

Depression and intellectual state in children with chronic renal failure

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Abstract

The aim of this work is to study the problem of depression and intellectual impairment in children with chronic renal failure, clarifying the possible risk factors. The results showed significant correlation between depression and low IQ, with the severity of renal failure. Also there was significant correlation between low IQ with early age onset of renal failure. No significant correlation was found with the causes of renal failure, but increased prevalence of depression and low IQ was found to be more associated with chronic dialysis, than with conservative treatment, the possible explanations were discussed, with suggestions for prevention and management.

Introduction Disordered mental functioning forms a prominent part of the syndrome of uraemia. In Stenback and Haaphene's study (1967), mental manifestations were found in (60%), of patients in a renal unit, rising to 75%, when the blood urea exceeded 250 mg/100 ml. Occasionally the mental changes can be the first manifestation of uraemia and lead directly to psychiatric consultation, especially when the uraemia has developed slowly and the clinical picture in such a case might simulate neurasthenia with symptoms of lethargy, anorexia and depression. (Lishman 1987). Insidious development of intellectual impairment is, by far, the commonest mental disturbance in uraemic patients (Stenback and Haaphanen, 1967), with the early symptom of difficulty in concentration that could be, at first, episodic. Thus, the patient may perform well for short periods of time, but cannot sustain mental activity, but, with further progression, memory becomes obviously impaired with episodes of disorientation and confusion.

Rodin and Voshart (1987) reported depressive symptoms in 25% of patients with end stage renal disease, depressed patients being more disabled than non-depressed. Hong et al., (1987) found 30% of patients with end stage renal disease to have symptoms fulfilling the DSM-III / criteria of major depression. The problem of the children is aggravated by their low pain threshold, low frustration tolerance and regressive tendencies leading to passive demanding behavior (De Nour, 1978). Another difference from adults, is the uncompleted growth process both at a physical or mental level so that early onset of severe renal failure may have its influence on the future intellectual development (Loirat et al., 1990)

Both biological and psychological factors do interact for the development of such mental manifestations in chronic renal failure and overlap between symptoms of uraemia and such mental symptoms is possible (Smith et al., 1985). Among the biological factors involved in pathogenesis are: electrolyte disturbance (Tyler, 1968), neurotoxic effects, (Lishman et al, 1987), iatrogenic causes by the commonly administered drugs as sedatives and antibiotics (Richet et al., 1970), the possibility of intracranial infection (Neary, 1976), abnormalities of serum aluminum level (Andreoli, 1990), as well as other factors. Among the psychological factors of particular importance in children are: the psychological stresses associated with haemodialysis (Salmons, 1980), regressive tendencies (De Nour, 1988), the parents' reaction (Khan et al., 1971), the child's stage of psychological development (Khan et al., 1971), as well as the emotional attitude of the treating staff (De Nour, 1988).

The aim of the present study is to assess the problem of depression and intellectual impairment in children with chronic renal failure, with the hope of possible early detection and the ultimate goal of proper prevention, if possible, taking the various risk factors into consideration.

Methodology The work was carried out on a sample of 30 children (21 males and 9 females) with chronic renal failure (creatinine clearance < 20 ml / min / m²) present to the Clinic of Nephrology in Cairo University Children Hospital. The age ranged from 6 to 12 years.

We checked the physical investigations previously done as:

1. Blood chemistry:

- Serum creatinine and blood urea to determine the degree of renal failure.
- Serum calcium, phosphorus, alkaline phosphate which are indicative of renal osteodystrophy.
- Complete blood count and haemoglobin in blood were done.

2 Urine analysis to detect any urinary tract infection or crystalluria.

3 Plain X-ray of the urinary tract and abdominal sonography to detect the renal cause of the renal failure.

Every case was subjected to:

1 Complete physical and psychiatric examinations to evaluate the physical and psychiatric conditions.

2 Psychological assessment:

- Depression was estimated by applying the D score for depression (Kovacs, 1983).
- Intelligence quotient (I.Q.) was estimated by doing Draw A Man test which is designed by Florence Goodenough, 1920 (Goodenough, 1931).

Data were tabulated and comparisons drawn by means of appropriate statistical methods. The chi square and the T test were used.

Results We found that the mean I.Q., of the male cases (21 cases) was 78 ± 2.61 and that of the female cases (9 cases) was 80 ± 1.46 with no significant difference between them. ($P > 0.05$) (Table 1).

Table (1): Distribution of Intelligence

		N	Mean IQ	P
Age of onset	< 5 yrs of age	9	72 ± 2.57	< 0.01
	> 5 yrs of age	21	86 ± 4.48	
Residual renal functions:	C.R.F.	19	82 ± 4.17	< 0.01 sig.
	E.S.R.D.	11	76 ± 1.57	
Original renal disease:	Paranchymal renal disease	15	78 ± 1.17	> 0.05 insig.
	Systemic dis. involving kidney	6	79 ± 3.72	
	Obstructive renal disease	9	81 ± 4.86	
	Medical treatment only	4	84 ± 1.16	
	Medical and surgical treatment	7	82 ± 3.63	
Lines of treatment:	Medical treatment and occasional dialysis	8	82 ± 3.82	
	Chronic Haemodialysis	7	75 ± 2.31	
	Chronic peritoneal dialysis	4	74 ± 1.07	

N.B.: The difference between chronic dialysis (whether haemo or peritoneal) and other lines of treatment was significant ($P < 0.05$) regarding IQ.

As regards depression we found that 14 out of 30 cases (47%) had depression; 10 out of 21 boys (48%) and 4 out of 9 girls (44.4%) with no significant difference between them (Table 2)

Age of onset of renal failure

We found that the mean I.Q. of the cases with age of onset before 5 years old (9 cases) was 72 ± 2.57 and that of the cases with age of onset after 5 years old (21 cases) was 86 ± 4.48 with significant difference between them ($P < 0.01$). (Table 1)

As regards depression, 5 out of 9 cases (55%) with age of onset before 5 years had depression and 9 out of 21 cases (43%) with age of onset after 5 years old had

depression, with no significant difference ($P > 0.05$) between them. (Table 2)

Table (2): Distribution of depression

		N	Mean IQ	P
Age of onset	Before 5 yrs of age	5	55 %	<0.05
	After 5 yrs of age	9	45 %	insig.
Residual renal functions	C.R.F.	6	32 %	<0.05
	E.S.R.D.	8	73 %	sig.
Original renal disease	Paranechymal renal disease	7	47 %	
	Systemic dis. involving kidney	3	50 %	>0.05 insig.
Lines of treatment	Obstructive renal disease	4	44 %	
	Medical treatment only	1	25 %	
	Medical and surgical treatment	2	28.6 %	
	Medical treatment and occasional dialysis	3	37.5 %	
	Chronic Haemodialysis	5	71.4 %	
	Chronic peritoneal dialysis	3	75 %	

N.B.: The difference between chronic dialysis (whether haemo or peritoneal) and other lines of treatment was significant ($P < 0.05$) regarding depression.

Residual Renal Function

The mean I.Q. of the patients with chronic renal failure (residual renal functions from 13% to 50%) was 82 ± 4.17 and that of the patients with end stage renal diseases (residual functions from 0% to 10%) was 76 ± 1.57 with significant difference between them (Table 1).

As regards depression, 6 out of 19 cases with CRF; (32%) had depression and 8 out of 11 cases with ESRD (73%) had depression with significant difference between them ($P < 0.05$) (Table 2).

Original Renal Disease

The mean I.Q. of the patients with parenchymal renal disease (15 patients) was 78 ± 1.17 , those with systemic diseases involving the kidney (6 patients) was 79 ± 3.2 and those with obstructive renal disease (9 patients) was 81 ± 4.86 (Table 1)

As regards depression, 7 out of 15 patients (47%) with parenchymal renal disease were depressed, 3 out of 6 cases (50%) with systemic diseases involving the kidney were depressed and 4 out of 9 patients (44%) with obstructive renal disease were depressed. (Table 2)

Lines of treatment

The mean I.Q. of the patients (Table 1) treated with chronic dialysis (either haemodialysis or peritoneal) were lower than those treated with medical treatment with significant difference ($P < 0.05$). Also, there is high percentage of depression in the patients treated with chronic dialysis (either haemodialysis or peritoneal) than those treated with medical treatment, with significant difference ($P < 0.05$). (Table 2).

Discussion The findings in this study support the increased prevalence of depression and intellectual impairment in chronic renal failure, as found also in other studies (Rodin & Voshart, 1987, Hong et al., 1988, Loirate et al., 1990)

Regarding the factor associated with poor intellectual endowment, positive correlation was found in this study, between lower IQ values and younger age of onset of renal failure on one hand and the severity of renal failure on the other hand. However, only mild impairment of intelligence* was observed meaning that early onset or severe renal failure do not induce severe mental retardation. Loirate et al (1990) reported significant correlation between I.Q. and the severity of renal failure.

Furthermore, more impairment was found in those with parenchymatous renal disease or systemic disease involving the kidney than in those with obstructive renal disease, although the difference was not statistically significant. The explanation might be attributed to the presence of other factors affecting intellectual functioning in systemic disease and decreased ability for compensation in those with parenchymatous renal disease than in obstructive but, on the whole, the origin of renal disease or cause of renal failure has not much influence on the associated I.Q. level. Concerning the applied line

* Borderline intelligence (IQ from 70 to 79) according to Hilgard et al (1975)

of management, impairment was found more in those on chronic haemo or peritoneal dialysis. A possible explanation for such a finding could be the fact that dialysis itself has its metabolic complications, which have their own impact on intellectual development. Another factor to be considered also in those children is the reduced school attendance, separation from home and restricted social environment - all might have their influence on the resulting mental abilities of such children. For those children, reduced hospital stays and active nutritional management may help to improve mental abilities.

Regarding the factors associated with depressions, positive correlation was found also with the severity of renal failure, but the relation with earlier age of onset was insignificant. Possible explanations could be as follows: First the more functional disability observed in those children, being prevented from ordinary childhood activities and playing for longer periods. Second, the late parents attitude to the child, which carries partially a sense of anger and despise. Third, the overlap between symptoms of depression and those of uraemia, giving a false impression of increased depression in those patients, especially when the manifestations of uraemia are so marked.

No significant correlation has been found between depression and the cause of renal failure, but positive correlation was found between depression and chronic dialysis whether haemo or peritoneal, a finding which is consistent with other studies (Abram *et al.*, 1971, Farmer *et al.*, 1979, Gomez 1987, Heinrischson *et al.*, 1990, El Mahallawy *et al.*, 1991). Of course, several factors do interplay for the development of depression in those patients, most importantly are the marked reduction in social life activities, the increased dependency, the changed life style with increased separation from home and school, and others. Other studies have reported decreased depressive symptoms in those doing dialysis in clinics than in hospital. (Abram *et al.*, 1971, El Mahallawy *et al.*, 1991), with controversial reports about the correlation between depression and the frequency of dialysis.

Based on the findings of this study, children with chronic renal failure, especially with an onset early in life, should be carefully assessed for depression and intellectual impairment. Psychological intervention is encouraged as early as possible, especially in those children for whom dialysis is deemed necessary, with free communication with the children, careful, kind preparation, simplifying and describing the procedure as well as the following steps, reinforcing understanding and independency as far as possible. Once in dialysis,

periodic psychological inquiry about adaptation, in a way that does not encourage sickness role is helpful.

Pharmacotherapy and tricyclic anti-depressants for depressed children may be hazardous as those patients tend to be more vulnerable to side-effects. If necessary, lowest possible doses are advised. Structured exercise training programs could be of therapeutic benefit (Carney, 1987), with minimization of social restrictions to be as low as possible.

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الاكتئاب والحالة العقلية عند الأطفال الذين يعانون من فشل كلوي مزمن

يهدف هذا البحث إلى دراسة مشكلة الاكتئاب وانخفاض القدرة العقلية عند الأطفال الذين يعانون من فشل كلوي مزمن مع توضيح العوامل المهيئة لذلك. وقد أوضحت النتائج أن هناك ارتباطاً دالاً إحصائياً بين الاكتئاب وانخفاض معدل الذكاء مع شدة الفشل الكلوي.

كما يوجد ارتباط دال إحصائياً بين انخفاض معدل الذكاء وبداية الفشل الكلوى فى سن صغيره. ولكن لا يوجد ارتباط دال إحصائياً بين الاكتئاب ومعدل الذكاء مع أسباب الفشل الكلوى، ولكن تزيد نسبة الاكتئاب وانخفاض معدل الذكاء لدى الأطفال الذين يعالجون بواسطة الغسيل الكلوى عن الذين يعالجون وقائياً.