THE EUROPEAN JOURNAL OF PSYCHIATRY

ORIGINAL ARTICLE

Depression and cognitive distortions in hemodialysis patients with end stage renal disease: A case-control study

Özgecan Tuna [a,*], Özlem Devrim Balaban [b], Caner Mutlu [c], Özge Şahmelikoğlu [b], Musa Bali [d], Cagatay Ermis [e]

[a] Kanuni Sultan Süleyman Training and Research Hospital, Department of Psychiatry, Turkey
[b] Bakirkoy Mental and Nervous Diseases Training and Research Hospital, Department of Psychiatry, Turkey
[c] İstanbul Çam ve Sakura City Hospital, Department of Child and Adolescent Psychiatry, Turkey
[d] Gazi University Hospital, Department of Nephrology, Turkey
[e] Dokuz Eylul University Hospital, Department of Child and Adolescent Psychiatry, Turkey

Abstract

Background and objectives: Identifying cognitive distortions is essential for Cognitive Behavioral Therapy (CBT) that plays a key role in the treatment of depression. Depression seen in patients with End-Stage Renal Disease (ESRD) has not been sufficiently diagnosed and treated. This study aimed to examine the cognitive distortions and schemas of patients diagnosed with ESRD.

Methods: Fifty-six patients undergoing hemodialysis and forty-seven controls were enrolled in the study. A sociodemographic and clinic data form, Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I), Hospital Anxiety and Depression Scale (HADS), Dysfunctional Attitudes Scale (DAS), Automatic Thoughts Questionnaire (ATQ) were applied to all participants.

Results: The prevalence of the psychiatric disorder in the case group was significantly higher than the prevalence of the psychiatric disorder in the control group. Compared with the control group, the HADS depression subscale was significantly high in the patient group. There was a positive correlation between the duration of hemodialysis and total scores of DAS as well as the ''dependency attitudes'' factor among the case group. The ''helplessness'' subscale scores of the ATQ were significantly higher in the case group compared to the control group.

* Corresponding author at: Department of Psychiatry, Kanuni Sultan Süleyman Trainning and Research Hospital, Halkali Küçükçekmece, 34403 İstanbul, Turkey.
 E-mail address: ozgecan.tuna@saglik.gov.tr (Ö. Tuna).

Conclusions: The duration of hemodialysis was related to dependency attitudes of cognitive distortions among patients with ESRD. Studies investigating cognitive modalities are needed to treat depression more successfully in this population. It will contribute to the Cognitive Behaviour Therapy of ESRD patients when these factors are taken into consideration.

Introduction

End-Stage Renal Disease (ESRD) is an important public health problem with high morbidity and mortality, adversely affecting the quality of life, imposing a great economic burden, low awareness and early diagnosis.[1] According to the United States Renal Data System's 2019 Annual Data Report, the prevalence of ESRD continues to rise and reached 746,557 in 2017 (versus 727,912 in 2016).[2] This represents a 2.6% increase since 2016, which is the result of decreasing death rates in the ESRD population. The European Renal Association – European Dialysis and Transplant Association (ERA-EDTA) Registry Annual Report 2016 reported that the incidence of renal replacement therapy (RRT) for ESRD was 121 per million population (pmp) in 2016, ranging from 29 pmp in Ukraine to 251 pmp in Greece.[3]

Psychiatric disorders, particularly depression, commonly appear in patients with ESRD.[4–6] The impairment in functioning was strongly associated with the severity of depression in patients with ESRD.[7,8] Depression in ESRD is associated with negative outcomes such as poor adaptation to dialysis, malnutrition, decreased quality of life, and increased mortality.[9,10] Although current evidence emphasizes the clinical significance of depression in ESRD, many depressed patients with ESRD are not recognized and do not receive adequate psychiatric treatment.[11] Depression also could be presented by non-specific cognitive or somatic symptoms, including anorexia, sleeping difficulties, fatigue, and gastrointestinal complaints, which can be seen in uremia.[12] These overlapping symptoms can mimic a depressive disorder among patients with ESRD and cognitive symptoms of depression should be thoroughly evaluated for an adequate diagnosis.[4] Accordingly, timely diagnosis and treatment of patients with ESRD had utmost importance. Both pharmacological approaches and cognitive behavioral therapy (CBT) was recommended to alleviate depressive symptoms in this population.[13,14] Psychotherapies could be an effective treatment option for patients with ESRD diagnosed with comorbid depression.[15,16]

CBT is an evidence-based treatment option used for the treatment of depression. CBT could be applied in hospital settings to reduce the severity of depressive symptoms.[13,17–19] In a meta-analysis by Wang et al., results also suggested the effectiveness of CBT to alleviate depressive symptoms compared to treatment as usual in patients with diabetes.[20] Although there were many studies for CBT applications for the treatment of depression comorbid with medical conditions, CBT for depression in the ESRD population was not widely investigated.[18,19,21] Some promising results have been provided from observational studies and relatively small randomized controlled studies.[22] In a study performed by Duarte et al.[13] on 85 dialysis patients diagnosed with depression, a significant decrease in depression severity and an increase in the quality of life have been observed at the end of a 12-week CBT program. A study investigated the therapeutic efficacy of CBT to reduce depressive symptoms in patients receiving hemodialysis treatment. In this study, Individual CBT was given for three months by a psychologist in ten sessions. After three months, there was a significant reduction in the CBT arm compared to the controls on the waiting list. Depressive symptoms were less commonly present in patients receiving CBT compared to the waiting list group (11% vs. 62%).[23]

According to the cognitive model of depression, there is a negative bias in the cognitive processing of internal stimuli or external events, which gives rise to cognitive distortions.[24] By biased interpretation of data, cognitive distortions lead to dysfunctional automatic thoughts increasing emotional distress.[25] The main target of cognitive interventions is to guide the individual to challenge these automatic thoughts with more objective and functional thoughts and beliefs.[24] In the extant literature, cognitive distortions are closely associated with the severity of depression and depressive feelings.[26–29]

Dysfunctional beliefs and attitudes were related to depressive symptoms across several physical illnesses.[30,31] Güner et al. showed the relationship between automatic thoughts/dysfunctional attitudes and depressive symptoms among patients newly diagnosed with multiple sclerosis.[32] In another study, patients with breast cancer showed higher scores in dysfunctional attitudes as well as stress, anxiety, and depression domains.[30]

Investigating cognitive distortions and dysfunctional schemas in patients with ESRD are crucial for CBT applications. Given the depressive disorders characterized by cognitive distortions and dysfunctional schemas as per the cognitive theory,[33] to our knowledge, no study investigated the relationship between depression and cognitive distortions using a psychometrically valid tool to measure the cognitive schemas in patients with ESRD.

To this end, we aimed to examine the relationship between the cognitive distortions determined with ''dysfunctional attitudes'' and ''automatic thoughts'' and some clinical characteristics on patients diagnosed with ESRD, and compare those with the control group. We also investigate the frequency and severity of depressive mood-related disorders among patients with ESRD. As far as we know, this study is the first study investigating cog-

nitive distortions and schemas of patients diagnosed with ESRD.

Materials and methods

Among patients receiving ongoing hemodialysis treatment between February and April in a dialysis center within the Turkish Kidney Foundation, subjects meeting the inclusion criteria have been consecutively included in the study. The inclusion criteria of the study consisted of (i) being between age 18–65, (ii) being literate, (iii) having sufficient mental and physical capacity to understand and answer tests, and (iv) receiving hemodialysis treatment for at least 12 months. Exclusion criteria were (i) mental retardation, (ii) the presence of alcohol/substance use disorder, (iii) disability or language problems impairing diagnostic psychiatric interviews, (iv) a diagnosis of dementia, delirium, or a psychotic disorder, (v) history of hospitalization or acute exacerbation within the last 3 months and (vi) inability to complete the scales used in the study. A control group who was a volunteer for participating in the study and did not have renal failure have been included in the study as a control group. We posted ads to find the control group and we had interviews random with applicants until we reached a sufficient number. The study protocol has been approved by the Local Ethics Committee. All subjects have given written informed consent for the study.

Clinical assessments

Structured clinical interview for DSM-IV axis I disorders (SCID-I)

Structured Clinical Interview for DSM-IV, Clinical Version (SCID-I) was originally named and developed by First and his friends SCID-I was a semi-structured clinical interview applied by an interviewer to determine the diagnosis of Axis I psychiatric disorders according to DSM-IV.[34] The validation study of SCID-I in the Turkish population was performed by Özkürçügil et al.[35] The psychiatric status of all subjects was evaluated by the first author by implementing the SCID-I.

Hospital anxiety and depression scale (HADS)

Hospital Anxiety and Depression Scale (HADS) was developed to measure the levels of anxiety and depression in individuals with somatic disease.[36] A Likert-type scale involving 14 questions to measure anxiety and depression symptoms in a 4-point range. The reliability and validity study for the Turkish version of HAD was performed by Aydemir et al.[37]

Automatic thoughts questionnaire (ATQ)

Automatic Thoughts Questionnaire measures the frequency of negative automatic thoughts associated with depression.[38] A Likert type scale consists of thirty items scored between ''1 = never'' and ''5 = always''. Reliability and validity analyses of the scale in Turkey have been performed in two different studies.[39,40] ATQ has a five-factor structure listed as ''negative self-concept'',

''confusion/escape fantasies'', ''personal maladjustment and desire for change'', ''loneliness/isolation'' and ''giving up/helplessness''.[38]

Dysfunctional attitude scale (DAS)

Dysfunctional Attitude Scale measures the level of dysfunctional attitudes associated with depression. The attitudes can be considered as ''intermediate beliefs'' of ''schemas'' manifested by ''negative automatic thoughts''. These attitudes reflect the absolute and strict standards of individuals to evaluate themselves and the world.[41] DAS was designed as a Likert-type scale consisting of forty items scored from ''1 = totally disagree'' to ''7 = totally agree''. The total score of the scale indicates the levels of dysfunctional attitudes.[42] Turkish validation study of DAS was performed[43] and the DAS has a predictive value to show cognitive vulnerability to depression.[27] It has four sub-scales consisting of ''perfectionist attitude'', ''approval by others'', ''dependency attitude'' and ''variable attitude''.

Statistical analysis

Statistics Package for Social Sciences Version 24.0 (IBM Corporation, Armonk, NY) program was used for the statistical evaluation of data. Kolmogorov-Smirnov method was used to assess normal distribution. The student t-test was used for the comparison of two groups with continuous variables meeting parametric test assumptions. For continuous variables not meeting parametric test assumptions, the Mann Whitney U test was implemented to compare study groups. The Chi-square test and Fisher's exact test were used for comparing categorical variables. Pearson correlation analyses were performed between clinical variables. Statistical significance was set at $p < 0.05$ as two-sided.

Results

Sociodemographic information and research diagnoses of the study participants are shown in Table 1. The age of study groups at the time of participation was comparable (50.1 ± 11.3 years in the case group vs. 50.3 ± 9.8 years in the control group, $p = 0.942$). No statistically significant difference was found between the case and control group regarding sex, marital status, smoking, and the presence of comorbid medical diseases. When compared for their employment status, patient groups yielded higher rates of unemployment compared to the control group (80.4% vs. 40.4%, $p < 0.001$). The average duration of education also did not differ between study groups (8.5 ± 3.5 years in the case group vs. 8.5 ± 3.3 years in the control group, $p = 0.970$). Patients with ESRD had higher rates of comorbid Axis-I diagnoses compared to community controls (50.0% vs. 25.5%, $p = 0.020$). Depressive mood-related disorders (MDD and adjustment disorder with depressive mood) was higher among patients with ESRD than community controls (39.3% vs. 14.9%, $p = 0.012$).

Table 2 summarizes the comparison of study groups in terms of the total scores of the scales used in the study. Total HADS-Depression and the ''helplessness'' subscale scores of

Table 1 Sociodemographic information and research diagnoses of the study participants.

	ESRD, n = 56	Control, n = 47	t/Z/ X²	p*
Age, mean ± SD	50.1 ± 11.4	50.3 ± 9.8	0.7	0.942
Sex, male n (%)	33 (58.9)	27 (57.4)	0.0	0.879
Education, years, mean ± SD	8.5 ± 3.5	8.5 ± 3.3	0.0	0.970
Married, n (%)	41 (73.2)	34 (72.3)	0.0	0.921
Unemployed, n (%)	45 (80.4)	19 (40.4)	15.7	<0.001
Smoking, n (%)	14 (25.0)	14 (29.8)	0.1	0.748
Alcohol intake, n (%)	5 (8.9)	4 (8.5)	0.0	1.0
Comorbid medical illness n (%)	26 (46.4)	19 (40.4)	0.2	0.680
Any SCID-I diagnosis (present), n (%)	28 (50.0)	12 (25.5)	5.5	0.020*
Depressive mood-related disorders (i.e major depressive disorder and adjustment disorder with depressive mood) (present), n (%)	22(39.3)	7 (14.9)	6.4	0.012*

ESRD: End-Stage Renal Disease, MDD: MDD, SCID-I: Structured Clinical Interview Scale for DSM-IV Axis I disorders, SD: standard deviation.
  * Chi-square was considered significant at p < 0.05.

Table 2 Comparison of study groups in terms of the total scores of HADS, DAS and ATQ.

Total scale scores	ESRD, n = 56 mean ± SD	Control, n = 47 mean ± SD	t	p*
HADS Depression	7.5 ± 4.3	5.9 ± 3.6	−2.0	0.048
DAS Total	135.3 ± 29.8	132.3 ± 23.4	0.3	0.576
ATQ Total	59.9 ± 23.5	52.9 ± 20.2	−1.6	0.113
DAS ''perfectionist attitude''	48.7 ± 16.8	47.8 ± 14.1	−0.3	0.768
DAS ''approval by others''	43.5 ± 12.0	41.6 ± 9.4	−0.9	0.363
DAS ''dependency attitude''	19.9 ± 6.9	20.5 ± 6.6	0.4	0.689
DAS ''variable attitude''	18.3 ± 4.2	19.0 ± 4.9	0.8	0.414
ATQ ''negative self-concept''	17.9 ± 7.8	16.3 ± 7.0	−1.3	0.262
ATQ ''confusion/escape fantasies''	11.7 ± 5.2	10.3 ± 4.8	−1.4	0.184
ATQ ''personal maladjustment and desire for change''	7.5 ± 3.2	6.7 ± 2.6	−1.4	0.184
ATQ ''loneliness/isolation''	8.0 ± 3.3	6.9 ± 2.6	−1.9	0.065
ATQ ''helplessness''	8.7 ± 4.0	7.2 ± 3.2	−2.1	0.039

ATQ: Automatic Thoughts Questionnaire, DAS: Dysfunctional Attitude Scale, ESRD: End-Stage Renal Disease, HADS: Hospital Anxiety and Depression Scale, SD: standard deviation.
  * p < 0.05 was considered significant for independent sample t-test.

the ATQ were significantly higher in the case group compared to the control group. (For depression subscale of the HADS, 7.5 ± 4.3 vs. 5.9 ± 3.6, p = 0.048; and for helplessness subscale of ATQ, 8.7 ± 4.0 vs. 7.2 ± 3.2, p = 0.039, respectively). Other scales used in the study did not differ between study groups.

Pearson correlation between cognitive assessment and HADS-Depression scores were also implemented (Table 3). No statistically significant correlation was found between HADS-Depression scores and total DAS scores in the control group (p = 0.052). HADS-Depression score was found positively correlated with the ''Dependency Attitude'' subscale score of the DAS in the case group (r = 0.377, p = 0.004). In both groups, a significant positive correlation was found between the HADS-Depression scores and total scores of the ATQ. In addition, age, the total duration of education, and the duration of renal illness were not correlated with the total scores of the scales used in the study. The duration of the dialysis period was correlated with total DAS scores

(r = 0.273, p = 0.042) and the ''Dependency Attitude'' subscale scores (r = 0.339, p = 0.011) (Table 4).

Discussion

This study investigated cognitive distortions in patients with ESRD in comparison to community controls. In the previous literature, psychiatric disorders were found higher in patients with ESRD compared to the general population.[44,45] Of these, depression was relatively prevalent among patients with ESRD.[4,46] In line with the previous literature[44,45,47] patients with ESRD had higher levels of psychopathology in our study compared to community controls with the interviews with SCID-I. Half of the individuals with ESRD were diagnosed with Axis-I disorders in our study, and 39.3% of them suffered from depressive mood-related disorders (that included MDD and adjustment disorder with depressive mood). Considering the number of patients with medical conditions who have adjustment disorder in the

Table 3 Correlations of total depression subscale scores of HADS.

| | Total depression scores of the HADS | | | |
| | ESRD | | Control | |
	r*	P	r*	P
DAS total	0.313**	0.019	0,285	0,052
ATQ total	0.503***	0,000	0,520***	0,000
DAS ''perfectionist attitude¨	0,230	0,088	0.322**	0,027
DAS ''approval by others	0,235	0,081	0,049	0,743
DAS ''dependency attitude''	0.377***	0,004	0,084	0,576
DAS ''variable attitude''	0,105	0,442	0,117	0,434
ATQ ''negative self-concept''	0.459***	< 0,001	0.483***	0,001
ATQ ''confusion/escape fantasies''	0.403***	0.002	0.440***	0.002
ATQ ''personal maladjustment and desire for change''	0.393***	0.003	0.588***	< 0.001
ATQ ''loneliness/isolation''	0.490***	< 0.001	0.423***	0.003
ATQ ''helplessness''	0.483***	< 0.001	0.488***	0.001

ATQ: Automatic Thoughts Questionnaire, DAS: Dysfunctional Attitude Scale, ESRD: End-Stage Renal Disease, HADS: Hospital Anxiety and Depression Scale.
* Pearson correlation analysis.
** <0.05.
*** <0.01, p < 0.05 was considered significant.

Table 4 Correlation of Renal Disease Period and Dialysis Period with Hospital Anxiety and Depression, Dysfunctional Attitude and Automatic Thoughts Questionnaire Scores among case group.

| | Renal disease period | | Dialysis period | |
| | Case (n = 56) | | Case (n = 56) | |
	r*	P	r*	P
HADS depression	0.218	0.107	0.215	0.112
DAS Total	0,098	0,471	0,273	0,042
ATQ Total	0,036	0,793	0,099	0,466
DAS ''perfectionist attitude''	0.053	0,697	0,061	0,654
DAS ''approval by others''	0,099	0,466	0,230	0,088
DAS ''dependency attitude''	0,071	0,601	0,339	0,011
DAS ''variable attitude''	0,105	0,440	0,203	0,133

HADS: Hospital Anxiety and Depression Scale, DAS: Dysfunctional Attitude Scale, ATQ: Automatic Thoughts Questionnaire.
* Pearson correlation (p < 0.05 was considered significant).

course of the illness,[48] adjustment disorder with depressive mood and MDD were on the same continuum for this population under the title of depressive mood-related disorders. In this context, we could conclude patients with ESRD had more commonly depressive mood-related disorders compared to the people not diagnosed with ESRD. Nevertheless, only one study suggested ESRD was not related to depressive symptoms.[49] The point prevalence of depression rate in the general population was found between 2–10% in community settings.[50,51] Surprisingly, in our sample, the control group also yielded a higher level of depressive symptoms than expected. This result is not surprising considering that the depression prevalence in ESRD patients is rather assessed according to the cut-off points of self-report scales in the literature.[52–55] This is because these scales are instruments recommended for determining the severity of depressive symptoms and their follow-up, rather than diagnosing depression or adjustment disorder.[56]

Higher DAS and ATQ scores have been somewhat associated with depressive mood.[27,33,43,57] Recent studies focused on the association between cognitive distortions and depressive symptoms in patients with physical comorbidities.[31,32] Lam et al. also showed the link between cognitive distortions and depressive symptoms among patients with an early-stage malignancy.[31] Guzman et al. also demonstrated illness-related negative schemas and social support were related to depression scores among patients with ESRD.[22] In parallel with the previous literature, the results of our study suggested total HADS was correlated with total ATQ and DAS scores in patients with ESRD. In this context, cognitive distortions and dysfunctional attitudes were also associated with depression in the ESRD population. This result supports the cognitive model also in ESRD cases, which states that the presence of depressive schemas makes individuals delicate and vulnerable against depression, ñegative automatic thoughtsäre generated in any way when a depressive schema

is activated and thus cognitive distortions are created. It can be suggested that this finding will contribute to cognitive therapy modalities, which have been successful in chronic medical conditions.[24]

Moreover, in our study total helplessness subscale scores of ATQ were higher in the case group than those in the control group. ESRD patients could experience the feeling of helplessness, frequently stated as ''I don't think I can go on'', ''There is no joy in anything anymore'', ''I feel very helpless'', ''I can't take this anymore'' in the ATQ. In the previous literature, patients with physical illness commonly reported helplessness across studies.[58,59] Besides, the symptoms of physical illnesses were correlated with the feeling of helplessness among patients with diabetes mellitus, multiple sclerosis, and chronic pain.[60–62] Likewise, arthralgia observed in rheumatoid arthritis was closely related to the scores of helplessness.[63] Smallheer et al. found a correlation between the severity of perceived helplessness and depressive symptoms.[64] Helplessness and despondency was reported by previous studies focusing on depression seen in patients with ESRD.[65] Therefore, helplessness had a major impact on depressive symptomatology among individuals suffering from physical illnesses. In line with previous observations, the results of this study specifically emphasized the role of dysfunctional attitudes related to helplessness among subjects with ESRD, which could be seen as a therapeutic target in treatment.

Total DAS scores and total DAS ''dependency attitude'' sub-scale scores were correlated with the duration of the dialysis treatment. These attitudes reflect absolute and strict standards the individual uses while evaluating themselves and the world.[41] Longer duration of dialysis treatment might give rise to an impairment in self-efficacy. Accordingly, some patients could develop a more dependent attitude in many areas of life.[66] Statements of this subscale are somewhat an extension of the belief of ''not being loved'', which is one of the core beliefs playing an efficient role in the formation of depression.[25] Due to this core belief, the individual requires to be liked and approved by others. Patients depending on dialysis lose their financial power and suffer from impairments in their role at home, work, and the social circle; thus, they might not be capable of taking independent actions, even need a caregiver.[67] As being dependent on dialysis machines and dealing with health problems, patients treated with hemodialysis restricted their social activities.[68] Schmidt-Busby et al. investigated self-management and motivation among subjects with ESRD. In addition to the feeling of dependence stemming from chronic illness, both patients with ESRD and their family members feel responsible to mutually support each other.[69] In parallel with our findings, Chilcot et al. also showed the duration of dialysis treatment predicted depression among patients with ESRD.[70] Taken together, modifying dependent attitude might be a vital treatment goal of CBT applications in chronic medical illnesses since the longer hemodialysis treatment was correlated with increased dependency beliefs. In this context, CBT applications should seek dependency attitudes among individuals receiving dialysis for longer periods.

There was a significant positive correlation between the scores of ''independent attitude'' and the severity of depression in the case group. Of cognitive distortions and dysfunctional attitudes, independent attitudes interact with depressive symptoms and cause more disability within individuals with ESRD. Studies suggested hemodialysis was related to a poorer quality of life compared to peritoneal dialysis.[71,72] However, a recent-meta analysis did not support the relationship between the dialysis type and quality of life.[73] On the other hand, a recent study showed that hemodialysis restricted work- or study-related activities and the changes in life plans, leading to a feeling of dependency.[74] Therefore, the hemodialysis treatment seemed to impede the social roles of patients with ESRD,[67–69] thereby undermining beliefs of self-sufficiency and independence.

While there is a limited number of articles on ESRD cases for cognitive therapy modalities,[13,17] to the best of our knowledge, no study in the literature evaluated the dysfunctional attitudes of patients with ESRD by using standardized psychometric tools. More comprehensive treatment approaches targeting illness-specific interventions are still needed. Better characteriz3ation of cases with ESRD will be instructive for an illness-oriented approach.

Limitations of our study should be acknowledged when interpreting our results. The small number of subjects from a single dialysis center reduced statistical power. The cross-sectional design of the study was a limitation. Cognitive schemas remained relatively stable over time. Nevertheless, we assumed dialysis treatment had a major impact on schemas. Overall, despite our limitations, our study provided important information regarding cognitive schemas and negative automatic thoughts to develop illness-oriented CBT applications in the future.

Conclusions

ESRD culminated in impairments in the quality of life, as a chronic illness requiring hemodialysis treatment. Psychiatric disorders, mainly depression, were not uncommon in these patients. The role of CBT gradually increases in the treatment of depression and anxiety disorders among patients with a chronic medical condition. In our study, ESRD showed specific alterations in the schema and automatic thought scales, which could pave the way for illness-specific interventions.

Funding

Ethical statement

Ethics approval of the original study had been obtained from the İstanbul Bakirkoy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery Authority Cluster Research Ethics Committee before collecting the data.

Conflict of interest

The authors have no conflict of interest to declare.

Acknowledgment

None.

References

1. Suleymanlar G, Utas C, Arinsoy T, Ates K, Altun B, Altiparmak MR, et al. A population-based survey of chronic renal disease in Turkey—the CREDIT study. Nephrol Dial Transplant. 2011;26(6):1862–71.
2. Saran R, Robinson B, Abbott KC, Bragg-Gresham J, Chen X, Gipson D, et al. US renal data system 2019 annual data report: epidemiology of kidney disease in the United States. Am J Kidney Dis. 2020;75 1 Suppl (1):A6–7.
3. Kramer A, Pippias M, Noordzij M, Stel VS, Afentakis N, Ambuhl PM, et al. The European Renal Association - European Dialysis and Transplant Association (ERA-EDTA) Registry Annual Report 2015: a summary. Clin Kidney J. 2018;11(1):108–22.
4. Hawamdeh S, Almari AM, Almutairi AS, Dator WLT. Determinants and prevalence of depression in patients with chronic renal disease, and their caregivers. Int J Nephrol Renovasc Dis. 2017;10:183–9.
5. Palmer S, Vecchio M, Craig JC, Tonelli M, Johnson DW, Nicolucci A, et al. Prevalence of depression in chronic kidney disease: systematic review and meta-analysis of observational studies. Kidney Int. 2013;84(1):179–91.
6. Feroze U, Martin D, Reina-Patton A, Kalantar-Zadeh K, Kopple JD. Mental health, depression, and anxiety in patients on maintenance dialysis. Iran J Kidney Dis. 2010;4(3):173–80.
7. Erengin N, Keçecioğlu N, Güven M, Sarıkaya M, Tuncer M, Özcan S, et al. Comparison of patients on hemodialysis and continuous ambulatory peritoneal dialysis in terms of depression, anxiety and disability. Turkish J Nephrol. 1998;7(3):137–40.
8. Kutner NG, Brogan D, Hall WD, Haber M, Daniels DS. Functional impairment, depression, and life satisfaction among older hemodialysis patients and age-matched controls: a prospective study. Arch Phys Med Rehabil. 2000;81(4):453–9.
9. Koo JR, Yoon JY, Joo MH, Lee HS, Oh JE, Kim SG, et al. Treatment of depression and effect of antidepression treatment on nutritional status in chronic hemodialysis patients. Am J Med Sci. 2005;329(1):1–5.
10. Ganu VJ, Boima V, Adjei DN, Yendork JS, Dey ID, Yorke E, et al. Depression and quality of life in patients on long term hemodialysis at a national hospital in Ghana: a cross-sectional study. Ghana Med J. 2018;52(1):22–8.
11. Hedayati SS, Finkelstein FO. Epidemiology, diagnosis, and management of depression in patients with CKD. Am J Kidney Dis. 2009;54(4):741–52.
12. Kimmel PL, Levy NB. In: Daugirdas JT, Blake PG, Ing TS, editors. Handbook of Dialysis. 3rd ed Philadelphia: Lippincott Williams and Wilkins; 2001. p. 413–9.
13. Duarte PS, Miyazaki MC, Blay SL, Sesso R. Cognitive-behavioral group therapy is an effective treatment for major depression in hemodialysis patients. Kidney Int. 2009;76(4):414–21.
14. Shirazian S, Grant CD, Aina O, Mattana J, Khorassani F, Ricardo AC. Depression in chronic kidney disease and end-stage renal disease: similarities and differences in diagnosis, epidemiology, and management. Kidney Int Rep. 2017;2(1):94–107.
15. Hedayati SS, Daniel DM, Cohen S, Comstock B, Cukor D, Diaz-Linhart Y, et al. Rationale and design of a trial of sertraline vs. cognitive behavioral therapy for end-stage renal disease patients with depression (ASCEND). Contemp Clin Trials. 2016;47:1–11.
16. Hedayati SS, Yalamanchili V, Finkelstein FO. A practical approach to the treatment of depression in patients with chronic kidney disease and end-stage renal disease. Kidney Int. 2012;81(3):247–55.
17. Lloyd GG, Guthrie E. Handbook of Liaison Psychiatry. New York: Cambridge University Press; 2007.
18. Safren SA, Gonzalez JS, Wexler DJ, Psaros C, Delahanty LM, Blashill AJ, et al. A randomized controlled trial of cognitive behavioral therapy for adherence and depression (CBT-AD) in patients with uncontrolled type 2 diabetes. Diabetes Care. 2014;37(3):625–33.
19. Uchendu C, Blake H. Effectiveness of cognitive-behavioural therapy on glycaemic control and psychological outcomes in adults with diabetes mellitus: a systematic review and meta-analysis of randomized controlled trials. Diabet Med. 2017;34(3):328–39.
20. Wang ZD, Xia YF, Zhao Y, Chen LM. Cognitive behavioural therapy on improving the depression symptoms in patients with diabetes: a meta-analysis of randomized control trials. Biosci Rep. 2017;37(2), http://dx.doi.org/10.1042/BSR20160557.
21. Berkman LF, Blumenthal J, Burg M, Carney RM, Catellier D, Cowan MJ, et al. Effects of treating depression and low perceived social support on clinical events after myocardial infarction: The Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Randomized Trial. JAMA. 2003;289(23):3106–16, http://dx.doi.org/10.1001/jama.289.23.3106.
22. Guzman SJ, Nicassio PM. The contribution of negative and positive illness schemas to depression in patients with end-stage renal disease. J Behav Med. 2003;26(6):517–34, http://dx.doi.org/10.1023/a:1026249702054.
23. Cukor D, Ver Halen N, Asher DR, Coplan JD, Weedon J, Wyka KE, et al. Psychosocial intervention improves depression, quality of life, and fluid adherence in hemodialysis. J Am Soc Nephrol. 2014;25(1):196–206, http://dx.doi.org/10.1681/ASN.2012111134.
24. Beck AT. The current state of cognitive therapy: a 40-year retrospective. Arch Gen Psychiatry. 2005;62(9):953–9, http://dx.doi.org/10.1001/archpsyc.62.9.953.
25. Türkçapar H., Bilişsel Terapi H. Turkish 5th ed. İstanbul, HYB Basım Yayın A, 2011, 38-88.
26. McGinn LK, Cukor D, Sanderson WC. The relationship between parenting style, cognitive style, and anxiety and depression: does increased early adversity influence symptom severity through the mediating role of cognitive style? Cogn Ther Res. 2005;29(2):219–42, http://dx.doi.org/10.1007/s10608-005-3166-1.
27. Brown GP, Hammen CL, Craske MG, Wickens TD. Dimensions of dysfunctional attitudes as vulnerabilities to depressive symptoms. J Abnorm Psychol. 1995;104(3):431–5, http://dx.doi.org/10.1037//0021-843x.104.3.431.
28. Kwon S-M, Oei TPS. Differential causal roles of dysfunctional attitudes and automatic thoughts in depression. Cogn Ther Res. 1992;16(3):309–28, http://dx.doi.org/10.1007/BF01183284.
29. Rnic K, Dozois DJ, Martin RA. Cognitive distortions, humor styles, and depression. Eur J Psychol. 2016;12(3):348–62, http://dx.doi.org/10.5964/ejop.v12i3.1118.
30. Musarezaie A, Khaledi F, Kabbazi fard M, Momeni-GhaleGhasemi T, Keshavarz M, Khodaee M. Investigation the dysfunctional attitudes and itsŕelationship with stress, anxiety and depression in breast cancer patients. Health Syst Res. 2015;11(1).
31. Lam KF, Lim HA, Tan JY, Mahendran R. The relationships between dysfunctional attitudes, rumination, and non-somatic depressive symptomatology in newly diagnosed Asian cancer patients. Compr Psychiatry. 2015;61:49–56, http://dx.doi.org/10.1016/j.comppsych.2015.06.001.
32. Güner MC, Yazar MS, Meterelliyoz KŞ. Cognitive predictors of depression and anxiety in individuals with newly diagnosed multiple sclerosis. Eur J Psychiatry. 2020;34(4):202–10, http://dx.doi.org/10.1016/j.ejpsy.2020.06.004.

33. Cerit CCB. The comparison of cognitive distorsions among patients with depression, dysthymia, remitted depression and healthy control group. Anadolu Psikiyatri Derg. 2012;13(4):250–5.

34. First MBSR, Gibbon M, et al. Structured clinical interview for DSM-IV axis I disorders (SCID-I), clinical version. Washington D.C.: American Psychiatric Press Inc; 1997.

35. Özkürkçügil AAÖ, Yıldız M. DSM-IV eksen bozuklukları için yapılandırılmış klinik görüşmenin Türkçeye uyarlanması ve güvenirlik çalışması. İlaç ve Tedavi Dergisi. 1999;12:233–6.

36. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983;67(6):361–70, http://dx.doi.org/10.1111/j.1600-0447.1983.tb09716.x.

37. Aydemir Ö. Validity and reliability of Turkish version of hospital anxiety and depression scale. Turk J Psychiatry. 1997;8:280–7.

38. Hollon SD, Kendall PC. Cognitive self-statements in depression: development of an automatic thoughts questionnaire. Cogn Ther Res. 1980;4(4):383–95, http://dx.doi.org/10.1007/BF01178214.

39. Aydın G, Aydın O. Otomatik Düşünceler Ölçeğinin geçerlilik ve güvenilirliği. Turkish Journal of Psychology. 1990;7:51–7.

40. Şahin NH, Şahin N. Reliability and validity of the Turkish version of the automatic thoughts questionnaire. J Clin Psychol. 1992;48(3):334–40.

41. Savaşır I, Şahin N. (Cognitive-Behavioral Therapy Scales Commonly Used in the Assessment) Turkish. In: Bilişsel-Davranışçı Terapilerde Değerlendirmede Sık Kullanılan Ölçekler. 1st ed Ankara: Türk Psikologlar Derneği Yayınları; 1997.

42. Weismann A.N., Beck A.T., Development and validation of the Dysfunctional Attitude Scale: A preli-minary investigation. 62nd Annual meeting of the AERA, Toronto, Ontario, Canada. 27, 1978, 31-33.

43. Sahin NH, Sahin N. How dysfunctional are the dysfunctional attitudes in another culture? Br J Med Psychol. 1992;65(Pt1):17–26, http://dx.doi.org/10.1111/j.2044-8341.1992.tb01680.x.

44. Fukunishi I, Kitaoka T, Shirai T, Kino K, Kanematsu E, Sato Y. Psychiatric disorders among patients undergoing hemodialysis therapy. Nephron. 2002;91(2):344–7, http://dx.doi.org/10.1159/000058418.

45. Kimmel PL, Thamer M, Richard CM, Ray NF. Psychiatric illness in patients with end-stage renal disease. Am J Med. 1998;105(3):214–21, http://dx.doi.org/10.1016/s0002-9343(98)00245-9.

46. Hedayati SS, Minhajuddin AT, Toto RD, Morris DW, Rush AJ. Prevalence of major depressive episode in CKD. Am J Kidney Dis. 2009;54(3):424–32, http://dx.doi.org/10.1053/j.ajkd.2009.03.017.

47. Sağduyu A, Erten Y. Mental disorders in chronic kidney patients undergoing hemodialysis. Turkish Journal of Psychiatry. 1998;9:13–22.

48. Goyal E, Chaudhury S, Saldanha D. Psychiatric comorbidity in patients undergoing hemodialysis. Ind Psychiatry J. 2018;27(2):206–12, http://dx.doi.org/10.4103/ipj.ipj_5_18.

49. Ricardo AC, Fischer MJ, Peck A, Turyk M, Lash JP. Depressive symptoms and chronic kidney disease: results from the National Health and Nutrition Examination Survey (NHANES) 2005-2006. Int Urol Nephrol. 2010;42(4):1063–8, http://dx.doi.org/10.1007/s11255-010-9833-5.

50. Rihmer Z, Angst J. In: Sadock BJ, Sadock VA, Ruiz P, editors. Kaplan&Sadock's comprehensive texbook of psychiatry. 9th ed Lippincott Williams & Wilkins; 2009. p. 1645–53, in Chapter:13.2.

51. Kessler RC, Berglund P, Demler O, Jin R, Koretz D, Merikangas KR, et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). JAMA. 2003;289(23):3095–105, http://dx.doi.org/10.1001/jama.289.23.3095.

52. Craven JL, Rodin GM, Johnson L, Kennedy SH. The diagnosis of major depression in renal dialysis patients. Psychosom Med. 1987;49(5):482–92, http://dx.doi.org/10.1097/00006842-198709000-00005.

53. Watnick S, Kirwin P, Mahnensmith R, Concato J. The prevalence and treatment of depression among patients starting dialysis. Am J Kidney Dis. 2003;41(1):105–10, http://dx.doi.org/10.1053/ajkd.2003.50029.

54. Hedayati SS, Jiang W, O'Connor CM, Kuchibhatla M, Krishnan KR, Cuffe MS, et al. The association between depression and chronic kidney disease and mortality among patients hospitalized with congestive heart failure. Am J Kidney Dis. 2004;44(2):207–15, http://dx.doi.org/10.1053/j.ajkd.2004.04.025.

55. Kutner NG, Fair PL, Kutner MH. Assessing depression and anxiety in chronic dialysis patients. J Psychosom Res. 1985;29(1):23–31, http://dx.doi.org/10.1016/0022-3999(85)90005-4.

56. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4:561–71, http://dx.doi.org/10.1001/archpsyc.1961.01710120031004.

57. Dowlati Y, Segal ZV, Ravindran AV, Steiner M, Stewart DE, Meyer JH. Effect of dysfunctional attitudes and postpartum state on vulnerability to depressed mood. J Affect Disord. 2014;161:16–20, http://dx.doi.org/10.1016/j.jad.2014.02.047.

58. Holm AL, Lyberg A, Severinsson E. Living with stigma: depressed elderly persons' experiences of physical health problems. Nurs Res Pract. 2014;2014:527920, http://dx.doi.org/10.1155/2014/527920.

59. Akdemir N, Bostanoğlu H, Yurtsever S, Kutlutürkan S, Kapucu S, Özer ZC. Needs of home care services for the bedridden patient's problems living in their home. Dicle Medical Journal. 2011;38(1):57–65.

60. Van Der Werf SP, Evers A, Jongen PJ, Bleijenberg G. The role of helplessness as mediator between neurological disability, emotional instability, experienced fatigue and depression in patients with multiple sclerosis. Mult Scler. 2003;9(1):89–94, http://dx.doi.org/10.1191/1352458503ms854oa.

61. Amadi KU, Uwakwe R, Odinka PC, Ndukuba AC, Muomah CR, Ohaeri JU. Religion, coping and outcome in out-patients with depression or diabetes mellitus. Acta Psychiatr Scand. 2016;133(6):489–96, http://dx.doi.org/10.1111/acps.12537.

62. Samwel HJ, Evers AW, Crul BJ, Kraaimaat FW. The role of helplessness, fear of pain, and passive pain-coping in chronic pain patients. Clin J Pain. 2006;22(3):245–51, http://dx.doi.org/10.1097/01.ajp.0000173019.72365.f5.

63. Naidoo P, Pretorius TB. The moderating role of helplessness in rheumatoid arthritis, a chronic disease. Soc Behav Pers Int J. 2006;34(2):103–12, http://dx.doi.org/10.2224/sbp.2006.34.2.103.

64. Smallheer BA, Vollman M, Dietrich MS. Learned helplessness and depressive symptoms following myocardial infarction. Clin Nurs Res. 2018;27(5):597–616, http://dx.doi.org/10.1177/1054773816689752.

65. Misiewicz ARJ, Marchelek-Myśliwiec M, Wiśniewska M. Psychosocial problems of chronic dialysis patients. Postępy Nauk Medycznych. 2010;3:188–91.

66. Shea EJ, Bogdan DF, Freeman RB, Schreiner GE. Hemodialysis for chronic renal failure. Iv. Psychological considerations. Ann Intern Med. 1965;62:558–63, http://dx.doi.org/10.7326/0003-4819-62-3-558.

67. Cook WL, Jassal SV. Functional dependencies among the elderly on hemodialysis. Kidney Int. 2008;73(11):1289–95, http://dx.doi.org/10.1038/ki.2008.62.

68. Rezaei Z, Jalali A, Jalali R, Khaledi-Paveh B. Psychological problems as the major cause of fatigue in clients undergoing hemodialysis: a qual-

itative study. Int J Nurs Sci. 2018;5(3):262–7, http://dx.doi.org/10.1016/j.ijnss.2018.07.001.

69. Schmidt-Busby J, Wiles J, Exeter D, Kenealy T. Self-management action and motivation of Pacific adults in New Zealand with end-stage renal disease. PLoS One. 2019;14(9):e0222642, http://dx.doi.org/10.1371/journal.pone.0222642.

70. Chilcot J, Wellsted D, Farrington K. Depression in end-stage renal disease: current advances and research. Semin Dial. 2010;23(1):74–82, http://dx.doi.org/10.1111/j.1525-139X.2009.00628.x.

71. Griva K, Kang AW, Yu ZL, Mooppil NK, Foo M, Chan CM, et al. Quality of life and emotional distress between patients on peritoneal dialysis versus community-based hemodialysis. Qual Life Res. 2014;23(1):57–66, http://dx.doi.org/10.1007/s11136-013-0431-8.

72. Aguiar R, Pei M, Qureshi AR, Lindholm B. Health-related quality of life in peritoneal dialysis patients: a narrative review. Semin Dial. 2019;32(5):452–62, http://dx.doi.org/10.1111/sdi.12770.

73. Zazzeroni L, Pasquinelli G, Nanni E, Cremonini V, Rubbi I. Comparison of quality of life in patients undergoing hemodialysis and peritoneal dialysis: a systematic review and meta-analysis. Kidney Blood Press Res. 2017;42(4):717–27, http://dx.doi.org/10.1159/000484115.

74. Dąbrowska-Bender M, Dykowska G, Żuk W, Milewska M, Staniszewska A. The impact on quality of life of dialysis patients with renal insufficiency. Patient Prefer Adherence. 2018;12:577–83. https://doi.org/10.2147/PPA.S156356