Understanding the Modalities of Complementary and Alternative Asthma Treatments: What Every Health Educator Needs To Know

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Introduction

Since there are 12 to 15 million people with asthma in the U.S., health educators may have many opportunities to teach about the prevention and management of asthma. Despite the rise in general knowledge about asthma over the past 15 years, asthma-related mortality and morbidity rates continue to increase (Bone, 1997; Evans, Wilson, Rosenberg & Chevarley, 1987; Jackson, Sears, Beaglehole & Rea, 1988; Yunginger, Reed, O'Connell, Melton, O'Fallen & Silverstein, 1992).

Asthma treatment is aimed at preventing and relieving symptoms, and reducing long-term deterioration in lung function. Health care providers need to inform patients about asthma, in addition to developing a plan for the individual to avoid the causal triggers and prevent the symptoms by correct administration of prophylactic medications including whether or not corticosteroids and bronchodilators are necessary based on preference and social conditions (Woolcock, 1996). However, there is a growing trend of consumers incorporating the use of complementary and alternative medical treatments into their health care regimen. Thus, it is important for health educators to be familiar with the standard patient education material and protocols for corticosteroids and bronchodilators as well as the complementary and alternative therapies emerging in asthma management.

Background

Clearly, it is therefore necessary to define "alternative" and "complementary" medicine. At the linguistic level this is not difficult. "Alternative" should imply "instead of" western medical procedures and "complementary" should mean "in addition to." In practice most of the techniques we shall describe are used in Western societies alongside conventional remedies and so they are complementary. There are, however, differences that go beyond linguistics. In some instances, the philosophy behind the approach is truly alternative, as in the case of acupuncture. Where based on confirmed scientific examination, acupuncture clearly relieves pain by stimulating the production of endorphins, thus can and has been employed as a alternative and complementary procedure in the treatment of asthmatics (Lane & Lane, 1991).

In 1993, a national survey was conducted to determine prevalence, costs and patterns of complementary and alternative therapy use for all medical health problems in the United States. One in 3 adult respondents (n=1539) reported the use of at least one complementary therapy within the prior year. Highest use stemmed for the non-African American population ranging in age from 25-49 years with the majority seeking the therapies for chronic rather than life-threatening disease. Seventy-two percent who used these methods did not inform their medical practitioners that they had done so. Since individuals are spending enormous amounts of out-of-pocket money on visits to alternative practitioners, it appears that the public is looking for something more in health care (Bielory & Gandhi, 1994; Eisenberg, 1993).

In the U.S., a growing number of individuals are seeking alternative and complimentary treatment modalities for a variety of health problems, including but not limited to: the treatment of asthma, chronic heart disease, addictions, anemia, diabetes, and the like, either out of curiosity, in the hope of resorting to "natural" or "less harmful" substances, or to prevent, cure, or delay disease processes (Bielory & Gandhi, 1994). Since the creation of the Office of Alternative Medicine in 1992 at the National Institutes of Health (NIH), many alternative therapies are undergoing scientific evaluation to determine whether they affect the clinical course and outcomes of an illness and/or whether they enhance wellness (Cron, 1993a).

Alternative and complimentary treatments continue to be labeled as such due to the lack of conformity with the standards of the established medical community (Eisenberg, 1993).

As of 1996, the NIH Office of Complimentary and Alternative Medicine has funded 30 studies to evaluate the effectiveness of complementary therapies such as acupressure, massage therapy, electrochemical treatment, hypnosis, music therapy, guided imagery, biofeedback, prayer, and administration of antioxidants to determine there ability in alleviating chronic disease symptomtology . The results will provide scientific basis for determining which alternative therapies are or are not effective (Cron, 1993b). The list of specific chronic diseases were not provided in this newsletter brief.

With this growing body of medical literature, it is time for health educators to explore or enhance their knowledge about alternative therapies. The purpose of the article is to explore the complementary and alternative therapies for asthma by reviewing the literature and describing specific treatments for the alleviation of or cure of. With greater knowledge of and familiarity with alternative therapies, health educators will be more comfortable discussing the benefits and risks of incorporating these as complementary therapies into the management and treatment of asthma.

Alternative and Complementary Treatments

The following discussion defines the complementary therapies, reviews the literature on how the modality has been applied to asthma treatment, and provides some information on the benefits and risks. The information is presented in alphabetical order for ease of reference not effectiveness of treatment.

Acupuncture

Originating in China, acupuncture is a way of adjusting the body's "life energy" flow by the insertion and manipulation of fine needles into carefully selected acupuncture points along the meridians of the body. Acupuncture is used relieve symptoms of asthma, arthritis, headaches, menstrual imbalances, digestive disturbances, in addition to a myriad of additional health problems, as well as to promote general health and well being (Shealy, 1996).

Acupuncture has been widely used in the treatment of asthma, and in some countries nearly a quarter of general practitioners believe it to be efficacious (Lewith & Watkins, 1996). There have been a number of controlled trails assessing the use of acupuncture in the treatment of asthma. These fall into two classes: first, those of an experimental nature where only a single or small number of sessions of acupuncture were given and the short-term effects monitored; second, trials where a course of acupuncture was given whereupon both short- and long-term effects were assessed.

Tashkin et al. compared classical acupuncture, sham acupuncture (needle insertion at incorrect sites), isoprenaline, saline, and no treatment in methacholine-induced brochospasm in 12 patients with chronic stable asthma. On a wide range of objective measures of lung function (specific airway resistance, thoracic gas volume, and forced expiratory flow volume), the authors showed a significantly greater effect for real acupuncture over sham and saline, although isoprenaline was the most effective treatment (Lewith & Watkins, 1996). While acupuncture has been shown to be beneficial in acute asthma in the short term, it has proven more difficult to demonstrate its efficacy in the management of chronic symptoms.

This evidence suggest that even though acupuncture may be able to improve airway obstruction acutely, its long-term efficacy has yet to be established. In addition, acupuncture may be more effective in certain subgroups, such as drug induced or allergic asthmatics (Lewith & Watkins, 1996).

Chiropractic

David Daniel Palmer founded the field of chiropractic in the 1890s. He believed that joint subluxation, or partial dislocation, is a causal factor in disease and that removal of the sublaxation by thrusting on the bony projections of the vertebrae restores health. Through this manipulation, Chiropractic's believe that not only can structural problems such as sciatica or the effects of injury be improved but also conditions such as asthma can be alleviated because chiropractic could ease the tension in the chest muscles (Shealy, 1996). Presently, chiropractic is the largest of the alternative complementary health profession in North America (Coulter, Adams, Coggan, Wilkes & Gonyea, 1998).

In addition to manipulating and adjusting bone

and tissue, particularly in the spinal column, chiropractors use a variety of manual, mechanical, and electrical treatments. Chiropractors are most widely recognized for providing drug-free, non-surgical management of back and neck pain as well as of headaches. A recent randomized controlled trail, which studied spinal manipulation in the treatment of episodic tension-type headaches, found positive results for chiropractic. Spinal manipulation was just as effective as the massage treatment, and both treatments brought about significant pain relief and resulted in a reduction in the number of analgesics used by the patients (Bove & Niels, 1998). Furthermore disease prevention and health promotion through proper diet, exercise and lifestyles are other important features of chiropractic medicine.

As mentioned chiropractic also relates to asthma management. A randomized patient- and observer-blinded crossover trial was conducted to evaluate the efficacy of chiropractic treatment in the management of chronic asthma when combined with drug therapies. Thirty-one chronic asthma patients aged 18-44 who controlled their condition by bronchodilators and/or inhaled steroids participated. Patients who had received any chiropractic treatment for asthma within the last 5 years, or who received oral steroids and immunotherapy, were not eligible. Patients were randomized to receive either active chiropractic spinal manipulative treatment or sham chiropractic spinal manipulative treatment twice weekly for 4 weeks, and then crossed over to the alternative treatment for another 4 weeks. Manipulative treatment included a specific spinal thrusting technique over certain vertebrae, which carried the joint slightly beyond the normal physiological range of motion. Whereas sham treatment, employed a gentle manual pressure over the spinal contact, but no direct manipulative thrust was applied to the patient's spine.

Over the course of the study lung function did not change, but non-specific bronchial hyperactivity improved by 36% ($P = 0.01$) and patient-rated asthma severity decreased by 34% ($P = 0.0002$) compared with the baseline values (Nielsen, Bronfort, Bendix, Madsen & Weeke, 1995).

Diet and Dietary Supplements

Vitamin C

Vitamin C or ascorbic acid and its use in asthma have been repeatedly studied from as far back as 1803 (Bielory & Gandhi, 1994). In the 1950s, studies suggested a relationship between vitamin C deficiency and asthma, but since that time numerous short-term studies have failed to show an association due to possible confounders and poor model design. Although the current literature does not support a definite indication for the use of vitamin C in asthma and allergy treatment, there are promising and positive studies which are reviving new curiosity and interest.

Consumption of Oily Fish

The investigations relating oily fish consumption and asthma have mixed results. The results of one study indicated a reduced risk of current asthma was associated with the consumption of fish oils that contained omega-3 fatty acids (Kremer, Jubiz & Michalek, 1987). Since omega-3 fatty acids have proven anti-inflammatory effects, it has been theorized that these oils could either prevent the development of asthma or reduce its severity by reducing airway inflammation (Hodge et al., 1996).

Schwartz and Weiss conducted a study employing 2526 adults, to discern if eating fish more than once a week resulted in a higher level of lung function. However, only 2.9% of subjects were asthmatic, so no conclusion could be drawn about the effect of fish consumption on asthma. In another study of current and former adult smokers (n=8960) who reported a high dietary intake of omega-3 fatty acids, the results were inversely related to the risk of chronic obstructive pulmonary disease (COPD). This apparent protective effect is biologically plausible, as neutrophilic inflammation is a feature of both COPD (Shahar, Folsom & Melnick, 1994) and chronic asthma. Although these studies are of interest, larger prospective intervention studies are required to determine if dietary changes, which include omega-3 fatty acids, can truly produce advantageous results for the asthmatic (Thien, Woods & Walters, 1996).

Dietary fish oils were also examined for the effects on seasonal hay fever and asthma in pollen-sensitive subjects. No significant changes were observed in the prevention of seasonal hay fever and asthma, in 25 pollen-sensitive subjects. These individuals were followed for 6 months and consumed omega-3 capsules daily for the course of the study and was matched to a placebo group. Final analysis revealed fish oil supplementation did not prevent asthma (Thein, Mencia-Huerta & Lee, 1993).

Herbal Remedies

Chinese knowledge of botanical medicine dates back to the discovery of the herbal source of ephedra sinica, ma huang, around 3000 BC. Although it was initially used as a stimulant, ma huang is central to asthma treatment but is also used for respiratory afflictions and other diseases in traditional forms of Chinese medicine (Ziment, 1988). Since the active ingredient in ma huang is an effective bronchodilator, numerous asthma treatment preparations rely on this botanical medicine in both the United States and abroad (Hackman, Stern & Gershwin, 1996).

Extracts of Gingko biloba have been shown to inhibit platelet-activating-factor (PAF), thus offering a scientific explanation for the use of this herb for treatment of asthmatic coughs (Barnes, Chung & Page, 1988). Although none of the Chinese herbal medications used to treat asthma have been found to have corticosteroid activity, it is quite possible that many herbs have anti-inflammatory properties. For example, licorice has been extensively studied and does have such an effect. Ledebouriella seseloides, Rehmannia glutinosa, and Paeonia lactflora also have anti-inflammatory effects (Hackman et al., 1996).

Kampo, the Japanese adaptation of traditional Chinese medicine dates back to the 16th and 17th Centuries which utilizes saiboku-to, a herbal formula responsible for many therapeutic effects on asthmatics. Saiboku-to is a mixture of ten different herbal extracts and recent analytical studies have suggested the possible mechanisms for its effectiveness in the treatment of this ailment (Chanez, Bousquet, Godard & Michel, 1996; Hackman et al., 1996). Homma et al. (1993) hypothesized that magnolol, the active component of saiboko-to, may act as an inhibitor to chemical components, beta-hydroxysteroid dehydrogenase and T-lyymphocyte proliferation, components responsible for asthmatic episodes.

Nakajima et al. (1996) reported at length the steroid-sparing effect of this herbal preparation on 40 patients who took the remedy regularly for 6-24 months. Remarkable steroid-sparing effects were noted after saiboku-to had been taken for 6-12 months by steroid-dependent asthmatics (Lewith & Watkins, 1996). The study was thorough and indicated few side-effects. Similar research by Homma et al. (1993) on saiboku-to involving nine patients who took the remedy over 1 year, again showed quite dramatic clinical effects. Saiboku-to is probably one of the best studied herbs' in relation to asthma, the evidence suggesting that further, more detailed clinical trails are definitely needed. Thus, scientific methodology applied to Chinese herbal medicine could possibly open avenues that would merge Chinese and Western medicine and create new asthma treatments.

Homeopathy

Homeopathy aims to help the body heal itself and comes from the Greek word *homios* meaning "like" and *pathos* meaning "suffering." Homeopathy means that a substance which causes symptoms of illness in a well person can be used to cure similar symptoms in an ill person (Shealy, 1996). This concept is comparable to the Western medical concept of allergy injections.

There have been three different homeopathic approaches to the management of asthma. The first is classical homeopathy in which the toxic symptoms of a particular herb or animal remedy are matched against the patient's symptoms and then the remedy is given in a very dilute form. This is classical homeopathy.

The second approach utilizes complex homeopathy: this involves medicines that contain a mixture of various herbal and homeopathic products. There is a large volume of descriptive evidence that looks at both complex and classical homeopathy, and many claims are made for the use of homeopathy as a treatment for asthma, however there is virtually no clinical trial evidence to substantiate these claims.

The third homeopathic approach involves isopathy, which is a much simpler system. Isopathic theory suggest that a sufferer from hay fever should be treated with a homeopathic dilution of pollens, treating like with like. Based on studies on rhinitis and pollen, Reilly et al. has provided some preliminary evidence that an isopathic approach might have real validity in the management of asthma. For instance, by giving a small amount of house dust mite to house dust might sensitive asthmatics might alleviate allergic symptomology (Lewith & Watkins, 1996).

Although homeopathy is still not well known in the U.S., it is very popular in Europe with between 20-50% of French, German, British, and Dutch physicians prescribing homeopathic remedies (Ullman, 1995). In 1991, the British Medical Journal published a review of 107 studies, 81 of which showed homeopathy to be

effective. While most of the studies had methodological flaws, 22 studies were considered of high caliber and 15 of them showed efficacy of the homeopathic medicines.

In 1986 at the University of Glasgow in England, the results of a double-blind, placebo-controlled asthma trial study showed that over 80% of patients given a homeopathic remedy improved, while only 38% of patients given a placebo experienced a similar degree of relief (Reilly et al., 1994).

Another publication reviewed over 160 research studies about the effectiveness of homeopathy treatments. While the publication focuses on the methodological weakness, the reviewers concluded that several studies did stand up well to criticism (Reilly, Taylor McSharry & Aitchison, 1986).

Hypnosis

One of the oldest therapeutic arts, hypnosis attempts to heal a patient, who is placed in a state of trance. Ancient cultures around the world revered individuals deemed to be in contact with supernatural powers by means of hypnosis. Apparently these individuals were able to utilize the contacts made in this sleeplike trace to cure the sick and distressed. Today there is plenty of clinical evidence that hypnosis can be used to make beneficial changes, even though it cannot be fully explained. With hypnosis, it is possible to reprogram beliefs in the subconscious by the use of suggestion. Hypnosis is not effective for people under the influence of alcohol or drugs, those with psychotic conditions, or children under the age of five (Shealy, 1996).

Groen (1964), Maher-Loughnan, Macdonald, Mason & Fry (1962), and Smith and Burns (1960) reported similar results in which hypnosis was used to reduce many asthma manifestations that resemble Pavlov-like conditioning or classical conditioning. Classical conditioning is a paradigm case of animal learning, typically demonstrated in the laboratory. It is called "conditioning" to imply that what goes on in this kind of learning is some mechanical or electrical adjustment of the nervous system, void of ones consciousness (Windholz, 1987). General experience has shown that those who have had asthma for many years may acquire a habit of response that resembles psychogenic asthma but which is actually a form of conditioning. These studies confirmed earlier impressions that hypnosis is valuable in relieving asthmatic symptoms and reducing patient-doctor dependency. Although hypnosis is not a recommended treatment for acute asthmatic episodes, it is effective as a prophylactic therapy to avoid the risk of steroid dependency (Maher-Loughnan, 1970).

Osteopathy

This system of medical practice is based on the principle that health depends on the maintenance of proper relationships among the various structures of the body. Osteopathic medicine holds that true health involves complete physical, mental, and social well being, rather than merely the absence of disease. In this system, the body has a capacity for health that the physician helps the individual attain. The osteopathic concepts emphasize: 1) the human person is a unit in which structure, function, mind and spirit are mutually and reciprocally interdependent; 2) the body, through a complex equilibrium system, tends to be self-regulatory and self-healing in the face of disease processes; 3) adequate function of body systems depends upon the unimpeded circulatory mechanisms, nerve impulses and neutrophic influences; 4) a rational treatment regimen is based on this philosophy and these principles (American Osteopathic Association, 1991).

According to osteopathic theory, defects in the musculoskeletal system influence the natural function of internal organs. To correct structural abnormalities, osteopathic therapy, or manipulative treatment with the hands or related mechanical means, is used. This treatment modality is called Osteopathic Manual Medicine (American Osteopathic Association, 1991). The osteopathic physician attempts to use this treatment when appropriate, either alone or in combination with other accepted therapeutic methods such as drugs, surgery, and radiologic treatments. An osteopathic physician is fully trained and licensed to practice all branches of medicine and surgery.

The osteopath gently applies force to promote movement of bodily fluids, to therefore eliminate dysfunction in the motion of the tissues, and release compressed bones and joints. Additionally, the body areas being treated require proper positioning to assist the body's ability to regain normal tissue function. Manipulation in the region of the second thoracic vertebra is said to release restricted movement of the ribs and improve asthma (O'Donovan, 1951). The basis for this is believed to be viscerosomatic reflexes

arising from an affected internal organ, in this case the lung, and reflected in muscle splinting. Interestingly Bouhuys (1991) has shown that posture affects histamine reactivity in both asthmatic patients and normal individuals, reactivity being greater in the supine than in the sitting position. There are however no controlled clinical trials to support the claims of oesteopathy effects on asthma (Lane & Lane, 1991).

Reflexology

Reflexology is a complementary, biological, integrative health service, where pressure is applied to reflex areas of the hands and feet, which are composed of 7200 nerve endings apiece. The application of this pressure is assessed on the basis of ten longitudinal zones and areas on the feet and hands. The pressure attempts to stop further deterioration, persuade the body to biologically correct itself, strengthen and reinforce all systems in the body, and encourage reflexology maintenance (Kunz & Kunz, 1983). It should be noted that a reflexologist never prescribes or diagnoses, but provides additional services to a medical practitioner. Though few studies have been conducted, reflexology at this time has not demonstrated to be effective in the alleviation of asthmatic symptoms. Petersen, Faurschou, Olsen, & Svedsen (1993) randominzed 30 bronchial asthma patients, into two groups, one that received foot zone therapy and the other which merely received clinical care but without "placebo foot zone therapy". The "active" group received a total of ten foot zone therapy sessions at one episode per week. The asthmatic symptoms, consumption of medicine and the objective pulmonary function parameters were followed-up during the subsequent 6 months. Decrease in consumption of beta-2 agonist and increase in peak-flow levels were observed in the group which received foot zone therapy, but the same changes were observed in the control group. The investigators concluded that the favorable effects in both groups were due to increased care and control.

Self-Help

Besides the medical treatments and complementary therapies, there are numerous self-help activities that reduce the exposure to environmental factors, which may trigger an asthmatic episode. First, exposure to second-hand smoke is strongly associated with hospital admission rates of asthmatic children (Burr, Verrall & Kaur, 1997; Eggelston, 1998). Second, occupational asthma may be reduced by limiting exposure to laboratory animals, the use of latex gloves, wheat four, proteolytic enzymes and simple chemical compounds such as isocyanates (Fabri, 1997). Third, cockroach antigens (proteins found in the insects' feces, saliva, eggs, and shed cuticles) have been implicated as one of the leading causes of asthma among inner-city children, because these antigens can trigger severe allergic reactions, and even tiny amounts can be potentially fatal to sensitive asthmatics (Potera, 1997). Fourth, in some patients exercise induces asthma (EIA) which is characterized by transient airway obstruction occurring after strenuous exertion. Prevention is the main objective in managing EIA. Non-pharmacological measures include warming up before vigorous exertion, covering the mouth and nose in cold weather, exercising in warm, humidified environments if possible and cooling down after exercise. Aerobic fitness and good control of baseline bronchial reactivity also help to diminish the effects of EIA (Tan & Spector, 1998).

Lastly, Blanc, Kuschner, Katz, Smith & Yelin (1997) reported that among adults (n=601) with access to specialty care for asthma, self-treatment with nonprescription products such as herbal preparations and over-the-counter medications were common and associated with increased risk of reported hospitalization. This association does not appear to be accounted for by illness severity or other disease covariates and may reflect delay in utilization of more efficacious treatments.

Speleotherapy

Although not known to be practiced in the U.S., speleotherapy, which involves seeking the health-giving enhancing effect of salt mines or caves, is an old and yet popular alternative therapy which is still used in some regions of Central Europe, the Balkans, and in Turkey (Karakoca, Demir, Kisackik, Kalyoncu & Findik, 1995). One study describes a course of therapy which was 4 hours a day for 6-8 weeks, the 100 COPD and asthma patients reported improvement which lasted 6 months to 7 years (Skulimowski, 1965). Similar studies were published from Poland, Hungary and Czechoslovakia with cure rate of around 20% for asthma (Bichonski & Skumlowski, 1971; Kessler, Morik, Morlin & Varkonyi, 1969; Paskova, Kolesar & Siposova, 1976). Despite several published articles reporting a decrease in the symptoms of asthma and

allergies, the investigations lack scientific rigor.

Therapeutic Touch

Healing through touch is as old as civilization. Practiced extensively in all ancient cultures, it is thought to be the oldest form of treatment, however, it was not until 1972, when Dr. Dolores Krieger and Dora Kunz, both RNs, began developing therapeutic touch as a Western healing modality (Bronstein, 1996). Therapeutic touch is an intentionally directed process of energy exchange during which the practitioner uses the hands as a focus to facilitate the healing process. It is the contemporary interpretation of several ancient healing practices in addition to being a scientifically based practice founded on the premise that the human body, mind, emotions and intuition form a complex, dynamic energy field. This energy field is governed by pattern and order. In health, the field is balanced, however in disease, the energy is characterized by imbalance and dis-order (Kreiger, 1998).

Therapeutic touch therapies are designed to engage the recipient's psyche and heighten spiritual awareness while producing both overt and covert physical changes. Although the techniques vary among practitioners, the objective of the various techniques are similar: to relax, soothe, stimulate, relieve physical, mental, emotional, and/or spiritual discomfort, or aid in the transition of the client to a heightened plateau of being. The practitioners that use therapeutic touch do so from a calm, centered place and believe that focused intention facilitates the transference of healing energy (Dossey et al., 1995). During therapeutic sessions a practitioner may ask the client to visualize the part of the body that is to be influenced through touch with the intent of increasing the contact with that body part's energy field. The practitioners' goal is to ascertain the degree of blockage in the energy field of the muscles or viscera. Self-perception post therapeutic intervention on an asthmatic child revealed that after the completion of a fifteen minute touch session the child reported feeling better and appeared free of respiratory distress, thus it is determined that the clients body had been returned to its normal symmetry (Dossey et al, 1996).

Quantitative research has been done on therapeutic touch in order to facilitate appropriate application of this modality in practice, and to offer recommendations for future research (Green, 1998, Mulloney, 1996, & Spence 1997). The National Institute of Health (NIH), Office of Alternative Medicine has found that therapeutic touch has one of the strongest research bases of any of the alternative/complimentary modalities. It has been concluded that there is evidence to support the practice of therapeutic touch for the reduction of pain or anxiety. However, there is clearly a lack of congruity between the research statement, conceptual framework, operational definition of therapeutic touch and the findings (Spence, 1997).

Yoga

In India, yoga has been part of the central philosophy on health and healing for the past 1000 years and has been shown to be effective in asthma treatment (Bichonski & Skumlowski, 1971; Chanez et al., 1996; Khanam, Sachdeva, Guleria & Deepak, 1996; Vedanthan, et al., 1998). In 1985, using 53 asthmatic adults matched to 53 control group asthmatic adults Nagarathna and Nagendra (1985) demonstrated significant values ($p<0.005$) in the number of asthma attack per week, scores for drug treatment, and peak flow rate following 2 weeks of extensive yoga techniques. These techniques included breathing exercises, physical postures, and meditation. In 1986, Nagendra and Nagarathna conducted a larger study using 570 bronchial asthmatics, which were similarly exposed to yoga practices for 2-4 weeks and followed from 3 to 54 months. The asthmatics who continued the regular practice of yoga showed the greatest improvements in their peak expiratory flow rate (PFR). In addition, between 66% to 72% of the patients stopped or reduced their parenteral, oral and cortisone medication (Nagendra & Nagarathna, 1986).

In summary, even though some of these complementary therapies are employed in health care systems of many countries, the treatments have been not tested with the scientific rigor of the U.S. biomedical arena. Therefore, few are not widely accepted for the treatment of asthma and hence have been traditionally disregarded and deemed as alternative and thus of lesser value. Although fear associated with the incorporation of alternative therapies due to the lack of proven methodologies, the following discussion reveals that proven Western medical asthma treatments are not without some risk and long-term consequences. The greatest concern of both alternative as well as Western medical

practitioners is the risk of mortality if asthma is left untreated.

Biomedical Treatments and Research

Steriods

Steriods are a large group of substances having a common structure, most are naturally occurring hormones. Corticosteriods are essential to life, without them the body wastes away and blood pressure cannot be maintained. Since the late 1940s, corticosteroids have been used as a safe and effective treatment for asthma and allergies with no major side effects on a short-term basis. However, long-term corticosteroid use may cause serious side effects such as ulcers, weight gain, cataracts, decreased growth in children (McCowan et al., 1998), high blood pressure, elevated blood sugar, and thinning of the bones and skin (Chanez et al., 1996; Dawson, Penna & Manglick, 1995; Efthimiou & Barnes, 1998; Haapasaari, Rossi, Risteli & Oikarinen, 1998). Today the biomedical treatment of asthma continues to rely on the usage of corticosteroids and bronchodilators (Ganderton, 1997).

The corticosteroids are anti-inflammatory drugs that decrease airway inflammation thus, reducing the symptoms of asthma. The most widely prescribed short acting drug is predisone (Cydulka & Emerman, 1998) and it is among the first long acting inhalants. Additional drugs include triamcinolone and cortone, inhaled corticosteroids; flunisolide and azmacort and over-the-counter nasal spray antihistamines. Triamcinolone diacetate which is an intra-muscular drug is the latest corticorsteriod drug being evaluated for safety and efficacy (Schuckman et al., 1998).

Non-Steroidal anti-inflammatory drugs

With the potential of long-term complication with corticosteriodal use, the medical community has begun looking at non-steroidal anti-inflammatory drugs (NSAID), for those patients who require long-term asthma therapy. Of the available drugs, inhaled lysine acetylsalicylate and furosemide are being reviewed, in addition to mofebutazone tablets. A randomized, double blind crossover trial was conducted to test the efficacy of the inhaled lysine drugs. The experimental design was to compare steroidal beclomethasone dependent patients, with combination inhalant users of the aforementioned drugs, to combination steroidal and lysine users, in addition to a placebo group. The study clearly determined, that 30% of the combination lysine users, acetylsalicylate and furoseide, were completely able to suspend steriodal use, and 71% of those who were steroidally dependent were able to significantly reduce the number milligrams previously needed. Thus treatment of the non-steroidal drugs allowed for a considerable sparing of inhaled steroids without significant side effect in patients with asthma (Bianco et al., 1995).

Additionally use of an oral NSAID, mofebutazone, twice daily for 15 days, found that asthmatics did not suffer an increase in the incidence or severity in asthmatic attacks during the course of the drug treatment. The drug tended to improve pulmonary functions or at least to leave them unchanged, but there was no consistent relationship between the extent of reduction and the degree of benefit or worsening sustained by an individual patient (Khayyal, El-Ghazaly, El-khatib & Hatem, 1995). It is evident that mofebutazone was well tolerated and thus was attributed to an improvement in the pulmonary functions, a fact that would advocate the use of this NSAID in asthmatic patients whenever a need for such therapy becomes necessary.

Bronchodilators

Brochodilators are drugs which open up narrowed bronchi. Two drugs were identified towards the end on the last century as having this ability: adrenaline and ephedrine. Adrenaline was prepared as a solution for injection and for inhalation. Ephedrine was prepared as a tablet. Following the discovery of the medicinal uses of these naturally occurring drugs, attempts followed to manufacture compounds of similar chemical properties. However what was discovered was that these drugs had problems, not only did they relax bronchi, but stimulated all parts of the sympathetic nervous system. Thus, further research continued and receptors specific to the bronchi were identified, beta 2 receptors. Hence β_2-agonists were developed (Lane, 1996).

Salbutamol remains the most frequently prescribed β_2-agonists (Rodrigo & Rodrigo, 1998), followed closely by salmeterol, albuterol (Higham et al., 1997) and fetnoterol (Garrett, Lanes, Kolbe, Rea, 1996). Much like the corticosteroid triamcinolone, theophylline is the latest bronchodilator being evaluated for safety and efficacy for chronic asthma drug treatment (Barnes, 1997).

In the U.S., pharmaceutical asthma treatment most frequently categorizes and treats patient by the severity of their illness, infrequent asthmatic episodes versus chronic cases. The use of inhaled bronchodilators addresses mild, infrequent asthma symptoms, while for more severe or chronic cases a combination of inhaled and oral corticosteroids and broncodilators are employed. Although direct drug action at the site of disease and the good physiological drug acceptance by patients seems relatively simple, if patient education is lacking, drug compliance and relief of symptomology is unusually poor (Karrer, 1997). Education improves patient compliance and is critical to the successful biomedical treatment of asthma (Bone, 1996). Therefore, the teaching of inhalation methods is paramount when addressing the greatest challenge to overcome non-compliance (Morris, 1997).

The following studies illustrate the pervasiveness of poor patient education and health care professional knowledge. First, O'Donnell, Birkinshaw, Burke and Driscoll (1997) found that 40% of emergency personnel (n=50) routinely checked inhaler techniques upon patient discharge and were aware of inhaler use guidelines. Second, Van Ganse et al., (1997) interviewed patients (n=54) and their family physicians and reported that the majority patients had a negative perception of anti-inflammatory therapy, specifically relating to issues of safety and efficacy. Also this study reported that despite the family physician's involvement in the care of asthmatic patients, the family physicians failed to optimally assess therapy and outcomes. These findings suggest poor patient education results in a decrease of the overall health status of asthmatics.

Besides lack of patient education, the underlying causes of non-compliance may be traced to characteristics of the disease, treatment, patient, and caregiver system with the consequences measured in patient suffering, financial cost, and serious compromise of clinical trial outcomes. Improved compliance will lead to improved treatment management, but only if the medical care systems encourages and supports the allocation of sufficient resources to reduce barriers for self-management. Several programs have adopted the concept of community-based partnerships in asthma care with special programs focusing on difficult-to-manage patients that result in significant health improvement and cost savings (Bellamy, 1996; Bender, Milgrom & Rand, 1997; Scott, 1997).

Conclusion

Alternative and complementary medicine can obviously play a role in the treatment of certain ailments experienced by asthmatics. Statistically significant results can be seen in the utilization of acupuncture and yoga for the reduction of asthma symptomtology. Herbal and dietary remedies perhaps have the largest potential for the alleviation of symptoms in asthmatics, based on chemical mechanisms that have not yet been identified by Western medicine. Chiropractic and homeopathic remedies can complement western medicine, by maintaining the body's healthy state but still has not been proven to work independently to cure.

After exploring the mixed results on the effectiveness of a variety of complementary and alternative medical therapies for the treatment of asthma, the question remains: Why then are so many Americans seeking alternative forms of treatment when the Western medicines are scientifically proven to be effective? Until the answer is more fully understood, health care professionals would benefit from gaining a greater awareness of the alternative practices that their patients may be using to decrease their dependency on pharmaceuticals for their asthma.

Before rejecting the alternative practices for their lack of scientific rigor, it is important to recall the doubts associated with long-term use corticosteroids, the value of theophylline, and the acceptability of immunotherapy. For the same reason that not all individuals with asthma are comfortable receiving their health care from a pulmonologist or allergist, they may not choose to place high value scientific methodologies and are thus more comfortable seeking care from a practitioner of alternative medicine.

As health educators, it is important to stay current on all types of asthma treatments which patients may choose to incorporate into their treatment plan. Without a thorough understanding the benefits and risks of Western medical treatments as well as the complementary therapies, patients will be less likely to discuss their use complementary therapies. "Perhaps we need to give more attention to the passions that inflame the minds of asthmatics, rather than striving to correct the cytoneurochemical events that cause

inflammation in the lungs" (Ziment, 1996, p.320).

References

American Osteopathic Association. (1991). Princicples of Osteopathy. (1st ed.). New York ; NY: Rosegarth Limited.

Barnes, P.J. (1997). Current therapies for asthma. Promise and limitations. *Chest. 111*(2 Suppl), 17S-26S.

Barnes, P.J., Chung, K.F. & Page, C.P. (1988). Platelet-activating factor as a mediator of allergic disease. *Journal of Allergy Clinical Immunology, 81*(5 Pt 1),751-769.

Bianco, S., Vaghi, A., Robuschi, M., Refini, R.M., Pieroni, MG. & Sestini, P. (1995). Steroid-sparing effect of inhaled lysine acetylsalicylate and furosemide in high-dose beclomethasone-dependent asthma. *Journal of Allergy and Clinical Immunology, 5*(1), 937-43.

Bichonski, R. & Skumlowski, M. (1971). Some biophysical characteristics of the blood in asthma patients undergoing subterreotherapy at Wieliczka (in Polish). *Przegl Lek 27*, 515-517.

Bellamy, D. (1996). New drugs and asthma care. *Community Nurse, 2*(2), 25-26.

Bender, B., Milgrom, H. & Rand, C. (1997). Nonadherence in asthmatic patients: is there a solution to the problem? *Annals Allergy Asthma Immunology, 79*(3), 177-185.

Bielory, L. & Gandhi, R. (1994). Asthma and vitamin C. *Annals of Allergy,73*, 89-96.

Blanc, P.D., Kuschner, W.G., Katz, P.P., Smith, S. & Yelin, E.H. (1997). Use of herbal products, coffee or black tea, and over-the-counter medications as self-treatments among adults with asthma. *Journal of Allergy and Clinical Immunology, 100*(6 part 1), 789-791.

Bone, R.C. (1997). Goals of asthma management. A step-care approach. *Chest, 112*(5):1444.

Borchers, A.T., Hackman, R.M., Keen, C.L., Stern, J.S. & Gershwin, M.E. (1997). Complementary medicine: a review of immunimodulatory effects of Chinese herbal medicines. *American Journal of Clinical Nutrition. 66*(6), 1303-12.

Bove, G. & Niels, N. (1998). Spinal manipulation in the treatment of episodic tension-type headache. A randomized controlled trial. *Journal of the American Medical Association, 280*, 1576-1579.

Bronstein, M. (1996). Healing hands. Canadian *Nurse, 92*(1), 32-26.

Burr, M.L., Verrall, C. & Kaur, B. (1997). Social deprivation and asthma. *Respiratory Medicine, 91*(10), 603-608.

But, P. & Chang, C. (1996). Chinese herbal medicine in the treatment of asthma and allergies. *Clinical Reviews in Allergy and Immunology, 14*,53-269.

Carlson, C.M. & Sachs, M.I. (1994). Is alternative medicine an alternative for the treatment of asthma? *Journal of Asthma, 31*(3), 149-151.

Chanez, P., Bousquet, J., Godard, P. & Michel, F.B. (1996). Controversial forms of treatment for asthma. *Clinical Reviews in Allergy and Immunology, 14*, 247-251.

Chanez, P., Paradis, L., Des Roches, A., Paganin, F., Bashir, M., Godard, P. & Bousquet, J. (1996). Comparison of three different oral corticosteroids in steroid-dependent asthma patients. *European Journal of Allergy & Clinical Immunology, 51*(11), 850-1.

Coulter, I., Adams, A., Coggan, P., Wilkes, M. & Gonyea, M. (1998). A comparative study oc chiropractic and medical education. *Alternative Therapies in Health Medicine 4*(5), 64-75.

Cron, T. (1993a). OAM Awards 30 exploratory grants in first round. *Alternative Medicine Newsletter, 1*(2) 1.

Cron, R. (1993b). It's the law: There is an Office of Alternative Medicine. *Alternative Medicine Newsletter 1*(1)3.

Cydulka, R.K., and Emerman, C.L. (1998). A pilot study of steroid therapy after emergency department treatment of acute asthma: is a taper needed? *Journal of Emergency Medicine, 16*(1), 15-9.

Dawson, K.P., Penna, A.C., & Manglick, P. (1995). Acute asthma, salbutamol and hyperglycaemia. *Paediatrica, 84*(3), 305-7.

Dossey, B.M., Keegan, L., Guzzetta, C.E., Kolkmeier, L.G. (Ed. 2). (1995). *Holistic Nursing. A handbook for practice.* Gaithersburg, MD: Aspen Publishers, Inc.

Efthimiou, J. & Barnes, P.J. (1998). Effect of inhaled corticosteroids on bones and growth. European *Respiratory Journal, 11*(5), 1167-77.

Eggelston, P.A., Malveaux, F.J., Butz, A.M., Huss, K., Thompson, L., Kolodner, K., Rand, C.S. (1998). Medications used by children with asthma

living in the inner city. *Pediatrics, 101*(3 pt 1), 349-54.

Eisenberg, D. (1993). Unconventional medicine in the United States: Prevalence, costs, and patterns of use. *New England Journal of Medicine, 328*, 246-252.

Evans, R., Wilson, R.W., Rosenberg, H.M. & Chevarley, F.M. (1987). National trends in the morbidity and mortality of asthma in the U.S. Prevalence, hospitalization, and death from asthma over two decades: 1965-1984. *Chest*, *91*(1) 655.

Fabri, G. (1997). The prevention of occupational asthma in industries. *Journal of Investigative Allergology and Clinical Immunology, 7*(5), 377-379.

Ganderton D.(1997). General factors influencing drug delivery to the lung. *Respiratory Medicine, 91* Suppl A, 13-6.

Garrett, J.E., Lanes, S.F., Kolbe, J., Rea, H.H.(1996). Risk of severe life threatening asthma and beta agonist type: an example of confounding by severity. *Thorax, 51*(11), 1093-9.

Green, C.A. (1998). Reflection of a therapeutic touch experience: case study 2. *Complementary Therapies in Nursing & Midwifery, 4*(1), 17-21.

Groen, J.J. (1964). *Psychosomatic research: a collection of papers*. New York: Pergamon Press.

Hackman, R.M., Stern, J.S. & Gershwin, M.E. (1996). Complementary and alternative medicine and asthma. *Clinical Reviews in Allergy & Immunology, 14*(3), 321-36.

Haapasaari, K., Rossi, O., Risteli, J. & Oikarinen, A. (1998). Effects of long-term inhaled corticosteroids on skin collagen synthesis and thickness in asthmatic patients. *European Respiratory Journal, 11*(1), 139-43.

Hodge, L., Salome, C.M., Peat, J.K., Haby, M.M., Xuan, W. & Woolcock, A. (1996). Consumption of oily fish and childhood asthma risk. *Medical Journal of Australia, 164*,137-140.

Homma, K., Oka K., Niitsuma, T., Yamamoto, S., Itoh, H. & Takahashi, N. (1993). Impact of free magnolol excretions in asthmatic patients who responded well to saiboku-to, a Chinese herbal medicine. *Journal of Pharmacy & Pharmacology, 45*(9), 844-6.

Jackson, R., Sears, M.R., Beaglehole, R. & Rea, H.H. (1988). International trends in asthma mortality: 1970-1985. *Chest, 94*, 914.

Higham, M.A., Sharara, A.M., Wilson, P., Jenkins, R.J., Glendenning, G.A., Ind, P.W. (1997).Dose equivalence and bronchoprotectiveeffects of salmeterol and salbutamol in asthma. *Thorax, 52*(11), 975-80.

Karakoca, Y., Demir, A.U., Kisackik, G., Kalyoncu, A.F. & Findik, S. (1995). Speleotherapy in asthma and allergic diseases. *Clinical and Experimental Allergy, 25*, 666-667.

Karrer, W. (1997). Inhalation therapy--advantages and difficulties. Schweizerische Rundschau fur Medizin *Praxis. 86*(50), 1975-8.

Kessler, H., Morik, J., Morlin, Z. & Varkonyi, T. (1969). Air hygiene investigations in the Lake of Topolca. *Geography Medicine, 70*(1), 171-191.

Khanam, AA., Sachdeva, U., Guleria, R. & Deepak, K.K. (1996). Study of pulmonary and autonomic functions of asthma patients after yoga training. Indian *Journal of Physiology & Pharmacology, 40*(4), 318-24.

Khayyal, M.T., El-Ghazaly, M., El-Khatib, A.S. & Hatem, A. (1995). Tolerability of mofebutazone in asthmatic patients. *International Journal of Clinical Pharmacology Research, 15*(4), 145-51.

Kremer, J.M., Jubiz, W. & Michelek, A. (1987). Fish-oil fatty acid supplementation in active rheumatoid arthritis. *Annals of Internal Medicine,106*,497-503.

Kreiger D. (1998). Dolores Krieger, RN, PhD healing with therapeutic touch. *Alternative Therapies in Health and Medicine, 4*(1), 86-92.

Kunz, K. & Kunz, B. (1983) Refexology. *Reflexions, 3*, 23-28.

Lane, D.J. & Lane, T.V. (1991). Alternative and complementary medicine for asthma. *Thorax, 46*(11), 787-97.

Lane, D.J. (1996). *Asthma the facts*. Oxford University Press, 3rd edition. New York, N.Y.

Lewith, G.T. & Watkins, A.D. (1996). Unconventional therapies in asthma: an overview. *Allergy, 51*(11), 761-9.

Lis-Balchin, M. (1997) Essential oils and 'aromatherapy': their modern role in healing. *Journal of the Royal Society of Health, 117*(5), 324-9.

Maher-Loughnan, G.P. (1970). Hypnosis and autohypnosis for the treatment of asthma. *The International Journal of Clinical and Experimental Hypnosis, 18*,(1), 1-14.

Maher-Loughnan, G.P., Macdonald, N. & Mason, A.A. & Fry, L. (1962). Controlled trial of hypnosis in the symptomatic treatment of asthma. *British Medical Journal, 2*, 371-376.

McCowan, C., Neville, R.G., Thomas, G.E., Crombie, I.K., Clark, R.A., Ricketts, I.W., Cairns, A.Y., Warner, F.C., Greene, S.A. & White, E. (1998). Effect of asthma and its treatment on growth: four year follow-up of cohort of children from general practices in Tayside, Scotland. *British Medical Journal, 316*(7132), 668-672.

Morris, A. (1997). Non-compliance to long-term asthma treatment – our greatest challenge. *British Journal of General Practice, 47*(419), 406.

Mulloney, S.S. & Wells-Federman, C. (1996). Therapeutic touch: a healing modality. *Journal of Cardiovascular Nursing, 10*(3), 27-49.

Nagarathna, R. & Nagendra, H.R. (1985). Yoga for bronchial asthma: a controlled study. *British Medical Journal, 291*, 1077-1079.

Nagendra, H.R. & Nagarathna, M.R. (1986). An integrated approach of yoga therapy for bronchial asthma: a 3-54 month prospective study. *Journal of Asthma, 23*(3), 123-137.

Nielsen, N.H., Bronfort, G., Bendix, T., Madsen, F. & Weeke, B. (1995). Chronic asthma and chiropractic spinal manipulation: a randomized clinical trial. *Clinical & Experimental Allergy, 25*(1), 80-8.

O'Donnell, J., Birkinshaw, R., Burke, V. & Driscoll, P.A. (1997). The ability of A&E personnel to demonstrate inhaler technique. *Journal of Accident and Emergency Medicine,14*(4), 271.

Paskova, S., Kolesar, J. & Siposova, E. (1976). Lungenautoactikorper bei Patienten mit Asthma bronchialei die einer Speleo und Klimatherapie in Bystra unterworfen wurden. *Allergy Immunology, 22*, 23-27.

Petersen, L.N., Faurschou, P., Olsen O.T. & Svendsen, U.G. (1992). Footzone therapy and bronchial asthma. *Ugeskrift for Laeger, 154*(30), 2065-8.

Potera, C. (1997). Working the bugs out of asthma. *Environmental Health Perspectives, 105*(11), 1192-1194.

Reilly D., Taylor M.A., Beattie, N.G., Campbell, J.H., McSharry, C., Aitchison TC., Carter R. & Stevenson, R.D. (1994). Is evidence for homoeopathy reproducible? *Lancet, 344*(8937), 1601-6.

Reilly DT., Taylor MA., McSharry C. & Aitchison T. (1986). Is homoeopathy a placebo response? *Lancet, 2*(8512), 881-6.

Rodrigo, C., Rodrigo, G. (1998). Therapeutic response patterns to high and cumulative doses of salbutamol in acute severe asthma. *Chest, 113*(3), 593-8.

Schuckman, H., DeJulius, D.P., Blanda, M., Gerson, L.W., DeJulius, A.J., Rajaratnam, M. (1998). Comparison of intramuscular triamcinolone and oral prednisone in the outpatient treatment of acute asthma: a randomized controlled. *Annals of Emergency Medicine, 31*(3), 333-8.

Schwartz, J. & Weiss, S.T. (1994). The relationship of dietary fish intake to level of pulmonary function in the first national Health and Nutrition Survey. *European Respiratory Journal, 7*, 1821-1824.

Scott, S.D. (1997). Partnerships in asthma care. *Advance for Nurse Practitioners, 5*(5), 86.

Shahar, E., Folsom, A.R. & Melnick, S.L. (1994). Dietary omega-3 polyunsaturated fatty acids and smoking-related chronic obstructive pulmonary disease. *New England Journal of Medicine, 331*, 228-233.

Shealy, C.N. (1996). *The complete family guide to alternative medicine: an illustrated encyclopedia of natural healing*. New York, NY: Barnes and Noble Press.

Shou-kang, L. (1994). Acupuncture treatment on asthma. *International Jounral of Clinical Acupuncture, 5*(1), 53-60.

Skulimowski, M. (1965). Behandlung der Bronchialasthmakranken in den Kammern der Steinsalzgrube in Wieliczka. *Archives of Physical Therapy, 17*, 417-421.

Smith, J.M. & Burns, C.L.C. (1960). The treatment of asthmatic children by hypnotic suggestion. *British Journal of Disease and Chest, 54*, 78-81.

Spence, J.E. & Olson, M.A. (1997) Quantitative research on therapeutic touch. An integrative review of the literature 1985-1995. *Scandinavian Journal of Caring Sciences, 11*(3), 183-90.

Tan, R.A. & Spector, S.L. (1998). Exercise-induced asthma. *Sports Medicine, 25*(1), 1-6.

Thein, F.C., Mencia-Huerta, J.M. & Lee, T.H. (1993). Dietary fish oil effects on seasonal hay fever

and asthma in pollen-sensitive subjects. *American Journal of Respiratory Disease, 147*(5), 1138-43.

Thien, F.C., Woods, R.K. & Walters, E.H. (1996). Oily fish and asthma - a fishy story? *Medical Journal of Australia, 164*, 135-136.

Ullman, D. (1995). *The homeopathic treatment of asthma: A breath of fresh air*. Berkeley, CA: Homeopathic Educational Service.

Van Ganse, E., Leufkens, H.G., Vincken, W., Hubloue, I., Bartsch, P., Bouckaert, A. & Ernst, P. (1997). Assessing asthma management from interviews of patients and family physicians. Journal of *Asthma, 34*(3), 203-209.

Vendanthan, P.K., Kesavalu, L.N., Murthy, K.C., Duvall, K., Hall, M.J., Baker, S. & Nagarathna, S. (1998). Clinical study of yoga techniques in university students with asthma: a controlled study. Allergy and *Asthma Proceedings, 19*(1), 3-9.

Windholz, G. (1987). Pavlov as a psychologist. A reappraisal. *Pavlovian Journal of Biological Science, 22*(3), 103-2.

Woolcock, A.J. (1996). Strategies for the management of asthma. *Respirology, 1*(2), 79-83.

Yunginger, J.W., Reed, C.E., O'Connell, E.J., Melton, L.S., O'Fallen, W.M. & Silverstein, M.D. (1992). A community-based study of the epidemiology of asthma. *American Review of Respiratory Disease, 146*, 888.

Ziment, I. (1996). Unconventional therapy in asthma. *Clinical Reviews in Allergy and Immunology, 14*, 289-320.