CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.5037302

Available online at: http://www.iajps.com Research Article

FACTORS AFFECTING BRONCHIAL ASTHMA CONTROL AMONG THE PEDIATRIC POPULATION IN JEDDAH CITY, 2019

Abeer Mahmoud Mirdad[1], Seba Mohammed Alharbi[2], Shuruq Sultan Alkibary[3], Samar Mahmoud Farraj[4], Fatemah Mohammed Alsabiani[4], Arwa Salamah Alsharif[4], Abdulrahman Abdulwahed Algarni[2], Aljawharah Muidh Asiri[2], Mohsen Mohammed Alzamanan[2], Hadeel Ahmed Alsubhi[2], Ibrahim Ahmed Aldayini[4], Sajedah Zohair Bahumdain[2], Shaima Muidh Asiri[2]

[1] Endocrinology Consultant, … Hospital, …, Saudi Arabia
[2] East Jeddah Hospital, Jeddah, Saudi Arabia
[3] Alaziziah Hospital MCH, …, Saudi Arabia
[4] Almusadiah Hospital MCH, …, Saudi Arabia

Article Received: February 2019 **Accepted:** March 2019 **Published:** April 2019

Abstract:

Introduction: *Bronchial asthma is a multifaceted illness involving the conducting airways and is characterized by persistent airway inflammation, decreased airway function, and tissue adaptation.* ***Methodology:*** *This was a descriptive cross-sectional study performed among the pediatric population in Jeddah, Saudi Arabia, to assess asthma control factors.* ***Results:*** *A total of 590 children were included in this study; most were males (68%). Regarding the BMI, 38.3% were underweight, and 10.7% were obese. The most common asthma triggers were dust (50.8%) and common cold (19%). Age (P=0.000), BMI (P=0.000), the parents' education (P=0.001), the average monthly income (P=0.000), and the most common triggers (P=0.000) were all significantly associated with asthma control.* ***Conclusion:*** *Most children with uncontrolled bronchial asthma were obese children. Dust was the most common cause of bronchial asthma in Jeddah, followed by the common cold. The majority of children with uneducated parents have uncontrolled bronchial asthma. High family income was significantly associated with better asthma control.*

Keywords: *Bronchial asthma, control, body mass index, childhood.*

Corresponding author:

Abeer Mahmoud Mirdad,

Endocrinology Consultant, Hospital,Saudi Arabia

QR code

Please cite this article in press Abeer Mahmoud Mirdad et al., ***Factors Affecting Bronchial Asthma Control Among The Pediatric Population In Jeddah City, 2019.,*** *Indo Am. J. P. Sci, 2019; 06(04).*

INTRODUCTION:

Bronchial asthma is a heterogeneous condition that involves the conducting airways and includes chronic airway inflammation, a decline of airway function, and tissue adjustment.[1] Asthma is a disease that causes narrowing of the airways and produces extra mucus, causing dyspnea, coughing, and wheezing symptoms.[2] Asthma prevalence has rapidly increased within the last few decades to for an epidemic proportion. Now, there are an estimated 300 million individuals of different ages, ethnic groups, and nations suffering from bronchial asthma, a total that is anticipated to rise in a dramatic manner over the coming 15–20 years. [1] It is one of the most frequent chronic conditions in Saudi Arabia, affecting over 2 million Saudis.[3-5] Its influence is manifested in the patients themselves, their families, and the community regarding life quality, frequent visits to the emergency department (ED), hospital admissions, and deaths. Asthma is related to immense healthcare disbursements, and in spite of the improvements of effective therapy, the coherent economic charge associated with disease control and morbidity continues to aggravate.[6] It is counted that mostly 250,000 people die prematurely per year resulting from asthma.

Concepts of the severity and control of asthma are principal in assessing patients and their response to the therapy.[1] There is escalating and convincing epidemiological proof of a relationship between obesity and asthma. Cross-sectional studies almost revealed an increased prevalence of asthma among obese patients compared with their lean counterparts in adults and children.[7] Even more substantial question is why asthma symptoms among obese patients are usually so critical to control.[8] Obese patients affected with asthma are less responsive to the standard treatments of asthma and stay uncontrolled even when they are given high doses of inhaled corticosteroids. [9] Weight gain and obesity have been related to various chronic diseases, including diabetes mellitus (DM), hypertension, and sleep apnea. Currently, asthma can be an additional condition to the list of chronic diseases affected by obesity. Children and adults with obesity are increasingly affected by asthma, especially among women. Obesity is presently listed as a potential risk factor for developing asthma. A significant association was determined between the over-weighted persons and the risk of developing asthma.

Obesity has particularly been correlated with increased daily asthma symptoms, missing workdays, frequent use of bronchodilator treatments and an increased hazard of hospitalization. [2] There is also an association demonstrated between the trend towards obesity and asthma. Furthermore, it has been established that asthma symptoms are related to obesity. [10] Variable hypotheses have been suggested about this association between obesity and asthma; one hypothesis depends on the facts that obesity causes a decrease in lung volumes, including the tidal volume that may enhance airway obstruction, adipose tissue conjugated hormones and cytokines like leptin, tumor necrosis factor, adiponectin, and interleukins that have an inflammatory role. [11] Adipose tissue generates a bundle of mediators, termed adipokines, which play a significant metabolic impact. Adiponectin, which is one of these adipokines, is reduced in obese persons. Adiponectin's primary metabolic impacts are glucose control and fatty acid metabolism; adiponectin is also an anti-inflammatory agent. [12-13]

The normo-caloric dietary management was related to a better prognosis of asthma-related quality of life and asthma control. Dietary programs may act as an integral non-pharmacologic therapeutic management among obese adolescents with asthma. [14] Dietary programs may accelerate acute weight loss in obese children with asthma, with developments in static lung function, asthma control, and self-reported life quality. Systemic and airway inflammation has not been adjusted after weight loss. [14] Obese children were significantly symptomatic than the non-obese children. Obese children were found to have more cough and wheezing than non-obese children. The diagnosis of asthma by physicians and inhaler users was also more common among obese children than non-obese children. [15] However, childhood obesity is a global and critical public health problem in the current century that affects many individuals in low- and middle-income nations, especially in urban settings. The increasing prevalence of obesity has an alarming issue. [16] In 2015, the global prevalence of overweight children, who are younger than five years, is estimated to be more than 42 million; additionally, overweight and obese children are more liable to stay obese during adulthood. Overweight and obesity, as well as their related comorbidities, are highly preventable. Consequently, preventing childhood obesity needs high priority. [17] The National Growth Study in Saudi Arabia revealed that the overall prevalence of obesity among children and adolescents aging from 5 to 18 years was 11.3%.[18-19]

METHODOLOGY:

This descriptive cross-sectional study was conducted in 22 primary and intermediate schools in Jeddah city, Saudi Arabia. The study was implemented between March and April 2019. A random sampling determined the schools. Sampling was ranged for the variable geographical areas of the identified city. Our study comprised children with bronchial asthma

aging from 5-16 years old. We included 590 children having bronchial asthma, and the self-administered questionnaire was formally validated,[20] presuppose information about: (bronchial asthma symptoms including the severity and control, and most frequent causes of aggravation) was indicated and sent with each pupil to his parents to be filled by one of the parents and then returned on the following day. A letter that interpreted the general and specific objectives of the study and asked for parental consent was attached to the questionnaire. Each pupil's weight and height estimated by a medical physician and well-trained students, then Body Mass Index (BMI) was estimated as Weight\ Height^2. BMI was categorized as; underweight, normal, overweight, and obese following the Saudi growth charts of BMI. The questionnaire responses were interpreted and analyzed by the Statistical Package for the Social Science (SPSS Inc. Chicago, IL, USA) version 23. Frequencies and percentages presented categorical variables. Descriptive analysis involving the Chi-square test was utilized to test the significance of the relationship between categorical variables. The level of significance was determined at P< 0.05. Official letters were deemed to the selected primary and intermediate schools. The parents were asked to provide their written consent prior to participation in the study.

RESULTS:

Table (1) shows the sociodemographic characteristics of 590 included participants. Less than half of them (48.5%) aged from 9-13 years, 35.6% aged from 2-9 years, and with a mean age of 10±3 years. Most participants were males (68%). Regarding the BMI, 38.3% were underweight, 38.1% were average, 12.9% were overweight, and 10.7% were obese. In addition, 38% of the participants' parents had secondary education, 14.1% had a university degree or more, 29.8% had intermediate education, and 13.2% were uneducated. Less than half of the participants have a monthly income that ranges from 5,000-10,000 / month.

Table (2) presents the factors that affect asthma control among the participants. The most common asthma triggers were dust (50.8%), followed by common cold (19%), while the least common trigger was flowers and trees (0%). Most participants (76.1%) were affected by the seasonal variations, and 64.9% had more symptoms in school. The majority (82.9%) skipped from zero to 6 days of school attendance, and only 5.9% skipped 15 days or more. Nearly (33.2%) were hospitalized 3-5 times during the last year, 31.7% were hospitalized for 1-2 times, and 18.1% were hospitalized for 6 times or more. The majority (61.4%) were exposed to trigger factors at home, 74.9% experienced increased asthma symptoms within a day during the last month for two times or less per week, and 68.5% used an inhaler during the last month two times or less. Over half of the participants (53.9%) experienced an increase in asthma symptoms during the night in the last month for two times or less. The majority (67.1%) suffered from activity limitations due to asthma. Most participants (61%) did not use the Peak Flow Meter (PFM), and 11% do not know the device. The majority (75.6%) were satisfied with asthma treatment; however, less than half of them (48.5%) were controlled.

Table (3) investigates participants' sociodemographic characteristics in association with BA control. Age (P=0.000), BMI (P=0.000), the parents' education (P=0.001), the average monthly income (P=0.000), and the most common triggers (P=0.000) were all significantly associated with asthma control. Older participants aging from (9-12 years) and (13-14 years) were more controlled (54.9%) and (48.9%), respectively, than the younger ones. Obese children (38.1%) were less controlled than the average children (4%) and underweight (14.6%). More controlled subjects were found among families with a family income above 20000 SR/ month (68.6%) than the participants with less than 5000 SR/ month (46%). Participants exposed to cigarette smoke (66.2%), cold weather (66.7%), and common cold (57.1%) were more controlled than the others.

Table 4 shows the association between BA control and patient history with BA. Seasonal variation was significantly associated with BA control (P=0.000) as a higher proportion of patients with controlled BA did not report seasonal variation. Uncontrolled BA was more reported among children with more school absenteeism during the last academic year (P=0.000), as 0.0% of the children with school absenteeism of 15 days or more had controlled BA. Similarly, hospitalization during the last year was significantly associated with the control (P=0.000), as 0.0% of patients hospitalized 6 times or more during the last year had controlled BA.

The presence of asthma trigger factors at home was associated with higher rates of partially controlled BA (39.8% for present trigger factors versus 33.3% for not) (P=0.047). In addition, increased asthma symptoms during the day and night were significantly associated with BA control at P=0.000, as 0.0% of patients with daily experiences of increased asthma symptoms during the day or night had controlled BA.

During the last month, the use of inhalers was significantly associated with asthma control (P=0.000), as 67.8% of those who used it twice or less/ week were controlled while none of those who used the inhaler daily were controlled.

Increased asthma symptoms during the night in the last month were significantly associated with asthma control (P=0.000), as 60.4% of those who experienced asthma symptoms twice or less during the night were controlled compared, and none of those who experience these symptoms daily were controlled.

The majority (84.5%) of those who did not experience activity limitations due to asthma was controlled; this association was statistically significant (P=0.000). More than half of those who do not use PFM (55.3%) were controlled, while only 26.2% of those who use PFM were controlled; this association was statistically significant (P=0.000). Nearly half of those satisfied with the treatment (50.7%) and 40.1% of those who were not satisfied were controlled; this association was statistically significant (P=0.022).

Table (1): The sociodemographic characteristics of the participants (n=590).

Parameter		Frequency (%)
Age, y	2 -	210 (35.6%)
	9 -	286 (48.5%)
	13 - 14	94 (15.9%)
	Mean±SD	10±3
Gender	Male	401 (68%)
	Female	189 (32%)
BMI	Underweight	226 (38.3%)
	Average	225 (38.1%)
	Overweight	76 (12.9%)
	Obese	63 (10.7%)
Education (Parent)	Uneducated	78 (13.2%)
	primary school	29 (4.9%)
	intermediate school	176 (29.8%)
	secondary school	224 (38%)
	University or more	83 (14.1%)
Income	bellow 5,000 \ month	100 (16.9%)
	From 5,000-10,000 \ month	274 (46.4%)
	From 10,000-20,000 \ month	181 (30.7%)
	above 20,000 \ month	35 (5.9%)

Table (2): Factors affecting asthma control among the participants.

Parameter		Frequency (%)
Most common triggers	Cigarette smoke	71 (12%)
	Dust	300 (50.8%)
	Cold weather	72 (12.2%)
	Pets	23 (3.9%)
	Flowers and trees	0 (0%)
	Physical exercise	6 (1%)
	Common cold	112 (19%)
	Cleaning products/Air spray	6 (1%)
Seasonal variation	Yes	449 (76.1%)
	No	141 (23.9%)
More symptoms in school	Yes	383 (64.9%)
	No	207 (35.1%)
School absence during last year	From zero to 6 days	489 (82.9%)
	From 7 to 14 days	66 (11.2%)
	From15 days or more	35 (5.9%)
Hospitalization during the last year	none	100 (16.9%)
	From 1 to 2 times	187 (31.7%)
	From 3 to 5 times	196 (33.2%)
	From 6 times or more	107 (18.1%)
Home exposure to trigger factors	Yes	362 (61.4%)
	No	228 (38.6%)
Increased asthma symptoms during the day in the last month	Two(2) times or less \ week	442 (74.9%)
	Three(3) to 6 times \ week (but not daily)	89 (15.1%)
	Daily	48 (8.1%)
	Daily and throughout the day	11 (1.9%)
Use of inhaler during the last month	Two(2) times or less \ week	404 (68.5%)

	Three(3) to 6 times \ week (but not daily)	126 (21.4%)
	Daily	48 (8.1%)
	Daily and throughout the day	12 (2%)
Increased asthma symptoms during the night in the last month	Two(2) times or less \ Month	318 (53.9%)
	Three(3) to 4 times \ Month	159 (26.9%)
	one(1) time or more \ week(but not daily)	84 (14.2%)
	Daily	29 (4.9%)
Activity limitations due to asthma	No	194 (32.9%)
	Yes	396 (67.1%)
Use of Peak Flow Meter (PFM)	Yes	65 (11%)
	No	360 (61%)
	I do not know it	165 (28%)
Satisfaction with treatment	Yes	446 (75.6%)
	No	144 (24.4%)
BA Control	Controlled	286 (48.5%)
	Partial control	220 (37.3%)
	Uncontrolled	84 (14.2%)

Table (3): The association between the participants' sociodemographic characteristics and BA control.

Parameter		**BA Control**			**X^2**	**P-value**
		Uncontrolled	**Partial control**	**Controlled**		
Age, y	2 -	18 (8.6%)	109 (51.9%)	83 (39.5%)	36.6	**0.000**
	9 -	54 (18.9%)	75 (26.2%)	157 (54.9%)		
	13 - 14	12 (12.8%)	36 (38.3%)	46 (48.9%)		
Gender	Male	54 (13.5%)	148 (36.9%)	199 (49.6%)	0.9	0.633
	Female	30 (15.9%)	72 (38.1%)	87 (46%)		
BMI	Underweight	33 (14.6%)	100 (44.2%)	93 (41.2%)	67.7	**0.000**
	Average	9 (4%)	93 (41.3%)	123 (54.7%)		
	Overweight	18 (23.7%)	18 (23.7%)	40 (52.6%)		
	Obese	24 (38.1%)	9 (14.3%)	30 (47.6%)		
Education (Parent)	Uneducated	18 (23.1%)	24 (30.8%)	36 (46.2%)	26.1	**0.001**
	primary school	0 (0%)	18 (62.1%)	11 (37.9%)		
	intermediate school	18 (10.2%)	60 (34.1%)	98 (55.7%)		
	secondary school	36 (16.1%)	77 (34.4%)	111 (49.6%)		
	University or more	12 (14.5%)	41 (49.4%)	30 (36.1%)		
Average monthly family income, SR	Below 5,000 \ month	6 (6%)	48 (48%)	46 (46%)	59.8	**0.000**
	From 5,000-10,000 \ month	24 (8.8%)	103 (37.6%)	147 (53.6%)		
	From 10,000-20,000 \ month	54 (29.8%)	58 (32%)	69 (38.1%)		
	above 20,000 \ month	0 (0%)	11 (31.4%)	24 (68.6%)		
Most common triggers	Cigarette smoke	6 (8.5%)	18 (25.4%)	47 (66.2%)	115.5	**0.000**
	Dust	54 (18%)	131 (43.7%)	115 (38.3%)		
	Cold weather	6 (8.3%)	18 (25%)	48 (66.7%)		
	Pets	0 (0%)	11 (47.8%)	12 (52.2%)		
	Flowers and trees	0 (0%)	0 (0%)	0 (0%)		
	Physical exercise	6 (100%)	0 (0%)	0 (0%)		
	Common cold	6 (5.4%)	42 (37.5%)	64 (57.1%)		
	Cleaning products/Air spray	6 (100%)	0 (0%)	0 (0%)		

Table (4): The association between the factors affecting patients with asthma and asthma control.

Parameter		BA Control			X^2	P-value
		Uncontrolled	Partial control	Controlled		
Seasonal variation	Yes	72 (16%)	185 (41.2%)	192 (42.8%)	24.6	**0.000**
	No	12 (8.5%)	35 (24.8%)	94 (66.7%)		
More symptoms in school	Yes	54 (14.1%)	154 (40.2%)	175 (45.7%)	4.3	0.119
	No	30 (14.5%)	66 (31.9%)	111 (53.6%)		
School absenteeism during last year	From zero to 6 days	54 (11%)	167 (34.2%)	268 (54.8%)	74.3	**0.000**
	From 7 to 14 days	24 (36.4%)	24 (36.4%)	18 (27.3%)		
	From15 days or more	6 (17.1%)	29 (82.9%)	0 (0%)		
Hospitalization during the last year	none	0 (0%)	11 (11%)	89 (89%)	371.1	**0.000**
	From 1 to 2 times	0 (0%)	55 (29.4%)	132 (70.6%)		
	From 3 to 5 times	18 (9.2%)	113 (57.7%)	65 (33.2%)		
	From 6 times or more	66 (61.7%)	41 (38.3%)	0 (0%)		
Home exposure to trigger factors	Yes	42 (11.6%)	144 (39.8%)	176 (48.6%)	6.1	**0.047**
	No	42 (18.4%)	76 (33.3%)	110 (48.2%)		
Increased asthma symptoms during the day in the last month	Two(2) times or less \ week	24 (5.4%)	167 (37.8%)	251 (56.8%)	162.3	**0.000**
	Three(3) to 6 times \ week (but not daily)	24 (27%)	42 (47.2%)	23 (25.8%)		
	Daily	30 (62.5%)	6 (12.5%)	12 (25%)		
	Daily and throughout the day	6 (54.5%)	5 (45.5%)	0 (0%)		
Use of inhaler during the last month	Two(2) times or less \ week	12 (3%)	118 (29.2%)	274 (67.8%)	337.0	**0.000**
	Three(3) to 6 times \ week (but not daily)	30 (23.8%)	90 (71.4%)	6 (4.8%)		
	Daily	30 (62.5%)	12 (25%)	6 (12.5%)		
	Daily and throughout the day	12 (100%)	0 (0%)	0 (0%)		
Increased asthma symptoms during the night in the last month	Two(2) times or less \ Month	24 (7.5%)	102 (32.1%)	192 (60.4%)	124.8	**0.000**
	Three(3) to 4 times \ Month	18 (11.3%)	59 (37.1%)	82 (51.6%)		
	one(1) time or more \ week(but not daily)	24 (28.6%)	48 (57.1%)	12 (14.3%)		
	Daily	18 (62.1%)	11 (37.9%)	0 (0%)		
Activity limitations due to asthma	No	6 (3.1%)	24 (12.4%)	164 (84.5%)	150.9	**0.000**
	Yes	78 (19.7%)	196 (49.5%)	122 (30.8%)		
Use of Peak Flow Meter (PFM)	Yes	24 (36.9%)	24 (36.9%)	17 (26.2%)	41.5	**0.000**
	No	36 (10%)	125 (34.7%)	199 (55.3%)		
	I don't know	24 (14.5%)	71 (43%)	70 (42.4%)		
Satisfaction with treatment	Yes	54 (12.1%)	166 (37.2%)	226 (50.7%)	7.6	**0.022**
	No	30 (20.8%)	54 (37.5%)	60 (41.7%)		

DISCUSSION:

Asthma in children is the main cause of visits to the emergency department and hospitalizations. Unfortunately, childhood asthma cannot be treated, and symptoms may continue and escalate into adulthood. However, with the right treatment modalities, you and your child can control asthma symptoms and prohibit damage to growing lungs.[21] In this study, uncontrolled bronchial asthma was evaluated by GINA guidelines of the severity and control of bronchial asthma. In the current, obese children have the highest rate of uncontrolled bronchial asthma (38.1%) in comparison with overweight and underweight children who have uncontrolled bronchial asthma were (23.7%) and (134.6%), respectively. Children with normal BMI with uncontrolled bronchial asthma were (4%). Similar findings were found in many other countries and suggest that childhood obesity is related to an increased risk of worse bronchial asthma control and aggravation.[22] Other findings that identified higher BMI and obesity as possible behavioral factors associated with worsening asthma control and life quality, but not the severity of asthma, and principal important pathways for the management and control of asthma.[23]

This study indicated that obese, overweight, and underweight children are related to a higher risk of uncontrolled bronchial asthma in both genders, but more common in the female subjects. Another study presented that higher BMI was related to more symptom days and exacerbations among females only.[24] Another study proposed that there is no statistically significant association between BMI and asthma control.[25]

In this study, most parents had an intermediate and secondary school education. Graduated parents and parents with basic education had more children with controlled bronchial asthma than uneducated parents who have more children with uncontrolled bronchial asthma. A study was conducted among children with bronchial asthma found that children from families with lower education levels used fewer controller treatments than those whose parents were college graduates.[26] The prevalence of aggravating factors also was investigated, the most frequent triggering factors were dust and the common cold.

Another study in Tabuk city showed that the most common aggravating factors of bronchial asthma were URTI and dust.[27] It is important to know the common triggering factors in our domain to help control asthma symptoms and decline hospital admissions by advising patients regarding the needed methods and strategies for decreasing any allergen exposure. Given the rising morbidity and mortality rates associated with asthma, it is evident that therapeutic efforts should be directed on identifying significant allergens and advising patients on measures for limiting exposure.[28] Peak flow rate measurement in asthma episodes aids in determining the severity of asthma attacks and direct treatment strategies in the home, school, physician's office, and emergency department.[29]

In the present study, older participants were significantly more controlled than younger ones. Additionally, more controlled subjects were found among families with a higher family income. It has been suggested that asthma, as a chronic illness, maybe affecting children's behavioral health, regardless of their control level. However, **Tibosch *et al.***[30] discovered that having well-controlled asthma does not rule out serious psychosocial issues. According to the authors, prospective cohort research would be a better way to examine the direct association between these sociodemographic factors and asthma control.

We found that participants exposed to cigarette smoke (66.2%), cold weather (66.7%), and common cold (57.1%) were more controlled than the others. In contrast, a study that assessed the association between asthma control and life quality among children reported that participants with a history of smoking exposure were poorly controlled. [31]

Seasonal variation was significantly associated with BA control (P=0.000) as a higher proportion of patients with controlled BA did not report seasonal variation. Asthmatics who are allergic to grass, birch, or Alternaria have extremely distinct seasonal patterns than those who are not. Individuals sensitized to grass record more attacks in the summer (mostly due to allergen exposure). In comparison, those who are not sensitized have more attacks in the winter (mostly due to the effects of respiratory infections).[32] Although clinicians are well aware of these patterns, no epidemiological investigation of this magnitude has yet identified them or calculated risk estimates based on sensitization state in representative samples of the asthmatic populations.[33]

Uncontrolled BA was more reported among children with more school absenteeism during the last academic year, as none of the children with school absenteeism of 15 days or more had controlled BA. Similarly, hospitalization during the last year was significantly associated with the control (P=0.000), as none of the patients hospitalized 6 times or more during the last year had controlled BA. The presence of asthma trigger factors at home was associated with higher rates of partially controlled BA (39.8% for present trigger factors versus 33.3% for not) (P=0.047). Both the start of school in October and the conclusion of school in June appear to significantly

impact the number of children admitted to hospitals. This corresponds to the study's findings of a rapid decline in school-age asthma admissions followed by a significant rise.[34, 35] We believe the increase in October is attributable to an increase in viral respiratory tract infections (such as the respiratory syncytial virus), which have been linked to asthma exacerbation. Noncompliance with preventative therapy throughout the summer, when asthmatic attacks are less common, could also contribute to noncompliance continuing into October.[36]

This study established that frequent use of inhalers, frequent asthma symptoms during the night, frequent PFM use, limited daily activities due to asthma, and patients who were not satisfied with the treatment were associated with poorly controlled asthma.

Because it is an episodic disease, the patient may remain asymptomatic for a long time if properly managed. On the other hand, depending on the season of the year or indoor or outdoor allergens, the patient may experience highly severe episodes. As a result, our patients' responses may not completely represent their true disease condition or asthma management. Therefore, longitudinal studies are required to examine the child's yearly control and inquiries about events throughout the course of the year (for example, the previous week or month) and to try to determine the intensity and frequency of symptoms at different periods of the year.

CONCLUSION:

Most children with uncontrolled bronchial asthma were obese children. Dust was the most common cause of bronchial asthma in Jeddah, followed by the common cold. The majority of children with uneducated parents have uncontrolled bronchial asthma. High family income was significantly associated with better asthma control. Older children also showed better asthma control than younger ones. On the other hand, high rates of hospitalizations were associated with school attendance. The frequent use of inhalers, frequent asthma symptoms during the night, frequent PFM use, limited daily activities due to asthma, and patients who were not satisfied with the treatment were associated with poorly controlled asthma. Because most parents of children with bronchial asthma do not utilize or are unaware of PFM, we need to make more efforts to raise PFM knowledge among asthmatic children.

REFERENCES:

(1) World Health Organization. *Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach, 2007*. Available at http://www.who.int/gard/publications/GARD%20Book%202007.pdf. Accessed at 2017 May 13.

(2) http://www.obesityaction.org/educational-resources/resource-articles-2/obesity-related-diseases/obesity-and-asthma. Accessed at May 14 2017

(3) Stewart WF, Ricci JA, Chee E, Morganstein D. Lost productive work time costs from health conditions in the United States: Results from the American Productivity Audit. J Occup Environ Med 2003;45:1234-46.

(4) Al-Mobeireek A. Prescribing for asthmatic children in primary care. Are we following the guidelines? Saudi Med J 2003;24:1274.

(5) Dashash NA, Mukhtar SH. Prescribing for asthmatic children in primary care. Are we following guidelines? Saudi Med J 2003;24:507-11.

(6) Murdoch JR, Lloyd CM. Chronic inflammation and asthma. Mutation Research. 2010 Aug 7; 690(1-2): 24–39.

(7) Ford ES. The epidemiology of obesity and asthma. J Allergy ClinImmunol 2005;115:897–909.

(8) Quinto KB, Zuraw BL, Poon KY, Chen W, Schatz M , Christiansen SC. The association of obesity and asthma severity and control in children. J Allergy ClinImmunol 2011;128:964–969.

(9) Sutherland ER, Goleva E, Strand M, Beuther DA, Leung DY. B ody mass and glucocorticoid response in asthma. Am J RespirCrit Care Med 2008;178:682–687.

(10) Tai A, Volkmer R, Burton A. Association between asthma symptoms and obesity in preschool (4-5 year old) children. J Asthma 2009;46:362-5.

(11) Shore SA. Obesity and asthma: lessons from animal models. J ApplPhysiol 2007;102:516-28.

(12) Dixon AE. Adipokines and asthma. Chest 2009; 135:255–256.

(13) Shore SA, Terry RD, Flynt L, Xu A, Hug Ch. Adiponectin attenuates allergeninducedairway inflammation and hyper responsiveness in mice. J Allergy ClinImmunol 2006; 118:389–95.

(14) **Jensen ME**, **Gibson PG**, **Collins CE**, **Hilton JM**, **Wood LG**. Diet-induced weight loss in obese children with asthma: a randomized controlled trial.**ClinExp Allergy.** 2013 Jul;43(7):775-84.

(15) **Bibi H**, **Shoseyov D**, **Feigenbaum D**, **Genis M**, **Friger M**, **Peled R**, **Sharff S**. The relationship between asthma and obesity in children: is it real or a case of over diagnosis?.**J Asthma.** 2004 Jun;41(4):403-10.

(16) Obesity: Preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser; 2000. p. 100-42. Available on file:///C:/Users/HP/Downloads/WHO_TRS_894%20(4).pdf. Accessed at 2017 May 14.

(17) World Health Organization. Global Strategy on Diet, Physical Activity and Health. Childhood overweight and obesity. Available from: **http://www.who.int/dietphysicalactivity/childhood/en/** accessed at 2017 May 14.

(18))Musaiger AO. Overweight and obesity in Eastern mediterranean region: Prevalence and possible causes. J Obes 2011;2011:2-17.

(19) El-Mouzan MI, Foster PJ, Al Herbish AS, Al Salloum AA, Al Omer AA, Qurachi MM, et al. prevalence of overweight and obesity in Saudi children and adolescents. Ann Saudi Med 2010;30:203-8.

(20) Pocket guide for asthma management and prevention(for adults and children alder than five years).2017.Gina Initiative For Asthma.

(21) Huffaker MF, et al. Pediatric asthma: Guidelines-based care, omalizumab, and other potential biologic agents. Immunology Allergy Clinics of North America. 2015;35:129.

(22) Kenneth B, Bruce L, Kwun-Yee , Wansu C, Michael S, Sandra C. The association of obesity and asthma severity and control in children. Journal of Allergy and Clinical Immunology Volume 128, Issue 5, November 2011, Pages 964-969.

(23) Kim L, Simon L, Manon L, André C, Blaine D. Higher BMI is associated with worse asthma control and quality of life but not asthma severity. Respiratory Medicine Volume 100, Issue 4, April 2006, Pages 648-657.

(24) Meyer Kattan, MD, CM, Rajesh Kumar, M.D., Gordon R. Bloomberg, M.D., Herman E. Mitchell, Ph.D., Agustin Calatroni, MA, M.S., Peter J. Gergen, MD, M.P.H., Carolyn M. Kercsmar, M.D., Cynthia M. Visness, Ph.D., Elizabeth C. Matsui, M.D., Suzanne F. Steinbach, M.D., Stanley J. Szefler, M.D., Christine A. Sorkness, PharmD, Wayne J. Morgan, MD, C.M., Stephen J. Teach, MD, MPH, and Vanthaya N. Gan, MD. J Allergy Clin Immunol. Asthma control, adiposity, and adipokines among inner-city adolescents. 2010 March ; 125(3): 584–592

(25) Fariba A, Susanne V, Hubertus A, Anthonius D, Jason L, Meyer K, Colin P, Somnath M, Steve T, Anke H. Childhood obesity in relation to poor asthma control and exacerbations. European Respiratory Journal *2016, 48 (4): 1063-1073.*

(26) Gong T, Lundholm C, Rejnö G, Mood C, Långström N, Almqvist C. Parental Socioeconomic Status, Childhood Asthma and Medication Use – A Population-Based Study. PLoS One. 2014 Sep 4;9(9)

(27) Abdalla A, Osama S, Asmaa S, Sawsan A, Najwa J, Hyder O, Abdelrouf M, Palanisamy A. Basic Research Journal of Medicine and Clinical Sciences. Association of triggering factors with asthma exacerbations among the pediatric population in Tabuk, Kingdom of Saudi Arabia. 2016 September; Vol. 5(7):114-118

(28) Platts-M. · Ward, J. · Sporik R. · Gelber L. · Chapman M. · Heymann P. Epidemiology of the Relationship between Exposure to Indoor Allergens and Asthma. Int Arch Allergy Immunol 1991;94:339–345.

(29) PFM10-National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma; Full Report 2007. *Department of Health and Human Services, National Institutes of Health, National Heart, Lung and Blood Institute*. 2007. Available on http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm

(30) Tibosch M, Reidsma C, Landstra A, Hugen C, Gerrits P, Brouwer M, van Gent R, Merkus P, Verhaak C. An asthma-related quality of life instrument is unable to identify asthmatic children with major psychosocial problems. European journal of pediatrics. 2010 Dec 1;169(12):1495-501.

(31) Banjari M, Kano Y, Almadani S, Basakran A, Al-Hindi M, Alahmadi T. The relation between asthma control and quality of life in children. International journal of pediatrics. 2018 Jul 3;2018.

(32) Nicholson KG, Kent J, Ireland DC. Respiratory viruses and exacerbations of asthma in adults. British Medical Journal. 1993 Oct 16;307(6910):982-6.

(33) Canova C, Heinrich J, Anto JM, Leynaert B, Smith M, Kuenzli N, Zock JP, Janson C, Cerveri I, De Marco R, Toren K. The influence of sensitisation to pollens and moulds on seasonal variations in asthma attacks. European Respiratory Journal. 2013 Oct 1;42(4):935-45.

(34) Horn ME, Reed SE, Taylor PA. Role of viruses and bacteria in acute wheezy bronchitis in childhood: a study of sputum. Archives of Disease in Childhood. 1979 Aug 1;54(8):587-92.

(35) Johnston SL, Pattemore PK, Sanderson G, Smith S, Campbell MJ, Josephs LK, Cunningham A, Robinson BS, Myint SH, Ward ME, Tyrrell DA. The relationship between upper respiratory infections and hospital admissions for asthma: a time-trend analysis. American journal of respiratory and critical care medicine. 1996 Sep;154(3):654-60.

(36) Cordina M, McElnay JC, Hughes CM, Ebejer MJ. Skin Pick Testing in Maltese Patients Suffering from Asthma. Eur. Respir. J. 1999;14.