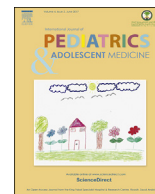


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Original research article

Assessment of physical and psychosocial status of children with ESRD under regular hemodialysis, a single centre experience

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ABSTRACT

Background and objectives: Children with end stage renal disease (ESRD) under regular hemodialysis suffer from various health problems that result either from the sequelae of disease itself or its various lines of therapy. The aim of this study is to clarify biodemographic characteristics, common complaints, and physical, and psychosocial status of children with ESRD under regular maintenance hemodialysis.

Patients and methods: This study was conducted on forty children (13 males, 17 females) aged 6–16 years with ESRD under regular hemodialysis, selected from the Pediatric Nephrology Unit at Tanta University Hospitals. Three structured questionnaires were used that measured the biodemographic data of children and their parents, common complaints before and after the onset of hemodialysis, and a physical and psychosocial status assessment sheet comprising of nutritional habits, sleeping patterns, daily physical activities, school achievement, the emotional, behavioral and social aspects of children, and different social relationships.

Results: Most children with ESRD exhibited abnormal nutritional habits, disturbed sleep, decreased physical daily activities, impaired school achievement, and changing emotions and behaviors, and depressed social relationships.

Conclusion: Common adverse effects of ESRD and hemodialysis in our center are inadequate nutritional status, abnormal sleep patterns, decreased physical activity, low school achievement, and psychosocial deterioration.

Recommendations: Great efforts on the part of parents, pediatric nephrologists, nurses, psychologist, and school teachers are needed to improve the physical and psychosocial health of dialysis patients and thereby improve their quality of life.

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1. Introduction

The number of pediatric patients aged under 15 years receiving hemodialysis is rising markedly. In Europe in 2005, the reported incidence of children and adolescents with ESRD under hemodialysis (HD) was 28 per million-child population. In England, the prevalence of the national renal registry was 12.2 per million of total population [1]. Precise statistical reporting on the prevalence of regular maintenance dialysis among Egyptian children is not

available, but the figures have gradually risen over the last three decades. Statistical records from the Pediatric Nephrology Unit of Tanta University Hospital indicate that 62 children are scheduled for regular maintenance hemodialysis [2]. End stage renal disease (ESRD) is a permanent obstacle to a normal child's daily physical, emotional, and social activities. ESRD also causes a financial burden on the patient's family that adversely affects their own daily needs [3]. Health-Related Quality of Life (HRQOL) scores in children with ESRD under HD or peritoneal dialysis are significantly lower than in healthy controls and in transplant recipients [3]. Moreover, the parents of children on maintenance dialysis also exhibited lower quality of life and more depression symptoms than the parents of healthy children [4]. Children with (ESRD) under regular hemodialysis suffer from various physical and psychological health hazards that result either from complications of the illness itself, vascular

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access, medications, or various types of dialysis [5]. Common examples of physical health hazards are growth failure, physical and psychic dependence on the dialysis machine, restriction of fluids and some dietary factors, insufficient time in school due to spending long periods away, delayed transition from childhood into adulthood, and inability to develop close relationships with peers [3]. Children on dialysis are forced to practice frequently changing dietary modifications throughout their course of disease and its therapeutic options. At the same time, the growth and development of the dialysis patients are in their most dynamic phases, which is markedly affected by the eating behaviors and food choices during the childhood and adolescence stages [6]. In addition, common examples of psychological health hazards are affective and behavioral disorders. Thinking that life is meaningless, suffering endless pain, the impossibility of a permanent cure, the challenges to live an ordinary life, and the lack of expectations for a better future are constant thoughts.

A maintained comprehensive therapy for children undergoing dialysis is necessary to optimize near normal psychosocial status [7]. The dialysis nurse as a primary caregiver also has an important role in providing ongoing assessment, recognizing some complaints, supporting the medical plan, providing informed and concerned care [8] to psychologically support patients' families, and help them explore emotions of guilt or blame about their siblings [9].

2. Patients and methods

2.1. Design and setting

This descriptive study was carried out after approval from the research ethical committee center of Tanta University Hospital and obtaining informed, written consent from parents of the included children at the Pediatric Nephrology Unit of the Pediatric Department, Tanta University Hospital. The study was carried out from July 2015 to January 2016 on 30 children on regular hemodialysis with ESRD. The patients' ages ranged from 6 to 16 years. All patients were undergoing hemodialysis three times per week, with each dialysis session lasting three to four hours. Dialysis was started when GFR is equal or less than 15 ml/min/1.73 m². Patients were dialyzed on a Fresenius 4008 B dialysis machine (Germany) at a blood flow rate = 2.5 × weight (kg) + 100 ml/min, using polysulfane hollow fiber dialysers suitable for the surface area of the patients (Fresenius F3 = 0.4 m², F4 = 0.7 m², F5 = 1.0 m², and F6 = 1.2 m²). Bicarbonate dialysis solutions were used. All patients were receiving supportive therapy in the form of subcutaneous (SC). Erythropoietin in a dose of 50 IU/kg/session, IV iron dextran 100 mg/kg/week, oral folic acid 1 mg/day, oral calcium 1000 mg/day, oral vitamin D (one alpha) in a dose of 0.01–0.05 µg/kg/day, and oral antihypertensive medications for hypertensive patients.

2.2. Inclusion criteria

All children with ESRD and treated by regular maintenance hemodialysis.

All patients were subjected to the following:

- (1) Thorough history taking including biodemographic data of child: age, sex, birth order, level of education, residence and living conditions, and common complaints before and after regular HD sessions using the General Information Sheet [10].

An Arabic-translated and validated version of The Child Behavior Checklist – school age (ages 6–18) (CBCL/6–18) form (a

questionnaire measure format) was completed by the parent or caretaker who spent most of the time with the child (see Appendix 1) [11].

2.2.1. What questionnaire was used?

The Child Behavior Checklist – school age (CBCL/6–18) form is a standardized measure based on new national norms that were collected from February 1999 to January 2000. It is a general assessment measure type in a questionnaire measure format [11]. The CBCL/6–18 provides ratings for 20 competence and 120 problem items. The CBCL/6–18 includes open-ended items covering physical problems, concerns, and strengths. The parent or caregiver rated how true each item was contemporaneous with the assessment, or was within the past 6 months. It is one of the most widely used outcome measures [12]. The CBCL/6–18 assesses general symptomatology, externalizing and internalizing symptoms, and mood and anxiety symptoms.

The reliability of the Arabic translation was measured using a Cronbach's coefficient on a sample of 50 participants. The Coefficients for the dimensions of CBCL were moderately high, ranging from 0.566 to 0.860. We also performed validity analysis by measuring the internal consistency between the dimensions of the scale. The correlation between the dimensions of CBCL was moderately high [13]. CBCL/6–18 was scored using a computerized scoring software system (Assessment Data Manager-version 9.1; ASEBA Foundation, Burlington, USA) [14].

2.2.2. How was it generated?

CBCL was generated in 2001 [11]. The current CBCL measure has been refined after years of use [12]. Old items that failed to discriminate significantly have been replaced, and slight changes were made in the wording of various items to make them clearer. Currently, all the items discriminate between referred and non-referred demographically similar children [11].

2.2.3. How was it validated?

Construction of validity for non-clinical samples, clinical samples, and diverse samples: criterion validity includes predictive validity and postdictive validity. The sensitivity rate was **0.92**, and the specificity rate was **0.82**. [11] Validity analysis of the Arabic version was performed by measuring the internal consistency between the dimensions of the scale. The correlation between the dimensions of CBCL was moderately high [13].

CBCL/6–18 reliability: was reported for scale scores.

1-Test-Retest-8 days: acceptable rating with Pearson's statistics (0.88) [11].

2-Internal Consistency: acceptable rating with Cronbach's alpha (0.73) [12,14].

2.2.4. Variability standardization

Although the CBCL does not require administration by a clinician, it should be administered by someone with at least a graduate-level degree that included course work in standardized assessments [11]. The variability standardization should be administered only after adequate training, and the form should be completed independently by respondents. Interviewers can read and fill in items for respondents who cannot complete the forms on their own (training to administer). Graduate training at the master's level or higher in standardized assessment or two years of residency in pediatrics, psychiatry, or family practice is required in addition to a thorough knowledge of the relevant manuals and documentation [11].

2.2.5. Conduction of the interview

An Arabic-translated and validated version of the Achenbach

System of Empirically Based Analysis (ASEBA) CBCL/6–18 was completed by a child's parent, family member, or caregiver. The average time to complete the assessment was 15 min for a paper checklist and a pen. An additional 10 min was needed to score the checklist [11].

The questionnaire details in both Arabic and English are attached as appendices at the end of this article, with permission.

The questionnaire focused on the following points:

I. Daily physical activities:

- Nutritional habits, e.g., appetite change in desire or amounts, number of meals per day, and preferred restricted food and types of food prepared for the child at home.
- Sleeping patterns, e.g., place of sleeping, number of hours of sleep per day, and naps and sleep problems.
- Exercise habits.
- School attendance and achievement.

II. Psychosocial status:

- Emotional and behavioral aspects:
 - Practicing religious obligation, e.g., regular attendance at mosque or church.
 - Feelings when hemodialysis began, e.g., feeling that the disease was a punishment of Allah.
 - Sense of differences or feelings of enthusiasm.
 - Hiding disease from others.
 - Having a plan for the future.
 - Spiritual satisfaction, e.g., feeling of self and relative satisfaction.
- Social relationships with children including relationships with children around parents, siblings, peers and teachers, visiting relatives, introversion, and seeking children with the same disease.

2.3. Exclusion criteria

Children with other medical diseases such as Type 1 diabetes, heart diseases, liver diseases, or mental retardation were excluded.

2.4. Statistical analysis

The collected data were tabulated and analyzed using SPSS version 20 (SPSS Inc, Chicago, ILL Company), and Microstat-W (India, CNET Download.com). Categorical data were presented as number and percentages, while quantitative data were expressed as the mean \pm standard deviation [15].

3. Results

Table 1 shows the biodemographic characteristics of the studied children. The mean age of the studied children was 14.73 ± 4.56 yo. Females accounted for 56.7% of the sample, while 43.3% were males. The majority of respondents lived in rural areas with their families (80%, 90%, respectively).

Table 2 demonstrates the comparison between common complaints among the studied children before and after dialysis sessions. It was found that the majority of studied complaints, such as nausea, vomiting, abdominal colic, muscle cramps, and generalized muscle weakness decreased after dialysis sessions, whereas hypotension, flushed face, and pain due to maneuvers increased after dialysis sessions.

Table 3 summarizes the children's daily physical activities. With regard to the children's nutritional habits, it was found that majority (90%) of studied dialysis children experienced appetite loss. Only one-third of studied children were sharing the family diet, and one-half of patients had food and fluids on demand.

Table 1
Demographic data of studied children.

| Characteristics | N = 30 | % |
|--------------------|------------------|------|
| Age in years: | | |
| 6–7 | 1 | 3.3 |
| 8–9 | 7 | 23.3 |
| 10–11 | 1 | 3.3 |
| 12–13 | 7 | 23.3 |
| 14–16 | 14 | 46.8 |
| Mean \pm SD | 14.73 \pm 4.56 | |
| Sex: | | |
| Male | 13 | 43.3 |
| Female | 17 | 56.7 |
| Birth order: | | |
| First | 12 | 40 |
| Second | 7 | 23.3 |
| Third | 6 | 20 |
| Fourth or more | 5 | 16.7 |
| Educational level: | | |
| Primary | 12 | 40 |
| Preparatory | 8 | 26.7 |
| Secondary | 10 | 33.3 |
| Residence: | | |
| Rural | 24 | 80 |
| Urban | 6 | 20 |
| Living with: | | |
| Family | 27 | 90 |
| Father only | 0 | 0 |
| Mother only | 3 | 10 |

Table 2
Common complaints of the studied children before and after regular hemodialysis sessions.

| | Complaints before dialysis session | | Complaints after dialysis session | |
|-----------------------------|------------------------------------|------|-----------------------------------|------|
| | No = 30 | % | No = 30 | % |
| Nausea | 30 | 100 | 24 | 80 |
| Vomiting | 27 | 90 | 15 | 50 |
| Dizziness | 18 | 60 | 12 | 40 |
| Abdominal colic | 10 | 33.3 | 8 | 26.7 |
| Muscle cramps | 12 | 40 | 10 | 33.3 |
| Hypotension | 3 | 10 | 12 | 40 |
| Flushed face | 3 | 10 | 4 | 13.3 |
| Generalized muscle weakness | 18 | 60 | 11 | 36.7 |
| Pain due to maneuvers | 4 | 13.3 | 27 | 90 |

With regard to sleep, it was found that 70% of children slept less than 8 h a night. Approximately one-half of the studied children (53.3%) experienced interrupted sleep, and approximately one-third of children experienced difficulty sleeping (Table 3).

For physical exercise, it was found that approximately three quarters of the studied children engaged in no physical exercise. For over 50% of the children, the main reasons for not practicing exercise were fear of injury and vascular access; other causes include school restrictions, tiring easily, and dyspnea (Table 3).

With regard to the effect of dialysis on school achievement, all children experienced irregular attendance to school; 43.3% had high marks, 36.7% had low marks, and 20% failed to pass exams (Table 3).

Table 4 reveals the emotional and behavioral aspects of the studied children. It was found that 60% of the studied children were not religiously active, and only 10% of studied children felt that the disease was a punishment from Allah. More than one-half of the children felt a sense of difference from others, hiding from others and not making plans for the future. The majority of the studied children (83.3%) lacked spiritual satisfaction.

Table 5 reveals the children's social relationships. Regarding children-parent relationships, 80% complained of parents'

Table 3
Daily physical activities of the studied patients.

| | | N = 30 | % |
|--------------------------------------|--|--------|------|
| Children's Nutritional Habits | Appetite loss: | | |
| | Yes | 27 | 90 |
| | No | 3 | 10 |
| | Number of meals/day: | | |
| | 2 | 21 | 70 |
| | 3 | 6 | 20 |
| | >3 | 3 | 10 |
| | Preferred restricted food*: | 20 | 66.7 |
| | Salty diet | 9 | 30 |
| | Dairy products | 2 | 6.67 |
| | Meat | 3 | 10 |
| | Salty snacks | 6 | 20 |
| | No preferred food | 10 | 33.3 |
| | Type of food prepared for the child at home: | | |
| | Special diet | 20 | 66.7 |
| | Family diet | 10 | 33.3 |
| | Food intake: | | |
| Limited | 15 | 50 | |
| On demand | 15 | 50 | |
| Children's sleeping pattern | Place of sleep: | | |
| | Alone | 5 | 16.7 |
| | With other siblings | 10 | 33.3 |
| | Beside mother | 15 | 50 |
| | Number of hours of sleep/night: | | |
| | <8 | 21 | 70 |
| | 8 | 6 | 20 |
| >8 | 3 | 10 | |
| Nap frequency: | | | |
| Daily | 0 | 0 | |
| On the day of dialysis | 25 | 83.3 | |
| None | 5 | 16.7 | |
| Sleep problems: | | | |
| Difficulty to sleep | 10 | 33.3 | |
| Interrupted sleep | 16 | 53.3 | |
| Normal sleep | 4 | 13.3 | |
| Practice of Physical Exercises | Practice physical exercises: | | |
| | Yes | 7 | 23.3 |
| | No | 23 | 76.7 |
| | Where exercise*: | | |
| | At home | 3 | 10 |
| | At street | 4 | 13.3 |
| | At school | 0 | 0 |
| | Reasons for not exercising (n = 21): | | |
| | Not allowed because of health condition | 3 | 10 |
| | Afraid of any accident to vascular access | 18 | 60 |
| Easy fatigability and dyspnea | 2 | 6.7 | |
| School Achievement | Irregular school attendance | 30 | 100 |
| | School performance: (last year) Failed | 6 | 20 |
| | Have low marks | 11 | 36.7 |
| | Have good marks | 13 | 43.3 |

*Daily physical activities of the studied children.

overprotection, and complaints about preferences for siblings came from 10% of the studied children. Seventy percent of studied children had good sibling relationships, while complaints about violence (teasing) and incongruence with each other were found in 16.7% and 10% of the children, respectively.

Regarding the children's relationships with their peers, it was found that only one of our studied children complained of violence and teasing, while more than three quarters of the children (86.7%) described feeling kindness from their peers. The majority of the studied children (80%) did not visit their relatives. Seventy percent of the studied children had good relationships with their school teachers. Two-thirds of the studied children were introverted, preferring isolation from others. Sixty percent of them sought children with the same disease.

4. Discussion

Chronic diseases are life-changing disorders that interfere

Table 4
Emotional and behavioral attitude of the studied children.

| Variable | N = 30 | % |
|---|--------|------|
| Practice degree of religious obligation (regular prayer): | | |
| Yes | 12 | 40 |
| No | 18 | 60 |
| Feeling that disease is a punishment from Allah: | | |
| Yes | 3 | 10 |
| No | 27 | 90 |
| Sense of difference: | | |
| Yes | 19 | 63.3 |
| No | 11 | 36.7 |
| Hiding from others: | | |
| Yes | 16 | 53.3 |
| No | 14 | 46.7 |
| Planning for the future: | | |
| Yes | 7 | 23.3 |
| No | 23 | 76.7 |
| Spiritual satisfaction: | | |
| Yes | 5 | 16.7 |
| No | 25 | 83.3 |

Table 5
Social relationships of the studied children.

| Social relation | N = 30 | % |
|---|--------|------|
| Children-parent relationship: | | |
| Overprotection | 24 | 80 |
| Preference for their siblings | 3 | 10 |
| Most requests are achieved | 15 | 50 |
| Children-sibling relationships: | | |
| Violence (teasing) | 3 | 10 |
| Incongruent with each other | 5 | 16.7 |
| Kindness | 21 | 70 |
| Children-peer relationships: | | |
| Violence (teasing) | 1 | 3.3 |
| Incongruent with each other | 3 | 10 |
| Kindness | 26 | 86.7 |
| Children-teacher relationships: | | |
| Good | 21 | 70 |
| Bad | 9 | 30 |
| Visiting relatives: | | |
| Yes | 6 | 20 |
| No | 24 | 80 |
| Prefer isolation from others: | | |
| Yes | 20 | 66.7 |
| No | 10 | 33.3 |
| Seeking children with the same disease: | | |
| Yes | 18 | 60 |
| No | 12 | 40 |

with children's interactions with their environment [3]. ESRD has adverse outcomes for children's physical and psychosocial status [3].

The present study showed that 56.7% of the studied children were females. This finding is in agreement with the studies by Ramzy et al. (1999) [2] and Sabry et al. (2005) [16], who reported that there was a high prevalence of kidney disease among females. One of the accepted explanations for this finding is higher incidence of chronic glomerulonephritis in girls, secondary to neglected or inadequately treated acute poststreptococcal glomerulonephritis, which is common in low socio-economic classes who spend more time indoors in poor housing conditions. The difference could also be due to Egyptian rural traditions of paying more attention to the rearing and medical care of boys than girls. To some extent, the early diagnosis of renal diseases has helped prevent the progression of these diseases to ESRD [17].

A promising point in this study is that the majority of the studied children live with their parents, as children undergoing maintenance hemodialysis are in urgent need of care from both

parents to help them minimize the many potential emotional and behavioral problems these children can experience.

The present study revealed that the majority of the studied complaints, such as nausea, vomiting, general weakness, abdominal colic, muscle cramps, and generalized muscle weakness decreased after dialysis session, while hypotension and flushed face increased after sessions. These findings reflect the benefits of dialysis sessions in improving children's common complaints before starting the dialysis sessions.

The present study revealed that 90% of our studied dialysis patients under regular hemodialysis experienced pain initiated by different routine maneuvers for the preparation of, or during, the HD session. This is in agreement with Immelt S (2006), who confirmed that children undergoing dialysis have an inability to tolerate pain initiated by repeated sampling, vascular access insertion and exchange, in addition to the psychological burden secondary to prolonged hospitalization [6].

Immelt also stated that the children undergoing dialysis in his study had an unexpected high tolerance for continuous feelings of disability.

Daily physical activities are vital constituents of health-related quality of life, which includes nutritional habits, healthy sleep patterns, practicing physical exercises, recreational activities, and school achievement [18].

A major health problem in school age children and adolescents is maintaining proper nutrition to establish a healthy body, preventing nutritional diseases, and contributing to physical, cognitive, and psychosocial well-being [7].

Hockenberry (2005) reported that children undergoing dialysis usually feel that they are deprived of their favorite foods [19].

Vessey (2004) stated that it is necessary for children undergoing dialysis to limit some dietary intakes to avoid biochemical complications related to ESRD and improve the adequacy of their dialysis [20].

In this study, the majority of our studied dialysis patients had anorexia, meaning they usually have only two meals per day.

These findings are in accordance with those of Sabry et al. (2005), who mentioned that two-thirds of children in their study were eating 2 meals per day, while only one-third were eating 3 meals per day [16]. This finding could be explained by uremia-related anorexia.

With regard to recommended restricted foods, the current study revealed that two-thirds of our studied children had a preferred restricted food, a result that reflects the emotional and behavioral attitudes of children toward restricted foods; this may be attributed to the difficulty of controlling their nutritional habits, especially outdoors.

In our study, one-third of children on dialysis had no dietary changes after being diagnosed because they preferred the ordinary family diet, but two-thirds of them received a special diet after continuous nutritional health education from nurses of our unit. These results were similar to those of Sabry et al. (2005) [16].

These findings may be attributed to low socioeconomic standards and the nutritional ignorance of patient's families which make them unable to prepare a special diet for their renal siblings. Kalantar (2001) reported that there are many reasons for the impaired nutritional status of children on dialysis, frequently stemming from the low quality of care given to these children; most of mothers of dialysis children prepare meals from available foods without paying attention to the requested special nutrition for their diseased children [21]. In addition, the majority of parents of the studied children were less educated workers who lacked the time and interest to maintain recommended special diets.

With regard to the sleeping habits, the present study revealed that one-half of the studied children sleep beside their mothers to

ensure intimate health care.

The findings of the current study showed that more than two-thirds of the studied children experienced less than 8 h of sleep per day. These findings are evidenced by the commonality of sleep disorders in dialysis patients.

One-third of the studied children had difficulty sleeping, and more than one-half of them experienced interrupted sleep, which may be explained by complaints of difficulty in breathing and psychoemotional disorders of children such as affective disorders.

These results are supported by the results of Parker et al. (2001) who revealed that 85% of patients undergoing hemodialysis suffer from some sort of sleep disorder [22].

The present study clarified that nearly all the studied children nap on the days of their dialysis sessions. This could be attributed to fatigue, drowsiness, and/or the desire to sleep after a dialysis session.

School age childhood is a phase of rapid physical and emotional growth in which children are able to assume responsibility for their own needs, share different tasks, and participate in different household activities leading to children's maturation energy expansion [22].

It is well-documented that practicing regular physical exercises improve physical, psychoemotional, behavioral, and social well-being, as well as self-confidence.

Unfortunately, more than three quarters of the studied children under regular hemodialysis are hypoactive and rarely practice physical activities.

There are many potential reasons for this observation, including the presence of anemia, which leads to exercise intolerance, being easily fatigued, and dyspnea [22].

Chronic Kidney Disease Mineral Bone Disease (CKD-MBD), a common health hazard for children with ESRD, often restricts their physical activities to avoid painful sensation in extremities [23]. Children's deficit of knowledge about the types of activities allowed and family overprotection, which prevent them from sharing in home activities, often lead to family dependency, thus adversely affecting children's psychosocial conditions.

With regard to school activities, this study noticed that none of the studied children participated in school activities. This result is justified by the children's frequent absenteeism and tendency to tire easily. School is the place for children to experience a sense of competence [2,23].

This study reported that all children undergoing dialysis showed irregular school attendance, and 20% failed to pass school exams, while 36.7% earned low marks. These results may be attributed to regular visits to dialysis centers for dialysis sessions three days a week, leading to irregular school attendance and low achievement [23].

Similar results were reported by Furth SL (2001) who mentioned that sick children with CRF under HD therapy were most vulnerable to disrupted school attendance, leading to school failure and poor achievement. The main cause behind the disruption is regular repeated attendance at the hospital for dialysis sessions. In addition, the concentration impairment of diseased children to school materials may be due to their chronic disease [24].

Learning difficulties in children with CRF are previously reported by Delano (1995) [25].

In 2001, Brown studied the spiritual behavior of pediatric patients under regular hemodialysis and concluded that the greater the level of religiosity and spirituality, the healthier the cognition and behaviors and the fewer the abnormal behaviors [26].

The present study found abnormal emotional and behavioral attitudes among the studied dialysis children: more than one-half of the studied children did not practice religious obligations such

as praying regularly. These findings may be explained by the fact that these children are always fatigued, tired, and frequently hospitalized; another explanation is related to the behavior of over-protective parents.

In spite of that, only ten percent of the children were not satisfied with their religious practices as they thought that their disease was a punishment from Allah.

More than one-half of the studied patients felt a sense of difference from others, isolating themselves from others and were not planning for the future. The majority of studied children (83.3%) lacked spiritual satisfaction. These results are in accordance with previously published studies, e.g., those by Furth (2001) and Golstein (2007) [27,28]. Regarding the studied children's social relationships with their parents, 80% complained of overprotection and 10% of sibling favoritism. Seventy percent of the studied children experienced good sibling relationships, with teasing and incongruence with each other accounting for 16.7% and 10% percent of responses, respectively. Regarding children's relationships with their peers, it was found that only one of our studied children complained of violence and teasing, while more than three quarters of the studied children (86.7%) felt kindness from their peers. The majority of studied children (80%) were not visiting their relatives. Seventy percent of the studied children had good relationships with their school teachers. Two-thirds of the studied children preferred isolation from others, and 60% were seeking children with the same disease. These results are in agreement with many previously published studies [3,4,23]. Thus, children with ESRD under maintenance hemodialysis suffer continuously from stressful health problems that adversely affect all aspects of life. They are therefore in urgent need of physical, psychosocial, and financial support to enable their parents to adapt to these burdens.

Adequate health education, recreational activities, intimate contact, and school achievements are advised for parents of dialysis children.

5. Conclusion

Children with ESRD experience many undesired effects on the physical, psychoemotional, and social aspects of their lives. These often lead to financial burdens. Furthermore, their disease as well as HD negatively affects social relationships and school achievements, leading to reduced health-related quality of life.

6. Recommendations

At the national level, it is recommended that the number of renal transplantation centers in Egypt be increased to save the lives of children with ESRD. Pediatric nephrologists, social specialists, and nurses should encourage children's parents with maintenance hemodialysis to improve social relationships (visiting their relatives), so it would improve the psychological state of their children (encouraging recreational activities and suitable hobbies), thus improving the overall life quality. Dietary counseling and nutritional education should be confirmed to help dialysis children and their families to understand the recommended nutritional requirements for their sick children.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.ijpam.2017.01.001>.

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