

University of Khartoum  
The Graduate College  
Medical & Health Studies Board

# **PSYCHOSOCIAL IMPACT OF ASTHMA ON CHILDREN AND THEIR PARENTS**

A thesis submitted in partial fulfillment for the requirements of the degree of Clinical  
MD in Paediatrics & Child Health.

2006

***By***

**Fatima Abd ElFattah Ibrahim Elhag**

M.B.B.S. (U. of K)

***Supervisor***

**Dr. Yahia Shakir Abd A/Gadir**

MPCH (U. of K)

Associate Professor

Department of Paediatrics & Child Health

Faculty of Medicine

University of Khartoum.

قل تعالي: **لما عرضنا الامنة على السموات والارض والجبل فبين ان يمتنها  
واشفقن منها وحملها الاسنان انه كان ظلوما جهولا**  
الاية 72  
سورة الاحزاب

# *Dedication*

*To  
My Mother  
To the Soul of My Father  
Husband and Brother (Zaki)*



*To my daughter Sarra  
The whole family  
And  
To All Asthmatic Children  
With Love*

***Table of contents***

<b>Page</b>	
<i>Acknowledgement</i> .....	<i>i</i>
<i>English Abstract</i> .....	<i>ii</i>
<i>Arabic abstract</i> .....	<i>iii</i>
<i>List of abbreviations</i> .....	<i>iv</i>
<i>List of tables</i> .....	<i>v</i>
<i>List of figures</i> .....	<i>vi</i>

**Chapter One:**

<b>1 . Introduction</b> .....	<b>1</b>
1.1 Definition of asthma.....	1
1.2 Historical background.....	1
1.3 Epidemiology.....	2
1.4 Genetics of asthma.....	6
1.5 Natural history.....	8
1.6 Pathophysiology and pathogenesis.....	11
1.7 Clinical feature.....	14
1.8 Classification of asthma sensitivity.....	16
1.9 Triggering factor of asthma.....	18
1.10 Diagnosis of asthma.....	19
1.11 Management of asthma.....	21
1.12 Mortality in asthma.....	23
1.13 Children and chronic conditions.....	26
1.13.1 How common are chronic condition.....	27
1.13.2 Impact of chronic illnesses on children.....	27
1.13.3 Children adjustment according to their different developmental stages.....	30

1.13.4	Impact of child chronic illness on families.....	31
1.14	Parameters in the assessment of the burden of asthma...	33
1.14.1	Assessment of the burden on the patient.....	33
1.14.2	Parameter in the assessment of the burden of asthma on the family.....	34
1.15	Psychosocial effect of asthma on children.....	34
1.16	Psychosocial and financial burden on the patient and family.....	38
1.17	Parameter in the assessment of the burden on society.....	40
1.18	The cost burden on society.....	41
1.19	Psychological reaction to stressful conditions and illness..	42
1.19.1	Acute reactions.....	42
1.19.2	Adjustment disorders.....	44
1.20	Anxiety.....	45
1.21	Depression.....	48
	▪ <b>Justification.....</b>	<b>51</b>
	▪ <b>Objectives.....</b>	<b>52</b>

*Chapter Two:*

<b>2-</b>	<b>Patients and Methods.....</b>	<b>53</b>
-----------	----------------------------------	-----------

*Chapter Three:*

<b>3-</b>	<b>Results.....</b>	<b>63</b>
-----------	---------------------	-----------

<b>3.1</b>	Demographic characteristics.....	63
<b>3.2</b>	Disease characteristics.....	67
<b>3.3</b>	Children social adjustment.....	81
<b>3.4</b>	Social background of the family.....	85
<b>3.5</b>	Economics and social impacts.....	88
<b>3.6</b>	Behaviour of children.....	97
<b>3.7</b>	Psychological impact.....	101

*Chapter Four:*

<b>4-</b>	<b>Discussion .....</b>	<b>110</b>
	▪ <b>Conclusion.....</b>	<b>122</b>
	▪ <b>Recommendations.....</b>	<b>124</b>
▪	<b>References.....</b>	<b>126</b>

## *ACKNOWLEDGMENT*

*My grateful thank to my supervisor Dr. Yahiya Shakir Abd A/Gadir for his supervision, valuable support and advice.*

*Special thanks to all asthmatic children and their parents.*

*I express my thanks to Mr. Hassan Ali for all statistical work and nice spirit.*

*I am thankful to Mrs. Fadia A/Galil who patiently typed the thesis.*

*I am most grateful to all people who contributed to my training, teachers and consultants, colleagues and patients.*

*Special thanks to my mother, sisters, brothers, and my daughter Sarra for their valuable support.*

## **ABSTRACT**

A description cross sectional hospital based study was conducted during the period January – June 2006 in some hospitals in Khartoum State.

The main objectives of the study were to study the psychological and social impact of asthma in children and their parents and to evaluate the financial burden of the disease on families.

The study included 90 children with their mothers, the majority of children 32.2% were in the age group. (6- < 12) male to female ratio was (1.3), 28 (31.1%) of children had mild asthma, 41 (45.6%) had moderate asthma and 21 (23.3%) had severe asthma. 76 (84.4%) had restriction of daily activity, 61 (67.8%) had restriction of playing because of their illness. This restriction was significantly associated with behavioral problems in 31 (50.8%) of children in the study group. 71 (78.9%) had interrupted schooling, 6 (6.7%) stopped schooling because of their illness.

Behavioral problems were detected in 35 (38.9%), children, 18 (65.7%) were male and 17 (43.3%) were females and the majority of them 26 (74.2%) were in the age group. [9 – 16 years), 18 (85.7%) of those with severe asthma and 16 (39%) of those moderate asthma had behaviour of problems and when compared with those of mild asthma 1 (3.6%), it was statistically significant.

Financial help was provided mainly by relatives in 52 (57.8%). Marital life of the guardian was not affected but their day to day life was disturbed by the physical care of the ill child in 70 (77.8%) and the social visit to relatives is reduced.

Children siblings' affection was mainly due to maternal unavailability.

The mothers of children had anxiety and depression in 39 (43.3%) and 25 (27.8%) respectively.

Mother's anxiety and depression was directly related to their children's asthma severity and behavioral problems.

2006

- 6) 90  
(%31.3)28 . (1 : 1.3) ( 12  
76 . (%23.3) 21, (%45.6) 41 .( )  
(%67.8 ) 61 (%84.4)  
31  
(%78.9) 71 , (%50.8)  
(%6.7) 6  
(%56.7) 18 , (%38.9) 35  
(%85.7) 18 . ( 16-9) (%43.3) 17  
(%39) 16 ,  
(%3.9) 1  
(%57.8) 52  
-  
-  
25 (%43.3) 39  
(%27.8)

### *List of abbreviations*

---

ECBI	Eyberg Child Behaviour Inventory
ED	Emergency Department
FEV <sub>1</sub>	Forced Expiratory Volume in 1 Second
FVC	Forced Vital Capacity
HADS	Hospital Anxiety Depression Scale
HRQOL	Health Related Quality of Life
ICS	Inhaled Corticosteroids
IgE	Immunoglobulin E
IP	Ipratropium Promide
MDI	Meter Dose in haler
MgSO <sub>4</sub>	Magnesium Sulfate
NAEPP	National Asthma Education and Prevention Program
PEFR	Peak Expiratory Flow Rate
PFA	Potentially Fatal Asthma
UK	United Kingdom
US	United States of America

---

## *List of Tables*

	<i>Page</i>
Table (1): Distribution of cases according to age	64
Table (2): Distribution of cases according to age at first presentation	69
Table(3): Triggering factors of asthma in the study group	70
Table (4): Type of asthma medication taken by children	71
Table (5): Relationship between history of atopy and the study group	73
Table 6-a: Showing father education in the study group	86
Table 6-b: Showing mother education in the study group	87
Table 7: Showing family size of the children in the study group	89
Table 8: Showing monthly income of the families in the study group	90
Table 9: Showing percent of monthly income spent on child treatment in the study group	92
Table 10: Showing guardian reaction towards the expenses of their children in the study group	93
Table 11: Showing the effect of child illness on parent relationship	94
Table 12: Showing psychological problems of siblings of children in the study group	96
Table (13): Behaviour of children in relation to gender in the study	99
Table (14): Behaviour of children in relation to different age group	100
Table (15): Showing behaviour of children relation to playing in the study group	102
Table (16): Showing behaviour of children in relation to the diagnosis of asthma in the study group	103
Table (17) Mothers HADS anxiety in relation to IS behavior	105
Table (18): Mothers HAD depression in relation to IS behavior	106
Table (19): Showing the relation between diagnosis and mother HAD anxiety	108
Table (20): Diagnosis of asthma in relation to mothers HAD depression	109

## *List of Figures*

	<i>Page</i>
Figure (1): Gender distribution of cases of childhood asthma	65
Figure (2): Distribution of cases by residence	66
Figure (3): Presenting symptoms of the study group	68
Figure (4): Diagnosis of asthma in the study group	74
Figure (5): Times of hospitalization of children with asthma in the study group	75
Figure (6): Weight distribution of the study group in percentile	77
Figure (7): Height distribution of the study group in percentile	78
Figure (8): Presenting sign of the study group	79
Figure (9): Tanner staging of the study group	80
Figure (10): The child relationship with parent and sibling in the study group	82
Figure (11): Academic performance in the study group before and after the illness	84
Figure (12): Behaviour of children in the study group	98

## *Chapter One*

# **1- INTRODUCTION AND LITERATURE REVIEW**

### **1.1 Definition of Asthma:**

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular element play a role, in particular, mast cells, oesinophils, T lymphocytes, neutrophils, and epithelial cells. In susceptible individual, this inflammation causes recurrent episodes of wheezing , breathlessness, chest tightness and cough, particularly at night and in early morning. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment. The inflammation also causes an associated increase in the existing bronchial hyper-responsiveness to a variety of stimuli<sup>(1,2)</sup>.

### **1.2 Historical Background:**

Although asthma is one of the disease longest recognized as district entity, it has moved to center stage as a public health problem only in the last 30 years.

Von Helmet compared the asthmatic attack to an epileptic and names asthma the falling sickness of the lungs.

In 1698 Sir John Floyer was the first to differentiate the condition clearly from other varieties he described two types of asthma continued, and periodic .and he was the first to appreciate the importance of the expiratory component of bronchial construction, he was also recognized the several factors underlying the asthmatic state (e.g. hereditary, whether, season etc... <sup>(3)</sup>).

In 1878 Paul Ehrlich demonstrated the eosinophilia in the WBC to be a feature of clinical pathology of asthma, in 1910 asthma classified as allergic disease <sup>(4)</sup>.

In 1950 Vitalograph came into general clinical use and provided a useful means of monitoring expiratory airway obstruction <sup>(4)</sup>.

In 1959 Peak expiratory flow meter was introduced with a lot of advantage <sup>(4)</sup>.

### **1.3 Epidemiology:**

A recent international epidemiologic study conducted in more than 50 countries in the world showed that asthma is a world wide problem, with a various prevalence among countries, even if this prevalence is higher in industrialized countries its already very high in Africa with an average of 10% in children 13-14 years. This prevalence is higher in urban than in rural areas. The asthma prevalence in Africa will increase in the

next decade, essentially because of the urbanization process taking place in Africa and the change in the life style of its population<sup>(5)</sup>.

Asthma frequently begins in childhood. Most children develop asthma before age 8 years and over half below 3 years. Before puberty asthma occur 1½ - 3 times as frequently in boys as in girls, in adolescence this difference between the sexes tends to equalize – whereas adult onset asthma appear to occur more frequently in women<sup>(6)</sup>.

In many estimates two third to three fourth of all children with asthma are allergic<sup>(6)</sup>.

The familial association among asthma, allergic rhinitis and atopic dermatitis suggest that these disorders may have a common genetic basis<sup>(6)</sup>.

About 10-15% of UK school children suffer from asthma at anytime.

The prevalence and severity are steadily increased in most of the industrialized nations in the world. Presumably as a result of environmental changes, only in some rural areas of the developing world does childhood asthma appear still to be rare, ethnic differences are largely explained by differences in environment and upbringing rather than genetics although hereditary (familial) factors in asthma are well recognized<sup>(7)</sup>.

In the United States (US) asthma morbidity and mortality are particularly high in African-American children. Asthma hospitalization

and death are more than three times higher in black versus whites Americans. A combination of biologic, environmental, economic and psychosocial risk factors is believed to increase the likelihood of severe asthma exacerbation for ethnic minority, asthmatics living in US inner city low income communities. Although asthma prevalence is slightly higher in black versus white United State children (in 1998, 16.1% vs, 13.2%, respectively), asthma prevalence is not believed to differ significantly with either ethnicity or income status.

Therefore, asthma morbidity and mortality is linked to ethnic minority and low income status whereas asthma prevalence is primarily associated with urban living<sup>(8)</sup>.

Between 1964-1980 asthma has become more prevalence in children less than 17 years of age but this does not reflect an increase in severity of asthma.

Over this same time period hospitalization rates for asthma between 1965-1983 increased by 50% in adult and by over 200% in children. Rates for black patients are 50% higher in adult and 150% greater in children. There has been a marked increase in hospitalization rates for asthma, moderate increase in death rate and smaller increase in prevalence of asthma in United State<sup>(9)</sup>.

During 1980-1996, asthma prevalence increased annual rates of persons reporting asthma episodes or attack measured during 1997-1999

were lower than the previously reported prevalence rates, whereas the rate of lifetime asthma also measured during 1997-1999 were higher than the previously reported rates. Since 1980 the proportion of children and adults with asthma who report activity limitation has remained stable. Since 1995 the rate of outpatient visits and emergency department visit for asthma increased whereas the rates of hospitalization and death decreased – blacks continue to have higher rates of asthma emergency department visit, hospitalization and death than do whites<sup>(10)</sup>.

Asthma is common and its prevalence is increasing, up to 15% of children in United Kingdom (UK) have asthma. The increase in the prevalence of asthma most probably relating to changes in the indoor environment including early exposure to air allergen and cigarette smoke, childhood infections and changes in diet. There is variability in geographical prevalence with the highest rates observed in New Zealand, Australia and the UK and the lowest in countries such as China and Malaysia<sup>(9)</sup>.

Asthma is a common problem in Sudan, its expected to increase in the future because a high proportion of the population in Sudan is young, where urbanization and industrialization are occurring resulting in an increase in air pollution, asthma affect any one yet. Its more common in children and young adults, it affects boys more than girls<sup>(5)</sup>.

## 1.4 Genetics of Asthma:

There was very strong tendency for asthmatic patient to have asthmatic children but only a small part of this appeared to be related to the familial aggregation of total serum IgE in the absence of asthmatic parent, there was a slight but significantly higher prevalence of asthma in children of whom both parent had IgE level in the highest tertile. Very high rates of children asthma depended on there being an asthmatic parent, who also had at least moderate levels of serum IgE. It was also shown that asthmatic children have considerably higher total IgE levels than would be expected on the basis of their parent IgE levels alone. The inflammation in the airways of asthmatic patients itself tends to increase the serum IgE level possibly secondary to mediators that it generates<sup>(11)</sup>.

In asthmatic children parental smoking increase symptoms and frequency of asthma attacks, the capability of environmental tobacco smoke to induce asthma may be modified by genetics, some chromosomal regions eg 5Q might harbor genes that exert their effect predominantly in combination with environmental tobacco smoke (ETS) exposure<sup>(12)</sup>.

IgE production a hallmark of asthma and atopic disease may be under genetic control. Genes of the IL4 and IL13 pathway, central for IgE regulation have been assessed in studies of single gene effect. Only the

combined analysis of genetic alteration in the IL4/IL3 pathway reveal its actual significantly to the development of atopy and childhood asthma<sup>(13)</sup>.

The familial association among asthma, allergic rhinitis and atopic dermatitis suggest that these disorders may have a common genetic basis, bronchial hyper responsiveness is an integral part of asthma and seems to have a heritable component there is a greater concordance for bronchial hyper reactivity among monozygotic than dizygotic twins, a major gene locus have identified on chromosome 5Q 31- q33 that regulate serum IgE concentrate<sup>(6)</sup>.

The presence of asthma in successive generation is more likely caused by shared genes than shared environmental risk factors, however substantial heterogeneity among families may exist. Genetic analysis especially among the families with an obvious familial component in development of asthma may enhance the chance of revealing the pathogenetic mechanism<sup>(14)</sup>.

## **1.5 Natural History:**

The natural history of asthma remains poorly defined, the condition has been described as being a syndrome rather than specific illness because of its broad and heterogeneous etiology and clinical presentation.<sup>(2)</sup> Inflammation progress throughout the airways and Parenchyma and affect the mechanics of the lung, also manifesting with airway narrowing and

airflow limitation. Asthma is not generally classified however, a process termed airway remodeling describes irreversible physiologic changes in the airways that occur secondary to observed chronic inflammatory process<sup>(15)</sup>. Estimates indicate that 28% to 78% of young children with asthma ultimately have symptoms resolution once adulthood is reached, with 6% to 19% continuing with severe forms of the disease<sup>(16)</sup>.

The long term prognosis of asthma may often be best characterized relative to the number and severity exacerbation, because these acute episodes contribute substantially to morbidity and mortality associated with the disease. A patient's atopic status (IgE related immune responses to environmental stimuli) has been stated as being the most important risk factor for predictor of a poor prognosis<sup>(17)</sup>.

Patient with asthma who are initially treated with therapy appropriate for mild asthma are rarely treated later with therapy suggesting the advent of severe disease. Patient initially dispensed medication suggesting the presence of severe asthma often see the intensity of treatment wane overtime<sup>(18)</sup>.

Asthma was classified as the cause of death in only 4% of the patients and there was no evidence of an increased risk of death among patients with a more recent diagnosis of asthma. These results provide assurance that community based patients with asthma usually have a good prognosis<sup>(19)</sup>.

The majority of infants with wheezing have transient conditions associated with diminished airway functions at birth and do not have increased risk of asthma or allergies later in life. In a substantial minority of infants however, wheezing episodes are probably related to a predisposition to asthma<sup>(20)</sup>.

For some children asthma is a disease whose symptoms seem to remit with time, numerous children however, develop disease that is persistent throughout their lifetimes and is associated with more severe symptoms, airway reactivity and loss of lung function. These children typically have a family history of asthma and demonstrate increased airway reactivity and atopy in childhood<sup>(11)</sup>.

The likelihood for children with asthma to improve and to lose symptoms altogether appear to be much greater if the asthma is mild and if the child is free from symptoms between the attacks.

Children with non allergic asthma or with wheezing episodes associated primarily with infection are more likely to out grow asthma before adulthood than children who have asthma in which allergic factors play an important role. An association with other manifestation of atopic disease also appears to relate to most severe and more persistent asthma.

The prognosis of individual asthma attack is good. A fatal outcome occurs if the treatment is inadequate or delayed.

Spontaneous remission occurs in episodic asthma in children than in chronic one. Seasonal variation occurs in both types of asthma atopic children with episodic asthma usually worse in the summer when more heavily exposed to antigens. While chronic asthmatic patients are usually worse in winter months because of the increased frequency of viral infections<sup>(9)</sup>.

## **1.6 Pathophysiology and Pathogenesis:**

The main feature of asthma are from the activities of histamine, other mediators of inflammation and cytotoxic proteins released by inflammatory cells in the mucosa, the histological features include mucous gland hypertrophy, leading to excessive production of mucous and plugging of the air way lumen.

- Inflammation causing epithelial damage scarring and persistent narrowing of the lumen.
- Mucosal oedema and impaired mucociliary clearance.
- Enlargement of bronchial smooth muscle<sup>(21)</sup>.

The respiratory system changes are initiated by an allergic reaction. The allergen stimulate the release of histamine, histamine stimulate the release of mucous, contraction of bronchial smooth muscle and dilatation of blood vessels.

The allergic reaction in asthma is preceded by sensitization phase, sensitization depends on genetic susceptibility and exposure to relevant agent. In a non sensitized individual exposure to very large quantities of an allergen does not provoke symptoms, in contrast extremely small (picogram) amount of allergen are sufficient to cause symptoms in people who have become sensitized. Measurement of allergen specific IgE in the blood and skin testing with common antigens can be used to determine whether sensitization has taken place.

The first description of pathological changes in asthma relied on post mortum examination of the lung tissue in people who had died from status asthmaticus this is characterized by occlusion of large segments of the airways with mucous, plasma protein and cell debris, the bronchial walls show oedema, a dense eosinophil infiltrate and loss of epithelium.

The mucosa in all asthmatic patients is infiltrated by inflammatory cells eosinophil, lymphocytes and to a lesser extent neutrophil together with mast cells at various stage of degranulation<sup>(21)</sup>.

Asthma is multifactorial in origin arising from interaction of both genetic and environmental factors, airway inflammation characterizing asthma occurs when genetically susceptible individual are exposed to environmental factors, but the exact process vary from patient to patients, the timing, intensity and mode of exposure to aeroallergens are important environmental factors which stimulate the production of IgE<sup>(9)</sup>.

Although the exact role of IgE in developing and maintaining the asthmatic phenotype remains unclear there is substantial evidence linking elevation of serum IgE levels with the presence of airway hyper responsiveness and/or asthma, this association persists even if no atopic strains can be demonstrated.

Although in the vast majority of asthmatic children specific IgE antibody can be demonstrated to a variety of allergen, a high circulating concentration of IgE is not always associated with asthma<sup>(6)</sup> .

Although usually associated with acute asthmatic reaction the cytokine induced IgE may play a role in maintaining the chronicity of asthma.

Recent study of Finnish medical registries revealed asthma prevalence to be higher in children with autoimmune diseases (i.e. celiac disease, rheumatoid arthritis, type 1 diabetes, these reports suggest that the immune processes underlying childhood asthma and autoimmune disease might be similar, and that the hygiene hypothesis may also be relevant to autoimmunity<sup>(22)</sup>.

## **1.7 Clinical Feature:**

Typical features of asthma comprise wheeze, breathlessness, cough and a sensation of chest tightness, these symptoms occur at the first time at

any age and may be episodic or persistent, patients with episodic asthma are usually asymptomatic between exacerbations, which occur during viral respiratory tract infections or after exposure to allergen. This pattern of asthma is commonly seen in children or young adults who are atopic – in other patients the clinical pattern is of persistent asthma with chronic wheeze and breathlessness. The variable nature of symptoms is characteristic, there is a clinical pattern with symptoms and Peak Expiratory Flow Rate (PEFR) being worse in the early morning. Symptoms such as cough and wheeze often disturb sleep and the term nocturnal asthma emphasized this, cough may be the dominant feature and so called cough variant asthma, symptoms may be provoked by exercise, in exercise induced asthma so asthma is not a uniform static disease but a broad dynamic syndrome<sup>(9)</sup>.

- **Acute severe asthma:** it's a life threatening attack of asthma, patients are usually extremely distressed using accessory muscles of respiration, are hyper inflated and tachypnoic, this accompanied by tachycardia, pulses paradoxus and sweating if very severe central cyanosis occur, airflow become so restrictive that ronchi are no longer produced, the presence of a silent chest and bradycardia in such patients is an ominous sign.

**Nocturnal asthma:**

Is defined as an exacerbation of the underlying asthma condition at night, with usual peak flow variability of at least 20%.

Its relatively common, affecting a proximately two third of asthmatics, the underlying mechanism likely involves endogenous circadian rhythms acting on the hyperactive bronchi of people with asthma, sleep seems to have a contributory role.

A chronotherapeutic approach in which corticosteroids, long acting B agonist, slow release theophylline, leukotriene modifiers and anticholinergic medication are administered at specified time during the day may enhance the response to therapy<sup>(23)</sup>.

## **1.8 Classification of Asthma Severity:**

Classification of asthma is based on severity which considers general symptoms eg (intermittent, long terms, night time symptoms and pulmonary function).

National Asthma Education and Prevention Program (NAEPP) uses the following scheme relating to stepwise therapy beginning with the mildest form and building in term of severity, step 1 mild intermittent step 2 mild persistent step 3 moderate persistent and step 4 severe persistent<sup>(2)</sup>.

Specific cases of asthma may also be described as seasonal, allergic, nocturnal or cough variant and may involve exercise induced bronchospasm<sup>(2)</sup>.

According to national heart lung blood institute, expert panel report guidelines for the diagnosis and management of asthma together with the criteria of asthma severity, the classification were:

**A- Mild asthma:**

- 1- Frequency 1-4 per year with no symptoms in between the attacks.
- 2- Good school attendance (1-2 absence/year)
- 3- Good exercise tolerance
- 4- No or little interruption of sleep
- 5- No hyper inflation
- 6- PEFr more than 80%

**B- Moderate asthma:**

- 1- Frequency 5-10 per year
- 2- Cough and wheeze between severe attacks
- 3- Schooling (5-6 day missed/year)
- 4- Diminished exercise tolerance
- 5- Sleep disturbance may occur at night
- 6- Hyper inflation of the chest occur.
- 7- Complete or partial recovery between attacks

8- PEFR between 60-80%.

**C- Severe asthma:**

1- Frequency of attacks more than 10/year

2- Recurrent hospitalization

3- Schooling missed more than 7 days/year

4- Sleep disturbance wakes more than 7 nights per month.

5- Poor exercise tolerance

6- Chest deformities

7- More severe disturbance of lung function

8- PEFR less than 60%

## **1.9 Triggering Factor of Asthma**

Recurrent exacerbations are a major cause of morbidity and medical expenditure in patient with asthma. Various endogenous and exogenous factors are thought to influence the level of asthma control, factors significantly associated with frequent exacerbation include<sup>(24)</sup>:

1- Severe nasal sinus disease.

2- Recurrent respiratory infections

3- Gastro-oesophageal reflux

4- Psychological dysfunction

5- Obstructive sleep apnoea

- 6- Exposure to allergen
- 7- Drugs
- 8- Immunoglobulin deficiency
- 9- Hypothyroidism
- 10- Hormonal influences
- 11- Poor inhaler technique<sup>(24)</sup>

### **1.10 Diagnosis of Asthma:**

Although patient with asthma may present in a variety of ways most have certain common historical features and asthma often can be diagnosed on the basis of history alone. Expiratory airway obstruction usually is manifested by wheezing a musical high pitched, whistling sound produced by airflow turbulence in the large airways below the thoracic inlet, asthma can occur without wheezing if the obstruction involves small airways predominantly. Occasionally coughing may be the only symptom and it also frequently accompanies wheezing.

Symptoms are severe at night or early morning. Infant and young children have history of recurrent bronchiolitis or pneumonia: persistent coughing with cold. Recurrent croup or just chronic chest rattles. Older children complain of tight chest with cold, recurrent chest congestion

,persistent coughing or wheezing, improved with bronchodilator suggest the diagnose but failure of response doesn't rule out asthma<sup>(6)</sup>.

In asthma there is usually a marked diurnal variation in PEFR the lowest values being recorded in the morning (morning dipping).

Pulmonary function test: measurement of the FEV<sub>1</sub>/FVC ratio or PEFR provides a fairly reliable indication of the degree of airflow obstruction.

Radiological examination: in acute attack the lungs appear hyperinflated, between episodes the chest radiograph is usually normal. In long standing chronic cases a lateral view may demonstrate a pigeon chest deformity.

Arterial blood gas :- measurement of the arterial blood gas (Pa O<sub>2</sub> and Pa CO<sub>2</sub>) are indispensable in the management of patient with acute severe asthma<sup>(9)</sup>.

There is other advanced tests which have no place in routine practice in Sudan due to their cost and complexity, these include broncho provocation test, allergy skin tests, measurement of IgE and peripheral blood eosinophil count.

## 1.11 Mortality in Asthma:

Despite the relatively high prevalence of asthma, mortality rates are extremely low approximately 5000 people (adult and children) die of asthma in the United States each year.

The major causes of death are failure of the physician, parent or patient to appreciate the severity of asthma which result in adequate or delayed treatment, poor access to health care and the use of inappropriate medications, such as over reliance on B adrenergic agonists and avoidance of corticosteroids<sup>(25)</sup>.

History of sudden severe exacerbation, the use, or recent withdrawal of systemic corticosteroids and excessive use of inhaled  $\alpha_2$  agonists have identified as major risk factor for severe exacerbation or asthma related death<sup>(26)</sup>.

There are risk factors for intubation in asthma like:

- Psychological and psychosocial problems
- Family dysfunction
- Low socioeconomic status
- Little formal education
- Unemployment
- Active tobacco smoking and/or second hand smoke exposure.

- Perinatal history of allergy or asthma.
- Emergency room visit in past year.
- Prior asthma hospitalization in past year
- Steroid dependence.

These risk parameters may be in patients of base line risk for asthma deaths and their recognition may have a significant impact on prevalence measures<sup>(27)</sup>.

In spite of available pharmacologic therapy that control even severe cases of asthma the mortality rate continue to rise patient with potentially fatal asthma (PFA) must be identified and treated, such management not result in control of patient with PFA when the patient is not compliant with the medical regimen. There are some psychologic abnormalities in patients with PFA, such as adolescent non compliance, prednisone phobia or bipolar affective disorders. These respond to medical and psychiatric management.

Diseases that occur in patient with PFA such as antisocial personality disorder or schizophrenia may have a poor prognosis even with medical and psychiatric management<sup>(28)</sup>.

Those who had fatal asthma exacerbation were usually white males, between the ages of 10 and 20 years, with mild intermittent or persistent asthma by history.

Fatal asthma exacerbation occurred in both competitive and recreational attacks and could be precipitated by a sporting activity<sup>(29)</sup>.

### **1.12 Management of Asthma:**

The aims of management are to prevent death, to restore normal pulmonary function to the patients best as quickly as possible, to maintain optimal pulmonary function and to prevent early relapse<sup>(9)</sup>.

Over the last 20 years the treatment of asthma has changed from a trial and error approach to one that is evidence based.

Its possible that the application of genetics and biomarkers of airway inflammation might be useful in guiding management strategies<sup>(29)</sup>.

- B<sub>2</sub> adrenergic agonists are the most effective known bronchodilators, and have been the first line treatment of acute child hood asthma.
- Anticholenergics

Recent data shown that the addition of Ipratropium Bromide(IB) to B agonist improve outcomes in Acute Pediatric asthma IB is available as a

meter dose inhaler( MDI)s ,(18 µg per puff) and as solution (200 µg/ml) in unit dose vials of (500 µg).

- Corticosteroids

There is little evidence that inhaled corticosteroid(ICS) are effective in the treatment of pediatric acute asthma regardless of severity and treating asthma exacerbations. ICS may be effective in treating mild asthma symptoms in children at home, systemic Cs should be used in moderate to severe exacerbations.

- Leukotriene receptor antagonist

- To date no published studies have examined the efficacy of leukotriene receptor antagonists in acute childhood asthma.

- Magnesium sulfate:

Mgso<sub>4</sub> has been shown to inhibit smooth muscle contraction, decrease histamine release from mast cells, and in triple acetylcholine release from cholinergic nerve endings, normal serum levels range from 1.5 – 2.2 mg/dL, at 4-6 mg/dL it stimulate bronchodilation, and levels of 12-15 mg/dL are associated with respiratory failure, cardiac arrhythmia and death.

- Methylxanthine:- A bronchodilator first used in 1937.

Routine use of theophylline is no longer advocated, although it has been shown to have adjunctive benefit in select patients with impending respiratory failure.

- Oxygen and helium: – oxygen mixtures heliox are available in concentration of 80% helium 20% oxygen and 70% helium 30% O<sub>2</sub> ,heliox mixture have a low density compare with air 80/20 is approximately third the density of air ,it's a temporary measure to reduce respiratory resistance work and forestall muscle fatigue until airways obstruction improve with conventional therapy.

Heliox may also be effective as the diving gas for nebulised bronchodilator. The low density of helium improves the deposition of aerosolized particle in the airways which can lead to a more rapid response to treatment and significant improvement in airway function.

- Non invasive mechanical ventilation.
- This type of ventilation allow for correction of gas exchange abnormalities with lower inspiratory pressure (< 25 cm H<sub>2</sub>O) than invasive ventilation, continuous positive airway pressure has been reported to have a bronchodilator effect in asthma ,to relieve fatigued inspiratory muscles and to improves gas exchange in the emergency department(ED), the addition of bi-level positive airway pressure to conventional treatment albuterol, Ipratropium and corticosteroids can improve lung function and asthma symptoms significantly and reduce the need for hospitalization<sup>(30)</sup>.

## **1.13 Children and Chronic Conditions:**

Chronic health conditions are defined as a health problem that last over 3 month, affect child normal activities and requires lots of hospitalization and/or home health care and/or extensive medical care<sup>(31)</sup>.

Chronic illness differs from acute physical conditions in several important respects. A chronic illness is usually treatable but not curable. The daily burden of care is high and is extremely distressing to the relatives. Parent with children who have long term illnesses are under greater strain than other families<sup>(32)</sup>.

### **1.13.1 How common are chronic conditions?.**

About 15-18% of children will have chronic health condition<sup>(33)</sup>.

Although estimates of the size of this population vary greatly (because of the wide spectrum of sensitivity of various conditions).

Data from the 1994-1995 National Health Interview survey indicate that 15-18% have some form of chronic conditions ,developmental disabilities, disorder of learning, primary mental health conditions. Adding speech defects, visual and hearing impairment, repeated ear infections, Skin allergies and other common condition raises the prevalence to over 30%<sup>(8)</sup>.

### **1.13.2 Impact of chronic illnesses on children:**

Self-esteem, school functioning and sport participation are among the most significant psychosocial issues that affect children and adolescents with chronic illness. Although these capacities are essential components of development for the children, they present special concern for children with limitation of health. Parent, teacher and coaches play important roles in providing normalizing and gratifying opportunities for children who struggle to be competent and accepted by their peers<sup>(34)</sup>.

Much can be done to provide chronically ill children with experience and support that will allow them to grow up happier, feel better about themselves, and enjoy more success<sup>(34)</sup>.

For the past eight years the Rochester child health group has systematically investigated chronic illnesses in childhood, with the goal of minimizing the psychosocial sequelae of chronic illnesses through more optimal management, this overview examines the impact of chronic illness on 404 children and their families in five separate studies<sup>(35)</sup>:

209 children in a follow up of all children with chronic symptoms in a previous random sampling of children; 42 children with juvenile arthritis; 44 children with nephrotic syndrome; 54 asthmatic children; 55 chronic ill children live in rural area of western New York.

Information was obtained through parental interview, school reports, psychosocial testing of the child. The percentage of parent reporting impact of the child illness in the family differed according to

study population. The percentage reporting area of impact according to severity of the illness is as follows: worry 75-97; financial burden 46-60, fatigue of parent 31-65, change in a sleep arrangement 17-31, change in furnishing 15-40; less social life for parents 12-35 restriction on travel 13-40; parental friction 9-20; sibling neglect 10-120; sibling resentment 10-25; embarrassment 12-20; interference from relatives 5-17. over half the parent felt their child future education, job changes, and social life would be affected. One third reported activity limitation. Compared to a control group of children a significantly greater percentage of parent of the chronically ill, reported teacher concern about their child's effort and behaviour and showed concern about the child having too few friends<sup>(35)</sup>.

Children can react in different ways to stressful experiences depending on their developmental stages .the problems are:

- Behavioural problem (aggressive angry withdrawn poor sleeping and eating pattern).
- Illness and treatment related problem due to frequent doctor and hospital visits.
- Psychological problem (sadness, fear of separation, feeling hopeless and powerless.
- Relationship problems (peer problems because can not join in or being teased).

- School and educational difficulties (poor learning, multiple absences)<sup>(36)</sup>.

### **1.13.3 Children adjustment according to their different development stage:**

*Infant and toddler:* have little of understanding of their illness so they experience pain restriction of motion and separation from parents as challenges to developing trust and seemingly Parent can help by staying with their children during hospitalization and holding them smoothly.

*Preschool children:* They may understand what it means to get sick but they don't understand the cause, effect and nature of the illness ,parent help by being firm with things the child does not have a choice over.

*Early school age children* believe that they cause the illness by thinking bad thoughts or by hitting their mothers. Parent can help by reassurance and by allowing children to help in management of their own illness.

*Older school aged children* Are more capable of understanding their illness and treatment, but they shouldn't be expected to react as adult do. To the extent allowed by the child doctor, parent should help the child to participate in the school or other activities

Adolescent begin to develop their own identity separate from their families. Many teens will go times of denial of their illness, when they may

neglect to take medication or follow special diets. It's important to help them to gain control of their disease management<sup>(31)</sup>.

#### **1.13.4 Impact of child chronic illness on families:**

The diagnosis of chronic illness result in an overwhelming number of intense emotions, shock, confusion and numbness-denial – anger and anxiety, guilt, self blame, fear and helplessness, depression, resentment and rejection are a few examples<sup>(37)</sup>.

Whenever a chronic disease is diagnosed, family members typically go through grieving processes similar to those seen at the time of death, including anger, denial, negotiation in an attempt to forestall the inevitable and depression. However because the child with the chronic disease is a constant reminder of the object of this grief, it may take family member along time to accept the condition. Understanding and support on the part of the physician can facilitate this process by sharing both the known and unknown and by allaying guilty feeling and fear. In order to minimize denial, its helpful to confirm the families observation about the child. Once the diagnosis has been presented, the family may not be able to absorb any further information, so written material and the option for further discussion at a later date should be offered<sup>(38)</sup>.

Children with long term illnesses are at risk of developing problems in psychological adjustment and in functioning in activities of daily life. Their families face increased risk of marital and economic dysfunction and

siblings too face special tasks in living with a chronically ill child. A variety of interventions can help children and their families to cope. Pediatrician should be alert to effects on the family, children respond to family stress in very predictable way<sup>(39)</sup>.

Understanding the impact of chronic childhood illness on families is a difficult task. Parents have reasons for obscuring the impact and particularly their distress, from the view of their pediatrician.

Physicians are often uncertain how much understanding they ought to offer. Careful attention to the parent pediatrician relationship is essential to a thorough understanding of the impact of childhood illness on the family<sup>(40)</sup>.

## **1.14 Parameters in the Assessment of the Burden of Asthma**

### **1.14.1 The burden on the Patient:**

A number of different parameters may be used to assess the impact of asthma on those who have it as follows:

- Number of asthma symptom days
- Number of night time awaking
- Number of asthma attacks
- Number of emergency department visit and urgent physician visits.

- Number of hospitalization
- Use of quick relief medicines/rescue medication.
- Number of oral prednisolone courses.
- Number of prescription
- Number of missed days from school.
- Effect on life style activity and exercise.
- Consequences of professional career.
- Direct expenditure for medical care and medical cost.
- Indirect cost arising from morbidity and mortality.
- Side effects of asthma medications such as candidiasis and esophageal reflux.
- Epidemiological means of asthma such as prevalence rates and mortality figures <sup>(41)</sup>.

**1.14.2 Parameter in the assessment of burden of asthma on the family:**

- Missed work of adult caretaker – due to the child’s asthma.
- Effect on quality of life of sibling, parent and care taker.
- Effect on life style and activity of sibling parent and caretakers.
- Consequences on professional career of parent and/or care taker.

- Direct expenditure for medical care and medical cost.
- Indirect cost arising from morbidity and mortality including the value of time lost from work by parent/care taker<sup>(41)</sup>.

### **1.15 Psychological Effects of Asthma on Children:**

Asthma is a chronic respiratory disorder characterized by recurrent episodes of impaired breathing, the disease causes psychological problems due to hospitalization, long term medication use and restricted social life. Both asthmatic children and their mothers are negatively affected by the disease<sup>(42)</sup>.

Studies of families of asthmatic children indicate association between psychological factors and asthma symptoms. Children at 3 years age with symptoms suggestive of asthma are at elevated risk of behavioural problems<sup>(43)</sup>. Children from families without a history of asthma and allergic diseases may be particularly vulnerable to behavioural disturbance. Families may benefit from additional advice on management of their child's behaviour particularly if parent do not have the experience of having the illness themselves<sup>(43)</sup>.

Meta analytic study reviewed the behavioural adjustment of children and adolescent with asthma, results indicate that children with asthma have more behavioural difficulty than do healthy children and the

finding suggest that patients with asthma particularly children with severe asthma should be considered at higher risk for behavioural difficulties that may necessitate psychosocial intervention<sup>(44)</sup>.

Swadi H in United Arab emirate (UAE) did a survey in stratified community sample of school children (6-13) years using a rutter questionnaire (teacher and parent version). Comparisons were made between children with asthma and control matched per age, sex and school. About 16 percent of children with asthma were simultaneously reported by parent and teacher to show significant psychopathology. Rate of disturbance is significantly higher in asthmatic than in the control group<sup>(45)</sup>.

Reichenberg K, Broberg AG studied the emotional and behavioural problem in Swedish 7-9 years old with asthma 59 children 34 boys and 25 girls with (mild n = 11) moderate (n = 38) severe (n = 10) a normalities sample of 306 children in the same age range 150 boys and 156 girls are used as a comparison group – children with parent reported exercise induced asthma symptoms were attributed more problems than asthmatic children without such symptoms ,its Concluded that asthma in preadolescent children is associated with emotional and behavioral problems, special attention should be paid to children reported to have exercise induced symptoms<sup>(46)</sup>.

Goodwin RD, et al studied the prevalence of probable mental disorder among pediatric asthma patients age 5-11 years in the waiting room of an inner city clinic ,he found one in four meet The criteria for a probable diagnosis of current anxiety disorder or depression – separation anxiety among 8.1%, panic among 14.9%, generalized anxiety disorder among 4.1%,a gographia among 5.4% ,and 2.7% had depression .Having more than one anxiety disorder or depression diagnosis was associated with higher level of inpatient and outpatient medical services<sup>(47)</sup>.

Its well documented that individual with asthma tends to experience reduced health related quality of life (HRQOL) and although HRQOL tend to be lower for individual with severe asthma the effect on these with mild asthma can also be considerable. Asthma of any severity may lead to reduction in each of the physical, psychological and social domains of HRQOL, with most people with asthma, reporting some restriction on their life, and having poorer health status than individual without asthma

A large population based study by Ford et al demonstrated that individual with asthma had significantly lower HRQOL than those who had never had asthma and also experienced an average of 10 day per month of impaired physical or mental health, almost double that of those who had never had asthma<sup>(48)</sup>.

Investigation of the prevalence of depression in asthma has reported findings ranging from 1-45% of individual with asthma also suffering from depression or depressive symptoms. Unfortunately this wide variation in the reported rates makes it difficult to draw conclusion but most author suggest an increased prevalence of depression in patient with asthma<sup>(48)</sup>.

Erhaber GE, et al studied the psychosocial impact among a sample of south western Nigerian 50 asthmatic with 48 Nigerian control groups with similar socio demographic background. A high prevalence of psychiatric disorder 80% were found in the asthmatic group while only 27% in the control group has psychopathology<sup>(49)</sup>.

## **1.16 Psychosocial and Financial burden of Asthma on the Patient and Family:**

Bronchial asthma as a chronic disease is best cared for by practitioners and clinician in an environment of therapeutic partnership with patient and families<sup>(41)</sup>.

The cost of therapy is a general concern for the majority of patients. The capacity to afford medication is a determining factor of treatment choices, socioeconomic aspect therefore will influence the ways of managing financial costs, such as not buying the medication or

lowering/altering the dose in order to prolong medication use, for parent and care takers the necessity to take time off work travel, waiting times and the anticipated benefit are other aspect of costs and will influence the decision to visit a doctor. These influence might become even more important in countries with difficult employment status ,because of impending fear of losing the job or loss of income<sup>(50)</sup>.

Bronchial asthma adversely impact on patient health related quality of life, the genetic components in question are symptoms, physiological function, psychological states, perception of current health (as state of complete physical, mental, psycho emotional and social well being – not only the absence of disease) expectation of future health, satisfaction as a whole, pleasure, school work, productivity, social functioning , economic well being, capacity to cope with adversity<sup>(50)</sup>.

Living with asthma has a substantial impact up on child and adult life style, both feel tired and frustrated by their emotion of fear and panic associated with recurrent experiences of asthma attack. The potential impact of an asthma attack often influence decision about holiday destinations, sporting activities, playing at school or with animals, socializing with friends and participating in school camps. An emotional burden especially during adolescence arises from the role change from waiting to be independent of help when being well to needing support from family and friends during an attack. This caring role by family

member and friends might result in their absence from school, work or social activities, leading to even more stress for them than for the asthmatics themselves, thus, psychosocial aspects have an integral role in the morbidity of asthma related quality of life – an important impact on daily life of the patient, sibling and parents<sup>(51)</sup>.

### **1.17 Parameters in the Assessment of the Burden on Society:**

Health care costs arising from asthma may be the major burden on society. Socioeconomic factors are integral to asthma care, however, they do not only affect society but also the patients and their family. There are other important factors ,such as the patient absence or his or her physical or psychological limitation, which not only have a major impact on the patient and/or their family but also on group dynamics in school activities and extracurricular activities and hence on society. There for there is some overlap of parameters in the assessment of the burden on society with those parameter in the assessment of the burden on the patient and/or their family

- Cost(direct & indirect expenditure)
- Absence from school as an impairment of long term educational achievement

- Loss of learning time
- Disruption of class work
- Consequences on professional career of family members
- Impaired socializing opportunities.
- Missed recreation opportunities<sup>(51)</sup>.

### **1.18 The Cost Burden on Society:**

The economic appraisal of asthma care and therefore the costs of therapy have grown over the last few years <sup>(52)</sup>. Asthma related costs include direct expenditures for medical care. (Hospitalization out patient services, physician services and office visits) and medical cost (medication for asthma and asthma related problems such as gastro-oesophageal reflux and oral candidiasis) indirect cost mainly include opportunity ,cost and arise from morbidity and mortality. Indirect cost also includes the economical value of time off work by parent and care takers of children suffering from asthma and the loss of school days. Indirect costs are an indicator of asthma impact on individuals and families, reflecting their functioning and quality of life in the presence of the disease<sup>(53)</sup>.

### **1.19 Psychological Reaction to Stressful Condition and Illness:**

Reaction to stressful conditions classified into:

- Acute reaction which are brief and immediate, to sudden intensive stress.
- Post traumatic stress disorder.
- Adjustment disorder.

### **1.19.1 Acute reaction:**

When a person faces stressful event the normal reaction is an emotional response coupled with a coping strategy or defense mechanism, which serve to limit the intensity of the emotional response.

The normal emotion of response to threatening event is anxiety and to loss is depression. The most frequent coping strategy and defensive mechanism is to reduce the effect of stress, emotion so that normal performance can be maintained<sup>(54)</sup>.

#### ***Coping strategies:***

Coping is the cognitive and behavioural efforts to manage specific external and/or internal demands appraised as taxing or exceeding the resources. Of the individual a distinction that is often made in coping literature is between active and avoidant coping strategies – active coping strategies are either behavioural or psychological responses designed to change the nature of the stressor itself, or how one think about it. Whereas avoidant coping strategies lead people into activities or mental states that keep them from directly addressing stressful events. Fathers

most commonly coped by emotional withdrawal whereas mothers coped through emotional release<sup>(55)</sup>.

### **Treatment of acute reaction**

#### *Treatment aims*

- Reducing emotions by sympathetic sighting and in severe cases by short term anxiolytics.
  - First group: includes symptoms of persistent anxiety, irritability, insomnia's, poor concentration, panic or aggression.
  - Second group: include avoidance and denial, difficulty recalling events at will, intensive imaging of events (Flashback" and recurrent distressing dreams.
  - Third group: these experience the following reactions: detachment inability to feel numbness and diminished interest in activation.
  - Management:-
  - The patient needs opportunity to recall stressful experience and express associated emotions to an understanding and reassuring person.
  - Anxiolytic drug treatment should be carried out early<sup>(56)</sup>.

### **1.19.2 Adjustment disorder:**

Adjustment disorders are characterized by the development of emotional or behavioural symptoms in the context of one or more identified stressor.

The resultant symptomatology is seemed to be clinically significant by virtue of either impairment in social occupational or educational function, or the subjective experience of distress in excess of what would normally be expected for the given stressor<sup>(57)</sup>.

***Clinical picture:***

Symptoms are similar to acute reaction but an adjustment disorder start gradually and last longer, these symptoms are anxiety worry, poor concentration, depression and irritability and physical symptoms of autonomic arousal such as palpitation and tremor.

The diagnosis of adjustment disorder is reached when symptoms are not severe enough to meet the diagnostic criteria of anxiety or depression.

- Treatment of adjustment disorder :-
- Discuss the problem to reduce anxiety
- Relieve anxiety by expression of feeling.
- Anxiolytic drugs.
- Provide problem solving or crises intervention<sup>(58)</sup>.

## **1.20 Anxiety:**

The sensation of anxiety is commonly experienced by virtually all humans. The feeling is characterized by a diffuse unpleasant vague sense of apprehension. Often accompanied by autonomic symptoms such as headache, perspiration, palpitation, tightness in the chest and mild stomach discomfort an anxious person may also feel restless, as indicated by inability to sit or stand still for long. The particular constellation of symptoms present during anxiety tends to vary among people.

### ***Fear and anxiety:***

Fear is a response to threat that is known external, definite, or non conflictual in origin.

Anxiety is a response to a threat that is unknown, internal, vague or conflictual in origin<sup>(59)</sup>.

### **Epidemiology:**

Woman tends to have a high life time prevalence of anxiety disorder (30-50%) than man (19-20). The prevalence of anxiety disorders decrease with higher socioeconomic status<sup>(60)</sup>.

### **Adaptive function of anxiety**

Anxiety worn of an external or internal threat, it has life saving qualities. At a lower level anxiety worn of threat of bodily damage pain,

helplessness, possible punishment or the frustration of social or bodily needs of separation of loved ones. It promotes the person to take the necessary steps to prevent the threat or lessens its consequence. Thus anxiety prevents damage by alerting the person to carry out certain acts that forestall the anger<sup>(59)</sup>.

- Psychological and cognitive symptoms :-The experiences of anxiety has two components:
  - Physiological sensation such as palpitation and sweating
  - The awareness of being nervous or frightened<sup>(59)</sup>.
  - Pathological anxiety:-

Anxiety disorders are classified into:

- Generalized anxiety disorders:- with persisting symptoms that vary a little from one to another.
- Phobic disorder:- Present with episodic symptoms associated with defined anastomosis.
- Panic disorders: – present with episodic symptoms not associated with defined circumstances.

\* **Treatment:**

Psychological treatment:

- Supportive social measures to deal with social problems causing the disorder.

- Behavioural treatment – relaxation treatment to reduce the disorder.
- Reduce hyperventilation by breathing in a bag.
- Cognitive therapy by special training.

**Drug treatment:**

- Long acting benzo diazepines
- Beta adrenergic drugs
- Tricyclic anti depressant
- Monoamino oxidase inhibitors<sup>(61)</sup>.

**1.21 Depression:**

Depression is common and may be mild, moderate or severe clinically significant depression is often referred to a major depression disorder, depression is a major cause of disability and suicide.

It can be both a complication of a medical condition and a cause for medically unexplained symptoms.

It has somatic as well as psychological symptoms ,so difficult to distinguish from medical condition.

**Epidemiology:**

Depression is approximately as common in women as in men and the incidence increases with age in both sexes, twin studies indicate that the liability to major depression in adult woman is largely genetic in origin.

Negative life events cause precipitate and contribute to depression but genetic factors influence the sensitivity of individuals to these stressful events, in most cases both biologic and psychosocial factors are involved in the precipitation of depression episode. The most potent stressor appears to involve death of a relative, assault or severe marital or relationship problems<sup>(62)</sup>.

Classification of depression: based on etiology.

- 1- Reactive: symptoms in response to external stressor.
  - 2- Endogenous: symptoms caused by a tractor within an individual person and one independent on an external stressor.
- Clinical feature of reactive depression include
    - Anxiety
    - Irritability
    - Phobias
  - Clinical feature of endogenous depression:
    - Loss of appetite and weight
    - Constipation

- Reduced libido
- Early waking.
- Mild depression:-
- Symptoms include:- low mood, lack of energy, poor sleep.
- Severe depression:- symptoms and signs are sad appearance, psychomotor retardation, low mood, anxiety, irritability, agitation, lack of energy and interest.
- **Biological symptoms:**  
 Early awakening, worse mood in the morning, loss of weight, amenorrhea, reduced sexual desire
  - Depressive thinking.
  - Guilty Thought, helplessness, suicidal tendencies, self blame poor memory and concentration.

**Treatment:**

- Tricyclic antidepressant
- Mono amine oxidase inhibitors.
- Lithium
- Sodium valproate

**Psychotherapy:**

- Supportive psychotherapy
- Inter personal therapy
- Cognitive therapy<sup>(63)</sup>.

## ▪ **JUSTIFICATION**

- 1- Asthma is a common health problem affecting children world wide.
- 2- Childhood asthma has significant impact on child daily activity schooling family life and finance.
- 3- No similar study was conducted among Sudanese children before.

## ▪ **OBJECTIVES**

- 1- To study the psychological effect of asthma on the child and the parents.
- 2- To assess the social impact of asthma on the affected children and their parents.
- 3- To evaluate the financial burden of the disease on the family.

## *Chapter Two*

### **MATERIALS AND METHODS**

#### **2.1 Nature of the Study:**

This is a descriptive cross sectional hospital based study.

#### **2.2 Study Area:**

The study was conducted in hospitals in Khartoum State including Khartoum children Emergency Hospital, Ahmed Gasim Hospital, Omdurman children Emergency Hospital.

#### **2.3 Duration of the Study:**

The study was conducted from Jan –June 2006.

#### **2.4 Study Population:**

All children diagnosed as having Asthma aged 6-16 years and their mothers (or care taker).

#### **2.5 Sample Size and Sampling Technique:**

According to the equation

$$N = \frac{Z^2 PQ}{d^2}$$

$$\begin{array}{l} N = \text{Sample size} = 77 \\ Z = \text{Statistical certainty} = 1.96 \end{array}$$

$$P = \text{Prevalence} = 5\%$$

Q = Probability of failure at 95%

D = Designed margin of error = 0.05

## **2.6 Inclusion Criteria:**

All children diagnosed as having asthma (for > 6 month) age(6 – 16) years and their mothers (or care taker).

## **2.7 Exclusion Criteria:**

1: Children with chronic lung or heart disease,

2: Children having mental retardation,

3: Non consenting mother or care taker.

## **2.8 Consent and Ethical consideration:**

Parent or accompanying care takers of children in the study were informed briefly about the aim and methods of the study and verbal consent was obtained from them all – also verbal consent was obtained from the consultant of the units and the treating doctors. Information secrecy was preserved – children with behavioral problems were referred to psychiatric assessment.

## **2.9 Study Technique:**

Each patient and his mother seen in one of the hospitals mentioned above were interviewed. Each patient was seen for medical evaluation

and psychiatric evaluation for the child and the guardian using a standardized questionnaire.

## **2.10 Study Team:**

The author, and the statistician.

## **2.11 Questionnaires:**

Three questionnaires were conducted for all guardian and patients. It is standardized questionnaire designed by psychologist attended by the author who was trained to design and fill this type of questionnaire which included the following.

### **2.11.1 Designed clinical and social questionnaire:**

including

- Personal data
- The duration of asthma
- Frequency of attacks of asthma, atopy, precipitating factors,
- Family history of asthma.
- Schooling, presence of school health services
- Nutritional history
- Social background and parent education and occupation
- Social and financial impact of the disease

- Drugs used ( salbutamol inhaler , steroid inhaler and other drugs-
- Vaccination.

### **2.11.2 Behavioral assessment:**

The behavioral assessment of children in the study was done using the Eyberg Child Behavior Inventory (ECBI) <sup>(64)</sup> which is a parent rating scale, widely used to measure the frequency and severity of disruptive behavioral problems in children 2-16 years as well as extent to which parents find the behavior troublesome.

It consist of 36 short statements of common behavioral problems, it has two scores, an intensity score (IS) and a problem score (PS) ,at the intensity score; the parent indicates on a 7 point scale how often each behavior occurs , 1(never)2 and 3(seldom), 4 (sometimes) 5 and 6 (often) and 7 always, the parent also indicates if the occurrence of the specific behavior is currently a problem by circulating yes or no for each behavior the summation of intensity score represent the total frequency of occurrence of the 36 behaviors, possibly ranging from( 36-252) the summation of the problem score represents the total number of the (36) behaviors, that are indicated to be problems, possible range from 0 to 36.

The cut off are 132 on the intensity scale and 15 on the problem scale, according to the results of the ECB1, patients in the study were categorized into 3 groups. Those with normal behavior whose (IS) and (PS) are below the cut off point, and those with behavioral problem in

whom the (IS) and (PS) are exceeding the cutoff point. The third group is patients with behavioral problems with high parental tolerance in whom the (IS) exceeds the cut off point but the (PS) doesn't, in this group the child is having disruptive behavior but the parent don't consider it as a problem because they are very tolerant<sup>(65)</sup>. Eyberg child behavior inventory has been found to have strong sensitivity and specificity in detecting behavioral problems<sup>(64)</sup>.

### **2.11.3 Hospital Anxiety Depression Scale (HADS):**

This structured questionnaire was conducted with the guardians of the patients so as to study the psychological impact of the disease. It is a fourteen item self rating scale seven concerned with anxiety and seven with depression it's designed specially for use in non psychiatric hospital departments the items on the scale are all concerned with the psychological symptoms of neurosis, this makes the scale suitable for use in patient with concurrent illness with a cut off point. The (HAD) depression scale had a specificity of 94% and sensitivity of 67% for identifying clinical cases.

The (HAD) anxiety scale had a specificity of 76% and sensitivity of 87%. (HADS) seems to be the best instrument available for simple evaluation for psychological interventions in patient with physical illness.

The (HADS) scale is valid for the use as screening instrument in non psychiatric units and although initially have been developed for use in

hospital setting, it can be usefully employed in community settings of countries to screen for mental morbidity.

The questionnaire was read loudly, and explained for illiterate guardians participating in the study.

The test scores were as follows for both anxiety and depression 0-3 considered as normal, while 4-7 as moderate and 8 and above scores for severe anxiety and depression<sup>(65)</sup>.

## **2.12 Weigh & height measurements (were done using the seca scale):**

### **2.12.1 Weight:**

The child was weighted with light dresses and without shoes – the weight was measured in kilo grams and the reading taken to the nearest 0.1 kg. the weights were plotted on the cent chart <sup>(66)</sup>.

### **2.12.2 Height**

This was measured with the child standing straight the head straight and facing horizontally with the hand hanging by side and lower limb straight with the feet put together and without shoes. Measured in centimeters and the reading taken to the nearest 0.1 cm. The height was plotted on the centile chart<sup>(66)</sup>.

### **2.12.3 Peak Expiratory Flow Rate (PEFR):**

This was measured using the mini right peak flow meter (Clement Clarke international Ltd. London, England) in (ml/minute) peak expiratory flow rate in the fastest rate at which air can move through airways during a forced expiration started from fully Inflated lung the PEFR was taken with the child standing up and holding the peak flow meter horizontally. The child was told to take a deep breath, seal his/her lips round the mouth piece and then blow out as fast as hard as possible<sup>67</sup>.

After the child was familiar with the procedure and has successfully performed an example; he/she can blow out the peak flow meter three times. The best of the three reading was recorded for each child<sup>(67,68)</sup>.

The value of PEFR were expressed as percentage of the predicted value based on normal values of Sudanese children's PEFR determined by Dr. mabrouks study 1993 by the equation  $y=a+bx$  where :

y : represent the dependent variable

x : represent the standing height

a : is the intercept at the origin with limits identical to the variable

b : is the slope with units equal to those of the variable

(the mathematical work was done by the author)

### **2.12.4 Tanner stage:**

Determined by the appearance of first sign of puberty:

Breast bud in females and testicular volume more than four ml in males

- Prepubertal
- Pubertal<sup>(66)</sup>

**Definitions: A-Mild asthma:**

- 1- Frequency 1-4 per year with no symptoms in between the attacks.
- 2- Good school attendance (1-2 absence/year)
- 3- Good exercise tolerance
- 4- No or little interruption of sleep
- 5- No hyper inflation
- 6- PEFr more than 80%

**B- Moderate asthma:**

- 1- Frequency 5-10 per year
- 2- Cough and wheeze between severe attacks
- 3- Schooling (5-6 day missed/year)
- 4- Diminished exercise tolerance
- 5- Sleep disturbance may occur at night
- 6- Hyper inflation of the chest occur.
- 7- Complete or partial recovery between attacks

8- PEFR between 60-80%.

**C- Severe asthma:**

1- Frequency of attacks more than 10/year

2- Recurrent hospitalization

3- Schooling missed more than 7 days/year

4- Sleep disturbance wakes more than 7 nights per month.

5- Poor exercise tolerance

6- Chest deformities

7- More severe disturbance of lung function

8- PEFR less than 60%

**2.14 Statistical analysis:**

The data obtained was coded and entered into a computer and a master sheet was constructed to arrange the row data, tables were then drawn and chi square test ( $X^2$ ) was used to test for significant differences between the variables using the statistical package for social science (SPSS) a P value of 0.05 or less is considered significant.

## *Chapter Three*

### **3- RESULTS**

#### **3.1 Demographic Characteristic of Children in the Study**

##### **Group:**

A total of 90 asthmatic children age 6-16 years were studied.

There were 52, 20 and 18 cases from Khartoum pediatrics emergency hospital, Omdurman pediatrics emergency hospital(OPEH) and Ahmed Gasim Hospital, respectively

##### **3.1.1 Distribution according to age:**

Children 6 - < 12 years old were 70%

12 – 16 years old were 30%. *(Table 1)*

##### **3.1.2 Sex distribution of cases of childhood asthma:**

The males were 51 (56.7%) and the females were 39 (43.3%). *(Figure 1).*

##### **3.1.3 Distribution of cases by residence:**

Residence included Khartoum 52, Omdurman 20, Khartoum north 18. *(Figure 2)*

**Table (1): Distribution of cases according to age**  
**n = 90**

<b>Age in years</b>	<b>No</b>	<b>Percentage</b> <b>(%)</b>
6 - < 9	34	37.8
9 - < 12	29	32.2
12 - 16	27	30
<b>Total</b>	<b>90</b>	<b>100</b>

Figure (1): Gender distribution of cases of childhood asthma in the study group ( n = 90)

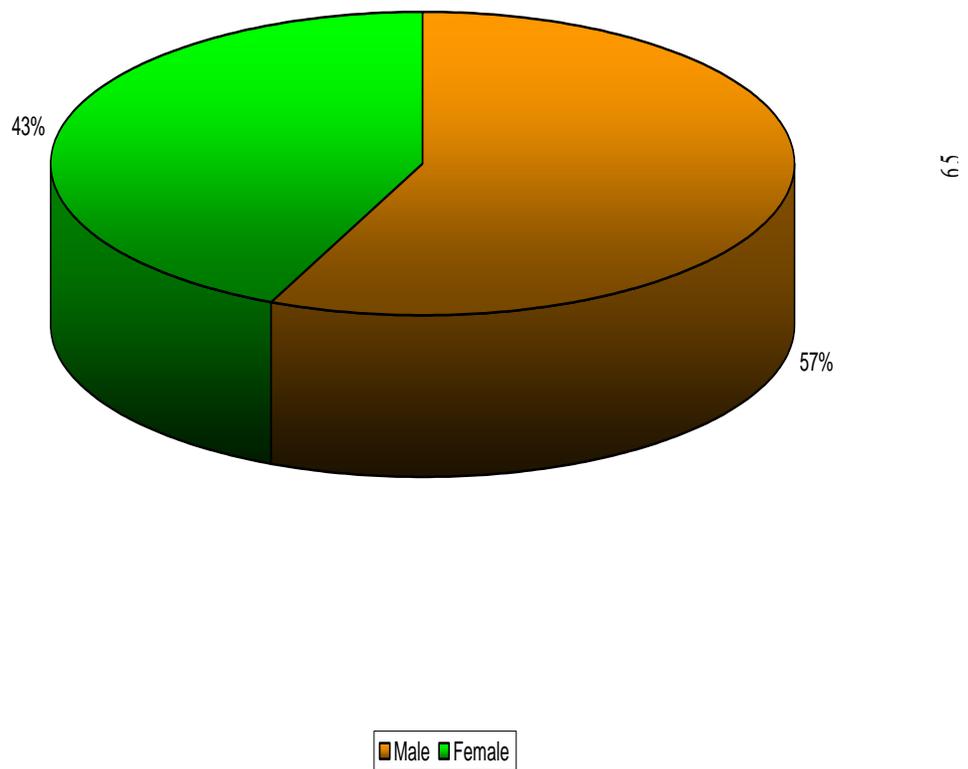
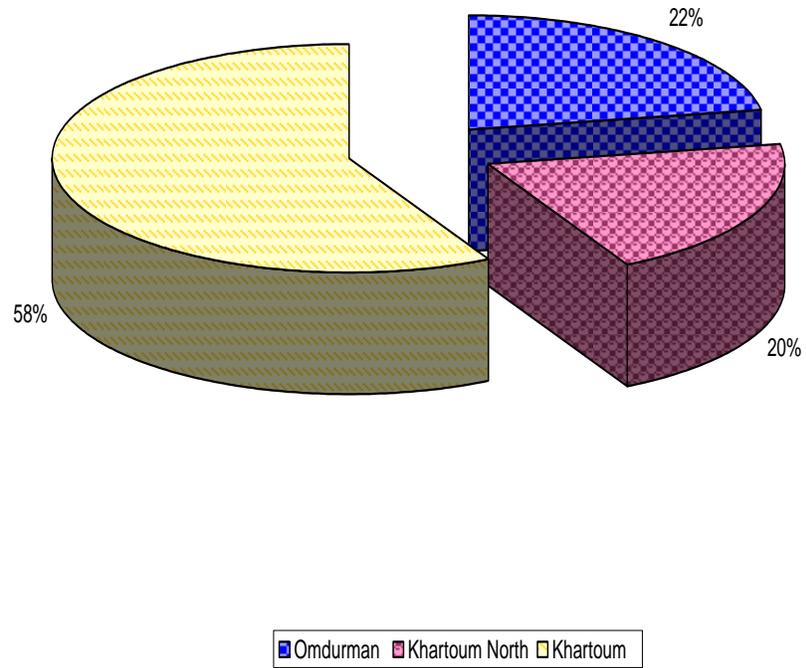


Figure (2): Distribution of cases by residence in the study group (n=90)



## **Disease Characteristic**

**3.1.2 Presenting symptoms of the study group:** cough shortness of breath wheeze and sleep disturbance were the commonest symptoms in 90(100%), 90(100%), 86(95.5%) and 56(62.2%), respectively.

Fever was observed in 27(30%), abdominal pains in 21(23.3%) vomiting in 15(16.6%). (*Figure 3*)

**3.2.2 Distribution of cases according to age at first presentation of wheeze:**

The commonest age at first presentation of wheeze was 1-<3 years (48.3%) then < 1 year (13.5%) and >7 years (12.4%). The lowest was 3 < 5 (9%). (*Table 2*)

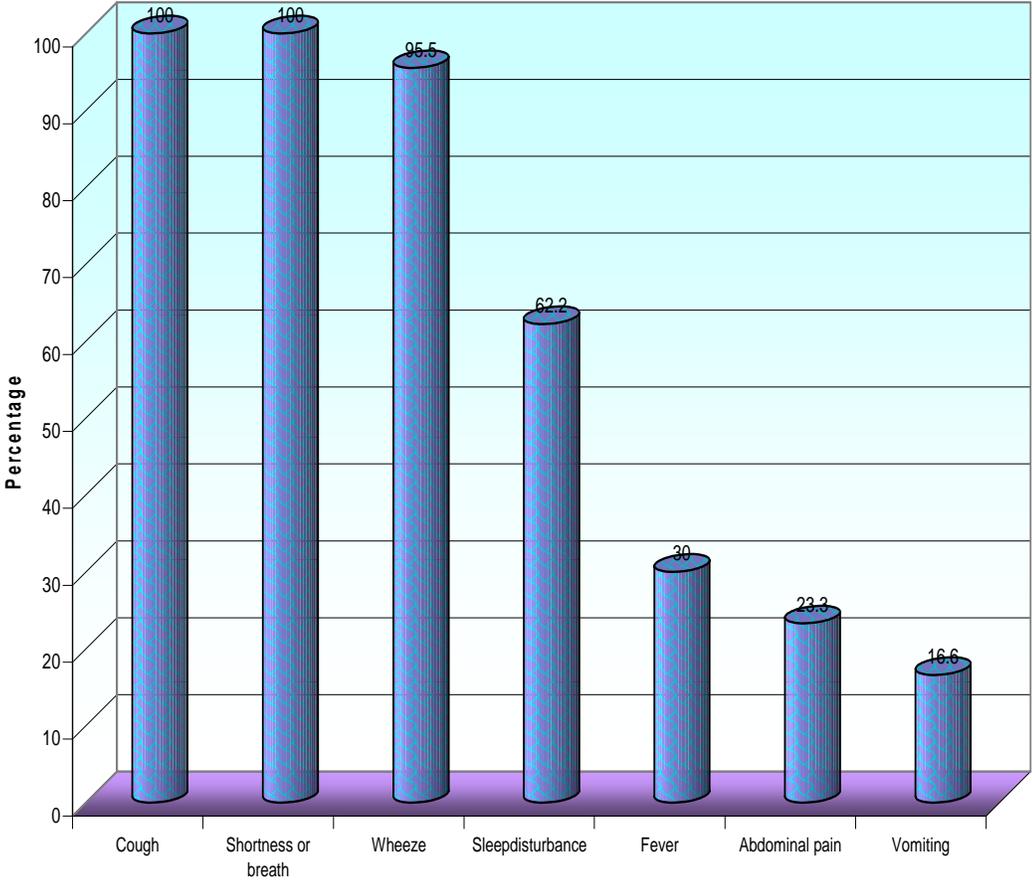
**3.2.3 Triggng factor of asthma in the study group:**

The triggng factors included respiratory infection in 87 (96.7%), dust mite or smoke 88 (97.8%), animal or other housing condition 26 (28.9%), hot weather 44 (48.9%), cold weather 46 (51.1%). (*Table 3*)

**3.2.4 Type of asthma medication taken by the study group:**

Ninety (100%) of children received salbutamol, 72 (80%) hydrocortisone, 27 (30%) prednisolone, 4 (4.4%), aminophyline, 23 (25.6%) inhaled steroids, 6 (6.6%) adrenaline. (*Table 4*)

Figure (3): Presenting symptoms of the study group



**Table (2): Distribution of cases according to age at first presentation**

**n = 90**

<b>Age in years</b>	<b>No</b>	<b>Percentage</b> <b>(%)</b>
< 1		13.5
1 - < 3		48.3
3 - < 5		9
5 - < 7		16.8
> 7		12.4
<b>Total</b>		<b>100.0</b>

**Table (3): Triggering factors of asthma in the study group:**

**n = 90**

<b>Age in years</b>	<b>No</b>	<b>Percentage</b> <b>(%)</b>
Chest infection	90	100
Dust mite	88	97.8
Smoke	87	96.7
Cold weather	46	51.1
Hot weather	44	48.9
Animal and other	26	28.9
Housing condition		

**Table (4): Type of asthma medication taken by children  
n = 100**

<b>Drugs</b>	<b>n</b>	<b>Percentage (%)</b>
Salbutamol	90	100
Hydrocortisone	72	80
Prednisolone	27	30
Inhaled steroid	23	25.6
Aminopylline	4	4.4
Adrenaline	6	6.6

**3.2.5 Relationship between the family history of atopy and the study group:**

Family history of asthma was shown to be related to the risk of child having asthma. Family history of asthma presented in 61 (67.8%) of cases paternal in 7 (7.8%) cases, maternal in 7 (7.8%) cases, sibling, 15 (16.7%) cases and other 15 (16.7%) cases.

Consanguinity was shown to be related to the risk of child having asthma in 45 (50%) cases. (*Table 5*)

### 3.2.6 Diagnosis:

Of the 90 children with asthma in the study group 28 (31.1%) cases have mild asthma, 41 (45.6%) have moderate asthma and 21 (23.3%) have severe asthma. (*Figure 4*)

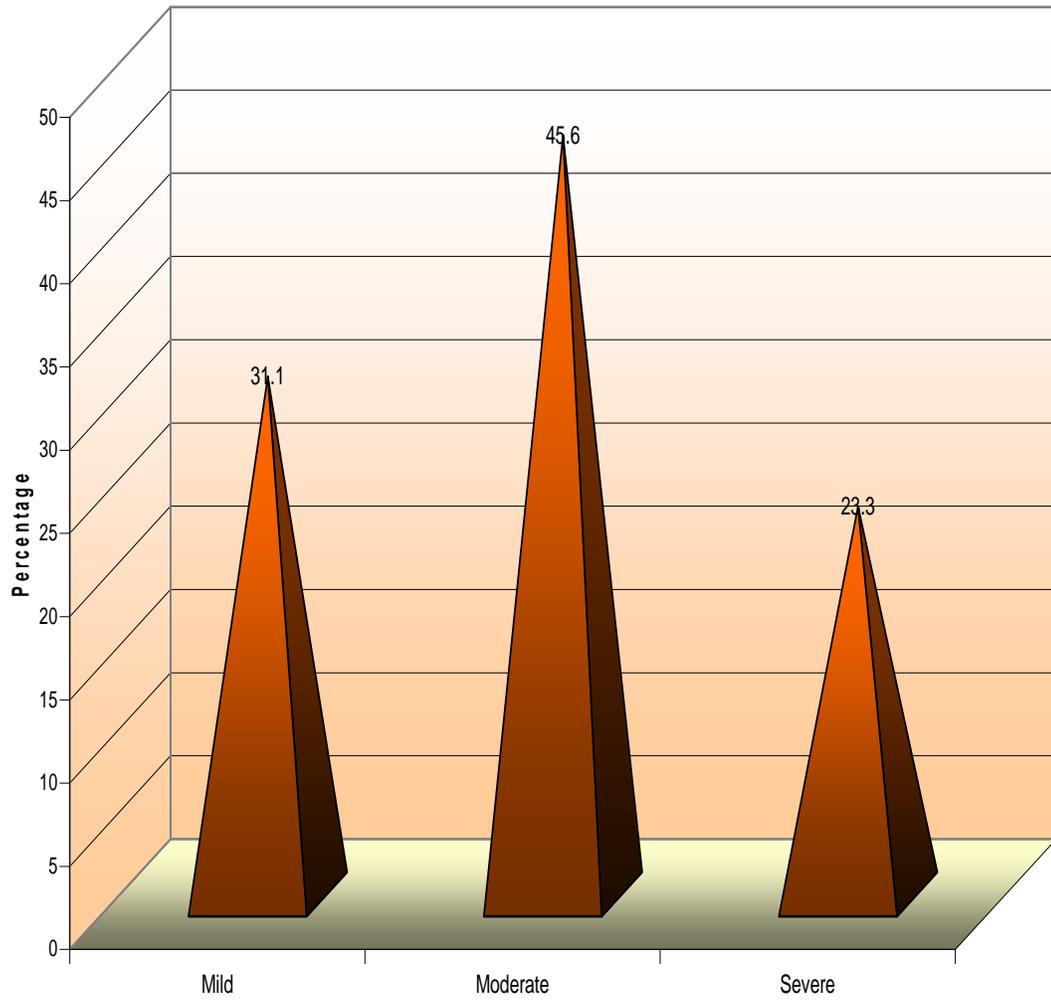
### 3.2.7 Hospitalization:

Of the total group 38 (42.2%) of children had been hospitalized  $\leq 4$  times during the last year while 31 (34.4%) hospitalized 5 – 10 times and 21 (23.4%) hospitalized more than 10 times. (*Figure 5*)

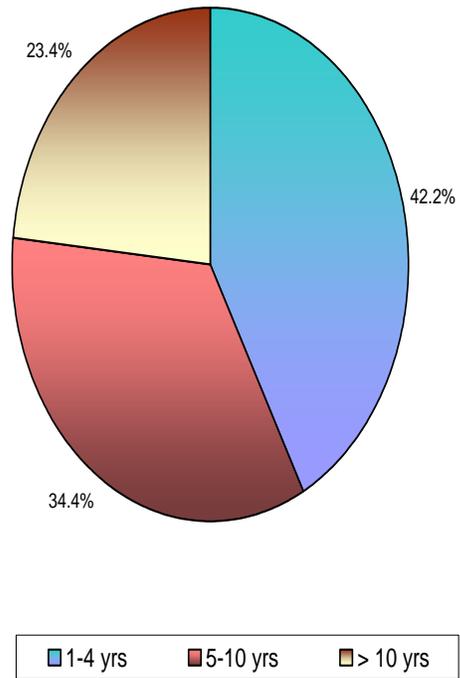
**Table (5): Relationship between history of atopy and the study group**

Risk factors	n = 90		Percentage (%)
	Yes (n)	No (n)	
Family history	61	29	67.8
Father asthmatic	7	83	7.8
Mother asthmatic	7	83	7.8
Sibling asthmatic	15	75	16.7
More than one member	17	73	18.9
Other relative	15	75	16.7
Consanguinity	45	45	50
FH of rhinitis	53	37	58.9
FH of eczema	10	80	11.1

Figure (4): Diagnosis of asthma in the study group (n = 90)



**Figure (5): Times of hospitalization (per year) of children with asthma in the study group (n=90)**



### **3.2.8 Weight distribution of the study group in percentile:**

The weight of most children were between the 3<sup>rd</sup> and 97<sup>th</sup> centile 65 (72.2%), < 3<sup>rd</sup>, 24 (26.7%) and only one child had weight above the 97<sup>th</sup> percentile 1 (1.1%). (*Figure 6*)

### **3.2.9 Height distribution of the study group in percentile:**

As seen in *Figure (7)* the majority of children had their height between the 3<sup>rd</sup> and 97<sup>th</sup> percentile 72 (80%).

Children had their height below 3<sup>rd</sup> percentile were 17 (18.9%), only one child has his height above the 97<sup>th</sup> percentile 1 (1.1%).

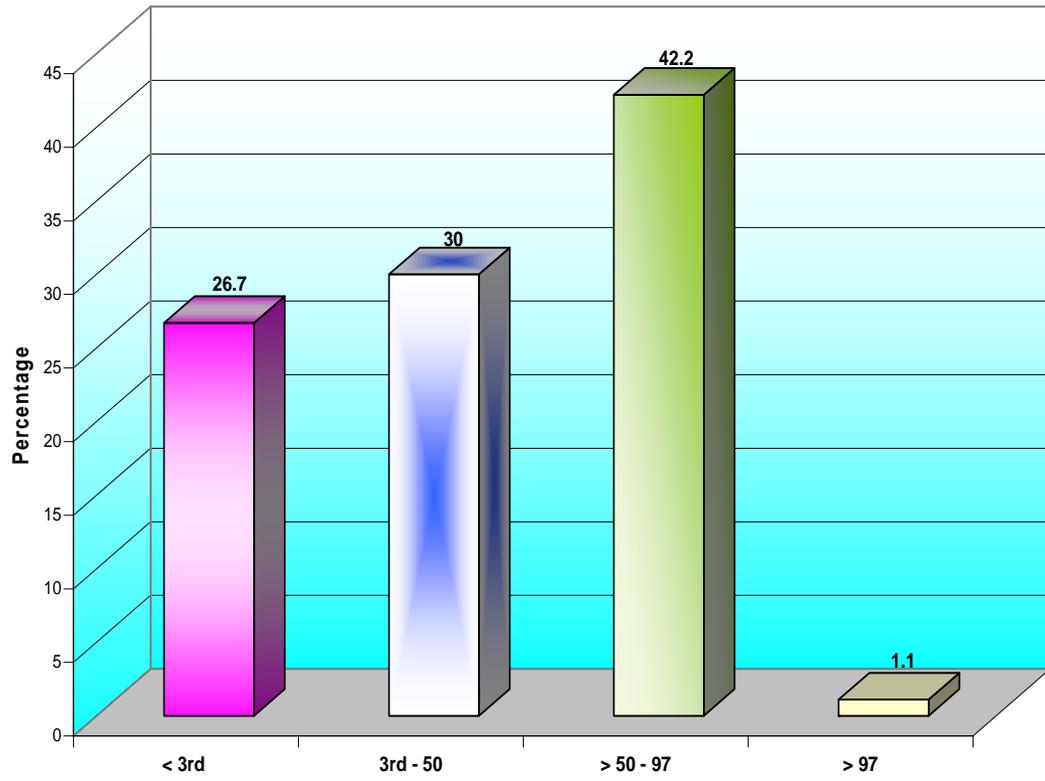
### **3.2.10 Presenting signs of the study group:**

The signs were wheeze 89 (98.9%) crepitation 27 (30%), fever 14 (15.6%), pallor 3 (3.3%) hepatomegally 10 (11.1%), splenomegally 2 (2.2%), chest deformity 18 (20%). (*Figure 8*)

### **3.2.11 Tanner staging of the study group:**

Of the 90 children in the study group 65 (72.2%) were preadolescent while 25 (27.8%) were adolescent. (*Figure 9*)

Figure (6): Weight distribution of the study group in percentile (n=90)



**Figure (7): Height distribution of the study group in percentile (n=90)**

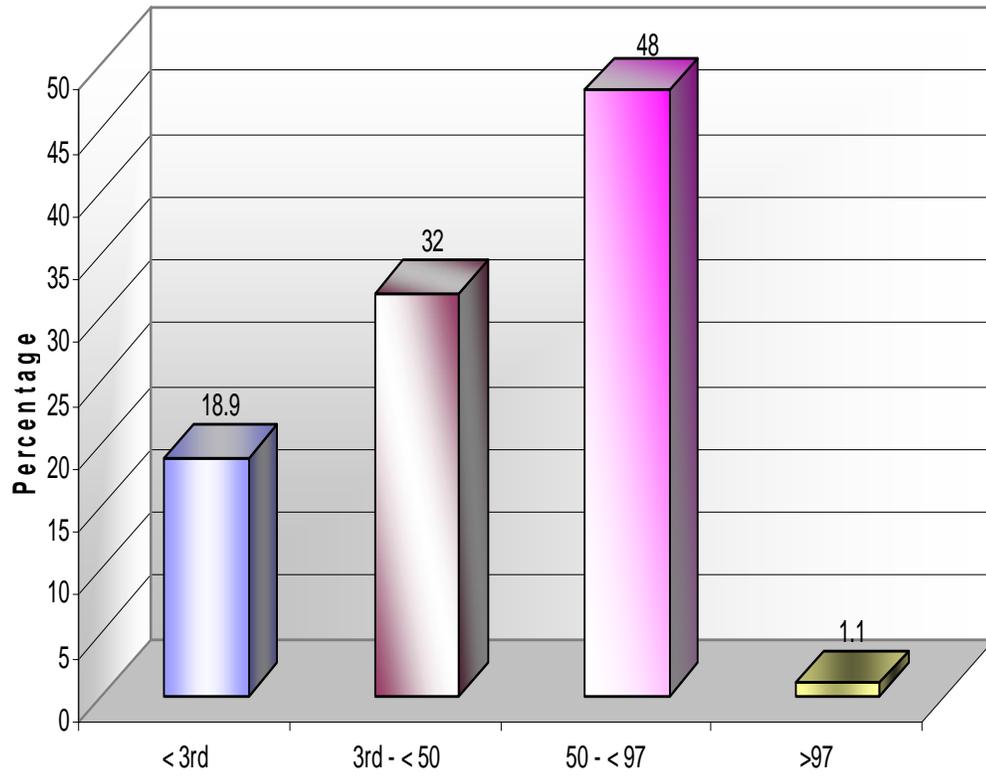


Figure (8): Presenting sign of the study group

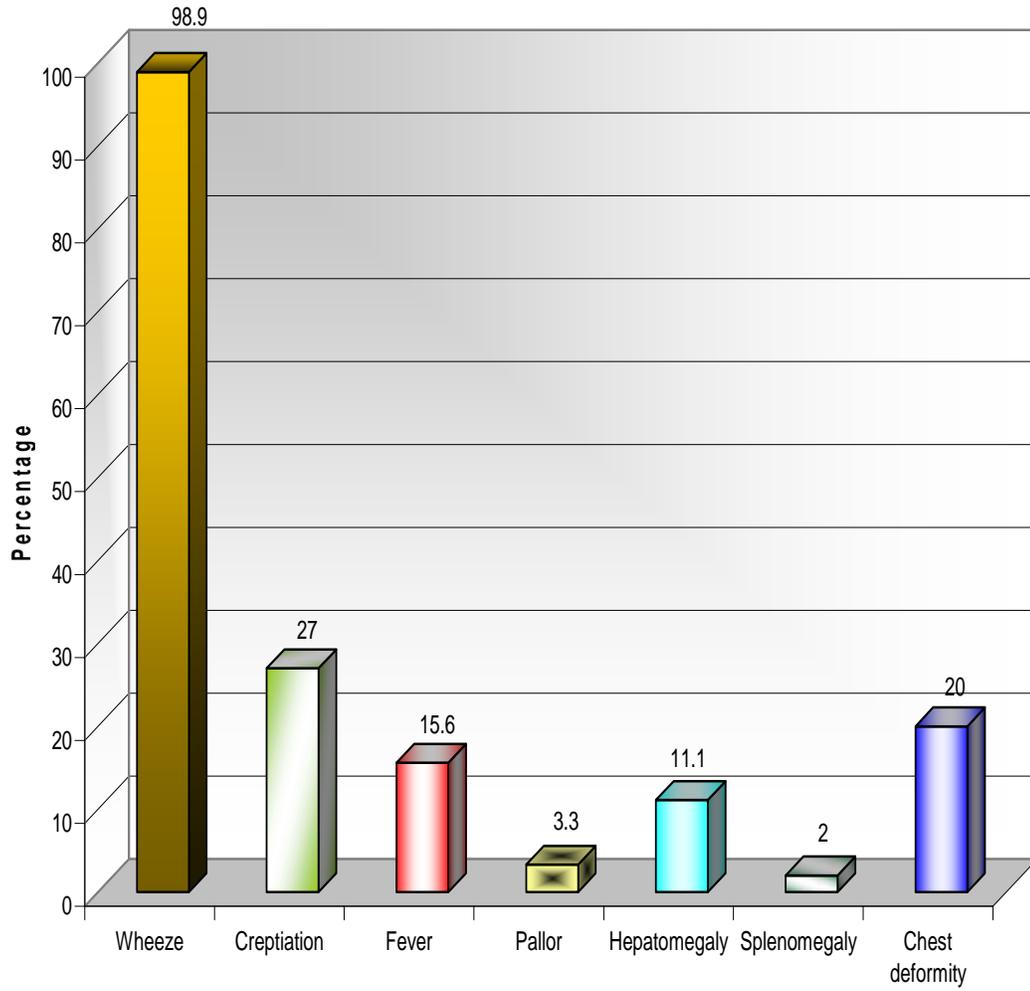
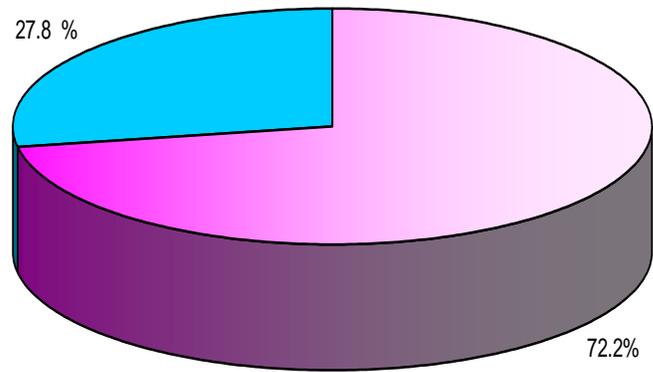


Figure (9): Tanner staging of the study group (n = 90)



## **3.2 Children Social Adjustment:**

### **3.2.1 The child rank:**

Of the 90 patient with asthma in the study group 28 (31.1%) were the eldest, 15 (16.7%) were the youngest, 47 (52.2%) were in the middle most of whom were the second child.

### **3.2.2 The child relation with parents:**

The relation between the children and their parents were judged to have strengthened in 27 (30%) of cases, while 56 (62.2%) had no change in their relation with parents, 1 (1.1%) had their relation weakened and 6 (6.7%) have over protection. (*Figure 10*)

### **3.2.3 The child relation with sibling:**

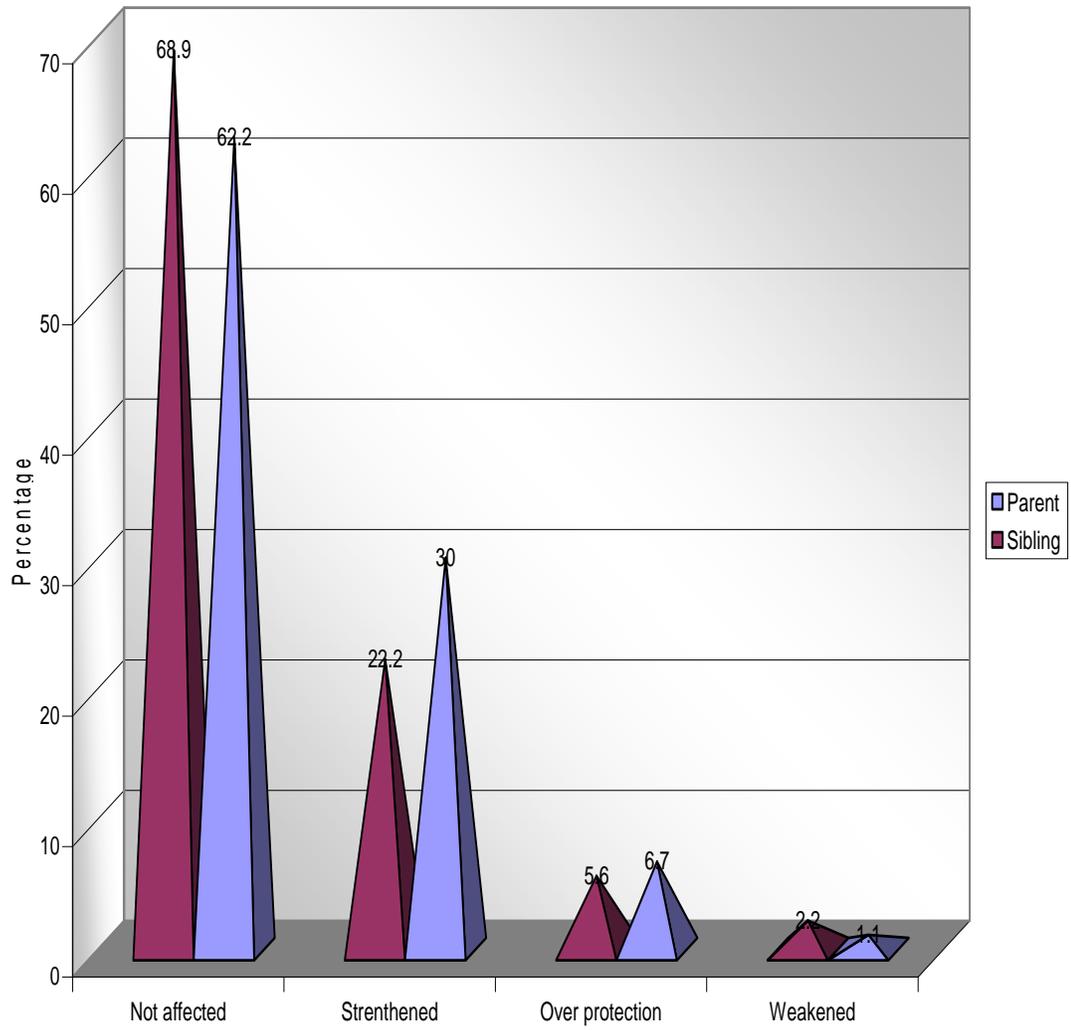
The relation was not affected in the majority of cases 62 (68.9%) it was strengthened in 20 (22.2%) of cases over protection in 5 (5.6%) and weakened in 2 (2.2%). (*Figure 10*)

### **3.2.4 The relation with peers:**

This relation was not affected in 77 (85.6%) weakened in 2 (2.2%), strengthened in 10 (11.1%) over protection in 10 (11.1%).

Nine (10%) of children had difficult in making friends while the rest 81 (90%) had no such problem.

Figure (10): The child relationship with parent and sibling in the study group (n=90)



### **3.2.5 Restriction of daily activities, playing and social visits:**

Asthma restricted the daily activity of 76 children (84.4%) whereas the remaining 14 (15.6%) performed their daily activities in a fair manner 61 (67.8%) had restriction in playing because of their illness.

Social visits to relatives and friends were restricted in 23 (25.5%) while the rest 67 (74.5%) were visiting them normally.

### **3.2.6 Academic adjustment:**

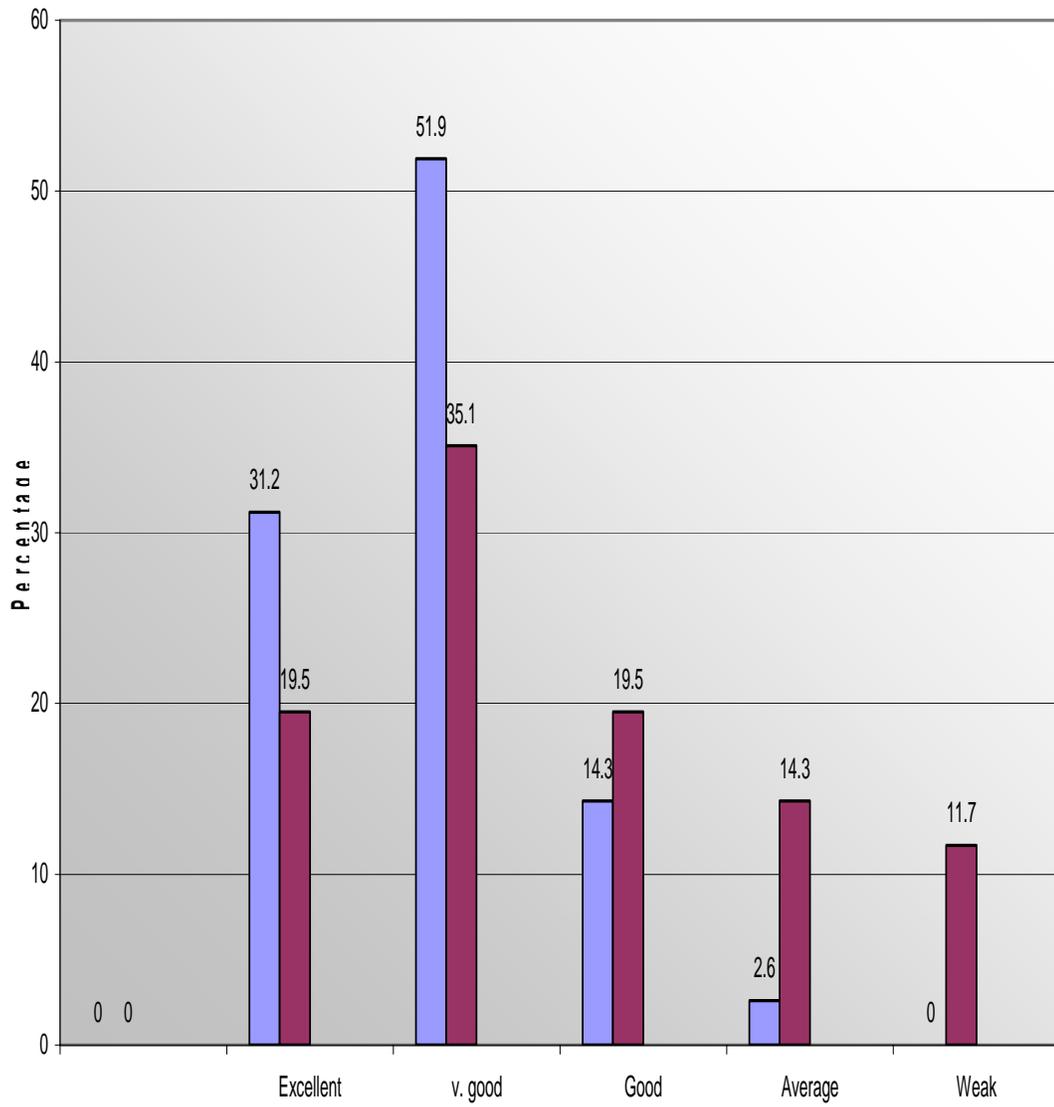
29 (32.2%) of children are at school before their illness the rest 61 (67.8%) are not.

Of these children representing 13 (14.4%) were in the kindergarten of those who were schooling 70 (77.8%) in the basic school and 7 (7.8%) in the secondary school.

Of the total sample 71 (78.9%) had interrupted schooling, 6 (6.7%) stopped schooling, 13 (14.4%) not affected.

The school performance before the illness was excellent in 24 (31.2%), very good in 40 (51.9%), good in 11 (14.3%) average in 2 (2.6%), their performance at school had deteriorated after the illness where only 15 (19.5%) were excellent, 40 (51.9%) were very good, 15 (19.5%) were good, 11 (14.3%) were average and 9 (11.7%) were weak. and this is found to be statistically significant  $P = (0.000)$ . (Figure 11)

Figure (11): Academic performance in the study group before and after the illness (n=77)



### **3.3 Social Background of the Family:**

#### **3.3.1 Marital life:**

The marital life was stable in the majority of cases 77 (85.6%) while in 4 (4.4%) it was disrupted. The remaining 9 (10%) either the father or the mother was dead.

#### **3.3.2 Father education:**

Fathers educational levels in the study was as follows 10 (11.1%), illiterate 26 (28.9%), primary school 14 (15.6%) intermediate school, 22 (22.4%) high secondary school, 12 (13.3%), university and only 6 (6.7%) had higher studies. (*Table 6-a*)

#### **3.3.3 Mother education:**

13 (14.4%) of the mothers were illiterate, 33 (36.7%) were primary school graduate, 9 (10%) intermediate school, 28 (31.1%) high secondary school, 2 (2.2%) university graduate and 5 (5.6%) were had higher studies. (*Table 6-b*)

#### **3.3.4 Parent occupation:**

##### **(a) Father occupation:**

30 (33.3%) of the fathers were civil servants, 5 (5.6%) were professional, 29 (32.2%) were skilled laborer, 16 (17.8%) were unskilled laborer, 5 (5.5%) were business man and 5 (5.5%) had no work.

**Table 6-a: Showing father education in the study group**

**n = (90)**

<b>Level of Education</b>	<b>Number</b>	<b>Percentage</b>
		<b>(%)</b>
Illiterate	10	11.1
Primary	26	28.9
Intermediate	14	15.6
Higher secondary	22	24.4
University	12	13.3
Higher studies	6	6.7

**Table 6-b: Showing mother education in the study group**

**n = (90)**

<b>Level of education</b>	<b>Number</b>	<b>Percentage</b>
		<b>(%)</b>
Illiterate	13	14.4
Primary	33	36.7
Intermediate	9	10.0
Higher secondary	28	31.1
University	2	2.2
Higher studies	5	5.6

### **b) Mother Occupation:**

The majority of the mothers 80 (88.9%) in the study group were house wives, 6 (6.7%) were civil servants, 3 (3.3%) were professional and 1 (1.1%) was skilled laborer.

### **3.3.5 Housing condition:**

In table (7); 70 (77.8%) live in their own house; while 20 (22.2%) live in rented house. 60 (66.7%) of the houses were made of brick and 30 (33.3%) made of mud. The number of direct family members living in the house was 4-8 in the majority 60 (66.7%), 24 (26.7%) had family member > 8 and the remainder 6 (6.7%) had < 4 members. (*Table 7*)

## **3.4 Economical and Social Impact of the Disease on the Family:**

### **3.4.1 Economical impact:**

*Table (8)* shows the sponsor of the family was the father mainly 81 (90.0%), the family monthly income was less than 20.000 SD in 56 (62.2%).

**Table 7: Showing family size of the children in the study group**

**n = 90**

<b>Family size</b>	<b>Frequency</b>	<b>Percentage (%)</b>
< 4	6	6.6
4 –8	60	66.7
> 8	24	26.7
<b>Total</b>	<b>90</b>	<b>100</b>

**Table 8: Showing monthly income of the families in the study group**

**n = 90**

<b>Income in SD</b>	<b>Frequency</b>	<b>Percentage (%)</b>
< 10.000	26	28.9
10.000 – 19.999	30	33.3
20.000 – 30.000	14	15.6
> 30.000	20	22.2
<b>Total</b>	<b>90</b>	<b>100</b>

Fifty percent of the income per month spent on the child treatment in 72 (80%) and more than 50% of the income spent in 18 (20%). (*Table 9*)

This financial situation necessitated help from others and it was received by 70 (77.8%) of the families. Help was provided predominantly from relatives in 52 (57.8%) in an irregular pattern.

In spite this financial burden only 28 (31.1%) search for extra job 9 (10%) selling assist, 4 (4.4%) burrows money. 4 (4.4%) travel abroad and in 45 (50.0%) there was no change. (*Table 10*)

### **3.4.2 Social impacts:**

Reaction of the guardian to the diagnosis both parents experienced similar reactions ranging from denial and crying in 17 (18.9%) to sadness and grief (18.9%). The majority 56 (62.2%) showed acceptance and reliance on God.

#### **3.5.2.1 Family relations:**

The effect of the child illness on the relation of the parents was assessed in 90 families. The child illness did not affect the relation of 61 (67.8%) while the relation was affected negatively in 4 (4.4%), in 16 couples (17.8%) their relations was strengthened. (*Table 11*)

**Table 9: Showing percent of monthly income spent on child treatment in the study group**

**n = 90**

<b>Income in SD</b>	<b>Frequency</b>	<b>Percentage</b>
<b>(%)</b>		<b>(%)</b>
25	50	55.6
25 - < 50	22	29.4
50 - < 75	10	11.1
> 75	8	8.9
<b>Total</b>	<b>90</b>	<b>100</b>

**Table 10: Showing guardian reaction towards the expenses of their children in the study group**

**n = 90**

<b>Reaction</b>	<b>Frequency</b>	<b>Percentage</b>
		<b>(%)</b>
Search extra job	28	31.2
Selling assist	9	10.0
Burrows money	4	4.4
Travel abroad	4	4.4
No charge	45	50.0
<b>Total</b>	<b>90</b>	<b>100</b>

**Table 11: Showing the effect of child illness on parent relationship**

**n = 90**

<b>Effect</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Affected negative	4	4.4
Strengthened	16	17.8
Indifferent	61	67.8
One parent dead	9	10
<b>Total</b>	<b>90</b>	<b>100</b>

**3.5.2.2 Social support**

Social support from friends and relatives was received by 83 (92.2%) families while only 7 (7.8%) families had no social support from any of the relatives or friends.

**3.5.2.3 Social life**

The day to day family life was disturbed by the physical care of the child in 70 (77.8%) of families and the social visit to relatives and friends and neighbors was reduced in 32 (35.6%). Fifteen 15 (16.7%) abandoned join leisure activities on account of the child illness and in this group 6 (40%) made restriction because of financial priorities arrangements.

### 3.5.2.4 *Sibling affection by the child illness*

The effect of the child illness on sibling was studied in 90 families 53 (58.4%) guardian reported that there was no complaint in their sibling during the child illness, while 33 (36.7%) guardians reported that the siblings were always complaining of maternal unavailability.

The schooling and performance of the sibling of the affected child was not affected in 4 (4.4%) families defective social behaviour of the sibling were noted it was in the form of jealousy and aggressive behaviour.

*(Table 12)*

**Table 12: Showing psychological problems of siblings of children in the study group**

**n = 90**

<b>Problem</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Maternal unavailability	33	36.7
Jealousy	3	3.3
Aggressive behaviour	1	1.1
No problem	53	58.9
<b>Total</b>	<b>90</b>	<b>100</b>

### **3.5 Behavior of Children in the Study:**

According to the results of the eye berg child behaviour inventory (ECBI) test most of children were of normal behaviour 55 (61.1%) while 35 (38.9%) were suffering from behavioural problems.

11 (12.2%) children were having behavioural problems but their parents either were not evaluating properly the magnitude of the problem or were tolerant to the disruptive behaviour of their children. (*Figure 12*)

#### **3.5.1 Behavior of children in relation to gender:**

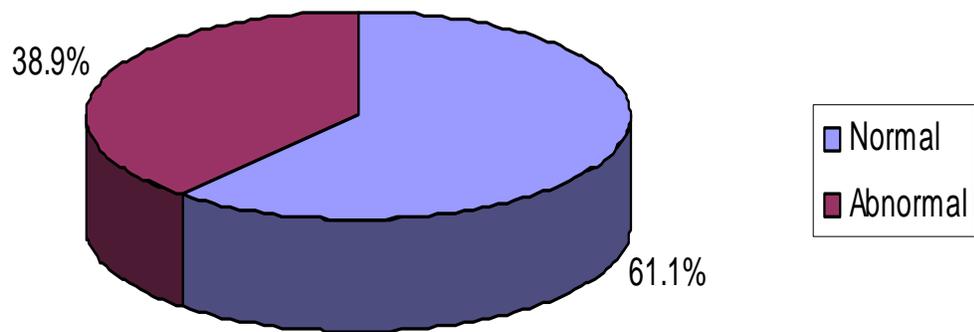
In *Table (13)* 51 males 33 (64.7%) have normal behaviour and 18 (35.3%) had behavioural problems. 39 females 22 (56.4%) have normal behaviour while 17 (43.6%) had behavioural problems, and this is found to be statistically insignificant  $P = (0.280)$

#### **3.5.2 Behavior in relation to age:**

55 (61.1%) had normal behaviour they were mainly of the age group 6 - < 9: 25 (45.5%), followed by 9 - < 12: 16 (29%) then 12 - 16: 14 (25.5%).

Behavioural problems predominated in the age group 9- < 12: 29 (32.2%) followed by the age 12 - 16: 23 (27.3%) then 6 - < 9: 9 (25.7%) and this is found to be statistically insignificant  $P = (0.176)$  (*Table 14*)

**Figure (12): Behaviour of children in the study group  
( n = 90)**



**Table (13): Behaviour of children in relation to gender in the study group n = (90)**

gender	Normal behavior		abnormal behavior		Total	
	No	%	No	%	No	%
Male	33	64.7	18	35.3	51	56.7
Female	22	56.4	17	43.6	39	43.3
<b>Total</b>	<b>55</b>	<b>61.1</b>	<b>35</b>	<b>38.9</b>	<b>90</b>	<b>100</b>

**P = (0.280)**

**Table (14): Behaviour of children in relation to different age group**

Age	Normal behaviour		Behaviour problem		Total	
	No	%	No	%	No	%
6 – < 9	25	73.5	9	26.5	34	37.8
9 - < 12	16	55.2	13	44.8	29	32.2
12 – 16	14	51.9	13	48.1	27	30.0
<b>Total</b>	<b>55</b>	<b>61.1</b>	<b>35</b>	<b>38.9</b>	<b>90</b>	<b>100</b>

P = (0.176)

### **3.5.3 Behavior in relation of playing:**

31 children (50.8%) of children with restricted playing were found to have behavioural problems. While only 4 (13.8%) of those without restriction of playing had behavioural problem and this is found to be statistically significant P = (0.000) (Table 15)

### **3.5.4 Behaviour of children in relation to the diagnosis:**

In the study group of the 28 patient with mild asthma 27 (96.4%) have normal behaviour; only one 1(3.6%) have behavioural problem.

Of those 41 with moderate asthma 25 (61%) have normal behaviour and 16 (39%) have behavioural problem.

Those 21 patient with severe asthma 3 (14.3%) have normal behaviour and the majority 18 (85.7%) have behavioural problem, and this is found to be statistically significant  $P = < (0.000)$  (Table 16)

### 3.6 Psychological Impact of the Child Asthma on the Parent:

#### 3.6.1 Anxiety:

The majority of the guardian 51 (56.7%) had no anxiety during the study period, 28 (31.1%) had moderate anxiety and 11 (12.2%) had severe anxiety.

**Table (15): Showing behaviour of children relation to playing in the study group**

**n = 90**

Activity	Normal behaviour		Behaviour problems		Total	
	No	%	No	%	No	%
	Restricted	30	49.2	31	50.8	61
Normal	25	86.2	4	13.8	29	32.2
<b>Total</b>	<b>55</b>	<b>61.1</b>	<b>35</b>	<b>38.9</b>	<b>90</b>	<b>100</b>

*P value = 0.001*

**Table (16): Showing behaviour of children in relation to the diagnosis of asthma in the study group**

**n = 90**

	Normal behaviour		Is behaviour abnormal		Total	
	No	%	No	%	No	%
Mild asthma	27	96.4	1	3.6	28	31.1
Moderate asthma	25	61	16	39	41	45.6
Severe asthma	3	14.3	18	85.7	21	23.3
<b>Total</b>	<b>55</b>	<b>61.1</b>	<b>35</b>	<b>38.9</b>	<b>90</b>	<b>100</b>

P value < 0.000

### **3.7.2 Mothers HADS anxiety in relation to IS behavior**

In the 35 guardian of children with behavioural problem 11 (31.6%) have severe anxiety, 17 (48.6%) had moderate anxiety and only 7 (20%) were normal.

Of those with normal behaviour 11 (20%) had moderate anxiety, 44 (80%) were normal, and this is found to be statistically significant P = (0.000) (Table 17)

### 3.7.3 Depression:

65 (72.2%) of the guardian were normal while the rest were having depression, 20 (22.2%) were moderate and 5 (5.6%) were severe.

### 3.7.4 Mothers HADS depression in relation to IS behavior

In the 35 in the guardian of children with abnormal behaviour 13 (37.1%) had no abnormality, 17 (48.6%) had moderate depression and only 5 (5.6%) had severe depression. Of those with normal behaviour only 3 (5.5%) had moderate depression and the rest 52 (94.5%) were normal and this is found to be statistically significant  $P = (0.000)$  (Table 18)

**Table (17) Mothers HADS anxiety in relation to IS behavior**

**n = 90**

Mothers HADS anxiety	IS behavior				Total	
	Normal		abnormal		No	%
	No	%	No	%		
Normal	44	86.3	7	13.7	51	56.7
Moderate	11	39.3	17	60.7	28	31.1
Severe			11	100	11	12.2
<b>Total</b>	<b>55</b>	<b>61.1</b>	<b>35</b>	<b>38.9</b>	<b>90</b>	<b>100</b>

P value = 0.000

**Table (18): Mothers HAD depression in relation to IS behavior**

**n= (90)**

<b>Mothers had anxiety</b>	<b>Is behaviour</b>				<b>Total</b>	
	<b>Normal</b>		<b>abnormal</b>			
	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>
Normal	52	80	13	20	65	72.2
Moderate	3	15	17	85	20	22.2
Severe			5	100	5	5.6
<b>Total</b>	<b>55</b>	<b>61.1</b>	<b>35</b>	<b>38.9</b>	<b>90</b>	<b>100</b>

P value 0.000

### **3.7.5 Mothers HADS anxiety in relation to the diagnosis:**

In the 28 mother or case taker of children with mild asthma 25 (89.3%) had normal had anxiety 2 (7.1%) had moderate and only 1 (3.6%) had severe anxiety. Of those 41 patients with moderate asthma 23 (56.1%) had normal had anxiety, 12 (29.3%) had moderate anxiety and 6 (14.6%) had sense anxiety. In those 21 patients with severe asthma only 3 (14.3%) had normal HAD anxiety, 14 (66.7%) had moderate HAD anxiety and 11 (12.2%) had severe anxiety, and this is found to be statistically significant  $P = (0.000)$  (Table 19)

**3.7.6 Relation between asthma diagnosis and mother HAD depression:**

In the guardian of children with mild asthma 27 (96.4%) were normal, 1 (3.6%) had moderate depression no one had severe depression.

Of those with moderate asthma 31 (75.6%) were normal, 7 (17.1%) had moderate depression only 3 (7.3%) had severe depression. 7 (33.3%) of those with severe asthma were normal, 7 (17.1%) had moderate depression only 3 (7.3%) had severe depression. 7 (33.3%) of those with severe asthma were normal, 12 (57.1%) had moderate depression and 2 (9.5%) had severe depression, and this is found to be statistically significant  $P = (0.000)$  (Table 20)

**Table (19): Showing the relation between diagnosis and mother HAD anxiety n = 90**

	Mothers had anxiety						Total	
	Normal		Moderate		Severe		No	%
	No	%	No	%	No	%		
Mild asthma	25	89.3	2	7.1	1	3.6	28	31.1
Moderate asthma	23	56.1	12	29.3	6	14.6	41	45.6
Severe asthma	3	14.3	14	66.7	4	19	21	23.3
<b>Total</b>	<b>51</b>	<b>55.7</b>	<b>28</b>	<b>31.1</b>	<b>11</b>	<b>12.2</b>	<b>90</b>	<b>100</b>

P value 0.000

**Table (20): Diagnosis of asthma in relation to mothers HAD depression**

**n = 90**

	<b>Mothers had depression</b>						<b>Total</b>	
	<b>Normal</b>		<b>Moderate</b>		<b>Severe</b>		<b>No</b>	<b>%</b>
	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>		
Mild asthma	27	96.4	1	3.6	-	-	28	31.1
Moderate asthma	31	75.6	7	17.1	3	7.3	41	45.6
Severe asthma	7	33.3	12	57.1	2	9.5	21	23.3
<b>Total</b>	<b>65</b>	<b>72.2</b>	<b>20</b>	<b>22.2</b>	<b>5</b>	<b>5.6</b>	<b>90</b>	<b>100</b>

P value 0.000

## *Chapter Four*

### **4- DISCUSSION**

#### **4.1 General Characteristics of the Study Group:**

*Sex and age:* A total of 90 patients with asthma were studied during the period from January to June 2006.

Male to female ratio was found to be higher in males with a ratio of 1.3 as mentioned by Grant H being a male increase the risk for asthma<sup>(17,69)</sup> in Sudan asthma affect boys more than girls<sup>(5)</sup>.

Study done in Swiss children with asthma show decrease male to female ratio with increase in age and independent of age twice as many boys than girls reported the diagnostic label asthma<sup>(26)</sup>.

The majority of patient 34 (37.8%) were below 9 years of age. This might be a reflection of increased viral infections triggering the attack of asthma.

#### **4.2 Disease Characteristic**

**4.2.1** Triggering factor of asthma in the study:- chest infections, dust mites and smoking among the commonest causes. 100%, 97.8%, 96.7% respectively followed by cold and hot weather housing conditions and animals. This is similar to study done by A. Ten Brinke et al, where

respiratory infections chronic sinusitis and gastro esophageal reflux appear to be among the commonest risk factors<sup>(24)</sup>.

#### **4.2.2 Relationship between history of atopy and asthma:**

Family history found in 61 (67.8%), history of consanguinity in 45 (50%). Family history of rhinitis and eczema in 58.9% and 11.1% respectively.

This is similar to study done by AL Mousawi et al in Kuwait's children; he found family history increase the risk of asthma where breast milk is protective<sup>(70)</sup>.

In a prospective population based cohort study from Germany IIIi et al found that a topic dermatitis in infancy is associated with asthma at school age<sup>(71)</sup> they reported that the onset of wheezing tended to occur before or at the onset of a topic dermatitis<sup>(72)</sup>.

Guilbert et al examined the a topic profile of 285 children between 2-3 years with frequent wheeze, history of a topic dermatitis and parental history of asthma, they found 61% were sensitized to food and aeroallergen suggesting sensitization at a younger age<sup>(73)</sup>.

#### **4.2.3 Weight and height distribution by the study group:**

The majority of children had their weight and height between the 3<sup>rd</sup> and 97<sup>th</sup> percentile (72.2%) and (80%) respectively.

26.7% and 18.9% were below the 3<sup>rd</sup> for weight and height.

Only one patient had weight and height above the 97<sup>th</sup> percentile this explained by the study done by Balfour-Lynn<sup>L</sup> showed the main cause of growth retardation in the past was long term prophylactic use of oral corticosteroids. Since the advent of inhalation steroids this has no longer been a problem<sup>(74)</sup>.

### **4.3 Children Social Adjustment:**

**4.3.1 The child relation with the parent:** The relation between the chronically ill children and their parents was strengthened in 27 (30%) while no change in 56 (62.2%), 1 (1.1% had their relation weakened, which could be explained by psychological upset in the side of the patients.

The relation between mothers and their children is because of parental over protection due to the chronic nature of the disease and troubles during the treatment.

### **4.3.2 The child relation with sibling:**

The ill child relation with his/her siblings was not affected in the majority 62 (68.9%) strengthened in 20 (22.2%), over protection in 5 (5.6%) and weakened only in 2 (2.2%) this weakness might be from the side of the siblings and might be explained by jealousy from paternal over care of the ill child.

#### **4.3.3 Restriction of daily activities playing and social visits:**

Asthma restricts daily activity of 76 (84.4%) of children, restrict playing of 61 (67.8%) and social visits to relative and friends of 23 (25.5%). This is consistent with the study done by Ladha et al where childhood asthma has significant adverse impact on child's daily activities, schooling, and family life and finance<sup>(75)</sup>.

#### **4.3.4 Academic adjustment:**

The majority of children are not in the school before the illness 61 (67.8%), 29 (32.2%) are at school.

During the study 13 (14.4%) were in the kinder garden, of those schooling 70 (77.8%) in the basic school and 7 (7.8%) in the secondary school, of the total sample, 71 (78.9%) had interrupted schooling, 6 (6.7%) stopped schooling, 13 (14.4%) not affected.

The school performance had deteriorated in the majority after the illness. This is similar to study done in Al-Ain UAE, which confirm that asthma is a common chronic disease among primary school children in AL-Ain and is a common cause of absenteeism from school<sup>(76)</sup>.

Study done by Gnegory B; he found night time awakening in children with asthma may affect school attendance, school performance as well as work attendance by parent<sup>(77)</sup>.

#### **4.4 Social Background of the Family:**

##### **4.4.1 Father education and occupation:**

40% of fathers were illiterate or have not completed their primary schooling while 20% were university and post graduate. The laborers were 45 (50%), professional and civil servant were 35 (38.9%), this pattern of job observed was almost consistent with the level of education, reflecting the normal pattern.

##### **4.4.2 Mother education and occupation:**

55 (61.1%) are illiterate, primary and intermediate school graduates, 28 (31.1%) 2<sup>nd</sup>ry school graduates while 7 (7.8%) were university and higher study graduates, the majority of mothers 80 (88.9%) were house wives which is the normal pattern, this may contribute to the low incomes in the family.

##### **4.4.3 Family monthly income:**

The majority of families 56 (62.2%) had monthly income of less than (20.000 SD) so the majority are of low income and social class. This could be explained by the low educational and occupational pattern of fathers and mothers.

##### **4.4.4 Marital status of the parents:**

Marital life was stable in the majority 77 (85.6%), disrupted in 4 (4.4%) the remaining 9 (10%) either the father or mother was dead. This

pattern of stable marital life is consistent with Sudanese society where the marital relations are strongly protected by the society and the healthy social concepts.

## **4.5 Economical and Social Impact of the Disease on the Family:**

### **4.5.1 Economical impact:**

The sponsor of the family is the father mainly 81 (90%), the family monthly income was less than 20,000 SD in 56 (62.2%), > 50% of the income per month spent on the child treatment in 18 (20%) of the families.

Financial help received from others in 70 (77.8%) of the families, help was provided from relatives in 52 (57.8%) in an irregular pattern.

Having a child with poor health status is associated with reduced parental employment and with the financial burden. The parents seek other solutions like search for extra job.

This shows the tremendous financial burden of chronic illnesses like asthma which can not be faced by the families alone.

### **4.5.2 Social impacts:**

Reaction of the guardian to the diagnosis both parents experienced similar reactions denial and crying in (18.9%) sadness and grief in 18.9%, the majority 56 (62.2%) showed acceptance and reliance on god. This is in contra distinction of the usual initial responses that include denial and

disorganization on one hand, families may become preoccupied with thoughts of the condition, sometimes unable to function or accomplish their normal activities, and on the other hand they may continue with feeling of disbelief and unwillingness to accept the diagnosis<sup>(78)</sup>.

#### **4.5.3 Social support:**

Social support from friends and relatives was received by 83 (92.2%) families while only 7 (7.8%) had no social support from any of the relatives or friends.

The Sudanese society has strong relations and this probably explain that families having social support constitute a high percentage.

#### **4.5.4 Social life:**

The day to day family life was disturbed by the physical care of the child in 70 (77.8%) of families and the social visit to relatives and friends was reduced in 32 (33.6%), 15 (16.7%) a abandoned join leisure activities on account of the child illness and in this group 40% made restriction because of financial priorities.

This is similar to study done in India in order to assess the social educational and economic impact in children with asthma, the patient and their parent were interviewed to assess the restriction on various activities of the child and family 162 children studied 87% had either mild or moderate persistent asthma, two third of children had some restriction placed on their play activity because of asthma, restriction on other

physical activities and social activities were reported in half the children. Children had absent from school for a median of 4 days in preceding 6 month. All these restriction were more common in children with more severe disease and/or poor control of symptoms, about one third of monthly income spent on the child treatment<sup>(79)</sup>.

#### **4.5.5 Sibling affection by the child illness:**

The effect of the child's illness on sibling is studied in 90 families in 53 (58.9%) there was no complain while in 33 (36.7%) the mothers reported that siblings were always complaining of maternal in availability this is similar to study done in Australia in children with chronic condition, the illness places stress on parents and siblings who may themselves become exhausted and develop psychological problems such as anger and depression, so its vital not to forget the siblings whose needs are easily neglected if parent focus too much on the sick child<sup>(80)</sup>.

#### **4.6 Behavior of Children in the Study:**

According to the results of the Eye berg child behavior inventory (ECBI) test most of children were of normal behaviour 55 (61.1%) while 35 (38.9%) were suffering from behavioural problems like any chronic illness that place psychological and behavioural burden on the child<sup>(80)</sup>. 11 (12.2%) children were having problems but their parents either were not

evaluating properly the magnitude of the problem or were tolerant to the disrupted behaviour of their children.

#### **4.6.1 Behaviour of children in relation to gender:**

In the study 51 males ,18 (35.3%) had behavioural problems and of the 39 females ,17 (43.6%) had behavioural problems this is in contradistinction to the study demonstrated that male sex, low income, low maternal, education increased the risk for behavioural problems<sup>(81)</sup>.

#### **4.6.2 Behavioural in relation to age:**

55 (61.1%) had normal behavior; behavioral problems predominated in the age group. 9 - < 12, 29 (32.2%) followed by the age. 12 - < 15: 22 (24.4%).

This can be explained by the impact of chronicity of asthma on psychosocial status and that normal children, approaching adolescence had more disruptive behaviour because of the complicity of this period during their development.

#### **4.6.3 Behaviour VS restriction of daily activity:**

Thirty one children 31 (50.8%) of children with restricted playing were found to have behavioural problem while only 4 (13.8%) of those without restriction of playing had behavioural problems. This is a similar to study done by Davis Isaacs and Jiil Rsewell<sup>(80)</sup>.

For all children with disabilities, limitation to schooling, mobility and communication constitute the most significant restriction of daily activity.

#### **4.6.4 Behaviour of children in relation to the diagnosis:**

In the 90 patient of the study group of the 28 patient with mild asthma only one 1 (3.6%) have behavioural problem. Of those 41 with moderate asthma 16 (39%) had behavioural problem.

Of those 21 patient with severe asthma the majority 18 (85.7%) have behavioural problems this is similar to the study done by MCQ Uaid EL et al. The finding suggest that patient with severe asthma should be considered at higher risk for behavioural difficulties that may necessitate psychosocial intervention<sup>(44)</sup>.

### **4.7 Psychological Impact of the Child's Asthma on the Family:**

#### ***Anxiety and depression:***

The majority of the mothers had no anxiety or depression. Of the 39 guardian having anxiety, 28 (31.1%) had moderate and 11 (12.2%) had severe anxiety.

Of those 25 having depression 20 (22.2%) were moderate and 5 (5.6%) were severe.

This is similar to the study done in Turkish asthmatic where both asthmatic children and their mothers are negatively affected by the disease<sup>(44)</sup>.

## ❖ CONCLUSION

There is an obvious psychosocial burden of asthma on children and their families.

Asthma was found to be more common in males than females in early life and reversed with increasing age its severity tends to increase with age.

The social life of most children was affected in the form of restricted daily activity, playing and schooling.

Most of children had frequent absenteeism from the school with reduced school performance.

Restriction of daily activity contributed to the behavioural problems.

Behavioural problems was noticed to be more in females than in males and in the age group 9-16 behavioural problems was noticed to increase with asthma severity.

The main problems of children's siblings were the complain of maternal unavailability. Family life was affected by the child illness psychologically financially and socially.

Social problems were in the form of restricted day to day activity. Reduced visit to relatives and friends.

The majority of guardian seeks different solutions to overcome the burden of the illness of their children in the form of extra job – selling assist and borrowing money.

Most of the families had financial support from relatives and friends which was irregular.

Majority of mothers had anxiety and depression. They were related to the severity of asthma and behavioural problem of their children.

## ❖ **RECOMMENDATIONS**

The main recommendations from this study are:

- 1- To increase the awareness of the medical care provider, families and the community with the psychosocial problems in children with asthma.
- 2- Psychiatrists and social workers should be part of the treating team, to relieve the emotional strain anxiety and depressive states affecting the ill child and his family.
- 3- To explore the patient individual burden of asthma to form a therapeutic, partnership with patient, family and caretaker.
- 4- Improve management strategies for patient and families by increasing their knowledge and awareness of asthma medication, asthma control, and removal of barriers to adherence and treatment recommendations.
- 5- To increase the use of school based health centers.
- 6- To ascertain the patient perspective of the affordability and acceptability of medication to achieve optimal treatment compliance.
- 7- To supplement traditional verbal and printed asthma education with interactive media programs.

## ***References***

- 1) Erant H, Skeepne K, Stan V. Epidemiology, clinical and economic burden and natural history of chronic obstructive airway disease and asthma. *Am J Manage Case* 2004; 105: 129-38.
- 2) Sears MR. Consequences of long term inflammation: The natural history of asthma. *Clin Chest Med* 2000; 21: 315-29.
- 3) Nersean M, Clark A, Mertyn R. Strengthening asthma education to enhance disease control. *Chest J* 2002; 2: 1661-662
- 4) Sokula A. A history of asthma. *J R Coll Phys* 1998; 22(1): 36-44.
- 5) Nadia K. Management of asthma in Sudan. *Sudan manual* 2000.p.8-9.
- 6) Chernick EL, Boat K. Asthma. In: Chernick V, Boat T, editors. *Kendig's Disorders of the Respiratory Tract in Children*, 6<sup>th</sup> ed. Philadelphia: W.B. Saunders; 1998. p. 688-724.

- 7) Campbell AGM, McIntosh N, (editorials). Asthma. Forfar and Arneils Text Book of Paediatrics, 5<sup>th</sup> ed. New York: Churchill Livingstone; 1998. p.536-637.
- 8) Behrman RG, Kliegman RM, Jensen HB. Asthma. In: Richard E, (editor). Nelson Textbook of Paediatrics, 17<sup>th</sup> ed. California: W.B. Saunders Ltd; 2000.p.761.
- 9) Hunter J. Asthma. In: Haslett C, Chilvers ED, editors. Davidson's Principles and Practice of Medicine, 19<sup>th</sup> ed. London: Churchill Livingstone; 2002.p.513-520.
- 10) Mannino DM, Homa DM, Akinbami WJ, Moorman JE, Gwynn C, Redd SC. Surveillance for asthma – United State 1980-1999. MMWR Surveill Sum 2002; 29: 51(1): 1-13.
- 11) Guilbrt T, Krawlec M. National history of asthma. Pediatr Clin North Am 2003; 50(3): 523-38.
- 12) Kabbisch M. Gene by environment interaction and the development of asthma and allergy. Toxicol 2006; 162(1): 43-8.
- 13) Kabesch M, Schedel M, Carrdi WB, Fritsch C, Weiland SK, Von Mutius E. IL4-IL-13 pathway genetics strongly

- influence serum IgE levels and childhood asthma. *J Allergy Clin Immunol* 2006; 117(2): 269-74.
- 14) Au-Laitinen T, Rasanen M, Kaprio J, Koskenvuo M, Laitinen LA. Importance of genetic factors in adolescent of asthma a population based twin family study. *Am J Respir Crit Care Med* 1998; 157(4PTI): 1073-78.
  - 15) Busse W, Elias J, Sheppard D, Banks-Schlegel S. Airway remodeling and repair. *Am J Resp Crit Care Med* 1999; 160: 1035-42.
  - 16) Ahmed IH, Sornet JM. The national history of asthma. In: Murphy S, Kelly HW, editors. *Pediatric Asthma*, 6<sup>th</sup> ed. New York: Marcel Dekker; 1999.p. 211-250.
  - 17) Roy SR. Asthma. *Southern Med J* 2005; 96: 1061-67.
  - 18) Ernst P, Cai B, Blais L, Suissa S. National history of asthma: The early course of newly diagnosed asthma. *Am J Med* 2002; 112(1): 44-8.
  - 19) Au-Silverstein MD, Reed CE, O'Connell EJ, Melton LJ, O'Fallon WM, Younginger JW, et al. Long term survival of cohort of community resident with asthma. *N Engl J Med* 1994; 331(23): 1537-541.

- 20) Mortiez FD, Wright AL, Taussig LM, Holberg CJ, Haonen M, Morgan WJ. Ti-Asthma and wheezing in the first six years of life the group health medical associates. *SO N Eng J Med* 1995; 332(3): 133-38.
- 21) Steven L, Mera BA. Childhood asthma. In: John AA, Hunter S, (editors). *Pathology and Understanding Disease prevention, 7<sup>th</sup> ed.* London: Stanley Thornes Pub; 2003.p. 738-741.
- 22) Andrew H, Liu MD, Stanley J, Szeffler MD. Advance in childhood asthma: Hygiene hpothesis, national history and management. *J Allergy Clin Immunol* 2003; 111: s785-92.
- 23) Gwen S, Scloor MD. Nocturnal asthma: mechanisms and management. *J Allergy Clin Immunolog* 2003; 111: s785-92.
- 24) Brinke T, Stark PJ, Masclee AAM, Spinhoven P, Schmidt VT, Zwindeman AH, et al. Risk factors of frequent exacerbation in difficult in treat asthma. *Eur Respir J* 2005; 26: 812-18.
- 25) Mullally Di, Wilson RE, Evans R, Gergen PJ, Rosenberg HM, Grauman JS, et al. National trend in the morbidity and mortality of asthma in the US. *Prevalence hospitalization*

and death from asthma over two decades: 1965-1984.

Allergy Immunopathol 1995; 23(5): 235-47.

- 26) NAEPP. National Asthma Education & Prevention Program. Expert panel report guidelines of the diagnosis and management of asthma. National Heart lung & blood vessel institute, Bethesda: US Department of Health & Human Services; 2002.
- 27) Leson S, Gershwire MZ. Risk factors for asthmatic patients requiring intubation a comprehensive review. Allerg Immunopathol (Madr) 1995; 23(5): 235-47.
- 28) Patterson R, Greenberger PA,, Patten DR. Potentially fatal asthma: the problem of non compliance. Ann Allergy 1991; 67(2PT1): 138-42.
- 29) Stemley J, Szefler MD, Apter A. Advances in asthma. allergy immunol Series 2005; 115: 470-77.
- 30) Bradyley E, Chipps MD, Kevin R, Murphy S. Assessment and treatment of acute asthma in children. J Paediatr 2005; 147: 288.
- 31) Bethesdy S, Rock VR. Chronic illnesses self management in children. Dept Hlth Human Ser 1999; 10-4.

- 32) Copeland LG, Glemerb DB. Parental perception and support strategies in caring for a child with chronic condition, Issue in comprehensive. *Pediatr Nursing* 1993; 16: 109-21.
- 33) Public relation & marketing communication children with chronic conditions - University of Michigan. *Hlth Syst Ann Arbor Med J* 2005; 48(109): 734, 936, 4000.
- 34) Vitulano LA. Psychosocial issues for children and adolescents with chronic illnesses: self stern - school functioning and sport participation. *Child Adolesc Psychiatr Clin Am* 2003; 12(3): 585-92.
- 35) Scatterwhite BB. Impact of chronic illness on child and family: an overview based on five surveys with implication for management. *Int J Rehabil Res* 1978; 1: 7-17.
- 36) Fact sheet for parent & children. Chronic illness. [www.chw.educ.au](http://www.chw.educ.au)
- 37) Kullhara P, Marwaha R, Das K, Aga VM. Burden of case in parent of children suffering from haematological malignancies. *Indian Psychiatr* 1998; 40: 13-20.
- 38) Kliegman B, Richard E, Mehrman MD, Robert M, Developmental and behavkoral pediatrics. *Nelson Essentials*

of Pediatrics, 2<sup>nd</sup> ed. Philadelphia: W.B. Saunders Company; 1994. p. 53.

- 39) Perrin JM, Maclean WEJr. Children with chronic illness. The prevention of dysfunction. *Pediatr Clin North Am* 1988; 35(6): 1325-337.
- 40) Sabbeth B. Understanding the impact of chronic childhood illness on families. *Pediatric Clin North Am* 1984; 31(1): 47-57.
- 41) Patients view of the burden of asthma a qualitative study. Geoman DP, Aroni RA, Stewart K. *Med J Aust* 2002; 177: 295-99.
- 42) Aydogan A, Zadeh H, Camioghr Y, Cokugras H. Psychological problems in Turkish asthmatic children and their families. *Allergy Immunopathol (Medr)* 2003; 31(5): 282-87.
- 43) Calam R, Cregg L, Simpson B, Morris J, Woodcook A, Custovic A. Childhood asthma, behaviour problems, and family functioning. *J Allerg Clin Immunol* 2003; 112(3): 499-504.

- 44) McQuaid EL, Kopel SJ, Nassau JH. Behavioural adjustment in children with asthma a Meta analysis. *J Dev Behav Pediatr* 2004; 22(6): 430-39.
- 45) Swadi H. Psychiatric morbidity in a community sample of Arab children with asthma. *J Trop Pediatr* 2001; 47(2): 106-7.
- 46) Reichenbrg K, Brobrg G. Emotional and behavioural problems in Swedish 7 to 9 years old with asthma. .... *Respir Dis* 2004; 1(4): 183-89.
- 47) Prevalence of probable mental disorders among pediatric asthma patients in an inner city clinic. *J Asthma* 2005; 42(8): 643-47.
- 48) Opolski M, Wilson I. Asthma and depression: a pragmatic review of the literature and recommendation for future research. *Clin Pract Epidemiol Mental Hlth* 2005; 1: 18.
- 49) Erbabor GE, Kuteyi F, Obembe F. Asthma: The psychological impact among a sample of south western Nigerian. *J Natl Med Assoc* 2002; 94(11): 987-93.
- 50) Morgan M, Khan DA. Asthma epidemiology, burden and quality of life. *Adv Psychosom Med* 2003; 24: 1-15.

- 51) Woolcock A, Bastiamplillai SA, Marks GB, Keena VA. The burden of asthma in Australia. *Med J Aust* 2001; 175: 141-45.
- 52) Szugs TD, Anderhub HP, Rulishauser M. Determinant of health care costs and pattern of care of Asthmatic patient in Switzerland. *Schweiz Med Wochenschr* 2000; 130: 305-13.
- 53) Gergen P. Understanding the economic burden of asthma. *J Allergy Clin Immunol* 2001; 107: s445-s48.
- 54) Harper DC. Paradigms for investigations rehabilitation and adaptation to childhood disability and chronic illness. *J Paediatr Psychol* 1990; 16: 533-42.
- 55) Mastroyannopovlov K, Stakard P, Lewis M, Lenton S. The impact of childhood non malignant life threatening illness on parents: gender differences and prediction of parental adjustment. *J Child Psychol Psychiatr* 1997; 38(7): 823-29.
- 56) Gelder M, Gath R, Reaction to stressful experiences. In: Michael G, Dennis G, Richard M, (editors). *Concise Oxford Text Book of Psychiatry*, 2<sup>nd</sup> ed. Philadelphia: Lipincott; 1997.p.85-89.
- 57) Kaplan T, Sadock S. Clinical manifestation of psychiatric disorders. In: Joelyyagel MD, Michael J, (editors).

Comprehensive Text Book of Psychiatry, 7<sup>th</sup> ed. London: Lipincott; 2000.p. 813-815.

- 58) White RW. Strategies of adaptation. In: Goden GV, Hanbwig D, Adam JE, (editors). Copying and Adaptation, 1<sup>st</sup> ed. New York: W. B. Saunders Company; 1974.p. 47-68.
- 59) Harold I, Kaplan HI, editorials. Clinical manifestation of psychiatry disorder. In: Concise Text Book of Clinical Psychiatry 7<sup>th</sup> ed. New York: Chirchill Livingstone; 2000.p.785-792.
- 60) Kaplan HI, Sadocks JB. Mood disorders. In: Harold I, Benjamin J, (editors). Behaviour Sciences Clinical Psychiatry, 7<sup>th</sup> ed. Philadelphia: Lippincott; 1994.p. 553-93.
- 61) Gelder M, Gath R. Depression disorders. In: Michael G, Richard M, Philep C, (editors). Oxford Text Book of Psychiatry, 2<sup>nd</sup> ed. Philadelphia: Lipin Cott; 1994.p. 573-85.
- 62) Kasper B, Braunwald F, Hauser S, Longo J. Mental disorders. Harrison Principles of Internal Medicine, 16<sup>th</sup> ed. London: McGraw Hill; 2005.p. 2554-2555.

- 63) Gelder M, Gath R. Anxiety disorders. In: Michael G, Richard M, Philip C, (editors). Oxford Text Book of Psychiatry, 2<sup>nd</sup> ed. Philadelphia: Lipincott; 1994; 573-85.
- 64) Eyberg S, Robirson E. Parent child interaction training: effects on family functioning. J Clin Child Psychol 1982; 11: 130-37.
- 65) Kendell R, Zeally AK. Measurement in psychiatry. In: Stephen L, David O, Michael S, Christopher F, Eve J, (editors). Companion to Psychiatric Studies, 3<sup>rd</sup> ed. Oxford: Churchill Living Stone; 1983.p.175.
- 66) Cuple S. Growth and development. The Short Text Book of Paediatrics, 9<sup>th</sup> ed. New Delhi: Faypee Brother Ltd; 2002.p.28-31.
- 67) Ibrahim SA, Mabrouk AA. Bulmonary function in normal Sudanese children. Paediatr Rev Comm 1994; 7: 331-39.
- 68) Cotes JE. Peak expiratory flow rate. Lung Function Assessment and application in medicine. Oxford Text Book of Psychiatry, 4<sup>th</sup> ed. Oxford: Blackwell 1994; 573-85.
- 69) Castrorodrigues JA, Holberg CJ, Wright AL, Martinez FO. A clinical index to define risk of asthma in young children

with recurrent wheezing. *Am J Respir Crit Care Med* 2000; 162: 1403-406.

- 70) Al-Mousawi MSH, Lovel H, Behbehani N, Arifhodzic N, Woodcock A, Custovic A. Asthma and sensitization in a community with low in-door allergin levels and low bet keeping frequency. *J Allergy Clin Immunol* 2004; 114: 1389-394.
- 71) Illi S, Vonmutius G, Lau S, Nickel R, Gruber C, Niggemann B, et al. the natural course of atopic dermatitis from birth to age 7 years and the association with asthma. *J Allergy Clin Immunol* 2004; 113: 925-31.
- 72) Martinez FD, Wright AL, Taussig LM, Holberge J, Halenen M, Morgan WJ. Asthma and wheezing in the first six years of life. The group health medical association. *N Engl J Med* 1995; 332: 133-38.
- 73) Guildert T, Morgan WJ, Zeiger RS, Bachria LB. atopic characteristics of children with recurrent wheezing at high risk for the development of childhood. *Asthma J Allergy Clin Immunol* 2004; 114: 282-87.

- 74) Lynn B. Effect of asthma on growth and puberty. *Paediatrician* 1987; 14(4): 237-41.
- 75) Lodha R, Puranik M, Kattal N, Kabra SK. Social and economic impact of childhood asthma. *Indian Pediatr* 2003; 40(9): 874-79.
- 76) Bener A, Abdulrazzag YM, Debuse P, Abdin AH. Asthma and wheezing as the cause of school absence. *J Asthma* 1994; 31(2): 93-8.
- 77) Gregory B, Diette L, Markson L, Eljabeth A, Skinner J, Theresa T, et al. Nocturnal asthma in children affect school attendance school performance and parent work attendance. *Arch Pediatr Adolesc Med* 2000; 154: 923-28.
- 78) Pythis RM, Philip LC. Psychological impact of chronic pediatric conditions. In: Plyllis RM, (editor). *Psychological Management of Pediatric Problems, Vol. 1. Early Life Conditions and Chronic Disese*. Baltimore: University Park Press; 1978.p. 3-14.
- 79) Iodha R, Puranik M, Kattal N, Kabra SK. Social and economic impact of childhood asthma. *Indian Pediatr* 2003; 40(9): 874-79.

- 80) Isaacs D, Rsewell J. Children with chronic conditions. Am Med J 2003; 179(S): 235-36.
- 81) Babani L, Banis CB, Wilcox KT. Children with chronic physical disorder. Maternal reports of their psychological adjustment. J Pediatr Psychol 1988; 13: 197-212.