

Depression in chronic hemodialysis patients: screening and associated factors on a Tunisian sample

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Background

Depression is the most common psychiatric distress in chronic hemodialysis (HD) patients. It is associated with several factors that have to be recognized for the prevention and proper management of this mental health disorder.

Aims

Screening for the presence of depression in chronic HD patients, evaluating its severity, and identifying its associated factors.

Patient and methods

We conducted a descriptive and analytical cross-sectional study between June and December 2022 in public and private HD centers in a Tunisian governorate. Depression was screened using the Beck Depression Inventory in its full version.

Results

A total of 175 patients were included in the final study. The mean age was 56.5 ± 15.8 years, with a male predominance. We detected moderate to severe depression in 58.3% of cases. Univariate analysis revealed 18 variables correlated with moderate to severe depressive symptoms. In multivariate analysis, five variables were retained, which were in descending order of risk: Low socioeconomic status [adjusted odds ratio (Ora) = 5.478, 95% confidence interval (CI) (1.549–19.376), $P = 0.008$], insomnia [Ora = 5.34, 95% CI (1.483–19.214), $P = 0.01$], recourse to an emergency HD session [Ora = 3.847, 95% CI (1.483–19.214), $P = 0.009$], pruritus [Ora = 3.46, 95% CI (1.195–10.039), $P = 0.022$] and illiterate or primary education level [Ora = 3.26, 95% CI (1.056–10.064), $P = 0.04$].

Conclusion

Our study highlights the importance of systematically screening for depression in chronic HD patients and addressing its modifiable risk factors.

Keywords:

chronic hemodialysis, chronic kidney disease, depression

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Introduction

Chronic kidney disease (CKD) is a major public health problem worldwide, particularly in developing countries, due to its morbidity, mortality, and considerable cost. It is a non-communicable disease that affected 10% of the world's population in 2015 [1]. Studies have consistently shown that people of African descent have an increased risk of developing CKD and progressing to end-stage renal disease [1]. Hemodialysis (HD) is the most widely used renal replacement therapy for end-stage renal disease. In Tunisia, the prevalence of chronic HD patients has been steadily increasing, rising from 734 per million inhabitants in 2008 to over 13 000 patients in 2023, representing a prevalence of 1.083 per million inhabitants [2]. The cost of dialysis patient care in 2011 exceeded 90 million dinars (37 000 Euros), representing nearly 5% of total Tunisian health expenditure [3]. Furthermore, it is widely acknowledged that HD patients have significantly impaired physical and mental health compared with the general population due to the various limitations imposed by this chronic

and permanent renal replacement therapy [4]. Indeed, depression, defined by the WHO as persistent sadness and a lack of interest or pleasure in previously enriching or enjoyable activities, is not uncommon among this population [5]. It was described as the most frequent psychiatric disorder among chronic HD patients in Yaoundé, Cameroon, in 2023, with an estimated prevalence of 42.4% [6]. In Tunisia, few studies have investigated and screened for psychiatric disorders in chronic HD patients. This study was conducted to address this gap, with the following objectives:

- (a) Screening for depression in chronic HD patients and assessing its severity.
- (b) Identifying factors associated with moderate to severe depressive symptoms in this population.

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Patients and methods

A descriptive and analytical cross-sectional study was conducted in the HD unit of a regional hospital and in two private HD centers in the same Tunisian governorate over a 6-month period (June 10 to December 10, 2022). We included patients over 18 years of age, with at least three months of chronic HD experience, and who consented to participate in the study. Data were collected through patient interviews and from their medical records. Data collection was carried out using a pre-established information sheet, which allowed recording of epidemiological characteristics, medical history and comorbidities, clinical and biological data, functional complaints, HD-related data, treatments received by patients, and whether or not they were registered on the national kidney transplant list. To screen for the presence of depressive disorders, we administered a questionnaire during the HD session: the Beck Depression Inventory in its full 21-item version, using the following procedure:

- (a) The inventory was translated into Arabic. - The translated version was tested with the target population (a small group of 5 people).
- (b) The translated inventory was refined, and the necessary modifications were made.
- (c) A technical committee (the thesis supervisor and co-supervisor, and a physician specializing in epidemiology) reviewed the inventory before its use.

The questionnaire was administered by a single interviewer, the study's author.

All data were entered and analyzed using IBM SPSS Statistics version 28.0 (IBM Corporation, SPSS Statistics version 28.0. Armonk, New York, United States of America (USA)). We performed a descriptive and an analytical analysis of the data. To obtain statistically interpretable results, we converted variables with more than two responses into binary variables by grouping "similar responses". A statistically significant association was considered to be if P less than 0.05. In the multivariate analysis, we considered the variables that were significantly associated with moderate to severe depressive symptoms in the univariate analysis and studied them using logistic regression. Only variables that maintained a P less than 0.05 were retained.

Results

Descriptive study

Sample presentation

From 184 HD patients in the three study unities, six were not included [One patient was aged less than 18,

three patients had initiated chronic HD from less than 3 months, and two patients had profound hearing loss]. From the remaining 178 patients, three were excluded [two patients died during the study and one patient withdrawn his consent]. In the final study, 175 patients were retained.

Patients' profile

The mean age was 56.5 ± 15.8 years, with a range from 18 to 97 years. Men comprised 62% of the study population (male-to-female ratio = 1.63). 111 (63.4%) patients resided in urban areas. Patients receiving HD in private centers represented 61.7% of the study population. 104 (59.4%) patients had a middle socioeconomic status, compared with 29.1% with a low socioeconomic status and 11.5% with a high socioeconomic level. 65% of patients were illiterate or had a primary education, 25% had a secondary education, and 10% had a university education. 82% of patients were unemployed at the time of the study. 63% of patients were married, 20% were single, 13% were widowed, and 4% were divorced. 158 (90.3%) patients considered themselves to have good family support. 23% of patients were active smokers at the time of the study. Two patients reported regular alcohol consumption. Forty-three (24.6%) patients had at least four somatic comorbidities other than renal insufficiency. Hypertension was the most frequent comorbidity, affecting 131 (75%) patients, followed by diabetes (42 patients, 24%). Seventy-six (43.4%) patients had at least one SARS-CoV-2 infection. Five (2.9%) patients had previously experienced diagnosed and treated depressive episodes, four (2.3%) had experienced anxiety disorders, and one patient was being treated for schizophrenia. Seventeen (9.7%) patients had experienced at least one psychological trauma in their past. No patient had a history of suicide attempt. Erectile dysfunction was the most frequent functional complaint, affecting 62.4% of men. Other reported complaints included pruritus (38.3%), poor to average visual acuity (37.1%), insomnia (34.3%), chronic somatic pain (24.6%), exertional dyspnea (22.9%) and poor to average hearing acuity (22.9%). The median duration of chronic HD, expressed in years, was 6.1 ranging from 3 months to 30 years. 77.7% of patients were receiving three sessions of HD a week. 66% of patients were dialyzed during the first session, around 6:00 am., and 39.4% were dialyzed during the second session, around 10:00 am. A 4 h HD session was the norm in 48% of cases. 24% of patients have had the confection of more than two vascular accesses. At the time of the study, the functional vascular access was an arteriovenous fistula in 90.2% of cases, an internal jugular catheter in 8.6% of cases, and a femoral sheath in two cases. 26% of patients had an interdialytic weight gain greater than 6% of their dry weight. Per-dialytic

hypotension was observed in 7.4% of cases. The mean Kt/V was 1.36 ± 0.3 (0.7–1.92), and the mean PRU was 66.3 ± 7.9 [41–79]. Inadequate HD was observed in 39.4% of cases. 39% of patients had residual urine output greater than or equal to 500 ml/24 h. 16.6% of patients had functional impairment related to limb amputation or a disabling rheumatic disease. 24% of patients were not autonomous. 20.9% of patients were malnourished, 47.1% had a normal BMI, 29% were overweight, and 11% were obese. 20% of patients were on the national kidney transplant waiting list. No patient had a living candidate for kidney donation.

Prevalence and severity of depression in chronic hemodialysis patients

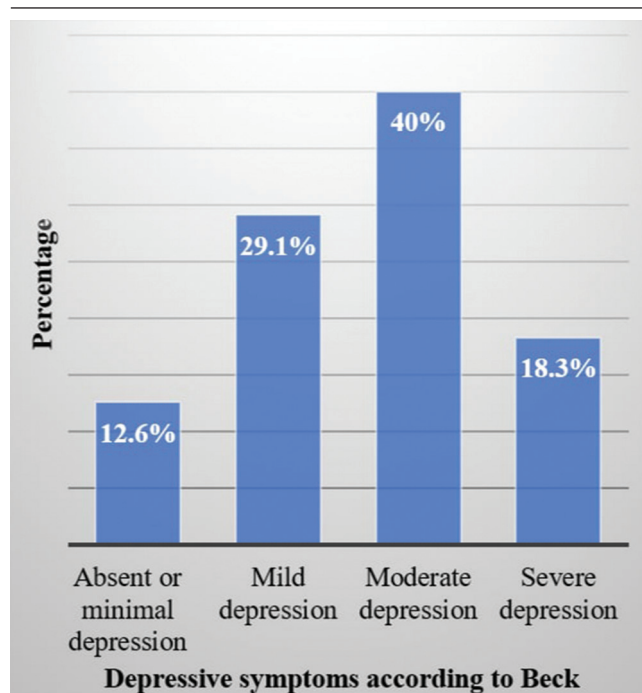
87% of the study population had depression. 58.3% had moderate to severe symptoms (Fig. 1).

Factors correlated with moderate to severe depressive symptoms

Univariate analysis

Socio-demographic Factors: Older age (60.98 ± 15.06 years vs. 50.26 ± 1.79 years), low socioeconomic status, primary or illiterate education and unemployment were correlated with moderate to severe depressive symptoms, with $P < 0.001$ for the first three variables and $P = 0.002$ for the fourth one. Sex, place of residence, marital status, HD center, and low to medium family support were not associated with depressive symptoms.

Figure 1



Depressive symptoms according to Beck's Inventory.

Medical History Associated with Depression: Only diabetes was found to be correlated with depression with $P = 0.001$. Hypertension, heart failure, coronary artery disease, stroke, hypothyroidism, viral hepatitis, and a history of SARS-CoV-2 infection were not associated with depression.

Functional Complaints Associated with Depression: Six variables were significantly associated with moderate to severe depressive symptoms: exertional dyspnea ($P < 0.001$), insomnia ($P = 0.001$), chronic somatic pain ($P = 0.001$), pruritus ($P = 0.003$), poor to average hearing acuity ($P = 0.009$), and poor to average visual acuity ($P = 0.01$). Erectile dysfunction was not associated with depressive symptoms.

Factors Specific to HD: The dialysis dose was correlated with moderate to severe depressive symptoms ($P = 0.049$). Dialysis vintage, number of sessions per week, session duration, number of vascular accesses, functional vascular access at the time of the study, interdialytic weight gain greater than 6% of dry weight, and peridialytic hypotension were not correlated with depression.

Clinical Factors: Functional impairment and loss of autonomy were significantly associated with depression ($P = 0.007$ and 0.012 , respectively).

Biological Factors: No biological parameters were associated with depression, to mention; Anemia, hypoalbuminemia, hypocalcemia, hyperphosphatemia, hyperparathyroidism (>9 times the upper limit of normal), and biological inflammatory syndrome characterized by a CRP greater than 6 ng/l.

1.7 Treatments associated with depression: Statins use was found to be protective against moderate to severe depressive symptoms ($P = 0.026$).

Registration on the national transplant list: No correlation.

Multivariate study

Five variables were identified as significantly associated with moderate to severe depressive symptoms using logistic regression (Table 1).

Table 1 Logistic regression study

Variable	Ora	CI 95%	P
Low socioeconomic status	5.478	(1.549–19.376)	0.008
Insomnia	5.338	(1.483–19.214)	0.010
Emergency hemodialysis session	3.847	(1.405–10.534)	0.009
Pruritus	3.463	(1.195–10.039)	0.022
Illiterate or primary education level	3.261	(1.056–10.064)	0.04

CI, confidence Interval; Ora, adjusted odds ratio.

Discussion

Prevalence of depression

In our study, 87.4% of patients had depression, of whom 66.7% had moderate to severe symptoms. The Togolese study by Tsevi *et al.*, also using the Beck Depression Inventory but in its simplified version, found a prevalence of depression of 68.2%, of which 47.7% a severe form [7]. The Tunisian study by Zouari *et al.*, for its part, reported a prevalence of depression of 46.2%, referring to the HADS scale [8]. These differences are likely related to the use of different nosological frameworks; Some authors use the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition, thus considering only major depressions that meet all the criteria for a major depressive episode, while others, in a symptomatic approach, include all depressive manifestations, even moderate ones [9,10].

Factors correlated with depression

The multivariate analysis of our study showed a strong correlation between moderate to severe depressive symptoms and five factors: low socioeconomic status, insomnia, the recourse to an emergency HD session, pruritus, and illiterate or primary education. The association between depression and low socioeconomic status is well documented in the literature [11–13]. Regarding insomnia, several authors have stated that it often precedes the onset of depression and that individuals suffering from it have a two- to four-fold times higher risk of developing depression compared with those without sleep disorders [14]. Furthermore, they highlighted a complex bidirectional relationship between insomnia and depression, with shared biological, psychological, and social mechanisms [14]. Pruritus is associated with reduced quality of life and particularly pronounced sleep disturbances in patients with advanced CKD or those undergoing HD [15,16]. These disturbances are generally correlated with the onset or worsening of depression [15,16]. As clearly demonstrated by Koutou *et al.* [17]. Regarding the history of recourse to emergency HD, to our knowledge, this parameter has not yet been studied in the literature. Indeed, it is well admitted and recommended to prepare patients with CKD for renal replacement therapy as early as stage IV of CKD to avoid emergency situations where the patient's life is at risk. Therefore, in our study, we focused on evaluating the impact of this event on patients' psychology.

In terms of education level, Chazelle *et al.*, revealed that, for both sexes, a low level of education was correlated with major depression [11]. Some authors explain this association by the fact that low levels of

education can lead to feelings of social devaluation and helplessness [18]. We also identified other factors correlated with depression, but to a lesser extent; they were in number of nine, to mention in descending order of significance: Advanced age, which suggests a greater vulnerability to depression in elderly chronic HD patients. However, this association was not found by Coulibaly *et al.* [19]; Professional inactivity, which is classically associated with depression, particularly in chronic HD patients [8,19–21]; Diabetes, in accordance with the study of Aatif *et al.*, who identified diabetes as the only factor significantly linked to depression in HD patients [22]; Exertional dyspnea, which constitutes, in chronic HD patients, a part of severe cardiovascular comorbidities that limit exercise tolerance [23]. It is often classified as NYHA class III–IV [23]. Chronic somatic pain, considered as one of the major predictors of depression in chronic HD patients, according to Menye *et al.* [18]. Poor to average hearing acuity, which corroborates the findings of a recent meta-analysis (2024) that included more than 24 000 people and which showed that hearing loss increases significantly the risk of depression, with an overall risk of 1.35 times higher. The risk is higher in cases of severe hearing loss with a long-term follow-up (≥ 5 years) [24]. The impact of functional impairment and heteronomy on mental health has been more studied in elderly people; Indeed, research have highlighted that loss of functional autonomy in older adults is correlated with increased depression, perceived stress, and feelings of helplessness, thus worsening overall mental health [25].

The ninth factor that has been correlated to moderate to severe depressive symptoms was inadequate dialysis. This finding is consistent with the Iranian study by Sanavi *et al.*, who used the Beck Depression Inventory to assess depression in chronic HD patients, and who found that the dialysis dose estimated by Kt/V was significantly associated with the severity of depression ($P = 0.04$) [26]. In our study, although erectile dysfunction was the most frequently reported functional complaint, it was not significantly associated with depression, unlike the study of Ati *et al.* [27]. In terms of biological variables, anemia and hypoalbuminemia were not associated with depression in our study, as well as several other studies conducted on chronic HD patients [20,26,28,29]. Based on our study, statins use appeared to be a protective factor against moderate to severe depressive symptoms, which supports the findings of the meta-analysis conducted by Salagre *et al.*, which concluded that adjunctive statin therapy could be useful for treating depressive symptoms [30]. Similarly, registration on the national kidney transplant waiting list proved to be protective against definite depressive symptoms. This parameter has not yet been mentioned in the literature.

Conclusion

Our study highlighted a significant prevalence of depression among chronic HD patients, underscoring the importance of systematic screening for depressive disorders in this population. Continuous intervention on modifiable factors associated with the onset of this psychiatric disorder, particularly promoting the socio-professional integration, screening for functional complaints such as insomnia, exertional dyspnea, pruritus, and chronic pain, as well as ensuring high-quality dialysis, is essential. A causal relationship between these various factors and depression remains to be established in prospective randomized studies.

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Conflicts of interest

There are no conflicts of interest.

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