RISK FACTORS ASSOCIATED WITH CHILDHOOD ASTHMA AMONG CHILDREN AGED 1-12 YEARS IN RAWALPINDI

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ABSTRACT

Objective: To explore various risk factors associated with childhood asthma in Rawalpindi garrison and city among children 1-12 years old.

Study Design: Case Control study

Place and Duration of study: Pediatric departments of Military hospital and Combined military hospital Rawalpindi from 1st Aug to 30th Nov 2009.

Materials and Methods : A total of 128 children with diagnosis of asthma presenting in outpatient and indoor pediatric departments of MH and CMH Rawalpindi between ages of 1-12 years were included. Age, gender and socioeconomically matched 112 children without diagnosis of asthma were included as controls. A predesigned questionnaire containing various factors associated with childhood asthma was filled by the researcher by detailed interview with either of parents.. Data was analyzed by SPSS version 15 and chi-square test was applied to determine significance. *p* v alue < 0.05 was considered significant.

Results : Out of 15 risk factors studied 8 were found significantly associated with childhood asthma. Significant factors were education of any of the parents more than matric, history of fever at least three times in last year, use of antibiotics, history of hay fever, raised IgE levels, exposure to passive smoking, living in urban areas and family history of asthma(*p* value<0.005). Non significant factors were mode of delivery, exclusive breast feeding for more than 3 months, partial breastfeeding for more than 6 months, history of eczema, atopy, history of viral respiratory infections in infancy and less than three number of rooms at home. Male preponderance was noted amongst cases.

Conclusion: Education of parents, fever, antibiotics, hay fever, raised IgE levels, exposure to passive smoking, living in urban areas and family history of asthma proved to be significant factors which are similar to those reported in other studies. However, difference was found in other factors. Recognition of these factors can help to optimize management of asthma in children in this area.

Keywords: Asthma, Childhood asthma, Risk Factors,

INTRODUCTION

Prevalence of asthma is increasing all over the world and is greater in children than adults[1]. International Study of Asthma and Allergies in Childhood (ISAAC), which involved 155 centers in 56 countries found great disparities (as high as 20 to 60-fold difference) in asthma prevalence across the world, with increasing trend towards more developed and westernized countries[2].

World Health Organization (WHO) reports that some 8% of the Swiss population suffers from asthma today, compared with just 2% some 25–30 years ago[3]. Although asthma is more common in affluent countries, it is by no means a problem restricted to developed world. WHO estimates that there are between 15 and 20 million asthmatics in India. Westernization only however does not explain the entire difference in asthma prevalence between countries, and the disparities may also be affected by differences in genetic, social and environmental risk factors[4]. Studies have yielded important clues about some key risk factors. The strongest risk factor for developing asthma is a family history of atopic disease[5]. Other risk factors studied are environmental pollution, urbanization, breast feeding, education of parents, use of antibiotics, IgE levels, socioeconomic status etc.

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Majority of studies to determine various risk factors associated with childhood asthma have been done in western world. However some studies have been done in India[6]. A few studies have been done in our country at Lahore, Hyderabad and Karachi[7]. In Pakistan we have diversity in environmental, weather, genetic, racial, social, economic, cultural, educational and behavioral factors due to its geographical make and structure. So naturally risk factors can be different when compared with developed world as well as within different parts of country. Through this study we have tried to highlight these risk factors in our population residing in Rawalpindi garrison and city. This will help to have better understanding of risk factors in childhood asthma in our local population and adopt preventive strategies in future specifically relevant to local requirements.

PATIENTS AND METHODS

This is a case control study. It was conducted at Pediatric outpatient and indoor departments of Military hospital (MH) and Combined military hospital(CMH) Rawalpindi from 1st Aug to 30th Nov 2009.

A total of 128 children with diagnosis of asthma presenting in outpatient and indoor paediatric departments of MH and CMH Rawalpindi between ages of 1-12 years were included. Age, gender and socio economically matched 112 children without diagnosis of asthma were included as controls. Informed consent was obtained from parents of diagnosed children for inclusion in study. A predesigned questionnaire mentioning various factors affecting childhood asthma was filled by the researcher by detailed interview with either of parents. Interview was done in the language which parents understood the best. Risk factors studied were gender, exclusive breast feeding (EBF) more than 3 months, partial breast feeding (PBF) more than 6 months ,mode of delivery – spontaneous vaginal delivery (SVD) or lower segment cesarean section (LSCS), education of parents-either of parents educated more than matric level, history of fever at least three times in last one year, use of antibiotics in last year, history of hay fever, history of eczema,number of rooms at home(more than 3 or less than 3), history of smoking at home by any family member, IgE levels, living in urban, periurban or village area, family history of asthma or other allergic diseases in grandparents, parents, siblings or cousins, history of atopy and viral respiratory infections in infancy. IgE levels were done by ELISA in all participants by taking 2 ml serum.

Data was analyzed by using SPSS version 15. Descriptive statistics were used to describe the data. Frequency and percentages were used to describe the categorical variables. Chi-square test was used to compare the variables between cases and controls. Odds ratio(OR) with 95% confidence interval(CI) was calculated through 2×2 table. p value < 0.05 was considered as significant.

RESULTS

This study included 128 cases and 112 controls. Age ranged between 1-12 years.They included 84 (65.6%) male and 44 (34.4%) female children among cases while 68 (60.7%) male and 44 (39.3%) female children among controls (p=0.431). Statistical analysis revealed 8 factors having significant association.

Education of parents was a significant risk factor as 86 (67.2%) parents in cases while 52 (46.4%) parents in controls were educated more than matric level (p-value 0.001). History of fever at least three time in the last year is also a significant factor as 102 (79.7%) cases while 34 (30.4%) controls had fever more than 100^0 F at least three times in last year (p-value <0.001). Similarly 123 (96.1%) cases and 93 (83%) controls had used antibiotics in the last year (p value<0.001). Use of antibodies is also a significant risk factor. Sixty cases (46.9%) were found to suffer from hay fever symptoms while only 8 (7.1%) controls had positive history of hay fever (p-value< 0.001). Family history of asthma was significantly higher among cases i.e 86 (67.2%) them control 22 (19.6%) (p-value <0.001). It was found that 73 (57%) cases and only 22 (19.6%) controls had raised IgE levels (> 120 units) (p-value <0.001). IgE levels was also a significant risk factors.

Exposure to cigarette smoke among cases was 87 (68%) while in controls 62 (55.4%) children had exposure to passive smoking in home environment (*p*-value 0.045). Living in urban was a significant risk factors sinceareas-110 (85.9%) cases while 82 (73.2%) controls lived in urban or peri urban areas. (*p*-value 0.014) (table-1).

Risk factors which did not show significant association were mode of delivery-SVD or LSCS, EBF for > 3 months, PBF for > 6 months, eczema, number of rooms at home (3 or >3), viral respiratory infections in infancy and history of atopy (Table-2).

DISCUSSION

Prevalence of asthma in children is variable worldwide. Studies have reported it to be 4.1% in Indonesia[2], 32.1% in Costa Rica[8] and 4-20% in India[9]. In Pakistani children, a research done in 1997 revealed 10% of children suffering from this disorder[10]. This study was repeated in 2006 and it showed that the prevalence had increased to 18% among children of 13-14 years age groups[10]. Although, precise reasons for this increase are unknown, it is likely that a number of environmental factors are at least partly responsible.

Several studies have reported an association between childhood asthma and family history of asthma[5]. In a study Yahya reported 47% of asthmatic children to have family history of asthma[11]. The present study confirms these findings in Rawalpindi area also. In Africa, asthma is more common in children who live in urban areas[12]. This study also supports these findings. Children who live on farms are protected against the development of asthma and atopic diseases, probably by bacterial endotoxins as proposed in Hygiene Hypothesis. The role of place of residence and, therefore, lifestyle is illustrated by the doubling or tripling of the prevalence of respiratory symptoms in children, who immigrated to Australia 5 to 14 years ago from countries in which the prevalence of asthma was low[13].

There is increasing evidence that substandard housing conditions correlate with high rates of asthma . Jafari *et al.* found in their study that 81% of asthmatic lived in cramped congested houses[14]. But in this study no significant difference for asthma association was found in children living in smaller houses as compared to those living in larger houses. This may be indirect evidence that living conditions and ventilation status is satisfactory even in lower socioeconomic group in this part of country. Conflicting data have been found in international studies on this topic. Mitchell *et al.* from New Zealand found a higher prevalence of wheezing in children from families with low socioeconomical status[15]. While an Italian study found that urbanisation and socioeconomical status had little impact on the prevalence of wheezing or asthma, but might influence the management of asthma[16].

Exposure to tobacco smoke is reported to be clearly associated with the development of asthma[17]. Rathore. mentioned 36.59% asthmatic children having cigarette smoke exposure[18]. In this study, this particular risk factor was found to be significant.

Results of present study do not show significant association of absence of EBF or PBF as a risk factor for asthma. We studied the effect of EBF (for at least 3 months) and PBF (for at least 6 months). In literature controversial association of breast feeding with asthma has been reported. Zeiger *et al.* critically evaluated 16 studies, out of which nine prospective studies showed benefit and seven showed lack of effect[19]. A study by Wright *et al.* has demonstrated that breast-feeding was most protective against wheezing and lower respiratory tract illness early in life[20]. The protective role of human breast milk immunoglobulins, especially serum IgA, in inhibiting absorption of antigenic substances has been documented in human neonates[21]. Howevere the relationship between breastfeeding and asthma is unclear.

Male to female ratio amongst cases in our study was 1.9:1**.** This is in accordance with the previous studies which also depicted male preponderance ranging from 1.4:1 in the United States[22] to over 2:1 from New Zealand[23]and 1.4:I in India[9]. This may be related to a greater degree of bronchial lability in males. Gerrard et

al have reported significant association between asthma and history of hay fever[24] and same is supported by this study.

Interestingly education of either of parents more than matric grade was found to be a significant risk factor for asthma. Although it seems to be an odd finding but similar findings have been reported in an indian study by Awasthi et al[25]. Since there is no plausible direct link of education of parents with asthma in children, there are likely to be unmeasured confounders associated with life-style. Our findings are in contrast to study by Celedon, *et al.* from Costa Ric[8].

Antibiotics use in early life has been associated with development of asthma in various studies. It is thought that antibiotics use makes individual susceptible to asthma by modifying the gut flora and thus the immune system[26]. Antibiotics use has been identified as a significant risk factor for asthma in our study also. This finding is consistent with an Indian study done in Lucknow[25]. Promotion of rational use of antibiotics may reduce the risk of asthma and should be encouraged.

History of atopy in the individual and family has been strongly associated with asthma in different studies as mentioned by Istanbul study [27]. But in our study association of atopy as risk factor for asthma could not be proved. This may be due to lack of clear illustration and understanding of atopic symptoms on the part of interviewer or respondent or both. Increased Ig E levels were found to have strong association as a risk factor for asthma which is supported by other studies also[28].

More than three episodes of fever during the last year as an independent risk factor was studied and it showed significant association. This finding is supported by Norwegian study carried out by Lindbaek[29]. It is well known that some children who develop asthma later in life are more sensitive to upper respiratory tract infections. However, history of frequent viral respiratory infections in infancy was also studied as a risk factor for asthma in this study and the results did not prove any significant association. This finding is in contrast to other studies which have mentioned it as a significant risk factor because increased inherent hyperactivity is likely to make infants more prone to viral respiratory infections[30]. Eczema as a marker of atopic disposition may be a risk factor for asthma but its association proved to be insignificant. This is also in contrast to other studies[24].

Caesarian section has been found to be associated with up to 20% increased risk of asthma as mentioned in a meta analysis by Thavagnanam [31]. This is attributed to exposure of baby to modified bacterial flora during LSCS as compared with vaginal birth which modifies the immune system as proposed by hygiene hypothesis. In our study LSCS was found to be an insignificant risk factor.

CONCLUSION

Education of parents, fever, antibiotics, hay fever, raised IgE levels, exposure to passive smoking, living in urban areas and family history of asthma proved to be significant factors in Rawalpindi are which are similar to those reported in other studies. However it has been observed that living conditions, mode of delivery, eczema and atopy breast feeding, viral respiratory infections in infancy, having insignificant association with childhood asthma, which is different from other reported studies. Further larger studies are recommended in this part of country to define risk factors associated with childhood asthma more precisely.

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Table-1: Description of significant risk factors for asthma in children

Factors	Asthmatic children (n = 128) Frequency (%)	Control group (n = 112) Frequency (%)	Odds Ratio	95% CI	p-value
Education of either parent > Matric	86 (67.2)	52 (46.4)	2.363	1.400 – 3.988	0.001
Fever>3 times in last year	102 (79.7)	34 (30.4)	1.049	4.991 – 16.23	< 0.001
Antibiotic use in last year	123 (96.1)	93 (83)	5.026	1.810 – 13.96	0.001
Hay Fever	60 (46.9)	8 (7.1)	11.471	5.162 – 25.491	< 0.001
Exposure to cigarette smoke	87 (68)	62 (55.4)	1.711	1.011 – 2.896	0.045
IgE (Raised)	73 (57)	22 (19.6)	5.43	3.031 – 9.726	< 0.001
Living (Urban)	110 (85.9)	82 (73.2)	2.236	1.167 – 4.285	0.014
Family History (Yes)	86 (67.2)	22 (19.6)	8.37	4.623 – 16.129	< 0.001

Table-2: Description of insignificant risk factors for asthma in children

Factors	Asthmatic children (n = 128) Frequency (%)	Control group (n = 112) Frequency (%)	Odds Ratio	95% CI	p-value
LSCS	39 (30.5)	33 (29.5)	1.049	0.603 – 1.825	0.865
EBF(>3 months)	24 (18.8)	15 (13.4)	1.492	0.74 – 3.011	0.264
PBF (>6 months)	73 (57)	61 (54.5)	1.110	0.666 – 1.849	0.690
Eczema	16 (12.5)	7 (6.3)	2.143	0.848 – 5.416	0.101
Rooms (3 or <3)	88 (68.8)	72 (64.3)	1.222	0.714 – 2.092	0.464
Viral Respiratory infections in infancy (No)	76 (59.4)	62 (55.4)	1.179	0.706 – 1.969	0.530
Atopy (No)	114 (89.1)	97 (86.6)	1.259	0.579 – 2.539	0.561