Screening for depression and associated risk factors among Egyptian end-stage renal disease patients on haemodialysis

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Background
Depression is prevalent among end-stage renal disease (ESRD) patients on haemodialysis.

Objectives
To study the rates of depressive disorders among Egyptian haemodialysis patients with ESRD and to point some putative risk factors associated with depression in this population.

Method
We assessed a cross-sectional sample of 300 Egyptian ESRD patients on regular haemodialysis using the Beck Depression Inventory (BDI), the Mood Module of the Structured Clinical Interview for DSM IV Axis-I disorders (SCID-I), the activity of daily living (ADL), and assessed the level satisfaction with social support.

Results
45.3% screened positive for depressive symptomatology using the BDI; however, only, 8.3% fulfilled the DSM-IV criteria for major depression, 7.3% had dysthymia and 13.3% had mood disorder due to general medical condition. Despite these high rates of depression, merely 9.5% were diagnosed and received antidepressant treatment. Medical comorbidity, longer duration on haemodialysis, ability to work in the preceding six months and the perception of unsatisfactory social support correlated significantly with depression.

Conclusion
Depression is common among Egyptian ESRD patients. It is therefore, important to increase patients and clinicians' awareness, improve the recognition by routine screening, and to develop strategies for early intervention and treatment of clinical depression in this vulnerable group.

Keywords:
Beck Depression Inventory, depression, dysthymia, end-stage renal disease, haemodialysis

Introduction

End-stage renal disease (ESRD) has a significant impact on the lives of haemodialysis (HD) patients because of the loss of the primary role in family and occupation [1], the decreased mobility, the decline in cognitive skills and sexual dysfunction [2]. Further stressors include the side effects of medication, dietary constraints, fear of death and dependency on treatment. This may affect patients' quality of life and exacerbate their feelings of depression [3]. The estimated prevalence of depressive disorders among HD patients is around 30–50%; nonetheless, the problem is still understudied and seldom identified or treated adequately [4,5].

Comorbid depressive illnesses amplify the impact of chronic renal disease, increase functional disability [6], reduce the motivation to maintain self-care care [7], increase healthcare costs and services utilization [8] and increase hospitalization rate [9] and nonadherence to treatment and prescribed dietary restriction [10].

Depression has the potential to alter adversely the medical outcomes of patients with ESRD [11]. The relative risk of mortality is reported to be 23% greater among depressed patients versus nondepressed patients [12].

Depression in HD patients remains difficult to assess [4]. This can be because of the similarity between depressive symptoms and those of renal impairment [5], together with the patients' tendency to deny their depressive symptoms because of the stigma associated with mental illness [11].

ESRD is one of the main growing health problems in Egypt [13]. The estimated annual incidence of ESRD is around 74/million, and HD represents the main mode of treatment for these patients [14].

Globally, the prevalence of HD patients increased from 10/million population in 1974 to 264/million population in 2002 [15]. In Egypt, the ESRD burden is increasing significantly [16].

Missing the diagnosis of depression in this growing population can increase morbidity and mortality, and decrease patients' satisfaction with the healthcare provided [17]. Nonetheless, the recent practice guidelines for haemodialysis in Egypt [13] missed the screening for depression among HD patients. This research will shed light on the prevalence and risk factors of depression in this population, which is scarcely studied in the Middle East. Hopefully, it will draw attention to the magnitude of the problem and its effects, aimed at consideration of depression screening, diagnosis and management to be included in the Egyptian guidelines and to be considered as essential for the best benefit of ESRD patients.

Aim of the work

The aim of this work is to identify the rates of depressive disorders among a sample of Egyptian HD patients with ESRD using both diagnostic and screening tools, and to delineate the demographic, medical and social risk factors that correlated with depression in this vulnerable group.

Patients and methods

This study was a cross-sectional, observational study. Patients were recruited from the HD units of Ain Shams University Hospitals and Nasser Institute for Research and Treatment.

The study included 324 Egyptian ESRD patients on regular HD. The inclusion criteria for this study included age between 20 and 65 years, clinical stability, no history of cerebrovascular disease, systemic lupus erythematosus, steroid medication, substance abuse, previous psychiatric illness or dementia.

Of 324 consecutive patients, seven were excluded because of a history of systemic lupus erythematosus and four because of previous stroke. Another five refused to participate whereas eight patients withdrew their consent after the beginning of the interview. Therefore, 300 patients enrolled in this study. 56.7% ($n = 170$) were men and 43.3% ($n = 130$) were women. Their mean age was 47.4 ± 4.7 years.

Ethical consideration

The study design and procedures were approved jointly by the Ethical Committees of the Faculty of Medicine, Ain Shams University and Nasser Institute. The researchers explained the details of the research goals to the participants, and assured them that participation is voluntarily, the data obtained will be kept confidential and that participants could withdraw from the study at any time. A written informed consent was obtained.

The tools, which were selected to serve the purpose of the study, were as follows.

(1) Beck Depression Inventory (BDI) [18]: It is a self-administered, widely used standardized, consistent instrument for screening of depression with proven validity and reliability [19] in several studies targeting ESRD patients [20]. BDI was found to have the highest sensitivity, specificity and accuracy for the diagnosis of depression in ESRD patients [21]. It measures a broad spectrum of depressive symptoms with the depth of the behavioural manifestations of depression. It consists of 21 items, each of which has four responses. Numerical values ranging from 0 to 3 are assigned to each statement to indicate the degree of severity. We used the translated and validated Arabic version with the following cutoff scores: 0–9, no depression; 10–15, mild; 16–23, moderate; and >24, severe [22].

(2) The Mood Module of the Structured Clinical Interview for DSM-IV Axis I Disorders (research version) (SCID-I) [23]: The SCID-I is a semistructured diagnostic psychiatric interview according to the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV) criteria. This was administered by a bilingual experienced clinician trained on the use of the SCID-I research version. SCID-I was used previously in ESRD patients [24].

(3) Activity of daily living (ADL) [25]: This assesses certain basic abilities that an individual must possess to remain independent. These abilities allow an individual to do basic self-care tasks. Accordingly, patients were classified as follows: needs no support (10), needs partial support (2–9) or needs full support (0–5). We used the Arabic standardized version [26].

(4) A questionnaire was designed by the authors that included a set of yes/no and closed-ended questions to assess some personal, sociodemographic data, family living situation and the perception of social support received. Moreover, medical files were thoroughly revised to obtain information about the details of medical history.

Statistical analysis

All data gathered were recorded, tabulated and transferred onto statistical package for social sciences, Version 15 (SPSS Inc., Chicago, Illinois, USA), using a personal computer and suitable statistical parameters were used. Descriptive statistics were reported as means and frequencies. The Student t-test was used to test for statistical significance of variance between two sample means. The Pearson χ^2-test was used to detect whether there is a significant association between different categorical variables. Multiple logistic regression analysis was used to examine the extent to which a set of variables independently predicts a dependent variable. P-value is used to indicate the level of significance; P less than 0.05 was considered significant, P less than 0.01 as highly significant and P less than 0.001 as very highly significant.

Results
Rates of depression
Three hundred ESRD patients were screened using the BDI; 45.3% ($n = 136$) of the patients scored above the

cut-off point of BDI. The distribution of patients according to BDI severity scores is shown in Fig. 1a. 20.3% ($n = 61$) had mild depressive symptoms, 18% ($n = 54$) had moderate symptoms, whereas only 7% ($n = 21$) had severe symptoms. 54.67% ($n = 164$) had no depressive symptoms.

Data presented in Fig. 1b show that 18.3% ($n = 55$) of patients fulfilled the DSM-IV criteria for a current major depression, whereas 7.3% ($n = 22$) had dysthymia and 13.3% ($n = 40$) fulfilled the criteria for mood disorder because of a general medical condition. None fulfilled the diagnosis of bipolar disorder, cyclothymia or substance-induced mood disorder. In total, 117 (39%) patients had a diagnosis of a depressive mood disorder.

Only 9.5% ($n = 13$) of the depressed group on BDI were diagnosed by their physicians and received antidepressants treatment, whereas 24.3% ($n = 33$) were identified to have depression, but no treatment was given. The majority, 66.2% ($n = 90$), were neither diagnosed nor treated. Surprisingly, none of the patients even sought help for their depressive symptoms.

Demographic variables
Table 1 summarizes the demographic characteristics of depressed and nondepressed patients. The mean age of the patients in the depressed group and the non-depressed group was 47.79 ± 11.68 and 47.08 ± 13.08

years, respectively. The percentage of women with ESRD and depression was nonsignificantly higher than those without depression (47.79 and 39.63%, respectively). In contrast, male ESRD patients without depression outnumbered those with depression ($P = 0 156$). In conclusion, depression was identified more in women receiving HD than men receiving HD.

Table 1 shows that marital status, educational level and occupation did not influence significantly the occurrence of depression; however, the competence and ability to work was found to affect the presence of depression significantly as most of the depressed patients (81.62%) had been unable to work in the last 6 months compared with the nondepressed patients ($P = 0.001$).

The ADL and the ability to work over the previous 6 months were significantly lower in the depressed group ($P = 0.001$). This perhaps indicates that they had major financial problems as compared with the nondepressed group ($P = 0.002$).

Medical variables
Data in Table 2 show that the longer the duration on dialysis, the higher the rates of depression ($P = 0.013$). The comorbidity of ESRD with another medical illness (e.g. heart problems, diabetes mellitus, hypertension, arthropathies, lung diseases, etc.) was significantly associated with depression ($P = 0.048$). Meanwhile, the

Figure 1
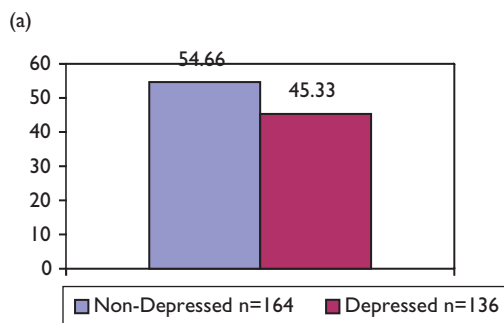
	n	%
Mild	61	20.33
Moderate	54	18.00
Severe	21	7.00
No Depression	164	54.66
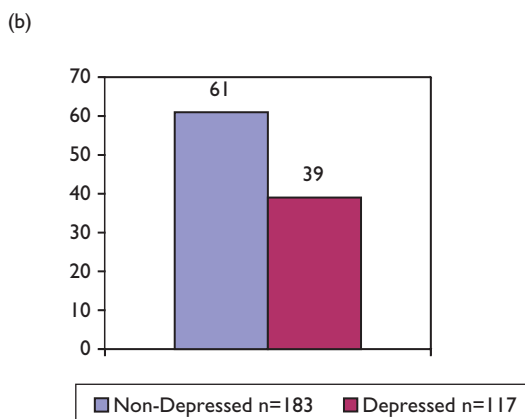
	n	%
Major Depressive Disorder	55	18.33
Dysthymic Disorder	22	7.3
Mood disorder due to general medical condition	40	13.33
No Depression	183	61

(a) Screening for depression among end-stage renal disease patients using Beck Depression Inventory. (b) Diagnosis of depression by SCID-I.

Table 1 Sociodemographic variables in relation to Beck Depression Inventory in haemodialysis patients

	Beck depression score [N (%)]			
	Nondepressed (n=164)	Depressed (n=136)	Test used	P-value
Age (mean ± SD) (years)	47.08 ± 13.08	47.79 ± 11.68	t= − 0.49	0.62
Sex				
Male	99 (60.37)	71 (52.21)	χ^2=2.016	0.156
Female	65 (39.63)	65 (47.79)		
Educational level				
Illiterate	44 (26.83)	39 (28.68)	χ^2=3.052	0.384
Read/write	38 (23.17)	34 (25.00)		
Secondary	45 (27.44)	43 (31.62)		
University	37 (22.56)	20 (14.71)		
Marital status				
Married	116 (70.73)	105 (77.21)	χ^2=4.824	0.185
Divorced	5 (3.05)	4 (2.94)		
Widow	16 (9.76)	16 (11.76)		
Single	27 (16.46)	11 (8.09)		
Occupation				
Manual worker	20 (12.20)	24 (17.65)	χ^2=6.149	0.188
Professional	39 (23.78)	25 (18.38)		
Administrative	18 (10.98)	17 (12.50)		
Technician	36 (21.95)	19 (13.97)		
House wives	51 (31.10)	51 (37.50)		
Fitness to work (last 6 months)				
Can work	61 (37.20)	25 (18.38)	χ^2=12.868	<0.001*
Cannot work	103 (62.80)	111 (81.62)		
Financial status				
Sufficient	26 (15.85)	14 (10.29)	χ^2=12.049	0.002*
Almost sufficient	87 (53.05)	53 (38.97)		
Insufficient	51 (31.10)	69 (50.74)		
Activities of daily living (mean ± SD)	11.841 ± 1.401	10.037 ± 1.899	χ^2=4.217	<0.001*

*Significant.

Table 2 Medical variables in relation to depression in haemodialysis patients

	Beck depression score [N (%)]			
	Nondepressed	Depressed	Test used	P-value
Dialysis duration [mean (SD)] (years)	6.360 ± 4.150	7.610 ± 4.522	t= − 2.494	0.013*
		N (%)		
Comorbid medical disease				
Positive	111 (67.68)	106 (77.94)	χ^2=3.909	0.048*
Negative	53 (32.32)	30 (22.06)		
Aetiology of chronic renal failure				
Unknown	23 (14.02)	15 (11.03)	χ^2=2.374	0.882
Hypertension	78 (47.56)	63 (46.32)		
Diabetic nephropathy	14 (8.54)	12 (8.82)		
Adult polycystic kidney	5 (3.05)	7 (5.15)		
Obstructive uropathy	14 (8.54)	11 (8.09)		
Chronic glomerulonephritis	23 (14.02)	24 (17.65)		
NSAID	7 (4.27)	4 (2.94)		
Dialysate solution				
Bicarbonate	103 (62.80)	88 (64.71)	χ^2=0.116	0.733
Acetate	61 (37.20)	48 (35.29)		
Previous surgical procedure				
Positive	81 (49.39)	63 (46.32)	χ^2=0.280	0.597
Negative	83 (50.61)	73 (53.68)		

NSAID, nonsteroidal anti-inflammatory drug.
*Significant.

aetiology of the chronic renal failure, the type of dialysate solution and previous surgical procedures showed an insignificant difference between groups.

Social variables

We found an inverse relation between depression and perception of satisfactory social support by HD patients. Neither receiving assistance from family members (to deal with medical problems of HD) nor living situation was related to depression (P = 0.24 and 0.55, respectively) (Table 3).

Putative risk factors associated with depression in Egyptian haemodialysis patients

To evaluate the predictive value of the previously described variables, we carried out a multiple logistic regression analysis. We used the presence of depression by scores of BDI above the cutoff point as a dependent factor and the following variables as putative risk factors: monthly income, ability to work, presence of comorbid medical disease, perception of satisfactory social support, duration on dialysis and scores of daily living activity. We found that the very highly significant putative risk factors

associated with depression were longer duration on dialysis, inability to work in the previous six months, dissatisfaction with social support and the presence of comorbid medical illness ($P = 0.002$, 0.002, 0.006 and 0.032, respectively) (Table 4).

Discussion

Depression is the most common psychological problem encountered in patients with ESRD receiving HD [2]. There is overwhelming evidence that individuals with depression in this population are highly underdiagnosed and undertreated [4]. In an attempt to estimate the prevalence of depression in a sample of 300 Egyptian patients undergoing HD, we used BDI as a valid measure for assessment of depressive affect. We found that 45.33% of patients scored above the cut-off point of BDI for depression. Almost similar results were obtained by Graven *et al.* [21], who found that 45.4% of ESRD patients had depression when assessed using BDI. In a similar culture, in Tunisia, Zouaria *et al.* [27], using the Hospital Anxiety and Depression Scale, found that 46% of patients were depressed.

Previous studies have also reported that between one-third and one-half or more of HD patients had a BDI score suggestive of depression [20,28,29], making it the most common psychiatric problem in HD patients. There are probably some differences between the prevalence of depression in ESRD patients in different ethnic groups. In Taiwan, Chen *et al.* [30] reported that 35% of ESRD patients had depression. Similarly, Park *et al.* [31] found that the rate was around 32% among HD patients in Korea.

Wilson *et al.* [5] reported that 38.7% of a sample of British HD patients screened using BDI were depressed. A higher rate (52.5%) was determined by Bossola *et al.* [32] in Italy and Čengić and Resić [33] in Bosnia. Moreover, almost half of a predominantly African-American ESRD population receiving HD therapy had depression [17].

The variation in the reported prevalence depends on the type of assessment performed and the definition of depression used [2]. In conclusion, all screening measures confirm a high prevalence rate for depression in patients with ESRD despite the variation in results.

As reported previously by Kimmel [17], that the majority of depressed patients had mild to moderate depression, we found that among our ESRD patients. Twenty, 18 and 7% had mild, moderate and severe depression, respectively.

A distinction must be made between levels of depressive affect and the diagnosis of a psychiatric disorder [11] as screening tools for depression often show a higher prevalence compared with the diagnostic interviews [2]. This is the case in our study, in which 45.33% were high scorers on BDI, whereas only 39% had DSM-IV clinical diagnoses according to the SCID-I interview. We found that 25.63% fulfilled the diagnostic criteria of two forms of depression, namely, major depression, in 18.33%, and dysthymic disorder, in 7.3%; meanwhile, 13.33% had adjustment disorder with depressed mood.

Our study is in agreement with previous findings obtained by Watnick *et al.* [24], and Hedayati *et al.* [34], who reported 26 and 27% rates of depression, respectively, among HD patients.

The current study showed that the rates of major depression and dysthymic disorder were in agreement

Table 3 Social variables in relation to depression in haemodialysis patients

	Beck depression score [N (%)]		Test used χ^2	P-value
	Nondepressed	Depressed		
Perception of social support				
Not satisfied at all	130 (79.27)	55 (40.44)	56.064	<0.001*
Not satisfied	27 (16.46)	38 (27.94)		
Satisfied	3 (1.83)	19 (13.97)		
Fully satisfied	4 (2.44)	24 (17.65)		
Assistance from family members				
Yes	137 (83.54)	102 (75.00)	3.345	0.067
No	27 (16.46)	34 (25.00)		
Living situation				
Alone	7 (4.27)	5 (3.68)	8.061	0.089
Spouse	15 (9.15)	21 (15.44)		
Children	13 (7.93)	17 (12.50)		
Spouse and children	99 (60.37)	80 (58.82)		
Family	30 (18.29)	13 (9.56)		

*Significant.

Table 4 Risk factors for depression in haemodialysis patients (logistic regression)

	B	SE	Wald	*P*-value	Odds ratio	95% CI for exp(*B*)	
						Lower	Upper
Duration on dialysis	0.104	0.034	9.156	0.002*	1.109	1.037	1.186
Work (last 6 months)	−1.110	0.360	9.504	0.002*	3.035	1.498	6.149
Perception of social support							
Not satisfied at all	−	−	12.495	0.006*	−	−	−
Not satisfied	−1.471	0.722	4.147	0.042	0.230	0.056	0.946
Satisfied	−0.971	0.732	1.759	0.185	0.379	0.090	1.590
Fully satisfied	1.232	1.009	1.490	0.222	3.429	0.474	24.796
Comorbid medical disease	0.703	0.329	4.575	0.032*	0.495	0.260	0.943
Score of daily living activity	−0.137	0.089	2.366	0.124	0.872	0.733	1.038
Socioeconomic status	−0.251	0.210	1.420	0.233	1.285	0.851	1.940

CI, confidence interval.
*Significant.

with other ESRD studies in different countries [24,29,35].

The prevalence of major depression was also reported to be as low as 6.5% in some studies using the Schedule of Affective Disorder and Schizophrenia as a diagnostic tool [36].

Finally, the exact prevalence of depression in HD patients is highly variable because of the wide variation in considering depressive symptoms or depressive syndrome, the different criteria used to diagnose the problem and the tools used for assessment.

Despite the high prevalence of depression among our HD patients, only 9.5% were diagnosed by their physicians and received antidepressant treatment.

In different cultures, previous reports by Cukor *et al.* [4] and Wilson *et al.* [5] indicated that only 13 and 12.1%, respectively, of those who had depressive symptoms were treated adequately.

This variation in providing mental healthcare could be related to the practice pattern, diminished financial resources and stigma because of mental illness. In addition, cultural and religious beliefs may play an important role in forming attitudes towards mental healthcare providers.

In support of this explanation, previous studies have shown that physicians in Japan failed to identify and treat depression more often than physicians in other countries because of stigma related to mental disorder [7,37].

According to Chilcot *et al.* [38], the aetiology of depression in ESRD is probably a complex and multifaceted problem with both biological and psychological aspects. Depression is associated with elevated inflammatory cytokine levels, suggesting that the inflammatory process plays a 'possible' role in the aetiology of depression. Moreover, cytokines stimulate the hypothalamic–pituitary–adrenal axis and affect serotonergic and noradrenergic systems that are implicated in the pathogenesis of depression [39].

The stress associated with the rigorous nature of ESRD, the perception of loss, helplessness and uncontrolability [40] may be closely associated with the development of depression [41].

Cukor *et al.* [4] explained depression in ESRD patients using the themes of 'aloneness' and 'ineffectiveness' as hallmarks of the depressogenic changes that are associated with ESRD treatment [42].

Medical risk factors
In this study, we found that comorbidity of ESRD with physical illness was one of the significant risk factors correlated with depression, a conclusion that was also reached by different researchers [30–32]. Different explanations include the severity of complications, the associated disability, the poorer health-related quality of life and the higher risk of death and alteration in mood [7,43].

Major depressive disorder and medical illnesses are linked by several mechanisms, which accumulate over the prolonged duration of illness; depression may increase the risk of development of some specific diseases, decreases patients' adherence to dialysis and increases noncompliance to medication. However, depression can be secondary to the presence of medical conditions or the side effects of medications used to treat these diseases [44].

Duration on dialysis
We found that the duration in years on dialysis was one of the most significant correlates with depression, being more in patients on a longer duration on dialysis. This suggests that development of depression is related to the long-term biological challenges or psychological chronic stress.

In contrast, in a Canadian [21] and American study [45], depression was associated with a short duration on dialysis. However, in a Swedish study [46], depression was not associated at all with the duration of dialysis. Variability in the above results may be related to the sampling differences.

Demographic risk factors
In this study, sex difference was found to be insignificant in the multiple regression analysis. Similarly, previous studies suggested that depression was independent of sex. Older age was found to be a significant risk factor for impaired quality of life and depression in ESRD patients [47].

However, in our study, age was not found to be a significant factor on comparing depressed versus nondepressed HD patients. Marital status, living condition, educational level and type of job showed an insignificant correlation to depression in our HD patients, both in univariate and in multiple regression analysis. An almost similar conclusion was reached by Cuker *et al.* [4], Kao *et al.* [47], Moreno *et al.* [48] and Takabi *et al.* [49].

Performing activities of daily living as measured by ADL and the financial status were found to be significantly related to depression in univariate, but not in multivariate regression analysis.

Financial status is an important issue for Egyptian patients, as the average cost of a HD session ranges from US$16 in governmental hospitals to around US$32 in some private centres [13]. In this context, together with the fact that a considerable sector of the Egyptian population is not covered by health insurance and that they have to pay for treatment from their pockets. The extent of suffering of the nonaffluent patients and, consequently, their depressive symptoms can be explained.

Fitness to work
Work, in addition to being a source of income, is often associated with a sense of accomplishment, self-esteem and identity [50]. Vocationally active HD patients in the last 6 months were unlikely to have depression; thus, fitness in work and not the type of job was one of the highly significant risk factors for development of depression in our HD patients. Recently, Zouari *et al.* [27] reported a similar finding in Tunisia.

Social risk factors

Social support refers to a social network provision of psychological and mental resources intended to help an individual cope with stress [51].

The perceived feelings of unsatisfied social support were found to be a significant risk factor for the development of depression among our HD patients. Perception of satisfactory social support and family understanding help the patients to cope better with the stressors imposed by their chronic illness, which in turn increase optimism and reduce depression.

In fact, the Egyptian culture, like many other oriental ones, depends on family bonds and high expression of emotions is expected in the family context.

In the western culture, many investigations reported an inter-relationship between perceived unsatisfactory social support and depression among ESRD patients [1,17,52].

The extent of the relationship between perception of social support, depression and outcome should not be underestimated in this group of patients.

Social support may reduce the risk of depression in ESRD patients by improving compliance or through effects on the immune system [17]. Several studies have shown an association between better perception of social support with better outcomes, compliance and less utilization of health services [11].

This underscores the importance of using appropriate diagnostic and screening techniques for evaluation of depression in patients with ESRD. It is expected that depression screening tools often show a higher prevalence compared with diagnostic interviews on the basis of criteria used in diagnostic classifications.

Conclusion and recommendation

Our study supports previous findings that depression is highly prevalent among ESRD patients; however, it is under-recognized and undertreated.

Putative risk factors for the development of depression among this group include fitness in work, duration on dialysis therapy, presence of comorbid medical diseases and non satisfaction with social support.

The results obtained highlight the importance of including screening for depression in the guideline procedures for the treatment of ESRD patients, implementing depression awareness programmes for the HD management team and encouraging physicians to identify depression and liaison with psychiatrists for an early and adequate intervention for the patients to reduce their suffering.

Limitation

Data of this study should be interpreted in the context of its limitation. The study was limited to patients in two large hospitals in Cairo; patients from rural areas were not studied. Thus, the results of the demographic data may not reflect all social states.

As the study was cross-sectional, we could not determine a causal relationship.

Despite this limitation, the strength of this study is that it is one among few studies that explores some aspects of depression in Egyptian HD patients.

Acknowledgements

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