

## Anxiety and Aggression Disorders of Children with Chronic Kidney Disease on Regular Hemodialysis

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**Abstract: Background:** Chronic hemodialysis is an established treatment of end stage renal disease which maintains the lives of individuals who otherwise would have succumbed to a uremic death. However, this method of treatment raises certain psychological, social and ethical issues, anxiety and aggression are the most common disorders. **Aim:** to evaluate psychological problems including aggression and anxiety disorders in children with chronic kidney disease (CKD) on regular hemodialysis compared to children with attention deficit hyperactive disorder (ADHD) and healthy children. **Patients And Methods:** this study included 20 children with CKD on regular hemodialysis, and 20 children with ADHD, they were selected from hemodialysis unit and psychiatric departments of AL –zahraa hospital, Al-Azher university. Also the study included 20 healthy children age and sex matched as a control group. Aggression and anxiety scores (CAS) were assessed for all the participated groups. **Results:** the mean aggression scores showed higher degrees in children with ADHD and CKD patients compared to the control group. Anxiety score was higher in CKD patients on regular hemodialysis compared to children with ADHD and the control group. Aggression and anxiety has been found in 100% of CKD patients. A significant positive correlations between the presence of aggression and anxiety and the duration of hemodialysis. **Conclusion:** psychiatric disorders, mainly anxiety are prevalent in our CKD patients on regular hemodialysis. A significant positive correlation between aggression and anxiety scores and the duration of hemodialysis so bring attention to the severity of medical illness that can be of great influence in the child behavior and planning treatment strategies is essential to improve treatment outcome.

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### 1. Introduction

Chronic disease of childhood may have implications for the psychosocial well-being of children and their families. <sup>(1)</sup>About 5 to 10 per cent of all children have sometimes during childhood a moderately to severely handicapping long-term illness or disability. These children are at risk, not only medically, but for complex social, educational, and emotional difficulties. The potential interferences with normal development imposed by a chronic illness are varied but pervasive, and depend on the specific characteristics of the illness, the child, and the child's family. <sup>(2)</sup>

Chronic kidney disease (CKD, is a progressive loss in renal function over a period of months or years. The symptoms of worsening kidney function are non-specific, often, (CKD) is diagnosed as a result of screening of people known to be at risk of kidney problems, such as those with high blood pressure or diabetes and those with a relative with chronic kidney disease. Chronic kidney disease may also be identified when it leads to one of its recognized complications, such as cardiovascular disease, anemia or pericarditis. <sup>(3)</sup>

Children with CKD often experience a series of body habits changes from the condition itself and

from the immunosuppressive therapy used to treat it. Polyuria and polydipsia, with subsequent enuresis; kidney disease-related edema; CKD-related growth impairment; and devices placed in the body, including those used for feeding or dialysis access, all influence the physical, emotional, and sexual growth of these children. These physical side effects distinguish them from their peers and take a toll on self-esteem. <sup>(4)</sup>

Advances in medical care, including improvements in dialysis and transplantation, have increased the survival rates for children with chronic renal failure (CRF). This long survival increases the opportunities for the development of psychiatric morbidity among these children <sup>(5)</sup>. The prevalence as well as the pattern of psychiatric disorders among children with CRF vary from one study to another <sup>(5-8)</sup>.

The aim of the study was to assess the common psychological disorders including aggression and anxiety scores in children with CKD on regular hemodialysis at Al-Zahraa hospital, Al-Azher university and compared them to children with ADHD and the control group.

### 2. Patients and Methods:

Across section comparative study included 20 patient with CKD on regular hemodialysis, they were dialyzed for 4 hours/ setting, 3 times weekly;

they were 12 males and 8 females, their ages ranged from 5-15 years with a mean of (10.52 years), the most common cause of CKD group was unknown (30%) followed by reflux nephropathy (20%) and chronic nephritis. The mean duration of dialysis was (1.9±1.3years)and the mean Kt/V (1.52±0.219), Kt/V (accepted nomenclature for dialysis dose), "K" represents urea clearance, "t" represents time, and "V" represents volume of distribution for urea,20 children with ADHD, their age ranged from (5-15years)with mean age(8.070 years), also 20 of apparently healthy, age and sex matched included as a control group. Severely depressed, mental retarded children with family troubles(single parents,ill-treat), congenital anomalies, any medical problems other than CKD and ADHD were excluded from the study.This study was carried on pediatrics hemodialysis unit &psychiatric department of Al-Zahraa hospital, Al-Azhar university, Cairo, Egypt. Informed consent was obtained from the participating patients or their parents in adherence with the guidelines of the ethical committee of AL-Zahraa hospital, AL-Azher University, Cairo, Egypt.

All studied groups were subjected to:

- 1- Full history taking with detailed renal history for patients including: duration and etiology of chronic kidney disease. duration of dialysis, drug, history of any other diseases
- 2- Full general and local clinical examination
- 3- Laboratory investigations including: CBC, CRP.
- 4- Psychiatric interview for children and screening of ADHD: With a screening questionnaire (the modified Arabic version of the Connors ADHD Index).
- 5- Psychological assessment: children completed the questionnaire about anxiety and aggression, using children manifest the anxiety Scale (CMAS)/, and aggression scales of children.

a-Children anxiety scale. was filled by all the patients. This scale was developed by Castaneda et al. <sup>(9)</sup> It

consists of 53 items and each item consists of one statement which has two answers yes or no.(i)If the answer is (Yes) the degree = 1(ii)If the answer is (No) the degree = zero

Total score ranges from (0–53) According to their scores, they were classified into mild, moderate and severe degrees. <sup>(9)</sup>

(i)Mild anxiety is less than 18

(ii)Moderate anxiety is from 19–28

(iii)Severe anxiety is more than 29

This Scale translated to Arabic and take validity and reliability by <sup>(10)</sup>.

b-Aggression Questionnaire (AQ).The Aggression scale consists of 3 factors, Physical Aggression (PA), Verbal Aggression (VA), and Hostility (H). The total score for aggression is the sum of the factor scores. <sup>(11)</sup>

: Using the 4 point scale, indicate how uncharacteristic or characteristic each of the following statements is in describing patient. 0 = extremely uncharacteristic of me 1 = somewhat uncharacteristic of me 2 = somewhat characteristic of me 3 = extremely characteristic of me

According to their scores, they were classified into low, moderate and high degrees<sup>(11)</sup>

. AQ Score ranges are:

None: 0–28 T Low: ≤29 T–39 T

Moderate: 40 T–59 T High: 60 T: ≥70 T.

**Statistical Analysis**

The data were collected, revised and entered to the statistical package for social science (SPSS) version 16. The Kolmogorov-Smirnov test was used to check for normality in the continuous variables. All results were expressed as mean ± SD. Comparisons between groups were made using independent t-tests. Significance was assumed for *p* values of less than 0.05.

**3. Results:**

The results are shown in Tables 1-6 and Figure 1

Table (1): Comparison between patients and the control groups regarding age, sex and anthropometric measurements. It shows that no statistically significant difference regarding age, sex weight, height and BMI values between comparing groups.

Variable	CKD no=20	ADHD no=20	Control no=20	ANOVA		
	Mean ±SD	Mean± SD	Mean ±SD	F	<i>p</i> -value	Sig
Age y	10.525±3.477	8.070±3.333	8.910±3.416	2.679	0.077●	NS
Sex n%						
Male	12(60.0%)	12(60.0%)	12(60.0%)	0.000	1.000●	NS
Female	8(40.0%)	8(40.0%)	8(40.0%)			
Wt/kg	25.475±10.376	35.390±15.027	30.716±13.560	2.853	0.066●	NS
Height/cm	111.400±21.072	123.800±27.037	129.025±23.560	2.842	0.067●	NS
BMI	16.880±3.577	16.775±2.889	17.515±2.514	0.350	0.706●	NS

Table (2): Comparison between patients groups and the controls regarding CBC, and CRP. It shows that a highly statistically significant decrease in the number of total leucocytes and platelet counts and decrease in the mean hemoglobin level in CKD patients compared to the patients with ADHD and the controls. A highly significant increase in CRP in CKD patients compared to patients with ADHD and the control group.

Variable	CKD no=20	ADHD no=20	Control no=20	ANOVA		
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	F	p -value	Sig
WBCs/cmm	5.539 $\pm$ 2.782	7.935 $\pm$ 2.237	8.085 $\pm$ 2.384	6.645	0.01**	HS
Hb gm/dl	9.065 $\pm$ 1.645	10.895 $\pm$ 1.897	12.215 $\pm$ 0.965	20.749	0.01**	HS
Platelet/cmm	230.750 $\pm$ 43.988	245.750 $\pm$ 77.199	286.700 $\pm$ 54.617	4.626	0.01**	HS
CRP: n (%)						
Negative	11(55%)	20(100%)	20(100%)	21.176	0.01**	HS
Positive	9(45%)	0 (100%)	0 (0%)			

Table (3) Comparison between the three studied groups regarding aggression and anxiety ;it revealed that a highly significant increase in aggression disorder in patients with ADHD compared to CKD patients and the control group and also there was a significant increase in aggression score in CKD patients compared to the control group.Regarding anxiety, there was a high anxiety score in CKD patients group compared to patients with ADHD and the controls.

		Mean	SD	Minimum	Maximum	F	p -value
Aggression disorder	CKD	75.56	16.993	50	96	94.288	0.01
	ADHD	110.33	11.325	93	125		
	Control	31.56	5.411	24	41		
Anxiety disorder	CKD	36.44	6.064	25	44	49.181	0.01
	ADHD	20.44	4.825	15	27		
	Control	13.78	3.801	9	21		

Table (4): Comparison between patients with CKD and ADHD children regarding severity of aggression score. it revealed that 75%of CKD patients of high aggression score, while 100%of ADHD patients of high aggression score.

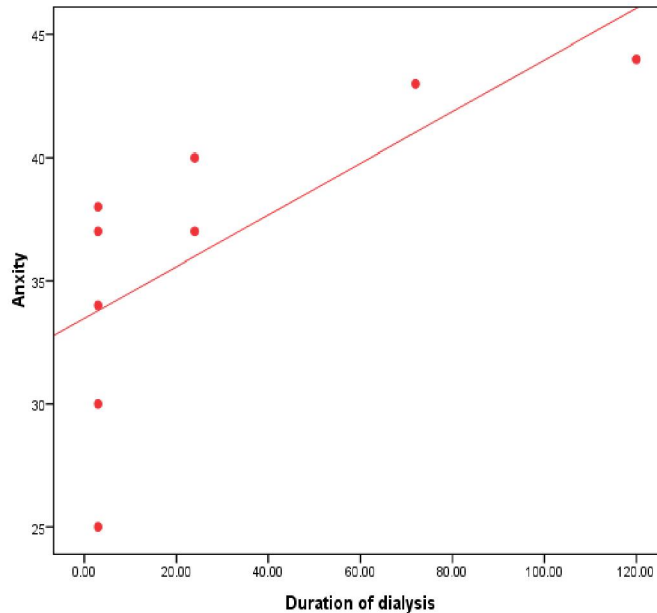
Aggression score	CKD patients		ADHD patients		Chi-square test	
	No.	%	No.	%	X <sup>2</sup>	p -value
Mild	0	0	0	0	2.25	0.134
Moderate	5	25	0	0		
High	15	75	20	100.00%		
Total	20	100.	20	100.00%		

Table (5): Comparison between patients with CKD and ADHD group regarding anxiety score. it shows that 100%of patients with CKD have anxiety disorders,75%of them of sever degree and the remaining of moderate degree,while 55% of patients with ADHD of moderate degree of anxiety.

Anxiety	CKD patients		ADHD patients		Chi-square test	
	No.	%	No.	%	X <sup>2</sup>	p -value
Mild	0	0	9	45%	14.667	0.01
Moderate	3	15%	11	55%		
Severe	17	85%	0	0.00%		
Total	20	100.00%	20	100.00%		

Table(6):Correlation between aggression and anxiety disorders with the studied parameters in CKD patients. it shows a positive correlation between aggression and anxiety disorders and the duration of hemodialysis.

Variable	Aggression		Anxiety	
	r	p -value	r	p -value
Age	0.432	0.246	0.440	0.236
Duration of dialysis	0.844**	0.004	0.815**	0.007
Kt/V	0.189	0.627	0.246	0.524
Wt	-0.081	0.836	-0.261	0.498
Hb	0.427	0.252	0.458	0.215



Fig(1). Shows a positive correlation between anxiety disorder and the duration of hemodialysis

#### 4. Discussion:

In the last decades there was a striking improvement in survival of children with chronic kidney disease. As life expectancy has increased in children with CKD, concern has risen about its physical, psychological, and social consequences.<sup>(12)</sup>

To describe the psychological problems in children with chronic kidney disease (CKD) on regular hemodialysis, we studied aggression and anxiety scores in 20 patients with CKD on regular hemodialysis, 20 patients with diagnosis of attention deficit hyperactive disorder (ADHD), and 20 control children. All three groups were subjected to psychiatric interview of children, children anxiety scale (CAS) and aggression questionnaire (AQ).

For (AQ) scale, it was a logical to find that the mean score of the aggression was significantly higher in children with ADHD when compared to children with CKD on regular hemodialysis and the control group and the aggression score was higher in CKD patients compared to the control group. Surprisingly we found that the mean score of the anxiety scale was significantly higher in children with CKD when compared to the controls and children with ADHD. Anxiety is a normal phenomenon that has evolutionary value. Anxiety has both a physiologic component, mediated by the autonomic nervous system, and a cognitive and behavioral component, expressed in worrying and wariness. When anxiety becomes disabling, interfering with social interactions and development, a diagnosis should be made and intervention initiated.<sup>(13)</sup> We found that the levels of

anxiety and aggression disorders has been reported in 100% of CKD patients, this surprising results can be explained by children with CKD often suffer from growth retardation and bone deformity due to osteodystrophy anemia and chronic inflammatory state. Stigmata of hemodialysis therapy include multiple scars, needle puncture marks, and disfiguring fistula or arteriovenous shunts, which are particularly devastating. These problems are often exacerbated by the delay in the emergence of secondary sex characteristics that often accompanies uremia. These negative changes in body image exacerbate the child feelings of being different and result in alienation of the peer group. For these reasons, children and adolescents with CRF are liable to have psychiatric morbidity.<sup>(14–16)</sup>

**Squalli et al**<sup>(17)</sup> reported the level of anxiety in maintenance hemodialysis patients has been observed to be as high as 69.3% by and 85.1%.<sup>(18)</sup> The associated psychological and sociological factors add to the stress in addition to the underlying chronic disease. A number of psychosocial problems like loss of freedom due to dependency on machine<sup>(19)</sup> social adjustment problems, deterioration in psychomotor performances, mental functions and perceptual performances add on to lead to an anxiety state<sup>(20–24)</sup>

This results are in line with study done by **Bakr et al**.<sup>(25)</sup> Psychiatric assessment was done according to the DSM-IV TR criteria in 19 children with predialysis chronic renal failure (CRF) and 19 children with end-stage renal disease on regular hemodialysis. The prevalence rate of psychiatric

disorders in all the studied patients was 52.6%. Adjustment disorders were the most common disorders (18.4%), followed by depression (10.3%) and neurocognitive disorders (7.7%). Anxiety and elimination disorders were reported in 5.1 and 2.6%, respectively. The disorders were more prevalent ( $P=0.05$ ) in dialysis (68.4%) than in predialysis patients (36.8%). Also Many studies prove that adolescents affected by ESRD often experience anxiety and depression<sup>(14-16, 26, 27)</sup>. The difference in the prevalence rate of psychological disorders in the present study and the other studies due to the heterogeneity of the studied patients as well as the used tool of psychiatric assessment.

Several hypotheses have been suggested to explain this increase in the prevalence of mental disorders. In addition to the stress inherent to CKD and its treatment, studies have pointed out to other factors that contribute to the predisposition to psychiatric disorders in this group. Among them, we can mention the decrease in the levels of the brain-derived neurotrophic factor and the low serum levels of serotonin in CKD patients. They also present uremia, which can be associated with irritability, restlessness, insomnia and delayed development of secondary sexual features.<sup>(25,8)</sup> Also during hemodialysis, the blood-dialyzer interaction has the potential to activate mononuclear and dendritic cells, leading to production of inflammatory cytokines.<sup>(28)</sup> Several researchers support the supposition that proinflammatory cytokines are involved with depression in renal patients. In particular, there is evidence that depression is associated with interleukin IL-1, IL-6, tumor necrosis factor alpha (TNF- $\alpha$ ), and C-reactive protein (CRP) in both the general and ESRD populations.<sup>(29,30,31)</sup> This statement is in line with our study as 9(45%) of the studied cases had CRP positive. We found a significant positive correlation between the presence of psychiatric disorders and the duration of hemodialysis and we did not find any significant correlation between other factors such as age, sex, severity of anemia, or the efficiency or the duration of hemodialysis that the presence of these disorders were more likely explained by the difficulties encountered in living with CKD rather than by these demographic or physical factors. **In conclusion**, psychiatric disorders, mainly anxiety are prevalent in our patients with CKD on regular hemodialysis. These results call for more studies on a wide scale to find the relation between childhood anxiety and aggression disorders in CKD patients and then planning treatment strategies to improve treatment outcome. A comprehensive management plan that includes pharmacological and psychosocial interventions, is essential.

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