

The role of depression, anxiety, stress and adherence to treatment in dialysis patients' health-related quality of life: a systematic review of the literature

Helena García-Llana¹, Eduardo Remor², Gloria del Peso¹, Rafael Selgas¹

¹ Servicio de Nefrología. Hospital Universitario La Paz-IdiPAZ (REDinREN, Red de Investigación Renal del Instituto de Salud Carlos III, Fondos FEDER). Madrid (Spain)

² Departamento de Psicología Biológica y de la Salud. Facultad de Psicología. Universidad Autónoma de Madrid (Spain)

Nefrologia 2014;34(5):637-57

doi:10.3265/Nefrologia.pre2014.Jun.11959

ABSTRACT

Health-related quality of life (HRQOL) has been widely studied in the field of dialysis patients. However, there are few studies that include relationships of psychosocial variables and adherence to treatment with HRQOL. The aim of this review is to systematically synthesise available information on the role that psychological variables (depression, anxiety and stress) and adherence to treatment have on HRQOL of dialysis patients through a systematic narrative review. We selected studies that included and related, in their results psychological variables (at least one of the following: depression, anxiety or perceived stress), adherence to treatment and HRQOL in adults on dialysis due to advanced chronic kidney disease (ACKD). The studies included had to incorporate standardised instruments into their assessment protocol. We searched the MEDLINE and PsycINFO databases from January 2002 to August 2012. Thirty-eight studies were included in this review and we assessed their methodological quality. The review revealed that 100% of the studies identified a negative association between indicators of anxiety, depression and stress and HRQL, indicating that these variables are risk factors for quality of life. Adherence to treatment was associated with psychological factors and HRQOL in 8% (N=3) of the studies included and has been demonstrated to be a protective factor for quality of life in 66% of studies (2 of 3) that included this variable. Considering the effect of these variables on HRQOL, it is important to screen for early indicators of anxiety, stress and depression or difficulties in complying with treatment in the ACKD population on dialysis. This will allow preventive interventions to be carried out before HRQOL deteriorates.

Keywords: Health-related quality of life. Depression. Anxiety. Stress. Adherence. Dialysis. ESRD. Systematic Review.

Correspondence: Helena García Llana

Servicio de Nefrología. Hospital Universitario La Paz-IdiPAZ. (REDinREN, Red de Investigación Renal del Instituto de Salud Carlos III, Fondos FEDER). Paseo de la Castellana, 261. 28046 Madrid. (Spain). helenagllana@hotmail.com

El papel de la depresión, la ansiedad, el estrés y la adhesión al tratamiento en la calidad de vida relacionada con la salud en pacientes en diálisis: revisión sistemática de la literatura
RESUMEN

La calidad de vida relacionada con la salud (CVRS) ha sido ampliamente estudiada en el ámbito de los pacientes en diálisis. Sin embargo, son pocos los trabajos que incluyen las relaciones de variables psicosociales y de adhesión al tratamiento con la CVRS. El objetivo de esta revisión es sintetizar sistemáticamente la información disponible sobre el rol que las variables psicológicas (depresión, ansiedad y estrés) y la adhesión al tratamiento tienen sobre la CVRS de los pacientes en diálisis a través de una revisión narrativa sistemática. Se seleccionaron los estudios que incluyeron y relacionaron en sus resultados variables psicológicas (al menos una de ellas: depresión, ansiedad o estrés percibido), adhesión al tratamiento y CVRS en población adulta en tratamiento con diálisis debido a su enfermedad renal crónica avanzada (ERCA). Los estudios incluidos debían incorporar en su protocolo de evaluación instrumentos estandarizados. Se efectuaron búsquedas en las bases de datos MedLINE y PsycINFO de enero de 2002 a agosto de 2012. Se incluyeron 38 estudios en esta revisión y fueron sometidos a una evaluación de la calidad metodológica. La revisión ha permitido observar que un 100 % de los trabajos identifica una asociación negativa entre indicadores de ansiedad, depresión y estrés con la CVRS, reflejando que dichas variables son factores de riesgo para la calidad de vida. La adhesión al tratamiento ha sido asociada con factores psicológicos y con la CVRS en un 8 % (N = 3) de los estudios incluidos, mostrándose un factor de protección para la calidad de vida en el 66 % de los estudios (2 de 3) que incluyeron la variable adhesión. Considerando el efecto de dichas variables sobre la CVRS, es importante detectar precozmente indicadores de ansiedad, estrés y depresión o dificultades para cumplir con el tratamiento en la población ERCA en diálisis. Esto permitirá intervenir a tiempo antes de que la CVRS se vea mermada.

Palabras clave: Calidad de vida relacionada con la salud. Depresión. Ansiedad. Estrés. Adhesión al tratamiento. Diálisis. ERCA. Revisión sistemática.

INTRODUCTION

The number of individuals with advanced chronic kidney disease (ACKD) is increasing exponentially worldwide

every year¹, and by extension, the number of ACKD patients who will require renal replacement therapy (RRT) is increasing. Chronic kidney disease prevalence in Spain stands at 11% and with the number of patients who are eligible for RRT increasing 5%-8% per year, these figures mean that this disease is a health, social and economic problem of the highest order². In 2010, 83.8% of patients who began RRT opted for haemodialysis, 13.6% for peritoneal dialysis and 2.7% for an early transplant³. Moreover, the life expectancy of patients who begin RRT is short and no significant differences have been found between the two dialysis techniques when variables such as age and the presence of diabetes mellitus are controlled⁴. In short, the dialysis options are not optimal in terms of survival, regardless of the technique chosen. Given this bleak context, we should highlight the impact of an expensive, highly invasive, time-consuming therapy that requires self-care on the patient and their family. This set of factors puts ACKD patients on RRT in a paradigmatic situation for the study of the psychosocial cost of chronic disease⁵.

ACKD, like many chronic diseases, may be treated but is not curable. This means that nephrology teams must base their healthcare work on managing the objective parameters of cardiovascular risk, diet control and the impacts of uraemia, and subjective parameters, which refer to what patients say about their functional, physical, social and mental condition, as well as the impact that the disease and the treatments have on their lives⁶. In the sphere of chronicity, these subjective parameters are key when assessing the available treatment options and the quality of psychological adjustment to a disease⁷ that the patient will have for the rest of their lives. It is clear that medical and pharmacological healthcare is insufficient in the comprehensive care of kidney patients on RRT⁸. In line with Fukuhara et al.⁹ claim, if our aim is to provide an excellence-based response, nephrologists must look at not only the objective results, but also, and with the same level of importance being afforded hereto, the thoughts of patients about their state of health and quality of life.

Health-related quality of life (HRQOL) is a multidimensional concept that has been defined as the subjective evaluation that an individual carries out on the impact of the disease and its treatment on their physical, psychological and social dimensions, assessing the impact on their functioning and well-being. According to some experts¹⁰, the evaluation of HRQOL should address a minimum of three dimensions: physical, psychological and social, with the domains most commonly studied in the sphere of HRQOL in chronic disease being physical health, body pain, the emotional or affective state, social functioning and mental health¹¹.

In Spain, the development of the research and study of HRQOL in RRT patients dates back to the mid 1990s¹².

However, the majority of review studies found in the literature focus on the clinical factors that determine HRQOL in each stage of the kidney disease^{13,14}, the validity of instruments used for the assessment of HRQOL¹⁵ or the challenges for the nephrology community in this field of study¹⁶. In this regard, the empirical studies published mainly report the role of certain sociodemographic (age, sex, employment situation) and clinical or biological variables (comorbidity, certain biochemical parameters [haemoglobin and albumin], years on dialysis and tolerance to the latter) in explaining the variance of HRQOL in renal patients on dialysis¹⁷⁻²⁰.

Psychosocial variables related to HRQOL have not been studied very systematically, with the study of the impact that symptoms of depression have on kidney patients on dialysis being the main subject both in the past^{21,22} and in the present^{23,24}. Other psychosocial variables that have become important in relation to the HRQOL of dialysis patients have been symptoms of anxiety²⁵, the experience of stress²⁶ and social support²⁷.

Furthermore, recognising the complexity of treatment regimens, and as a result, adherence to treatments, has been described as one of the most common problems faced by both kidney patients²⁸ and dialysis unit staff²⁹. However, although there are studies that relate this variable to quality of life^{30,31}, there is still little scientific evidence that describes the role of adherence to treatment and the psychosocial variables on HRQOL in dialysis patients.

In our review of the literature, we did not find any theoretical study that summarised the role of psychosocial variables and adherence to treatments on HRQOL. Greater efforts must be made in this line of study, beyond continuing to examine the role of depression on HRQOL of kidney patients on dialysis. As such, this study proposes the objective of systematically summarising the information available on the role that psychological variables (depression, anxiety and stress) and adherence to treatment have on the HRQOL of dialysis patients through a systematic non-meta-analytic review.

METODOLOGY: EVALUATION CRITERIA FOR STUDIES IN THIS REVIEW

Type of studies

We selected the studies that included and related psychosocial variables in their results (at least one of the following: depression, anxiety or perceived stress), adherence to treatment and HRQOL. We included the subsamples of the studies that compared dialysis patients. The studies included had to incorporate standardised

instruments for measuring variables into their evaluation protocol.

Type of participants

We only included studies with an adult population of over 18 years of age on treatment with dialysis due to ACKD.

Search strategy to identify studies

Searches using English terminology were performed between January 2002 and August 2012 in the following databases: MedLINE and PsycINFO. The search terms we used were as follows: “end stage renal disease”, “chronic kidney disease”, “renal dialysis”, “depression”, “anxiety”, “perceived stress”, “stress”, “adherence”, “quality of life”, “health related quality of life”. The

search terms were adapted to each database and included cross-references and combined references of key words. Other sources used were the lists of references of the articles identified.

Selection of studies

H. G. examined the titles and abstracts generated by the searches. Reference lists from the references of the reviewed articles were also examined, and abstracts followed by the full articles were compiled. The review only includes full-text articles in English or Spanish. As we observe from Figure 1, of the 256 initial non-duplicated abstracts, 71 apparently fulfilled the inclusion criteria for incorporation into the review. Of these 71 articles that were analysed in depth, 35 were excluded for different reasons (Figure 1). The whole process was supervised by E. R. Any doubts and conflicts were resolved together

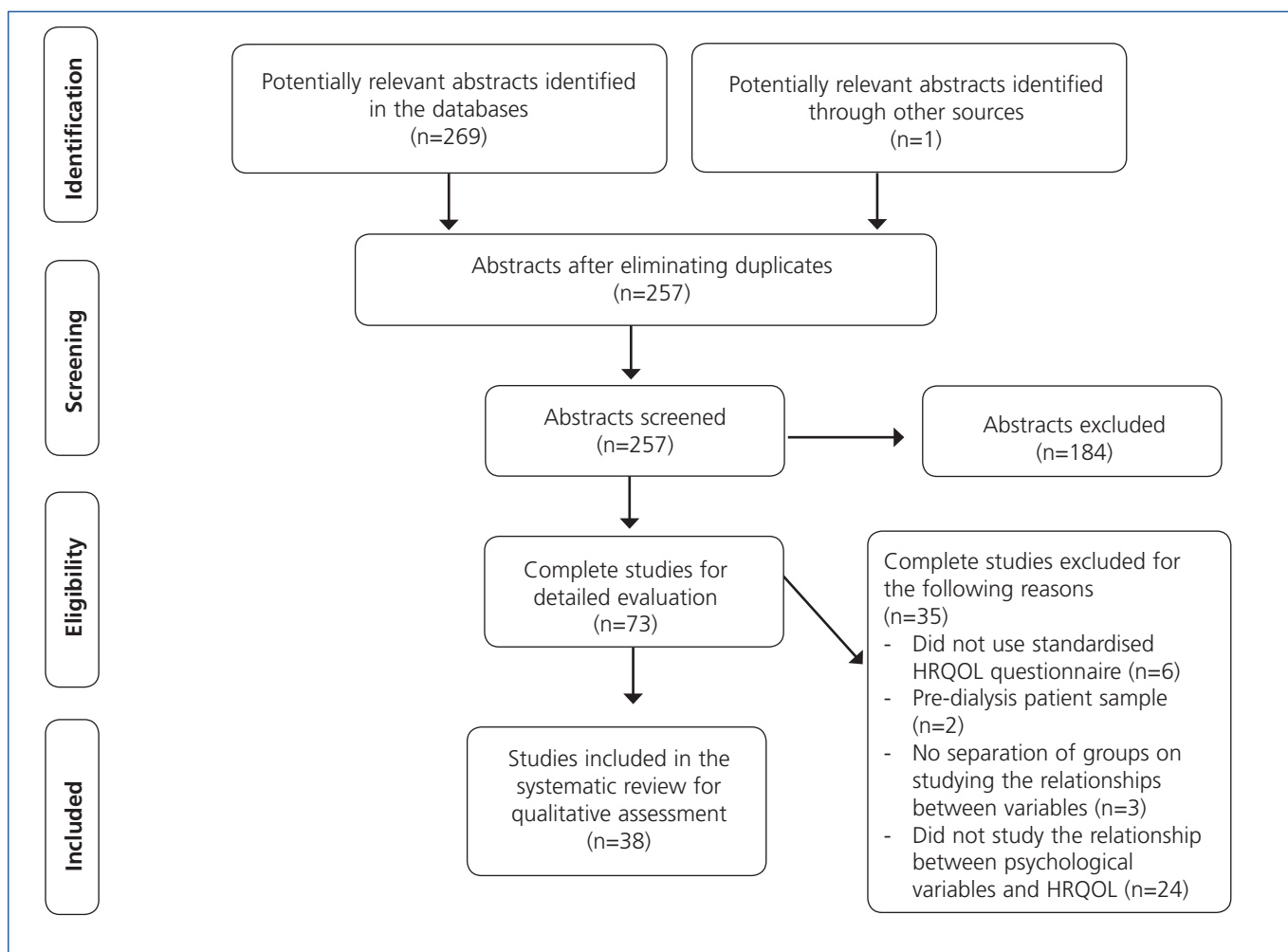


Figure 1. PRISMA flow diagram of the different phases of the systematic review.

HRQOL: health-related quality of life.

by H. G. and E. R. Lastly, we included 38 studies in this review, covering 38 independent samples that spanned a total of 6997 participants.

Evaluation of the methodology quality of the studies

Each of the 38 studies were submitted for an evaluation of the methodology quality according to criteria adapted from the instrument designed by Barra, Elorza-Ricart and Sánchez³². The results are summarised in Table 1 (adapted from the systematic review carried out by Segura-Ortiz³³).

RESULTS

38 studies met the inclusion criteria. Most studies (16 of 38) focussed exclusively on the role of depression on HRQOL³⁴⁻⁴⁹, 14 were studies that evaluated depression and anxiety together on HRQOL⁵⁰⁻⁶², 2 related depression, quality of sleep and HRQOL^{63,64}, and the other studies^{31,65-69} related different combinations of the variables that are the subject of this review (Table 2).

Furthermore, 24 of the 38 studies included other variables not related to the subject of the review. The variables included were: psychiatric diagnosis^{25,40,46,48,59,68}, symptom burden^{41,44,65}, social support^{56,57,61,67}, sleep quality^{63,64}, sexual function^{66,69}, fatigue^{36,51}, cognitive impairment^{49,52}, beliefs⁴⁶, neurotic asthenia⁵⁵, alexithymia⁵⁰, locus of control⁵⁰, coping^{50,61,65}, religiousness^{61,68}, suicidal thoughts⁵¹, perception of the disease⁶⁷, life satisfaction⁶⁷, self-efficacy⁶¹, dispositional optimism⁶¹ and stressful life events⁶⁵.

Table 2 summarises the main results of the 38 studies. To facilitate the reader's comprehension of the table, if the primary source did not display the data of interest, it was calculated from the raw data, but if the data were absent, we included an "a" in the table.

General description of the studies included

Participants

The 38 studies reviewed covered a total of 6997 participants. The study with the lowest number of participants included N=23⁵², and that with the highest number included N=1047⁵⁵.

Dialysis technique

Five studies exclusively examined peritoneal dialysis patients^{36,39,50,63,64} and 6 included mixed samples of patients

on both dialysis techniques^{31,41,45,59,65,66}. Of the studies, 27 exclusively included haemodialysis patients.

Sex

The patient total included 3405 females and 3592 males. All articles reviewed report the sex of participants in the total samples. In one study, only females participated⁶⁶ and in another, only males participated³⁵.

Age

The age of participants included in the studies ranged between 18 and 91 years of age. However, 24 studies did not report the age range of their participants.

Duration of dialysis

A common inclusion criterion for most of the studies was that subjects had to have been on dialysis for at least three months. The time on dialysis data display a mean maximum time of 9.1 years⁵⁴ and a mean minimum time of 1.2 years⁵⁹. Eight studies did not report the time on dialysis of their participants.

Design of the studies

The studies evaluated were mostly correlations, with the exception of two: one had a pre-post design with a single group³⁹ and another had a longitudinal design⁴⁸.

Evaluation instruments used

The standardised instruments used by the studies to measure the variables of interest were varied. To measure depression, the instrument most used was the BDI/BDI-II (Beck Depression Inventory) (71% of studies), for anxiety, it was the STAI (State-Trait Anxiety Inventory) (35% of studies), for anxiety and depression combined, it was the HADS (Hospital Anxiety Depression Scale) (35% of studies), for stress, it was the PSS (Perceived Stress Scale) (100% of studies that included this variable) and for adherence to treatment, it was objective clinical parameters and the Morisky Green Levine Test.

Methodology quality

The mean score of the criteria adapted from Barra, Elorza-Ricart and Sánchez³² was 8.5 (out of a maximum of 12).

Table 1. Methodology quality of the 38 studies reviewed

	1	2	3	4	5	6	7	8	9	10	11	12	Total	Quality
Arenas et al., 2007 ⁵⁴	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Abdel-Kader et al., 2009 ⁴¹	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Abdel-Kader et al., 2009 ⁶⁵	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Atalay et al., 2010 ³⁹	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Bilgic, 2008 ⁶⁴	+	+	+	-	-	+	+	+	+	-	+	+	9	High
Cengiçet al., 2010 ⁴⁷	+	+	-	-	-	+	+	+	+	-	+	-	7	Medium
Chen et al., 2010 ⁵¹	-	+	+	-	-	+	+	+	+	-	+	+	8	Medium
Cruz et al., 2010 ⁴⁰	+	+	+	+	+	+	+	+	+	-	+	+	11	High
Cukor et al., 2008 ²⁵	-	+	-	+	-	+	+	+	+	-	+	+	8	Medium
Cukor et al., 2007 ⁵	-	+	+	+	-	+	+	+	+	-	+	+	9	High
Drayer et al., 2006 ⁴⁸	+	+	-	+	-	+	+	+	+	-	+	+	9	High
Dogan et al., 2005 ⁵⁸	+	+	-	-	-	+	+	+	+	-	+	-	7	Medium
Ferreira et al., 2011 ³⁴	+	-	+	+	-	+	+	+	+	-	+	+	9	High
García et al., 2010 ⁸³	+	+	+	-	-	+	+	+	+	-	+	+	9	High
García-Llana et al., 2013 ³¹	+	+	-	+	-	+	+	+	+	-	+	+	9	High
Gil-Cunheiro et al., 2003 ⁴⁹	+	-	-	+	-	+	+	+	+	-	+	+	8	Medium
Guney et al., 2008 ⁶³	+	+	+	-	-	+	+	+	+	-	+	-	8	Medium
Kao et al., 2009 ⁴³	+	+	+	-	-	+	+	+	+	-	+	-	8	Medium
Lew-Starowicz et al., 2009 ⁶⁹	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Lopes et al., 2010 ⁴²	-	+	+	-	-	+	+	+	+	-	+	+	8	Medium
Montinaro et al., 2010 ⁵³	+	-	-	-	-	+	+	+	+	-	+	+	7	Medium
Morales-Jaimes et al., 2008 ⁴⁵	+	+	+	+	-	+	+	+	+	-	+	+	9	High
Park et al., 2010 ²⁴	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Patel et al., 2002 ⁶⁷	-	-	-	-	-	+	+	+	-	+	+	+	6	Medium
Peng et al., 2010 ³⁷	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Perales-Montilla et al., 2012 ⁶¹	+	+	-	+	-	+	+	+	+	-	+	+	9	High
Preljevic et al., 2011 ⁵⁹	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Ramírez et al., 2012 ⁶⁰	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Santos et al., 2010 ⁵²	-	+	+	-	-	-	+	-	+	+	-	+	6	Medium
Senol et al., 2010 ³⁶	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Son et al., 2009 ⁴⁴	+	+	+	-	-	+	+	+	+	-	+	+	9	High
Taskapan et al., 2005 ⁶⁸	+	-	+	-	-	-	+	+	+	-	+	+	7	Medium
Vasilieva, 2006 ⁵⁵	+	+	+	-	-	+	+	+	+	-	+	+	9	High
Varela et al., 2011 ⁵⁰	+	+	+	+	-	+	+	+	+	-	+	+	10	High
Vázquez et al., 2003 ⁵⁶	+	+	+	-	-	+	+	+	+	-	+	+	9	High
Vázquez et al., 2005 ⁵⁷	+	+	+	-	-	+	+	+	+	-	+	+	9	High
Urzúa et al., 2011 ⁶²	+	+	+	+	-	+	+	+	+	-	+	+	9	High
Yazici et al., 2009 ⁶⁶	-	-	-	-	-	+	+	+	+	-	+	+	6	Medium

Research selection and design:

1. Patient inclusion and/or exclusion criteria are indicated; 2. The sample selection method is specified; 3. The research design is clearly specified in the text; 4. The number of patients potentially eligible and/or those initially selected and/or those who accepted and/or those who finally participated or responded is reported; 5. If groups are compared, the information in point 4 is indicated for each group.

Definition and measurement of the study variables

6. The study variables are clearly defined; 7. Validated instruments are used for all the main study variables.

Method and analysis of data:

8. The samples evaluated are equal to or greater than 30 patients; 9. The statistical tests used are specified; 10. The loss of participants and/or data were correctly addressed (or it is at least indicated in the text that the data quality has been reviewed before statistical analysis).

Quality of the results and discussion:

11. The results are reported clearly in accordance with the study objectives; 12. The study considers the practical implications of the results and potential benefits for patients.

Quality

1-4 points: low; 5-8 points: medium; 9-12 points: high.

Scores for individual studies ranged from 6 to 11. No study was classified as low quality (1-4 points), 13 were classified as medium quality (5-8 points) and 25 as high quality (9-12 points). The item-by-item breakdown for the methodology quality is shown in Table 1. Only one study⁴⁰ reported the number of patients who were eligible and/or those initially selected and/or those who accepted and/or those who participated or responded when groups were compared. In none of the studies did it specify in the text whether the loss of participants and/or the data lost was correctly addressed or at least that the quality of the data had been reviewed before statistical analysis. In four studies^{43,47,58,63} the practical implications of the results with regard to potential benefits for patients were not specified in the discussion.

Description and summary of results according to the variables

Depression

There are 16 studies that evaluate the role of depression on HRQOL. In the 16 samples, prevalence of depression ranged between 25.8%³⁹ and 68.1%³⁵. One study⁴⁶ found a prevalence of 71.4% of psychiatric disorders measured through a semi-structured interview based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-IV, of which 20% corresponded to major depression and 10% to dysthymia (dysthymia is an affective disorder of a chronic depressive nature, characterised by low self-esteem and a melancholic, sad and downcast mood, but it does not have all the diagnostic patterns of depression). Sixteen of the 38 studies found that depression decreases HRQOL both in the physical and mental dimensions. As such, depression seems to act as a risk variable for HRQOL. This relationship appears to be strong, since it was observed in 42% of all studies (in 100% of the 16 that analysed this relationship). One study³⁴ found that time on dialysis and depression are directly related. Eight studies found an indirect relationship between depression and physical and mental HRQOL. Only one study⁴¹ found this association only in the mental dimension. Of the eight studies that reported multivariate analyses (logistic regression models), five indicated that depression is revealed as a variable that predicts low physical and mental HRQOL; one study³⁸ did not find an association between depression and HRQOL in any dimension; another⁴⁵ found that depression only predicted low physical HRQOL; and a final study⁴² found that symptoms of depression contribute to the differences in HRQOL between sexes in favour of males.

Depression and anxiety

We included 14 mixed studies that reported the role of anxiety in HRQOL as well as the role of depression.

Only three reported the prevalence of anxiety, with a range from 21%⁵¹ to 35.3%⁵⁰. One study²⁵ found a 71% prevalence of psychiatric disorders measured through semi-structured interviews based on the DSM-IV, of which 45.7% corresponded to anxiety disorders and 40% to mood disorders. One study²⁵ found that anxiety decreases the HRQOL both in the physical and mental dimensions. In the study by Arenas et al.⁵⁴ they reported that anxiety decreases HRQOL in most COOP-WONCA (World Organization of General Practice/Family Physicians Functional Health Assessment) subscales (except in “changes in health” and “social support”). In both^{25,54} they confirm the same relationship in relation to depression and HRQOL. In the studies by Chen et al.⁵⁰, Dogan et al.⁵⁸ and Prejlevic et al.⁵⁹ only the role of depression is reported as a risk factor for low HRQOL and not that of anxiety. Eight studies found that both anxiety and depression and physical and mental HRQOL are indirectly related. Of the five studies that reported multivariate analysis (logistic regression models), two^{50,25} found that both anxiety and depression were variables that predicted low physical and mental HRQOL; two^{56,60} found that anxiety alone predicts low mental HRQOL, and the final study⁶¹ only established one multiple linear regression model for depression, with the latter being a predictor of low physical and mental HRQOL. There are two studies^{58,61} that, despite including the measurement of anxiety in their variables results, did not study the relationships between anxiety and HRQOL, only focussing on the role of depression or other variables not related to the subject of this review.

Stress

Two studies^{31,65} evaluated the role of stress on HRQOL. Both concluded that stress and physical and mental HRQOL are indirectly related.

Adherence

Three studies were included in the review that assessed the role of adherence in relation to HRQOL and psychosocial variables such as depression⁶⁷; depression and anxiety⁶⁸; depression, anxiety and stress³¹. Only one study used self-report measurements³¹ to measure adherence to treatment, while the other two used objective measurements related to biological parameters^{67,68}. The study by Patel et al.⁶⁷ did not relate adherence to HRQOL in its results. In the other two, it is shown that low adherence decreases HRQOL in the physical dimension³¹ and in the “vitality” and “social function” subscales⁶⁷. Likewise, it was found that depression (and not anxiety) decreases adherence⁶⁸ and that adherence and the physical component of HRQOL are directly related³¹.

Table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
DEPRESSION							
Ferreira et al. (2011) ³⁴ Brazil	130	49,7 (18-80)	HD. M (82), F (48) 58.46% married 53.08% primary studies % work ^a Years on dialysis (50% between 1 and 5)	Correlational	DEP (BDI) HRQOL (WHOQOL-bref)	No	33.8% DEP DEP decreases HRQOL, both in its physical and mental dimensions DEP x time on dialysis: direct correlation DEP x physical and mental HRQOL: indirect correlation
García et al. (2010) ³⁵ Brazil	47	39,4 (^a , ^a)	HD. M (47) % married ^a % primary studies ^a % work ^a Years on dialysis ^a	Correlational	DEP (HDRS) HRQOL (KDQOL-SF)	No	68.1% DEP DEP decreases HRQOL, both in its physical and mental dimensions DEP x physical and mental HRQOL: indirect correlation
Senol et al. (2010) ³⁶ Turkey	156	46,5 (19-81)	PD. M (72), F (84) % married (75.6) % primary studies (69.2) % work ^a Years on dialysis (3.7)	Correlational	DEP (BDI) HRQOL (SF-36)	Yes (fatigue)	42% DEP DEP decreases HRQOL, both in its physical and mental dimensions DEP x physical and mental HRQOL: indirect correlation DEP predictor of low SPC and SMC
Peng et al. (2010) ³⁷ Taiwan	888	59,7 (^a , ^a)	HD. M (389), F (499) % married ^a % primary studies ^a % work ^a Years on dialysis (4.1)	Longitudinal	DEP (BDI) HRQOL (SF-36)	No	DEP x physical and mental HRQOL: indirect correlation DEP predictor of low SPC and SMC
Park et al. (2010) ³⁸ Korea	160	56,9 (^a , ^a)	HD. M (99), F (69) % married (80) % primary studies ^a % work ^a Years on dialysis (5.8)	Correlational	DEP (BDI) HRQOL (KDQOL-SF)	No	31.9% DEP DEP x physical and mental HRQOL: indirect correlation DEP did not predict worse HRQOL

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
Atalay et al. (2010) ³⁹ Turkey	124	52,6 (19-80)	PD. H (59), M (65) % married (84.8) % secondary studies or lower (10.2) % work (10.1) Years on dialysis (2.9)	Pre-post with only one group	DEP (BDI) HRQOL (SF-36)	No	25.8% DEP DEP decreases HRQOL, both in its physical and mental dimensions DEP x physical and mental HRQOL: indirect correlation
Cruz et al. (2010) ⁴⁰ Brazil	173 <i>Comparacion pacientes con CI (103)</i>	53 (^{a,a})	HD. M (44), F (26) % married (61.5) % primary studies (12.5) % work (13) Years on dialysis ^a	Correlational	DEP (BDI) HRQOL (SF-36, WHOQOL-breve)	Yes (psychiatric diagnosis)	36% DEP DEP decreases HRQOL, both in its physical and mental dimensions DEP predictor of low SPC and SMC
Abdel-Kader et al. (2009) ^a ⁴¹ United States	177 <i>Comparacion pacientes con ERC (87)</i>	54 (^{a,a})	HD (70), PD (20) M (51), F (39) % married (53) % primary studies (10) % work ^a Years on dialysis ^a	Correlational	DEP (PHQ-9) HRQOL (SF-36)	Yes (symptom burden)	15.5% DEP DEP x mental HRQOL: indirect correlation
Lopes et al. (2010) ⁴² Brazil	868	48,6 (^{a,a})	HD. M (513), F (355) % married ^a % secondary studies or lower (65,5) % work ^a Years on dialysis (62.9% >1)	Correlational	DEP (CES-D) HRQOL (KDQOL-SF)	No	43.8% DEP DEP decreases HRQOL, both in its physical and mental dimensions Multiple linear regression models: symptoms of depression contribute to the differences between sexes in HRQOL in favour of males
Kao et al. (2009) ⁴³ Taiwán	861	59,4 (^{a,a})	HD. M (373), F (488) % married (71.9) % primary studies (48.4) % work (54.1) Years on dialysis ^a	Correlational	DEP (BDI-II) HRQOL (SF-36)	No	60.5% DEP DEP predictor of low SPC and SMC

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
Son et al. (2009) ⁴⁴ Corea	146	28,1 % (> 60 years)	HD. M (80), F (66) % married (60.3) % primary studies ^a % work ^a Years on dialysis (31.5% between 3 and 5)	Correlacional	DEP (PHQ-9) HRQOL (KDQOL-Korean)	Yes (Symptom burden)	25.3% DEP DEP decreases HRQOL, both in its physical and mental dimensions
Morales-Jaimes et al. (2008) ⁴⁵ México	123	51,9 (a..a)	HD (78), PD (45) M (70), F (53) % married ^a % primary studies ^a % work ^a Years on dialysis (4)	Correlacional	DEP (BDI) HRQOL (KDQOL-SF)	No	26.2% DEP DEP predictor of low SPC
Cukor et al. (2007) ⁴⁶ United States	70	53,3 (a..a)	HD. M (33), F (37) % married ^a Years of education (12.7) % work ^a Years on dialysis (5)	Correlacional	DEP (BDI) HRQOL (KDQOL-SF)	Yes (psychiatric diagnosis, beliefs)	71.4% psychiatric diagnosis (20% major depression, 9% dysthymia) DEP x physical and mental HRQOL: indirect correlation
Cengic et al. (2010) ⁴⁷ Bosnia	200	57,2 (20-80)	HD. M (123), F (77) % married (62) % secondary studies (50.5) % work (13) Years on dialysis (5.3)	Correlacional	DEP (BDI) HRQOL (SF-36)	No	51% DEP DEP decreases HRQOL, both in its physical and mental dimensions
Drayer et al. (2006) ⁴⁸ United States	62	57 (18-91)	HD. M (32), F (30) % married (62) % secondary studies ^a % work ^a Years on dialysis ^a	Longitudinal	DEP (PHQ-9) HRQOL (KDQOL-SF)	Yes (psychiatric diagnosis)	28% DEP DEP decreases HRQOL in the mental dimension
Gil-Cunheiro et al. (2003) ⁴⁹ Spain	51	79,5 (a..a)	HD. M (24), F (27) % married ^a % primary studies (25.5) % work ^a Years on dialysis (1.3)	Correlacional	DEP (Escala de depresión geriátrica de Yesawage) HRQOL (KDQOL-SF)	Yes (cognitive impairment)	DEP decreases HRQOL, both in its physical and mental dimensions DEP x physical and mental HRQOL: indirect correlation DEP predictor of low SPC and SMC

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
DEPRESSION AND ANXIETY							
Varela et al. (2011) ⁵⁰ Spain	53	49,5 (^a - ^a)	PD. M (24), F (29) % married (64.2) % no studies/ primary studies (54.7) % work (32) Years on dialysis (2.33)	Correlational	DEP (Yesavage Geriatric Depression Scale) HRQOL (KDQOL-SF)	Yes (cognitive impairment)	31.4% ANX 35.3% DEP ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation ANX predictor of low physical and mental HRQOL DEP predictor of low physical HRQOL
Chen et al. (2010) ⁵¹ Taiwán	200	58,6 (^a - ^a)	HD. M (96), F (106) % married ^a Years of education (7.1) % work ^a Years on dialysis (5.7)	Correlational	ANX and DEP (HADS) HRQOL (SF-36)	Yes (thoughts of suicide and fatigue)	21% ANX 35% DEP DEP decreases HRQOL, both in its physical and mental dimensions ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation
Santos et al. (2010) ⁵² Brazil	23	39,3 (^a - ^a)	HD. M (10), F (13) % married ^a % primary studies ^a % work ^a Years on dialysis (5.7)	Correlacional	ANX (BAI) DEP (BDI) HRQOL (WHOQOL)	Yes (cognitive impairment)	ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation
Montinaro et al. (2010) ⁵³ Italy	50 <i>Comparison with CKD patients (20)</i>	57,8 (^a - ^a)	HD. M (10), F (20) % married ^a % primary studies ^a % work ^a Years on dialysis (5.5)	Correlational	ANX and DEP (HADS) HRQOL (KDQOL-SF)		ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
Cukor et al. (2008) ²⁵ United States	70	53,3 (^a - ^a)	HD. M (33), F (37) % married ^a Years of education (12.7) % work ^a Years on dialysis (5)	Correlational	ANX and DEP (HADS) HRQOL (KDQOL-SF)	Yes (psychiatric diagnosis)	71% psychiatric diagnosis (45.7% anxiety disorders, 40% mood disorders) ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation ANX decreases HRQOL, both in its physical and mental dimensions DEP decreases HRQOL, both in its physical and mental dimensions ANX predictor of low SPC and SMC DEP predictor of low SPC and SMC
Arenas et al. (2007) ⁵⁴ Spain	75	49,2 (20-65)	HD. M (50), F (25) % married (70.6) % no studies or primary studies (78.6) % work (28) Years on dialysis (9.1)	Correlational	ANX (HARS) DEP (BDI, HDRS) HRQOL (COOP-WONCA)	No	44% DEP (BDI) and 53.4% DEP (HDRS) ANX decreases HRQOL DEP decreases HRQOL
Vasilieva (2006) ⁵⁵ Rusian	1047	43,5 (^a - ^a)	HD. M (576), F (471) % married (62) % secondary studies ^a % work ^a Years on dialysis (4.5)	Correlational	ANX (STAI-state and trait) DEP (SDS) HRQOL (SF-36)	Yes (neurotic asthenia)	DEP predictor of low SPC and SMC
Vázquez et al. (2005) ⁵⁶ Spain	194	48,5 (19-86)	HD. M (84), F (110) % married (65.5) % primary studies (45.9) % work (16.5) Years on dialysis (3.7)	Correlational	ANX (STAI-trait) DEP (CDI-BDI without somatic subscale) HRQOL (KDQOL-SF)	Yes (social support)	27.8% DEP ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation ANX predictor of low SMC DEP predictor of low SPC

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
Vázquez et al. (2003) ⁵⁷ Spain	117	41,7 (19-64)	HD. M (54), F (63) % married (62.4) % primary studies (54.7) % work (21.7) Years on dialysis (3.7)	Correlational	ANX (STAI-state) DEP (CDI-BDI without somatic subscale) HRQOL (KDQOL-SF)	Yes (social support)	ANX x physical and mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation ANX predictor of low SPC and SMC DEP predictor of low SPC and SMC
Dogan et al. (2005) ⁵⁸ Turkey	43	33,2 (^a - ^a)	HD. M (28), F (15) % married ^a % primary studies ^a % work ^a Years on dialysis (2.5)	Correlational	ANX (HARS) DEP (HDRS) HRQOL (SF-36)	No	48.8% DEP DEP decreases HRQOL, both in its physical and mental dimensions DEP x HRQOL: indirect correlation ^a Does not report ANX results
Preljevic et al. (2011) ⁵⁹ Norway	109	57 (^a - ^a)	HD (84), PD (25) M (33), F (76) % married (57.8) % >12 years of education (30.6) % work ^a Years on dialysis (1.2)	Correlational	ANX (HADS) DEP (BDI, HADS) HRQOL (SF-36)	Yes (psychiatric diagnosis)	35% depression 30.3% psychiatric diagnosis Psychiatric diagnoses (amongst them DEP) decrease HRQOL, both in its physical and mental dimensions
Ramirez et al. (2012) ⁶⁰ Brazil	170	48,4 (^a - ^a)	HD. M (109), F (61) % married (57) % primary studies ^a % work ^a Years on dialysis (5.4)	Correlational	ANX (HADS) DEP (HADS) HRQOL (WHOQOL-bref)	Yes (religious coping)	25.9% ANX 15.3% DEP ANX predictor of low mental HRQOL DEP predictor of low physical and mental HRQOL
Perales-Montilla et al. (2012) ⁶¹ Spain	39	22% (40 to 49 years)	HD. M (27), F (12) % married ^a N primary studies (24) % work ^a Years on dialysis (N = 20 between 1 and 5)	Correlational	ANX (STAI-state and trait, HADS) DEP (HADS) HRQOL (SF-36)	Yes (auto-efficacy, social support, dispositional optimism, coping)	DEP predictor of low physical and mental HRQOL

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
Urzúa et al. (2011) ⁶² Colombia	128	56,1 (^{a,a})	HD. M (63), F (65) % married ^a % primary studies ^a % work ^a Years on dialysis (4.1)	Correlational	ANX (GHQ-28) DEP (GHQ-28) HRQOL (KDQOL-SF)	No	ANX x mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation
DEPRESSION AND STRESS							
Abdel-Kader et al. (2009) ⁶³ United States	151 <i>Comparison con pacientes con ERC (65)</i>	49,8 (^{a,a})	HD (70), PD (16) M (52), F (34) % married ^a % primary studies ^a % work ^a Years on dialysis ^a	Correlational	DEP (PHQ-9) STR (PSS-4) HRQOL (SEIQOL-DW, SF-36)	Yes (symptom burden, coping, stressful life events)	DEP x HRQOL: indirect correlation STR x HRQOL: indirect correlation STR predictor of low HRQOL (SEIQOL-DW) DEP predictor of low HRQOL (SEIQOL-DW)
DEPRESSION AND QUALITY OF SLEEP							
Guney et al. (2008) ⁶⁴ Turkey	124	52,6 (19-80)	PD. M (59), F (65) % married (80.4) % secondary studies or lower (12.8) % work (9.9) Years on dialysis ^a	Correlational	DEP (BDI-II) HRQOL (SF-36)	Yes (quality of sleep)	25.8% DEP DEP x physical and mental HRQOL: indirect correlation
Bilgic et al. (2008) ⁶⁵ Turkey	60	45,5 (19-80)	PD. M (33), F (17) % married ^a % primary studies ^a % work ^a Years on dialysis (3.6)	Correlational	DEP (BDI) HRQOL (SF-36)	Yes (quality of sleep)	DEP x physical and mental HRQOL: indirect correlation DEP predictor of low SPC and SMC
DEPRESSION AND SEXUAL FUNCTION							
Yacizi et al. (2009) ⁶⁶ Turkey	165 <i>Compared to healthy controls (48)</i>	48,5 (^{a,a})	HD (32), PD (85) M (0), F (117) % married ^a % primary studies ^a % work ^a Years on dialysis (3.5)	Correlational	DEP (BDI) HRQOL (SF-36)	Yes (sexual dysfunction)	DEP x physical and mental HRQOL: indirect correlation

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
DEPRESSION AND ADHERENCE							
Patel et al. (2002) ⁶⁷ United States	53	54,4 (31-90)	HD. M (23), F (30) % married ^a % primary studies ^a % work ^a Years on dialysis (3.9)	Correlational	DEP (BDI, CDI) ADH (concordance between prescribed and real time on dialysis) HRQOL (McGuill QOL and Felstein QOL score)	Yes (perception of disease, social support, religiousness, satisfaction with life)	DEP x HRQOL: indirect correlation It does not relate ADH to DEP or to HRQOL
DEPRESSION, ANXIETY AND ADHERENCE							
Taskapan et al. (2005) ⁶⁸ Turkey	40	48,3 (^a - ^a)	HD. M (25), F (15) % married (70) % secondary studies or lower (47.5) % work ^a Years on dialysis (2.3)	Correlational	ANX (HARS) DEP (HDRS) ADH (nutritional state, serum phosphorus and inter-dialysis weight gain) HRQOL(SF-36)	Yes (psychiatric diagnosis)	35% DEP 65% psychiatric diagnosis DEP (not ANX) decreases ADH ANX decreases HRQOL, both in its physical and mental dimensions DEP decreases HRQOL, both in its physical and mental dimensions Low ADH decreases HRQOL (vitality and social function subscales)
DEPRESSION, ANXIETY AND SEXUAL FUNCTION							
Lew-Starowicz et al. (2009) ⁶⁹ Poland	112	47,5 (20-60)	HD. M (69), F (43) % married ^a % primary studies ^a % work ^a Years on dialysis ^a	Correlational	DEP (BDI) ANX (STAI-state) HRQOL (SF-36)	Yes (erectile dysfunction, sexual experience and quality of sexuality)	80.5% DEP in females and 72.7% in males DEP x physical and mental HRQOL: indirect correlation

Continues on next page >>

Continues table 2. Main characteristics and results of the 38 studies included in the systematic review

Reference, country	N	Age (range)	Participants	Study design and methodology	Variables measured (instruments)	Includes other variables unrelated to the subject of the review	Main results
DEPRESSION, ANXIETY, STRESS AND ADHERENCE							
García-Llana et al. (2013) ³¹ Spain	61	54,2 (21-90)	HD (30), PD (31) M (43), F (18) % married ^a % primary studies (39.3) % work ^a Years on dialysis (3.6)	Correlational	ANX (STAI-state) DEP (BDI-II) STR (PSS-10) ADH (Morisky-Green-Levine Test) HRQOL (SF-36)	No	23% DEP DEP decreases HRQOL, both in its physical and mental dimensions Low ADH decreases physical HRQOL ANX x mental HRQOL: indirect correlation DEP x physical and mental HRQOL: indirect correlation STR x physical and mental HRQOL: indirect correlation ADH x physical HRQOL: direct correlation DEP predictor of low physical and mental HRQOL ANX did not predict HRQOL

^a Data not reported.

ADH: adherence, ANX: anxiety, BAI: Beck Anxiety Inventory, BDI/BDI-II: Beck Depression Inventory, CDI: Cognitive Depression Index (BDI excluding somatic scale items), CES-D: Center for Epidemiological Studies Depression Scale, IHD: ischaemic heart disease, COOP-WONCA: World Organization of General Practice/Family Physicians Functional Health Assessment, SPC: summary physical component, SMC: summary mental component, HRQOL: Health-related quality of life, DEP: depression, PD: peritoneal dialysis, CKD: chronic kidney disease, Yesavage Geriatric Depression Scale, STR: stress, Felstein QOL Score: Felstein Quality of Life Score, GHQ-28: General Health Questionnaire-28, M: males, HADS: Hospital Anxiety Depression Scale, HARS: Hamilton Anxiety Rating Scale, HD: haemodialysis, HDRS: Hamilton Depression Rating Scale, KDQOL-SF: Kidney Disease Quality of Life-Short Form, F: females, McGill QOL: McGill Quality of Life Questionnaire, PHQ-9: Patient Health Questionnaire-9, PSS-4: Perceived Stress Scale-4, PSS-10: Perceived Stress Scale-10, RTX: kidney transplant, SDS: Self-Appraisal Depression Scale, SEIQOL-DW: Quality of Life-Direct Weighting, SF-36: Short Form-36, STAI: State-Trait Anxiety Inventory, WHOQOL: World Health Organization Quality of Life-bref.

Depression and quality of sleep

Two studies^{63,64} related depression, quality of sleep (measured by the Pittsburgh Sleep Quality Index) and HRQOL of patients on peritoneal dialysis. Depression and physical and mental HRQOL were indirectly related in both (that is, as depression increased, HRQOL decreased). Bilgic et al.⁶⁴ found evidence for depression as a variable that predicts physical and mental HRQOL. Both studies highlight that a poor

quality of sleep is a risk factor for HRQOL of patients on peritoneal dialysis.

Depression, anxiety and sexual function

Two studies related depression, sexual function and HRQOL in females on both dialysis modalities⁶⁶; and depression, anxiety, sexual function and HRQOL in males and females on haemodialysis⁶⁹. Lew-Starowicz

et al.⁶⁹ found a depression rate of 80.5% in females and 72.7% in males. This rate is the highest in all the studies we reviewed. The instrument used was BDI and the authors noted that most patients had mild (39% of females and 31.8% of males) or moderate depression (31.7% of females and 31.8% of males). Depression and physical and mental HRQOL were indirectly related in both studies (that is, as depression increased, HRQOL decreased). The two studies highlighted that sexual dysfunction is a major risk factor for HRQOL both in females on peritoneal dialysis and in a population of both sexes on haemodialysis.

DISCUSSION

This review highlights that the variables of anxiety, depression and stress negatively affect HRQOL in a large number of studies. Another finding of interest in relation to psychosocial variables is that depression is conceptualised as a risk factor for low physical and mental HRQOL. That is, as symptoms of depression increase, HRQOL decreases. These effects observed in the studies reported were recently confirmed in a major cohort study with 32,332 dialysis patients⁷⁰, in which depression and low social support explained the variability in the physical dimension of HRQOL and survival. Lastly, both depression and anxiety are the main variables that predict physical and mental HRQOL (in the case of depression) and mental (in the case of anxiety). These results are supported by the study by Kallay et al.⁷¹, carried out with dialysis and transplant patients. Studies carried out in our country also note that these two psychosocial variables are the main variables responsible for the differences in HRQOL in males and females in favour of males⁷².

With regard to the measurement instruments, we can say that the gold-standard for measuring depression is the BDI, used in 20 of the 38 studies. However, only three of them^{31,43,63} used updated available versions, such as BDI-II. This coincides with authors who indicated that the current strategy in dialysis units of evaluating depression through the BDI has demonstrated its validity and usefulness in this type of patient⁷³. Despite the BDI having shown its usefulness, we should remember that the items that it measures also includes somatic symptoms (energy, appetite and sleep), which could put its applicability in doubt in patients with severe diseases. As such, in this review, we recommend using the CDI (Cognitive Depression Index), composed of 15 of the 21 BDI items when we eliminated the somatic scale. This was the instrument used in the two studies carried out by the Spanish group led by Vázquez^{56,57}. In reference to the anxiety study, there continue to be many doubts over which is the measurement of choice that must be used. Seven studies use the HADS, which

has been validated in hospitalised patients. Although it is true that dialysis is a technique that requires constant contact with the hospital, it continues to be an outpatient technique, both as haemodialysis and as peritoneal dialysis, which is also a home technique, and as such, we can question the use of HADS in this type of patient. The appropriate choice of evaluation instrument in this type of multimorbid patient (ACKD) in complex situations is very important, since we are detecting psychological symptoms in which intervention is possible, and as such, an adequate measurement of these symptoms will help us select adjusted treatments. In the case of the STAI, we should remember that STAI-state measurement, according to the original authors, involves a measurement of anxiety that refers to the subjective feelings of tension, apprehension and hyperactivation of the autonomic nervous system while patients respond to the questionnaire⁷⁴ and does not refer to a stable measurement of anxiety. In the study of perceived stress, it seems clear that the measurement of choice is some versions of the PSS (ten or four items), since it is employed in the only two studies that evaluate this variable in relation to HRQOL^{31,65}. With regard to HRQOL, we can state that the generic instrument of choice is SF-36 (Short Form-36), which is used in 19 studies, and the KDQOL-SF (Kidney Disease Quality of Life-Short Form) is the specific gold-standard employed in 12 of the 38 studies reviewed.

Furthermore, adherence to treatment is directly associated with HRQOL in the physical dimension and in the vitality and social function subscales. That is, the greater the patient adherence to self-report methods and/or objective indicators, the better their physical and social HRQOL and vitality will be. This is confirmed in 100% of the studies that include the measurement of adherence in their variables and relate it with HRQOL. One of the main problems in the study of adherence to treatment is how to obtain a reliable measurement of a complex, multidimensional behaviour with multiple causes that goes beyond taking medical prescriptions into account⁷⁵. Due to the variability of the measurements used, we were still not able to identify which was the gold-standard⁷⁶. We only found one study that included self-report markers and objective markers in the assessment of adherence, putting more emphasis if possible when displaying the results on the values reported in the self-report³¹. What does seem clear in the area of ACKD is that more than one measurement should be used in the evaluation of adherence and that objective measurements used in the biomedical field, such as inter-dialysis weight gain should be significantly related to self-report measurements⁷⁷. Only three studies^{31,67,68} included the measurement of adherence along with psychosocial variables and in one of them⁶⁷, it was not related to HRQOL, and as such,

it seems that more effort must be made to try to clarify the role of adherence in HRQOL and the effect that psychosocial variables may have on both markers.

Moreover, we observed a greater prevalence of haemodialysis than peritoneal dialysis. Of the total number of people included in the studies, 29% represented those who used the home technique. In accordance with the studies analysed in this review, we cannot conclude which of the two dialysis techniques results in a higher HRQOL, since this was not one of our objectives. Instead, we can report that, of the six studies that included both dialysis methods, two did not make comparisons between techniques^{45,59}, two others^{41,64} did not find significant differences in HRQOL between the two methods and one³¹ of the two remaining studies found differences in physical HRQOL in favour of peritoneal dialysis, and the last found physical and mental differences in HRQOL in favour of haemodialysis⁶⁶. More effort should be made to clarify the role of dialysis method on HRQOL, because the results do not provide a clear picture.

P. L. Kimmel, a reference author in a psychosocial approach in kidney patients, encourages us to continue studying the role of psychosocial aspects on the adaptation and progression of kidney disease⁷⁸.

Limitations of the studies evaluated

Although the studies selected had a good methodology quality, it was common to find studies with an incomplete or non-existent^{35,42-44,47,51-53,55-58,63,64,66-68} description of the sample characteristics evaluated. With regard to the presentation of results, it is striking that several studies^{40,42,43,45,54,60} did not explicitly report bivariate analysis data amongst their variables (correlations), but did report multivariate analysis results (multiple linear regression models) to predict HRQOL. A more detailed presentation of these indicators may facilitate the potential use of this information in meta-analyses and allow greater clarity on the effect of these variables.

Practical implications

The studies reviewed inform us that depression rates in dialysis units may be around 80.5% and anxiety rates may be above 30%. Anxiety disorders in this population have been underestimated, since they were associated with symptoms of depression, but the reality shows us that they are significant and that it is probably necessary to improve diagnostic procedures in order to detect them effectively²⁵.

This review reflects the availability of standardised evaluation instruments that allow these variables to

be measured. The choice of good, reliable and valid evaluation measurements is essential for the correct diagnosis of HRQOL risk factors.

Moreover, it is necessary to bear in mind the patient's perspective⁷⁹. This may prove very advantageous for the quality of the research process and allow experts to not become detached from what is important to the patient. For example, the study carried out by Schipper and Abma⁸⁰ highlighted the main priorities from the point of view from the individual with chronic kidney disease: coping with dialysis (decision-making), family relationships (how they are affected) and dialysis as a stressful experience that interrupts the individual's life.

Psychological factors are modifiable elements on which we can act with treatment strategies from behavioural science (and/or combined with indicated drugs), in order to boost HRQOL in kidney patients. In XXI century nephrology, it is understood that in dialysis units, we should be capable of detecting, diagnosing and treating anxious-depressive disorders, since we possess interventional tools and programmes that have proven to be effective⁸¹. For optimisation, these programmes may be undertaken during dialysis sessions, which is a period of time in which the patient may be more available⁸². In Spain, the participation of mental health professionals as integrated members of nephrology teams⁸³ is rare, and the development of the specialty (psychonephrology) is still in its infancy. However, the resources of the hospital interclinic model and patient associations are available to us, which are local resources that traditionally incorporate psychosocial support.

Lastly, we must bear in mind that the development of a comprehensive perspective in chronic patient care is increasingly necessary. This gives us an excellent opportunity to create interdisciplinary care, teaching and research teams within the nephrology community that directly impact on the quality of healthcare for kidney patients and their families.

Acknowledgements

We would like to thank Shire Farmaceuticals, which supported the Nephrology Department's team in its research activities with an unrestricted grant.

We would also like to thank Solmar Rodríguez (Postgraduate Practicum in Health Psychology, Universidad Autónoma de Madrid) and María Arranz (Undergraduate Practicum in Psychology, Universidad Complutense de Madrid), for their collaboration in evaluating the methodology quality of the studies included in the review.

KEY CONCEPTS

1. HRQOL is negatively related to the symptomology of mixed anxiety-depressive disorder and perceived stress. The greater the symptomology of mixed anxiety-depressive disorder and/or stress, the less the HRQOL.
2. Depression is a variable predictor of low HRQOL in the physical and social health dimensions.
3. Anxiety is a variable predictor of low HRQOL in the mental health dimensions.
4. Stress can affect HRQOL.
5. Adherence to treatment shows a positive relationship with HRQOL in the physical health, vitality and social function dimensions. The greater the adherence, the greater the HRQOL.
6. The instruments chosen to study depression and HRQOL are CDI (BDI without a somatic scale) and the SF-36 (generic) or the KDQOL-SF (specific).
7. There is no consensus on the measurement of adherence in nephrology.
8. Research within the field of HRQOL is centred on the study of depression in patients on haemodialysis, with other factors that are potentially detrimental to HRQOL remaining neglected.
9. Collaboration between psychosocial and biomedical scientists is necessary in order to continue to deepen knowledge on the modifiable factors that are currently reducing HRQOL in patients on dialysis.

Conflicts of interest

The authors declare that they have no conflicts of interest related to the contents of this article.

REFERENCES

1. El Nahas AM, Bello AK. Chronic kidney disease: the global change. *Lancet* 2005;365:331-40.
2. Górriz JL, Otero A. Impacto socio sanitario de la enfermedad renal crónica avanzada. *Nefrología* 2008;3:7-15.
3. Registros SEN: Unidad de Información de Registros de Enfermos Renales. Available at: <http://www.senefro.org/modules.php?name=webstructure&idwebstructure=128>. Accessed: August 16, 2012.
4. Kao TW, Huang JW, Hung KY, Chang YY, Cheng PC, Yen CJ, et al. Life expectancy, expected years of life lost and survival of hemodialysis and peritoneal dialysis patients. *J Nephrol* 2010;23(6):677-82.
5. Cukor D, Cohen SD, Peterson R, Kimmel PL. Psychosocial aspects of chronic disease: ESRD as a paradigmatic illness. *J Am Soc Nephrol* 2007;18:3042-55.
6. Alvarez-Ude F, Rebollo P. Alteraciones psicológicas y de la calidad de vida relacionada con la salud en el paciente con enfermedad renal crónica estadios 3-5 (no en diálisis). *Nefrología* 2008;3:57-62.
7. de Ridder D, Greenen R, Kruijer R, Van Middendorp H. Psychological adjustment to chronic diseases. *Lancet* 2008;372:246-55.
8. Santacruz PL, Rangel ME, Navas N, Bolívar Z. La visión integradora biopsicosocial como estrategia ante el paciente con enfermedad renal crónica. *Requisito contemporáneo. Nefrología* 2006;26(5):635-6.
9. Fukuhara S, Yamakazi S, Hayashino Y, Green J. Measuring health-related quality of life in patients with end-stage renal disease: why and how. *Nat Clin Pract Nephrol* 2007;3:352-3.
10. Revicki DA, Osoba D, Fairclough D, Barofsky I, Berzon I, Leidy NK, et al. Recommendations on health-related quality of life research to support labeling and promotional claims in the United States. *Qual Life Res* 2000;9:887-900.
11. Remor E. Quality of life in hemophilia. In: Rodríguez-Merchán EC, Valentino L (eds.). *Current and future issues in hemophilia care*. Oxford, UK: Wiley-Blackwell; 2011.
12. Alvarez-Ude F, Vicente E, Badía X. La medida de la calidad de vida relacionada con la salud en los pacientes en programa de hemodiálisis y diálisis peritoneal continua ambulatoria de Segovia. *Nefrología* 1995;15(6):572-80.
13. Jofre R. Factores que afectan a la calidad de vida en pacientes en prediálisis, diálisis y trasplante renal. *Nefrología* 1999;19(1):84-90.
14. Valderrábano F, Jofré R, López-Gómez M. Quality of life in end-stage renal disease patients. *Am J Kidney Dis* 2001;38(3):443-64.
15. Glover C, Banks P, Carson A, Martin CR, Duffy T. Understanding and assessing the impact of end-stage renal disease on quality of life: a systematic review of the content validity

- of self-administered instruments used to assess health-related quality of life in end-stage renal disease. *Patient* 2011;4(1):19-30.
16. Finkelstein FO, Wuerth D, Finkelstein SH. Health related quality of life and the CKD patient: challenges for the nephrology community. *Kidney Int* 2009;76:946-52.
 17. Letchmi S, Das S, Halim H, Zakariah FA, Hassan H, Mat S, et al. Fatigue experienced by patients receiving maintenance dialysis in hemodialysis units. *Nurs Health Sci* 2011;13:60-4.
 18. Rebollo P, Bobes M, González MP, Saiz P, Ortega P. Factores asociados a la calidad de vida relacionada con la salud (CVRS) de los pacientes en terapia renal sustitutiva (TRS). *Nefrologia* 2000;20:171-81.
 19. Rodrigues-Fructuoso M, Castro R, Oliveira I, Prata C, Morgado T. Quality of life in chronic kidney disease. *Nefrologia* 2011;31(1):91-6.
 20. Kutner NG, Zhang R, Huang Y, Johansen C. Depressed mood, usual activity level and continued employment after starting dialysis. *Clin J Am Soc Nephrol* 2010;5:2040-5.
 21. Alvarez-Ude F, Fernández-Reyes MJ, Vázquez A, Mon C, Sánchez R, Rebollo P. Síntomas físicos y trastornos emocionales en pacientes en programa de hemodiálisis periódicas. *Nefrologia* 2001;21(2):191-9.
 22. Finkelstein FO, Finkelstein SH. Depression in chronic hemodialysis patients: assessment and treatment. *Nephrol Dial Transplant* 2000;15:1911-3.
 23. Hedeyati 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;81:247-55.
 24. Park HC, Yoon HB, Son MJ, Jung ES, Joo KW, Chin HJ, et al. Depression and health-related quality of life in maintenance hemodialysis patients. *Clin Nephrol* 2010;73(5):374-80.
 25. Cukor D, Coplan J, Brown C, Friedman S, Newville H, Safier M, et al. Anxiety disorders in adults treated with hemodialysis: A single center study. *Am J Kidney Dis* 2008;52(1):128-36.
 26. McClelland WM, Abramson J, Newsome B, Temple E, Wadley VG, Audhya P, et al. Physical and psychological burden of chronic kidney renal disease among older adults. *Am J Nephrol* 2010;31:309-17.
 27. Symister P. Beyond social support: using family expectations to predict psychological adjustment in end-stage renal disease patients. *J Health Psychol* 2011;16(7):1015-26.
 28. Neri L, Martini A, Andreucci VE, Gallieni M, Rey LA, Brancaccio D; MigliorDialisi Study Group. Regimen complexity and prescription adherence in dialysis patients. *Am J Nephrol* 2011;34(1):71-6.
 29. Sukolsky A. Patients who try our patience. *Am J Kidney Dis* 2004;44(5):893-901.
 30. Moist LM, Bragg-Gresman MS, Pisoni RL, Saran R, Akiba T, Jacobson SH, et al. Travel time to dialysis as a predictor of health-related quality of life, adherence and mortality: the Dialysis Outcomes and Practice Patterns Study. *Am J Kidney Dis* 2008;51(4):641-50.
 31. García-Llana H, Remor E, Selgas R. Adherence to treatment, emotional state and quality of life in patients with end-stage renal disease undergoing dialysis. *Psicothema* 2013;25(1):79-86.
 32. Barra S, Elorza-Ricart JM, Sánchez E. Instrumento para la lectura crítica y la evaluación de estudios epidemiológicos transversales. *Gac Sanit* 2008;22(5):492-7.
 33. Segura-Ortí E. Ejercicio en pacientes en hemodiálisis: Revisión sistemática de la literatura. *Nefrologia* 2010;30(2):236-46.
 34. Ferreira RC, da Silva Filho CR. Quality of life of chronic renal patients on hemodialysis in Marília, SP, Brazil. *J Bras Nefrol* 2011;33(2):129-35.
 35. Garcia TW, Veiga JP, Motta LD, Moura FJ, Casulari LA. Depressed mood and poor quality of life in male patients with chronic renal failure undergoing hemodialysis. *Rev Bras Psiquiatr* 2010;32(4):369-74.
 36. Senol V, Sipahioglu MH, Ozturk A, Argün M, Uta C. Important determinants of quality of life in a peritoneal dialysis population in Turkey. *Ren Fail* 2010;32(10):1196-201.
 37. Peng YS, Chiang CK, Hung KY, Chang CH, Lin CY, Yang CS, et al. Are both psychological and physical dimensions in health-related quality of life associated with mortality in hemodialysis patients: a 7-year Taiwan cohort study. *Blood Purif* 2010;30(2):98-105.
 38. Park HC, Yoon HB, Son MJ, Jung ES, Joo KW, Chin HJ, et al. Depression and health-related quality of life in maintenance hemodialysis patients. *Clin Nephrol* 2010;73(5):374-80.
 39. Atalay H, Solak Y, Biyik M, Biyik Z, Yeksan M, Uguz F, et al. Sertraline treatment is associated with an improvement in depression and health-related quality of life in chronic peritoneal dialysis patients. *Int Urol Nephrol* 2010;42(2):527-36.
 40. Cruz LN, Fleck MPA, Polanczyk CA. Depression as a determinant of quality of life in patients with chronic disease. Data from Brazil. *Soc Psychiatry Psychiatr Epidemiol* 2010;45:953-61.
 41. Abdel-Kader K, Unruh ML, Weisbord SD. Symptom burden, depression, and quality of life in chronic and end-stage kidney disease. *Clin J Am Soc Nephrol* 2009;4(6):1057-64.
 42. Lopes GB, Matos CM, Leite EB, Martins MT, Martins MS, Silva LF, et al. Depression as a potential explanation for gender differences in health-related quality of life among patients on maintenance hemodialysis. *Nephron Clin Pract* 2010;115(1):c35-40.
 43. Kao TW, Lai MS, Tsai TJ, Jan CF, Chie WC, Chen WY. Economic, social, and psychological factors associated with health-related quality of life of chronic hemodialysis patients in northern Taiwan: a multicenter study. *Artif Organs* 2009;33(1):61-8.
 44. Son YJ, Choi KS, Park YR, Bae JS, Lee JB. Depression, symptoms and the quality of life in patients on hemodialysis for end-stage renal disease. *Am J Nephrol* 2009;29(1):36-42.
 45. Morales-Jaimes R, Salazar-Martínez E, Flores-Villegas FJ, Bochicchio-Riccardelli T, López-Caudana AE. Calidad de vida relacionada con la salud en los pacientes con tratamiento sustitutivo renal: el papel de la depresión. *Gac Med Mex* 2008;144(2):91-8.
 46. Cukor D, Coplan J, Brown C, Friedman S, Cromwell-Smith A,

- Peterson RA, et al. Depression and anxiety in urban hemodialysis patients. *Clin J Am Soc Nephrol* 2007;2:484-90.
47. Cengic' B, Resic' H. Depression in hemodialysis patients. *Bosn J Basic Med Sci* 2010;10 Suppl 1:S73-8.
 48. Drayer RA, Piraino B, Reynolds CF, Houck PR, Mazumdar S, Bernardini J, et al. Characteristics of depression in hemodialysis patients: symptoms, quality of life and mortality risk. *Gen Hosp Psychiatry* 2006;28(4):306-12.
 49. Gil-Cunheiro JM, García-Cortés MJ, Foronda J, Borrego JF, Sánchez-Perales MC, Pérez del Barrio P, et al. Calidad de vida relacionada con la salud en pacientes ancianos en hemodiálisis. *Nefrologia* 2003;23(6):528-37.
 50. Varela L, Vázquez MI, Bolaños L, Alonso R. Predictores psicológicos de la calidad de vida relacionada con la salud en pacientes en tratamiento de diálisis peritoneal. *Nefrologia* 2011;31(1):97-106.
 51. Chen CK, Tsai YC, Hsu HJ, Wu IW, Sun CY, Chou CC, et al. Depression and suicide risk in hemodialysis patients with chronic renal failure. *Psychosomatics* 2010;51(6):528-528.e6.
 52. Santos JB, Mendonça M, Pinheiro MC, Tamai S, Uchida R, Miorin LA, et al. Negative correlations between anxiety-depressive symptoms and quality of life among patients on hemodialysis. *Sao Paulo Med J* 2010;128(2):102-3.
 53. Montinaro V, Iaffaldano GP, Granata S, Porcelli P, Todarello O, Schena FP, et al. Emotional symptoms, quality of life and cytokine profile in hemodialysis patients. *Clin Nephrol* 2010;73(1):36-43.
 54. Arenas MD, Alvarez-Ude F, Reig-Ferrer A, Zito JP, Gil MT, Carretón MA, et al. Emotional distress and health-related quality of life in patients on hemodialysis: the clinical value of COOP-WONCA charts. *J Nephrol* 2007;20(3):304-10.
 55. Vasilieva IA. Quality of life in chronic hemodialysis patients in Russia. *Hemodial Int* 2006;10(3):274-8.
 56. Vázquez I, Valderrábano F, Jofré R, Fort J, López-Gómez JM, Moreno F, et al.; Spanish Cooperative Renal Patients Quality of Life Study Group. Psychosocial factors and quality of life in young hemodialysis patients with low comorbidity. *J Nephrol* 2003;16(6):886-94.
 57. Vázquez I, Valderrábano F, Fort J, Jofré R, López-Gómez JM, Moreno F, et al.; Spanish Cooperative Renal Patients Quality of Life Study Group. Psychosocial factors and health-related quality of life in hemodialysis patients. *Qual Life Res* 2005;14(1):179-90.
 58. Dogan E, Erkoc R, Eryonucu B, Sayarlioglu H, Agargun MY. Relation between depression, some laboratory parameters, and quality of life in hemodialysis patients. *Ren Fail* 2005;27(6):695-9.
 59. Preljevic VT, Hortemo-Østhus TB, Sandvik L, Bringager CB, Opjordsmoen S, Nordhus IH, et al. Psychiatric disorders, body mass index and C-reactive protein in dialysis patients. *Gen Hosp Psychiatry* 2011;33(5):454-61.
 60. Ramirez SP, Macedo DS, Sales PM, Figuereido SM, Daher EF, Araújo SM, et al. The relationship between religious coping, psychological distress and quality of life in hemodialysis patients. *J Psychosom Res* 2012;72:129-35.
 61. Perales-Montilla CM, García-León A, Reyes-del paso A. Predictores psicosociales de la calidad de vida en pacientes con insuficiencia renal crónica en tratamiento de hemodiálisis. *Nefrologia* 2012;32(5):622-30.
 62. Urzúa A, Pavlov R, Cortés R, Pino V. Factores psicosociales relacionados con la calidad de vida en salud en pacientes hemodializados. *Terapia Psicológica* 2011;29(1):135-40.
 63. Güney I, Biyik M, Yeksan M, Biyik Z, Atalay H, Solak Y, et al. Sleep quality and depression in peritoneal dialysis patients. *Ren Fail* 2008;30(10):1017-22.
 64. Bilgic A, Akman B, Sezer S, Ozisik L, Arat Z, Ozdemir FN, et al. Predictors for quality of life in continuous ambulatory peritoneal dialysis patients. *Nephrology (Carlton)* 2008;13(7):587-92.
 65. Abdel-Kader K, Myaskovsky L, Karpov I, Shah J, Hess R, Dew MA, et al. Individual quality of life in chronic kidney disease: influence of age and dialysis modality. *Clin J Am Soc Nephrol* 2009;4(4):711-8.
 66. Yazici R, Altintepe L, Guney I, Yeksan M, Atalay H, Turk S, et al. Female sexual dysfunction in peritoneal dialysis and hemodialysis patients. *Ren Fail* 2009;31(5):360-4.
 67. Patel SS, Shah VS, Peterson RA, Kimmel PL. Psychosocial variables, quality of life, and religious beliefs in ESRD patients treated with hemodialysis. *Am J Kidney Dis* 2002;40(5):1013-22.
 68. Taskapan H, Ates F, Kaya B, Emul M, Kaya M, Taskapan C, et al. Psychiatric disorders and large interdialytic weight gain in patients on chronic haemodialysis. *Nephrology (Carlton)* 2005;10(1):15-20.
 69. Lew-Starowicz M, Gellert R. The sexuality and quality of life of hemodialyzed patients--ASED multicenter study. *J Sex Med* 2009;6(4):1062-71.
 70. Untas A, Thumma J, Rasclé N, Rayner H, Mapes D, Lopes AA, et al. The associations of social support and other psychosocial factors with mortality and quality of life in the dialysis outcomes and practice patterns study. *Clin J Am Soc Nephrol* 2011;6:142-52.
 71. Kállay E, Pop R, Balazsi. Emotional profile and quality of life in chronic renal failure and renal transplant patients. *Cognition, Brain and Behavior* 2009;8(3):313-28.
 72. Vázquez I, Valderrábano F, Fort J, López-Gómez JM, Moreno F, Sanz-Guajardo D. Diferencias en la calidad de vida relacionada con la salud entre hombres y mujeres en tratamiento en hemodiálisis. *Nefrologia* 2004;24(2):167-77.
 73. Troidle L, Wuerth D, Finkelstein S, Kliger A, Finkelstein F. The BDI and the SF36: Which tool to use to screen for depression? *Adv Perit Dial* 2003;19:159-62.
 74. Spielberger CD, Gorsuch RL, Lushene RE. *STAI. Manual for the State-Trait Anxiety Inventory*. Palo Alto California: Consulting Psychology Press; 1983.
 75. Remor E. Predictors of treatment difficulties and satisfaction with haemophilia therapy in adult patients. *Haemophilia* 2011;17:e901-5.
 76. Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med* 2005;353:487-97.
 77. Iborra-Moltó C, López-Roig S, Pastor MA. Prevalencia de la adhesión a la restricción de líquidos en pacientes renales en

- hemodiálisis: indicador objetivo y adhesión percibida. *Nefrologia* 2012;32(4):477-85.
78. Kimmel PL. Depression in patients with chronic renal disease: what we know and what we need to know. *J Psychosom Res* 2002;53:951-6.
79. Mayer M. Seeking what matters: patients as research partners. *Patient* 2012;5(2):71-4.
80. Schipper K, Abma TA. Coping, family and mastering: top priorities for social science research by patients with chronic kidney disease. *Nephrol Dial Transplant* 2011;26(10):3189-95.
81. Duarte PS, Miyakazy MC, Blay SL, Sesso R. Cognitive-behavioral group therapy is an effective treatment for major depression in hemodialysis patients. *Kidney Int* 2009;76:414-21.
82. Peterson RA. Improving hemodialysis in patients care: critical areas. *Patient Educ Couns* 2010;81:3-4.
83. García-Llana H, Barbero J, Olea T, Jimenez C, del Peso G, Miguel JL, et al. Incorporación de un psicólogo en un servicio de nefrología: criterios y proceso. *Nefrologia* 2010;30(3):297-303.