Prevalence of childhood bronchial asthma and its risk factors in Kom Hamada district, Beheira Governorate, Egypt

Ghada Saad Abdelmotaleb[1], Rasha Shaker Aldosoky[2], Rania Ibrahim Abdelaaty[3], Hamdi Attia Abd AL-Hakam[4]

Abstract

Background: *Asthma is common and potentially serious chronic disease that imposes a substantial burden on patients, their families and the community.*

Objective:*To estimate the prevalence of bronchial asthma among children in kom Hamada District,Beheira Governorate, Egypt and identify its risk factors in the community setting.*

Methods:*This was a community-based cross-sectional descriptive study carried out in kom Hamada District (Beheira Governorate) Egypt. The targeted population was 1450 children from both sexes aged 2–16 years (mean 9.04 ± 4.2) living in the study locality. A proportional multi-stage cluster sample was taken from both rural and urban areas. Data were collected by a questionnaire completed by older children themselves or by the help of guardians of younger children. Asthma was diagnosed according to International Study of Asthma and Allergies in Childhood questionnaire.*

Results:*Our Logistic regression for the predictors of bronchial asthma among the studied group showed that family history of asthma, rhinitis and conjunctivitis, contact with birds and younger age are significant good predictors of bronchial asthma among the studied group. As regard the relation between speech limitations (sever attacks) in last 12months and some risk factors, our study reported that, there was a significantly association between family history of conjunctivitis, contact with birds and speech limitations in last 12months.alsoThere was a significantly difference at occurrence of asthma symptoms at night regarding presence of family history of asthma, family history of dermatitis, contact with birds, contact with pets.*

Conclusion: *Bronchial asthmawas highly prevalent among children and adolescents in kom Hamada District. A positive family history of asthma and the presence of one or more type of other atopic diseases were significantly associated risk factors for asthma development.*

Keywords: *Asthma, Childhood, Kom Hamada.*

I.   Introduction

Wheezing disorders and asthma are the most prevalent chronic respiratory diseases both in childhood and adulthood, with about 300 million people of all ethnicities affected worldwide across all ages. Despite

common pathophysiological factors that lead to characteristic clinical symptoms, individuals affected by asthma vary substantially in their complaints, in their clinical manifestations, including comorbidities, and across age groups[1].Asthma is increasing worldwide secondary to both increasing access to healthcare with more and more asthma recognition and to urbanization. Asthma in children is different from adult with multiple phenotypes and variable natural course. It is frequently underdiagnosed and undertreated that result in poor quality of life in children and their parents. Asthma in children has significant socio-economic impact on the families because of direct treatment cost and indirect cost due to missed school days, hospitalization and lost days in parent's job [2].In the Middle East, asthma prevalence was previously reported to be lower than in "developed" countries (ranges 5–23%). The lowest 12-months wheezing prevalence rate was seen in rural Palestinian (5.5%) and the highest was in the desert population of Saudi Arabia (23%)[3].

II.   Population and Methods

This was community –based cross-sectional descriptive study carried out in kom Hamada District, Beheira Governorate, Egypt. The target population was children aged 2–16 years living in the study locality. A proportional multi-stage cluster sample was taken from both rural and urban areas.This cross sectional study was done by written questionnaire after approval of the parents & schools. Ethical committee, Benha faculty of medicine, Benha University, approved it. The study was conducted in period of 6 months starting from the 1st ofApril 2019 to the end of September 2019.

The study was conducted on 1450 children from both sexes whose subjected to specific questionnaire, and divided into 3 groups:**group (1):**Age group less than 5 years (n=264),**group (2):** Age group from 5-9 years (n=537) and **group (3):**age group above 9 years (n=649).

The number of children as regards gender was (717) male represented 49.4% and (733) female represented 50.6%.The study was done in one village and one city, randomly selectedfrom Kom Hamada district, Beheira Governorate, Egypt, as follow:

- 741 children were collected from the city (kom hamada city)
- 709 children were collected from the village (Albrigat village)

Inclusion criteria:

children aged 2-16 years were included.

Exclusion criteria:

Children < 2 years or > 16 years were excluded from this study.

Study tools:

The study was done by a written questionnaire;it was adopted from International study of Asthma and Allergies in Childhood(**ISAAC)[4] .**The questionnaires were completed by older children themselves or by the help of guardians of younger children. The child was considered to be asthmatic if there were a recurrent attacks of chest wheeze or recurrent cough apart from cold.

The severity of asthma symptoms was based upon: number of attacks ofwheezing, sleep disturbance due to wheezing and wheezing severe enough to limit speech to only one or two words at a time between breaths [4].

This written questionnaire includes:

I. Personal data: Name, Age, Residence, Sex.

II. Symptoms related to asthma (night cough, chest wheeze, difficultbreathing).

III. Symptoms related to severity of asthma (sleep disturbance, speechdisturbance and number of attacks during the last 12 months).

IV. Exacerbating factors (respiratory tract infection, exercise and exposure to allergens).

V. Bronchial asthma risk factors:

- Father: education and occupation.

- Mother: education and occupation.

- Exposure to tobacco smoke.

- Number of persons per room.

- The socioeconomic level of the family using the socioeconomic scale (SES) of **fahmy et al.[5]**

- Consanguinity among parents.

- Family history of bronchial asthma,allergic rhinitis, allergic conjunctivitis, or allergic dermatitis.

- History of contact with pets or birds.

III. Statistical analysis:

Data were organized, tabulated and statistically analyzed using SPSS software statistical computer package version 20. Qualitative data were expressed as (frequency) number and percentage. Quantitative data were expressed as mean ± standard deviation. *For qualitative variables,* the comparison between groups was statistically analyzed using Chi square test (x^2),Fishers Exact test was used when assumption for Chi squared test is not fulfilled.Binary logistic regression analysis was used to identify the predictors of bronchial asthma,P value less than 0.05 is significance difference.

IV. Results

Our demographic data showed that in studied group, 44.8% were >9 years old and 18.2% were<5 years old. The mean age of the studied groups was9.04 ± 4.2, and urbans consisted 51.1% of studied group. The study revealed that female (50.6%) and males (49.6%). Most of the parents had secondary education 56.8% for Fathers and 58.6% for mothers with middle socioeconomic stander (64%). Most of the parents (75.9%)had no consanguinity **(Table 1)**

Table (1) Socio demographic characteristics among the studied groups

Variables		No(n=1450)	%(100)
Age	<5 years	264	18.2
	5-9 years	537	37.0
	>9 years	649	44.8
Gender	Male	717	49.4
	Female	733	50.6
Residence	Urban	741	51.1
	Rural	709	48.9
Father education	Illiterate	68	4.7
	Primary	121	8.3
	Secondary	823	56.8
	Higher	438	30.2
Father occupation	Employed	1329	91.7
	Not	121	8.3
Mother education	Illiterate	119	8.2
	Primary	125	8.6
	secondary	849	58.6
	Higher	357	24.6
Mother occupation	Employed	263	18.1
	Not	1187	81.9
Socioeconomic level	Low	286	19.7
	Middle	928	64.0

	High	236	16.3
Consanguinity	Yes	350	24.1
	No	1100	75.9
Crowding index	≤1	275	19.0
	>1	1175	81.0

As regard Relation between asthma and some risk factors we found that,Family history of asthma was the most common risk factors for asthmatic patients (56.7%) followed byexposure to smoking (50.5%) ,family history of rhinitis (47.3%),contact with birds (46.4%)and contact with pets (36.2%). There was a highly significantly association between asthma and certain risk factors[family history of either asthma, rhinitis, and conjunctivitis, contact with birds and pets (P<0.001)]and significant association between family history of dermatitis, exposure to smokingand asthma (P=0.027, 0,036)**.(Table 2)**

Table (2) Relation between asthma and some risk factors

Variables		Asthma (n=1450)		X^2	P	OR	95% CI
		Yes (n=224)	**No (n=1226)**				
		No.(%)	No.(%)				
Exposure to smoking	Yes	113 (50.5%)	526 (43%)	0.393	0.036	1.096	0.82-1.45
	No	111 (49.5%)	700 (57%)				
Family history of asthma	Yes	127 (56.7%)	231 (18.8%)	145.96	<0.001	5.46	4.17-7.61
	No	97 (43.3%)	995 (81.2%)				
Family history of rhinitis	Yes	106 (47.3%)	300(24.5%)	49.05	<0.001	2.773	2.07-3.71
	No	118 (52.7%)	926(75.5%)				
Family history of conjunctivitis	Yes	72 (32.1%)	230 (18.8%)	20.57	<0.001	2.051	1.49-2.81
	No	152 (67.9%)	996 (81.2%)				
Family history of dermatitis	Yes	59 (26.3%)	243 (19.8%)	4.88	0.027	1.44	1.04-2.01
	No	165 (73.7%)	983 (80.2%)				

Contact with birds	Yes	104 (46.4%)	430 (35.1%)	10.49	0.001	1.60	1.20-2.14
	No	120 (53.6%)	796 (64.9%)				
Contact with pets	Yes	81 (36.2%)	305 (24.9%)	12.34	<0.001	1.71	1.26-2.31

Our Logistic regression for the predictors of bronchial asthma among the studied group showed that family history of asthma, rhinitis and conjunctivitis, contact with birds and younger age considered as significant good predictors for bronchial asthma among the studied group.**(Table 3)**

Table (3) Logistic regression for the predictors of bronchial asthma among the studied group

Variables	E (B)	95% CI	P value
Family history of asthma(positive)	4.553	3.309-6.267	<0.001*
Family history of rhinitis(positive)	1.802	1.300-2.498	<0.001*
Family history of conjunctivitis(positive)	1.722	1.209-2.455	0.003
Family history of dermatitis(positive)	0.969	0.669-1.405	0.870
Contact with birds(positive)	1.473	1.042-2.081	0.028
Contact with pets(positive)	1.324	0.926-1.894	0.124
Age	0.955	0.919-0.992	0.017
Crowding index **(> one person per room)**	1.356	0.857-2.143	0.193

As regard the relation between speech limitations in last 12months and some risk factors, our study reported that, there was a significantly association between family history of conjunctivitis, contact with birds and speech limitations in last 12months (P=0.004, 0.001).**(Table 4)**

Table (4) Relation between speech limitations (sever attacks) in last 12months and some risk factors

Variables		Speech limitations in last 12monthes (n=163)		X^2	P	OR	95%CI
		Yes (n=53)	No (n=110)				
		No.(%)	No.(%)				
Exposure to smoking	Yes	24 (45.3%)	48 (43.6%)	0.039	0.843	1.06	0.553-2.06
	No	29 (54.7%)	62 (56.4%)				
Family history of asthma	Yes	34 (64.2%)	58 (52.7%)	1.89	0.168	1.60	0.817-3.15
	No	19 (35.8%)	52 (47.3%)				
Family history of rhinitis	Yes	26 (49.1%)	52 (47.3%)	0.046	0.831	1.07	0.567-2.06
	No	27 (50.9%)	58 (52.7%)				
Family history of conjunctivitis	Yes	20 (37.7%)	27 (24.5%)	3.03	0.082	1.86	0.921-3.77
	No	33 (62.3%)	83 (75.5%)				
Family history of dermatitis	Yes	22 (41.5%)	22(20.0%)	8.39	0.004	2.83	1.38-5.82
	No	31 (58.5%)	88 (80.0%)				
Contact with birds	Yes	34 (64.2%)	40 (36.4%)	11.14	0.001	3.13	1.58-6.19
	No	19 (35.8%)	70 (63.6%)				
Contact with pets	Yes	21 (39.6%)	34 (30.9%)	1.21	0.270	1.46	0.741-2.90
	No	32 (60.4%)	76 (69.1%)				

Our results showedthat there was significantrelationof occurrence of asthma night symptoms regarding presence of some risk factors [family history of asthma, family history of dermatitis, contact with birds or pets (P = 0.014, 0.005, 0.037, 0.001) respectively]**(Table 5)**

Table (5) Relation between asthma symptoms at night and some risk factors

| Variables		Asthma symptoms at night (n=163)		X^2	P	OR	95%CI
		Yes (n=89)	No (n=74)				
		No.(%)	No.(%)				
Exposure to smoking	Yes	35 (39.3%)	37 (50.0%)	1.86	0.172	0.648	0.348-1.20
	No	54 (60.7%)	37 (50.0%)				
Family history of asthma	Yes	58 (65.2%)	34 (45.9%)	6.07	0.014	2.20	1.17-4.14
	No	31 (34.8%)	40 (54.1%)				
Family history of rhinitis	Yes	43 (48.3%)	35 (47.3%)	0.017	0.897	1.04	0.562-1.93
	No	46 (51.7%)	39 (52.7%)				
Family history of conjunctivitis	Yes	29 (32.6%)	18 (24.3%)	1.34	0.246	1.50	0.753-3.00
	No	60 (67.4%)	56 (75.7%)				
Family history of dermatitis	Yes	32 (36.0%)	12 (16.2%)	7.98	0.005	2.90	1.36-6.16
	No	57 (64.0%)	62 (83.8%)				
Contact with birds	Yes	47 (52.8%)	27 (36.5%)	4.34	0.037	1.94	1.03-3.65
	No	42 (47.2%)	47 (63.5%)				
Contact with pets	Yes	40 (44.9%)	15 (20.3%)	11.00	0.001	3.21	1.58-6.49
	No	49 (55.1%)	59 (79.7%)				
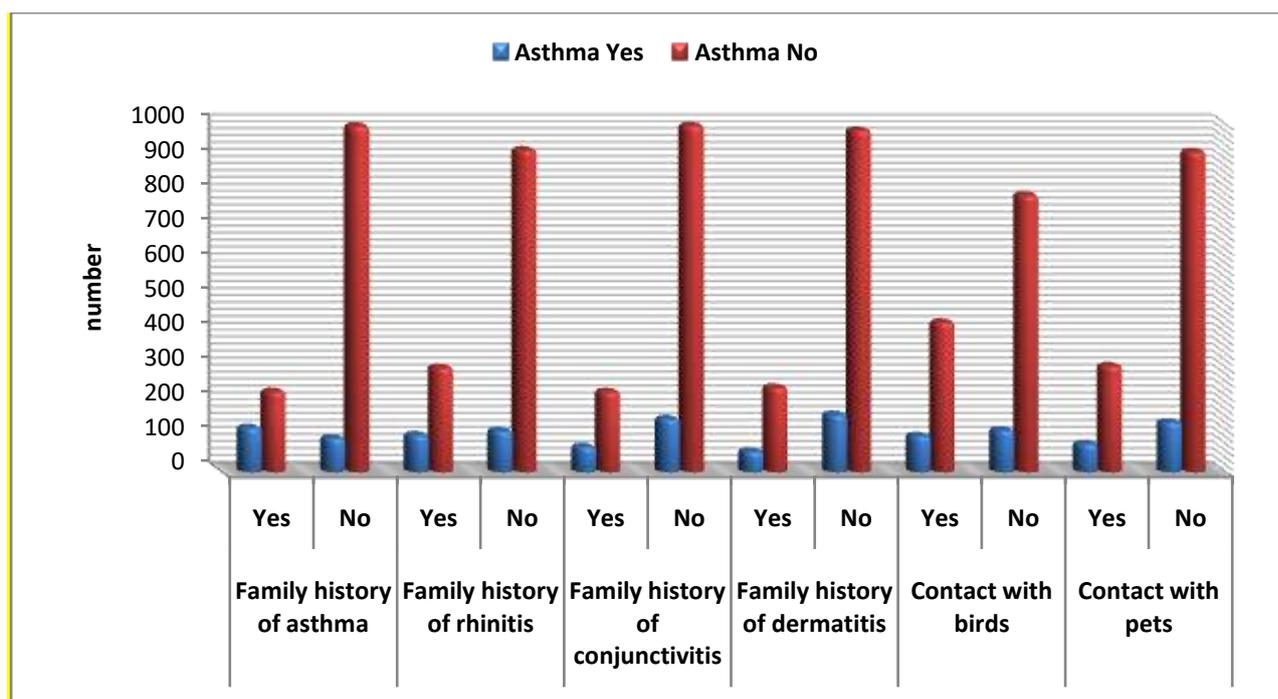
Fig (1) Relation between asthma and some risk factors

V.   Discussion:

Our study was aimed to determine the prevalence rate of bronchial asthma among children and adolescent in kom Hamada District, Beheira Governorate, Egypt (children aged 2–16 years) in a trial to identify the magnitude of the problem of asthma and to identify some of risk factors increasing the prevalence of it.

Our results showed that prevalence of bronchial asthma (physician diagnosed asthma) was 15.4 % of the studied children. While those had asthma symptoms in the past (questionnaire diagnosed asthma) was 17.6% of the studied children.

Different studiesin Egypt, tried to estimate the prevalence of asthma among children as **Asham, [6]**found that asthma prevalence in the studied governorates was 16.8% in Cairo metropolitan, 10.9% in Sharkia, 14.1% in Dakahlia and 18.7% in El-Behira governorate. So the prevalence of asthma in Egyptian school children ranged from 10.9 to 18.7% with mean of 15.1% in agree with our results.But in Menoufiya governorate **El-Mashad et al ., [7]** found that the prevalence of childhood bronchial asthma among primary school children was 6.5% in an observational study.

As regard Socio demographic characteristics among the studied groups, 44.8% were >9 years old and 18.2% were<5 years old. The mean age of the studied group was 9.04 ± 4.2, and urban consisted 51.1% of studied group. The study revealed thatfemales (50.6%) and males (49.4%). Most of the parents had secondary education 56.8% for fathers and 58.6% for mothers, 24.1% of the parents had consanguinity. About socioeconomic status (SE) 64% had middle SE level, 19.7% had low SE level and 16.3% had high SE level.

In favored with us **Mansour et al., [8]** studyin Damietta Governorate, Egypt.included 1426 students (758 from the rural areas and 668 from the urban areas) with mean age 14.3±0.7 years. Out of them 130 children

fitted the diagnosis of asthma (9.1%) but asthma was more prevalent among males (11.5%), compared to (7.1%) among females. They revealed that consanguinity among parents was 16.7%.

Other study by Ravikumar and Priyadarshini, [9] found that3.1% were asthmatic with predominance of males butwith no statistically significance. The association of socio-economic status of children showed 55% low socio-economic group, 27.2% middle socio-economic group, and 17.8% high socio-economic group. As regard to relation between asthma and some risk factors; there was highly significantly association between asthma and family history of asthma (56.7%) ,family history of rhinitis (47.3%), contact with birds (46.4%)and contact with pets (36.2%). In addition, there was significant association between family history of dermatitis,exposure to smokingand asthma. In agree with us **sheikh et al., [10],** who found that history of asthma in parents, siblings or grandparents was reported by 575 (69.8%) patients .

In favored with us **Mansour et al., [8]** study, the presence of one type or more of other allergic diseases were significantly associated with asthma, in agreement with other studies **Behl et al., [11], Halim et al., [12] and Abdallah et al., [13]** atopy particularly atopic dermatitis was significant risk factor for development and persistence of asthma in children. In another study in Egypt, by **Hossny et al., [14],**they found that 53.3% of asthmatic children had associated allergic diseases (atopic dermatitis, allergic rhinitis or food allergy).

According to relation between asthma and crowding index there was significant association between asthma and crowding index where incidence was higher with those who crowding index more than one person per room

In Mansour et al., [8] study, the findingsagree with us that, there was significant association between asthma and high crowding index in agreement with **other study by Halim et al., [12]** . This explained as the crowding enhances the recurrent chest infection either viral or bacterial and this lead to increased nasal and bronchial hypersensitivity.

Our Logistic regression for the predictors of bronchial asthma among the studied group, showed that, family history of asthma, rhinitis and conjunctivitis, contact with birds and younger age are significant good predictors of bronchial asthma among the studied group.

Relatively agree with us **Meireles-Neto et al., [15],** who report that, the significant factors for logistic regression of asthma were personal history of atopic rhinitis, history of maternal asthma and three or more episodes of wheezing during the first 3 years of life. However, age, gender, and maternal history of allergic rhinitis were insignificant factors.

After a multiple logistic regression analysis and adjusting the confounding variables, **Kim et al., [16],** found that the relationship between asthma and different variables including age, gender, passive smoking status and maternal educational level was found to be significant, while no significant relationship was detected between asthma and paternal educational level as well as residency area. Similar to us, **Kansen et al., [17],** reported that uni-variable logistic regression analyses showed that family history of asthma, was associated with asthma and in **2016, Ravikumar and Priyadarshini,[9]**found statistically significant association between the presence of family history of allergic disorders and the prevalence of asthma.

In our study, speech limitations (sever attack) in last 12months in relation to demographic characteristics and some risk factors; found thatthere was significantly difference of speech limitations in last

12months between different age categories (13.2 % in children less than 5 years, 54.7% in children 5-9 years and 32.1% in children above 9 years) and children with positive family history of conjunctivitis or contact with birds**.** In agree with us, **Fazlollahi et al., [18] who found** statistically significant difference between speech limitations and age, but no significant difference was found between speech limitations and gender, passive smoking status, paternal educational level or residency area.

Relation of asthma symptoms at night in last 12months with demographic data and risk factors, we reported that, there was significantly difference at occurrence of asthma symptoms at night regarding different age categories (13.5 % in children less than 5 years, 60.7% in children 5 -9 years and 25.8% in children above 9 years), father occupation (higher with employed fathers than unemployed), mother education(higher with secondary educated mothers), presence of family history of asthma, family history of dermatitis, contact with birds and contact with pets.

Fazlollahi et al., [18]found that, the most common asthma symptom in 6- to 7-year olds was nocturnal cough (13.9%). **Hirai et al., [19]** reported that, the cough counts were significantly increased at the time of falling asleep and waking. This pattern was not observed in children without asthma. The total cough counts and cough patterns in children with asthma were not affected by sex, age, cause of asthma exacerbation, or therapy.

VI.   Conclusions

- Bronchial asthma is highly prevalent among children and adolescents in kom Hamada district, with significant association between asthma andhigh Crowding index .

- A positive family history of asthma or other allergic diseases(allergic rhinitis , conjunctivitis or dermatitis) were significantly associated risk factors for asthma development.

- A campaign to raise awareness of the harmful effects of passive smoking and its role in precipitating asthma attacks is recommended, with good education programs for high risk families with positive history of different types of atopy.

References:

1. **Fuchs O, Bahmer T, Rabe KF,et al ., (2017):** Asthma transition from childhood into adulthood. *The Lancet Respiratory Medicine*; *5*(3): 224-234.

2. **Jat KR and Kabra SK (2017):** Awareness about childhood asthma. *The Indian journal of medical research*; *145*(5): 581.

3. **Zedan M, Settin A, Farag M, et al., (2009):** Prevalence of bronchial asthma among Egyptian school children. *Egypt J Bronchol*; *3*(2): 124-130.

4. **Asher MI and Weiland SK (1998):** The International Study of Asthma and Allergies in Childhood (ISAAC). ISAAC Steering Committee. Clinical and experimental allergy: Journal of the British Society for Allergy and Clinical Immunology; (28): 52-66.

5. **Fahmy SI, Nofal LM, Shehata SF, et al .,(2015):**Updating indicators for scaling the socioeconomic level of families for health research. *Journal of the Egyptian Public Health Association*; *90*(1): 1-7.

6. **Asham MA(2011):** Influence of the Nutritional status and asthma outcome in children. *CU Theses.*

7. **El-Mashad GM, Mahmoud AA and Hafez AA (2016):** The prevalence of bronchial asthma among primary school children in Menoufiya Governorate (El-Bagour Center). Menoufia Medical Journal; 29(1): 89.

8. **Mansour AE, Yasein YA, Ghandour A, et al., (2014):** Prevalence of bronchial asthma and its impact on the cognitive functions and academic achievement among preparatory school children in Damietta Governorate, Egypt. *J. Am. Sci*; *10*(7): 119-127.

9. **Ravikumar P and Priyadarshini Bai G (2016):** Study of prevalence of bronchial asthma, allergic rhinitis and atopy in the school children of 6-12 years of age in Tumakuru city. *Indian Journal of Immunology and Respiratory Medicine*; *1*(4): 88-92.

10. **Sheikh SI, Pitts J, Ryan-Wenger NA, et al., (2016):** Environmental exposures and family history of asthma. *Journal of Asthma*; *53*(5): 465-470.

11. **Behl RK, Kashyap S and Sarkar M (2010):** Prevalence of bronchial asthma in school children of 6-13 years of age in Shimla city. *The Indian journal of chest diseases & allied sciences*; *52*(3): 145.

12. **Halim WB, Khalil KA, Sobhy SA, et al., (2013):** Prevalence of bronchial asthma among secondary schools students at Abu Khalifa village-Ismailia Governorate. *The Medical Journal of Cairo University*; *81*(2) :19–24.

13. **Abdallah AM, Sanusy KA, Said WS, et al., (2012):** Epidemiology of bronchial asthma among preparatory school children in Assiut district. *Egyptian Journal of Pediatric Allergy and Immunology (The)*; *10*(2):109-117.

14. **Hossny EM, Hasan ZE, Allam MF, et al., (2009):** Analysis of the filed data of a sample of Egyptian children with bronchial asthma. *Egyptian Journal of Pediatric Allergy and Immunology; (The)*: *7*(2).

15. **Meireles-Neto I, Pimentel AM, Parreira JN, et al., (2020):** Recurrent wheezing, allergic rhinitis, and maternal asthma as predictors of asthma in children. In *Allergy & Asthma Proceedings*; (Vol. 41, No. 3).41(3):204-209.

16. **Kim SY, Sim S and Choi HG (2017):** Active, passive, and electronic cigarette smoking is associated with asthma in adolescents. Scientific reports; 7(1): 1-8.

17. **Kansen HM, Le TM, Uiterwaal CS, et al., (2020):** Prevalence and Predictors of Uncontrolled Asthma in Children Referred for Asthma and Other Atopic Diseases. *Journal of Asthma and Allergy*; *13*- 67.

18. **Fazlollahi MR, Najmi M, Fallahnezhad M, et al., (2019):** Paediatric asthma prevalence: The first national population-based survey in Iran. *The clinical respiratory journal*; *13*(1): 14-22.

19. **Hirai K, Enseki M, Tabata H, et al., (2016):** Objective measurement of frequency and pattern of nocturnal cough in children with asthma exacerbation. Annals of Allergy, Asthma & Immunology; 117(2): 169-174