

Anxiety and depression among children with chronic diseases

Alrawhaa A. Abo Amer^a, Yehia H. Abdel Maksod^a, Shewikar T. El Bakry^b
and Walaa H.M. El-Yamany^a

Departments of ^aPediatrics and ^bPsychiatry, Faculty of Medicine, Benha University, Benha, Egypt

Correspondance to Shewikar T. El Bakry, MD, 94 Hassan El Maamoun St., Nasr City, 11543 Cairo, Egypt
E-mails: shewikare@yahoo.com, shewikar@hotmail.com

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Introduction and aim of the study

Psychiatric morbidity is defined as the presence of handicapping abnormalities of emotions, behavior, and relationships that impede personal and social functioning. Therefore, the present study was designed to argue this issue.

Patients and methods

A total of 60 (32 males and 28 females) patients ranging in age from 5 to 18 years from the Pediatric Department of Benha University Hospital and Mansoura University Pediatric Hospital (Egypt) were included in the present study. Forty patients had chronic (> 1 year) diseases such as asthma (nine males vs. 11 females), diabetes mellitus (DM) (11 males vs. nine females), or chronic renal failure (CRF) and were on regular hemodialysis (12 males vs. eight females) whereas the other 20 patients were clinically healthy. Each patient was subjected to full assessment of medical history, and information was obtained on age, sex, education, socioeconomic state sleep pattern and sleep disorders, history of aggression, history of self-esteem, diagnosis with a special focus on onset of disease, duration, frequency, complications, and treatment. Psychological assessment was performed using the Children Anxiety Scale (Arabic version) and the Children Depression Inventory (Arabic version). A written consent was signed by parents. The majority of patients were from low socioeconomic levels and were still in education.

Results

The present results for accompanying psychological morbidities indicated low self-esteem in 25% asthmatic, 25% DM, and 55% of CRF children; social isolation in 25% asthmatic, 30% DM, and 20% of CRF children; sleep disorders in 40% asthmatic, 30% DM, and 70% of CRF children; aggression in 10% asthmatic, 10% DM, and 5% of CRF children; and suicidal thinking in 20% of CRF children. There was a significant increase in anxiety scores in patients with chronic disease compared with the controls ($P=0.028$), with no significant difference between the different groups of chronic illnesses [50% in asthmatic; 40% in DM; 50% in end stage renal failure (ESRD)]. Nevertheless, 25% of ESRD manifested severe levels of anxiety. There was a significant difference between male and female patients in anxiety among asthmatic and ESRD children as females with chronic diseases showed a higher prevalence of anxiety than males. Anxiety disorders were directly proportional in children of older age without improvement in disease symptoms, being especially evident in asthmatic children; yet, it increased persistently with the other diseases (DM and CRF). Severity and longer duration of the disease indicated a considerable increase in anxiety in patients with complications, where 20% patients with severe ESRD, 10% diabetic patients with complications, and 10% asthmatic patients developed severe levels of anxiety. Concurrent results for depressive disorders indicated a significant increase among patients with chronic diseases (90%) compared with the healthy controls, among whom only 10% presented with mild depression. Yet, there was no significant difference in depression among the three groups ($P=0.049$), with a significant increase in patients on regular hemodialysis, among whom depression was identified in 80% (55% mild, 15% moderate, and 10% severe). Female patients with chronic diseases showed a higher prevalence of depression than males, with a significant difference between female and male patients on regular dialysis, where severe depression was found in 10% and moderate depression in 15%, whereas males showed negative signs of depression. Depression was found to increase with the age of the patients, without any improvement in the disease symptoms in asthmatic patients and patients on regular dialysis. A considerable increase in the incidence of depression was validated as the disease was present for a longer duration, that is, more than 1 year. A similar increase was found among patients on regular hemodialysis and asthmatic patients as 10% with severe ESRD developed severe depression.

Conclusion

The present study shows that children with chronic diseases have significantly more psychological distress than healthy ones.

Recommendations

It is highly recommended that patients with chronic disease undergo continuous follow-up by psychiatrists and medical specialists together with routine screening for anxiety and depression. This may reduce the incidence of complications of asthma, DM, and end-stage renal failure. Again, periodic meeting with parents of children with chronic diseases is advisable to teach them how to deal with the psychological problems to facilitate early detection and management of psychological disorders.

Keywords:

anxiety, asthma, children, chronic renal failure, depression, diabetes mellitus

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Introduction

The term chronic illness refers to illnesses that require at least 6 months of continuous medical care, permanent adjustments to lifestyle, and continuous behavioral adaptation to the unpredictable course of the illness. Typical examples of chronic illnesses diagnosed and managed in childhood and adolescence include asthma, diabetes, epilepsy, chronic renal failure (CRF), cystic fibrosis, and a variety of cancers. The patient is required to accommodate physical changes, lifestyle restrictions, changes in social roles, complicated medical regimens, painful procedures, and frequent medical appointments, while remaining prepared for the possibility of further acute crises [1].

Asthma is a chronic inflammatory disease of the airways characterized by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm [2]. It is clinically classified as moderate to severe persistent, where the frequency of symptoms is daily and nighttime symptoms range from once per week to frequent [3].

Common symptoms of asthma include wheezing, shortness of breath, chest tightness, and coughing. Symptoms are often worse at night or in the early morning, or in response to exercise or cold air. Some patients with asthma only rarely experience symptoms, usually in response to triggers, whereas other may have marked persistent airflow obstruction [4].

Glucocorticoids are the most effective treatment available for long-term control whereas inhaled forms or oral steroids may be needed [5]. Long-acting β -adrenoceptor agonists, leukotriene antagonist, and mast cell stabilizers can be used as an alternative to inhaled glucocorticoids [6].

Diabetes mellitus (DM, type I insulin dependent) is a metabolic disorder characterized by the presence of hyperglycemia because of defective insulin secretion, insulin action, or both. It is associated with significant long-term complications including damage, dysfunction, and failure of various organs, especially the kidneys, eyes, and nerves, and also with a markedly increased risk of cardiovascular morbidity and mortality. It is thereby the most common endocrine disease and one of the most frequently encountered chronic disorders in childhood

and adolescence [7]. Its prevalence is about 1/400–500 in school-aged children and usually presents with a brief history of classic symptoms of polyuria, polydipsia, and fatigue and weight loss.

Long-term complications arise from the damaging of prolonged hyperglycemia and other metabolic consequences of insulin deficiency including retinopathy, cataracts, hypertension, progressive renal failure, early coronary artery disease, peripheral vascular disease, neuropathy, and increased risk of infection. Treatment is mainly by insulin intake and injections.

However, CRF is an insidious and irreversible condition that eventually progresses to end-stage renal failure. It is an important cause of morbidity and mortality in children worldwide. The prevalence of CRF in children is reported to be around 18.5–58.3/million children. However, under-reporting because of lack of identification may suggest an even higher prevalence in children [8]. CRF is presented in five stages according to the severity of the disease [9]. In end-stage renal disease, hemodialysis and peritoneal dialysis are the two available forms of chronic dialysis therapy. CRF patients on regular hemodialysis are usually under treatment protocols including dietary supplements of energy and protein, electrolyte control through calcium supplementation for a normal Ca/P ratio, active form of vitamin D, hypertension control, vitamin supplementation, anti-anemic drugs, and psychic support.

During childhood, chronic physical illness confers an increased risk of emotional and behavioral disorders, although the majority of children and families successfully adapt to the diagnosis [10].

Anxiety is a common response to the uncertainty of the diagnosis and prognosis of chronic disease as well as to various aspects of treatment [11]. A major medical crisis can be a contributing factor in the onset or exacerbation of an anxiety disorder [12]. However, the response may reach the level of a phobic anxiety disorder for some children.

Almost all anxiety disorders may be seen in ill children; children with such disorders who have a comorbid physical illness show greater levels of emotional problems, more somatic complaints, and more functional impairment [13].

Several disorders are associated with chronic illness in children such as sleep disorder, suicide, and behavioral problems. It is particularly important to assess sleep disorders in children with chronic diseases; it has been reported to be associated with behavioral problems, inattention, poor school performance, and reduced health-related quality of life [14].

Sleep disorders in asthmatic patients are because of altered anatomy of the respiratory tract, increased upper airway adipose deposition, altered pharynx skeletal morphology, and extension of pharyngeal airway leading to upper airway collapse [15]. Again, both patients receiving hemodialysis and peritoneal dialysis have sleep disorders, with tiredness being markedly higher in association with hemodialysis [16].

Meanwhile, affective disorders, hopelessness, depression, and depressive symptoms are associated with increased suicidal tendencies [17]. Patients with CRF and on dialysis show a higher incidence of suicide than those with other chronic medical conditions such as asthma or DM [18].

Chronic illness has a devastating effect on children, thus leading to behavioral problems. At different stages of a child's development, the young child, unable to understand why the sickness has occurred, may assume that it is a punishment for being bad and may thus become angry with doctors and parents for not being able to cure the illness. They are also susceptible to teasing from their classmates and this in turn may lead to decreased socialization [19]. Moreover, the school may not handle the issue in an appropriate manner, thus leading to an increase in behavioral problems, avoidance and refusal to attend school, loneliness, and a feeling of being different from others [20].

Among the medically ill, depression is a common concern, accounting for half of the identified psychopathology [21,22], where depression of all degrees occurs in at least 25% [23].

Childhood depression seems to be evident at earlier ages in successive cohorts and often occurs with comorbid psychiatric disorders, increased risk for suicide, substance abuse, and behavioral problems [24].

Anxiety and major depressive disorders are often comorbid with each other and are commonly associated with other psychiatric disorders and coexist with long-standing chronic medical conditions. Yet, effective recognition and treatment of anxiety and depression may be associated with functional improvement in the medical disorder [25].

Anxiety and depression are closely related to asthma [26], where estimates of psychopathology in severe asthmatics range from 30 to 63% [27]. Psychological stress may follow screening for diabetes as it may induce or worsen hyperglycemia [28]. A variety of psychological distress can occur when DM is diagnosed such as denial, anger,

guilt, reactive depression, and finally acceptance [29]. This may follow screening for diabetes, where, acting through the hypothalamo-pituitary-adrenal axis, stress may worsen hyperglycemia [28].

Children with CRF, however, often have growth retardation and bone deformity because of osteodystrophy. Stigmata of hemodialysis therapy include multiple scars, needle puncture marks, and disfiguring fistula or arteriovenous shunts. These problems are often exacerbated by the delay in the emergence of secondary sex characteristics that often accompany uremia. These negative changes in body image exacerbate the child's feeling of being different and result in alienation of the peer group, and thus are more likely to develop psychiatric morbidity [30–33]. Another possibility of increased physiological vulnerability to maladjustment is the side effects arising from chronic exposure to medications that these children have [34].

Unfortunately, very few pediatric data are available that validate the use of standard depression rating scales in the patient group. Currently, several clinical investigations are ongoing to develop and validate a scale for medically ill children [35].

Patients and methods

A total of 60 (32 males and 28 females) patients ranging in age from 5 to 18 years from the Pediatric Department of Benha University Hospital and Mansoura University Pediatric Hospital (Egypt) were included in the present study. There were 60 patients with chronic (>1 year) diseases such as asthma, DM, or CRF and were on regular hemodialysis and 20 clinically healthy children matched for age, sex, and economic status. All children and parents were subjected to the following:

- (1) Full assessment of medical history (age, sex, education, socioeconomic state [36], sleep pattern and sleep disorders, history of aggression, history of self-esteem, diagnosis with a special focus on onset of disease, duration, frequency, complications, and treatment).
- (2) Assessment of psychological distress using:
 - (a) The Children Anxiety Scale, Arabic version [37]: the scale consists of 53 items with yes or no answers measuring physiological, behavioral, and verbal measures, where yes receives 1 point and no receives 0 point; scores less than 18 indicate mild, scores 19–28 indicate moderate, and scores higher than 29 indicate severe status [38].
 - (b) The Children Depression Inventory, Arabic version [39]: the scale includes 27 items with three choices (0–2) for severity of symptoms according to the following table. The exclusion criteria of children were as follows:
 - (i) children with illnesses that have a major impact on quality of life.

- (ii) Children with recent onset of disease, that is, less than 1 year.
- (iii) Children with more than 3 degrees on the scale of anxiety.
- (iv) Extreme socioeconomic level.
- (v) Absence of parents because of divorce or death.
- (vi) Mental retardation among children with diseases.

A written consent was signed by parents before the commencement of the study. The results obtained were statistically analyzed by mean, SE, *t*-test, χ^2 , and analysis of variance using the SPSS (SPSS Inc., Chicago, Illinois, USA) software computer package.

Results

Demographic Studies

In the present study, the age range among children in each disease category is presented in Table 1.

Demographic data on sex, socioeconomic level, and education level are presented in Table 2.

Several accompanying symptoms were also assessed among children with diseases including self-esteem, social isolation, aggression, sleep disorders, and suicidal thoughts (Table 3).

Low self-esteem and obvious sleep disorders were among the highest accompanying symptoms, especially in CRF patients, followed by asthma, and the lowest in DM.

Psychological distress

Anxiety levels

Table 4 and Fig. 1 present the results of anxiety as measured by the Arabic version of Children Anxiety Scale among both males and females.

With regard to the implementation of age factor the following data were perceived (Table 5 and Fig. 2).

The presence of medical complications because of the three diseases studied had an impact on the level of anxiety among children. The results are presented in Table 6 and Fig. 3.

The Children Depression Inventory

Levels of depression were analyzed using the Arabic version of Children Depression Inventory; the results obtained are presented in Table 7 and Fig. 4 comparing levels of depression among males, females, and controls.

Again, age had an impact and was also included in the study as presented in Table 8 and Fig. 5.

Complications because of the diseases had positive effects on the levels of depression according to the data presented in Table 9 and graphically shown in Fig. 6.

Table 1 Age range of children with chronic diseases

	Asthma	Diabetes mellitus	Chronic renal failure	ANOVA	
				<i>F</i> -test	<i>P</i> -value
Range	5–12	5–16	8–17	17.325	0.009
Mean \pm SD	8 \pm 1.95	10.95 \pm 3.47	14.5 \pm 2.58		

ANOVA, analysis of variance.

Table 2 Demographic data of children with chronic diseases

	<i>N</i> (%)				<i>F</i> -test	<i>P</i> -value
	Asthma	Diabetes mellitus	Chronic renal failure	Control		
Sex					0.14	0.93
Male	9 (45)	11 (55)	12 (60)	10 (50)		
Female	11 (55)	9 (45)	8 (40)	10 (50)		
Socioeconomic level					4.24	0.02*
Low	17 (85)	16 (80)	19 (95)	12 (60)		
Moderate	3 (15)	4 (20)	1 (5)	8 (40)		
Education level					5.3	0.03*
Never joined school	0 (0)	1 (5)	1 (5)	0 (0)		
Discontinued	2 (10)	2 (10)	7 (35)	0 (0)		
Still at school	18 (90)	17 (85)	12 (60)	20 (100)		

*Significant.

Table 3 Incidence of other psychological morbidities in children with chronic diseases

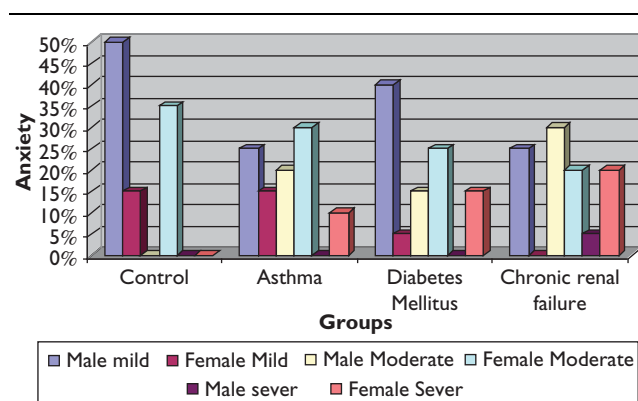
	<i>N</i> (%)			χ^2	<i>P</i> -value
	Asthma	Diabetes mellitus	Chronic renal failure		
Low self-esteem	5 (25)	5 (25)	11 (55)	6.33	0.03*
Social isolation	5 (25)	6 (30)	4 (20)	0.53	0.76
Aggression	2 (10)	2 (10)	1 (5)	0.44	0.8
Sleep disorders	8 (40)	6 (30)	14 (70)	6.96	0.03*
Suicidal thoughts	0 (0)	1 (5)	4 (20)	5.9	0.04*

*Significant.

Table 4 Comparison of anxiety between normal children and children with different chronic diseases

Groups	Anxiety	Sex [N (%)]			χ^2	P-value
		Male	Female	Total		
Asthma	Mild	5 (25)	3 (15)	8 (40)	2.93	0.05*
	Moderate	4 (20)	6 (30)	10 (50)		
	Severe	0 (0)	2 (10)	2 (10)		
Diabetes mellitus	Mild	8 (40)	1 (5)	9 (45)	1.15	0.54
	Moderate	3 (15)	5 (25)	8 (40)		
	Severe	0 (0)	3 (15)	3 (15)		
Chronic renal failure	Mild	5 (25)	0 (0)	5 (25)	2.63	0.04*
	Moderate	6 (30)	4 (20)	10 (50)		
	Severe	1 (5)	4 (20)	5 (25)		
Control	Mild	10 (50)	3 (15)	13 (65)	2.84	0.08
	Severe	0 (0)	7 (35)	7 (35)		

*Significant.

Figure 1

Comparison of anxiety between normal children and children with different chronic diseases.

Table 5 Effect of age on anxiety in normal children and children with different chronic diseases

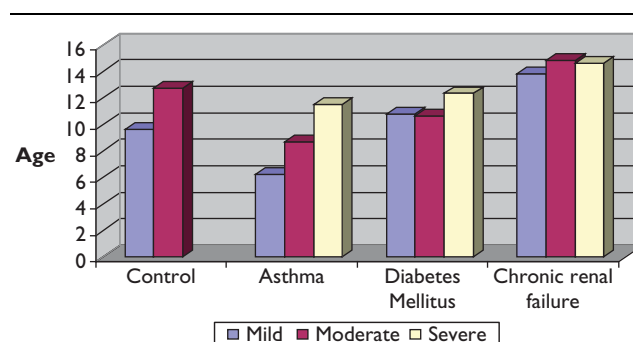
Conditions	Anxiety	Age (years)		ANOVA	
		Range	Mean \pm SD	F-test	P-value
Asthma	Mild	5–7	6.25 \pm 0.87	25.31	<0.001*
	Moderate	7–10	8.7 \pm 1.16		
	Severe	11–12	11.5 \pm 0.71		
Diabetes mellitus	Mild	5–16	10.78 \pm 3.9	0.26	0.77
	Moderate	6–14	10.63 \pm 3.29		
	Severe	9–16	12.33 \pm 3.51		
Chronic renal failure	Mild	8–17	13.8 \pm 3.77	0.23	0.79
	Moderate	12–17	14.8 \pm 1.55		
	Severe	9–17	14.6 \pm 3.36		
Control	Mild	5–16	9.62 \pm 3.64	3.74	0.07
	Moderate	9–17	12.71 \pm 2.93		

ANOVA, analysis of variance.

*Significant.

Discussion

The interaction between illness and psychological adjustment is better conceptualized as a complex system of feedback loops rather than a simple unidirectional influence. Although chronic illness in childhood and adolescence may increase the risk of emotional and behavioral problems, these may in turn have a profound influence on the morbidity and even mortality associated with the physical illness [24].

Figure 2

Effect of age on anxiety in normal children and children with different chronic diseases.

Table 6 Effect of complications on anxiety among normal children and children with different chronic diseases

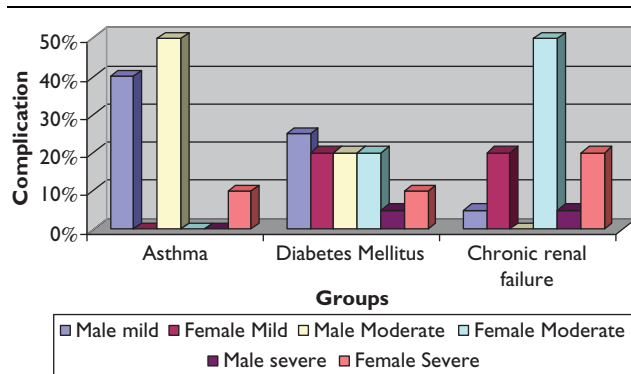
Groups	Anxiety	Complications			χ^2	P-value
		Negative	Positive	Total		
Asthma	Mild	8 (40)	0 (0)	8 (40)	20.25	<0.001*
	Moderate	10 (50)	0 (0)	10 (50)		
	Severe	0 (0)	2 (10)	2 (10)		
Diabetes mellitus	Mild	5 (25)	4 (20)	9 (45)	1.87	0.050*
	Moderate	4 (20)	4 (20)	8 (40)		
	Severe	1 (5)	2 (10)	3 (15)		
Chronic renal failure	Mild	1 (5)	4 (20)	5 (25)	2.64	0.049*
	Moderate	0 (0)	10 (50)	10 (50)		
	Severe	1 (5)	4 (20)	5 (25)		

*Significant.

Chronic illness in children has a devastating influence on the child and his/her family. The child has to cope with illness, medication, and its influence on his/her development. Consequently, many of these children develop emotional disorders that influence the course and outcome of physical disorders.

The patients included and the normal controls ranged in age between 5 and 18 years (32 males and 28 females). The majority of patients were from low socioeconomic levels and are still in education.

Figure 3



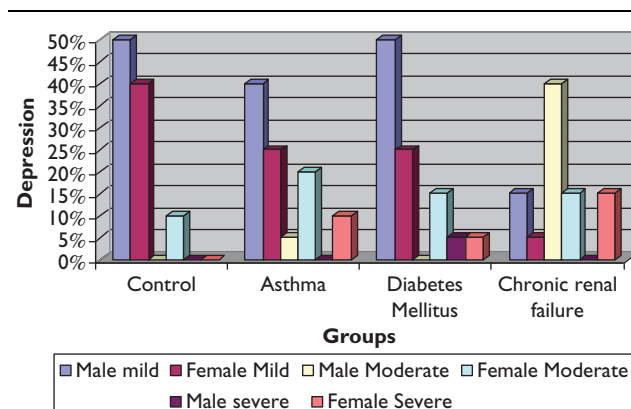
Effect of complications on anxiety among normal children and children with different chronic diseases.

Table 7 Comparison of depression in normal children and children with different chronic diseases

Groups	Depression	Sex [N (%)]			χ^2	P-value
		Male	Female	Total		
Asthma	No	8 (40)	5 (25)	13 (65)	1.54	0.47
	Mild	1 (5)	4 (20)	5 (25)		
	Moderate	0 (0)	2 (10)	2 (10)		
Diabetes mellitus	No	10 (50)	5 (25)	15 (75)	1.50	0.25
	Mild	0 (0)	3 (15)	3 (15)		
	Moderate	1 (5)	1 (5)	2 (10)		
Chronic renal failure	No	3 (15)	1 (5)	4 (20)	2.60	0.031*
	Mild	8 (40)	3 (15)	11 (55)		
	Moderate	0 (0)	3 (15)	3 (15)		
Control	No	10 (50)	8 (40)	18 (90)	1.49	0.27
	Mild	0 (0)	2 (10)	2 (10)		
	Severe	0 (0)	2 (10)	2 (10)		

*Significant.

Figure 4



Comparison of depression in normal children and children with different chronic diseases.

Several psychological morbidities were present in the patients studied. In diabetic children, low self-esteem was found in 25% of the patients, social isolation in 30%, sleep disorders in 30%, aggression in 10%, and suicidal

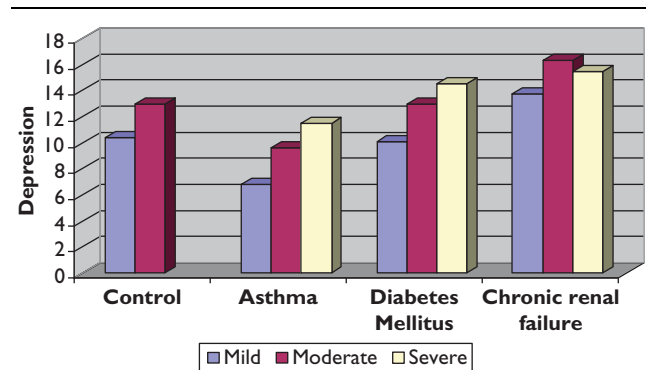
Table 8 Effect of age on depression among normal children and children with different chronic diseases

Conditions	Depression	Age (years)		ANOVA	
		Range	Mean \pm SD	F-test	P-value
Asthma	Mild	5–9	6.85 \pm 1.14	26.69	<0.001*
	Moderate	9–10	9.6 \pm 0.55		
	Severe	11–12	11.5 \pm 0.71		
Diabetes mellitus	Mild	5–15	10.07 \pm 3.26	2.35	0.13
	Moderate	9–16	13.0 \pm 3.61		
	Severe	13–16	14.5 \pm 2.12		
Chronic renal failure	No	14–16	14.75 \pm 0.96	2.64	0.03*
	Mild	8–17	13.73 \pm 3.17		
	Moderate	16–17	16.33 \pm 0.58		
Control	Severe	14–17	15.5 \pm 2.12	0.87	0.36
	Mild	5–16	10.44 \pm 3.51		
	Moderate	9–17	13 \pm 5.66		

ANOVA, analysis of variance.

*Significant.

Figure 5



Effect of age on depression among normal children and children with different chronic diseases.

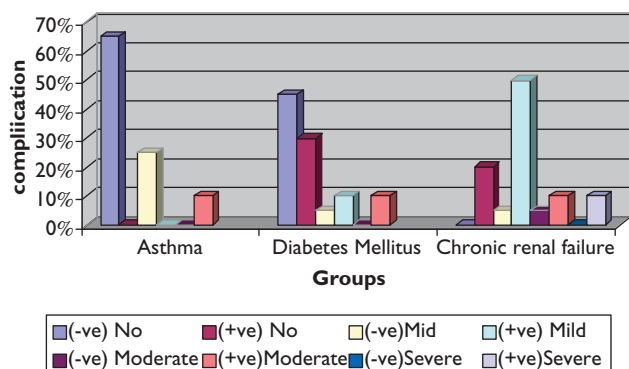
Table 9 Effect of complications on depression among normal children and children with different chronic diseases

Groups	Depression	Complications [N (%)]			χ^2	P-value
		Negative	Positive	Total		
Asthma	No	13 (65)	0 (0)	13 (65)	15.36	0.002*
	Mild	5 (25)	0 (0)	5 (25)		
	Moderate	0 (0)	2 (10)	2 (10)		
Diabetes Mellitus	No	9 (45)	6 (30)	15 (75)	2.93	0.23
	Mild	1 (5)	2 (10)	3 (15)		
	Moderate	0 (0)	2 (10)	2 (10)		
Chronic renal failure	No	0 (0)	4 (20)	4 (20)	2.1	0.03*
	Mild	1 (5)	10 (50)	11 (55)		
	Moderate	1 (5)	2 (10)	3 (15)		
	Severe	0 (0)	2 (10)	2 (10)		

*Significant.

thinking in only one patient. Among asthmatic children, low esteem was recorded in 25% of the patients, social isolation in 25%, sleep disorders in 40%, and aggression in 10%. Patients on regular hemodialysis had low self-esteem (55%), social isolation (20%), sleep disorders (70%), aggression (5%), and suicidal thinking (20%). Sometimes, these children are unable to understand why

Figure 6



Effect of complications on depression among normal children and children with different chronic diseases.

they are sick and believe it is some sort of punishment, and thus become angry and resentful.

Although improvements in hemodialysis techniques result in prolongation of the life course of patients, these patients become dependent on dialysis procedures as part of their daily lives and they require the continuous support of medical personnel, their family, and relatives. This can lead to depression, anxiety, decreased quality of life as well as loss of self-esteem [40].

Psychological distress, mainly anxiety and depression, among children with chronic diseases was assessed in this study. There was a significant increase in anxiety scores in patients with chronic disease compared with the controls ($P = 0.028$); yet, there was no significant difference between the different groups of children with chronic illnesses. Mostly, levels of anxiety were found to be moderate (50% in asthma; 40% in DM; and 50% in ESRD). Nevertheless, 25% of ESRD manifested severe levels of anxiety. Similarly, Cukor *et al.* [33] reported a 46% prevalence of anxiety disorders in a sample of hemodialysis patients. Moreover, these children become more aware of their difference from others in terms of diet or activity levels and impaired functional status. Another reason for this distress was the amount of time required for medical needs, frequent hospitalization, and the severity and complications of the illness. The high incidence of severe anxiety among end-stage renal failure may be because of the fact that hemodialysis therapy includes multiple scars, needle punctures, disfiguring fistula, and arteriovenous shunts, which all have devastating effects on the child. Changes in lifestyle and exposure to medications could be a factor responsible for the severe anxiety accompanying chronic diseases.

Separation anxiety from home or from those to whom the individual is attached is most often observed in younger children and in children who undergo prolonged hospitalization [11]. They may experience nightmares, be terrified that some calamity will befall them, or experience physical symptoms such as headaches and nausea, eventually leading to post-traumatic stress disorders.

Compared with other chronic conditions, children with asthma are at a higher risk for psychological problems, especially internalizing problems (anxiety and depression) and psychiatric disorders [41]. In addition, exposure to stress and strong emotions can exacerbate asthma; thus, the patient may be at an increased risk of developing anxiety disorders [42]. Comorbid psychiatric disorders have also been linked to more severe asthma, prolonged hospitalization, and increased use of steroids [43]. Other additional factors would be frequent admissions to hospital, inability to work, and limitations in other activities [44].

In terms of sex differences, there was a significant difference between male and female patients in anxiety among asthmatic and ESRD children as female patients with chronic diseases showed higher prevalence of anxiety than males. These results were in agreement with those reported by Lock and Barrett [45] and Allen *et al.* [46].

As regards to age, anxiety disorders seem to be directly proportional in children with increased age without improvement in disease symptom. This was especially more evident among asthmatic children; yet, it persistently increased with the other diseases (DM and CRF).

The longer duration of disease was an additional factor for the higher significant increase in the development of anxiety. Severity of the disease increased anxiety considerably in patients with complications; four (20%) patients with severe ESRD, two (10%) diabetic patients with complications, and two (10%) asthmatic patients developed severe levels of anxiety.

Considering that behavioral problems of children and adolescents with asthma such as depression, anxiety, sleep disorders, social isolation, or aggression make asthma management more difficult, an optimal treatment of patients with asthma should address the issue of comorbid emotional and/or behavioral symptoms [47].

Meanwhile, the symptoms of anxiety increased with an increase in age without improvement in symptoms of the disease and the longer the duration was. Furthermore, there was a significant increase in anxiety levels as severe anxiety was found more frequently in the presence of complications (20% of CRF; 10% of diabetics; and 10% of asthmatics).

Concurrent results for depressive disorders indicated a significant increase among patients with chronic diseases (90%) compared with healthy ones, among whom only 10% presented had mild depression. Yet, there was no significant difference in depression among the three groups ($P = 0.049$), with a significant increase in patients on regular hemodialysis, among whom 80% had depression (55% mild, 15% moderate, and 10% severe). These results were in agreement with those of Mollaoglu [48], who reported a rate of depression of 62% in Turkey, Anees *et al.* [49], who reported a rate of depression of 72% in Pakistan, Cukor *et al.* [50], who reported a rate of depression of 20% in Central Brooklyn, and Hedayati *et al.* [51], who reported a rate of depression of 27% in the USA. Nevertheless, the wide variation in results may be because of the different types of assessment performed

for depression and socioeconomic factors affecting patients in different geographical regions.

The routine of dialysis treatment might have had an impact on the feeling of hopelessness that in turn may have led to episodes of depression [52]. Another factor may be the delay in appearance of secondary sexual characters, decrease in physical health, the fact that they are dependent on others, having a life-threatening condition, or making changes in lifestyle, all of which may contribute toward the development of depression in this vulnerable group.

Depression was found to be prevalent in asthmatic children; 25% had mild and 10% had moderate depression. The medications and repeated hospitalizations may have played a role in the development of depression.

However, among the diabetic patients, 15% had mild and 10% had moderate depression. Poor glycemic control in pediatric type I DM is associated with lower socioeconomic status and depression. The probability of depression increases as glycemic control worsens. Therefore, screening for depression should be carried out routinely in patients with type I DM, targeting patients with deteriorating glycemic control [53].

In terms of sex differences, female patients with chronic diseases showed a higher prevalence of depression than males, with a significant difference between female and male patients on regular dialysis; 10% of the patients had severe depression and 15% had moderate depression, and males showed negative signs of depression. This is in agreement with the results of Allen *et al.* [46], who reported that females are at a two-fold higher risk of experiencing a major depressive episode than males. Although it is unknown why this occurs, some experts have found that the airway size of young males is smaller than that of females, which may contribute toward increased risk of wheezing after a cold or other viral infections.

However, Bakr *et al.* [54] who carried out a study in Egypt on children with CRF, reported that there was no correlation with sex. The difference was not significant between male and female patients in asthmatic and diabetic groups.

Depression was found to increase with patient age among those without any improvement in disease symptoms in asthma and patients on regular dialysis. Nevertheless, Bakr *et al.* [54], found no relation between either depression or anxiety and age.

A considerable increase in depression was found with longer duration of disease, that is, more than 1 year. A similar increase was found between patients on regular hemodialysis and asthmatic patients as 10% of patients with severe ESRD developed severe depression. Again, an increase in anxiety and depression was found among patients with chronic diseases who were noncompliant to treatment.

Glazebrook *et al.* [55] reported that two-thirds of children with asthma stated that asthma stopped them from

participating in sports and limited their activity on the basis of reports of an average of two fewer activities per day than children without asthma. Also, the lifestyle changes made by patients with CRD are numerous. Changes in self-image caused by edema, skin changes, and access devices lead to further anxiety and depression [31]. These observations may be attributed to the fact that children on dialysis experience more distressing physical symptoms, are on more medications, and depend on machines that could malfunction at any time. In addition, they receive more attention from physicians and parents, meaning more fostered dependency, thus decreasing their functionality. Accordingly, they realize that their physical health and even their lives are in danger. This alarms and augments their psychological resources to cope with these stresses [56].

Also, the awareness of morbidity and mortality and fear of death are significant and may result in risk-taking behaviors, antisocial behavior, avoidance, and refusal to attend school.

Conclusion

The present study shows that children with chronic diseases experience significantly more psychological distress than healthy children. Underrecognition of psychological disorders is a major concern in children with chronic diseases. Nevertheless, treatment of such disorders in patients with chronic diseases has received little attention, particularly with respect to psychological interventions.

It is highly recommended that patients with chronic disease undergo continuous follow-up by psychiatrists and medical specialists together with routine screening for anxiety and depression. This may lower the incidence of complications of asthma, DM, and end-stage renal failure. Again, periodic meeting with parents of children with chronic diseases is advisable to teach them how to deal with the psychological problems to facilitate early detection and management of psychological disorders.

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Conflicts of interest

There are no conflicts of interest.

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ملخص

القلق والاكتئاب بين الأطفال المصابين بأمراض مزمنة

يتم تعريف المرض النفسي بأنه وجود تشوهات المعوقة في السلوك والمشاعر والعلاقات التي تعرقل الوظائف الشخصية والاجتماعية. وفقا لذلك، تم تصميم هذه الدراسة لمناقشة هذه القضية من هذا القبيل. وقد أدرج عدد 60 [32 ذكر و 28 أنث] من المرضى الذين تتراوح أعمارهم ما بين 5 – 17 سنة من قسم طب الأطفال في مستشفى جامعة بنها ومستشفى منصور الجامعي للأطفال بمصر، في هذه الدراسة كان 40 مريضا يعانون من أمراض مزمنة (أكثر من سنة واحدة) مثل الربو (A) (ذكور 9 مقابل الإناث 11)، داء السكري (DM) (ذكور 11 مقابل الإناث 9) أو الفشل الكلوي المزمن (CRF) على نظام غسيل كلوي (ذكور 12 مقابل الإناث 8) بينما ال 20 الأخرى كانت من الأصحاء. خضع كل مريض إلى أخذ التاريخ الطبي الكامل من العمر، والجنس، والتعليم، والحالة الاقتصادية والاجتماعية، نمط النوم، واضطرابات النوم، وتاريخ الأعمال العدوانية، وتاريخ احترام الذات، والتشخيص مع التركيز بشكل خاص على بدء المرض والمدة، وتكراره ومضاعفاته والعلاج. تم إجراء التقييم النفسي للأطفال باستخدام مقياس القلق للأطفال (النسخة العربية) ومقياس الاكتئاب للأطفال (النسخة العربية). وتم التوقيع على موافقة خطية من قبل والديهم. وجاءت غالبية الحالات من المستويات الاجتماعية والاقتصادية المنخفضة ومازالوا في مجال التعليم. وتؤكد النتائج الحالية للأمراض النفسية المصاحبة وجود عدم ثقة بالنفس في 25% من حالات مرض الربو، 25% من مرضى السكري، 55% من مرضى الفشل الكلوي؛ العزلة الاجتماعية في 25% من مرضى الربو، 20% من مرضى السكري، 20% من مرضى الفشل الكلوي؛ اضطرابات النوم في 40% من مرضى الربو، 30% من مرضى السكري، 70% من مرضى الفشل الكلوي؛ العدوانية في 10% من مرضى السكري، 10% من مرضى السكري، 5% من مرضى الفشل الكلوي؛ أفكار انتحارية في 20% من مرضى الفشل الكلوي كانت هناك زيادة كبيرة في درجات القلق بين المرضى الذين يعانون من الأمراض المزمنة ($P = 0.028$ قيمة) مع عدم وجود فرق كبير بين المجموعات المختلفة من الأمراض المزمنة (50% في الربو، و 40% في السكري، و 50% في الداء الكلوي بمراحله الأخيرة). ومع ذلك، فقد عانى 25% من مرضى الداء الكلوي بمراحله الأخيرة بمستويات شديدة من القلق. كان هناك فرق كبير بين المرضى من الذكور والإناث في القلق بين الأطفال المصابين بالربو والداء الكلوي بمراحله الأخيرة حيث ثبت انتشار معدلات أعلى من القلق في الإناث عن الذكور. تناسبت اضطرابات القلق لدى الأطفال تناسباً طردياً مع زيادة العمر من دون تحسن في أعراض المرض حيث كان واضحاً بشكل خاص مع الأطفال المصابين بالربو إلا أنها زادت مع غيرها من الأمراض DM و CRF وكشفت خطورة طول مدة وشدة المرض في المرضى الذين يعانون من مضاعفات للمرض في القلق إلى زيادة ملحوظة حيث 20% من المرضى مع الداء الكلوي بمراحله الأخيرة، و 10% في مرضى السكري بمضاعفات و 10% بين مرضى الربو عانوا من مستويات عالية من القلق. وكشفت النتائج الحالية لاضطرابات الاكتئاب زيادة كبيرة بين المرضى (90%) مقارنة مع الأصحاء حيث قدم 10% فقط بمعدلات طفيفة من الاكتئاب. حتى الآن لم يكن هناك اختلاف كبير في الاكتئاب بين المجموعات الثلاث (ف = 0.049 قيمة) مع زيادة كبيرة في عدد المرضى للدلالة المنتظمة حيث سجلت 80% من الاكتئاب (55% معتدل، و 15% المعتدل والحاد 10%). وأظهرت النتائج انتشار الاكتئاب ما بين الإناث عن الذكور مع وجود اختلاف واضح بينهما في مرض الفشل الكلوي (10% اكتئاب حاد و 15% متوسط في الإناث). وسجلت النتائج زيادة مرض الاكتئاب مع زيادة عمر المريض الذي يفقد ظهور أعراض تحسن في مرض الربو والفشل الكلوي. وزيادة مطردة مع طول مدة المرض لأكثر من عام. ويشير البحث الحالي إلى أن الأطفال ذوي الأمراض المزمنة يعانون جري التحقق من زيادة كبيرة في تطوير الاكتئاب والمرض وشرع لمدة أطول أي أكثر من سنة واحدة. وتدل زيادة مماثلة بين المرضى على غسيل الكلى العادية ومرض الربو إلى 10% مع الداء الكلوي بمراحله الأخيرة شديدة المتقدمة الاكتئاب الحاد. في الختام، هذه الدراسة تكشف عن أن الأطفال مريضة مزمنة لديها الشدة النفسية بشكل ملحوظ أكثر من الأصحاء. ومن المستحسن جداً أن المرضى الذين يعانون من مرض مزمن يجب أن يخضع لمتابعة مستمرة من قبل الأطباء النفسيين والأخصائيين الطبيين جنباً إلى جنب مع الفحص الروتيني لتطوير القلق والاكتئاب. وهذا قد يقلل من حدوث مضاعفات الربو، مارك ألماني، ونهاية مرحلة الترددات اللاسلكية. اجتماع دوري مرة أخرى مع آباء الأطفال المريضة المزمنة ينصح لتعليمهم كيفية التعامل مع المشاكل النفسية لتقديم مفاتيح للكشف المبكر وإدارة اضطرابات نفسية.