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Review Article

Common chronic conditions in pediatric primary care

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ABSTRACT

Chronic health conditions comprise illnesses as well as physical disabilities that last longer than 12 months and limit the patient's usual activity. The prevalence of chronic illnesses and disabilities in children and adolescents has more than doubled in the last 60 to 70 years. Common chronic conditions encountered among children across the globe include bronchial asthma, cystic fibrosis, diabetes mellitus, epilepsy, and developmental disabilities like cerebral palsy, in addition to congenital and heredofamilial conditions including certain hemolytic anemias and genitourinary disorders endemic to Saudi Arabia and the Middle East. Factors implicated in the shift in child health epidemiology from acute to chronic illnesses include better availability of diagnostic tools, improved specialized care access for pediatric patients suffering from complex congenital disorders, neoplasms, and premature births, and especially in case of disadvantaged populations, environmental factors like unhealthy living conditions, food insecurity and poor perinatal health. The two most common chronic conditions of childhood and adolescence managed by primary care physicians around the world and in Saudi Arabia are asthma and diabetes. Common risk factors across various diseases are urbanization, poor lifestyle, and consanguinity. The research on childhood-onset diseases and their different phenotypes in Saudi Arabia is scarce and confined largely to a few highly prevalent conditions at present.

Keywords: Children, Chronic, Asthma, Diabetes, Developmental disorders, Primary care

INTRODUCTION

Chronic health conditions, including chronic illnesses as well as physical disabilities, are generally considered as those conditions that last longer than 12 months and are severe enough to limit the patient's usual activity. There is no set definition of chronic health conditions in childhood. One systematic review involving 64 publications discovered four commonly used concepts that differed in their reliance on types of condition, illness duration, impact on everyday activities, and needs for services.[1] The main difference among definitions was that they were either based on a list of diagnoses or on functional limitations as a result of various conditions.

The range of prevalence rates in the articles varied from 0.22% to 44% based on how the definitions were applied, the source of the study information, the kind of data collected, the study year.[1] Over the years, there has been a shift in the perception of what constitutes health and disease, as well as childhood chronic illness. Between the 1930s and 1960s, the focus was limited to "crippled children" and their physical defects, which shifted to "handicapped children" in the 1970s and 1980s, which included developmental disabilities and other physical impairments.[2] In 1998, the United States maternal and child health bureau proposed an inclusive definition of children with special health care needs that comprised physical, developmental, emotional, and behavioral conditions, reconfiguring the delivery system infrastructure for pediatric chronic health care.[3]

The prevalence of chronic illnesses and disabilities in children and adolescents has more than doubled in the last 60 to 70 years.[2] There is a wide variation in the literature regarding the estimated prevalence rates of chronic diseases in pediatric outpatients, ranging from 10% to 28%.[4-9] This rate is predicted to rise further in the future.[2] The past three decades have seen an alarming surge in the incidence of chronic diseases such as diabetes mellitus, hypertension and cardiac disease, cancer, genetic hemopathies, and obesity in the pediatric population in Saudi Arabia.[10-12] In fact, in today's times, chronic diseases account for the highest number of diagnoses among children annually in Saudi Arabia.[10,13] According to a Saudi council of health services report in 2009, around 10% of Saudi families in Jeddah had at least one child with one or more chronic illness like asthma, diabetes, cystic fibrosis, cancer, and epilepsy.[14] Two studies conducted by the Saudi ministry of health in 2009 and 2011 in Jeddah identified respiratory diseases including bronchial asthma (48% and 50%), leukemia (40% and 38%), diabetes mellitus (27% and 34%), anemia (21% and 28%), and brain tumors (13% and 20%) as the most common chronic conditions in children.[15] Another 2015 survey conducted in Jeddah reported respiratory diseases (32%), diabetes (26%), cancers mainly including leukemia and brain tumors (16%), hemopathies including anemia and thalassemia and cardiovascular conditions (14%), osteopathies (12%), neurological diseases (11%), and lastly, urological diseases (9%) as the most prevalent chronic pediatric conditions.[14]

LITERATURE SEARCH

A literature search for was carried out the national library of medicine database and Google scholar search engines to identify publications addressing chronic conditions in children commonly encountered in primary care, globally and in Saudi Arabia. Only articles in the English language were included. A limit to "full text" availability was put in the search query. Potentially relevant scientific articles were identified. The reference lists of identified publications were also scanned. Further, grey literature on the childhood chronic illnesses was also identified using Google search engine.

DISCUSSION

There are many factors implicated in this historic shift in child health epidemiology from acute to chronic illnesses.[16] Firstly, better health care access and better availability of diagnostic tools, particularly for behavioral and emotional conditions, has improved case detection. Secondly, improved specialized care access and delivery have increased life-expectancies in pediatric patients suffering from complex congenital disorders, neoplasms, and premature births. Further, the increased prevalence rates, specifically in disadvantaged populations, are attributed to environmental factors like poor living conditions and food insecurity in addition to inadequate perinatal care.[16] Some researchers believe that the epidemiological shift, as is evident from the significant increase in the number of children with chronic conditions like bronchial asthma, obesity, diabetes, and attention deficit/hyperactivity disorder (ADHD), is linked with a change in the social ecology of childhood.[2] This altered ecology consists of higher exposure to stress, increased parental absenteeism, more sedentary lifestyles, increased screen time, and consumption of sugary, fat-rich diets. Functional resilience from early childhood onwards, requires an interplay of developmental plasticity and developmental reserves. During this period, negative events that impact pediatric disease onset may trigger aberrant physiological pathways in the stress-sensitive nervous, endocrine and/or immune system and make these individuals susceptible to age-related illnesses as adults.[17] It is also hypothesized that the shared exposures due to the evolution of social ecology have led to rise in chronic conditions in today's children. Moreover, the same, shared exposures are implicated in the simultaneous rise of bronchial asthma, obesity and other psychological conditions, as well as multimorbidity. Recent evidence from literature has indicated a link between the prevalence of obesity with ADHD and asthma.[18,19]

Common chronic conditions encountered among children across the globe include bronchial asthma, cystic fibrosis, diabetes mellitus, epilepsy, developmental disabilities including ADHD, cerebral palsy, and autism spectrum disorders, in addition to congenital and heredofamilial conditions including certain hemolytic anemias and genitourinary disorders endemic to Saudi Arabia and the Middle East. Among these, the two most common chronic conditions of childhood and adolescence managed by primary care physicians around the world and in Saudi Arabia are asthma and diabetes.

Bronchial asthma

Asthma is the most prevalent chronic disease of childhood around the globe and in Saudi Arabia.[20] It is also the one of the most frequent reasons for primary care

visits and preventable hospital admission during childhood.[21] Today, there are over 334 million bronchial asthma patients globally.[22] Asthma ranks among the top of the list of diseases with the most disability-adjusted life years (DALYs).[23] Atopy, which is the genetic propensity for forming immunoglobin E antibodies on exposure to allergens, has been found as a risk factor consistently in research.[24] Approximately 38% asthmatic cases in children are linked to atopy.[25] In Saudi Arabia, with regard to DALYs, asthma ranks at the nineteenth position, and is the twenty-sixth most frequent cause of death.[26] Between 1986 to 2001, the prevalence rate of asthma in Saudi Arabia soared from 8% to 25%.[27] More recently, one survey study revealed prevalence rates of 33.7%, 17.7% and 14.1% in the cities of Hofuf, Riyadh and Jeddah, respectively.[26] The increase in incidence of asthma is suspected to be linked to environmental changes such as rise of aeroallergenic pollutants, introduction of imported plants, and higher exposure to pets and dust-mites related domestic allergens as well as indoor cigarette smoke.[28-31] In fact, one study showed a positive correlation between the number of cigarettes smoked in a Saudi household and childhood asthma.[32,33] Further, of interest is a recent study on a specific type of particulate matter, composed of dust storm driven fine sand and pigeon droppings, that triggers asthmatic attacks in atopic patients, a condition called 'desert storm pneumonitis'.[34] Lifestyle shift and urbanization have introduced many changes to the modern child's domestic environment. One Ethiopian study noted that children residing in urban neighborhoods were more prone to developing asthma compared to their rural counterparts.[35] The severity of asthmatic attacks has been found to decrease with increasing age, possibly due to the development of protective mechanisms in the airways.[36]

Diabetes mellitus

It is estimated that over 1.2 million individuals under the age of 20 years suffer from type 1 diabetes globally and approximately 150,000 new cases of type 1 diabetes emerge every in children and young adults under 20 years.[37] In Saudi Arabia, the estimated incidence of type 1 diabetes in people under 20 years in 2021 was 3.8 cases per 1000 children.[38] Nearly 29,000 individuals under 20 years currently suffer from type 1 diabetes in Saudi Arabia.[38] The global prevalence of type 2 diabetes is unknown. Type 2 diabetes, a chronic disease typically diagnosed in adults, is increasingly being detected in children. It is estimated that nearly 41,600 new type 2 diabetes cases among people under 20 years are diagnosed every year worldwide.[39] Most children of European origin and some of Arab-origin suffer from type 1 diabetes while in other pediatric cases, type 2 diabetes was the predominant phenotype.[37] Over 30% and 40% of total annual incidences of the latter type are reported from countries in the Western Pacific region and World Bank upper middle-income nations, respectively.[39] China, India and United States of America are estimated to have the highest incidence rates for type 2 diabetes.[39]

Type 1 diabetes is an autoimmune disease of unknown etiology, with the current hypotheses alluding to a wide variety of pathologic, environmental, and psychosocial triggers.[40] The destruction of beta cells in type 1 phenotype results in nearly complete insulin deficiency and thus, diabetes. Further, a phenomenon of superimposed insulin resistance also plays a role in determining the amount of exogenous insulin required for disease control. Insulin resistance is the main mechanism behind type 2 diabetes, which occurs once the beta cells are no longer capable of continuing hypersecretion to counter the impact of insulin resistance. Predisposing risk factors include obesity, firstly, which interrelates with other risk factors like unhealthy diet, physical inactivity and a sedentary lifestyle,[41] followed by other factors like genetic susceptibility, stress, and prenatal exposures like maternal malnutrition and gestational diabetes.[42-44]

Neurodevelopmental disorders

Intellectual disability, cerebral palsy, autism and epilepsy (seizure disorders) are the four most common neurodevelopmental diagnoses in Saudi pediatric primary care.[45] A community-based study from 2010 estimated the prevalence of neurological conditions at 68.5 cases per 10,000 persons in 13 administrative regions in Saudi Arabia.[10] The most common diagnoses were intellectual disability and cerebral palsy with estimated prevalence rates of 26.3 cases and, 23.4 cases per 10,000 persons, respectively. The prevalence rate of autism and epilepsy is estimated to be 18 and 8.8 cases per 10,000.[10,46] One study from Riyadh reported frequent coexistence of two or more conditions in the same patient.[45] Cerebral palsy is known to be the most common reason for childhood-onset motor disability, with an estimated global prevalence rate of 15 to 30 cases per 10,000 individuals.[47,48] In case of autism in Saudi Arabia, a male predominance was noted along with more severe ADHD-like symptoms, and an earlier age of diagnosis, due to suspected social masking of female patients.[49] Further, with regard to epilepsy, one Saudi study observed a link between epilepsy and the risk of certain psychosocial complications including learning disabilities, academic problems, emotional distress, and impaired social interactions.[48]

Malnutrition related diseases

While on one end of the spectrum, obesity-linked disorders like diabetes and cardiovascular diseases are increasingly prevalent among younger ages due to a nutritional excess, on the other end, malnutrition related conditions continue to impact children, especially those from lower socio-economic strata, in varied ways. Nutritional deficiencies prevent physical and mental development in children and adolescents, and are a silent cause of chronic illness, and physical and intellectual disability across the globe. It is estimated that roughly 30 million births annually worldwide are linked to intrauterine growth retardation, due to maternal

malnutrition.[50] Vitamin A, D and folate deficiencies are frequently found in the Middle Eastern populations and have been linked to development of metabolic syndrome.[13,51] One study found nutritional rickets as the most common cause for primary care visits at a hospital in Riyadh.[52] In another study in Riyadh, rickets accounted for 7% of the hospital admissions among pediatric patients.[45] However, in addition to dietary vitamin D insufficiency, lack of adequate sun exposure, and traditional local custom of swaddling infants were believed to contribute to the high prevalence of the disease. Further, in Saudi Arabia, the occurrence of protein calorie malnutrition was relatively rare.[45] Iron-deficiency anemia is one of most diagnosed anemias in children in Saudi Arabia. In fact, one study conducted at primary health care centers in northwestern Saudi Arabia found that over half of the infants between the ages of six months and two years suffered from iron-deficiency anemia.[53]

Hemolytic anemias

Hemolytic anemias are associated with high morbidity and mortality, and impaired health-related quality of life in children and adolescents. The burden of inherited hemolytic anemias like sickle cell anemia, thalassemia, and glucose-6-phosphate dehydrogenase (G6PD) deficiency is high in the Middle Eastern population due to malaria endemicity and high rates of consanguineous marriages in the region.[54,55] Sickle cell disease (SCD) is a hemolytic anemia that presents with episodes of extreme pain called painful crises, severe anemia, vision problems, infections, and stroke. At an estimated prevalence rate of 2.6%, eastern Saudi Arabia accounts for the highest number of SCD cases in the Middle East.[56] Young children and adolescents are especially prone to long-term complications like vaso-occlusive crises, acute splenic sequestration episodes, hemolytic and aplastic crises, infarction, and necrosis.[56] G6PD deficiency is another type of inherited disease which causes hemolytic anemia and jaundice, including neonatal jaundice, on exposure to oxidative stress. Although G6PD deficiency is an X-linked recessive trait with a high male predominance globally, data from Saudi Arabia have shown a more balanced gender distribution, hypothesized to arise from higher inactivation of normal X-chromosome in heterozygous females, owing to the higher rates of consanguinity.[55]

Allergies

Literature on allergic disorders in Saudi Arabia is scarce and restricted largely to asthma. It is believed that over 40% of children suffer from one or more allergic conditions within the first eight years of life.[57] Over the years, the incidence of allergic disorders has increases and currently between an estimated 8% to 15% of children in Saudi Arabia suffer from allergic diseases.[58] Excluding asthma, common allergic diseases in the school-going population are eczema and rhinitis. One study from Madinah reported the estimated prevalence of eczema and rhinitis clinical diagnoses as 14% and 4.2%, respectively in a sample of six- to nine-year-old children.[57] A minority of the students also demonstrated comorbid allergic disease.

CONCLUSION

The epidemiological transition to increased prevalence of noncommunicable chronic illnesses in children and adults has been accompanied by declining quality of life and rising health care expenditure. The data on childhood-onset diseases and their different phenotypes across the country is fairly limited at present. Given the very high prevalence of certain pediatric conditions with long-term consequences, further research is needed to understand the key heredofamilial and potentially modifiable environmental risk factors driving the surge of childhood chronic conditions, and guide clinicians and policymakers to develop better preventive strategies and therapeutic interventions.

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