



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>
 Journal DOI: [10.21474/IJAR01](https://doi.org/10.21474/IJAR01)

**INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH**

RESEARCH ARTICLE

PREVALENCE OF ASTHMA AMONG SCHOOL AGE CHILDREN IN TAIF, SAUDI ARABIA.

Dr.Hani Ahmed Abo Zid.

Head of Department of Public Health and Community Medicine, College of medicine, Taif University, Saudi Arabia.

Manuscript Info

Manuscript History:

Received: 19 March 2016
 Final Accepted: 13 April 2016
 Published Online: May 2016

Key words:

Asthma, children, school

*Corresponding Author

Dr.Hani Ahmed Abo Zid.

Abstract

Background: Prevalence of asthma and allergies among children has become an increasing problem in the last few decades. Asthma has become the most common chronic disease among children and is one of the major causes of hospitalization among those younger than 15 years of age (World Health Organization, 2006).

Aim of study: To estimate the prevalence of asthma among school age children in Taif, KSA and its level of control. Also, we tried to study the risk factors associated with asthma & factors that might affect the level of control.

Research Design and Methods: A cross-sectional descriptive study was done. A multistage random sampling technique will be used to recruit the 1197 students participate in the study by applying a written questionnaire on school age (5-18 years-randomly selected) children, the questionnaire was contain Socio-demographic data as number of living children, age of mother, mother education, mother occupation, father education, father occupation, father smoking, family history of any allergies, number of rooms in the house, ventilation and animals or birds in the house and Questions for asthmatic children To evaluate asthma clinically to detect triggers we asked about increased severity of asthma symptoms with foods, fumes, effort, smoking, cold exposure, drugs, contacts or others. Also, we asked about wheezing module used in The International Study of Asthma and Allergies in Childhood (ISAAC) and Asthma Control Test™ questions To assess clinical control.. Statistical analysis will be performed using Statistical Package for the Social Science (SPSS) program for windows version 16.

Results; we found that The prevalence of children asthma in Taif, Saudi Arabia was 10.44%.and Uncontrolled asthma was detected in 19.2% of asthmatic children, while 40 % of asthmatic children were partly controlled and 40.8% were well controlled.

Copy Right, IJAR, 2016.. All rights reserved.

Introduction:-

Asthma is a serious public health problem throughout the world, affecting people of all ages with an estimated 300 million affected individuals (Masoli et al, 2004 – Beasley, 2004). When uncontrolled, asthma can place severe limits on daily life, and is sometimes fatal. While early diagnosis of asthma and implementation of appropriate therapy significantly reduce the socioeconomic burdens of asthma and enhance patients' quality of life (GINA, 2009).

Prevalence of asthma and allergies among children has become an increasing problem in the last few decades. Asthma has become the most common chronic disease among children and is one of the major causes of hospitalization among those younger than 15 years of age (World Health Organization, 2006).

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation is associated with airway hyper-responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing, particularly at night or in the early morning (GINA, 2009).

There is now good evidence that the clinical manifestations of asthma symptoms as sleep disturbances, limitations of daily activity, impairment of lung function, and use of rescue medications can be controlled with appropriate treatment. When asthma is controlled, there should be no more than occasional recurrence of symptoms and severe exacerbations should be rare (Vincent et al, 2006).

The previous classification of asthma by severity into Intermittent, Mild Persistent, Moderate Persistent, and Severe Persistent is now recommended only for research purposes (GINA, 2009).

Factors affecting development of asthma:-

Host Factors:-

Genetics:-

Asthma has a heritable component, but it is not simple. Current data show that multiple genes may be involved in the pathogenesis of asthma (Holloway et al, 1999 - Wiesch et al, 1999)

Obesity:-

Obesity has also been shown to be a risk factor for asthma. Certain mediators such as leptins (produced by adipose tissue) may affect airway function and increase the likelihood of asthma development (Shore and Fredberg, 2005 - Beuther et al, 2006).

Sex:-

Sex affects the development of asthma in a time-dependent Manner. Male sex is a risk factor for asthma in children. Prior to the age of 14, the prevalence of asthma is nearly twice as great in boys as in girls (Horwood et al, 1985).

Environmental Factors:-

Allergens and Exposure to animals:-

Birth-cohort studies have shown that sensitization to house dust mite allergens, cat dander, dog dander (Sporik et al, 1990 - Wahn et al, 1997) and Aspergillus mold (Hogaboam et al, 2005) are independent risk factors for asthma-like symptoms in children up to 3 years of age. However, the relationship between allergen exposure and sensitization in children is not straightforward. It depends on the allergen, the dose, the time of exposure, the child's age and probably genetics as well (GINA, 2009).

Infections:-

During infancy, a number of viruses have been associated with the inception of the asthmatic phenotype. A number of long-term prospective studies of children admitted to the hospital with documented respiratory syncytial virus (RSV) have shown that approximately 40% will continue to wheeze or have asthma into later childhood (Sigurs et al, 2000).

Occupational sensitizers:-

Over 300 substances have been associated with occupational asthma (Newman, 1995, Venables and Chan-Yeung, 1997, Fabbri et al, 1997, Chan-Yeung and Malo, 1999 - Malo et al, 2004), which is defined as asthma caused by exposure to an agent encountered in the work environment.

Tobacco smoke:-

Tobacco smoking is associated with accelerated decline of lung function in people with asthma, increases asthma severity, may render patients less responsive to treatment with inhaled (Chalmers et al, 2002 - Lazarus et al, 2007) and systemic (Chaudhuri et al, 2003) glucocorticosteroids and reduces the likelihood of asthma being controlled (Bateman et al, 2004).

Outdoor/indoor air pollution:-**Diet:-**

The role of diet, particularly breast-feeding, in relation to the development of asthma has been extensively studied. In general, the data reveal that infants fed formulas of intact cow's milk or soy protein have a higher incidence of wheezing illnesses in early childhood compared with those fed breast milk (Friedman and Zeiger, 2005).

Methodology:-**Study area:-**

Taif city is located in Mecca province of Saudi Arabia at the west of Saudi Arabia in an elevation of 1700 meters on the slopes of the Al-Sarawat Mountains. It has a population of 987,914 (2010 census). Taif city includes 602 primary schools 310 for boys and 292 for girls. The number of primary schoolchildren is 66294 (31745 boys and 43540 girls).

Study design:-

A cross-sectional descriptive study was done by applying a written questionnaire on school age (5-18 years) children. The study was conducted from September 2015 to January 2016.

Study population:-

Primary and preparatory Taif governmental male schools students enrolled in, Saudi Arabia, 2015-2016, who were present at time of the study and were willing to participate in it

Sample size:-

A multistage random sample was carried out to recruit the participants of the study as follow:

First stage:- two male governmental primary schools were selected out of male governmental primary schools by using simple random sample.

Second stage:- two male governmental preparatory schools were selected out of male governmental preparatory schools by using simple random sample.

Third stage:- two male governmental secondary schools were selected out of male governmental secondary schools by using simple random sample.

Fours stage:- all students in the schools selected were included in the study.

Females will not be included in the study because they are not easily allowed to male investigators to access female students according to Saudi community traditions.

Population selection criteria:-**Inclusion criteria:-**

- ❖ Students enrolled in governmental schools in Taif, Saudi Arabia, 2015-2016.
- ❖ Boys between 5-18 years old

Exclusion criteria:-

- ❖ Primary school students who were not present at time of conducting the study or not willing to participate.
- ❖ Girls students
- ❖ Those aged less than 5 years or over 18 years.

Pilot study:-

Pilot study was done before beginning the work in order to test the questionnaire, detect any difficulties, and also to give an idea about the prevalence of the asthma among students.

Study site:

The study sample was taken from four schools in Taif City, Taif Governorate. The questionnaire was applied to all children aged (5-18) years within the school were subjected to the questionnaire, by themselves or by their relatives according to the age.

Study tools:-

A questionnaire was designed using:-

Socio-demographic questions:-

- ❖ Family evaluation: number of living children, age of mother, mother education, mother occupation, father education, father occupation, father smoking, family history of any allergies, number of rooms in the house, ventilation and animals or birds in the house.
- ❖ Asthmatic child evaluation: including child serial among siblings, school attendance, school performance and work status.
- ❖ Questions for asthmatic children: To evaluate asthma clinically and to detect triggers we asked about increased severity of asthma symptoms with foods, fumes, effort, smoking, cold exposure, drugs, contacts or others. Also, we asked about follow up and hospital admission for asthma.
- ❖ Core questions wheezing module used in The International Study of Asthma and Allergies in Childhood (ISAAC):
- ❖ Have you (or has your child) ever had wheezing or whistling in the chest at any time in the past? Yes [] No []
- ❖ IF YOU ANSWERED "NO", PLEASE SKIP TO QUESTION 6
- ❖ Have you (or has your child) had wheezing or whistling in the chest in the last 12 months? Yes [] No []
- ❖ IF YOU ANSWERED "NO", PLEASE SKIP TO QUESTION 6
- ❖ How many attacks of wheezing have you (or has your child) had in the last 12 months? None [] 1 to 3 [] 4 to 12 [] More than 12 []
- ❖ In the last 12 months, how often, on average, has your (or has your child) sleep been disturbed due to wheezing? Never woken with wheezing [] Less than one night per week [] One or more nights per week []
- ❖ In the last 12 months, has wheezing ever been severe enough to limit your (or your child) speech to only one or two words at a time between breaths? Yes [] No []
- ❖ Have you (or has your child) ever had asthma? Yes [] No []
- ❖ In the last 12 months, has your (or has your child) chest sounded wheezy during or after exercise? Yes [] No []
- ❖ In the last 12 months, have you (or has your child) had a dry cough at night, apart from a cough associated with a cold or a chest infection? Yes [] No [] (Beasley, 2004 - Asher et al, 2006)

Asthma Control Test™ questions:- To assess clinical control.

Asthma Control Test™ (ACT) is a simple test for asthma that has been validated in several studies (Schatz et al., 2007- Zhou et al., 2009). The ACT was initially developed in a study which looked at 22 of the most common questions that doctors ask when talking to patients about asthma control, with certain questions standing out as being the most accurate predictors. The questions take less than a minute to answer and can be asked by the health care professional or the patient can complete the test themselves. There is a score for each question, and an overall score in the range of 5–25, with low scores corresponding to a high level of symptoms and therefore poor asthma control.

Childhood Asthma Control Test™ (C-ACT) for children 5 to 11 years:-

- ❖ Have your child complete these questions:
 - ❖ How is your asthma today?
 - ❖ How much of a problem is your asthma when you run, exercise or play sports?
 - ❖ Do you cough because of your asthma?
 - ❖ Do you wake up during the night because of your asthma?
 - ❖ Please complete the following questions on your own:
 - ❖ During the last 4 weeks, how many days did your child have any daytime asthma symptoms?
 - ❖ During the last 4 weeks, how many days did your child wheeze during the day because of asthma?
 - ❖ During the last 4 weeks, how many days did your child wake up during the night because of asthma?
 - ❖ The Asthma Control Test™ (ACT) for people 12 years and older:
 - ❖ In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?
 - ❖ During the past 4 weeks, how often have you had shortness of breath?
 - ❖ During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?
 - ❖ During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?
 - ❖ How would you rate your asthma control during the past 4 weeks?
- (Nathan et al, 2004)

Studies have shown that the ACT score effectively discriminates between patients who differ in asthma control, is responsive to changes in control, and can discriminate between groups of patients in different lung function ranges. The ACT score is highly

effective as a screen for uncontrolled asthma and can correctly predict GINA-defined partly controlled or uncontrolled asthma in over 90% of cases.

A score of 20–25 means that a patient's asthma is controlled. A score of 15-19 means that it may be possible to increase the level of asthma control and a full review of the treatment plan, including education on inhaler technique and the importance of compliance with treatment, is warranted. A score of 14 or less indicates that asthma is poorly or not controlled and that an urgent review of and changes to the patient's management are needed, its use is highly likely to improve patient outcomes as asthma therapy can be confidently adjusted up if control is demonstrated to be poor (Schatz et al., 2007- Zhou et al., 2009).

Ethical consideration:-

Approval by the deanship of student affairs should be taken before starting the work. During the research activities, each studied subject will be informed about the study objectives stressing on confidentiality of collected data and getting a verbal consent of the subject to share in the study.

Statistical analysis:-

Data entry and Statistical analysis was been performed using statistical package for the social science (SPSS) program for windows version 16. Frequency and range checks was been performed. Descriptive statistics was been used for the quantitative variables. Percentage was been used to determine the rate of asthma

Results:-

Table 1: Socio-demographic characteristics of the studied population:

Character	No.= 1197	%	Character	No.= 1197	%
Age (years)			Child birth order		
<12	1346	56.22	First	436	36.42
≥12	1048	43.78	2-3	605	50.59
			4-5	179	10.74
			>5	27	2.21
Family size			No. of Living children		
≤4	325	27.19	1-2	318	26.57
5-6	698	58.27	3-4	698	58.31
7-8	116	9.73	5-6	130	10.86
>8	58	4.80	>6	50	4.14
			Missing	2	0.13
Mother education			Father education		
Illiterate	488	40.77	Illiterate	430	35.97
Primary & preparatory	108	9.02	Primary & preparatory	176	14.66
Secondary	225	18.84	Secondary	206	17.21
University(& higher)	369	30.79	University (& higher)	381	31.830
Missing	7	0.59	Missing	8	.33
Mother occupation			Father occupation		
housewife	932	77.86	not working	13	1.13
Professional	77	6.39	professional	179	14.91
semi-professional	83	6.93	semi-professional	290	24.22
Skilled	11	0.88	skilled	230	19.22
Unskilled	85	7.14	unskilled	424	35.42
Retired	3	0.21	Retired	18	1.50
Missing	7	0.59	Missing	43	3.59

40.77% of the mothers were illiterate versus 35.97% of the fathers who were highly educated. 77.86% of mothers were housewives while 35.42% of fathers were unskilled workers. 58.27% of families were composed of 5-6 members.

Table 2: Housing conditions and other risk factors of developing asthma of the studied population.

Character	No.= 1197	%	Character	No.= 1197	%
Animals in the house			Good ventilation		
Present	43	3.63	Yes	1038	86.72
Absent	1153	96.28	No	159	13.28
Missing	2	0.08			
Type of animal			Smoking father	592	49.42
Dog	6	14.94			
Cat	13	28.74			
Birds	16	35.63			
horses	8	19.54			
Missing	1	1.15			
Family history Of allergy			Smoking site		
Positive	254	21.22	Inside house	433	73.29
			Outside house	158	26.71
			Other family smoker	168	7.02

49.42% of fathers were smokers, 73.29% of them smoke inside house. 21.22% of children have positive family history to allergy; asthma accounts 56.69% of those with positive family history of allergy.

Table 3: Prevalence of asthma among target children.

Item	Value
Total target children	1197
Non-asthmatic children	1072
Asthmatic children	125
Prevalence of asthma	10.44%

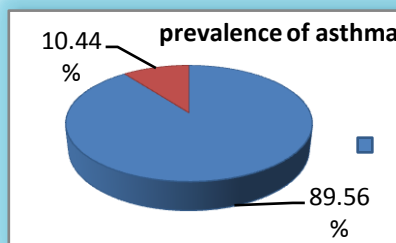


Table 4: Clinical data of asthmatic children (N=125).

Item	No=125	%	Item	No=125	%
Increased asthma severity with certain odors			Increased asthma severity with other factors		
Yes			Yes		
No	115	92.00	No	2	1.60
	10	8.00		123	98.40
Increased asthma severity with certain food			Follow up for asthma		
Yes			Yes	100	80.00
No	69	55.20	No	25	20.00
Unknown	55	44.00			
	1	0.80			
Increased asthma severity with exposure to smoking			Site of follow up (where?)		
Yes			Hospital	28	22.40
No	110	88.00	Primary health-care	52	41.60
	15	12.00	Private clinic	19	15.20
			Others	1	0.80
			Missing	25	20.00
Increased asthma severity with exercise			Time of follow up (when?)		
Yes	99	79.20	Regularly		
No	25	20.00	In acute attacks	18	14.40
Missing	1	0.80	Missing	84	67.20
				23	18.40
Increased asthma severity with cold air			Hospitalization for asthma		
Yes	110	88.00	None		
No	15	12.00	1-3 times	1	0.80
			> 3 times	20	16.00
			Missing	9	7.20
				95	76.00
Increased asthma severity with touching certain materials			Received medical information		
Yes			Yes		
No	36	28.80	No	123	49.20
Missing	88	70.40	Missing	125	50.00
	1	0.80		2	0.80
Increased asthma severity with certain drugs			Type of medical information received		
Yes			About causes	28	22.40
No	33	26.40	About Symptoms	27	21.60
Missing	90	72.00	About Severity	16	12.80
	2	1.60	About Importance of follow up	22	17.60
Increased asthma severity with common cold			About How to use inhalers		
Yes			About Risk factors to be avoided	13	10.40
No	115	92.00			
Missing	9	7.20		19	15.20
	1	0.80			

Asthma severity increased with certain odors in 92% of asthmatics. 88% of asthmatics have more severe symptoms with exposure to smoking, 88% with exposure to cold air & 92% with exposure to common cold attacks. Severity increased with certain drugs in 26.4% & with certain food in 55.2%. Exercise increased asthma severity in 79.2% of asthmatics. About 80% sought follow up only 14% attends it regularly; however 7.2% were admitted to hospital for more than 3 times because of severe asthma attacks. About 49.2% had received medical information mainly about factors to be avoided in 15.2%; only 10.4% learned how to use inhalers.

Table 5: ISAAC Core questionnaire -wheezing module.

	Item	N0.=125	%
1	Have you (or has your child) ever had wheezing or whistling in the chest at any time in the past? Yes No	122 6	97.60 2.40
2	Have you (or has your child) had wheezing or whistling in the chest in the last 12 months? Yes No Missing	105 18 2	84.00 14.40 1.60
3	How many attacks of wheezing have you (or has your child) had in the last 12 months? No attacks 1-3 attacks 4-12 attacks >12 attacks Missing	12 56 29 15 13	9.60 44.80 23.20 12.00 10.40
4	In the last 12 months, how often, on average, has your (or has your child) sleep been disturbed due to wheezing? Not awoken by any attacks > one night/week One or more nights/week Missing	15 39 58 13	12.00 31.20 46.40 10.40
5	In the last 12 months, has wheezing ever been severe enough to limit your (or your child) speech to only one or two words at a time between breaths? Yes No Missing	61 51 13	48.80 40.80 10.40
6	Have you (or has your child) ever had asthma? Yes No	103 22	82.40 17.60
7	In the last 12 months, has your (or has your child) chest sounded wheezy during or after exercise? Yes No	92 33	73.60 26.40
8	In the last 12 months, have you (or has your child) had a dry cough at night, apart from a cough associated with a cold or a chest infection? Yes No	98 27	78.40 21.60

Adapted from the International Study of Asthma and Allergies in Childhood (ISAAC)

About 97.6% reported recurrent wheezing before in their life & 84% recalled wheezing in the last 12 months, 44.8% of them reported 1-3 asthma attacks during the same period. Recalling events about past 12 months, about 31.2% had disturbed sleep for more than one night/week. Also, 48.8% experienced speech limitation during attacks, 82.4% of asthmatic children realized that they are asthmatics. Also, 73.6% had wheezes when perform exercise & 78.4% had dry cough at night that was not associated with cold or a chest infection.

Table (6): Childhood Asthma Control Test TM for children 5-11 years old (N=82):

Question	No.=82
1 How is your asthma today? Very bad Bad Good Very good	3 15 46 18
2 How much of a problem is your asthma when you run, exercise or play sports? big problem, I can't do what I want to do It's a problem and I don't like it It's a little problem but it's okay It's not a problem.	8 28 24 22
3 Do you cough because of your asthma? Yes, all of the time Yes, most of the time Yes, some of the time No, none of the time	8 51 71 33
4 Do you wake up during the night because of your asthma? Yes, all of the time Yes, most of the time Yes, some of the time No, none of the time	4 22 35 21
5 In the last 4 weeks, how many days have your child had any daytime symptoms? Everyday 19-24 days 11-18 days 4-10 days 1-3 days None	2 3 6 26 23 22
6 In the last 4 weeks, how many days have your child had wheezes during the day? Everyday 19-24 days 11-18 days 4-10 days 1-3 days None	2 2 7 23 23 25
7 In the last 4 weeks, how many days have your child wake up during the night? Everyday 19-24 days 11-18 days 4-10 days 1-3 days None	1 3 8 20 29 21

46 children felt good at time of interview. During past month, daytime symptoms appeared in 26 children (4-10 days); while night awakening occurred in 29 children (1-3 nights).

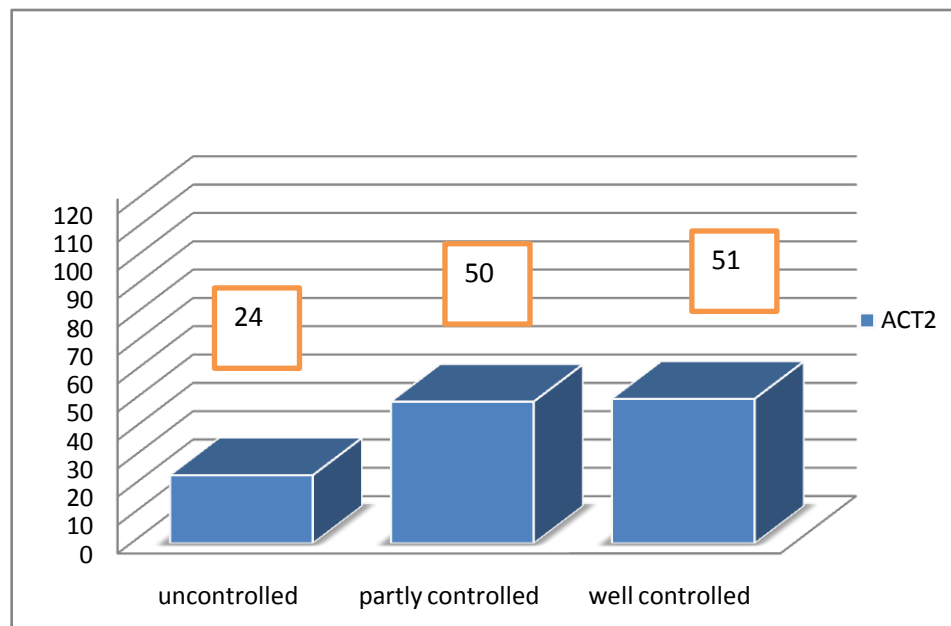
Table 7: Asthma Control Test TM for teens (12 years and older).

Question		No.=43
1	In the last 4 weeks, how much your asthma affects you in work, school or home? All time Most of the time Some of the time Little of the time Not at all	 1 8 12 6 16
2	In the last 4 weeks, how often have you had shortness of breath? > once per day Once per day 3-6 times per week Once or twice a week Not at all	 2 4 10 14 13
3	In the last 4 weeks, how often do asthma symptoms wake you up at night or early morning? ≥ 4 nights per week 2-3nights per week Once a week Once or twice Not at all	 4 6 8 12 13
4	In the last 4 weeks, how often had you used rescue inhaler or nebulizer medication? ≥ 3times per day 1-2 times per day 2-3 times per week ≤ once per week Not at all	 1 2 2 5 33
5	How would you rate your asthma control during the past 4 weeks? Not controlled poorly controlled somewhat controlled well controlled completely controlled	 4 6 16 8 9

Recalling the last 4 weeks, 33 children didn't use the rescue inhaler. About 14 children had shortness of breath once/ week & 8 children had disturbed sleep once/ week.

Table (8): Asthma Control Test TM results for asthmatic children:

ACT TM	No. =125 (%)
Uncontrolled	24(19.2%)
Partly controlled	50(40 %)
Well controlled	51(40.8%)

Figure (2): Asthma Control Test™ results of asthmatic children:

Applying ACT to 125 asthmatic children revealed uncontrolled asthma in 19.2%, partly controlled asthma in 40% & well controlled asthma in 40.8%.

Discussion:-

Asthma is a serious public health problem throughout the world, affecting people of all ages with an estimated 300 million affected individuals (Masoli et al, 2004 – Beasley, 2004).

Asthma has become the most common chronic disease among children and is one of the major causes of hospitalization among those younger than 15 years of age (World Health Organization, 2006).

Although from the perspective of both the patient and society the cost to control asthma seems high, the cost of not treating asthma correctly is even higher. Proper treatment of the disease poses a challenge for individuals, health care professionals, health care organizations, and governments (GINA, 2009).

There is every reason to believe that the substantial global burden of asthma can be dramatically reduced through efforts by individuals, their health care providers, health care organizations, and local and national governments to improve asthma control (GINA, 2009).

The previous classification of asthma by severity into Intermittent, Mild Persistent, Moderate Persistent, and Severe Persistent is currently recommended only for research purposes (GINA, 2009).

Instead, GINA recommends a classification of asthma by level of control: Well controlled, partly controlled, or uncontrolled. This reflects an understanding that asthma severity involves not only the severity of the underlying disease but also its responsiveness to treatment, and that severity is not an unvarying feature of an individual patient's asthma but may change over months or years (GINA, 2009).

Our study aimed at investigating the prevalence of asthma among school age children in Taif, Saudi Arabia, to describe the socio-demographic data of the asthmatic children, to detect the clinical features and risk factors of the childhood asthma and to assess the clinical control in asthmatic children.

The present study is a cross-sectional descriptive study. It was done by a written questionnaire applied to 1197 school age (5-18years).

Only few studies had evaluated asthma prevalence in Saudi Arabia. Mahfouz et al., 2009 reported that asthma prevalence was 10.8 % in Saudi Arabia, using a survey including infants and children aged less than 4 years old.

Mohammed O Al Ghobain et al in 2010 reported that The prevalence of lifetime wheeze, wheeze during the past 12 months, and physician-diagnosed asthma was 25.3%, 18.5% and 19.6%, respectively. The prevalence of exercise-induced wheeze and night cough in the past 12 months was 20.2% and 25.7%, respectively

El-Zahrani in 1994 found that asthma prevalence was 8.2%, using a questionnaire among children 3-15 years old.

El-Lawindi et al in 2003 reported that in Saudi Arabia, 23.2% of wheezy infants were proved to be real asthmatics. They also stated that asthma prevalence among school children aged 5-15 years was 8.2%, half of which was graded as moderate or severe.

Fahim et al in 2006 reported that there was a higher prevalence and increased severity of asthma symptoms in children of low socioeconomic groups.

In the present study estimation of prevalence of questionnaire-diagnosed asthma revealed that out of the 1197 responded school age children, asthmatics were 125 children. Therefore, the prevalence of asthma among school age (5-18 years old) children was 10.44 % in Taif, Saudi Arabia.

This is slightly higher than the prevalence estimated in Jeddah of 9.4 % by Fahim et al in 2006. They assessed 11-15 year-old school children in Jeddah, they revealed that wheeze during the last year was 14.7% and that physician-diagnosed asthma was 9.4%.

Our results revealed that the prevalence of asthma is lower than that was estimated in the study of Ali Alqurni et al in 2013 which showed that asthma prevalence in the studied governorates was: 16.8% in Riyadh. He concluded that the prevalence of asthma in school children aged 6-15 years old ranged from 10.9% to 18.7% with a mean of 15.1%.

In the Middle East, asthma prevalence was previously reported to be lower than in developed countries (which ranges from 5 to 23%). Masoli et al in 2004 indicated that the mean prevalence of asthma in Middle Eastern countries was estimated to be 5.8% and in North African countries to be 3.9%.

These results may be owed to the exposure to infections in early life that may have a role in prevention of asthma and atopy in children in developing countries (Schaub et al, 2006). Also some data suggest that certain characteristics of Western diets, such as increased use of processed foods and decreased antioxidant and decreased polyunsaturated fatty acid intake, have contributed to the recent increases in asthma and atopic disease (Devereux and Seaton, 2005).

Conclusions:-

The study reached the following conclusions:

- ❖ The prevalence of pediatric asthma in Taif, Saudi Arabia was 10.44%.
- ❖ Uncontrolled asthma was detected in 19.2% of asthmatic children, while 40 % of asthmatic children were partly controlled and 40.8% were well controlled.
- ❖ Maternal education and receiving medical information about asthma (health education) were significant factors in asthma control.

Reference:-

1. American Thoracic Society (ATS) (2000): What constitutes an adverse health effect of air pollution Official statement of the American Thoracic Society. *Am J Respir Crit Care Med*; 161: 665–73.
2. Asher MI, Montefort S, Björkstén B et al (2006): ISAAC Phase Three Study Group. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhino-conjunctivitis, and eczema in childhood: ISAAC Phases One and Three repeat multi-country cross-sectional surveys. *Lancet*; 26; 368:733–43
3. Ali Alqurni (2013): Epidemiology of Pediatric Asthma in Riyadh: Recent Data 2013.
4. Bateman ED, Boushey HA, Bousquet J et al (2004): Can guideline-defined asthma control be achieved The Gaining Optimal Asthma Control study. *Am J Respir Crit Care Med*; 170:836–44.
5. Beasley R (2004): The Global Burden of Asthma Report, Global Initiative for Asthma (GINA). <http://www.Ginasthma.org>.
6. Beutner DA, Weiss ST and Sutherland ER (2006): Obesity and asthma. *Am J Respir Crit Care Med*; 174:112–9.
7. Chalmers GW, Macleod KJ, Little SA et al (2002): Influence of cigarette smoking on inhaled corticosteroid treatment in mild asthma. *Thorax*; 57:226–30.
8. Chaudhuri R, Livingston E, McMahon AD et al (2003): Cigarette smoking impairs the therapeutic response to oral corticosteroids in chronic asthma. *Am J Respir Crit Care Med*; 168:1308–11.
9. Devereux G and Seaton A (2005): Diet as a risk factor for atopy and asthma. *J Allergy Clin Immunol*; 115:1109–17.
10. El-Zahrani AM (1994): *Med J King Abdulaziz Univ*; 62: 505–18.
11. El-Lawindi M, Mostafa N and Abu-Hashim F (2003): Bronchial asthma among children. Disease burden and exacerbations determinants. *Commun Med*; 21: 59–76.
12. Fabbri LM, Caramori G and Maestrelli P (1997): Etiology of occupational asthma. Toxicology of the respiratory system. Cambridge: Pergamon Press; 425–35.
13. Fahim HI, Geogry V, El Gafary M et al (2006): Prevalence and socioeconomic associations of asthma and allergic rhinitis in Northern Africa. *Eur Respir J*; 28:756–762.
14. Friedman NJ and Zeiger RS (2005): The role of breast-feeding in the development of allergies and asthma. *J Allergy Clin Immunol*; 115:1238–48.
15. Gauderman WJ, Avol E, Gilliland F et al (2004): The effect of air pollution on lung development from 10 to 18 years of age. *N Engl J Med*; 351:1057–67
16. Global Initiative for Asthma (GINA) (2009 updated in 2010): <http://www.ginasthma.org>
17. Hogaboam CM, Carpenter KJ, Schuh JM et al (2005): Aspergillus and asthma- any link? *Med Mycol*; 197–202
18. Holloway JW, Beghe B and Holgate ST (1999): The genetic basis of atopic asthma. *Clin Exp Allergy*; 29:1023–32.
19. Horwood LJ, Fergusson DM and Shannon FT (1985): Social and familial factors in the development of early childhood asthma. *Pediatrics*; 75:859– 68
20. Lazarus SC, Chinchilli VM, Rollings NJ et al (2007): National Heart Lung and Blood Institute's Asthma Clinical Research Network. Smoking affects response to inhaled corticosteroids or leukotriene receptor antagonists in asthma. *Am J Respir Crit Care Med*; 175:783–90.
21. Malo JL, Lemiere C, Gautrin D et al (2004): Occupational asthma. *Curr Opin Pulm Med*; 10:57–61.
22. Mahfouz et al, (2009): Outcome of asthma and wheezing in the first 6 years of life: follow-up through adolescence. *Am J Respir Crit Care Med*; 172, 1253–1258.
23. Masoli M, Fabian D, Holt S et al (2004): The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Allergy*; 59:469–478.
24. Mohammed O Al Ghobain et al in 2010: asthma: scientific evidence, epidemiological data and possible therapeutic options. *Ther Adv Respir Dis*; 2, 215–235.
25. National Asthma Education and Prevention Program (NAEPP) (2007): National Heart, Lung and Blood Institute. Expert Panel Report (EPR) 3: Guidelines for the Diagnosis and Management of Asthma.
26. Newman LS (1995): Occupational asthma: Diagnosis, management, and prevention. *Clin Chest Med*; 16:621–36.
27. Shore SA and Fredberg JJ (2005): Obesity, smooth muscle, and airway hyper-responsiveness. *J Allergy Clin Immunol*; 115:925–7.
28. Schaub B, Lauener R and Von Mutius E (2006): The many faces of the hygiene hypothesis. *Allergy Clin Immunol*; 117:969–77.
29. Sigurs N, Bjarnason R, Sigurbergsson F et al (2000): Respiratory syncytial virus bronchiolitis in infancy is an important risk factor for asthma and allergy at age 7. *Am J Respir Crit Care Med*; 161:1501–7.

30. Sporik R, Holgate ST, Platts-Mills TA et al (1990): Exposure to house-dust mite allergen (Der p I) and the development of asthma in childhood. A prospective study. *N Engl J Med*; 323: 502–7.
31. Schatz M, Mosen DM, Kosinski M et al (2007): Validity of the Asthma Control Test completed at home. *Am J Manag Care*; 13: 661–7.
32. Venables KM and Chan-Yeung M (1997): Occupational asthma. *Lancet*; 349:1465–9.
33. Vincent SD, Toelle BG, Aroni RA et al (2006): Exacerbations of asthma: a qualitative study of patient language about worsening asthma. *Med J Aust*; 184:451–4.
34. Wahn U, Lau S, Bergmann R et al (1997): Indoor allergen exposure is a risk factor for sensitization during the first three years of life. *J Allergy ClinImmunol*; 99:763–9.
35. Wiesch DG, Meyers DA and Bleecker ER (1999): Genetics of asthma. *J Allergy ClinImmunol*; 104:895–901.
36. World Health Organization, Asthma, Geneva (2006): Fact sheet No. 307. <http://www.who.int/mediacentre/factsheets/fs307/en/index.html> accessed 7 March 2007.
37. Zhou X, Ding FM and Lin JT (2009): Validity of Asthma Control Test for asthma control assessment in Chinese primary care settings. *Chest*; 135:904–10.