brigham and Women's Hospital, Boston, Massachusetts, noted that as early as the 12th century, a physician to a sultan's son made the observation that control of asthma required the treatment of the "total patient." She noted that psychological stressors can modulate CNS and immune system interactions, with a resulting influence on inflammatory processes

In summary, stress is an important, albeit challenging and complicated, area of research in patients with asthma. It is important to probe into areas of stress in the lives of patients with asthma, so that adequate intervention can be instituted (Rosalind J. Wright, 1999).

1.1.6.1 STRESS

Dr. Marshall's research (2003) showed that individuals studied before and after major exams showed a change in the cytokine balance in favor of TH2-type cytokine production. This pattern would tend to cause increasing asthma symptoms. Because of these biochemical influences of stress on asthma, it is important to appropriately manage stress. Appropriate

steps would include management of anxiety, depression, etc., and counseling patients with asthma to have a program to manage their stress (Dr.Marshall, 2003)

Often, stress is increased in those who feel they do not have any control over a disease process. It may, therefore, be helpful for patients to feel they are active partners in the management of their disease. They need to be able to manage the control of their disease and have an action plan to handle exacerbations of asthma (Nassau JH, 2003).

Comorbid conditions, such as rhinitis, sinusitis, or obstructive sleep apnea, may also increase the stress level in asthma patients. This may occur due to ongoing symptoms caused by these conditions or by physiologic effects,e.g. sleep deprivation. (Kiecolt-Glaser JK, 2002).

Dr. McLean (2000) reviewed data indicating that a history of adult or childhood trauma is clearly a risk factor for asthma and asthma symptoms. In a study of homeless families in New York, he estimated that the prevalence of asthma was approximately 40%, which is much higher than the general population. These data indicate that psychosocial factors have a significant impact on asthma morbidity and mortality (Dr. McLean, 2000).

Key points: PSYCHOSOMATIC CORRELATION, ASTHMA NERVOSA, STRESSORS, CYTOKENIN BALANCE, NEUROINDOCRINE-IMMUNE RELATIONSHIP

1.1.7 DIAGNOSIS OF ASTHMA

Even though the diagnosis of asthma is very difficult especially in young children, the following points will most likely confirm it:

- Symptoms, such as episodic shortness of breath, wheezing, cough, and chest tightness.
- Lung function (spirometry or peak expiratory flow) which measures the amount of air blown out of the lungs over time.
- Provide an assessment of the severity of airflow limitation, its reversibility and its variability.
- Measurements of allergic status can help to identify risk factors that cause asthma symptoms in individual patients.
- Extra measures may be required to diagnose asthma in children 5 years and younger and in the elderly, and occupational asthma.

- For patients with symptoms consistent with asthma, but normal lung function, measurement of airway responsiveness may help establish the diagnosis.
- Asthma severity may change over time, and depends not only on the severity of the underlying disease but also its responsiveness to treatment.
- Any family history of allergies or asthma
- Pulmonary function test after giving some asthma medication. This helps confirm that the blockage in the air passages that shows up on pulmonary function tests goes away with treatment which distinguishes the COPD from asthma.

Followings are the points shown when asthma is in a controlled stage:

- No (twice or less/week) daytime symptoms
- No limitations of daily activities, including exercise
- No nocturnal symptoms or awakening because of asthma
- No (twice or less/week) need for reliever treatment
- Normal or near-normal lung function
- No exacerbations

It is important to remember that asthma is a complicated disease to diagnose, and the results of airway function testing may be normal even if the child has asthma. Also of importance is that not all children with repeated episodes of wheezing have asthma. Some children are born with small lungs, and their air passages may get blocked by infections. As their lungs grow they no longer wheeze after an infection. This type of wheezing usually occurs in children without a family history of asthma and in children whose mothers smoked during pregnancy (American Academy of Paediatrics 2003). Eepisodic wheezing and cough are common in children who do not have asthma, particularly in those under age 3.Wheezing is usually associated with a viral respiratory illness, predominantly respiratory syncytial virus in children younger than age 2, and other viruses in older preschool children. Three categories of wheezing have been described in children 5 years and younger:

- Transient early wheezing, which is often outgrown in the first 3 years. This is often associated with prematurity and parental smoking.
- Persistent early-onset wheezing (before age 3). These children typically have recurrent episodes of wheezing associated with acute viral respiratory infections, noevidence of atopy, and no family history of atopy. Their symptoms normally persist through school

age and are still present at age 12 in a large proportion of children. The cause of wheezing episodes is usually respiratory syncytial virus in children younger than age 2, while other viruses predominate in children ages 2-5.

- Late-onset wheezing/asthma. These children have asthma that often persists throughout childhood and into adult life. They typically have an atopic background, often with eczema, and airway pathology that is characteristic of asthma.

The following categories of symptoms are highly suggestive of a diagnosis of asthma:

– Frequent episodes of wheeze (more than once/month), activity-induced wheeze,

– Night cough in periods without viral infections, absence of seasonal variation in wheeze,

– Symptoms that persist after age 3.

A simple clinical index based on the presence of a wheeze before the age of 3, and the presence of one major risk factor (parental history of asthma or eczema) or two of three minor risk factors (eosinophilia, wheezing without colds, and allergic rhinitis) has been shown to predict the presence of asthma in later childhood (Global Strategy for Asthma Management and Prevention 2006)

Several studies show that as many as 50–80 percent of children who have asthma develop symptoms before their fifth birthdays. Diagnosis can be difficult in this age group and has important implications. On the one hand, asthma in early childhood is frequently under diagnosed (receiving such inappropriate labels as chronic bronchitis, wheezy bronchitis, reactive airway disease (RAD), recurrent pneumonia, gastro esophageal reflux, and recurrent upper respiratory tract infections). Therefore, many infants and young children do not receive adequate therapy. On the other hand, not all wheeze and cough are caused by asthma, and caution is needed to avoid giving infants and young children inappropriate prolonged asthma therapy. Episodic or chronic wheeze, cough, and breathlessness also may be seen in other, less common conditions, including cystic fibrosis, vascular ring, tracheomalacia, primary immunodeficiency, congenital heart disease, parasitic disease, and foreign-body aspiration. Diagnosis is complicated by the difficulty in obtaining objective measurements of lung function in this age group (Expert Panel Report 3, August 28, 2007).

Airway responsiveness to inhaled methacholine or histamine in a normal subject, and in asthmatics with mild, moderate, and severe airway hyper responsiveness.

Asthmatics have an increased sensitivity and an increased maximal bronchoconstrictor response to the agonist. The response to the agonist is usually expressed as the provocative concentration causing a 20% decline in FEV1 (PC20). (Levy ML 2006)

Key Points: WHEEZING, SPIROMRTEY, RISK FACTORS, MISDIAGNOSIS, EARLY AGE ASTHMA

1.1.7.1 DIAGNOSTIC GROUPS

Asthma carries different labels that can be confusing at times. Among these terms:

Atopic Asthma: Chemical agents cause approximately 30% of cases of occupational asthma and roughly 90% of these cases involve immunological mechanisms (allergy).

mechanisms (allergy). Over the past few decades industrialized countries have witnessed a significant increase (although the rate of increase has recently slowed) in the prevalence of atopic diseases including atopic rhinitis, bronchial asthma (Kimber and Dearman, 2002). Extrinsic asthma and atopic asthma are two terms used interchangeably. It refers to the onset of wheezing, cough, shortness of breath upon contact of an allergen. The reaction is immunologic and mediated by IgE. 40% of the population have been reported to be atopic to an allergen, however only 5% of the population has asthma. Thus, atopy is not associated always with asthma, and not all asthmatics are atopics (Litonjua, MD. Scott T Weiss, MD, MS, 1999).

Seasonal Asthma: In some sensitized individuals, asthma may be exacerbated by seasonal increases in specific aeroallergens. Examples include birch pollen and ragweed. Seasonal asthma is usually associated with allergic rhinitis. This type of asthma occur intermittently with the patient being completely asymptomatic between seasons.

UK studies have demonstrated that the number of admissions of children with asthma is seasonal with a large peak in autumn and a smaller peak in spring (Merck Sharp Dohme Limited, 2007)

***Occupational Asthma*:** Asthma acquired in the workplace is referred to as occupational asthma. Many inhalant chemicals are known to induce asthma in the occupational environment. They range from isocyanates to platinum salts to complex animal and plant products. (Litonjua, MD. Scott T Weiss, MD, MS, 1999). Occupational Asthma is

subdivided into two groups: - Immunologic occupational asthma in which there is a time delay between exposure to a respiratory sensitizer and the development of symptoms and Non- immunologic occupational asthma that typically occurs within a few hours of high concentration exposure to an irritant at work. Most cases of occupational asthma are of the immunologic type (British Occupational Health Research Foundation, 2004).Dr Manolis Kogevinas, Barcelona, Spain and team, also found that conditions in the workplace may be causing up to 25% of new asthma cases in the developed world. The study looked at 6,837 people from 13 countries. They had all participated in the European Community Respiratory Health Survey, 1990-1995. None of them had reported any symptoms or history of asthma at the time of the study. Nine years later each participant was followed-up and tested for asthma. They also completed a questionnaire on symptoms. Potential exposures to substances that cause asthma were calculated using an 'asthma-specific job exposure matrix'. A computer model was then utilized to evaluate the risk of new-onset asthma, with age, sex and smoking factored in (Dr. Manolis Kogevinas, 2007).

ASTHMA DIAGNOSTIC TESTS

According to handbook of Diagnostic tests (1995), people with following symptoms will reveal most probably asthmatic:

- forced expiratory flow of less than 75%
- forced expiratory volume (after one second) of 83% or below
- tidal volume of less than 5 to 7 ml/kg of body weight
- residual volume greater than 35% of total lung capacity
- arterial blood gas analysis may reveal:
- PaO2 less than 75 mm Hg
- PaCO2 greater than 45 mm Hg (indicating severe bronchial obstruction)
- complete blood count reveals eosinophil count greater than 7%
- chest X-ray shows hyperinflation (handbook of Diagnostic tests ,1995)

1.8 DIFFERENTIAL DIAGNOSIS in Asthma and COPD

ASTHMA:

- FEV1, FEV%, PEF, MEF50 or MEF25 is:
  - Decreased, or temporarily normal in mild or well controlled asthma
- VC; FVC are:
  - Usually normal
  - FVC may be decreased ("dynamic restriction") in severe asthma where VC may be clearly larger than FVC, and the FEV % may be normal.
- A significant response is recorded in the bronchodilator test.
- MEF50 and MEF25 are very sensitive to technical variations in expiration. Pathological results in MEF50 or MEF25 without significant abnormalities in FEV, FEV% and PEF are not diagnostic.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD):

- FEV_1, FEV% or PEF is:
  - Continuously decreased, or normal in mild COPD.
- MEF_{50} and MEF_{25}
  - Are often decreased in the early stage of the disease, even before clinical symptoms (obstruction of small airways).
  - Particularly in emphysema , MEF50 and MEF25 may be very low ("collapse")
- FVC is often decreased ("dynamic restriction").
- No significant response is observed in the bronchodilator test (Evidence based medicine, 2004).

MEF_{25} or MEF_{50}: flow at volumes of 50 or 25 percent of the FVC

In the table below you can find more differences between asthma and COPD which distinguish one from another.

Table 1. Further differences in Asthma and COPD

Disease Characteristics	Asthma	COPD
Aetiology	unknown , atopy	smoking
Onset	often rapid	slow
Dyspnoea	paroxysmal	on physical exersion
Obstruction	variable	progressive, constant
Diffusion of respiratory gases	normal	often impaired
Eosinophilic lycocytes in sputum	often present	rarely present
Response to broncho-dilating drugs	strong	weak
courses of disease	variable	progressive

(Evidence based medicine guidelines 2004)

Key points: FEV, PEF, FVC, MEF, COPD, DYNAMIC RESTRICTION, SPIROMETRY, BRONCHDILATOR TEST, EMPHYSMA

1.1.9 CLASSIFICATION OF ASTHMA

Expert Panel 3, 2003, classified asthma in 3 categories as followed:

SERIOUSNESS	SYMPTOMS BEFORE ADEQUATE TREATMENT	PULMONARY FUNCTION	MINIMAL TREATMENT FOR MAINTAINING CONTROL
MILD	• Brief and intermittent symptoms, less than once • Nocturnal asthma, less than twice a month; • Asymptomatic between critical periods.	• PEF (peak expiratory flow) > 80% of normal 1 ; • Variability of PEF < 20%; • Normal PEF after inhalation of a ß 2 -agonist.	• Intermittent; • Needs only short course of inhalation of a ß 2 agonist
MODERATE	• More than one or two exacerbations per week; • Nocturnal asthma: more than twice per month; • Symptoms requiring a ß 2 -agonist almost everyday.	• PEF between 60 and 80% of normal 1 • Variability of PEF between 20 and 30% • Normal PEF after bronchial dilation	• Inhaled corticoid daily • Need to add a bronchodilator daily, particularly for preventing the nocturnal symptoms or when these appear.
SEVERE	• Frequent exacerbations; • Continuous symptoms; • Frequent symptoms; • Nocturnal asthma; • Physical limitation • History of hospitalization due to asthma; • Previous exacerbations threatening life.	• PEF < 60% of normal 1 • Variability of PEF > 30% • Abnormal PEF with optimal therapy.	• high doses of inhaled corticoids; • probably will be necessary to add a long acting Bronchodilator daily, especially for nocturnal symptoms • frequent usage of a systemic corticoid

Table 2: Classification of Asthma according to Expert Panel Report 2003

Above chart also mentions the function of lungs in each stage of asthma, and the necessity of medication according to the severity of asthma for maintaining control.

1.1.9.1 TREATMENT

Updated 2002 Expert Panel Report recommend before the treatment like every other disease to confirm asthma by the mentioned procedures in the chapter of diagnosis and exclude similar dieses.

After the steps the recommendation of these guidelines is to make a long term plan with the goal to control asthma by:

- Reducing impairment (prevent chronic symptoms, maintain almost normal lung function, normal activity, require infrequent use of short acting Beta II agonists)
- Reducing risk (prevent exacerbations, minimize the need for emergency care and hospitalizations, prevent loss of lung function, or for children, prevent reduced lung growth, have minimal or no adverse therapy effect) (Expert Panel Report 2002).

Diette and colleagues (2001) evaluated the rate of adherence of asthma care with the National Asthma Education and Prevention Program Guidelines for 318 pediatric patients (GB Diette, 2001). TV Hartert, (2000) found that 55% of patients used long-term controller medications daily, 49% had written instructions for handling asthma attacks, 44% had instructions for adjustment of medication before exposures, 56% had undergone allergy testing, and 54% had undergone pulmonary function testing (TV Hartert, 2000). Other research has shown similarly poor guideline adherence among adults with asthma (AP Legorreta). Even simple preventive measures are often neglected for asthma patients: patients with asthma are at high risk of developing complications after influenza-related illness, yet only one-third of adults and one-fifth of adults younger than 50 years with asthma receive the flu vaccine annually (Asthma and Flu Shots. 2005).

Furthermore The Expert panel report 2002 recommends the inhaled corticosteroids improve control of asthma for children with persistent asthma compared to as needed beta II agonists, as measured by prebronchodilator FEV1, reduced airway hyperresponsiveness, improvements in symptom scores and symptom frequency, fewer courses of oral corticosteroids, and fewer urgent care visits or hospitalizations. Numerous controlled trials have established the benefits of inhaled corticosteroids (Noble et al, 1992; Connett et al, 1993; Ilangovan et al, 1993; Ruiz, 1994; Agertoft et al, 1994; Peden et al, 1998; Mahajan et al, 1998; Baker et al, 1999).

It has been increasingly apparent that airway inflammation, characterized by the presence of eosinophils, is present even in children with infrequent episodic asthma (Vignola et al, 1998; Suissa & Ernst, 2001). Inhaled corticosteroids were initially introduced to reduce the need for oral corticosteroid in patients with severe asthma. Subsequently, recognition of the efficacy of inhaled corticosteroids in controlling the symptoms of asthma and reducing airway inflammation and hyperresponsiveness led to their increasing popularity in the treatment of asthma (Barnes, 1990; MacKenzie et al, 1993; Ribeiro, 1993; Pederson et al 1995; Simons, 1998; Barnes, 1998.

The four key components of care are due to The Expert Panel Report as followed:

- Assessment and Monitoring
- Education
- Control Environmental Factors and Comorbid conditions
- Medications

To monitor treatment

Regular peak flow readings can be used to help assess how well treatment is working. Peak flow readings improve if narrowed airways open up with treatment.

Below is an example of a two-week diary of peak flow readings done by child who has quite bad asthma. PIP (2005)

Dr. Maria Eugenia Gama (1992) writes in her book about "Treating Asthma in Children" about the treatments:

The most important objective of treatment is to control inflammation and prevent it in order to restore maximal possible respiratory function in the patient. Further objectives are to:

decrease the severity and frequency of the attacks or critical periods;

prevent bouts for as long as possible and keep patient as asymptomatic as possible by keeping reading from FRE (functional respiratory expiration) as close to normal as possible

enable patient to perform as normal social, scholastic, and athletic life as possible;

teach patient and family self-treatment of asthma in terms of environment and medication;

- teach how to take proper measures according to clinical symptoms or PEF readings, including boosting drug dose, repeating medication, calling the physician, or going to hospital

Respiratory reeducation

An asthmatic child should be taught to:

- decrease nasal obstruction;
- control cough;
- improve spasm with prolonged expirations and inspirations;
- use the breathing technique required for the aerosols and the technique for per-forming PEF;
- expectorate without spasmodic coughing through accelerated exhaling with open mouth
- perform exercises that help to improve breathing or prevent thoracic dysfunction, including abdominal breathing to improve diaphragm movement, and those that improve kyphosis. (Dr. María Eugenia Gama)

1.1.9.2 ASTHMA AND EXERCISE

Asthmatics who exercise, have better cardiopulmonary fitness, which means they can take more O2 and transfer more air in and out of their lungs (Felix S. Ram, MD, PhD Oct. 2005)

Regular exercise strengthens the lungs so that they don't have to work so hard at breathing thus asthmatics should keep physically active. Staying active helps control the symptoms. Aim for 30 minutes of physical activity on most days. If asthmatics were inactive before, they should start slowly and gradually increase activity over time. The exercise should not be done at once, it can be for a short period and continued after few hours for blood pumping and harder breathing for a few short periods such as 10 or 15 minutes at a time.

Exercising in cold weather may trigger symptoms. Asthmatics should wear a face mask to warm the air they breathe. They shouldn't exercise in temperatures below zero (Mayo 2007).

A heat exchange facemask is at least as good as albuterol pretreatment for cold air exercise-induced asthma (David A. Beuther, et al, 2006)

A Study recruited in 1993–1997, the cross-sectional association between physical activity and FEV_1 and that between physical activity and change in FEV_1 were analyzed. This study showed that physical inactivity is associated with lower forced expiratory volume in 1 Second . Indices of physical activity, including participation in vigorous recreational activity, stair climbing, and television viewing, were assessed with a validated questionnaire designed to assess activity in the previous year. Television viewing was negatively associated with FEV_1 in men and women ($p < 0.001$), whereas stair climbing and participation in vigorous leisure time activities were positively associated with FEV_1 in men and women ($p < 0.001$). The associations remained after adjustment for known confounders, including age, height, vitamin C, and smoking. Climbing more stairs and participating in vigorous leisure-time activity predicted a slower rate in annual percent decline in FEV_1 ($p < 0.004$ and $p < 0.002$, respectively). In conclusion, physical activity is associated with higher levels of FEV_1, whereas television viewing is associated with lower levels (American Journal of Epidemiology, 2002).

Colland's program (1993) for 301 asthmatic children was designed, called secondary Prevention in Asthma by Self-Management and Exercise (SPASME) over a three months period The SPASME-program consisted both of an educational program and a physical exercise program; a child physiotherapist trained in the exercise part, delivered the program in groups of 8 children. His study showed a significant improvement in their quality of life (Colland VT, 1993).

Four systematic reviews investigated the effectiveness of exercise therapy for patients with asthma (Ernst 2000, Gosselink and Wagenaar 1993a, Gosselink and Wagenaar 1993b, Holloway and Ram 2002, Ram et al 2002, Ram et al 2000). Based on the results of two reasonable quality systematic reviews (Holloway and Ram 2002, Ram et al 2002, Ram et al 2000), they concluded that there is insufficient evidence to support or refute the effectiveness of exercise therapy for children and adults with asthma, compared to no treatment or other conservative treatments

A published review included 13 studies on asthma and exercise that included 455 patients. Physical training was defined as whole-body exercise of at least 20 to 30 minutes of aerobic training, two to three times a week, over a minimum of four weeks. Regular exercise was

found to have no effect on resting lung function or the total number of days that the participants reported wheezing. The researchers concluded, however, that regular exercise can increase oxygen intake by up to 20%. It also improves overall fitness and air transfer in and out of the lungs (Ram. F. S. 2005).

Tancredi et al, (1989) evaluated 3-Min step test and treadmill exercise-induced asthma. A series of 154 asthmatic children (84 male children; mean age 12.9±0.9 yrs) underwent a 3-min step-test and treadmill testing on different days within a week at least 24 h apart. Before both tests each subject did spirometry to obtain the baseline forced expiratory volume in one second (FEV_1).

The mean % fall in FEV_1 was significantly higher for treadmill exercise than for the step test (15.0±7.5 *versus* 11.7±5.9); in all subgroups defined by habitual physical activity the mean % fall in FEV_1 decreased more after treadmill exercise than after the step test. After step test and treadmill exercise no significant correlation was found between % fall in FEV_1 and baseline lung function, or between % fall in FEV_1 among groups defined by habitual physical activity (Tancredi et al, 1989)

While it is clear that exercise can trigger asthma symptoms, planning ahead, Bassett and Ram agreed, can minimize the risk. Asthmatics with a history of exercise-induced symptoms should use a short-acting inhaler 10 to 15 minutes before they work out, Bassett says. An example of such an inhaler would be an albuterol inhaler, which also comes under the names Proventil or Ventolin.

He further recommends:

- Warming up for 10 or 15 minutes before exercising to full capacity.
- Drinking plenty of fluids, especially when exercising in the heat. A good rule of thumb is to drink 0.25l. of water before beginning exercise and then 0.25l. every 30 minutes while exercising.
- Cooling down slowly, rather than stopping exercise abruptly.
- Stopping the activity if respiratory symptoms occur.

Asthmatics should have their lung function tested to determine their exercise tolerance (Clifford W. Bassett, M.D., 2005). Activities such as golf, walking and swimming are less likely to trigger attacks, but any exercise program should be still discussed with the doctor (Mayo, Sep.2007)

Using data for 165,123 respondents of the 2000 Behavioral Risk Factor Surveillance System, Earl S. Ford (2003) examined leisure-time physical activity. Chest after adjusting for age, about 30% of participants with current asthma (12,489 participants), 24% with former asthma (4,892 participants), and 27% who never had asthma (147,742 participants) were considered to be inactive ($p < 0.001$). After adjusting for age, the estimated energy expenditure from leisure-time physical activity was 206 kilocalories (kcal) per week lower among respondents with current asthma than among respondents with former asthma ($p < 0.001$) and 91 kcal/week lower than respondents who had never had asthma ($p < 0.001$). About 27% of participants with current asthma, 28% of participants with former asthma, and 28% of participants who had never had asthma were participating in recommended levels of physical activity. Walking was the most frequently reported activity for all three groups (respondents with current asthma, 39%; respondents with former asthma, 39%; and respondents who had never had asthma, 38%. Participants with asthma were less likely to engage in running ($p < 0.001$), basketball ($p = 0.001$), golf ($p < 0.001$), and weightlifting ($p = 0.001$) but were more likely to use an exercise bicycle ($p = 0.035$) than were participants without asthma (Earl S. Ford, 2003).

2. CHAPTER II

SPECIAL PART

2.1 BREATHING EXERCISES:

Some Breathing Basics

Optimal Breathing

Most people breathe about 17 times per minute, or almost 25,000 times per day. In optimal breathing the diaphragm performs as the main muscle of respiration. Other muscles of the torso are involved in breathing, but only in a supportive role. The diaphragm is a dome shaped muscle that makes a floor for the ribcage and closes the bottom of the breath chamber, separating it from the digestive organs below. During inspiration it actively flattens, lifting the ribcage up and out while slightly displacing the organs of the abdomen below, causing it to bulge. This action reduces internal pressure, creating a partial vacuum and causing air to rush into the lungs. During exhalation the diaphragm relaxes upward, re-forming the dome which allows the ribs to drop down and in and the belly to flatten. While breathing can be either voluntary or involuntary, the diaphragm itself is an involuntary muscle and it cannot be moved directly, nor is it usually possible to determine its position within your body because it lacks the proprioceptive nerve endings required for feeling (Leland Vall, 1995).

Fig. 2a and 2b: The images above show the diaphragm in the ribcage (Leland Vall, 2005)

2.1.1 BREATHING FAULTS: Inefficiencies can develop in breathing when muscles other than the diaphragm take on a larger role. If the muscles of the ribcage or abdomen are actively engaged, they can begin to substitute the diaphragm, causing the diaphragm to weaken. These muscles are not as well suited to a larger role in breathing, making each breath less coordinated and less efficient. Inefficiencies can also develop if the muscles of the ribs or abdomen are fixed or held rigidly

which can impede the diaphragm's movement. Audible breathing, the sound of air moving in and out of the body, can be a sign of excess tension in the throat or excess effort in your breathing. Optimal breathing is silent.

2.2 ASTHMA AND BREATHING EXERCISE

Breathing exercise or "re-training" of the lungs is one the mildest physiotherapy plan that a patient may have to improve her/his quality of breathing, and thus the life, as asthmatic. It also helps reduce asthma symptoms and reduce the amount of medication needed to control asthma (Mayo 2007).

van Veldhoven, (2001) investigated whether an exercise program will improve health-related quality-of-life in school-age children with asthma. 301 Children with asthma, known at the outpatient pediatric clinics of the University Hospital in the Netherlands participated. In the 204 children who responded (67.8%) the generic-quality-of-life-level was investigated by means of the questionnaire. 53 Children had a high risk QOL-score below the normal range, which was defined as a total score under the tenth percentile (P10) reference score, while receiving regular care by pediatricians and asthma nurses. The inclusion criteria were: age7 through 12 years, asthma diagnosed according to international criteria (ATS 8), no recent exacerbation or infection, and a cognitive level consistent with seven years or more.

The children with moderate-to-severe asthma who had a low quality-of life level participated in this rehabilitation-program that included 10 training-sessions of 150 minutes, once a week. Two groups were randomly formed: the control group (C; n =14) that received regular care and the training group (T; n = 18) that received regular care and the program. Parents and teachers received education training. This study showed that an educational and exercise (SPASME) program offered to school age children with persistent asthma and their caregivers led to a significant improvement of quality-of-life. Low quality-of-life scores improved significantly in children who participated as measured in generic and disease-specific-questionnaires, while children enjoyed less medical consumption and fewer days absent from school (van Veldhoven, 2001).

Breathing exercises reduce the need for beta-agonists in asthma, according to the results of a double-blind, randomized trial reported Charles Vega, MD (June 2006).A Cochrane review

concluded that after a 2-week run-in phase, 57 subjects were randomized to 1 of 2 breathing techniques learned from instructional videos: a technique that focused on the nasal route of breathing, hypoventilation, and breath holding or a breathing technique incorporating nonspecific upper body maneuvers. During the following 30 weeks, subjects performed their assigned breathing exercises twice daily and as-needed for symptom relief. The main endpoints were quality of life score and daily symptom score at week 12. After week 16, the investigators attempted 2 successive inhaled corticosteroid down-titration steps. Primary and secondary outcomes were clinically similar in both groups at weeks 12 or 28. Quality of life score remained unchanged. Lung function and airway responsiveness were also unchanged. However, reliever use decreased by 86% and inhaled corticosteroid dose was reduced by 50% across both groups. Peak flow monitoring did not adversely affect asthma outcomes. Breathing techniques may be useful in the management of patients with mild asthma symptoms who use reliever frequently, but at present there is no evidence to favour nasal breathing over non-specific upper-body exercises," (Cassandra A. Slader, MD, June 2007).

DIFFERENT BREATHING METHODS:

2.2.1 THE BUTEYKO BREATHNG TECHNIQUE

Developed by Russian scientist Konstantin Buteyko in the 1950s in Moscow, this method was used to treat asthma in the former Soviet Union. It is a natural technique that slows and lessens the intake of air into the lungs, which if practiced over time is proposed to reduce the symptoms and severity of asthma and It is also used by asthma sufferers to reduce dependency on medications (Douglas Dupler, 2005). Training requires five 90-minute sessions. The 30-minute exercise program has to be repeated six times a day initially. Introduction of the method to the NHS could have a major impact on asthma management with potentially huge savings on cost.

In recent years, it has gained popularity elsewhere. This technique teaches you to habitually breathe less. This prevents breathing too much (hyperventilation). The Buteyko technique also includes advice about relaxation and stress reduction, medication use, and general health (Mayo, Oct 2007).

In December 1994, a three-month research trial at the Mater Hospital in Brisbane (Australia), began into the Buteyko Method. A group taught the Buteyko Method was compared to a control group on conventional medical treatment and standard physiotherapy breathing exercises. After six weeks, the Buteyko group showed: 90% reduction in bronchodilator use compared to 5% reduction in the control group; statistically significant reduction in symptoms and improvement in quality of life. After twelve weeks, the Buteyko group also showed a 49% reduction in steroid use (Jennifer Harris 1994).

In a study of M. Thomas et al, (2001) with 7033 patients (aged 17-65) were about a third of women and a fifth of men scored suggestive of dysfunctional breathing. Although further studies are needed to confirm the validity of this screening tool and these findings, these prevalences suggest scope for therapeutic intervention and may explain the anecdotal success of the Buteyko method of treating asthma (M. Thomas et al, 2001).

These results have been recently confirmed in another study at Victoria University where twelve weeks after learning the Buteyko Method, asthmatics were able to reduce reliever medication by an average of 92%, (Jennifer Harris, 2007)

2.2.2 THE PAPWORTH METHOD

This sequence of relaxation and breathing techniques involves deep abdominal breathing (diaphragmatic breathing), nose breathing and matching your breathing to suit whatever activity you're doing. Some evidence suggests this technique significantly reduces asthma symptoms (Mayo 2007).

Papworth method was developed in the 1960s for patients with asthma and dysfunctional breathing. This involves specific diaphragmatic breathing techniques, emphasizes nose breathing and development of a breathing pattern to suit current activity. It is accompanied by relaxation training and education to help people integrate the exercises into their daily lives and recognize the early signs of stress (Thorax, 2007).

The Papworth Method appears to improve respiratory symptoms, dysfunctional breathing such as asthma (Elizabeth A Holloway and Robert West, May 2006)

This breathing technique for asthma sufferers developed 40 years ago has been proved for the first time to cut symptoms of breathlessness by a third (Jeremy Laurance, June 2007),

Holloway, EA et al evaluated the effectiveness of the Papworth method and they randomly assigned 85peolple with mild asthma to receive either 5 sessions of treatment by the Papworth method on top of their medical care or to continue to rely on usual drug therapy. Use of the method was found to be associated with less depression and anxiety and symptoms from inappropriate breathing habits were also reduced. Improvement in symptoms was maintained one year later. The Papworth method appears to ameliorate respiratory symptoms, dysfunctional breathing and adverse mood compared with usual care (Holloway et al, 2007).

2.2.3YOGA

This gentle form of exercise has been practiced for thousands of years. All kinds of yoga are about stretching. In addition to providing the benefits of exercise, yoga also incorporates breathing techniques - called pranayama -, which may help reduce asthma symptoms. While more studies are needed to determine how helpful yoga is in treating asthma, doing yoga on a regular basis might help relieve stress and improve your overall fitness and well-being (Mayo 2007).

Fifty three patients with asthma underwent training for two weeks in an integrated set of yoga exercises, including breathing exercises, suryanamaskar, yogasana (physical postures), pranayama (breath slowing techniques), dhyana (meditation), and a devotional session, and were told to practise these exercises for 65 minutes daily. They were then compared with a control group of 53 patients with asthma matched for age, sex, and type and severity of asthma, who continued to take their usual drugs. There was a significantly greater improvement in the group who practiced yoga in the weekly number of attacks of asthma, scores for drug treatment, and peak flow rate. This study shows the efficacy of yoga in the long term management of bronchial asthma, but the physiological basis for this beneficial effect needs to be examined in more detail (Br Med J, 1988)

A further double blind, randomised, controlled trial by Singh et al (1990) came to a similar conclusion. This trial assessed the effects of two pranayama yoga breathing exercises (the Pink City lung exercise) on airway reactivity, airway calibre, symptom scores, and medication usage in patients with mild asthma. Following a one week run in period the 18 patients with mild asthma practised slow deep breathing for 15 minutes twice daily for two

weeks, while the control period subjects were provided with a matched placebo device. All patients improved more with the Pink City lung exerciser than with the placebo device, but the differences in this small study did not reach statistical significance. However, there was a statistically significant increase in the dose of histamine needed to provoke the 20% reduction in FEV, during pranayama breathing, but not with the placebo device. This study suggests that a simple device which effectively imposes a yoga breathing technique may help asthma (Singh V, 1990)

Sahaja Yoga is a traditional system of meditation based on yogic principles which may be used for therapeutic purposes. A study was undertaken to assess the effectiveness of this therapy as an adjunctive tool in the management of asthma in adult patients who remained symptomatic on moderate to high doses of inhaled steroids (G.Marks, 1993).

A parallel group, double blind, randomised controlled trial was conducted by Manocha (2002). Both the yoga and the control interventions required the subjects to attend a 2 hour session once a week for 4 months. Asthma related quality of life (AQLQ, range 0-4), Profile of Mood States (POMS), level of airway hyper responsiveness to methacholine (AHR), and a diary card based combined asthma score (CAS, range 0-12) reflecting symptoms, bronchodilator usage, and peak expiratory flow rates were measured at the end of the treatment period and again 2 months later. This randomised controlled trial has shown that the practice of Sahaja yoga does have limited beneficial effects on some objective and subjective measures of the impact of asthma (Manocha, 2002).

Yoga breathing exercises (pranayama) involves mental concentration to cause a reduction in breathing frequency; a 1:2 ratio of inspiration to expiration and a pause at the end of inspiration and expiration. The expiratory resistance in the PCLE imposes a reduction in breathing frequency and expiratory flow.

These findings support the suggestion''' that the Buteyko technique may help patients adapt to their asthma and feel more in control of their treatment. The effects of the Buteyko breathing technique, a device which mimics pranayama (a yoga breathing technique), and a dummy pranayama device on bronchial responsiveness and symptoms were compared over 6 months in a parallel group study. In a study of Cooper et al (2003), ninety patients with asthma

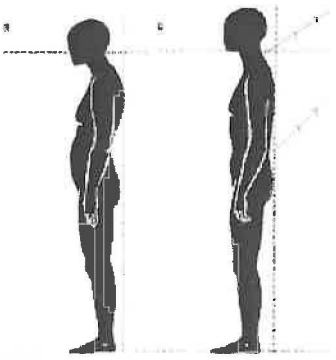
taking an inhaled corticosteroid were randomised after a 2 week run in period to Eucapnic Buteyko breathing, use of a Pink City Lung Exerciser (PCLE) to mimic pranayama, or a PCLE placebo device. Subjects practised the techniques at home twice daily for 6 months followed by an optional steroid reduction phase. Primary outcome measures were symptom scores and change in the dose of methacholine provoking a 20% fall in FEV(1) during the first 6 months. There was no significant difference between the three groups at 3 or 6 months. Symptoms remained relatively stable in the PCLE and placebo groups but were reduced in the Buteyko group. Bronchodilator use was reduced in the Buteyko group by two puffs/day at 6 months; there was no change in the other two groups (p=0.005). No difference was seen between the groups in FEV (1), exacerbations, or ability to reduce inhaled corticosteroids.

The effect of yoga on bronchial asthma has also been extensively studied. Pranayama has been shown to reduce clinical symptoms, reduce the need for medication and increase the PEFR, FEV_1 and FVC, though FEV_1 / FVC % did not change (Nagarathna & Nagendra 1985).

Vivekananda Kendra Yoga Research Foundation (Bangalore) has developed an integrated approach of yoga therapy which aims at correcting imbalances at all levels. It consists not only of asana, Kriyas, Pranayama, meditation, devotional sessions, but extensive coverage through lectures on the theory and philosophy of yoga. The benefits of this approach, when practiced regularly over 3 to 54 months, and compared to a control group, were a decrease in the number of asthma attacks per week, reduced intake of medication (including steroids), and improved PFR (Nagendra & Nagarathna 1985, Nagarathna et al 1991). This approach also includes a special 8-step yoga-chair breathing exercise which has proved useful for acute episodes of broncho-spasm (Nagarathna et al 1991). Singh (1987) demonstrated a particular maneuver (Kunjal) consisting of swallowing as much warm saline water as possible, first thing in the morning and then vomiting it out immediately, and it was shown to he helpful specially in asthmatics. A double-blind placebo-controlled crossover studies were done making use of a device which simulates pranayamic breathing (Singh et al. 1990). His study revealed a significant increase in the provocative dose of histamine needed to cause a 20% decrease in FEV_1.

2.2.4 ALEXANDER TECHNIQUE (AT):

Frederick Matthias Alexander was a Shakespearean orator who developed problems with losing his voice. After doctors informed him there was no physical cause, he carefully observed himself in multiple mirrors. This revealed that he was needlessly stiffening his whole body in preparation to recite or speak. Further, Alexander observed that many individuals experiencing voice problems tightened the musculature of the upper torso, especially the neck, prior to phonation in anticipation of the act of voicing; he suggested that this pattern of tensing would rotate the head backwards and downwards in relationship to the spine and disrupt efficient overall body alignment. Over the next eight years, he attempted to change this habit, after which point, he found that the pattern of voice loss had ceased (McEvenue, Kelly (2002).



Pic. 3: AT's goal while breathing (Vall, 2005)

The Alexander Technique does not involve exercises, medical therapy or treatment, forms of psychotherapy, or spiritual healing techniques. It is also unlike the manipulations of bodywork or manual healing techniques: Rather than looking at the body as a set of separate "parts" or pressure points to be individually "worked on," a skilled teacher guides a student through movement, observing and working with whole patterns of coordination, which include tension and postural patterns, how a student thinks about moving, and active movement itself. The student actively participates in this process, learning to apply his/her own intelligence to effectively change habits (Marian Goldberg, 1995).

AT helps improve the breathing by focusing primarily on the exhalation writes Leland Vall, a certified AT's instructor in Jan. 2008. The idea is to help discover an easy and extended exhalation. The exhalation is the relaxation phase of the breath. When the ribs and abdomen are soft, the diaphragm is able to rise to its highest point. This coordinated action, the easing of the abdomen, dropping of the ribs and rising of the diaphragm, helps to exhale the same amount of air taken in during the last inhale. The inhalation is the powered phase of the breath and it tends to occur as a reflex when the exhalation is properly coordinated. The relaxation and rise of the diaphragm makes it possible for the diaphragm to contract on the

next inhalation. In a lesson of Alexaner Technique, while lying on a table, the patient is encouraged by hands and verbal instructions of the therapist to move the ribs and abdomen, while at the same time encouraging length in the spine and width in the whole back to help avoid constricting. Progressive counting or other vocalizations are also used to help gradually extend the duration of the effortless exhalation. Approximately 10 lessons are required to learn breathing coordination (Vall, 2008).

A subjective sense of enhanced ease of breathing has been described by Austin and Ausubel, (1992) after instruction in the Alexander technique (AT) of proprioceptive musculoskeletal education (awareness and voluntary inhibition of personal habitual patterns of rigid musculoskeletal constriction). They investigated the effects of AT instruction on respiratory function in healthy adult volunteers (group 1, ten subjects), who received 20 private AT lessons at weekly intervals. Spirometry tests, including maximum static mouth pressures, were assessed before and after each course of lessons. Healthy control subjects, matched for age, gender, height, and weight (group 2, ten subjects), without instruction, were tested over a similar interval. Group 1 showed significant increases in PEF (9 percent, p less than .05), MVV (6 percent, p less than .05), MIP (12 percent, p less than .02), and MEP (9 percent, p less than .005) (paired Student's t testing). Group 2 showed no significant changes. Possible mechanisms for the changes in group 1 include increased length and decreased resting tension of muscles of the torso, which in turn may increase their strength, increase thoracic compliance, and/or enhance coordination. They concluded that AT musculoskeletal education may enhance respiratory muscular function in normal adult subjects (JH Austin and P Ausubel, 1992).

2.3 INTRODUCTION INTO SOME EFFECTIVE EXERCISES FROM FITNESS TO IMPROVE ASTHMA

1. DANDASANA:

1. Sit with your spine erect and your knees bent. Position the blocks on their broad sides on either side of your hips. Then place your palms on the blocks. Sit on your buttock bones.
2. Straighten each leg, one at a time, and join the inner sides of your legs and feet. Lengthen the calf muscles, and stretch your knees and toes. Keep your knees straight. Press your palms down on the blocks and stretch your elbows and arms.

3. Lift your abdomen, freeing the diaphragm of tension. Hold the pose for 1 minute. Beginners may find it easier to separate their feet slightly, and should hold the pose for just 30 seconds.

2. BADDHAKONASANA:

1. Sit on a bolster placed at right angles to your body. Place a side of your hips. Sit in Dandasana. Bend your knees and join both soles together. Pull your heels closer to the bolster. Beginners may find it easier to use a bolster positioned parallel to the hips.

2. Push your knees away from each other and lower them gradually onto the blocks. Open out your chest and draw in the abdomen. Initially, hold the pose for 1 minute. Gradually increase the duration of the asana to 5 minutes.

3. UPAVISTA KONASANA :

1. Sit against a wall. Then sit in Dandasana with your shoulders and back touching the wall. Keep your back erect. Sit on your buttock bones. Place your palms on the floor, beside your hips, fingers pointing forward. Look straight ahead (Anand 2001)

2.Press your palms down on the floor to push your torso upward.

Exhale, and spread your legs as far apart as possible. Use your hands, one by one, to help you push your legs even further out to the sides.

3.Move your hands behind your buttocks, and place both palms on the floor. Press your heels and highs down on the floor. Lift your waist and the sides of your torso. Rotate your thighs to the front so that the kneecaps face the ceiling. Shift your weight from the buttocks to the pelvic bone. Stretch each leg from thigh to heel. Hold the pose for 30 - 40 seconds.

4. VIRASANA :

1. Place 2 bolsters parallel to each other on the floor. Kneel on the bolsters, keeping your knees together. Place the rolled blanket on your shins, and the folded blanket under your buttocks. Sit with your back upright.

Keep your chest stretched out. Imagine you are squeezing your kidneys and drawing them into the body. Place your palms on your knees.
Look straight ahead. Stay in the pose for 30 - 60 seconds.

5. SUPTA BADDHAKONASANA:

1. Sit in Dandasana. Place a bolster behind you, its short end against your buttocks, and place a folded blanket on its far end. Place 2 wooden blocks on their broad sides on either side of your hips. Bend your knees, and join the soles of your feet together. Draw your heels toward your groin. Buckle the belt and loop it over your shoulders.

2. Bring the belt down to below your waist. Pass it under both feet to stretch it over your ankles and the insides of the thighs. Move your feet closer to your groin. The belt should feel neither too tight nor too slack, so adjust the buckle accordingly. Make sure that the end of the bolster touches your buttocks. Position a block under each thigh.

3. Place your elbows on the floor, and lower your head and back onto the bolster. Make sure that the bolster comfortably supports the length of your back and your head. Your spine should be on the centre of the bolster. Stretch your arms out to the sides, with the palms facing the ceiling. Relax, and extend your groin out to the sides. Feel the expansion of the pelvis, and the release of tension in your ankles and knees. Initially, With practice, increase the duration to 5 - 10 minutes.

6. SUPTA VIRASANA :

1. Kneel in Virasana and place a bolster behind you, the short end touching your buttocks. Place a rolled blanket on the far end. Make sure that the inner sides of your feet touch hips. Keep your back straight. Place your fingers on the floor beside your toes.

2. Press your palms on the floor, bend both elbows, and lean back toward the bolster. Place your elbows and forearms, one at a time, on the floor. Gradually lower your back onto the bolster. To avoid strain in the pelvic area or the thighs, ensure that your knees remain firmly on the floor.

3. Once you lower your back onto the bolster, rest the back of your head on the rolled blanket. Keep your chest fully expanded. Press your shoulder blades down on the bolster to lift your chest . Extend your toes and ankles toward the bolster. Push your feet closer to your hips with your hands. Extend the pelvis, and press your thighs close together.

4. Move your arms out to the sides, with the palms facing upward. Extend your neck, but keep your throat relaxed. Drop your eyelids down gently. Experience the relaxation of the thighs and the abdomen, and the lift of the chest. Feel the continuous stretch from the cervical spine to the tailbone. Initially, stay in the pose for 1 minute. With practice, increase the duration to 5 - 10 minutes.

7. SETUBANDHA SARVANGASANA :

1. Place a folder blanket on one end of the bench. Place a bolster on the floor in line with the bench, and touching one end of it. Place a folded blanket on the bolster. Then sit on the blanket on the bench, with your legs stretched out. Place a yoga belt under your thighs and bind it round the middle of your thighs.

2. Exhale, and lower your back toward the bolster. Press each palm down on the floor on either side of the bolster, your fingers pointing forward. Both arms should support your upper back. Keep your thighs, knees, and feet close together, your heels on the bench, and your toes pointing upward. Lower your arms to the floor.

3. Slide further down, until the back of your head and your shoulders rest on the bolster. Straighten your legs, keeping your feet together. Stretch the heels and toes away from the torso to increase the stretch of the legs. Extend your arms to the sides on the floor, with the palms facing the ceiling. Hold the pose for 3 minutes. Gradually increase the time to 5 - 8 minutes.

8.ADHOMUKHA SVANASANA :

1. Stand in Tadasana facing a wall, about 1m (3.5 ft) away from it. Place 2 of the blocks on their broad sides, shoulder- idth apart, against the wall. Place the third block on its long side, 45cm (18in) away from the wall. Separate your feet to a distance of 45cm(18in). Kneel, and place your palms on the two blocks against the wall.

2. Press your palms down on the blocks and walk your feet back, until they are 1.2m (4ft) away from your hands. Make sure that your feet are in line with your hands and the same distance apart. Raise both heels, stretch your legs, then lower your heels to the floor. Stretch your arms fully.

3. Consciously stretch each leg from heel to buttock, and from the front of the ankle to the top of the thigh. Raise your buttocks, stretch your chest, and push your sternum toward your hands. Exhale, then rest your head on the third block. Press your hands down on the blocks, extending your arms fully. Stretch your spine and expand your chest. Keep your throat soft and elongated. Relax your eyes and keep your brain passive.

9. UTTANASANA :

1. Stand in Tadanasana. Separate your legs to a distance of 30cm (1ft). Keep your feet parallel to each other, with the toes pointing forward. Pull up your kneecaps.
2. Inhale and raise your arms toward the ceiling, your palms facing forward. Push your spine up.
3. Bend from the waist toward the floor. To increase the stretch of your spine, vital for correct practice, press your heels down on the floor.
4. Rest the crown of your head on the blocks in front of you, and place your palms on the blocks beside your feet. Pull in your kneecaps. Extend your hamstrings and pull your inner legs upward. Feel one single stretch from the crown of your head to your heels. Hold the pose for 1 minute.

10. TADASANA SAMASTHITHI:

1.Stand in your bare feet on a smooth and even surface. Keep your feet together, with your heels touching the wall. Beginners may find it easier to keep their feet 5 cm (2in) apart.

2.Stretch your arms along your sides, with the palms facing your thighs, and your fingers pointing to the floor. Stretch your neck upward, keeping the muscles soft and passive.

3.Distribute your weight evenly on the inner and outer edges of your feet, and on your toes and heels. Tighten your kneecaps and open the back of each knee. Turn in the front of your thighs. Tighten your buttocks. Pull in your lower abdomen, and lift your chest.

4.Keep your head erect and look straight ahead. Breathe evenly and with awareness.

5.Experience your body and mind as an integrated whole and feel the surge of energy. Stay in the pose for 30 - 60 seconds.(Womenfitness.net 1999-2007)

INTRODUCTION INTO SOME EFFECTIVE SCHOOL EXERCISES BASED ON DYNAMIC YOGA

In this part of the thesis I would like to introduce some of our school breathing exercises or better said, remedial physical education of breathing, from two specialist docents; Docent Véle and Docent Strnad presented the dynamic breathing pattern which should change the "wrong" shape of the body. The change of shape will best answer the purpose to shift the load from the overloaded area and balance the posture in such a way to enable the right and sufficient breathing for each individual.

Through the pictures below you will be able to learn different patterns of breathing, the abdominal (diaphragmatic breathing), the lower chest, upper chest and the combination of all three, with and without the participation of pelvic floor muscles, breathing into the spine, into the region of scapulae etc. These exercises are mostly stimulated through the hands which are placed on the region which we want to breathe into it. In some exercises (pic. 19-23) the closing of fist or circling of thumb is shown. In these exercises you can breathe more or one sided if necessary for the areas which are in imbalance.

The exercises should be repeated everyday for the best results. Also for the best result it is of big importance to observe your own body and connect your body and mind. This way you can achieve your goal to full grade.

These exercises lead not only to a good and healthy posture and right breathing but also strengthen your mind and soul. When you realize what you do and believe in it, the positive changes will occur.

Do it yourself and experience it which exercise will enhance and which will inhibit the breathing.

Pic. 1a: Lying supine, flexed knees, feet matched with pelvis, arms apart from the body, palm facing up. (Starting position)

Pic.1b: Lying supine, flexed knees, feet matched with pelvis – arms close to the body, Palm facing to abdomen. (expansion of abdomen with breathe in)

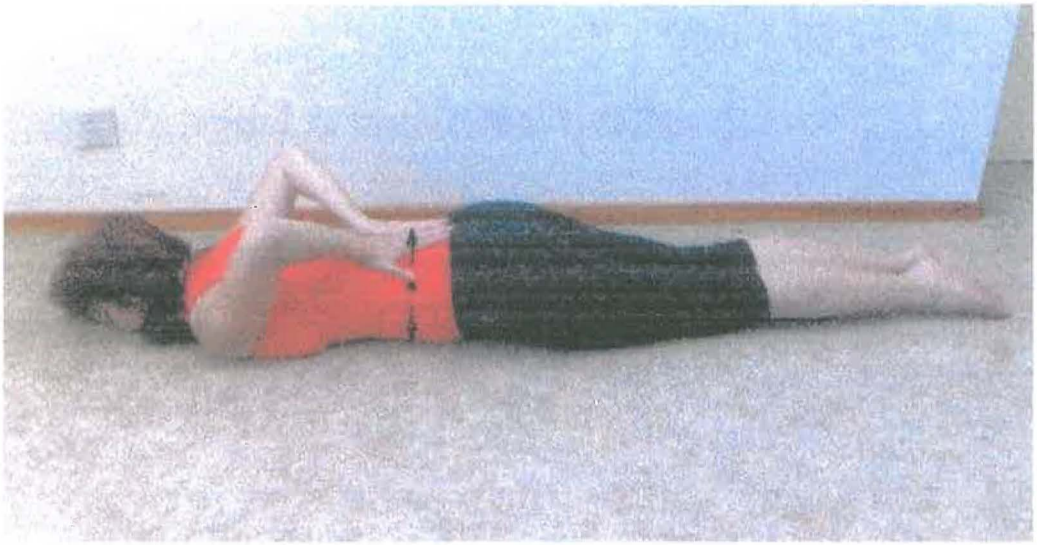
Pic. 1c: Lying supine, feet straight matched with pelvis – arms close to the body, Palm on the abdomen (abdomen down to L-spine with active breathe out)

Pic. 2a: Lying on back – arms bending across, palms on lower edge of chest. (Lower chest breathing – breath in)

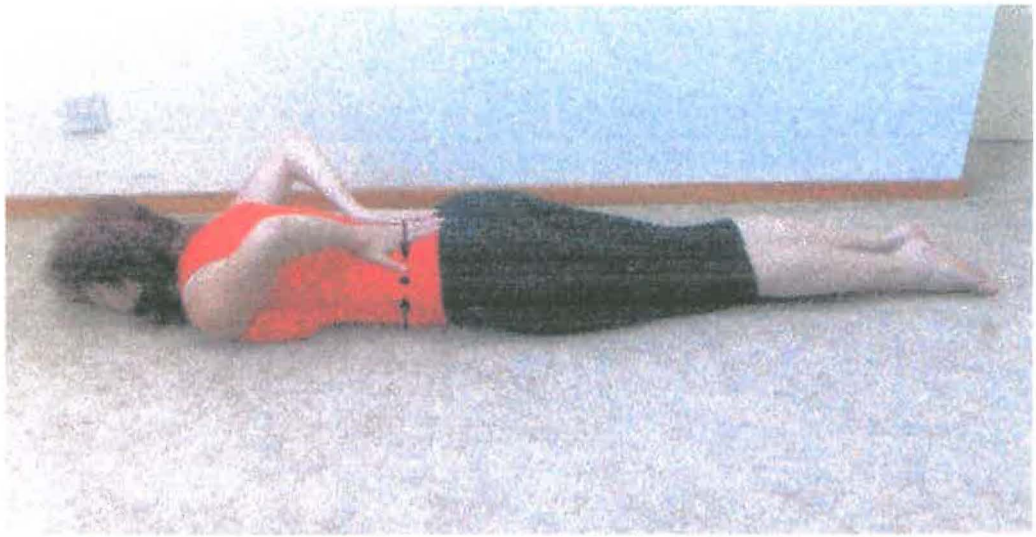
Pic.2b: Lying on back – arms bending across, palms on lower edge of chest. (Lower chest breathing – breath in)

Pic. 3a: Lying on back – arms bending across, forearm upwards in, palms placed on upper chest, under clavicle. (Upper chest breathing – breath in)

Pic.3b: Lying on back, arms bending across, palms placed on upper chest, under clavicle (Upper chest breathing – breath out)



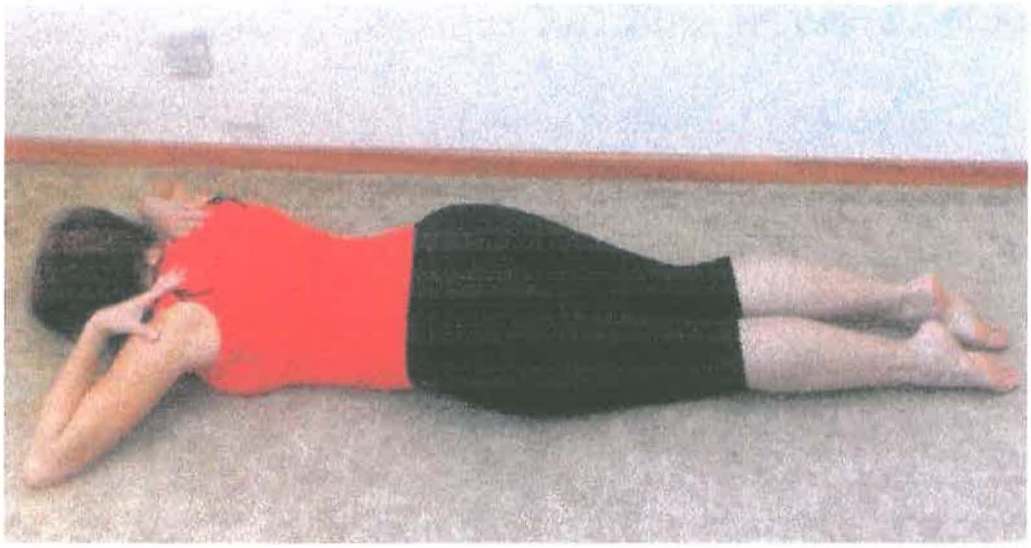
Pic. 4a: Lying on abdomen – arm bending along and on the L-spine, head extended, and chin leaned on the ground. (Abdomen breathing – breath out)



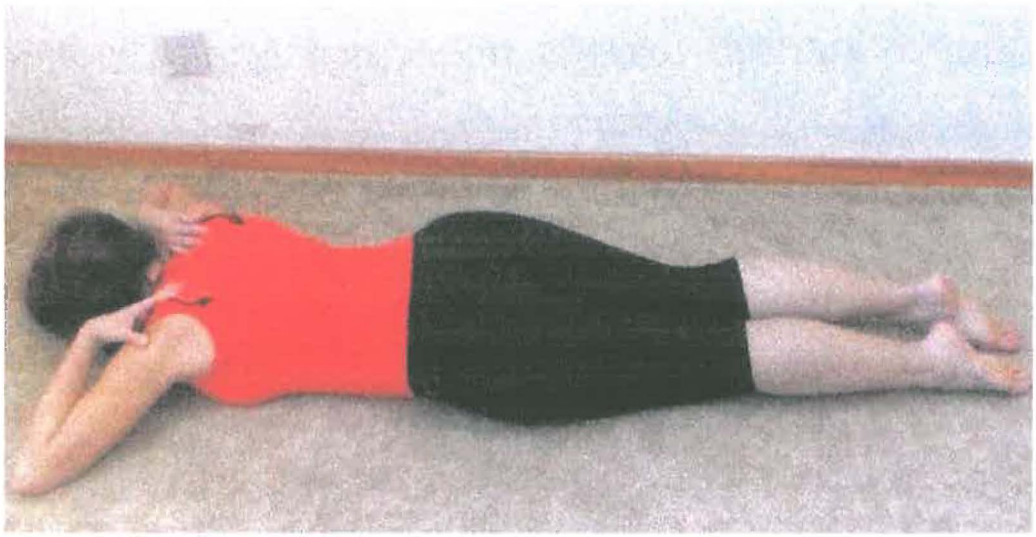
Pic.4b: Lying on abdomen – arm bending along and on the L-spine, head extended, chin leaned on the ground.(abdomen breathing – breath in)

Pic. 5a: Lying on abdomen – hands on the lower posterior side of ribs, head extended, chin leaned on the ground (Lower chest breathing – breath in)

Pic. 5b: Lying prone – palms on lower posterior side of ribs, head extended, chin leaned on the ground (Lower chest breathing – breath out)



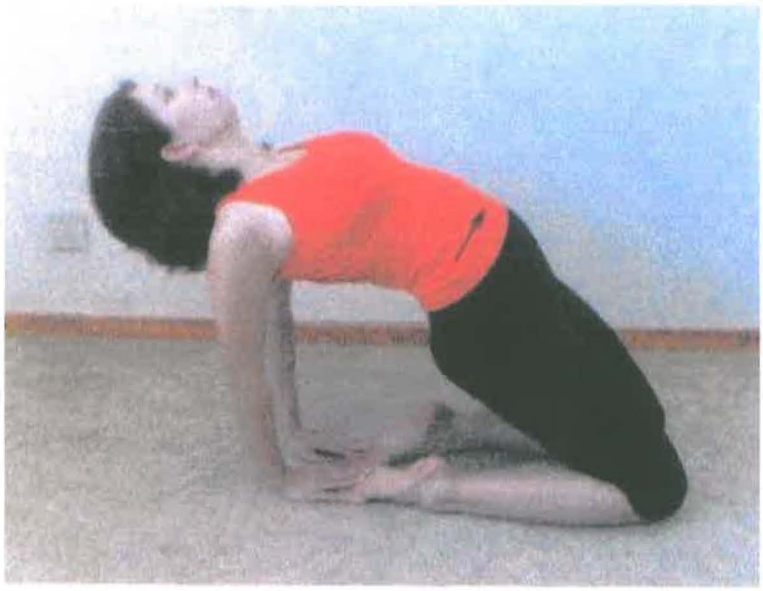
Pic. 6a: Lying on stomach – arm bending hands up, hands on back, upper side of chest, on upper margin of scapula (Upper chest breathing – breath in)



Pic.6b: Lying on stomach – arm bending, hands on posterior upper chest (scapula)
(Upper chest breathing – breath out)

Pic. 7a: Kneeling – arms freely along the body, trunk straight
(Body position in final phase of breath in)

Pic.7b: Knelt sitting – arms along the body.
(Body position in final phase of breath out)



Pic. 8a: Knelt sitting – tilt body back – arm swinging down-ward-backward.
fingers holding toes. (Body position in final phase of breath in)

Pic.8b: Knelt sitting – tilt body back – arm swinging downward-backwards fingers holding toes. (Body position in final phase of breath out)

Pic. 9a: sitting on the knees, Support on forearms, elbows touching knees. (Position of body in final phase of breathe in)

Pic. 9b: sitting on the knees, support on forearms, elbows touching knees.
(Position of body in final phase of breathe out)

Pic. 10a: sitting on the knees, hands in front of the knees.
(Position of body in final phase of breathe in)

Pic.10b: sitting on the knees, hands in front of the knees.
(Position of body in final phase of breathe out)

Pic.11a: lying on back, support on elbows, hands on lat. side of ASIS. (Position of body in final phase of breathe in)

Pic. 11b: Lying on back, support on elbows, hands on lat. ASIS. (Position of body in final phase of breathe out)

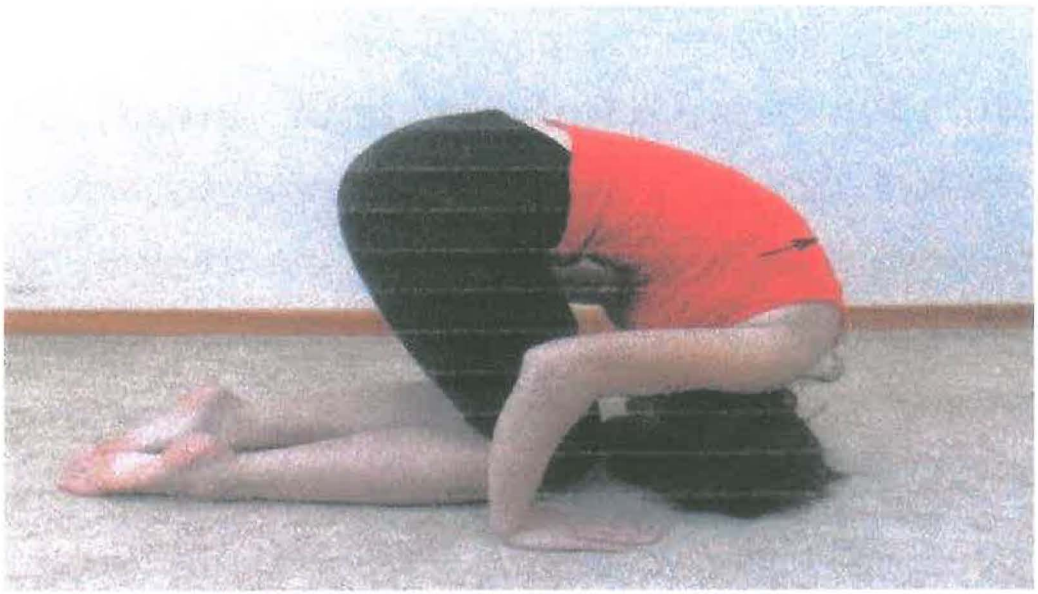
Pic.12a: Lying on over extended back, head based on the ground –arms sideways down, hands on the ASIS. (Position of body in final phase of breath in)

Pic.12b: Lying on hyper extended back, head on the ground; hands on ASIS (Position of body in final phase of breathe out)

Pic.13a: Full flexion of body while lying on the knees, head down to the ground in front of knee – hands up. (Position of body in final phase of breathe out)

Pic. 13b: Sitting on the knees – hands down, straight spine.
(Position of body in final phase of breathe in)

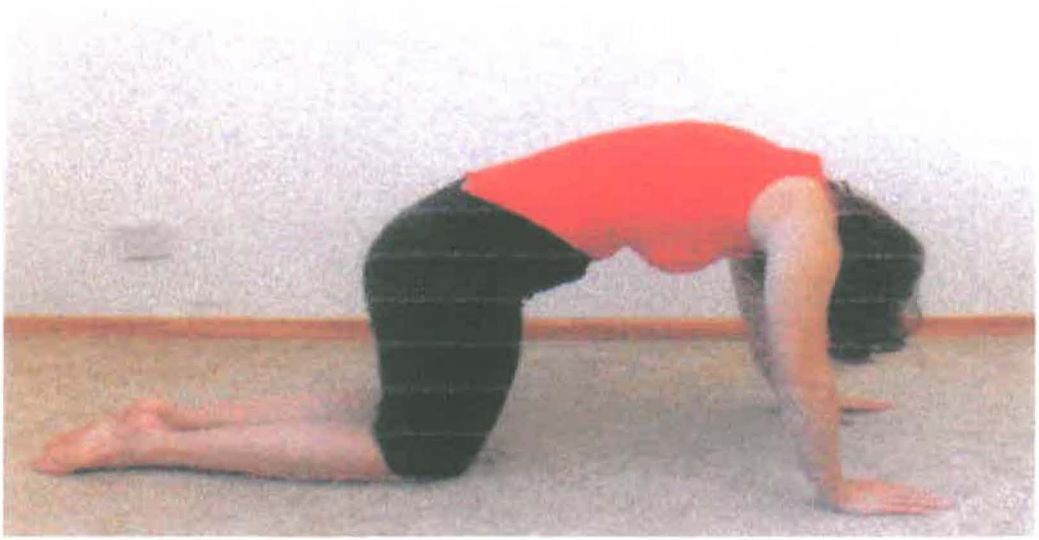
Pic.14a: Sitting on the knees – hands down, relaxed, head down.
(Position of body in final phase of breathe out; 7. – 12. Phase)



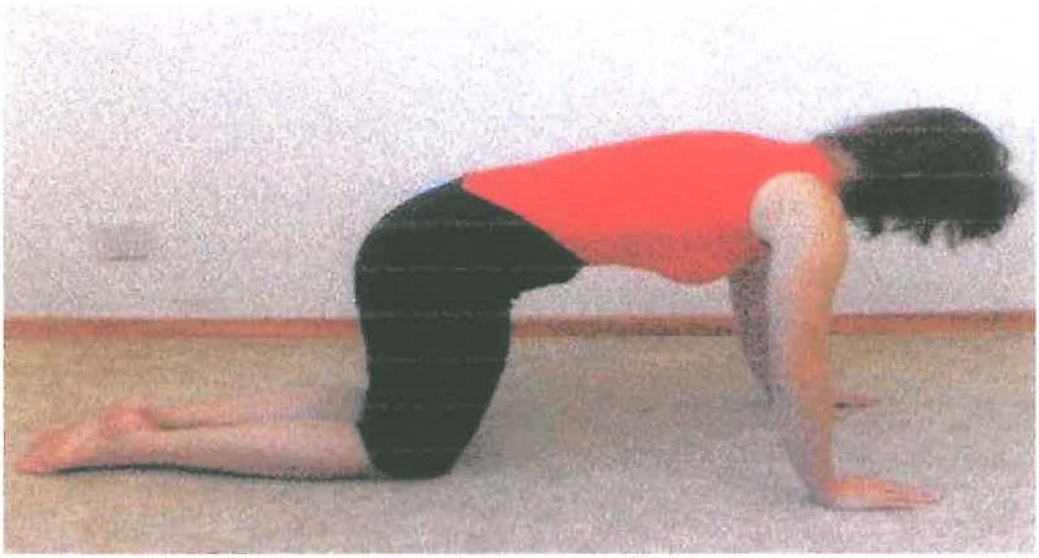
Pic.14b: Bend down to the knees – hands on the ground, buttock up.
(Position of body in final phase of breathe in; 13. – 18. phase)

Pic.15a: Lying prone with upper chest on the ground, buttock up, arms apart, on the sides, head to the side. (Body position on upper chest in final phase of breath in).

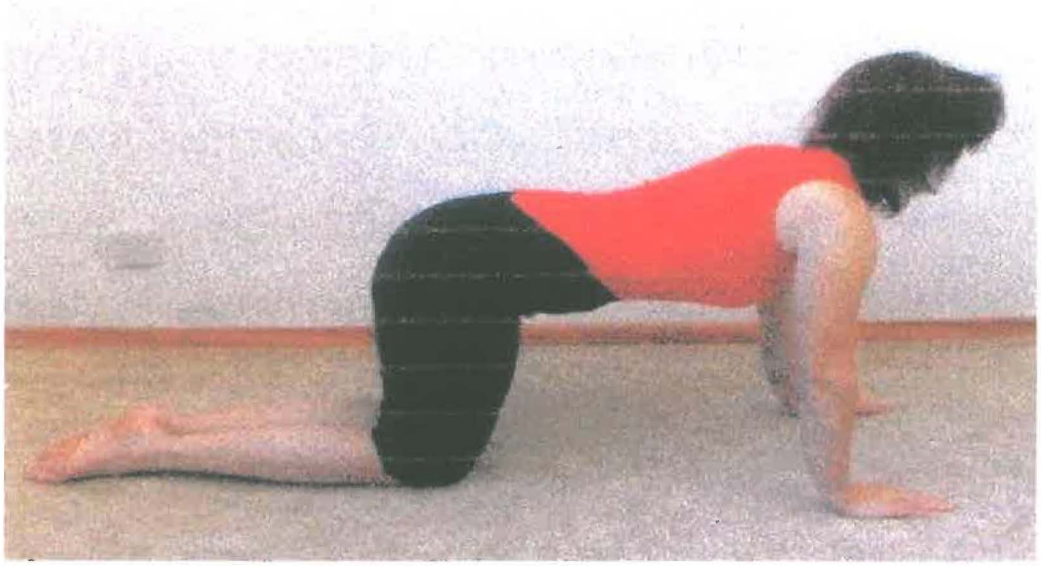
Pic.15b: Lying prone on upper chest, buttock up, arms apart, head on one side (Body position on upper chest in final phase of breath out).



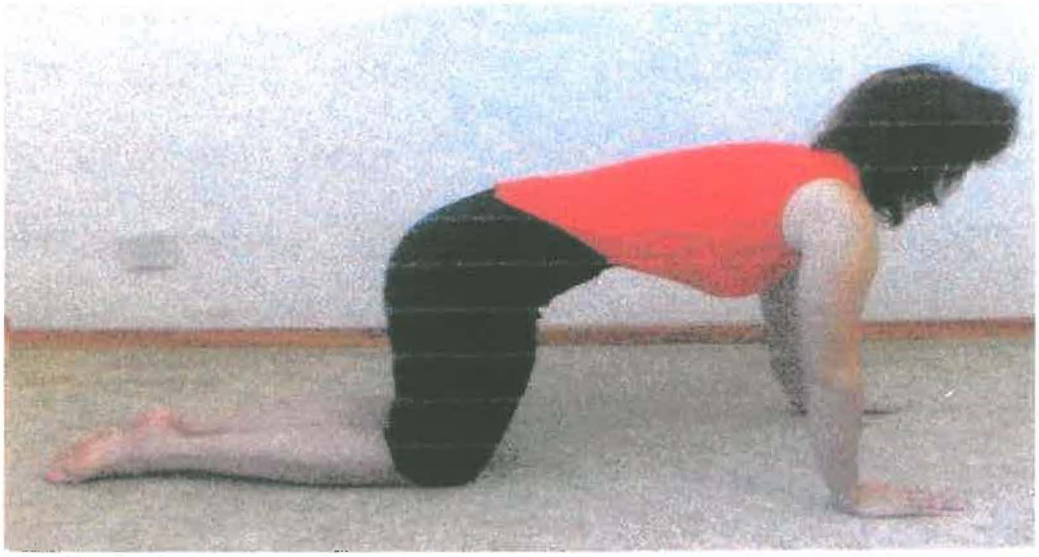
Pic.16a/1: kneeling, quadruped, head hanging – feet stretched, head hanging, kyphotic position (Body position in first two phases of breath in).



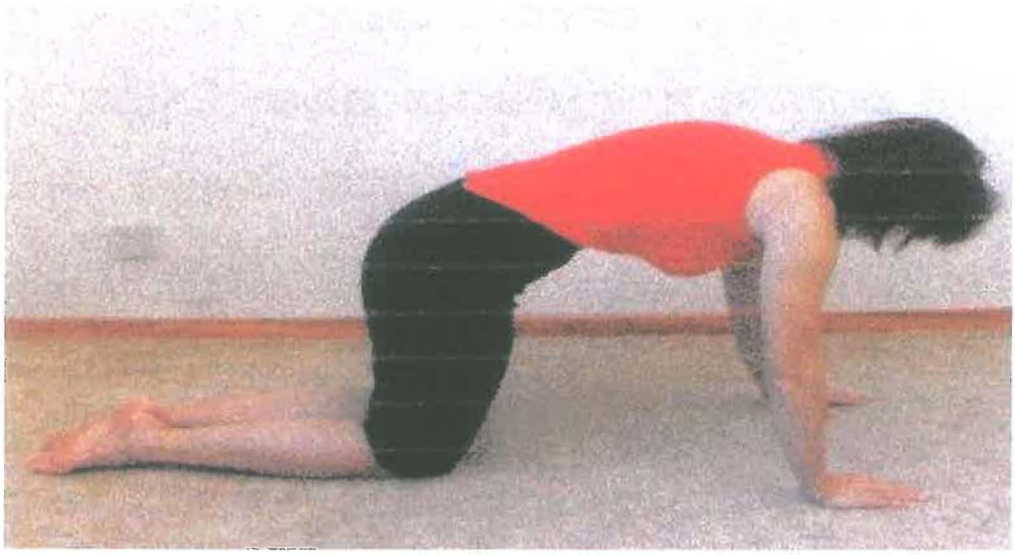
Pic. 16a/2: quadruped sitting on the knees in width of pelvis – feet stretched, side looking with straight spine (Body position in 3rd and 4th phases of breath in).



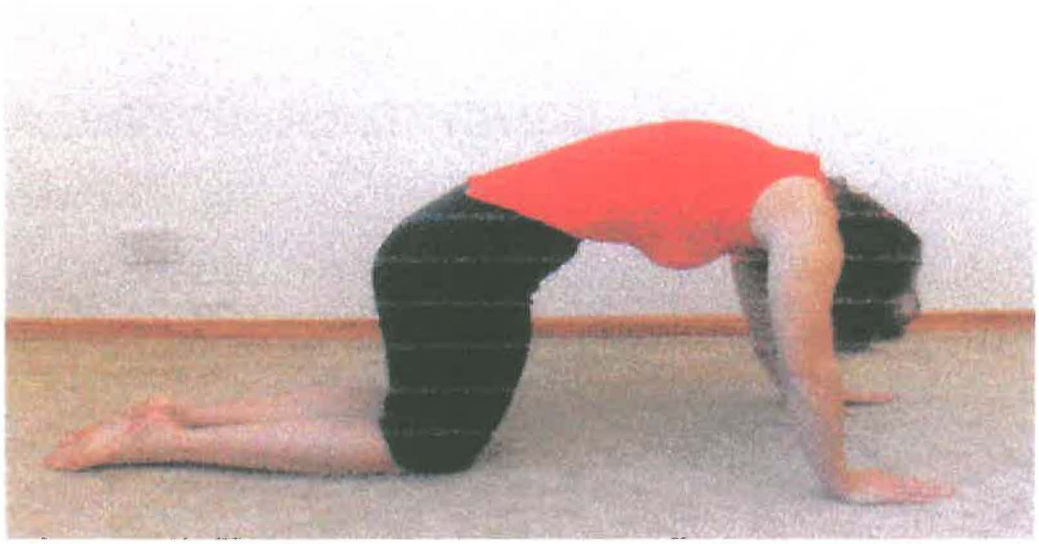
Pic.16a/3: quadruped sitting on the knees in width of pelvis – feet stretched, head rotated to side; lordotic position (Body position in 5th and 6th phases of breath in).



Pic.16b/1: quadruped sitting on the knees in width of pelvis – feet stretched, stretched spine (Body position in first two phases of breath out).

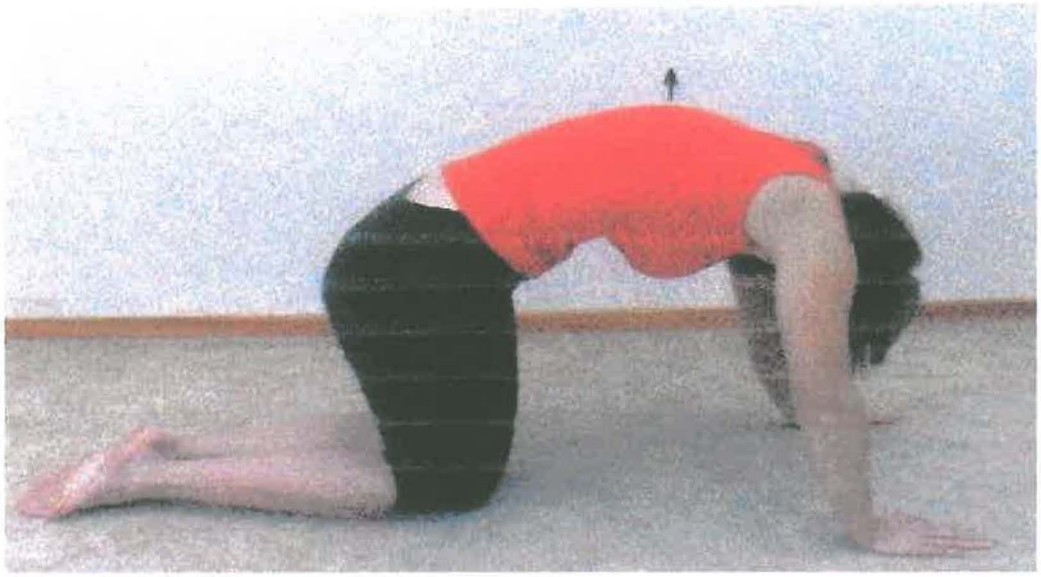


Pic.16b/2: quadruped sitting on the knees in width of pelvis – feet stretched; kyphotic position (Body position in 3rd and 4th phases of breath out).



Pic.16b/3: quadruped sitting on the knees in width of pelvis, head hanging, head hanging; kyphotic position (Body position in 5th and 6th phases of breath out).

Pic.17a: quadruped sitting on the knees in width of pelvis – feet stretched, head extended, lordotic position (Body position in final phase of breath in).



Pic.17b: quadruped sitting on the knees in width of pelvis – feet stretched, kyphotic position, head hanging (Body position in final phase of breath out).

Pic.18a: tripedal sitting on one knee in width of pelvis – feet stretched, 2nd leg straight in the level of spine. (Body position in final phase of breath in).

Pic.18b: tripedal sitting on the knees in width of pelvis, feet stretched, head hanging 2nd leg flx next to the epsilateral shoulder (Body position in final phase of breath out).

Pic.19: Sitting on knees – semi flex arms, circle thumb with 2nd digit as demonstrated and put them on the ASIS, rest of digits straight and next to each other. (Starting of practicing position and detail on hand position.)

Pic.20: Sitting on knees - flex arms sideways down, thumb and index finger make circle, the rest of the fingers are flexed and facing the inside of palm. (Starting of practicing position and detail on hand position.)

Pic.21: Sitting on knees - flex arms sideways down – make a fist with thumb inside, placed on ASIS (Starting practicing position and detail on hand position.)


Pic.22: Sitting on knees– hands in fists with thumbs inside, hands are touching with joints of 1st and 2nd phalanges on lower chest. (Starting of practicing position and detail on hands position.)


Pic.: Sitting on knees– hands on thighs, palms up with fingers straight thumb in 90° of abduction. (Starting of practicing position and detail on hand position.)

Pic.24a: Lying on back, arms sideways down, palms down, legs apart 30°, big toes touching each other (Body position – lower limbs in final phase of breathe in)

Pic. 24b: Lying on back, legs apart 45°, arms pronated, hip externally rotated (Body position – lower limbs in final phase of breathe out)

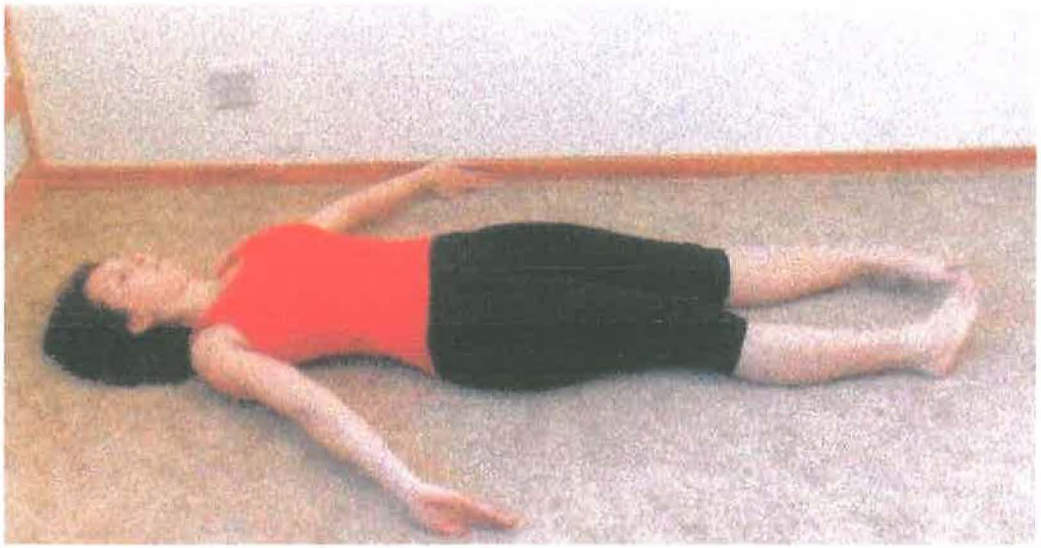
Pic.25a: Lying on back – legs apart 30°, arms externally rotated, (Body position: upper limbs in final phase of breathe in)

Pic.25b: Lying on back - legs apart 30°, arms internally rotated, (Body position: upper limbs in final phase of breathe out)

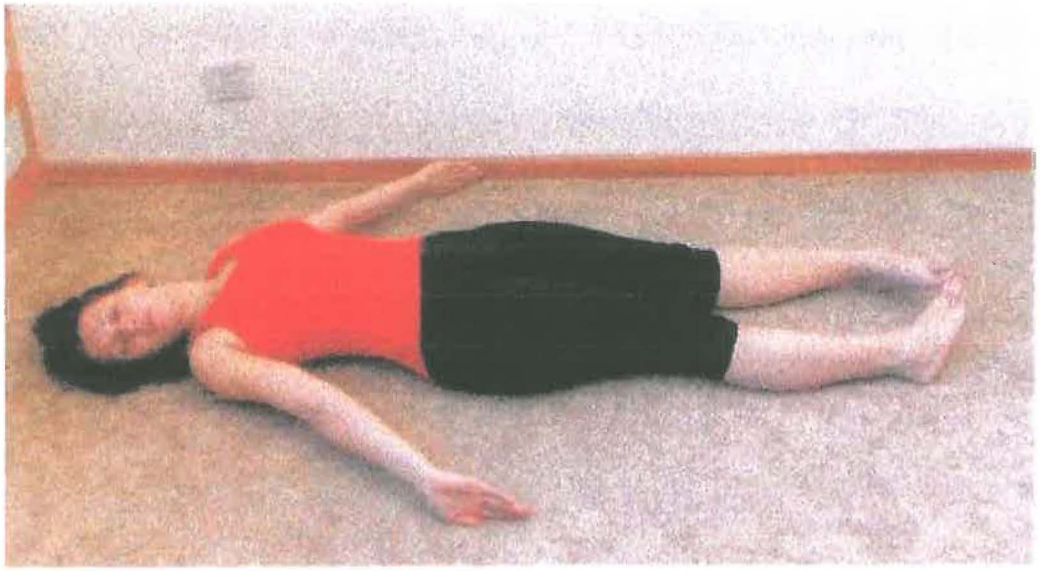
Pic.26a: Lying on back- legs apart 45°, arms pronated, head rotated.
(Body position – head to the right in final phase of breathe in)

Pic.26b: Lying on back- legs apart 45°, arms pronated, head rotated. (Body position – head to the left in final phase of breathe out)

Pic.27a: Lying on back - legs apart 30°, arms pronated, big toes touching, head straight. (Body position and its segments in 1. – 2. Phase)



Pic.27b: Lying supine; legs apart 30°; arms externally and hip internally rotated, head straight. (Body position and its segments in 1. – 4. phase)



Pic.27c: Lying on back - legs apart 30°, arms externally and legs internally rotated head rotated to the right (Body position and its segments in 5. – 6. phase)

Pic.27d: Lying supine, legs apart 45°, arms apart, externally rotated, legs externally rotated; head rotated to the right. (Body position and its segments in 7. – 8. phase)

Pic.27e: Lying on back - legs apart 45°, arms internally and legs externally rotated; head rotated to the right. (Body position and its segments in 9. – 10. phase)

Pic.27f: Lying on back- legs apart 45°, arms internally and legs externally rotated; head rotated to the left. (Body position and its segments in 11. – 12 phase)

Pic.28a: Lying on back- legs apart 30°, arms externally and hip internally rotated; head rotated to right.(Body position and its segments in6th phase during breath in)

Picture 28b: Lying on back straddle - arms sideways down. (Body position and its segments in 12th phase during breath out).

Pic. 29a: Sitting on the knees – flex arms, hands on the thighs
(Starting position for exercise 29 – 32)

Pic.29b: Sitting on the knees – flex arms, palms on thighs.
(Starting position for exercise 29 – 32)

2.4 ASTHMA STATISTICS

American Academy of Allergy Asthma and Immunology 1996-2008 has published following facts about asthma statistics in the United States. I might have talked about them individually but here is a resume of all the statistics:

Asthma and allergies strike 1 out of 4 Americans (CDC Fast Facts 2003).

Approximately 20 million Americans have asthma(Trends in Asthma Morbidity and Mortality May 2005).

Nine million U.S. children under 18 have been diagnosed with asthma(National Health Interview Survey, 2002).

More than four million children have had an asthma attack in the previous year (National Health Interview Survey, 2002).

More than 70% of people with asthma also suffer from allergies (National Library of Medicine).

10 million Americans suffer specifically from allergic asthma (National Institute of Allergy and Infectious Disease).

The prevalence of asthma increased 75% from 1980-1994 (Surveillance for Asthma - United States, 1960-1995).

Asthma rates in children under the age of five have increased more than 160% from 1980-1994 (Surveillance for Asthma - United States, 1960-1995).

In 2004, there were 13.6 million physician office visits and 1 million outpatient department visits due to asthma (CDC Fast Facts 2003).

Asthma accounts for one-quarter of all emergency room visits in the United States each year with 2 million emergency room visits in 2001 (New Asthma Estimates, 2001).

Approximately 44% of all asthma hospitalizations are for children (NCHS, 2000).

There are approximately 5,000 deaths from asthma annually (Trends in Asthma Morbidity and Mortality May 2005).

Direct health care costs for asthma in the United States total more than $10 billion annually; indirect costs (lost productivity) add another $8 billion for a total of $18 billion (The Costs of Asthma," Asthma and Allergy Foundation 2000 updates).

Prescription drugs represented the largest single direct medical expenditure, over $5 billion (Trends in Asthma Morbidity and Mortality May 2005).

Children 5-17 years of age missed 14.7 million school days due to asthma in 2002 (National Health Interview Survey).

Asthma accounts for approximately 24.5 million missed work days for adults annually (Trends in Asthma Morbidity and Mortality May 2005).

The value of reduced productivity due to death represented the largest single indirect cost related to asthma, approaching $1.7 billion. (Trends in Asthma Morbidity and Mortality May 2005).

Asthma prevalence is 39% higher in African Americans than in whites (Trends in Asthma Morbidity and Mortality May 2005).

The prevalence of asthma in adult females was 35% greater than the rate in males, in 2003 (Trends in Asthma Morbidity and Mortality May 2005).

Approximately 40% of children who have asthmatic parents will develop asthma (N Engl J Med 1995).

Every day in America 40,000 people miss school or work, 30,000 people have an asthma attack, 5, 000 people visit the emergency room, 1,000 people are admitted to the hospital and 11 people die due to asthma. AAAAI, 2000 (Annual U.S. Prevalence Statistics for Chronic Diseases).

2.4.1 ALLERGY STATISTICS

Allergies are estimated to be the biggest cause of asthma, thus I see the necessaty to introduce some statistic facts about allergies:

Estimates from a skin test survey suggest that allergies affect more than 50 million people in the United States (Gergen, P.J., Turkeltaub, P.C., Kaovar M.G., 1987).

Allergic disease is the 5th leading chronic disease in the U.S., 3rd common chronic disease in children under 18 year old

A recent nationwide survey found that more than half (54.6 percent) of all U.S. citizens test positive to one or more allergens (Arbes SJ et al.2005).

The costs associated with allergic disease are very high: $7.9 billion per year, $4.5 billion on direct care and $3.4 billion on indirect costs, related to lost work productivity (Stempel DA. 1997).

3. CHAPTER III

METHODOLOGY:

We did a comprehensive literature search using many databases amongst Medline, the Cochrane Library, Proquest, Pubmed and Embase. We used the following keywords in the search:

Clinical picture, Risk factors of asthma, Psychosomatics of asthma, Stress, Diagnosis of asthma, Treatment of asthma, Asthma and exercise, Asthma and breathing exercise, breathing techniques such as Buteyko, Papworth and Yoga.

We selected and extracted recent articles from 1985- 2007 that we felt to be of relevance or interesting as well as choosing topics that we were aware of being potentially important. All the authors are respiratory physicians with an interest in airways disease or/and therapies.

Abstracts were identified and 42 full text papers were obtained for assessment and possible inclusion. 26 studies were excluded due to a field, which was not relevant for the thesis (pregnancy and asthma, flight attendants suffered from asthma in smoking airplane....) or not having enough evidence (some studies claimed about some topics that couldn't be found in any other databases). A total of studies were included in the original review. Two single studies showed significant improvements in quality of life measures. Overall, benefits of breathing exercises were found in isolated outcome measures in single studies. Five studies compared breathing retraining with no active control and two with asthma education control groups.

The articles were abstracts, clinical reviews, systemic reviews, randomized single blind and double blind controlled trials, randomized follow-up studies, Journals and cross-sectional surveys.

Books were reviewed for history, Pathophysiology and clinical pictures (Evidence Based Medicine guidelines, Color Atlas of Pathophysiology, Rehabilitation of the Spine)

The review was also covered by some organizations such as WHO, Thorax, Chest , American College of Chest Physicians and American College of Allergy, Asthma and Immunology . Some Journals (American Journal of Respiratory and Critical Care

Medicine, BMJ (British Medical Journal), American Journal of Epidemiology) were also of good use.

3.1 Here is the summary of all databases used in this thesis

Proquest (59)
PubMed (n = 32)
Thorax (n=17)
MEDLINE silverplatter (n=16)
Cochrane Library (n =12)
EBSCO (n=10)
PEDro (n = 10)
EMBASE (n = 9)
CINAHL (n = 7)
NewsRx (n=7)
MEDLINE (n= 5)
Chest (3)
BMJ (n=3)
Biomed Central (n=2)
Science and Medicine (n=1)
Revolution Health(n=1)

4. CHAPTER IV

RESULTS AND DISCUSSION

The articles contain data relating to the effectiveness of exercise therapy compared to other treatments. Some of the studies show insufficient evidence to support or disprove the effectiveness of exercise therapy, but there are indications to support the effectiveness of some exercise and breathing exercise therapy. Different studies are being researched for different techniques of breathing retraining such as Buteyko, Yoga, Papworth and Alexander.

The power of intervention programs for asthmatics may be strengthened by the development of some breathing exercise programs contingent upon the consequences of the individual case. Also, breathing exercise therapy may be of assistance to mild asthmatics. Let's have a closer look to the research about exercises and breathing methods and at their outcomes:

Four studies, in 1993a, 1993b, 2000, 2002 by different researchers, claimed that regular exercise was found to have no effect on resting lung function or the total number of days that the participants reported wheezing however, regular exercise can increase oxygen intake by up to 20% and it also improves overall fitness and air transfer in and out of the lungs. It was confirmed in 2005 by further 13 studies with the same outcome (Ram. F. S. 2005).

Another study concluded that physical activity is associated with higher levels of FEV_1 (American Journal of Epidemiology, 2002).

There were many evidences which concluded that exercise induces asthma. They showed that heavy exercises such as treadmill or step test induces a percentage fall in FEV_1 (Tancredi et al, 1989).

Taking these outcomes into account, we would withdraw the heavy exercises since they are almost all inducing asthma but for the overall well being and a better gas exchange in the lungs we would certainly recommend some mild exercises with caution to the asthmatics and advise them to take a short acting beta 2 agonists, if necessary before starting exercises to avoid attacks during performance. But let's discuss breathing exercises and see if there is any need for the intake of beta 2 agonists:

Yoga is a good option to strengthen the body and breathing through mind. Doing yoga on a regular basis might help relieve stress and improve the overall fitness and well being (Mayo 2007). However Mayo's view about yoga is different. He claims that all yoga exercises are about stretching (page33 in the thesis), whereas yoga is a great deal of body- mind connection and it is more a spiritual exercise than "only" stretching. It involves mental concentration and is a kind of meditation-based exercise.

There were a variety of studies, which were concerned with the effectiveness of yoga on patients with asthma:

In one of the studies of Nagarathna R (1981-88), 53 patients with asthma underwent training for two weeks in an integrated set of yoga exercises, including breathing exercises, suryanamaskar (Sun Salutation), yogasana (physical postures), pranayama (breath slowing techniques), dhyana (meditation), and a devotional session, and were told to practice these exercises for 65 minutes daily. They were then compared with a control group of 53 patients with asthma matched for age, sex, and type and severity of asthma, who continued to take their usual drugs.

There was a significantly greater improvement in the group who practiced yoga in the weekly number of attacks of asthma, scores for drug treatment, and peak flow rate. This study shows the efficacy of yoga in the long term management of bronchial asthma, but the physiological basis for this beneficial effect needs to be examined in more detail (Br Med J, 1988)

A further double blind, randomised, controlled trial by Singh et al (1990) came to a similar conclusion. This trial assessed the effects of two pranayama yoga breathing exercises (the Pink City lung exercise) on airway reactivity, airway calibre, symptom scores, and medication usage in patients with mild asthma. Following a one week run in period the 18 patients with mild asthma practised slow deep breathing for 15 minutes twice daily for two weeks, while the control period subjects were provided with a matched placebo device. All patients improved more with the Pink City lung exerciser than with the placebo device, but the differences in this small study did not reach statistical significance. However, there was a statistically significant increase in the dose of histamine needed to provoke the 20% reduction in FEV, during pranayama breathing,

but not with the placebo device. This study suggests that a simple device, which effectively imposes a yoga breathing technique, may help asthma (Singh V 1990)

Sahaja Yoga is a traditional system of meditation based on yogic principles which may be used for therapeutic purposes. A study was undertaken to assess the effectiveness of this therapy as an adjunctive tool in the management of asthma in adult patients who remained symptomatic on moderate to high doses of inhaled steroids (Marks 1993).

A parallel group, double blind, randomised controlled trial was conducted by Manocha, (2002). Both the yoga and the control interventions required the subjects to attend a 2 hour session once a week for 4 months. Asthma related quality of life (AQLQ, range 0-4), Profile of Mood States (POMS), level of airway hyperresponsiveness to methacholine (AHR), and a diary card based combined asthma score (CAS, range 0-12) reflecting symptoms, bronchodilator usage, and peak expiratory flow rates were measured at the end of the treatment period and again 2 months later. This randomised controlled trial has shown that the practice of Sahaja yoga does have limited beneficial effects on some objective and subjective measures of the impact of asthma (Manocha, 2002)

Yoga breathing exercises (pranayama) involves mental concentration to cause a reduction in breathing frequency; a 1:2 ratio of inspiration to expiration and a pause at the end of inspiration and expiration. The expiratory resistance in the PCLE imposes a reduction in breathing frequency and expiratory flow. These findings support the suggestion"' that the Buteyko technique may help patients adapt to their asthma and feel more in control of their treatment. The effects of the Buteyko breathing technique, a device which mimics pranayama (a yoga breathing technique), and a dummy pranayama device on bronchial responsiveness and symptoms were compared over 6 months in a parallel group study. In a study of Cooper et al (2003), ninety patients with asthma taking an inhaled corticosteroid were randomised after a 2 week run in period to Eucapnic.

Focusing on Buteyko method, which is about less breathing and balancing the O2 and CO2 amount in the body accordingly, and avoiding hyperventilation, we can see different results from following studies:

1994: a three-month clinical trial in Brisbane (Australia) showed after six weeks that the Buteyko group had 90% reduced bronchodilator use compared to 5% reduction in the

control group, they also had statistically significant reduction in symptoms and improvement in quality of life. After twelve weeks, the Buteyko group also showed a 49% reduction in steroid use (Jennifer Harris 1994).

2001: In a study of M. Thomas et al, with 7033 patients scored suggestive of dysfunctional breathing. this prevalence may explain the anecdotal success of the Buteyko method of treating asthma, confirmed at Victoria University where twelve weeks after learning the Buteyko Method, asthmatics were able to reduce reliever medication by an average of 92%.

Over 90% of 100 000 patients who completed the Buteyko course in Russia are said to need no further asthma medication and a similar success rate has been claimed for 8000 patients in Australia.9 The results of the two controlled studies from Australia in 39 and 36 subjects are more modest.4 5 In one, which focused on patients taking high doses of short acting beta2 agonists (median >800 [mu]g salbutamol daily), Buteyko training resulted in a large reduction in beta2 agonist use which correlated with a reduction in minute ventilation compared with the control group. There was a non-significant trend to reduced inhaled steroid use and better quality of life, but no change in lung function or end tidal CO2 pressure. In the second study subjects taught Buteyko breathing exercises by video had a reduction in bronchodilator use and improvement in quality of life but no change in peak flow rate (Opat AJ, 2000).

Concerning Quality of life, there was a study with 301 asthmatic children who were examined for the relationship between exercising and their quality of life. They showed a significant improvement of quality-of-life.

Quality of life score remained unchanged in a double-blind, randomized trial reported Charles Vega, MD (June 2006) with 57 patients. Lung function and airway responsiveness were also unchanged. However, reliever use decreased by 86% and inhaled corticosteroid dose was reduced by 50% across both groups.

In a study with 204 asthmatic children in Holland, Low quality-of-life scores improved significantly in children who participated as measured in generic and disease-specific-questionnaires, while children enjoyed less medical consumption and fewer days absent from school (van Veldhoven, 2001).

Papworth breathing method is another choice of breathing, similar to "normal breathing exercises, dealing with deep abdominal breathing, nose breathing and matching the breathing in all condition and situations of daily living. Vall (1995) writes about abdominal breathing (page 29 in the thesis) and the role of diaphragm by saying that diaphragm is not a voluntary muscle and it cannot be moved directly... But as Docent Vele said, Diaphragm is not only an autonomous but also a voluntary muscle. Branches from the 3rd, 4th and 5th cervical nerve roots supply it. We can influence and strengthen the diaphragm by targeted and systematic abdominal breathing.

The research in Papworth method was either too little or not available in the data bases. We found only 4 studies with no reviews that claim: Papworth method cuts the symptoms of asthma and improves dysfunctional breathing and breathlessness by a third (Halloway, 2006; Mayo, 2007; Laurance 2007).

Due to the lack of evidence in Papworth method, not enough controlled trials have been reported, we cannot approve its effectiveness, even though it apparently shows the right breathing pattern what we learn in our breathing exercises in schools but is this the same way?

Cochrane study refuses all kinds of breathing exercises to cut asthma symptoms, improve quality of life by showing in a randomized controlled trial that breathing techniques may be useful in the management of patients with mild asthma symptoms who use reliever frequently, but at present there is no evidence to favour shallow nasal breathing (Papworth method) over non-specific upper-body exercises," (Cassandra A. Slader, MD, June 2007).

Halloway and colleagues in 2007 assert however in their small study with 85 patients that the Papworth method ameliorate respiratory symptoms, dysfunctional breathing and adverse mood compared with usual care (Halloway et al, 2007).

currently insufficient evidence to attribute the benefits of breathing retraining to this mechanism.

The Cochrane study says that Breathing techniques may be useful in the management of patients with mild asthma symptoms who use reliever frequently, but at present there is no evidence to favour shallow nasal breathing over non-specific upper-body exercises," (Cassandra A. Slader, MD, June 2007).

Studies show that two completely different types of breathing techniques, taught by video, can lead to a similar level of improvement in asthma outcomes particularly those relating to the use of a short acting beta-2 agonist. These improvements are of a magnitude similar to that observed in conventional clinical trials which assess pharmacological interventions to improve asthma control, and are therefore clinically important.... Given the magnitude of the differences in content of the two breathing techniques which were used in the present study, it appears likely that the observed clinical improvements were not due to the use of a particular type of exercise but to the process of both routine and as-required exercises that reinforce a message of relaxation and self-efficacy and provide a deferral strategy for beta-2 agonist use. (Thorax, June5, 2006).

Management of severe asthma remains a significant challenge. Patients with this condition do not respond adequately to inhaled corticosteroids and bronchodilators, forcing a search for alternative strategies. The clinician's initial priority is to firmly establish the diagnosis of severe asthma, as many conditions can mimic and/or aggravate this disease. Once the diagnosis is confirmed and confounding variables addressed, a variety of pharmacological and non-pharmacological approaches must be considered. Continuous use of oral corticosteroids carries a risk of significant adverse effects (R C Reddy, 2007). Alternative anti-inflammatory drugs and novel or unconventional modalities may also be used. Although severe asthma remains a clinical dilemma, a rational diagnostic and therapeutic strategy can be used to improve patient outcomes. The behavioral management of childhood asthma has been restricted to relaxation training, systematic desensitization, assertive training, biofeedback, and deconditioning of exercise induced asthma.

5. CHAPTER V

CONCLUSION

Improving asthma management can be achieved either by individual improvement or by improving system management. Improvement of asthma management could be achieved in this group of children by providing asthma education and by using the right therapies, amongst, breathing exercises.

We should concentrate on improving individual asthma management by assessment of background severity of asthma and by providing breathing exercises.

Breathing exercises may represent a safe and efficient means to improve asthma symptoms, but they have a mixed record of efficacy among these patients. In a systematic review of breathing exercises by Holloway and Row, which appeared in the *Cochrane Database of Systematic Reviews* in 2004, these exercises improved the use of rescue medications and the overall quality of life among asthma patients. However, breathing exercises were ineffective in improving airway hyperresponsiveness, measures of pulmonary function, and the use of anti-inflammatory medication. The authors of the current study compare a specific breathing technique, to improve asthma with upper extremity exercises that were designed to represent a control intervention.

Studies have shown that yoga significantly helps asthma sufferers, with exercises specifically designed to expand the lungs, promote deep breathing, and reduce stress. Pranayama is the yogic science of breathing, which includes hundreds of deep breathing techniques. They recommend that these breathing exercises should be done daily as part of any treatment program for asthma, as they are a very effective and inexpensive measure. (L Spicuzza, A Gabutti, C Porta, N Montano, L The Lancet, 2000)

In other reviews we saw that different breathing methods are being introduced which can improve asthma, especially when the cases are mild or moderate. Either the quality of life has changed positively or the intake of short acting beta II agonists is decreased, and the volume of lung capacity is becoming bigger. However no study has confirmed and proved that the symptoms of asthma will be cut down and there was neither any study, which would cure asthma through those exercises. But as we all learned to know, asthma

is non-curable. The only progress in asthma would be to control its symptoms; beside the factors, mentioned in chapter one under factor influencing asthma, which induces asthma, we can control asthma by strengthening the body and soul against it. This aim is approachable by exercises such as Alexander method, in which we observe our inner body and correct our posture so the spine stability will give the lungs the right amount of air and ease breathing.

Similar facts are also observed in Yoga, which is more dealing with soul than the body and connecting this "strong soul" to the "body in need" and strengthen it this way.

Despite the availability of evidence-based guidelines for the management of asthma, there remains a significant gap between accepted best practices for asthma care and actual care delivered to asthma patients. But as we came closer to the problem, we realize that posture plays a key role in the right breathing. Short extensors and a protruded head will narrow the way to the breathing center in medulla oblongata and the response would be insufficient air exchange in the lungs thus imbalance of buffer bases, CO2/O2 balance.

The exercises which I personally received in my lessons from two powerful docents (Doc. Vele and Doc. Strnad) were also based on observing the body while exercising the right breathing pattern and receiving the right amount of breathing in the "needed areas" of the body. I experienced them on my own, and was amazed by the fact how quick the response to those exercises was given from my weak spine and ill lungs. I felt so much stronger bodily that I could easily sit from lying position without any assistant which was impossible before and which can be confirmed through the Professors and the classmates.

As we mentioned above in the latter paragraph, the gap between the best-recommended exercises and the ones, which are applicable on individual patients, will continue to remain unanswered. The fact that every body is an individual with different styles and habits makes it also in the therapy clear. Every individual responds in her/his way to different therapies. Otherwise I would conclude that the exercises which I introduced in the special chapter are the best to strengthen the body, take the right amount of air and strengthen the lungs through them.

Professor Vele's words will stay as a legend who said that the exercises, whether its Alexander technique, Yoga or other spiritual exercises we practice, all practically resemble each other. It is all a matter of the treatment of the individual himself. These

exercises and the ones which are applicable on individual patients will continue to remain unanswered. The fact that everybody is an individual with different styles and habits makes it also in the therapy clear. Every individual responds in her/his way to different therapy. Otherwise I would conclude that the exercises which I will introduce in the next chapter are the best to strengthen the body, take the right amount of air and strengthen the lungs through them.

Professor Vele's words will stay as a legend who said that the exercises, whether its Alexander technique, Yoga or other spiritual exercises we practice, all practically resemble each other. It is all a matter of the treatment of the individual himself. These used techniques reinforce the function of the immune system and enhance the immunity against allergies. Therefore the individual can resist against other allergies better and this way she/he will control asthma which is very often connected to allergies. On the other hand posture alignment is another prevention for dysfunctional breathing, so with the discussed exercises we improve our posture thus the appropriate amount of oxygen enters our system.

After discussing different techniques for breathing retraining in asthmatics and their effect we conclude that all hypothesises that claimed:

- Dysfunctional breathing is identifiable and correctable
- Buteyko breathing method manages the reduction of medicine intake
- Yoga breathing is increasing the vital capacity
- Alexander technique leads to enhance respiratory muscular function

Are approved.

How do you rate your breathing?

Try this little quiz. Circle the number that applies to the frequency of your symptoms - 0 being never and 3 being quite a problem.

- Do you breathe through your mouth? 0 1 2 3
- Do you suffer from sinusitis? 0 1 2 3
- Is your breathing noisy? 0 1 2 3
- Is your breathing laboured? 0 1 2 3
- Do you get breathless easily? 0 1 2 3
- Do you exercises? 0 1 2 3
- Do you do breathing exercises? 0 1 2 3

    1. which kind of breathing
    2. how often

- Do you find it hard to "catch your breath"? 0 1 2 3

    1. When you exercise? 0 1 2 3

    2. Just doing normal daily chores? 0 1 2 3

- Do you sleep well at night? 0 1 2 3
- Do you wake refreshed? 0 1 2 3
- Do you snore? 0 1 2 3
- Do you wake frequently at night? 0 1 2 3
- Is your mouth dry in the morning? 0 1 2 3
- Do you have intense dreams? 0 1 2 3

- Does your upper chest move when you breathe? 0 1 2 3
- Do you have asthma? 0 1 2 3
- Do you have a persistent cough, snuffle or congestion? 0 1 2 3

If you circled numbers 1, 2 or 3 for any of these questions, then you are probably over breathing. Most people with asthma, hay fever and sinusitis, breathe enough air per minute for 2 or 3 people, often without it being noticed by themselves or others. In snorers it usually is noticed – sometime the house shakes with it!

The more serious your over breathing is, the more symptoms you will have ticked.

Good breathing is always nasal, quiet, diaphragmatic and gentle, not deep. Good breathing begins with good posture - hold your head up and always ensure that your back is straight whether sitting or standing. Relax your diaphragm area as much as possible and once again, above all, breathe in and out only through your nose.

Just as we have to learn what food is good for us and how to exercise correctly, we need to learn how to breathe properly. This way of exercises helps people as young as 3 and those just as young at heart but in their 90's plus, dancers, singers, athletes and naturally, people with asthma and breathing related disorders (Jennifer Harris ,2000)

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