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An Analysis of Risk Factors for Onset of Asthma

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Abstract

Asthma is a chronic respiratory condition that causes inflammation and bronchial constriction, which restricts the flow of air into the lungs. While it is more prevalent in children with atopy, maternal smoking during pregnancy, and prognosis, asthma is more commonly brought on by lifestyle factors in adolescence and adulthood, such as obesity, smoking, occupational exposures, and environmental pollutants like sulphur dioxide, nitrogen oxide, and ozone. About 90% of people worldwide, according to the World Health Organization, breathe insufficient air, which caused 4.2 million deaths in 2015. According to recent research, exposure to industrial and traffic-related pollutants has a considerable impact on the morbidity and mortality rates for asthma. The current study's objective is to identify the numerous elements involved in the emergence of asthma.

Keywords: Environmental pollutants, Occupational hazards, Bronchial constriction, Asthma, Aeroallergens

1. Introduction

Asthma is a chronic, diverse disease of the lower airways that causes coughing, wheezing, breathing difficulties, and tightness in the chest. It is characterised by persistent inflammation and airway hyper-reactivity. Asthma symptoms and signs are brought on by airflow blockage in the airways. In order to keep the airways open and to protect the host, the epithelium that lines the airways is crucial. Responses to inhaled air or aspirated substances, such as allergies, viruses, and bacteria, are started by the airway epithelium. Asthma development, phenotypic variability, and steroid response are also influenced by environmental variables, genetic polymorphisms, and epigenetic factors. Environmental changes and exposure reduction can help with asthma management and flare-ups [1]. One of the main characteristics of asthma is changes in the structure and function of the airway epithelium [2].

With 6.4 million affected children in the USA alone, it is the most prevalent chronic disease of childhood. There are regional variations in asthma prevalence, severity, and death [3].

2. Review on factors associated with Asthma

Information was made available regarding the risk factors linked to the development of atopy and asthma in children [4]. They found that several gene polymorphisms have been connected to allergy and asthma susceptibility; complex gene, environmental interactions play a crucial role in the development of disease. Additionally, they came to the conclusion that elements like atopic dermatitis, allergic rhinitis, and early exposure to aeroallergens, maternal smoking during pregnancy and exposure of children to tobacco smoke in the environment, among others, increase the risk of developing chronic asthma.

The risk factors for asthma in adolescents from Sao Paulo, Brazil was identified. According to their estimation, the consumption of cooked vegetables was thought to be a protective factor for asthma, while an allergen mother, aeroallergen sensitization, rhinitis, eczema, and prematurity were risk factors [5]. The impact of sociodemographic, cigarette smoking and validated measures of perceived asthma control, physical health status and severity of asthma on the risk of death and confirmed 123 deaths 100 person-years. It was concluded that greater the severity-of-Asthma scores and poorer perceived asthma control scores are associated with increased mortality risk in adults with severe asthma [6].

According to newly available information on occupational attributable risk for asthma, occupational exposures account for 16.3% of all cases of adult-onset asthma, and the overall median PAR value was 17.6%. As a result, clinicians should take the patient's occupational history into account when assessing asthmatic patients of working age [7]. Traffic exposure is linked to decreased lung function in adults with asthma, according to research that linked lung function and health status [8].

Contribution of epidemiology for the development of childhood asthma as well as its severity is affected by numerous factors and their interactions can be explained by the heterogeneous nature of the disease [9].

The global prevalence rates of doctor diagnosed asthma, clinical/treated asthma and wheezing in adults were 4.3%, 4.5% and 8.6% respectively and varied by as much as 21-fold amongst the 70 countries. The highest prevalence rates were observed in resource-rich countries and high prevalence of smoking remains a major barrier to combating the major barrier to combating the global burden of asthma [10].

In adults with asthma, an estimated 9.15% had work-related asthma (WRA) and 17.0% had current depression. Moreover, persons with either WRA, current depression or both WRA and current depression were significantly more likely to have adverse asthma outcomes than persons with asthma and neither conditions [11].

Severe or difficult-to-control asthma, non-adherence with controller therapy, viral infections, obesity and ethnicity are likely to be important risk factor for exacerbations during

pregnancy. It was suggested that up to 6% of women with asthma are hospitalised for an acute exacerbation during pregnancy [12]

Non –work related adult-onset asthma to be a heterogeneous entity and that environmental exposure factors appeared to have a lesser role then host factors when compared with occupational asthma [13]. In addition to atopy, stress, obesity and several environmental risk factors such as exposure to air pollution and tobaccos smoke as well as occupational risk factors increased the risk of developing asthma. The increasing prevalence of asthma in all age groups indicate that living environment and immunity are in imbalance with each other reacting with airway inflammation to the environmental exposures and often non-harmful proteins such as allergens causing asthma and allergy epidemic [14].

During 2008-2013, asthma was responsible for $3 billion in losses due to missed work and school days, $29 billion due to Asthma-related mortality and $50.3 billion in medical costs. The total cost of asthma in the United States based on the pooled sample amounted to $81.9 billion in 2013 [15]. According to an international study of asthma and allergy in children, urban rates were 17.1% in 1995 and 18% in 2001. In rural areas, the corresponding prevalence rates were 10.4% and 13.8%, respectively. It was founded that major risk factors for asthma included urban living, home environment, and cigarette smoke exposure, and breastfeeding was protective against asthma [16].

Obesity increases the prevalence of asthma and is associated with worse outcomes that confirmed a bi-directional relationship between obesity and asthma. Other pathophysiological factors implicated genetic risk, the effect of diet and microbiome, and obesity-related cytokines as the contributors for asthma [17]. Both the traffic-related air pollution and second hand smoke exposure are risk factors for the development of asthma in children, and air pollution has a negative effect on asthma outcomes in both the adult and paediatric populations [18].

Emerging concepts and challenges in implementing the exposome paradigm and its application in allergic diseases and asthma are summarized, including genetic and epigenetic factors, microbial dysbiosis and environmental exposure particularly to outdoor and indoor substances. The challenges, relationships and molecular mechanisms between asthma, allergies, SARS-CoV2 and COVID-19, due to Pandemics and its impact on patient management was discussed [19]. The pathobiology of asthma and the biology of airway epithelium in health stated that external triggers like allergens, viruses, and alarmins showed that the airway epithelium in asthma is dysfunctional and plays a crucial role in the onset, progression, and exacerbation of the disease [20].

Asthma mortality and morbidity rates are significantly influenced by air pollution. The main pollutants, along with their emission sources, epidemiological findings, and mechanistic evidence that links environmental exposures to asthma. It was determined that air pollution causes about 8 million deaths annually, with outdoor exposure accounting for more than 4.2 million deaths globally and indoor pollution-related incidents accounting for more than 3.8 million deaths [21].

3. Conclusion

The findings of the current study demonstrate that children and adults have different risk factors for developing asthma. Compared to adults, exposure to industrial and traffic-related pollutants has a greater impact on the development of asthma in children. Infant asthma is primarily caused by maternal smoking during pregnancy, exposure to air pollutants, and tobacco smoke, whereas adult asthma is primarily caused by lifestyle factors like obesity, smoking, and occupational exposures. For etiologic understanding and disease management, the study of these factors is crucial.

4. References

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