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RESEARCH ARTICLE

PREVALENCE OF ASTHMA AMONG SAUDI CHILDREN IN MAKKAH, SAUDI ARABIA

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Abstract

Objectives: The published data on prevalence of asthma among Saudi children and its risk factors is scarce. This study was carried out to determine the prevalence of Asthma and its relationship with risk factors among Saudi children in Makkah, Saudi Arabia.
Methodology: A retrospective study was done at Obstetrics and Gynecology Hospital (OGH) in Jarwal, Makkah, Saudi Arabia. Random selection of 150 cases (30 cases each year) admitted to OGH within the period 2002 – 2006. A questionnaire form was used to collect information from patient`s medical records, including demographic data discharge diagnosis with other associated diseases. Data were entered and analyzed using SPSS package.
Results: Overall, 36 out of 150 cases (24%) are asthmatic. 61.1% of asthmatic children are males and 38.9% are females. Asthmatic cases recorded the least percentage in 2002 (16.6%) and the highest in 2006 (36.6%). 20%of cases recorded in 2003 and also in 2005. In 2004 , 26.6% of cases recorded. Out of 36 children with asthma, 9 cases (25%) are with positive family history, 10 cases (27.8%) are with positive relation to change in weather, 16 cases (44.4%) are with positive relation to dust, 8 cases (22.2%) are with positive relation to exercise, 2 cases (5.6%) are with positive relation to passive smoking and 6 cases (16.7%) are with positive relation to pets.
Conclusion: The prevalence of asthma among Saudi children in Makkah is higher than those reported from the neighboring cities and other countries. Males are more susceptible to asthma than females. Dust was the most common risk factor triggering asthmatic children in Makkah. Passive smoking was the less common risk factor related to asthmatic children.

Introduction:

Asthma is the most common chronic disease in children [Asher I, Pearce N, 2014]. It is one of the most common chronic illnesses in Saudi Arabia and local reports suggest that the prevalence of asthma is increasing [Al-Ghamdi BR, Mahfouz AA, Abdelmoneim I et al 2008]. An estimated 300 million people worldwide suffer from asthma, with 250,000 annual deaths attributed to the disease WHO, 2007).Asthma is not just a public health problem for high income countries: it occurs in all countries regardless of level of development. Over 80% of asthma deaths occur in low and lower-middle income countries [WHO, 2006]. Asthma deaths will increase by almost 20% by 2020 if urgent action is not taken [WHO, 2006]. Despite the abundance of high-caliber medical services and the availability of international guidelines, recent studies have shown that the burden of asthma might be significantly higher than previously estimated [Rabe KF, Adachi M, Lai CK, Soriano JB et al 2004],[Abudahish A, Bella H. et al 2006]. Asthma is under-diagnosed and undertreated, creating a substantial burden to individuals and families and possibly restricting individuals' activities for a lifetime [WHO, 2006].

In Saudi Arabia, it is estimated that up to 11.5% of children are suffered from bronchial asthma [Al-Frayh AR et al.1992]. For reasons that remain unclear, the prevalence of bronchial asthma is increasing [El-Gamal FM et-

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al.1993]. In Taif city, western city in Saudi Arabia, the asthma prevalence rate among children was 13.1%, whereas smoking and a history of asthma in the family increased this rate [Fayez Hamam**,** Ahmed Eldalo**,** Ahmad Albarraq et al 2015]. Other researchers concluded that there was a significant increase in the prevalence of bronchial asthma in the Kingdom of Saudi Arabia every year (during the period 1986-1995) [A R Al Frayh; Z Shakoor; M O Gad El Rab; and S M Hasnain; 2001]. In United States, about 1 in 10 children (10%) had asthma in 2009 [Centers for Disease Control and Prevention, *Vital Signs*, May 2011]. In most parts of the world, asthma prevalence is continuing to increase or remaining stable [C. Anandan, U. Nurmatov, O. C. P. Van Schayck, A. Sheikh; 2009].

Asthma runs strongly in families and is about 50% due to genetic susceptibility and about 50% due to environmental factors [Palmer, L.J., Burton, P.R. et al. 2000]. Boys are consistently reported to have more prevalent wheeze and asthma than girls [Almqvist C, Worm M, Leynaert B; 2007].

Bronchial asthma in children is varying from region to region due to the variability of extrinsic allergens that play a major role in infection of susceptible children that lead to the disease [Al-Frayh AR et al.1992]. In a recent survey, 75 % of people said that cold air can trigger asthma symptoms [www.asthma.org.uk]. Change in weather, fluctuations in humidity and temperature, appear to influence emergency department visits for pediatric asthma [Nana Mireku, Yun Wang et al; 2009]. The exposure to air pollutants exacerbates the risk of asthma in children even at relatively low levels of exposure [Jong-Tae Lee, Ho Kim, Hoyin Song et al 2002]. Other investigators in Riyadh, Capital city in Saudi Arabia, revealed that dust of sand storm had no significant impact on acute asthma exacerbations in children [Abdullah A. Alangari, Muhammad Riaz; 2015]. Exercise-Induced Asthma is associated with impaired quality of life among children with asthma [Namiko Kojima, Yukihiro Ohya, Masaki Futamura et al 2009]. Bronchoconstriction of approximately 12-15% of the population associated with exercise can occur in nearly all individuals with asthma [Mahler DA; Section of Pulmonary and Critical Care Medicine, Dartmouth-Hitchcock Medical Center, 1993]. The exposure to environmental tobacco smoke in asthmatic children was higher than among healthy children, indicating that passive smoking may be a predisposing and/or aggravating factor for childhood asthma [S. Willers, E. Svenonius et al; 1991]. Prevalence rate for asthma in children with pets is twice that of children without pets [Bener A, al-Jawadi TQ, Ozkaragoz F, al_Frayh A, Gomes; 1993]. Pet-ownership was associated with increased respiratory symptoms [Bener A, al-Jawadi TQ, Ozkaragoz F, al_Frayh A, Gomes; 1993]. Children with pets had more frequent transient or intermittent asthma symptoms [M. Kerkhof, A. H. Wijga, B. Brunekreef et al; 2009].

In Saudi Arabia, few studies have been conducted so far to investigate the various aspects of this problem among children [El-Gamal FM et al 1993., Al-Frayh A et al.1992, Al-Frayh AR et al.1992].

This study was taken to assess the prevalence of asthmatic children in period from 2002 to 2006 and to figure out the most related risk factor to asthmatic children in Makkah.

Methodology:

A retrospective review was done randomly for 150 patients less than 5 years of age admitted to Obstetrics and Gynecology Hospital (OGH) in Jarwal, Makkah, Saudi Arabia with complaints of fever, abdominal pain, vomiting, shortness of breath, cyanosis, anemia, skin infections and high blood sugar during the period from 2002 to 2006. We randomly picked out 30 patient`s medical records for each year (2002 – 2006). The data were collected in 3 days from 22 – 24 / 4 / 2007. The study received approval from Institutional Review Board. Informed consent was obtained from the hospital. A questionnaire form was used to collect information from patient`s medical records, including demographic data discharge diagnosis with other associated diseases. Patient's medical records were filtered according to inclusive and exclusive criteria. Inclusive criteria are Saudi and under 5 years old patients. Gender, family history, change in weather, dust, exercise, passive smoking and animal indoor were the main risk factors focused on it inside patient's medical record. Data were entered and analyzed using SPSS package (Release 10.01, 1999, Chicago, IL, USA). Descriptive statistics were performed as appropriate, including frequencies for variables, mean ± standard deviation and cross tabulations. Statistical significance was set at $p < 0.05$ throughout the analysis.

Results:

First, 150 cases (30 each year) were randomly selected. Then of these 150 samples, 36 cases were asthmatic, and hence asthma prevalence rates among Saudi children less than 5 years of age was 24% (table 1.1).

The original distribution of Male: Female in Makkah is 1:1. The total number of Asthmatic cases in our sample is 36. During the period 2002 to 2006, we found that males are more faced to Asthma than females in which 22 out 36 cases are males and 14 out of 36 are females. It means 61.1% males and 38.9% are females (Table1.2). That reflects males are more likely to be affected by Asthma than females.

We noticed that the prevalence of asthma among Saudi children in Makkah increases by time (Table1.3). We randomly picked out 30 patient`s medical records for each year (2002 – 2006). At 2002, 5 cases out of 30 cases are asthmatic (16.6%). At 2003, 6 cases out of 30 cases are asthmatic (20%). At 2004, 8 cases out of 30 cases are asthmatic (26.6%). At 2005, 6 cases out of 30 cases are asthmatic (20%). At 2006, 11 cases out of 30 cases are asthmatic (36.6%). So totally, Prevalence of Asthma among Saudi Children increases every year in Makkah.

Within the period of 2002 – 2006, family history factor was positive in 9 cases (25% of cases).(Table 2.1 a). Change in weather factor was positive in 10 cases (27.8% of cases).(Table 2.1b). Dust factor was positive in 16 cases (44.4% of cases) (Table 2.1c). Exercise factor was positive in 8 cases (22.2% of cases)(Table 2.1d). Passive smoking factor was positive in 2 cases (5.6% of cases)(Table 2.1e). Indoor animal (Pets) factor was positive in 6 cases (16.7% of cases)(Table 2.1f).

1.1 Prevalence of asthma. 36 out of 150 cases (24%) are asthmatic children.

	Frequency	Percent
Asthma	36	24.0
Other	114	76.0
Total	150	100.0

1.2. Male: Female ratio. 61.1% of asthmatic children are males, 38.9% are females.

		Frequency	Percent
Valid	Male	22	61.1
	Female	14	38.9
	Total	36	100.0

1.3 Year prevalence. Asthmatic cases recorded the least percentage in 2002 (16.6%) and the highest in 2006 (36.6%). 20% of cases was recorded in 2003 and 2005. In 2004 , 26.6% of cases was recorded.

			Asthma	Total
Year	2002	Count	5	30
		%within Disease	16.6%	20%
	2003	Count	6	30
		%within Disease	20%	20%
	2004	Count	8	30
		%within Disease	26.6%	20%
	2005	Count	6	30
		%within Disease	20%	20%
	2006	Count	11	30
		%within Disease	36.6%	20%
Total		Count	36	150
		%within Disease	100.0%	100.0%

2.1a Family history. 9 cases (25%) are with positive family history.

			Disease
			asthma
Family history	Yes	Count	9
		% within cases	25%
	No	Count	27
		% within cases	75%

2.1b Change in weather. 10 cases (27.8%) are with positive relation to change in weather.

			Disease
			asthma
Change in Weather	Yes	Count	10
		% within cases	27.8%
	No	Count	26
		% within cases	72.2%

2.1c Dust. 16 (44.4%) cases are with positive relation to dust.

			Disease
			asthma
Dust	Yes	Count	16
		% within cases	44.4%
	No	Count	20
		% within cases	55.6%

2.1d Exercise. 8 (22.2%) cases with positive relation to exercise.

			Disease
			asthma
Exercise	Yes	Count	8
		% within cases	22.2%
	No	Count	28
		% within cases	77.8%

2.1e Passive smoking. 2 (5.6%) cases are with positive relation to passive smoking.

			Disease
			asthma
Passive smoking	Yes	Count	2
		% within cases	5.6%
	No	Count	34
		% within cases	94.4%

2.1f Pets. 6 (16.7%) cases are with positive relation to pets.

			Disease
			asthma
Pets	Yes	Count	6
		% within cases	16.7%
	No	Count	30
		% within cases	83.3%

Discussion:

This retrospective study has clearly shown that there is overall increase in the prevalence of asthmatic children in Makkah. The prevalence of 24% is relatively high compared with AlFrayh's study and Fayez Hamam's study [Al-Frayh AR et al.1992],[Fayez Hamam, Ahmed Eldalo, Ahmad Albarraq et al 2015]. This 24% of asthmatic children in Makkah is also more than the prevalence of asthmatic children in United States. The study concurs with the study of A R AlFrayh [A R Al Frayh; Z Shakoor; M O Gad El Rab; and S M Hasnain; 2001] in which the prevalence of asthma among Saudi children is increasing every year. Also, the study concurs with Almqvist's study [Almqvist C, Worm M, Leynaert B; 2007] in which males are more susceptible to have asthma than females. Although 50% of asthmatic children have family history [Palmer, L.J., Burton, P.R. et al. 2000], our study revealed 25% which is less than that in Palmer's study. Despite weather change triggers asthmatic symptoms and influence pediatrics to visit emergency department [www.asthma.org.uk], [Nana Mireku, Yun Wang et al; 2009], our study revealed that only 27.8% of asthmatic children visit emergency department due to change in weather. According to Alangari's study, there is no significant relation between dust and asthma [Abdullah A. Alangari, Muhammad Riaz; 2015]. Otherwise, our study revealed that 44.4% of asthmatic children triggered by dust. Bronchoconstriction associated with exercise

of approximately 22.8% asthmatic children is relatively high compared with Mahler's study [Mahler DA; Section of Pulmonary and Critical Care Medicine, Dartmouth-Hitchcock Medical Center, 1993]. Asthma associated with passive smoking of approximately 5.6% asthmatic children is relatively low compared with S. Willers's study [S. Willers, E. Svenonius et al; 1991]. 10.7% of asthmatic children triggered by pets is relatively low compared with Bener A's study [Bener A, al-Jawadi TQ, Ozkaragoz F, al_Frayh A, Gomes; 1993].

There are a number of limitations that need to be considered, of which the data taken from only one hospital and the sample size was very small. To overcome these limitations, a larger study that excludes all the limitations should follow.

In conclusion, the prevalence of asthma among Saudi children in Makkah is higher than those reported from the neighboring cities and other countries. Males are more susceptible to asthma than females. Dust was the most common risk factor triggering asthmatic children in Makkah. Passive smoking was the less common risk factor related to asthmatic children. Further studies including large sample size and more than one hospital are required.

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