Risk Factors of Asthma Among Children Attending Mosul Hospitals

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ABSTRACT: Background: Asthma is a inflammatory condition of the lung airways resulting in episodic airflow obstruction. Symptoms are produced by irritation of small airways and may include bronchial hyper responsiveness, coughing, mainly at night or early morning. The mutable airflow obstruction is often adjustable, either spontaneously or by management .

Objective: to find possible etiological risk factors and their links to Children asthma.

Methods: This case-control study was conducted in four pediatric teaching hospitals for the period extending from 1st of April to end of November 2018.

A total of 300 children < 15years were chosen randomly from the pediatric outpatient clinic, and divided in two group.

Group A : one hundred fifty asthmatic patients were labeled as asthmatic .

Group B : one hundred fifty children were matched to group A by age, sex, the group B without any history of asthma.

Inclusion criteria for Group A were: Diagnosed as asthmatic by consultant pediatrician and should be respond well to anti asthmatic medication.

Inclusion criteria for Group B were: Healthy or apparently healthy and without any history of medical problem or chronic diseases.

Any child who is not accompanied by his /her mother or relative, and who didn't meet the selection criteria for the A and B groups will be excluded from the study .

Results: After adjusting for possible cofounders; the study showed the factors which had significant association with childhood asthma were parent consanguinity 54%(P<0.001), low educational level of parents 63%, 58% (P<0.001), small house room 65% (P<0.001), presence of animals in the home57%(P<0.001), family history of asthma72% (P<0.001), , mother disease and medications 56%(P<0.001), household exposure 69% (P<0.001), respiratory infection during infant stage 81%(P<0.001) bottle feeding74%(P<0.001) .

Conclusion: The independent risk factors after adjusting was were parent consanguinity, low educational level of parents, small house room, presence of animals in the home, family history of asthma, mother disease and drugs use through pregnancy, household exposure, recurrent respiratory infection during 1st year of life. Exclusive breast feeding (1st 6 months) appeared to be protective from asthma.

Keywords: children asthma, risk factors: pediatric hospitals, genetic & environmental factors.

عوامل الخطورة من الربو بين الأطفال في مستشفيات الموصل

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الملخص: لقد تم اجراء دراسة الحالة والشاهد في اربع مستشفيات للأطفال في مدينة الموصل وذلك خلال الفترة من الاول من كانون الثاني إلى نهاية تشرين الثاني 2018 وهدف الدراسة معرفة ودراسة عوامل الخطورة ومدى علاقتها بالربو لدى الأطفال.

الهدف : هو دراسة عوامل الخطورة للربو عند الأطفال في مدينة الموصل.

شملت الدراسة عينة من 300 طفل تم اختيارهم عشوائيا من العيادات الاستشارية وشملت مجموعة (ا) 150 طفلاً مصاباً بالربو بالاعتماد على تشخيص أخصائي أمراض الأطفال. أما المجموعة (ب) تم اختيار150 طفلاً من نفس المجتمع والجنس والفئة العمرية لمجموعة (ا) مع الأخذ بالاعتبار كونهم غير مصابين بمرض الربو.

بعد التعديل لبعض العوامل التي من المحتمل أن تؤثر على دقة النتائج وجدت الدراسة الحالية علاقة بين عوامل الخطورة والربو وتتضمن: تقارب الوالدين 54% (P<0.001)، والمستوى التعليمي المنخفض للآباء والأمهات 63%، 58% (P<0.001)، قلة عدد الغرف للمنزل 65% (P<0.001)، وجود الحيوانات في البيت 57% (P<0.001)، والتاريخ العائلي للربو 72% (P<0.001)، وأمراض الأمهات خلال الحمل واستخدام الدواء خلال الحمل 56% (P<0.001)، والتعرض المنزلي 69% (P<0.001)، التهاب الجهاز التنفسي المتكررة خلال السنة الأولى 81% (P<0.001) الرضاعة غير الطبيعية 74% (P<0.001).

وبالنتيجة أوصى الباحث بتجنب التدخين عند وجود امرأة حامل مع تاريخ عائلي إيجابي للربو، وإسداء المشورة للأمهات الحوامل بتجنب الأدوية غير الضرورية أثناء الحمل، تجنب التهابات الجهاز التنفسي المتكررة للأطفال وخاصة خلال السنة الأولى، وتجنب وجود الحيوانات (كالقطط والطيور) في المنازل.

الكلمات المفتاحية: الربو عند الأطفال، مستشفيات الموصل العوامل الوراثية والبيئية.

Introduction:

Asthma is a inflammatory condition of the lung airways resulting in episodic airflow obstruction. This inflammation heightens the twitchiness of the airways, airways hyper responsiveness to provocative exposures, It characterized by symptoms can be triggered by numerous common events or exposures.[1] coughing, wheezing, and rapid of breath these symptoms can be worse at night.[2]

The large rises in the occurrence of asthma over the previous rare periods and the geographic difference in together base occurrence rates and the extent of the rises that environmental differences which play a big role in the present asthma epidemic.[3] Asthma has low mortality rate compared to other diseases.[4] Most asthma-association with low socioeconomically state, according to the latest WHO estimates, there were more then 383 000 deaths from 300 million people suffer from asthma in 2015.[5] According to National Asthma Education and Prevention Program (NAEPP), total prevalence is estimated to be 7.2% of the world's population (6% in adults, 10% in children).[6] The major reasons of asthma are not cleaar, More than 100 genetic loci have been linked to asthma. Although the genetic linkages to asthma have sometimes differed between cohorts, asthma has been consistently linked with loci containing proallergic, proinflammatory genes (the interleukin [IL]-4 gene cluster on chromosome 5). Genetic variation in receptors for different asthma medications is associated with variation in biologic response to these medications (polymorphisms in the β_2-adrenergic receptor). Other candidate genes include ADAM-33 (member of the metalloproteinase family), the gene for the prostanoid DP receptor, and genes located on chromosome 5q31 (possibly IL-12).[7]

Indoor and home allergen exposures in sensitized individuals can initiate airways inflammation and hypersensitivity to other irritant exposures, and are strongly linked to disease severity and persistence. Consequently, eliminating the offending allergen(s) can lead to resolution of asthma symptoms and can

sometimes "cure" asthma.[8] Environmental tobacco smoke and air pollutants (ozone, sulfur dioxide) aggravate airways inflammation and increase asthma severity. Cold dry air and strong odors can trigger bronchoconstriction when airways are irritated but do not worsen airways inflammation or hyper responsiveness.. [9] Poverty access to medical facilities, and economic factors is believed to increase the likelihood of severe asthma exacerbations.[10]

Ethical considerations:

This study had been submitted to the Scientific Council of Family and Community Medicine of Iraqi Board for Medical Specializations for ethical approval. A verbal consent has been taken from each mother before data collection.

Patients and method :

Study design:

A retrospect study (case-control) was used in this research in pediatric teaching hospitals in Nineveh town for the period extending from 1st of April to end of November 2018. A total of 300 children < 15years were chosen randomly from the pediatric outpatient clinic, and divided in two group:

Group A : one hundred fifty asthmatic patients were labeled as asthmatic .

Group B : one hundred fifty children without any history of asthma.

Subjects selection:

A case-control study be adopted among patients attending Mosel pediatric hospitals.

Case Group: included 150 asthmatic patient below 15 years old of both sexes (according to the diagnosis of the consultant pediatrician)with history of previous three or more asthma attack per year with a good response to anti-asthmatic medication.

Control Group : included 150 child below 15 years old of both sexes without any history of without any history of asthma. (were matched according to age, sex, and same community).

Study setting :

pediatric Hospitals in Nineveh town.:

1. General Mosul Hospital .
2. Ebn Al-Etheer pediatric Hospital .
3. AL-Khansaa teaching Hospital .
4. AL-Salaam teaching Hospital .

Sampling technique:

Both cases and controls groups were selected by sample random sampling technique from pediatric hospitals, during the period of the study.

Statistical analysis

- Descriptive statistics were used to describe patients' characteristics using mean, standard deviation, number, and percentage., The characteristics of subjects with or without asthma were examined by chi-squared test, odd ratio (OR) and 95% confidence intervals represented the effects of each risk factor on developing childhood asthma; all tests were at a 5%, and1% significance level.

- P- value mean the level of marginal significance within a statistical hypothesis test, representing the probability of the occurrence of a given event. Odds ratio (OR) is a measure of association between an exposure and an outcome. An Odds Ratio equal to one indicates 'no association' between the exposure and the disease. If the 95% confidence interval for the OR does not contain one we can conclude that there is a statistically significant association between the exposure and the disease.. Data were entered and stored in Microsoft Access Software and analyzed by SPSS version 19.

Aim of study: To examine risk factors of childhood asthma in Mosul city.

Results

1. Parent consanguinity:

The parents of both Groups A and B who were enrolled in the study were classified according consanguinity appear higher rate among asthmatic children (54%). (table1).

Statistical analysis parents was higher among asthmatic children (p<0.001, OR=4.001, 95%C.I = (3.851-7.63) .

Table (1) distribution of cases and controls according to parent consanguinity.

Parent consanguinity	Group A	Group B	OR	95%C.I(OR)	P*-value
	no. (%)	no. (%)			
Present	81(54.0)	34(22.7)	4.001	3.85- 7.63	0.001
Absent	69(46.0)	116(77.3)			
Total	150(100.0)	150(100.0)			

2. Parental education:

It was found that the rate of lower educational years (Illiterate & 10 school) of parents was higher among asthmatic children (63.3%), (58.6%) for mothers and fathers respectively. (table2, 3).Statistical

analysis showed a highly significant association between years of education of mothers and asthma (p<0.001, OR=3.618, 95%C.I = 2.621, 5.479) and that for fathers (p<0.001, OR=11.084, 95%C.I =4.151, 11.643).

Table (2) Frequency distribution of according level of education of the mother.

Educational Level	Group A no. (%)	Group B no. (%)	OR	95%C.I(OR)	P*-value
Illiterate	43(28.6)	9(6.0)	11.084	4.15-11.64	0.001
1^0 school	45(30.0)	26(17.2)	4.515	3.47-6.25	0.001
2^0 school	37(24.6)	57(37.7)	1.506	2.05-3.40	0.004
University	25(16.6)	58(38.4)	0.31	1.08-1.25	0.010

Table (3) Frequency distribution of cases & controls according to level of education of the father.

Educational Level	Group A no. (%)	Group B no. (%)	OR	95%C.I(OR)	P*-value
Illiterate	42(28.0)	26(17.3)	3.618	2.62-5.47	0.001
1^0 school	53(35.3)	35(23.3)	3.392	1.75-4.53	0.001
2^0 school	30(20.0)	33(22.0)	1.53	2.87-3.23	0.671
University	25(16.6)	56(37.3)	0.33	1.42-2.01	0.058

3. Crowding index :

Table (4) showed distribution of groups according living among small houses (1-2 room) more than others (table 4)

A significant association was found between number of rooms and asthma (p<0.001, OR=2.342, 95%C.I= 2.86-4.55).

Table (4) comparison between cases of asthma and control according to no. of rooms.

No. of rooms	Group A no. (%)	Group b no. (%)	OR	95%C.I(OR)	P*- value
1 room	32(21.3)	10(6.6)	3.79	2.86-4.55	0.000
2rooms	66(44.0)	27(18.0)	3.57	3.21-3.89	0.000

No. of rooms	Group A no. (%)	Group b no. (%)	OR	95%C.I(OR)	P*- value
3rooms	39(26.0)	55(36.6)	0.60	1.04-1.57	0.046
4rooms	11(7.3.0)	39(26.0)	0.22	0.84-1.08	0.011
5rooms	2(1.3)	19(12.6)	0.09	1.47-1.63	0.030

4. Animals in the house:

Table (5) showed distribution of groups according to presence or absence of animals 57.3% of cases of asthma having animals in their houses(cat & birds). Statistical analysis showed a highly significant association (P<0.001, OR =5.155 (95%C.I) = (3.89, 7.05)

Table (5) Comparison between cases of asthma and control according to animals in their houses.

Animals in The House	Group A no. (%)	Group B no. (%)	OR	95%C.I(OR)	P*- value
Present	86(57.3)	31 (20.6)	5.15	3.89-7.05	0.000
Absent	64 (42.7)	119(79.3)			
Total	150(100.0)	150(100.0)			

5. Family history of asthma:

Majority of cases of asthma 72.67% showed presence family history of asthma (table 6).

Statistical analysis showed highly significant association between asthma and family history of asthma (P<0.001, OR =2.246, (95%C.I) =(2.198, 5.054).

Table (6) Comparison between cases of asthma & control according to the family past history of asthma.

Family history of asthma	Group A no.(%)	Group B no.(%)	OR	95%C.I(OR)	P*- value
Present	109(72.6)	14(9.3)	2.24	2.198-5.054	0.000
Absent	41(27.3)	136(90.7)			

6. Household exposure:

Rate of mothers exposure to smoking was higher among asthmatic cases (69%) .Statistical analysis showed a highly significant association between history of exposure to smoking and risk of asthma(P<0.001, OR=2.520, 95%C.I = 2.176-7.231) (table7).

Table (7) comparison between cases of asthma & control according to household exposure.

Household exposure	Group A no. (%)	Group B no. (%)	OR	95%C.I(OR)	P*-value
Present	109(72.7)	77(51.7)	2.52	2.176-7.23	0.001
Absent	41(27.3)	73(48.3)			

7. Medical problems during pregnancy:

The children who included in the study were divided into two groups according to presence or absence of any problem and received more medication (56%), therefore the rate of asthma is increased with presence of medical problem during pregnancy . Statistical analysis showed a highly significant association between mother's illness during pregnancy and asthma (p<0.001, OR=4.696, 95%CI =2.811, 7.843) (table8).

8. Medication during pregnancy:

All cases and controls included in this study were divided into two groups (yes and no) according to history of exposure for a medication during their pregnancy .**115** mothers were taking treatment for a common cold during their pregnancies, among those mothers the rate was (76.7%). Statistical analysis showed a +ve relationship between asthma and gestational exposure to medicines for common cold (p<0.001, OR= 4.7693, 95% C.I=2.10, 5.24) (table9).

Table (8) comparison between cases of asthma & control according to medical problems during pregnancy.

Medical problems	Group A no. (%)	Group B no. (%)	OR	95%C.I(OR)	P*-value
Present	84(56.0)	32(21.2.0)	4.696	2.81-7.84	0.001
Absent	66(44.0)	118(78.8.0)			

Table (9) Comparison between cases of asthma & control according to medication during pregnancy.

medication during pregnancy	Group A	Group B	OR	95%C.I(OR)	P*-value
	no. (%)	no. (%)			
Present	115(76.7)	61(40.3)	4.76	2.10-5.24	0.001
Absent	35(23.3)	89(58.9)			

9. **Type of feeding:**

The children who enrolled in this study were classified according to the type of feeding in infancy into three groups found just 25.3% of asthmatic children are breast exclusively fed for at least 3 months. Statistical analysis showed a Bottle feeding was associated with increased odds of asthma (p<0.001, OR=6.460, and 95%C.I=4.14, 8.39) (table10).

Table (10) Frequency distribution of study population according to type of feeding.

Type of feeding	Group A	Group B	OR	95%C.I(OR)	P*- value
	no. (%)	no. (%)			
Breast feeding	38(25.3)	88 (58.3)		1.35-2.04	0.041
Bottle feeding	54(36.0)	12(7.3)	6.46	4.14-8.39	0.000
Mixed feeding	58(38.3)	50(34.4)	1.26	2.13-4.30	0.336

10. **Recurrent respiratory infections:**

Study results revealed that 81.3% of cases have presence of history of recurrent upper respiratory tract infection .Statistically a highly significant relationship between recurrent chest infection and asthma (P<0.001, OR= 19.849, 95%C.I =12.15, 21.25) (table11).

Table (11) Frequency distribution of study population according to history of recurrent respiratory infections during their 1st year of life.

Respiratory tract infection	Group A	Group B	OR	95%C.I(OR)	P*- value
	no. (%)	no. (%)			
Present	122(81.3)	27(17.5)	19.849	12.15-21.25	0.001
Absent	28(18.7)	123(82.5)			

Discussion:

Asthma is a common childhood disease of complex etiology. Early life environmental exposures are critical in determining susceptibility to asthma and allergic disease.

Our results showed (54%) of asthma cases had consanguineous parents which are the important factor to development of asthma in the offspring. This finding agreed with other studies conducted in Qatar with a high rate of consanguinity, reported a significantly higher proportion of asthma in the offspring .

Regarding parental education there was a highly significant association between lower years of parent's education (Illiterate & 1[ry] school) and asthma of their children (58.6%), (63.3%) for mothers and fathers respectively. Therefore the present study demonstrated that parents' educational level acts as a significant risk factor for development of asthma.

It was found(65.3%) that children with asthma living in small houses (1-2 room) more than others . This could be explained that, small house with adverse environmental factors such as Tobacco smoke, bad nutrition and housing conditions, also low birth weight and prematurity exist; these factors will make children more susceptible to aeroallergens in addition to less medical care.[1]

Considering the presence of animals in the house the current study showed 57.3% of cases of asthma have animals in their houses. This finding agreed with other studies conducted in United Kingdom. Such study can explain that exposure to cat and bird were associated with developed children with asthma.[2]

Regarding studying of positive family history of asthma as a risk factor for childhood asthma, a significant association was found between positive family history of asthma and childhood72.67% This finding was compatible with other studies reported by U.S. Section of Health Services, family history play an important causative role, as indicated genetics clearly show that by familial aggregation and the identification of candidate genes and using a positive family history of asthma can identify children at increased risk which could provide a basis for targeted prevention efforts, aimed at reducing exposure to environmental risk factors.[3]

The present study found (56%) mothers of asthmatic children complaining more from medical problems during their pregnancy and received more medication. Our findings of a relationship between exposures to infections in general during pregnancy and an increased risk of allergic disease.

In the present study (76.6%) of mothers were taking deferent treatment during their pregnancies like antitussives, expectorants, analgesics, acetaminophen and no steroidal anti-inflammatory drugs. Many studies had shown prenatal exposure to medication may increase the risk of asthma.[4]

The children who enrolled in this study were classified according to the type of feeding bottle feeding group in case (36%) control(7.3%) while exclusively breast feeding group case (25.3%) control (58.3%), consequently exclusive breastfeeding prevents children from having asthma. A meta-analysis and several individual studies showed that exclusive breastfeeding for at least 3 months was associated with lower rates of asthma .[5]

It was found (81.3%) that exposures to [recurrent] respiratory tract infections in the first year of life were associated with increased risk asthma in cases were suffering from recurrent respiratory infections during their first year of life.[6] Statistical analysis appear a highly significant association among recurrent RTI and asthma . recurrent respiratory infections in initial infant are related through early wheezing. Repeated inferior respiratory tract infection may affect infants who are previously at risk for asthma because of family-history [7] . Severe infection by certain viruses such as respiratory syncytial-virus and rhino-virus may show a role in persistent wheezing . Breast feeding: exclusive breast feeding during 1st six months of life appeared to be protective from risk of asthma.[8]

Conclusions:

The risk factors include the following: Parent consanguinity, lower educational level of parents, Crowding index, Animals in their houses(cat & bird family history of asthma, Exposure to smoking, Mother disease and medication use during pregnancy, recurrent respiratory infections during infancy, exclusive breast feeding during 1st six months of life appeared to be protective from risk of asthma.

Recommendations:

Mothers should be encouraged to breastfeed their babies exclusively especially in first 6 months of life. Health professionals should be educated to avoid self-prescribing any unnecessary medication during the pregnancy. Avoidance of smoking in the houses, where pregnant women or child with a positive family history. All families with positive family history of asthma should be informed by primary health care centers about possibility of having a child with asthma therefore care should be taken for avoidance of recurrent respiratory tract infections especially during first year of life through intensive hygiene, and avoidance of exposure to other persons with URTI.

References

1- Allan KM Prabhu N.Craig LC.et al. (2015). Maternal vit D&E intake during pregnancy are association with asthma in children .Eur Resoir J:45:1027.

2- Bandoli G, von Ehrenstein OS, Flores ME, Ritz B.(2015). Breastfeeding and Asthmatic Symptoms in The Offspring of Latinas: The Role of Maternal Nativity. J Immigr Minor Health;17(6):1739−1745.

3- Castro-Rodriguez JA, Forno E, Rodriguez-Martinez CE, Celedón JC.(2016). Risk and Protective Factors for Childhood Asthma: What Is the Evidence? J Allergy Clin Immunol Pract; 4:1111.

4- Ebmeier S, Thayabaran D, Braithwaite I, et al. (2017). Trends in international asthma mortality: analysis of data from the WHO Mortality Database from 46 countries (1993-2012) ;390:935-945.

5- Engelkes M, Janssens HM, de Ridder MA, de Jongste JC, Sturkenboom MC, Verhamme KM. (2015). Time trends in the incidence, prevalence and age at diagnosis of asthma in children. Pediatr Allergy Immunol.;26(4):367−374.

6- Gómez Real F, Burgess JA, Villani S, et al. (2018). Maternal age at delivery, lung function and asthma in offspring: a population-based survey. Eur Respir J, 51.

7- Lautenbacher L, Perzanowski MS.(2017). Global asthma burden and poverty in the twenty-first century. Int J Tuberc Lung Dis, 21: 1093.

8- Rava M, Smit LA, Nadif R.(2015). Gene-environment interactions in the study of asthma in the postgenomewide association studies era. Current opinion in allergy and clinical immunology. Feb;15(1):70–78.

9- Sordillo JE, Scirica CV, Rifas-Shiman SL, et al.(2015). Prenatal and infant exposure to acetaminophen and ibuprofen and the risk for wheeze and asthma in children. J Allergy Clin Immunol; 135:441.

10- Stanic B, van de Veen W, Wirz OF, et al. (2015). IL-10-overexpressing B cells regulate innate and adaptive immune responses. The Journal of allergy and clinical immunology. Mar;135(3):771–780 e778.