Journal of Diabetic Association Medical College 2018;2(1)9-10

Editorial

Risk Factors of Asthma in Children

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Asthma is one of the most common chronic disease worldwide, affecting almost 300 million people with a continuously increasing prevalence[1]. It is also the main chronic disease in childhood, affecting 10% of children. A great effort is currently being focused on the search of preventive strategies, which seems feasible based on evidence suggesting that the onset of atopy and asthma may be strictly connected to several events occurring in very early stages of life. In particular, exposure to antibiotics in fetal and neonatal period[2], being born by cesarean section[3], formula feeding, maternal diet, and the variety of microbes one is exposed to may play a key role [4].

Family and twin studies have indicated that genetics plays an important role in the development of asthma and allergy[5], likely through several genes of moderate effect (i.e, genes associated with the relative risks in the range of 1.2-2)[6].Genome-wide linkage studies and case-control studies have identified 18 genomic regions and more than 100 genes associated with asthma and allergy in 11 different populations. In particular, there are consistently replicated regions on the long arms of chromosomes 2,5,6,12 and 13[7].A recent genome-wide association study, identified a new gene,ORMDL3,that exhibited a highly significant association with asthma ($p < 10^{-12}$)[8].

Prenatal tobacco smoke, prenatal maternal smoking has been consistently associated with early childhood wheezing[9], and there is a dose-response relation between exposure and decreased airway caliber in early life[10]. Studies have shown a clear prenatal effect of smoking and tobacco smoke: this effect is increased when combined with postnatal smoke exposure.

In the last decades, a possible role of gut microbiota in allergic disease pathogenesis has been demonstrated. Next generation sequencing techniques have allowed the identification of a distinct microbiome in the healthy lungs. The lung microbiome is characterized by the prevalence of bacteria belonging to the phylum Bacteroidetes (mostly prevotella and veilonella spp) in healthy subjects and to the phylum Proteobacteria in asthmatics (mostly Hemophilus, Moraxella, and Neisseria spp).In asthma and as well as in other diseases, the lung microbiome composition changes due to a disruption of the delicate balance between immigration and elimination of bacteria. The lung microbiome can interact with the immune system, thus influencing inflammation. Eary infections with viruses, such RSV, may alter the microbiome composition favoring the emergence of Protebacteria, a phylum which is also linked to the severity of asthma and bronchial hypersensitivity. Lastly, antibiotics may alter the gut and lung microbiota and potentially disturb the relationship between the microbiota and the host. Therefore antibiotics should be prescribed with increasing awareness of their potential harmful effects on the microbiota in young children with or without asthma[11].

Rapid urbanization and industrialization are also a contribututing factors for increasing prevalence of asthma. Considerable evidence links exposure to air pollutants (such as particulate matter, mixed traffic-related air pollution, and polycyclic hydrocarbons to asthma in chidren. Polycyclic hydrocarbons (PAH) are a group of hydrocarbons with two or more fuse aromatic rings, are byproducts of incomplete combustion of tobacco, wood, coal, fossile fuels and other organic substances[12]. PAH can readily be absorbed through skin ,lugs and gastrointestinal tract. Underlying mechanisms o PAH-asthma association includes increasing oxidative stress, stimulating inflammatory response, enhancing sensitization to aeroallergens and epigenetic remodeling. In addition to asthma, vitamin D insufficiency (a circulating 25(OH)D level<30ng/ml) may modify the detrimental effects of PAH exposure on lung function[12].

Analysis of combined data collected between 1 to 15 years of age demonstrated that higher maternal vitamin D & E intakes during pregnancy were associated with a reduced likelihood of being diagnosed with asthma in the first 15 years :hazard ratio(95%CI)per quartile increase in vitamin intake of 0.87(0.78-0.98) and 0.88(0.78-0.98), respectively. Lower maternal vitamin D and E intakes during pregnancy are associated with increased risk of children wheezing and being diagnosed with asthma in the first 10 years but not after puberty, suggesting that postnatal exposure predominate in the etiology of incident asthma as children transition through puberty into adulthood[13].

Asthma comprises a range of heterogeneous phenotypes that differ in presentation, etiology and pathophysiology. The risk factors for each recognized phenotype of asthma includes genetic, environmental and host factors. Along with above mentioned factors some other factors should also be considered. They are pollen, indoor air pollutants (like mosquito coils, parental smoking, hair-dye, powders, perfumes & scents etc), pets, cockroaches, house dusts (house-dust mite, dermatophagoides pteronyssinus, has now been implicated as the most important cause of allergenicity of the house-dust allergens). Foods like cow's milk meat, eggs, wheat, nuts, chocolates and various food

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additives, and preservatives may be considered as risks factors in a good number of children.

Asthma continues to be a major health issue. Globally 300 million people have asthma and societies transition to a modern urban lifestyle, by 2025,an additional 100 million people will have asthma[13]. The overall disease burden of asthma remains high for those affected and healthcare systems. Investigation into asthma causation remains a key research priority.

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