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Nutrition & asthma- Feature review

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Abstract

Asthma is an airway inflammation disease which has series of generative, provoking, persuading and irritating factors which define its constitution and helps to correlate with genetic expression. Since it is both, genetic and atmospheric disease. In India the prevalence of asthma in increased 10-15% in 5-11 year old children. It took place due to hyper responsiveness of helper T-cells with the release of leukotrienes, histamines, cytokines, causing inflammation and bronchoconstriction. Several supplements like vitamins A, B, C; D and E have beneficial effect in bronchoconstriction, wheeze and inflammation. Alcohol and smoking habits have adverse effects in asthma. BMI have the potential effect on Asthma. BMI shows potential effects with increase BMI wheezing and panting symptoms are increased. Fast food i.e. burgers and pizza mark as the increase in wheezing and asthmatic symptoms. Fish and several nutrients like selenium, magnesium, sodium etc have beneficial effect in asthmatic and wheezing symptoms.

Keywords: wheezing, helper T cells, cytokines, lymphocytes, Chemokines.

Abbreviation: - IgE: Immunoglobulin E.

Introduction

The word 'Asthma' is derived from the Greek word which means panting or breathless. Previously, it was used to describe the episodic shortness of breath. Asthma is a disorder of respiratory symptoms that is renowned from the days of Hippocrates, who examined the situations of Heavy and deep breathing [1, 2]. Asthma is the complex disease with the series of generative, persuading, and provoking and irritating factors, which determine the disease constitution in the patients by correlating the expression of genetic code, since asthma is the disease with both genetic and atmospheric causes [3]. It's the chronic pulmonary disorder of repetitive respiratory symptoms like difficulty in breathing, airway constriction, wheezing, cough, and panting that relapse again or with the treatment. Later on the term was recovered in 19 century with the disquisition by Henry Hyde Salter on asthma and treatment measure for it. He defined asthma as, 'sudden breathlessness of an unusual symptom with interim of normal breathing between attacks' [4, 5] it's most common in young population.

Epidemiology of asthma

Asthma counts as the major disease of childhood and in adults. According to national asthma control initiative, about 1.7 million patients have emergency visits, and 10.6 million clinic visits and about 3,613 deaths and about 444,000 admitted patients over a year in the world [6]. Asthma death rate is declining with increase in the prevalence of asthma. Asthma causes patients, the limitation in their physical activities. One in 13 people have this respiratory disease. About 13% of total population is suffering from cough, panting, breathlessness, and wheeze like symptoms. About 50% of patients have the asthma attack once in a year that lead to the hospitalization like condition [7]. The prevalence of asthma in western countries increased from 1970 [8]. Mortality from this disease is as the tip of iceberg of poor asthma control [9]. According to a report survey of ISSAC and ECRHS, it has been found that, prevalence rate is low in Asian countries like china and India (2-4%) and a high rate of prevalence in countries like New Zealand, (15-20%) and UK etc [10].

In India, a survey found that the prevalence of asthma is from 10%- 15% among 5-11 year old children [11]. Approx, 20-30% of adults having cough from 3-4 weeks, exacerbate during early morning and exercise [12]. People with smoking habits (69%) has wheeze as the diagnostic factor for asthma than non-smoking individuals [13] According to a study carried out by Verma *et al*, in 2003, it has found that, Asthma prevalence has been rising by 23.11% in children of Haryana. The overall prevalence of asthma in school going children in India is, 11.92%. The total prevalence of asthma in north India estimated is 3.94%.

The prevalence of asthma reported high in the regions like, Rajasthan, Pune, Karnataka and lower prevalence of asthma was reported from Lucknow, Delhi, and north India [14].

Characteristics: The characteristics of asthma consist of inflammatory cell penetration, of neutrophils mainly during paroxysmal attack of asthma, asthmatic exposure, occupational asthma and patients with smoking and drinking habits. The cell penetration of white blood cells, eosinophils, mastocytes and epithelial cell damage [15]. Mostly socio-economic, educational, cultural, atmospheric and genetic factors influence asthma and asthmatic symptoms [16]. Asthma attack which results in narrowing of airways than normal conditions makes the respiration difficult [17]. Asthma is mainly characterized into:-

- **Airway Inflammation:** - In this type of condition, the lining of airways become red, swollen and narrow due to allergen attack.
- **Airway Obstruction:** - In this type of condition, the inner layer of airways become narrow that causes difficulty in breathing, causes improper functioning of lungs.
- **Airway hyper-responsiveness:-** In this, the inner layer of airways become hyper-responsive to small amount of allergen and irritants [18].

Symptoms

Airway inflammation, mucus production and chest tightness are the three major symptoms of asthma [19].

The other symptoms of asthma are recurrent episodes of wheezing and cough especially in day and night time like characteristics. People likely to have asthma if they were having bronchitis episodes in their childhood. Other causes having family history of asthma especially in the case of previous symptoms [20]. Symptoms include:

- **Cough:** Especially at morning and night, causes difficulty in sleeping.
- **Wheezing sound:** the sound of whistle during breathing.
- **Chest tightness:** Constriction in the airway
- **Breathlessness:** Difficulty in the breathing, especially during inhalation and exhalation process [21].
- **An adult is having the history of wheezing during childhood,** later on exacerbate respiratory symptoms, diagnosed first on the basis of their symptoms like hay fever, allergy to mites, pollens, animals, specific foods or medicine [22].

- Asthma symptoms increase may be due to the response of physical activity, and environmental allergen, occupational exposure, various medications like NSAIDs, smoking and alcohol habits, emotional stress etc. Patients with wheezing symptoms and low peak expiratory flow are very specific in asthma [23].

Pathophysiology of asthma

Asthma is the condition of hyper responsiveness of helper T-cells which occurs as allergic responses in the body. Various stimulus interactions induce immune mediated airway inflammation. The increased response of the helper T- cells releases the specific histamines, cytokines, leukotrienes etc that causes inflammation and bronchoconstriction [24-25]. NO is produced in airways by NO synthases [26, 27]. Current studies have shown that, the consistency of NO in exhalation increases the acute exposure to asthma due to decrease in pH [28, 29]. Beside these many mediators have been associated with several responses on airways on exposure to the stimulus. [30] Chemokines have a kingpin role in recruiting the inflammatory cells from the systemic circulations and cytokines adapt the inflammation [31, 32].

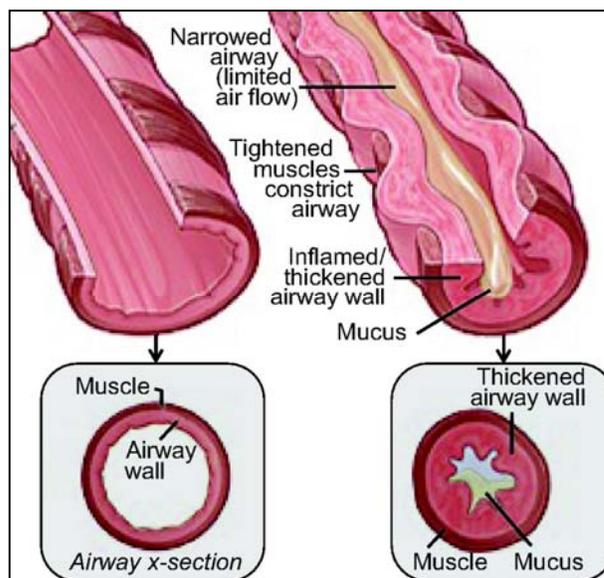


Fig 1: various obstructions of airways smooth muscles in asthma,

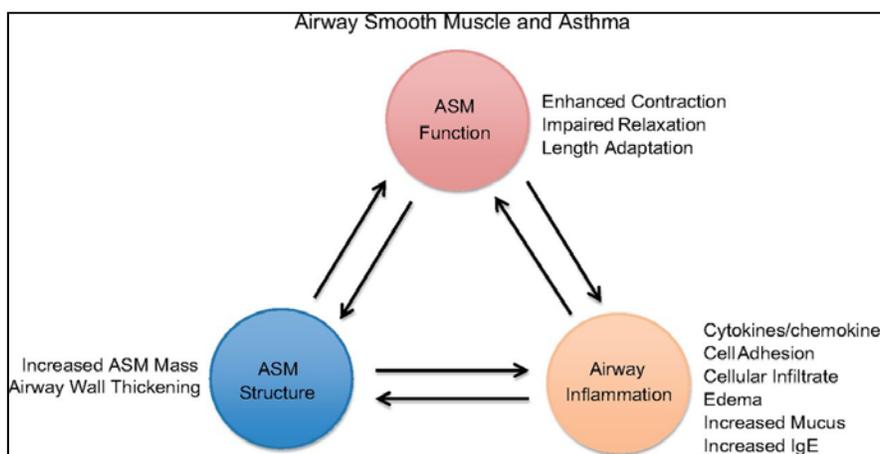


Fig 2: smooth muscles opt various ways for asthma pathogenesis 1. By direct obstruction of airflow 2. By remodelling of airway they cause indirect obstruction of airflow. That's why its a cycle process that is connected with one another [33].

Investigations and diagnosis

The diagnosis is based on the history of cough breathlessness, wheezing and recurrent airflow hindrance by time or by the response against the treatment [34]. Other diagnostic measures are:-

Spirometry: It is the most sensitive and confirmatory test for asthma. The FEV/FVC ration below 70% shows the airway obstruction. It is used to confirm the asthmatic condition. It is the test that should be done with the high quality assurance technique [35, 36].

In case of occupational asthma, the assessment is done in which the symptoms are assessed on all week days, as they having relieved symptoms on weekends or holidays [37].

Differential diagnosis: Many are the allergic conditions of respiratory symptoms, that are similar to that of asthma i.e. COPD, upper respiratory tract infection, post infective hyper responsiveness, whooping cough, left ventricular failure, hyperventilation, interstitial lung disease etc. It is very important to distinguish the condition COPD and asthma in

patients with smoking habits to avoid the inappropriate use of ICs [38].

Management of asthma

The action of effective drug therapies has been going on for many years. Management of asthma has always been the most important subject from many years so that all the patients get benefitted from the therapy. The drugs that are used for asthma treatment are mainly divided into two main groups.

- Relievers
- Preventers

Here, the main issue here in the asthma medication is about its management. To treat asthma the over use of reliever is being done and the under use of preventers in used largely in medication population [39].

Asthma Action Plan Zones [40] it is especially designed to check out the various stages in asthma, by which the need of medication and emergency condition can be facilitated as soon as possible.

Green Zone means: I feel good and have no symptoms	→	Take your controller medicines everyday
Yellow Zone means: I do not feel good, may have early warning signs such as cold and cough	→	It is important the rescue medication now
Red Zone means: I feel awful. May have coughing all the time and breathing difficulty	→	Take medication immediately and call doctor as soon as possible

Pharmacological approach to treatment [41]

Controller Medication

- Inhaled corticosteroids (ICs)
- Leukotrienes receptors antagonists (LTRAs)
- Inhaled Corticosteroids + long acting β adrenergic (LABA) inhalers.
- Theophylline
- Anti IgE therapy
- Systemic Corticosteroids.

Reliever Medication

- Short acting β₂- agonist
- Long acting β₂- agonist

Allergen specific immunotherapy

- ICs + LTRAs combination
- Omalizumab

Aims of drug therapy: The main goal of the drug therapy is to maintain the rational compliance of the medication prescription. The main aim is to minimize symptoms with lower adverse effects. But, when the severity of the asthma increases, patients with asthma must need to balance between symptoms control and lesser adverse effects along with the patients' safety. Patients with asthma require daily and regular checkups to manage and treat asthma as the regular recurrent treatment improves the symptoms of asthma in asthmatic individuals [42, 43].

Diet intake & respiratory disease: Diet; in present scenario is in choice of researches to modify the development and progression of asthma. Many of evidences are describing the beneficial effect of diet and dietary intake in asthmatic and patients with COPD in both early and developmental stage of the disease [44, 45].

In many of the observational and experimental studies, the beneficial effect of diet and various foods has been examined in various life stages and disease stages of respiratory disorder. This review focuses on the role of dietary patterns, obesity and their smoking and social habits in asthma and COPD [46].

Dietary patterns: There are so many studies that shown the link between different food or food nutrients and asthma and its related organs i.e. lung functions, airway working, and their various symptoms. These cross sectional studies and prospective studies have been carried out on adults and in teenagers. The studies have concluded the beneficial effects of diet and food nutrients on the people with asthma, lung diseases and airways hyper responsiveness [47, 48].

Fruits & vegetables: In many studies, it has been found that the change in dietary habits and dietary patterns like soft drinks, fast foods like noodles, hamburgers, pizza, etc has been associated with the increased prevalence of asthma in various countries [49, 50]. Generally fast food have high content of fat, salt that ultimately increases the risk of asthma as it increases the wheeze symptoms [51].

An increased intake of various antioxidants like Vitamin C, Vitamin E and selenium etc and vegetables are associated with beneficial effects in asthma and asthmatic symptoms [52]. It also advised that high intake of omega-3 fatty acids originated from fishes could be protective for asthma and various disease as well [53, 54].

In some of the fields of researches, the mechanism is still unknown but the overdose or increased amount of monosodium glutamate (MSG) increases asthma symptomatically [55]. Besides the deep fried foods just doubled the risk of asthma and asthmatic symptoms [56].

Cooked vegetables, tomatoes, and fruits rich in vitamin C are protective against wheezing symptoms. Other than the

common antioxidants, other antioxidants such as, oleuropein, hydroxytyrosol, and other polyphenols were having the advantageous effect on asthma therapy along with the medicines [57].

Studies show that citrus fruits like oranges, berries, grape fruits and tomatoes etc have the protective effects on asthma and related diseases [58-63].

Many of studies has also estimated that, the increased in BMI index or obesity directly increases the risk of asthma in individuals followed by missed working days, medical leaves, and increased use of protector bronchodilators [64, 65]. Alcohol consumption commonly triggers the immune system by increasing serum immunoglobulin E in the body which causes frequent asthmatic attacks in individuals [66, 67].

Various fruits and vegetables are the source of antioxidants. Low diet intake was associated with incidences of asthma in population [68]. Many studies have shown the association between fruit and vegetables consumption and symptoms of asthma [69].

A great inverse relation between intake of vegetables and prevalence of asthma has been shown in several of studies. Intake of various fruits and diets has been shown to improve the symptoms of asthma [70].

Nutrients and respiratory disease

Anti Oxidants and Oxidative Stress

1. Vitamins: The main causes of asthma are unidentified globally. The causes are usually multifactorial and may occur due to changes in diet as well. A low consumption of vegetables and fruits and increased intake of red meats, grain and saturated fats may cause the symptomatic changes in respiratory tract. Vitamins like A, B, C, D, and E and nutrients act like methyl donors i.e. folate, vitamin B12, choline etc. Sensitivity to allergens is prevalent in individuals with asthma, especially in children [71].

a. Vitamin A: The imbalance in oxidant species and antioxidants followed by oxidative stress, lead to tissue damage, inflammation in airways, abnormal tissue response thus, increase severity of asthma. The defence system of antioxidants includes endogenous and exogenous agents from the diet. The serum concentration of this diet is associated positively with the FEV (forced expiratory volume) in patients of asthma [72-76]. Vitamin A plays a kingpin role in various human processes, growth, reproduction and various immune responses [77]. Dietary vitamins are of two types, pre-formed vitamins (retinol) and pro- vitamin A (carotenoids) [78]. Vitamin A comes from several of sources like; milk, liver, eggs and fortified foods, red fruits, carrots, sweet potatoes, spinach, apricot, butter, winter squash etc. These are the main source of carotenoids, β -cryptoxanthins and β -carotene. Oxidative stress increases asthma by increasing the pro-inflammatory cytokines release causes airway inflammation and airway hyper responsiveness. [79]. Vitamin A might improve the treatment or prevention of asthma by deregulation of oxidative stress [80]. Through direct effect on immune system by increasing the proliferation of regulatory T- cells and inhibiting pro- inflammatory cells [81]. Vitamin A acts by increasing helper T- cell response [82]. Carotenoids promote the balance of helper T- cells and immune responses [83] and lycopene supplementation that reduces airway inflammation decreases the concentration of interleukin 4 and 5 [84].

b. Vitamin C: Vitamin C usually known as ascorbic acid is a water soluble vitamin which is a potent antioxidant which is found in several fruits and vegetables like red peppers, sprouts, grapes, berries, kiwi, red peppers etc have been commonly used to lower the risk of cardiovascular diseases, stroke and cancer [85]. Vitamin C in various findings has shown the anti- inflammatory role by reducing the C- reactive protein in people with increased C- reactive protein [86]. Ascorbic acid has the beneficial effects in asthma by prostaglandin inhibition, anti- inflammatory, or antioxidant properties. Vitamin C decreases the airway responsiveness, reduces the peribronciolar infiltration by inflammatory cells [87]. A cross sectional study on Turkish children has showed the decreased level of plasma vitamin C level in the patients of asthma [88]. Similarly the increase in plasma vitamin C levels and other antioxidants (carotene and selenium) were associated with the decreased prevalence of asthma in children of United States [89]. The high vitamin C, carotenoids, and flavanoids containing fruits are most commonly consumed fruits and vegetable that plays a kingpin role in protecting from exo and endogenous oxidative damage of airways [90]. Allen *et al* analyzed that the low consumption of vitamin C was associated with the increase in symptoms of asthma followed by wheeze and airway responsiveness, but severity was not signified. [91] Several cross sectional studies have shown that, vitamin C intake is related to increased lung functions in adult individuals [92].

c. Vitamin E: It is a fat soluble vitamin having different antioxidant functions. It has eight forms, α , β , γ , and δ -tocotrienol, α , β , γ , and δ -tocopherol, in which α - tocopherol is most bio available. Dietary sources of vitamin E include nuts, green vegetables, seeds, vegetable oils, mustard greens, turnip greens, hazel nuts, and olives etc. These factors might help in preventing asthma by decreasing the oxidative stress, inflammation of airways, and reducing the production of interleukin 4 in humans [93]. The unblended trials have supported this hypothesis that, intake of vitamin E for 4 months reduces the oxidative stress in airway responsiveness in adults with mild asthma [94].

d. Vitamin D: It is a nutrient and hormone which is important in metabolism of calcium phosphorus. The primary source of it is sun exposure, dietary factors like cheese, milk, egg yolk, especially fish and supplements as secondary sources. Vitamin D3 is commonly used in vitamin D deficiency [95]. Low serum plasma concentration has been seen with high risk of asthma or asthma morbidity in children and adults. They might regulate asthma by regulating gene expression or immune responses which affects the lung development preventing weight gain, viral illness and increasing steroid responsiveness [96].

e. Vitamin B: Vitamin B is a water soluble vitamin and has a king pin role in amino acid metabolism, pyridine, and purine synthesis. Dietary sources of vitamin B include cereals, dark leafy vegetables, bread, cauliflower, fish, bitter guard, banana oatmeal, pork etc. In various studies on animal models, it has been shown that its bronchoalveolar lavage has shown reduced eosinophills and reactive oxidant species in allergic airway disease. On adults, adolescents, it has been suggested that it decrease the allergic inflammation and airway inflammation [97, 98].

2. Minerals

a. Magnesium: It is a mild bronchodilator and its increased consumption has been shown to have beneficial effects on the lung functions, airways responsiveness and wheezing symptoms in UK population [99]. In further studies, the average intake of magnesium in normal adults was found to be 100 mg per day. The increased magnesium diet like yoghurt, black beans, figs, and dark chocolates was found to be associated with 27.6 ml high FEV1 and reduced airway reactivity to allergens, patient with severe have shown the slower or little intake of magnesium as compared to those with non-severe asthma. Several studies have also shown that, high magnesium intake was associated with improvement in symptoms but not in objective consideration of airway activity. [100].

b. Selenium: Its' been hypothesized that, the decreased amount of selenium that was associated with the activity of glutathione peroxidase that may be implicated in the pathogenesis of asthma. In a case controlled study conducted in New Zealand has shown that, increased in risk of asthma in patients had the lowest range of selenium and glutathione peroxidase activity. In a double blind placebo controlled study, selenium supplementation like tuna, beef, chicken, eggs and spinach etc had shown the clinical improvement symptoms of asthma as compared to placebo controlled groups. In normal to moderate asthma, the intake of selenium was associated with the increased symptoms of asthma but in case of severe brittle asthma, its intake has shown no significant effect [101].

3. Flavanoids

a. Coffee: Coffee is the most commonly consumed beverage after water in US, and it is the major source of caffeine in adults. Coffee is the complex beverages that have many biologically active compounds. For cardio vascular stand point, its consumption may reduce the risk of type II DM and HTN as well as conditions like obesity and depression on the other hand it may affect the lipid profile depend on how the beverage is being prepared. Large epidemiological data suggests that regular coffee intake have a reduced risk of mortality, and increased asthma control and lowers the risk of GI disease. A daily intake of 2-3 cups of coffee has been associated with beneficiary health effects. Coffee may improve asthma symptoms through caffeine, which is a methylxanthine, a bronchodilator and also enhance the performance in high intensity exercise [102].

b. Green Tea: Green tea extract is one of the most popular and widely consumed beverages in the world. The aqueous extract green tea was evaluated for the mast cell stabilizing and anti-anaphylactic activity. Allergic appearance includes allergic rhinitis, urticaria, asthma, anaphylaxis and disease with inflammatory symptoms. The anti anaphylactic and mast cell stabilizing effect of green tea decreases IgE antibody production, which is responsible for degranulation mast cells. Mast cells are known to be the primary responders in allergic reactions, most of which are triggered by cross-linking of high affinity IgE receptors. Mast cell stabilizing and anti allergic activities of medicinal plants are due to the presence of saponin, glycosides and flavanoids. Several flavanoids have been shown to inhibit leukocytes release and release of neutrophils betaglucuronidase. The results analysed in various studies suggest that green tea aqueous extract possess

anti anaphylactic action and stabilizes the mast cell membrane. Based on this, green tea has beneficial effect in treatment of asthma as it shows anti allergic and mast cell stabilization potential [103].

4. Capsaicin: Capsaicin is the main component found in the chillies. The reduction in cough and cough related symptoms by the use of capsaicin. An oral intake of natural capsaicin (chilli) could desensitize the cough reflex and improve unexplained coughing. Chronic unexplained cough triggered by environmental irritants characterized by increased cough reflex sensitivity, which could be demonstrated by means of inhaled capsaicin. Topical capsaicin could be used to improve non-allergic rhinitis and intestinal hypersensitivity and to reduce neuropathic pain. The regular oral intake of pure capsaicin from chilli fruits decreased capsaicin cough sensitivity and improved cough symptoms and cough scores in chronic cough patients. But the capsaicin supplement are well effective and exhibited few side effects [104].

5. Ajowan: Ajowan is a white flower plant which belongs to family Umbelliferae found in north India, Afghanistan and Nepal etc. It mainly consists of phenols and monoterpenes. Thymol is the main phenolic component found in it. It's a potent antispasmodic and germicide agent. It is a very good agent in treating asthma. In asthma, Ajowan seeds are soaked in lemon juice overnight and then chewed up to remove excess eosinophils from blood for relieving asthmatic symptoms. Another method investigated was, the seeds of ajowan are tied in a cloth of cotton, heated in a pan and applied on chest and neck when still warm to lessen chest tightness and pain [105].

6. Fenugreek: It is an annual plant which belongs to the family, leguminosae. It is commonly used in Indian food. Its' seeds are green coloured and are also used for medical remedies in old practise. In food, it increases the flavour and colour commonly. It is hypocholesterolemic, antibacterial, anticancer, agent. Drinking of water consisting of soaked fenugreek seeds helps in softening and dissolving the masses of cellular debris. Fenugreek is used to relieve bronchial complaints, influenza, colds, asthma, constipation, catarrh, sinusitis, pleurisy, sore throat, pneumonia, tuberculosis, laryngitis, hay fever and emphysema [106].

7. Zizyphus Jujuba: Anti allergic and anti anaphylactic activity of *Zizyphus Jujuba* fruits is very popular in urban population, *Zizyphus Jujuba* (Indian date), causes degranulation of mesenteric mast cells, decreased anaphylaxis. The red Indian date showed beneficiary effect as, inhibition of IgE antibody, degranulation of mast cells, and anti anaphylactic action [107].

Bad foods for asthma

8. Sodium: Many observational studies on dietary effect of sodium on asthma suggest that low salt diets are linked with reduction in non specific bronchial activity. Several studies have shown the small effect of increased sodium intake and bronchial activity [108].

9. Salt: Increased salt intake in diet might be responsible for the airway responsiveness in adults. In the data of regional and Wales has found the strong correlation between the table salt purchases and mortality in men and children but not in

women. According to a survey of Burney and his co-workers has found that people with high concentration of sodium excretion in their urine were associated with the airway symptoms of wheeze. According to survey of Schwartz and Weiss, the NHANES II it was found that the ratio of sodium alone and the both potassium and sodium were having a correlation between the wheezing and airway responsive symptoms in the populations. The prevalence of asthma is generally associated with the socio- demographic factors, with the diet related factors, but it strongly associated with the disturbances in the salt and its intake [109].

10. Egg: The white part in egg is the important source of allergen in egg and contain of about 80 allergic and non-allergic proteins. According to clinicians, the allergen present in egg white is ovomucoid, ovalbumin, ovotransferrin and lysozyme. In which ovomucoid is the most dominant allergen [110].

11. Wheat: Wheat allergy is very common and it differs at various ages and area levels. The prevalence of wheat allergy in children was <1%. Various studies have shown the prevalence of allergy in asthmatics of about 18%. [111] Many wheat allergic people were shown to be sensitized to a-, b-, or g- gliadins (high or low molecular weight glutenin). These has been associated with bakers' asthma [112].

12. Obesity, adipokines and respiratory disease: In past few years, obesity prevalence has increased drastically (BMI= 30 kg/m²). Obesity is associated with the high risk of many chronic diseases like, diabetes, cardio vascular disease. Thus it is a major health risk issue. [119] obesity is the reason of increased severity of asthma in children and adults both. Taylor *et al.* had reported the association of obesity with increased asthmatic symptoms, increased use of rescue bronchodilators, missed workdays [64]. Camargo *et al.* at first described the association between asthma and obesity, various epidemiologic studies have demonstrated the risk of asthma and asthma like symptoms in obsessed people [120]. Obesity, followed by formation of pro- inflammatory moiety which is responsible for formation of low grade inflammation in people. Adipose tissues are an important source of cytokine production. It has been estimated that, TNF- alpha, C-reactive proteins, interleukin- 6 is higher in obsessed people than in normal ones. In case of increased oxidative stress, the imbalance occurred followed by reduced antioxidant defence, which causes the imbalance that worsen the inflammation leading to injury by increasing pro- inflammatory cytokine release that alters enzymatic functions. In asthmatic individuals, the oxidative stress is found higher than in non-asthmatic ones that might be associated with the increased lipid peroxidation, and protein carbonyls in blood plasma with increased concentration of eosinophills, neutrophills, monocytes, and increased level of nitric oxide in exhaled air of asthmatic ones. Obesity affects asthmatic symptoms directly. Obsessed asthmatic patients showed marked improvement in asthmatic symptoms after losing weight. Yeh and huang, have estimated that, murine model increases the cholesterol which results in increased pulmonary allergic inflammation [113].

13. Alcohol habits: The prevalence of asthma has been increased in recent decades. This tends to cause the changes in the environmental and various lifestyle factors. Various

studies have suggested and showed the link between alcohol consumption and risk of atopic diseases. It is clearly said and shown that alcohol consumption triggers asthmatic attacks in asthmatic patients. On various animal and human studies, it has been shown that alcohol consumption has triggered immune system by increasing the level of IgE and impairing the T-lymphocytes. Liberoth and Backer *et al.*, in their study estimated that weekly or the moderate consumption of alcohol was associated with the protective effect on onset of asthma and the risk of asthma prominently increased in heavy drinkers that moderate consumers [114]. Women who were the heavy drinkers were highly exposed to the asthma and its symptoms but this indication were less common in men. Alcohol has the differential effects on respiratory symptoms in men and women. The regular and heavy consumption of alcohol was associated with the potential aeroallergen sensation. In several studies, it has been found that subjects who were drinking 2-3 units per week and subjects who were having above 10 drinks per week were at the higher risk of asthma with high level of IgE as compared to moderate drinkers with consumption of 5-10 drinks per weeks [115-16]. Nevertheless, wine drinking is inversely associated with the risk of asthma that means it can actually protect from asthma. Various studies have shown that Mediterranean diet has the protective effects in asthma because of antioxidants present in it. Thus, the natural antioxidant present in wine might attribute to the protective effect against asthma. But in some individuals with its allergy it might provoke the symptoms of asthma also [117].

14. Smoking: It is an important health problem to control. Exposure to tobacco smoke increases the risk of asthma in various age groups. Diet and lifestyle play an important role in asthma. While proper diet along with medication show the beneficiary role asthmatic patients. The lifestyle factors such as smoking, BMI, physical exercise after adjusting socioeconomic condition. Asthma prevalence was higher in smoking young adults the impacts of factors are differing in age groups, where BMI and gastro oesophageal reflux are at higher risk. In various studies the exposure to tobacco smoke is highly linked to the risk of asthma and on other hand, decreased exposure may diminish the risks [118-19].

15. Under nutrition and respiratory disease: Asthma prevalence has increased unexpectedly in recent years in developed countries, the changes are largely related to environmental and a lifestyle change which causes genetic shift that have occurred in short span of time. Dietary changes have been proposed the major cause for some instant of allergy. So many are the hypothesis that have shown the important role of diet and antioxidants, unsaturated fatty acids, saturated fats, and salt etc [120-21] a drastic change in interest towards fast foods have been increased in recent years, the results have been shown in increased BMI in similar period of time. Frequent hamburgers consumption had shown a dose dependent association between asthma symptoms and frequent hamburgers consumptions that have shown a similar association with bronchial hyper responsiveness. The frequent consumption of hamburgers, and fizzy drinks might be the lifestyle factors causing bronchial hyper responsiveness. Studies have found that, obese people were more likely to have hamburgers, fast foods as compared to normal ones and they were more exposed to the risk of asthma. It has shown that, fast foods have direct

effect on airway inflammation rather than IgE mediated effect. A significant relation has shown between McDonald restaurants and prevalence of wheeze among individuals [122], fast foods is also a risk factor for wheezing in children, whereas deep fried foods are the add on the symptoms of asthma and bronchial hyper responsiveness [123]. Fast foods in general, have higher content of salt, high fat that might be the possible risk factor of wheeze and asthma [124-25]. Experimental studies have shown that, low salt diet enhance and high salt diet worsen the airway symptoms. The fish consumption, with high x-3 polyunsaturated fatty acids is associated with reduced risk of asthma. Cochrane Review concluded that, an asthmatic supplements their dietary intake with x-3 fatty acids for symptoms relief [126-27].

Conclusion

Asthma is a hyper responsive allergic disease of airway causing airway inflammation, wheezing, panting like symptoms. Its prevalence is increasing rapidly from past few years. Diet along with the reliever and protector medication plays a beneficial role in improving asthmatic symptoms. Further, future studies need to be done on the diet supplements and food allergies to find out the protecting and causative factors. Lastly, various studies have been going on to find out the better and significant effect of other fruit, beverages and food diets to make the lifestyle better and free from asthma and asthmatic symptoms.

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