

Breathe Easier: There are Alternative Treatment Options for Asthma

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Introduction

-The word “asthma” has its roots in Greek, meaning “to breathe hard” or “panting”, and has been described by physicians as notable as Hippocrates and Maimonides. Among the chronic ailments of childhood, Asthma ranks as one of the top chronic diseases affecting our children,¹ and the combined costs for medical treatment and lost productivity due to asthma is approximated to be over 16 billion dollars.² This is no small issue, and it is crucial for the medical community to entertain the possibility that there are options and adjunctive therapies that may be added to the conventional approach to asthma treatment. Rates of prevalence and office visits for asthma have more than doubled since 1980 and remain at the highest rates we have ever seen.³ Emergency department visits have also increased since 1992, and mortality rates have declined since a recent increase in the 1980’s and 1990’s.⁴ This may be due to better asthma management and/or more effective and easily administered medications. An extraordinary amount of drug company funding to support the research and development of new medications has resulted in many more choices for these patients. These medications do provide symptomatic relief and save lives. However, despite the rapid influx of new medications, asthma prevalence rates remain high. The statistics beg the question: Are we treating the root of the cause or just its manifestations? Conventional diagnosis is largely based on symptoms, so conventional treatment has followed suit to address just that—the symptoms. Concerns of the possible long term effects of these medications have driven parents to seek alternative medicine for their children’s asthma. For example, corticosteroid use in asthma patients is common, and is known to cause decreases in bone density. Considering that teens gain approximately half of their skeletal mass during puberty, some of these patients may be predisposing themselves to an increased risk of osteoporosis later in life, especially at post-menopausal age. A salient point is that those who are currently being treated with corticosteroids may also have had previous chronic exposure to steroid treatment. Asthmatics often have a past history of other atopic conditions such as eczema and allergic rhinitis. Treatments for these conditions include other delivery routes of corticosteroids (nasal, topical, oral), possibly compounding long-term effects. Prevalence of interest in CAM for asthma exists internationally and across race and income lines.^{5,6,7,8} Some of the most popular treatments include breathing techniques, botanical medicine, homeopathy and acupuncture.⁹

The Environment

The concern of infection due to microbes has led to a strong emphasis on sterile environments. Consumers are constantly bombarded with advertising for antimicrobial soaps and other cleaning supplies, sending the message that sterility is the path to optimal health. It is clear that the rate of allergic diseases have risen in societies with the advent of technology and industrialization. It is possible that our children are receiving less exposure to nature or a farm-like environment, which may contribute to rising rates of the allergic conditions? In fact, those who are exposed to such environments do show less atopy,^{10,11} possibly due to immunomodulatory properties of the dust or other allergens in those settings.¹² Another factor in the benefit of farm-like settings may include a diet richer in beneficial microbes such as those found in raw dairy products. Industrialized societies are also seeing that the rise of asthma rates and hospitalizations due to asthma are directly related to air pollution,¹³ which is understandable.

Specific Therapies

Botanical medicine

Butterbur (*Petasites hybridus*) is indigenous to Europe, Asia and North America. It has typically been used for gastrointestinal complaints and migraines, but also has beneficial effects on patients with asthma. One reason that it is useful may be its effects on oxidative stress¹⁴, which is known to be an important factor in asthmatics^{15,16}. It has been proposed that Butterbur has an influence on the histamine response, but the literature is conflicting.^{17,18} Antispasmodic and antimuscarinic actions reported in animal models may be another contributing factor to its benefits.^{19,20} The active constituents are believed to be petasin and isopetasin. Petasin inhibits leukotriene synthesis, while isopetasin affects prostaglandin metabolism both resulting in anti-inflammatory effects.^{21,22,23} A multicenter, open-label study in 80 subjects taking 50-150mg

for a duration of 2-4 months had impressive results. The number, severity, and duration of asthma symptoms decreased, as well as a concomitant reduction in the need for asthma medications. Lung function tests such as peak flow and forced expiratory volume (FEV1) also improved.²⁴ Adverse reactions were minimal and not determined to be due to Butterbur. A Polish study concluded that patients taking petasites improved FEV1 and decreased bronchial reactivity both after one large dose of 600mg, as well as the same dose three times daily for two weeks.²⁵

Tylophora asthmatica is an Indian herb that has been used as a folk medicine for many years to treat asthma symptoms. Its antagonism of histamine release and therefore anaphylactic reactions have been demonstrated in animal models,²⁶ and it also may improve symptoms through improving endogenous steroid production.²⁷ What is interesting about *Tylophora* is that it may have long term treatment effects even after administration is discontinued.²⁸

Diet Modifications/Nutritional Interventions

Antioxidants

It is well known that there is increased oxidative stress in asthma patients. It has been postulated that modern diets are deficient in antioxidants, and that the environment of today exposes us to a much higher oxidative load. In order to combat this issue, antioxidant therapy is a reasonable intervention. It should come as no surprise that low intakes of dietary antioxidants as well as serum levels in asthmatics are well documented. Lower intakes of vitamins A, C, E, and Magnesium have all been noted in the asthmatic population²⁹ and are directly related to lung function.³⁰ Vitamin E and selenium have a synergistic relationship, in that they both fight against lipid peroxides, and vitamin E maintains adequate levels of the active form of selenium in the body.³¹ Higher intakes of dietary vitamin E may serve as a preventative measure against asthma development.³² An Indian study revealed that asthmatic children had four times the incidence of low serum vitamin A levels when compared to non-asthmatics.³³ 60 adult patients with brittle asthma had lower levels of vitamin A and E-containing foods in their diet.³⁴ In a case-control study of 51 adults, Soutar discovered that higher dietary intakes of vitamin C was negatively associated with airway reactivity.³⁵ The first National Health and Nutrition Examination Survey (NHANES 1) analyzed the data on 2526 adults and found that those with higher intakes of vitamin C were associated with better FEV1 measurements.³⁶ NHANES 2 showed that 9074 adults had similar results, with higher levels of serum vitamin C, niacin, and zinc:copper ratio corresponded to less wheezing.³⁷ Again, NHANES 3 showed a positive relationship between serum vitamin C levels and FEV1. What is interesting about NHANES is that dietary vitamin C did not show a relationship, while serum levels did. The logical approach would be to either change patients' diets or supplement them with antioxidant nutrients and see if it improves lung function. However, it may be prudent to test serum levels in patients to see if increased intake actually results in increased serum levels, or else this treatment intervention may be disappointing. A curious question: do these low levels predispose to exacerbations or does the chronic inflammatory state of asthma deplete the body of these vital nutrients that help quell oxidation? Or, is it a combination of the two?

Zinc

Serum zinc levels are shown to be lower in patients with asthma when compared to controls.³⁸ Low hair zinc levels were associated with increased wheezing in infants when compared to those who did not have wheezing.³⁹ In some cases, diet adjustment and/or supplementation of the mother during pregnancy could have a powerful effect on the respiratory health of the child later in life. Wheezing at 2 years old in children of mothers consuming high levels Vitamin E and Zinc was decreased, while no effects on the development of eczema was noted.⁴⁰ In 5 year olds, maternal intake of Vitamin E and Zinc had positive effects on FEV1 levels, and were negatively associated with the development of asthma. No relationship occurred between the children's intake and these values.⁴¹

Selenium

Selenium intake and its inverse relationship to asthma has been verified in medical literature.^{42,43} This is feasible, as selenium serves as a cofactor to glutathione peroxidase, whose main function is to protect from oxidative damage. In fact, asthmatics were found to have lower selenium levels than controls as well as lower glutathione peroxidase activity.⁴⁴ Supplementation with selenium at levels of 200µg daily over the course of 24 to 96 weeks resulted in a reduced need for both inhaled and systemic corticosteroid therapy in

a small pilot study of 17 adults.⁴⁵ Another study showed clinical improvement but not in bronchial hyperreactivity or lung function when 24 patients were treated for 14 weeks with 100µg daily and compared to a placebo group.⁴⁶ A more recent study in 197 asthmatic adults however, showed no benefit from supplementation of 100µg daily for 6 months.⁴⁷

B6

In a study of 15 adult asthmatics, serum B6 levels were found to be lower than control subjects. When supplemented with 50mg two times per day, all subjects reported improvements in their asthmatic symptoms.⁴⁸ The researchers were not able to explain the reasoning behind the beneficial effects of pyridoxine.

Magnesium

Magnesium is known to stabilize mast cell degranulation and is involved in the electric potential of cells and therefore directly affects bronchial smooth muscle. The use of intravenous magnesium sulfate for asthma patients in the emergency setting is standard for severe asthma attacks and those who are refractory to beta-agonist therapy.⁴⁹ Researchers have explored the question of whether oral supplementation would have a similar beneficial effect on asthmatics. A sample of 2633 adults with asthma were studied in regards to FEV1, bronchial hyperreactivity, and self-reported wheezing. Those who had higher levels of dietary magnesium did show improvements in these measures.⁵⁰ 17 patients participated in a double blind, placebo controlled study to look at short term magnesium dosing. During the treatment period with 200mg of magnesium, patients experienced subjective improvements, but objective measures of lung function did not change.⁵¹ A study from Scotland showed that when magnesium was removed from the diet, bronchial hyperreactivity increased.⁵²

Food allergens

One of parents' most frequently asked questions of their pediatrician is whether certain foods could be causing or aggravating their child's asthma symptoms. The typical response by conventional physicians is based on whether the patient has a positive skin prick test or serum IgE elevations to certain foods. If neither of those yield positive results, the patient is not considered to be allergic to the foods tested. However, the possibility of a delayed reaction exists, and the symptoms could be subtle enough to not be noticed or may not manifest for 1-2 days. A chronic, low level of inflammation could result from consistent exposure to certain foods. Ironically, the most commonly consumed foods happen to be quite allergenic, such as wheat, dairy, citrus, nuts, corn, eggs, and soy. Asthma has been described as one of the symptoms related to cow's milk allergy, along with eczema, vomiting, colic, growth retardation, and behavioral issues.⁵³

When addressing food allergens, parents/patients should be presented with the option of either an allergy elimination diet or IgG testing. The allergy elimination diet involves completely avoiding for at least 2 weeks suspicious foods that they may be reacting to. To be as accurate as possible, this should include any foods that have the allergenic component even as an ingredient. Parents should be educated on how to read labels and determine if the food is clear of the chosen allergens. After the elimination period, the patient introduces the food at every meal for 1 day, and parents observe for symptoms for the following two to three days. This will allow enough time for a delayed response to show. This approach seems to have the most accurate results for discovering intolerances to certain foods. However, in some cases, parents/patients do not want the inconvenience of changing the diet and laboratory testing is a more reasonable option. Several laboratories offer blood tests for delayed-type hypersensitivity/IgG levels to certain foods. The author has found this testing method to be much more reliable than the conventional IgE skin testing. This may be because the extracts that are used can degrade and show falsely negative results.⁵⁴ In addition, foods that show high reactivity on skin-prick tests are often those that present a more immediate-type reaction, not the delayed type observed in many asthmatics. Overall, IgE and IgG ELISA testing seems to be more sensitive than skin testing for reactivity to foods.⁵⁵

Sodium Intake

The intake of sodium has been suggested as another dietary factor that may exacerbate asthma. Direct relationships between the increase in sodium consumption in parts of England and asthma mortality have been noted.⁵⁶ Researchers looked into comparing 24 hour excretion of sodium with bronchial reactivity to histamine in 138 men who reported past symptoms of asthma and found a direct correlation as well.⁵⁷ It has been proposed that the connection is related to a potentiation of smooth muscle contraction via high sodium levels, which has been seen in animal models.⁵⁸ In addition, patients have been more susceptible to histamine when consuming higher levels of sodium.⁵⁹ It is difficult to address whether there are other confounding factors around high sodium diets, and the effects may not be limited to the direct actions of sodium alone. Many packaged foods with high sodium also contain preservatives, colorings and flavorings that may aggravate asthmatic symptoms, such as tartrazine dyes (yellow #5)⁶⁰. Sodium may also increase the loss of magnesium, which could cause bronchoconstriction. Others have theorized that individuals consuming a high sodium diet may not be eating large amounts of fresh fruits and vegetables, which are good sources of magnesium and antioxidants.

Essential Fatty Acids

In a large Australian study of 4366 children, bronchial reactivity was inversely related to consumption of fish more than once per week.⁶¹ The same researchers found similar results several years later.⁶² Some asthmatics may have enough chronic inflammation to warrant supplementation with essential fatty acids as opposed to relying solely on diet alone. It is also important to note the concern of high mercury levels in fish, and that supplementation may be a less toxic option. Physicians and patients need to make sure that the EFA supplement company they are using has refining processes that remove heavy metals and toxic substances such as dioxins from their product.

Breastfeeding

There is some conflicting evidence on breastfeeding and the prevention of asthma, but overall the information is positive. After all, breastfeeding infants have a more favorable microbial milieu in the gut than those who are formula fed. Elaboration on the relationship between gut bacteria and atopic conditions is discussed below. As expected, breast fed children have been shown to have lower asthma rates later in life.^{63 64 65 66} It is possible that we may see an even more pronounced protective role in those patients who have a positive family history of atopic disease.

Probiotics

In 1989, Fuller defined probiotics as a “live microbial supplement which beneficially affects the host by improving its intestinal microbial balance.”⁶⁷ There is a limited amount of research specifically on the sole use of probiotics in asthmatics. However, from the research that does exist, one could conclude that if used early in the gastrointestinal development of the infant, probiotics would serve as an effective protective measure. Atopic disease is indeed prevented by supplementation of beneficial bacteria, including *Lactobacillus rhamnosus* GG.⁶⁸ There is a popular misconception that these bacteria are either replacing what has been lost by antibiotic use or providing permanent residents to the intestines. In fact, they temporarily inhabit the gut and provide an amenable environment for a healthy population of other beneficial bacteria to grow. Those original species that were introduced are not typically in high concentration outside of specific supplementation.⁶⁹ The protective effect may be due to a number of actions. Intestinal permeability is a considerable concern when treating asthmatic patients, since it is increased in this populace.⁷⁰ Termed as “leaky gut” syndrome by many alternative medicine practitioners, increased permeability may be decreased by supplementation of probiotics. The idea is that there is a systemic mucosal issue with these patients, which seems to make sense. Many patients with asthma have past medical histories that include otitis media and other ENT conditions that would alert the physician of a possible defect in mucosal defense against pathogens. When approaching this from a holistic standpoint, all of the mucous membranes are connected, so the health of one area such as the gut could have resounding effects on a distant location, such as the upper respiratory tract. In fact, Gluck and Gebbers did show that oral supplementation with probiotics resulted in decreased levels of pathogens that are notorious for causing conditions of the upper respiratory tract.⁷¹ Rakoff-Nahoum discovered that a 4 week regimen of combination antibiotic (creating a sterile intestinal environment) in mice showed increased susceptibility to intestinal damage. Those mice whose guts were not devoid of commensal organisms showed protection from damage.⁷² This is an important point when treating infants and children in a preventive manner; Children with asthma frequently have a long history of antibiotic use. Are we predisposing our pediatric

patients to developing asthma with the widespread and often liberal use of antibiotics? This is a reasonable assumption given the clear correlations presented.

Recently, a study using lactobacillus and bifidobacterium prevented the development of eczema,⁷³ which seems to correlate with the development of asthma. The administration was prenatal to the mother as well as postnatally to the infant. Therefore, treatment of the mother is an additional facet of probiotic therapy that should be utilized, especially in high risk patients with an atopic family history. Another recent study looked at the combination of laser acupuncture on points that correspond to the lung and the large intestine along with the probiotic organism *Enterococcus faecalis*. The results were improved FEV1 levels and decreased bronchial hyperreactivity.⁷⁴ Interestingly, traditional Chinese medicine asserts that there is a direct connection between the lung and large intestine, while other studies show the direct correlation between intestinal permeability and atopic conditions. The use of Chinese medicine in the care of asthma is likely an overlooked option when considering alternative therapies.

Homeopathy

Homeopathy, the use of substances diluted to the point of no measurable amount, has been in use since the end of the 18th century. It has enjoyed overwhelming popularity in Europe and is used quite frequently for the treatment of asthma.⁷⁵ Over the course of 12 months, a randomized, double blind, placebo controlled trial on 96 children with asthma showed no significant differences between individualized homeopathic treatment and placebo groups. However, there was relative improvement in severity scales perceived by the participants. Critics of this study noted the mildness and well-controlled state of the participants' asthma, as well as the limitations of the primary outcome measure, which was a questionnaire. Peak expiratory flow rates were also used as outcome data, which may be considered an unreliable measurement.⁷⁶ For 4 weeks, 12 patients took a homeopathic preparation of either cat dander or house dust mite, based on skin prick testing.⁷⁷ This technique, known as isopathy, differs from the traditional form of homeopathy. Isopathic remedies are made from the disease-causing organism and is not based on the individual symptoms present in the patient, as in constitutional homeopathy. The patients in this study showed no differences in spirometry measurements after treated with the isopathic remedies. The fact that this study had such a small participant number may have affected the results. Nonetheless, there is a limited amount of literature on the use of isopathic remedies in asthma patients.

Mind-Body Medicine

Meditation may be helpful in the adjunctive treatment of asthma. 59 subjects with poorly controlled asthma on moderate to high doses of inhaled steroids completed a double blind, randomized controlled trial comparing Sahaja yoga (which focuses on meditation techniques) compared with relaxation techniques. Modest improvements were seen in mood scores and airway hyperresponsiveness to methacholine, but no significant changes were seen in lung function tests.⁷⁸ Using relaxation techniques in the control group may have strongly affected the outcome data, as one might consider meditation a relaxation technique in and of itself. A small randomized controlled trial on Sahaja yoga helped decrease asthma "attack" frequency in adult women as well as improve lung function.⁷⁹ Pranayama, an aspect of yoga that literally translates into "breath control", is a promising therapy for asthmatics. Decreased susceptibility to histamine provocation in subjects practicing these techniques⁸⁰ and improvement in pulmonary function tests and blood gases⁸¹ make pranayama an attractive option for an adjunctive therapy.

Buteyko breathing technique

Buteyko breathing is a technique created in the 1950's by Russian physician Konstantin Buteyko, and gained much of its popularity in Australia and New Zealand. It has many similarities to pranayama, which may explain a common physiologic effect. Proponents of the Buteyko method claim that it regulates the body's oxygen and carbon dioxide levels which can contribute to a more normal ventilation pattern. The method is thought to correct an underlying, habitual "hyperventilation". Conventional critics charge that there is no physiologic basis for why it should be helpful. However, there is research showing its benefits. Subjects using the Buteyko breathing techniques decreased their need for β -2 agonists and inhaled steroids, and improved quality of life when compared to a placebo breathing technique.⁸² Another study showed similar results, with subjects again decreasing the need for both β -2 agonists and inhaled steroids.⁸³ A third study did not have an effect on lung function or susceptibility to methacholine challenge, but bronchodilator use was decreased.⁸⁴

Conclusions

It should be mentioned that conventional medications have saved lives and made the experience of having asthma much more tolerable and less restrictive. It is essential for patients to always have rescue medicine quickly available in the event of an exacerbation. However, more and more physicians are realizing the added benefits of adjunctive therapies. If air and food quality continues on the same course as it has in the past several decades, patients will need more choices in asthma care.

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