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ORIGINAL ARTICLE

Depression in Pre Dialysis Chronic Kidney Disease in Children and Adolescents in Zagazig University Hospitals

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ABSTRACT

Background: Chronic kidney disease (CKD) is a major health problem worldwide. Although relatively uncommon in children, it can be a devastating illness with many long-term consequences. Children with chronic kidney disease often have growth restriction, multiple surgical scars, and frequently miss school and other childhood activities.

Objectives: to investigate depressive symptoms in children and adolescents with CKD and compare these values to those of healthy controls.

Patients and Methods: This cross-sectional study was carried out on 50 child admitted at the Nephrology Unit of Pediatrics Department, Faculty of Medicine, Zagazig University and they were classified into: group 1 included 25 child with CKD based on the National Kidney Foundation's Kidney Disease Outcomes Quality Practice classification, 11 male and 14 female ranged ages from 9 to 18 years old from Pediatric Nephrology Unit. Group 2 included 25apparently healthy child, 11male and 14 female ranged matched to the patients group regarding to age and sex.

Results: There were significant differences between CKD and control groups regarding depression score and depression grade and there were a significant differences between CKD subclasses and control groups regarding depression score and depression grade.

Conclusions: The CKD contributing to a higher frequency of depression.

Keywords: Depression, Chronic Kidney Disease, Children And Adolescents.

INTRODUCTION

CKD is a major public health problem worldwide and extensive epidemiological research in the adult population is available. In contrast, little is known about the epidemiology of CKD in the pediatric population. ESRD is a devastating disorder associated with excessive mortality and cardiovascular morbidity, and specific problems occur in children, such as impaired growth and psychosocial adjustment, all of which severely impact upon the quality of life. [1] Chronic kidney disease (CKD) affects virtually every organ system and in so doing has a major impact not only on mortality but also on the quality of life (QOL) of children. Consequently, optimal care for the pediatric patient with CKD involves not only medical management but also the management of psychosocial and developmental factors that will ensure a pediatric patient's successful transition into adulthood. Simply surviving is not sufficient; the quality of survival has emerged as a fundamental focus of comprehensive healthcare. [2]In Egypt, the prevalence of dialysis patients has increased from 225 per million population (pmp) in 1996 to 483 pmp in 2008 (according to last Egyptian renal registry) and the main causes of ESKD in Egypt, other than diabetic nephropathy, included hypertensive kidney disease, chronic glomerulonephritis, unknown etiology, chronic pyelonephritis, schistosomal obstructive uropathy, and schistosomal nephropathy [3] Studies in pediatric patients with chronic illnesses have shown that this patient population has a higher prevalence of depression than healthy populations and that depression has a negative effect on the underlying medical condition. Studies of adults with CKD indicate a high risk of depression, with a prevalence between 20–40 %. [4]

Chronic illness is a risk factor for psychological problems, such as depressive symptoms. For example, the presence of physical symptoms, such

as pain and fatigue, combined with the need for disease management regimes, are likely to interfere with many aspects of daily life, such as regular school attendance and maintaining peer relations, and may cause frustration. Children with chronic illness may feel different from his peers and experience peer rejection, which may have detrimental effects on their self-concept [5].

Depressive and anxiety symptoms are important factors affecting prognostic outcome and quality of life (QoL) in individuals with CKD, including ESKD. Indeed, renal dialysis places a considerable burden on patients with CKD and often compromises their QoL, leading to high levels of anxiety and depression [6]

PATIENTS AND METHODS

This cross-sectional study was carried out in the Nephrology Unit of Pediatrics Department of Zagazig University department of pediatrics, Faculty of Medicine, Zagazig University on 50 children subdivided into 2 groups: group 1 included 25 children with CKD, 11 male and 14 female, their ages ranged from 9 to 18 years old admitted to the Pediatric Nephrology Unit. Group 2 included 25 apparently healthy child, 11male and 14 female ranged age from 9 to 18 years matched to cases regarding to age and sex during the period from April to October 2018. Sample was taken including all children patients with chronic kidney disease during the period of the study.Diagnostic criteria for CKD were based on the National Kidney Foundation's Kidney Disease Outcomes Quality Practice classification [7]. All patients in this study were subjected to: full history taking, full clinical examination. Laboratory investigations: serum levels of creatinine, hemoglobin, albumin, cholesterol, triglycerides, total calcium, phosphorus, bicarbonate, parathormone and uric acid; in addition, the ratio between protein and creatinine in spot urine. Assessment of psychiatric symptoms by the Children's Depression Rating Scale.The Children's Depression Rating Scale (CDRS) was used to determine the severity of depression in children 6-12 years of age. Items are measured on 3-, 4-, 5-, and 6-point scales. The CDRS is derived from the Hamilton Rating Scale for Depression (HAM-D); a score of 15 on the CDRS is equivalent to a score of 0 on the HAM-D.The patient is rated by a clinician on 17 to 29 items (depending on version) scored either on a 3-point or 5-point Likert-type scale. For the 17-item version, a score of 0-7 is considered to be normal. Scores of 20 or higher indicate moderate, severe, or very severe depression.[8] Written informed consent was obtained from all childers' parents and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University. The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.Statistical analysis: Data were analyzed using Statistical Program for Social Science (SPSS) version 23 (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as mean ± standard deviation (SD). Median and range were also calculated. Qualitative data were expressed as frequency and percentage.

RESULTS

As regard age and gender, residence, father's age, mother's age, father's education and mother's education there was no statistically significant difference between patients and control groups **(table 1)**. As regard Glomerular filtration rate (GFR) and Systolic blood pressure (SBP), there was a statistically significant difference between different CKD stages groups. As regard CKD etiology and CKD duration, treatment duration, weight, height, DBP, use of anti-hypertensive drug and number of used medications there was no statistically significant difference between different CKD stages groups **(table 2)**. there were significant differences between CKD and control groups regarding depression score and depression grade with the diseased group reported the highest scores **(table 3)**. There were a significant differences between CKD subclasses and control groups regarding depression score and depression grade **(table 4)**. There was significant difference between stage 2 of KCD and controls regarding depression score **(table 5)**. There was significant positive correlation between albumin and patients with no depression and while there was negative correlation between albumin and CKD patients with borderline depression. Also there was significant positive correlation between GFR and patients with no depression **(table 6)**

Table (1): Comparison between CKD patients and controls regarding the demographic and social data**.**

Demographic and social data	CKD group	Control group	Test	P-value (Sig.)
Count	**25**	**25**		
Age (years)				
Mean ± SD	10.1 ± 2.4	9.6 ± 2.3	1.266 •	0.205(NS)
Median (Range)	10 (9 – 18)	10 (9 – 18)		
Gender				
Male	11 (44%)	11 (44%)	<0.001 ‡	1.000(NS)

Demographic and social data	CKD group	Control group	Test	P-value (Sig.)
Count	**25**	**25**		
Female	14 (56%)	14 (56%)		
Residence				
Urban	18 (72%)	19 (76%)	0.104 ‡	0.747(NS)
Rural	7 (28%)	6 (24%)		
Father's age (years)				
Mean ± SD	50.1 ± 6.3	47.2 ± 5.2	1.737 *	0.089(NS)
Median (Range)	49 (40 – 60)	48 (34 – 58)		
Mother's age (years)				
Mean ± SD	43.2 ± 5.1	41.2 ± 6.2	1.120 •	0.263(NS)
Median (Range)	43 (31 – 50)	43 (28 – 49)		
Father's education				
Elementary	1 (4%)	0 (0%)	2.209 ‡	0.530(NS)
Preparatory	3 (12%)	1 (4%)		
Secondary	5 (20%)	6 (24%)		
College	16 (64%)	18 (72%)		
Mother's education				
Elementary	3 (12%)	0 (0%)	3.682 ‡	0.298(NS)
Preparatory	3 (12%)	3 (12%)		
Secondary	8 (32%)	7 (28%)		
College	11 (44%)	15 (60%)		
Consanguinity				
No	16 (64%)	19 (76%)	0.857 ‡	0.355(NS)
Yes	9 (36%)	6 (24%)		

* Independent samples Student's t-test. • Mann Whitney U test.‡Chi-square test. p< 0.05 is significant.Sig.: significance.

Table (2): The clinical characteristics of CKD in patients' group (n=25).

CKD	Stage I	Stage II	Stage III	Test	P-value (Sig.)
Count (%)	**17 (68%)**	**7 (28%)**	**1 (4%)**		
CKD etiology					
GN	16 (94.1%)	4 (57.1%)	1 (100%)	5.242 ‡	0.073(NS)
Congenital & UTI	0 (0%)	1 (14.3%)	0 (0%)	2.679 ‡	0.262(NS)
Others	1 (5.9%)	2 (28.6%)	0 (0%)	2.559 ‡	0.278(NS)
CKD duration (years)					
Mean ± SD	2.3 ± 0.9	2.7 ± 1.4	2 ± 0	0.473 K	0.789(NS)
Median (Range)	2 (1 – 4)	2 (1 – 5)	2 (2 – 2)		
Treatment duration (years)					
Mean ± SD	2.1 ± 0.9	2.5 ± 1.0	2 ± 0	0.673 K	0.714(NS)
Median (Range)	2 (1 – 3.5)	2 (1 – 4)	2 (2 – 2)		
GFR (mL/min/1.73 m^2)					
Mean ± SD	88.1 ± 5.0	81.7 ± 7.6	59 ± 0	10.779 K	0.005(S)
Median (Range)	90 (75 – 90)	80 (70 – 90)	59 (59 – 59)		
Weight (kg)					
Mean ± SD	24.8 ± 8.5	25.6 ± 11.1	45 ± 0	2.863 K	0.239(NS)
Median (Range)	22 (14 – 37)	22 (15 – 43)	45 (45 – 45)		
Height (cm)					
Mean ± SD	128.2 ± 11.2	131.1 ± 12.2	132 ± 0	0.191 A	0.827(NS)
Median (Range)	130 (105 – 142)	130 (115 – 153)	132 (132 – 132)		
SBP (mmHg)					
Mean ± SD	112.9 ± 7.9	123.6 ± 12.8	150 ± 0	6.423 K	0.040(S)
Median (Range)	110 (100 – 125)	125 (110 – 145)	150 (150 – 150)		
DBP (mmHg)					
Mean ± SD	71.5 ± 8.8	81.4 ± 11.4	90 ± 0	5.773 K	0.056(NS)
Median (Range)	70 (60 – 90)	85 (65 – 95)	90 (90 – 90)		

CKD	Stage I	Stage II	Stage III	Test	P-value (Sig.)
Count (%)	**17 (68%)**	**7 (28%)**	**1 (4%)**		
Use of anti-hypertensive drug					
No	2 (11.8%)	0 (0%)	0 (0%)	1.023 ‡	0.600(NS)
Yes	15 (88.2%)	7 (100%)	1 (100%)		
Number of used medications					
Three or less	14 (82.4%)	4 (57.1%)	0 (0%)	4.242 ‡	0.120(NS)
More than three	3 (17.6%)	3 (42.9%)	1 (100%)		

[A] One-way Anovatest.[K]Kruskal Wallis test.‡Chi-square test.p< 0.05 is significant.Sig.: significance.

Table (3): Comparison between CKD patients and controls regarding the prevalence of depression.

Prevalence of depression	CKD group	Control group	Test	P-value (Sig.)
Count	25	25		
Depression score				
Mean ± SD	21.7 ± 5.3	18.6 ± 3.3	2.241•	0.025(S)
Median (Range)	20 (15 – 32)	18 (15 – 28)		
Depression grade				
No depression	11 (44%)	19 (76%)	6.891 ‡	0.009(S)
Borderline depression	10 (40%)	6 (24%)		
Significant depression	4 (16%)	0 (0%)		

• Mann Whitney U test. ‡Chi-square test (Linear-by-Linear Association).p< 0.05 is significant.Sig.: significance.

Table (4): Comparison between CKD subclasses and controls regarding the prevalence of depression.

Prevalence of depression	Stage I	Stage II	Stage III	Control group	Test	P-value (Sig.)
Count	17	7	1	25		
Depression score						
Mean ± SD	19.7 ± 4.3	25.4 ± 5.0	30 ± 0	18.6 ± 3.3	13.141[K]	0.004(S)
Median (Range)	18 (15 – 28)	25 (19 – 32)	30 (30 – 30)	18 (15 – 28)		
Depression grade						
No depression	10 (58.8%)	1 (14.3%)	0 (0%)	19 (76%)	14.500 ‡	<0.001(HS)
Borderline depression	6 (35.3%)	4 (57.1%)	0 (0%)	6 (24%)		
Significant depression	1 (5.9%)	2 (28.6%)	1 (100%)	0 (0%)		

[K]Kruskal Wallis test.‡Chi-square test (Linear-by-Linear Association).p< 0.05 is significant.Sig.: significance.

Table (5): Pairwise comparison between CKD subclasses and controls regarding depression score.

Sample 1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Controls-Stage 1	-3.580	4.543	-.788	.431	1.000
Controls-Stage 2	-20.151	6.180	-3.261	.001	.007
Controls-Stage 3	-27.080	14.739	-1.837	.066	.397
Stage 1 – Stage 2	-16.571	6.490	-2.553	.011	.064
Stage 1 – Stage 3	-23.500	14.872	-1.580	.114	.684
Stage 2 – Stage 3	-6.929	15.450	-.448	.654	1.000

Table (6): Correlation analysis between depression score of different depression grades and some clinical and laboratory parameters within CKD patients (n=25).

Variable	No depression (n=11)		Borderline depression (n=10)		Significant depression (n=4)	
	r	P	R	P	r	p
Age (years)	0.022	0.950	0.494	0.146	0.775	0.225
Weight (kg)	-0.579	0.062	0.605	0.064	0.258	0.742

Variable	No depression (n=11)		Borderline depression (n=10)		Significant depression (n=4)	
	r	P	R	P	r	p
Height (cm)	-0.561	0.072	0.461	0.180	0.775	0.225
SBP (mmHg)	-0.166	0.625	0.489	0.152	0.258	0.742
DBP (mmHg)	0.017	0.960	0.465	0.176	0.816	0.184
Hemoglobin (g/dL)	0.044	0.898	-0.204	0.572	0.258	0.742
Albumin (mg/dL)	0.781	0.005	-0.673	0.033	-0.775	0.225
Serum creatinine (mg/dL)	0.226	0.505	-0.170	0.638	-0.775	0.225
BUN (mg/dL)	0.014	0.966	-0.106	0.770	-0.258	0.742
GFR (mL/min/1.73 m2)	0.824	0.002	0.099	0.786	-0.258	0.742
Serum Ca (mg/dL)	-0.305	0.362	0.012	0.973	-0.258	0.742
Serum phosphorus (mg/dL)	0.450	0.165	-0.444	0.199	-0.544	0.456
PTH (pg/mL)	0.297	0.375	0.039	0.914	0.775	0.225
Uric acid (mg/dL)	0.043	0.901	0.431	0.214	0.258	0.742
Total cholesterol (mg/dL)	0.361	0.276	0.605	0.064	0.775	0.225
Triglycerides (mg/dL)	0.527	0.096	0.576	0.081	0.775	0.225

DISCUSSION

Chronic kidney disease as the other chronic diseases has its burden on the psychological, behavioral and quality of life of the patents. Depressive disorders and anxiety disorders are the most common mental health problems in the CKD population [9]The psychosocial interventions appear to reduce depressive symptoms and improve quality of life in patients with chronic-kidney-disease and their careers and some beneficial impact on anxiety. However, the small number of identified studies indicates a need for further research in this field [10].In the present study, there was no significant difference between CKD and control group regarding age and sex. This came in agreement with **Kogon et al., [11]** who found that there was no significant difference between CKD and control group regarding age and sex.In the present study, there was significant difference between CKD and control group regarding PTH with increase of PTH in CKD patients explained that maybe secondry hyperparathyrodism . This came in agreement with the study of **Wesseling-Perry and Salusky [12]** who found that there were abnormalities in calcium, phosphorus and parathyroid hormone (PTH). This was shown also in a report of data collected by the International Pediatric Peritoneal Dialysis Network on 900 children worldwide, where PTH levelswere over five times above the upper limit of normal values in ~50% of the patients **[13].**The current study showed that serum albumin was measured in the two groups of the study and significantly low albumin level was observed in case group than control (p=0.006) this was in agreement with the study of **Haller, [14],** who stated that Hypoalbuminemia is common in patients with CKD. In our study the prevalence of depression in CKD patents was 40% (borderline depression) and 16% (significant depression) which is in consistence with a study done by **Turkistani et al., [15]** who found that the prevalence of depression in CKD patents was 57%. This differs from the prevalence cited in the general adolescent population (7.5%) and is substantially higher than that identified in other pediatric CKD studies in which up to 35% of subjects reportedly suffered from depression [**11].** One explanation for this finding may be that because CKD is a large,rigorous, multicenter study requiring long-term yearly follow-up [16].

In the present study, no demographic data was correlated with depression. This came in agreement with the study of **Hernandez et al., [17],** which carried done in Per assessing depressive symptoms in children on dialysis found no association between depressive symptoms and demographic factors.A study of Egyptian pediatric patients with CKD before and after dialysis which carried by **Bakr et al., [18]** also failed to find any associations with demographic or clinical factors. It also mentioned that the presence of psychiatric disorders among their study cohort was not significantly correlated with age, sex, severity of anemia or duration of disease. Unfortunately, single-center designs and small sample sizes, their findings might be reflective of inadequate power as opposed to a true lack of association, and the possibility of other predictors of depression remains.Similar to at least one study of depression in adult CKD patients, carried by **Hedayati et al., [19]** we did not find that the likelihood of depression increased with worsening kidney function. Instead, the patients with less severe

stages of CKD were more likely to be depressed. This suggests that depression may not be related primarily to the abnormal metabolic milieu of CKD patients. It is also possible that the lower intensity of medical services provided to patients with pre-ESRD CKD may affect their perceptions of psychological support. If this were to be the case, then providing more clinical and medical support to patients with less severe disease could be evaluated as a means of reducing depression.

Limitations: The data was collected on small number of patients. A larger group of patients should be studied for a longer period of time to confirm the effects observed in this study. A larger sample size may be able to determine if assessing psychological status, QOL, diet and lifestyle modifications can help in slowing the progression of the chronic renal disease

CONCLUSIONS

CKD is contributing to a higher frequency of depression.

RECOMMENDATIONS

The assessment and enhancement of QOL and combined psychiatric disorders in CKD should be included in the disease management. Nephrology Clinic should include measurements of QOL and psychological symptoms for children in clinical practice. There is a need for mental health workers in the care centers so that those patients and their families can improve their adjustment and coping strategies. Adaptation of the CKD patient to new condition requires medical staff cooperation with patient's family and his friends support. Financial aid whether from governmental or private institutions should be provided to CKD patients in order to improve their quality of life.

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