VU Research Portal

Depressive and anxiety symptoms in Dutch chronic kidney disease patients

Loosman, W.L.

2016

document version
Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)
Loosman, W. L. (2016). *Depressive and anxiety symptoms in Dutch chronic kidney disease patients*.
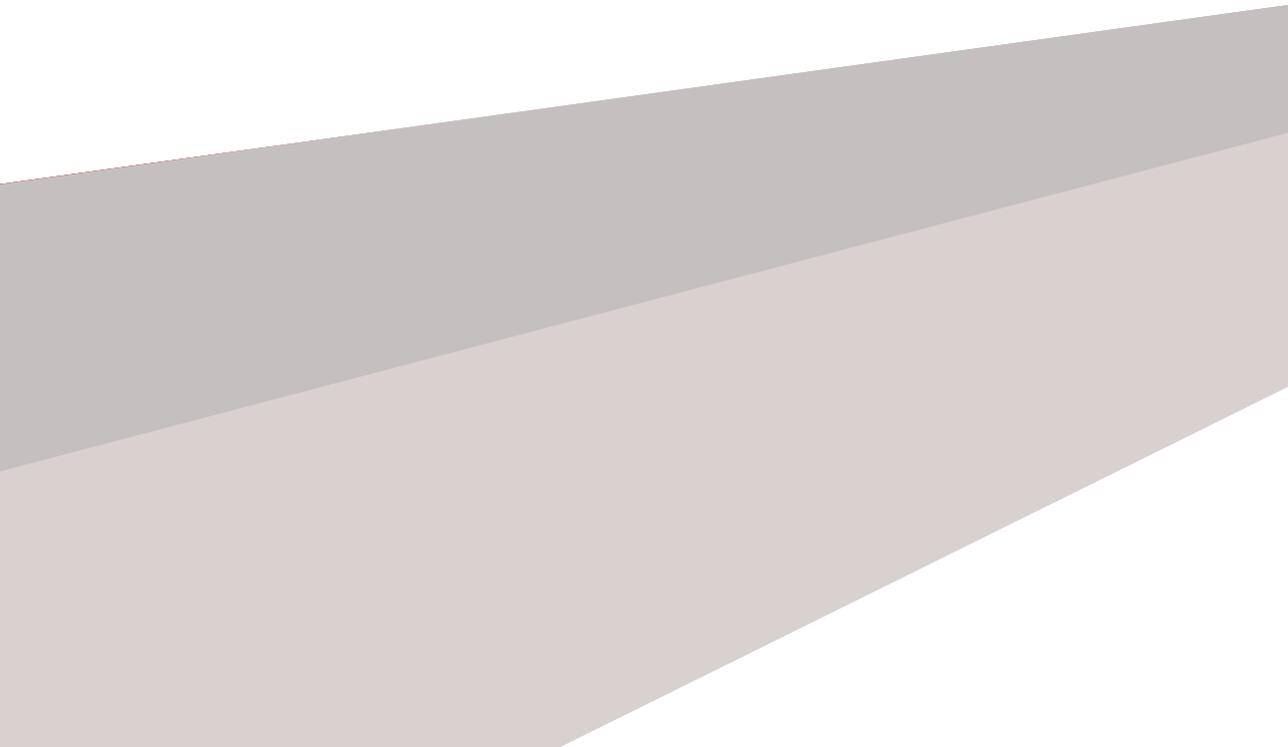
Chapter 4

Depressive and anxiety symptoms in Dutch native and immigrant dialysis patients

Wim L. Loosman, Gertrud L.G. Haverkamp, Tessa O. van den Beukel, Tiny Hoekstra, Friedo W. Dekker, Prataap K. Chandie Shaw, Yves F.C. Smets, Louis-Jean Vleming, Pieter M. Ter Wee, Carl E.H. Siegert, and Adriaan Honig

ABSTRACT

Background The prevalence of depressive and anxiety symptoms is high in dialysis patients, and leads to elevated morbidity and mortality. It is unclear whether being immigrant is a protective or risk factor for this high prevalence. The aim of this study is to determine the prevalence of depressive and anxiety symptoms in native and immigrant dialysis patients, and to explore whether patient characteristics can explain possible differences.

Methods Dialysis patient were included in four large teaching hospitals and one university hospital in The Netherlands (DIVERS). Regions of origin of immigrant patients were defined as Africa-South America, Asia and Europe. The Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI) were used to measure the prevalence of depressive and anxiety symptoms. Differences between native and immigrant patients were explored using logistic regression models adjusted for patient characteristics.

Results The prevalence of depressive symptoms was 35% in native (n=245) and 50% in immigrant (n=249) patients. The prevalence of anxiety symptoms was 30% and 42%, respectively. Crude odds ratio's (ORs) for depressive symptoms for all, African-South American, Asian and European immigrant versus native patients were 1.8 (1.2–2.5), 1.6 (0.9–2.9), 2.8 (1.6–4.9), and 0.9 (0.4–2.1) respectively. Crude ORs for anxiety symptoms for all, African-South American, Asian and European immigrant versus native patients were 1.7 (1.2–2.5), 1.6 (>1.0–2.6), 2.1 (1.3–3.4) and 0.7 (0.3–1.7) respectively. After stepwise adjustment for patient characteristics ORs remained the same.

Conclusions Immigrant dialysis patients have a higher prevalence of depressive and anxiety symptoms compared to native dialysis patients. Patient characteristics did not explain the differences between native and immigrant patients.

INTRODUCTION

Depressive symptoms are highly prevalent in dialysis patients with an estimated occurrence of 39% as was shown by a recent meta-analysis.[1] These symptoms are independently associated with mortality[2], hospitalization[3], and impaired health related quality of life (HRQOL).[4] Depressive symptoms often co-occur with anxiety symptoms.[5] Anxiety symptoms are also highly prevalent in dialysis patients with a prevalence that varies between 13% and 50%.[5-10] Anxiety symptoms are also associated with impaired HRQOL[7] in dialysis patients, and seem to contribute to the relationship between depressive symptoms and impaired HRQOL.[5]

Depressive and anxiety symptoms have been found to vary between native and immigrant groups in a range of settings including the general population and several patients groups.[11-14] In dialysis patients, however, it remains unclear whether the prevalence of depressive and anxiety symptoms differs between native and immigrants patients. A recent meta-analysis[1] showed that the prevalence of depressive symptoms does not seem to differ between white and non-white dialysis patients. The studies included in this meta-analysis[1] used ethnic origin, but did not include immigrant status and were predominantly United States (US) dialysis populations. In these US dialysis populations ethnic origin is often divided in two major groups: African American or black patients, and Caucasian or white patients. In the Netherlands and in many European countries the ethnic and immigrant composition is rather different and diverse, compared to the US dialysis population.[11;15]

The objective of this study is to determine the prevalence of depressive and anxiety symptoms in native and immigrant dialysis patients in the Netherlands. In addition, we explore if the prevalence of depressive and anxiety symptoms differs between regions of origin of the immigrant patients. Finally, we explore whether differences between dialysis patient groups can be explained by patient characteristics such as demographic and clinical parameters or physical status.

SUBJECTS AND METHODS

Patients

For this study we used cross-sectional data of the "Depression related factors In dialysis patients with Various Ethnicities and Races Study" (DIVERS), which is an observational prospective cohort study among dialysis patients in four urban teaching hospitals and

one university hospital in the Netherlands. These hospitals were chosen because of the high percentage of immigrant dialysis patients. Patients were included between June 2012 and December 2013 (prevalent patients) or until October 2014 (incident patients). Patients were included when they were at least 18 years of age, were on dialysis treatment for at least 90 days, and were able to fill out questionnaires in the Dutch, English, Turkish or Moroccan Arabic language. Patients were excluded if they had cognitive disabilities that interfered with filling out questionnaires. For the current analysis patients were also excluded if they gave permission for examination of their medical records, but did not want to fill out questionnaires. The study was approved by the medical ethics committee of the VU university medical centre (approval number: 2010/064). All patients gave written informed consent.

Patient characteristics

The following demographic and clinical data were obtained from medical records: age, gender, dialysis modality, date of starting dialysis treatment, comorbidity, primary cause of kidney disease, body mass index (BMI), and laboratory measures. Data on smoking status, country of birth, country of birth of both parents and grandparents, marital status, working status, and education were collected through a self-report questionnaire. The primary cause of kidney disease was classified according to the codes of the European Renal Association-European Dialysis and Transplantation Association (ERA-EDTA).[16] Co-morbid conditions were scored according to the Davies comorbidity index[17], resulting in a comorbidity index classified into: no, intermediate or severe. Laboratory parameters were collected from routine blood laboratory investigations performed in the individual dialysis centers. To determine patient's physical status we used the physical component summary score (PCS) of the Short Form 12 (SF-12). The SF-12 is a quality of life questionnaire, consisting of a physical and a mental component score. SF-12 is validated among dialysis patients.[18]

Immigrant status

Patients were classified as native or immigrant based on the country of birth of the patients and of their parents. According to the standard definition of the Statistics Netherlands criteria an individual is considered to be an immigrant if at least one parent was born abroad, regardless of the individual's own country of birth. Patients who are born abroad with at least one parent also born abroad are first generation immigrant patients. Patients who are born in the Netherlands with at least one patient born abroad are second generation immigrants.[19;20] Patients of whom both parents were born in the Netherlands were classified as native. Moreover, immigrant patients were further

classified into region of origin. Patients of whom at least one parent was born in Africa or South America were classified as African-South American immigrants. Patients of whom at least one parent was born in the Middle East or Asia were classified as Asian immigrants. Patients of whom at least one parent was born in Europe, other than the Netherlands, were classified as European immigrants. Surinamese patients of whom at least one grandparent was born in Asia were classified as Asian immigrants. All other Surinamese patients were classified as African-South American immigrants.[20] If both parents are born in different countries, the mother's country of birth is used to infer descent.

Depressive and anxiety symptoms

Depressive symptoms were measured using the Beck Depression Inventory (BDI)[21], and symptoms of anxiety were measured using the Beck Anxiety Inventory (BAI).[22] Both questionnaires consist of 21 questions which are scored on a 0 – 3 scale. Patients were considered as having depressive and anxiety symptoms when they scored at least 13 points on the BDI[23] and 13 points on the BAI[24;25], respectively.

Statistical analyses

The three ethnic groups were compared in terms of patient characteristics, depressive and anxiety symptoms using the analysis of variance F test or Kruskall-Wallis tests for continuous variables, and a Pearson's chi-square test for categorical variables. Mean with standard deviation or median with interquartile range was used, depending on the underlying distribution. After determining the prevalence of depressive and anxiety symptoms odds ratios (ORs) were calculated using logistic regression to determine differences between immigrant groups, and to explore whether differences between immigrant groups can be explained by demographic variables and clinical characteristics. Multivariable adjustment was done deliberately within the causal pathway in order to explain potential mechanism. We used gradually more extensive multivariable models with demographic and clinical variables, followed by psychosocial variables and the patients physical status.

To obtain complete datasets, missing values for both continuous and categorical variables were imputed with multiple imputation techniques (5 repetitions). With multiple imputation missing data are imputed by a value that is predicted using the patients available characteristics under the condition of missing 'at random'. Missing 'at random' means that the missing value probably depends on other observed patient characteristics. Parathyroid hormone, time on dialysis, Kt/V and ferritin were not normally distrib-

uted and therefore square root transformed to enter the multiple imputation model. Almost all variables had < 10% missing except for total cholesterol (18%).

A p-value < 0.05 was considered statistically significant. Patient characteristics, depressive and anxiety symptoms were calculated on both the original and imputed dataset. For all statistical analyses SPSS for Windows version 21.0 was used.

Sensitivity analysis

To test the robustness of the results, several sensitivity analyses were performed. Analyses were repeated (1) excluding second generation immigrants; (2) excluding patients who received help filling out the questionnaires, because these patients could give more socially accepted answers; (3) using different cut-off scores (≥ 14, ≥ 15, and ≥ 16) in our logistic regression models for both the BDI and the BAI; (4) stratifying immigrants into Turkish, Moroccan, Surinamese from Asian descent, and Surinamese from African descent because these are the main immigrant groups in the Netherlands.[11] Finally, patient characteristics were compared between patients who did and who did not fill out the questionnaires.

RESULTS

Patient characteristics

In total 554 dialysis patients were included in the DIVERS study of whom 494 filled out questionnaires, and were included in the current analysis (native n=245, immigrant n=249). The inclusion flow chart is presented in Figure 1. Patient characteristics of the included native and immigrant patients are presented in Table 1. Compared to native patients, immigrants were younger (p < 0.01), had a higher prevalence of diabetes (p < 0.01), had a lower calcium (p < 0.01), and have a different distribution in the cause of end-stage renal disease (p < 0.01). The immigrant group consisted of 108 African-South American patients, 114 Asian patients and 27 European patients. Moreover, 212 patients (85%) were first generation immigrant patients. The mean length of stay in the Netherlands of these patients was 32 (± 14) years. The countries of origin of all patients are presented in Supplementary table 1. Patient characteristics of the different immigrant groups are presented in Supplementary table 2.
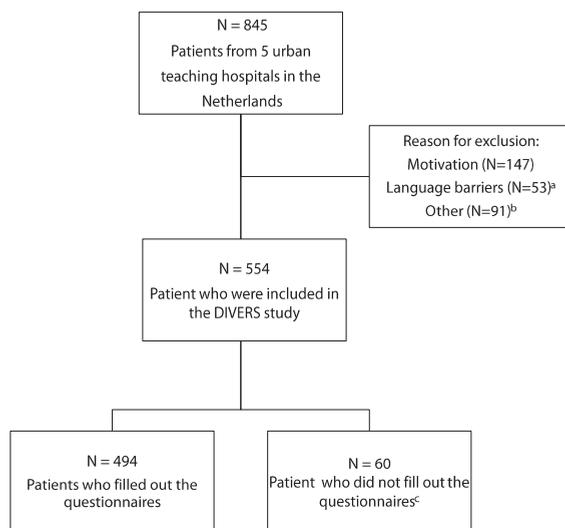
Figure 1. Inclusion flow chart for the DIVERS study.
[a] Patients who were unable to understand or fill out a questionnaire. [b] Consisting of cognitive impaired and medically ill patients. [c] Patients who only signed consent for medical chart examination (N = 38) or patients who gave consent, but had complete missing questionnaires (N = 22)

Depressive and anxiety symptoms

The prevalence of depressive and anxiety symptoms varied between immigrant groups (Table 2). Thirty-five percent of native and 49% of all immigrant patients had depressive symptoms above threshold (44%, 59% and 33% for African-South American, Asian and European immigrants, respectively). Thirty percent of native and 42% of all immigrant patients had anxiety symptoms above threshold (41%, 47% and 22% for African-South American, Asian, and European immigrants, respectively).

Logistic regression analysis immigrants versus natives

The crude OR for scoring above threshold for depressive symptoms using the BDI ($\geq$ 13) for all immigrants versus native dialysis patients was 1.8 (1.2 – 2.5), which implicates that immigrants have a 1.8 higher chance of having depressive symptoms compared to native patients. After stepwise adjustment for demographic characteristics, clinical characteristics, comorbidity, laboratory values, social characteristics, and physical status, ORs remained the same (Table 3). After dividing all immigrants in three regions of origin and compared them to natives ORs in the fully adjusted model were 1.6 (0.9 – 2.9), 2.8 (1.6 – 4.9) and 0.9 (0.3 – 2.3) for African-South American, Asian, and European immigrants, respectively (Table 3).

Table 1. Patient characteristics of 494 native and immigrant dialysis patients.

	Native N=245	Immigrant N=249	P-value
Sociodemographic			
Age, years	69.5 (13.8)	58.9 (15.3)	P < 0.01
Sex,% men	60	61	P = 0.81
Education, % low	41	40	p = 0.72
Married/living together, % yes	56	48	P = 0.06
Having children, % yes	76	79	P = 0.36
Employed, % yes	11	12	P = 0.84
Use of anti-depressants, % yes	9	10	P = 0.56
Clinical			
Incident, % yes	31	29	P = 0.60
Modality, % haemodialysis	89	90	P = 0.76
Time on dialysis, months	17.0 (5.0 – 45.0)	24.0 (6.0 – 65.0)	P = 0.07
BMI, kg/m2	27 (5.6)	27.2 (6.1)	P = 0.24
Current smoking, % yes	21	17	P = 0.29
Causes of ESRD, %			P < 0.01
Diabetes Mellitus	13	35	
Glomerulonephritis	13	9	
Renal vascular disease	30	25	
Other	45	31	
PCS	36.3 (10.5)	37.8 (10.8)	P = 0.06
Comorbidity			
Davies comorbidity, %			P = 0.06
No	31	23	
Intermediate	51	61	
Severe	19	16	
Diabetes Mellitus, % yes	34	50	P = 0.06
Cardiovascular disease, % yes	29	31	P = 0.15
Laboratory			
Albumin, g/l	36.6 (5.5)	37.5 (5.0)	P = 0.07
Haemoglobin, g/l	7.2 (0.8)	7.1 (0.8)	P = 0.47
PTH, pmol/l	26.9 (14.0 – 45.0)	30.0 (16.0 – 47.7)	P = 0.11
Ca, mmol/l	2.30 (0.14)	2.25 (0.18)	P < 0.01
Phosphorus, mmol/l	1.59 (0.42)	1.63 (0.51)	P = 0.35
Ferritin, ug/l	340 (181 – 562)	365 (173 – 637)	P = 0.51
Cholesterol, mmol/l	4.2 (1.2)	4.1 (1.4)	P = 0.62
Kt/V	1.51 (0.47)	1.52 (0.47)	P = 0.84

Data presented as mean (standard deviation) or median (inter quartile range)
ESRD: End-Stage Renal Disease, BMI: Body Mass Index, PTH: parathyroid hormone,
PCS: Physical Component Score

Table 2. Depressive and anxiety symptoms in dialysis patient divided in three ethnic groups

Depressive and anxiety symptoms	Native N=245	All immigrants N=249	Region of origin Africa-South America N=108	Asia N=114	Europe N=27
BDI ≥ 13 (%)	36	49	44	59	33
BDI total score*	11.2 (7.4)	14.7 (11.0)	13.8 (11.5)	16.5 (11.1)	10.7 (6.3)
BAI ≥ 13 (%)	30	42	41	47	22
BAI total score*	9.7 (8.5)	13.3 (11.3)	12.5 (11.3)	15.0 (12.0)	9.2 (6.1)

* Data presented as mean and standard deviation, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory

Table 3 .Odds ratios for depressive symptoms (BDI ≥ 13) for immigrants versus native, Asian versus native and African-South American versus native dialysis patients.

Model	Variables tested	All immigrant versus native	African-South American versus native	Asian versus native	European versus native
1. Unadjusted	ethnicity	1.8 (1.2 – 2.5)	1.4 (0.9 – 2.2)	2.6 (1.6 – 4.1)	0.9 (0.4 – 2.1)
2. Demographic	Model 1 plus age and gender	1.9 (1.3 – 2.8)	1.6 (0.9 – 2.6)	2.8 (1.8 – 4.4)	0.9 (0.4 – 2.2)
3. Clinical	Model 2 plus BMI, dialysis modality, primary kidney disease, smoking, time on dialysis	1.8 (1.2 – 2.7)	1.5 (0.9 – 2.5)	2.6 (1.6 – 4.2)	1.0 (0.4 – 2.3)
4. Comorbidity	Model 3 plus Davies co-morbidity score	1.8 (1.2 – 2.6)	1.5 (0.9 – 2.5)	2.5 (1.5 – 4.0)	1.0 (0.4 – 2.3)
5. Laboratory	Model 4 plus haemoglobin, calcium, albumin, phosphorus, PTH, ferritin, cholesterol and Kt/V	1.8 (1.2 – 2.8)	1.5 (0.9 – 2.6)	2.5 (1.5 – 4.2)	1.1 (0.5 – 2.7)
6. Social	Model 5 plus marital status, educational level, employment, children	1.8 (1.1 – 2.7)	1.4 (0.8 – 2.5)	2.4 (1.4 – 4.0)	1.2 (0.5 – 2.9)
7. Physical status	Model 6 plus PCS score	1.9 (1.2 – 2.9)	1.6 (0.9 – 2.9)	2.8 (1.6 – 4.9)	0.9 (0.3 – 2.3)

BDI: Beck Depression Inventory, BMI: Body Mass Index, PTH: parathyroid hormone,
PCS: Physical Component Score

The crude OR for scoring above threshold for anxiety symptoms using the BAI (≥ 13) for all immigrants versus native dialysis patients was 1.7 (1.2 – 2.5). After stepwise adjustment for demographic characteristics, clinical characteristics, comorbidity, laboratory values, social characteristics, and physical status, ORs remained the same (Table 4). After dividing all immigrants in three regions of origin ORs in the fully adjusted model were 1.9 (1.1 – 3.4), 2.2 (1.3 – 3.9) and 0.7 (0.3 – 1.9) for African-South American, Asian and European immigrants, respectively (Table 4).

Table 4 .Odds ratios for anxiety symptoms (BAI ≥ 13) for immigrant versus native, Asian versus native, and African-South American versus native dialysis patients.

Model	Variables tested	All immigrant versus native	African-South American versus native	Asian versus native	European versus native
1. Unadjusted	ethnicity	1.7 (1.2 – 2.5)	1.6 (>1.0 – 2.6)	2.1 (1.3 – 3.4)	0.7 (0.3 – 1.7)
2. Demographic	Model 1 plus age and gender	1.8 (1.2 – 2.7)	1.9 (1.1 – 3.1)	2.3 (1.4 – 3.7)	0.7 (0.3 – 1.8)
3. Clinical	Model 2 plus BMI, dialysis modality, primary kidney disease, smoking, time on dialysis	1.7 (1.2 – 2.7)	1.8 (1.1 – 3.1)	2.2 (1.4 – 3.7)	0.7 (0.3 – 1.8)
4. Comorbidity	Model 3 plus Davies co-morbidity score	1.7 (1.1 – 2.6)	1.8 (>1.0 – 3.0)	2.1 (1.3 – 3.5)	0.7 (0.3 – 1.7)
5. Laboratory	Model 4 plus haemoglobin, calcium, albumin, phosphorus, PTH, ferritin, cholesterol and Kt/V	1.8 (1.2 – 2.8)	1.9 (1.1 – 3.3)	2.2 (1.3 – 3.7)	0.8 (0.3 – 2.2)
6. Social	Model 5 plus marital status, educational level, employment, children	1.7 (1.1 – 2.6)	1.7 (0.9 – 3.0)	2.0 (1.2 – 3.5)	0.8 (0.3 – 2.3)
7. Physical status	Model 6 plus PCS score	1.7 (1.1 – 2.7)	1.9 (1.1 – 3.4)	2.2 (1.3 – 3.9)	0.7 (0.2 – 1.9)

BAI: Beck Anxiety Inventory, BMI: Body Mass Index, PTH: parathyroid hormone,
PCS: Physical Component Score

Sensitivity analysis

By excluding second generation immigrants differences between native and immigrant patients remained the same (data not shown). Twenty five percent of the patients needed help filling out the questionnaires. By excluding these patients differences between native and immigrant patients also remained the same (data not shown). After using different cut-off scores for BDI and BAI (≥ 14, ≥ 15 and ≥ 16), differences between groups became more pronounced when a higher cut-off score for BDI or BAI was used. Furthermore, after selecting immigrants from Turkey, Morocco, Surinam from Asian descent, and Surinam from African descent the prevalence of depressive symptoms was 56, 77, 70 and 44%, respectively and for anxiety symptoms 44, 71, 48 and 44%, respectively. Finally, no differences for patient characteristics were found between the 494 patients who did and the 60 patients who did not fill out the questionnaires (data not shown).

DISCUSSION

This observational study examined the prevalence of depressive and anxiety symptoms in native and immigrant dialysis patients. Compared to native patients, immigrant patients were almost two times more likely to report depressive and anxiety symptoms. These differences were more pronounced in Asian patients followed by African-South American patients. No differences in the prevalence of depressive and anxiety symptoms was found between European immigrants and native patients. We showed that patients characteristics do not appear to explain the differences between groups.

The differences between native and immigrant patients in the prevalence of depressive and anxiety symptoms are comparable to a general population cohort in the Netherlands and Europe.[11;12] In Europe prevalence rates of depressive symptoms are higher for immigrants and ethnic minority groups.[12] Furthermore, Turkish and Moroccan minorities in the Netherlands have a higher prevalence of depressive and anxiety symptoms than native Dutch patients, but Surinamese patients have a lower prevalence of depressive and anxiety symptoms.[11] In our cohort Surinamese immigrants and especially Surinamese immigrants from Asian descent have a higher prevalence of depressive and anxiety symptoms. Coping with chronic disease could be a possible explanation for the differences between Surinamese minorities from the general population, and Surinamese dialysis patients.

Immigrant dialysis patients in our cohort were divided in three regions of origin and compared to native dialysis patients. The first region of origin was Africa-South America.

African-South American immigrants dialysis patients have a slightly higher, but statistically not significant, prevalence of depressive symptoms compared to native patients. This trend towards a difference suggests a contradiction with results from a recent meta-analysis, that showed that there is no association at all between ethnicity and the prevalence of depressives symptoms in dialysis patients.[1] Differences could be explained by the distinction between white and non-white dialysis patients in the meta-analysis, whereas non-white patients do not necessarily need to be immigrant. The immigrant status possibly plays a role in the different prevalence of depressive symptoms rather than being part of an ethnic group.

The second region of origin in our cohort was Asia. The Asian immigrant dialysis patients in comparison to native patients had the highest prevalence of depressive symptoms of all immigrant groups. To the best of our knowledge there are no studies who reported the prevalence of depressive symptoms in Asian immigrant dialysis patients. Both African-South American and Asian patients have a higher prevalence of anxiety symptoms in our cohort. In the few studies that describe the prevalence of anxiety symptoms in dialysis patients differences between ethnic groups could not be made because of the small sample of different ethnic groups.[5-10] The third region of origin in our cohort was Europe. European immigrants did not seem to differ from native patients, but the sample size is small and it would be interesting to include more European immigrants in future research.

Patient characteristics could not explain the difference between native and immigrant dialysis patients as was shown by a series of logistic regression models. The origin of the difference between groups could be cultural[26] or religious[27;28], which could be topics for future research. Nonetheless, clinicians should be aware that immigrant dialysis patients are a high risk group for developing depressive and anxiety symptoms. Furthermore, future research should also address the association of depressive and anxiety symptoms with survival in patients from different immigrant groups, because the shortened survival of patients with depressive symptoms[2;29] and the prolonged survival of immigrant groups compared to native patients[30;31] seems contradictory. Studying survival patterns in immigrant and native dialysis patients with and without depressive symptoms may reveal underlying mechanisms of risk and protective factors for survival in dialysis patients.

A few limitations should be noted for this study. First, the broad spectrum of countries used to define groups makes it difficult to generalize these results for specific immigrant groups. Generalization is especially difficult for Turkish and Moroccan immigrants which are the main immigrant groups in the Netherlands. Second, the presentation of a

depression and anxiety disorder could differ across cultures. However, the BDI was validated in a comparable multi-ethnic cohort of dialysis patients.[23] Third, some participants filled out the questionnaire with help which makes the risk that participants give socially accepted answers higher. However, differences between ethnic groups remained the same after excluding the patients who received help with filling out the questionnaire.

In conclusion, immigrant dialysis patients have a higher prevalence of depressive and anxiety symptoms than native dialysis patients. Differences between native and immigrant patients were more pronounced in Asian patients. For both depressive and anxiety symptoms patient characteristics did not explain the differences between native and immigrant patients.

ACKNOWLEDGEMENTS

Supplementary table 1. Countries of origin of at least one parent of 494 dialysis patients included in the DIVERS study.

Native N = 245	Africa -South America N = 108	Asia N = 114	Europe N = 27
245 The Netherlands	52 Surinam*	46 Surinam*	14 Germany
	17 Morocco	32 Indonesia	3 Belgium
	12 Netherlands Antilles	16 Turkey	3 Poland
	5 Ghana	6 Pakistan	2 Portugal
	5 Somalië	5 India	1 Scotland
	3 Egypte	2 Afghanistan	1 Great Brittan
	2 Colombia	2 Filippijnen	1 Slovakia
	2 Algerije	1 China	1 Rumania
	2 Nigeria	1 Nepal	1 Italy
	2 Soedan	1 Armenia	
	1 Guinee	1 Iran	
	1 Eritrea	1 Irak	
	1 Liberia		
	1 Uruguay		
	1 Brasil		
	1 Sierra Leone		

* Surinamese patients of whom at least one grandparent was born in Asia were classified as Asian. All other Surinamese patients were classified as African-South American.

Supplementary table 2. Patient characteristics of 494 dialysis patients with various ethnicities.

	Native	Immigrant			
		African-South American*	Asian*	European*	P-value
	N=245	N=108	N=114	N=27	
Socio demographic					
Age, years	69.5 (13.8)	54.7 (14.4)	61.0 (14.2)	67.2 (15.5)	P < 0.01
Sex,% men	60	59	60	70	P = 0.74
Education, % low	41	36	44	35	P = 0.63
Married/living together, % yes	56	44	46	70	P = 0.02
Having children, % yes	76	75	82	85	P = 0.37
Employed, % yes	11	12	10	19	P = 0.64
Use of anti-depressants, % yes	9	11	9	12	P = 0.86
Clinical					
Incident, % yes	31	28	26	42	P = 0.41
Modality, % haemodialysis	89	92	89	89	P = 0.87
Time on dialysis, months	17.0 (5.0 – 45.0)	25.0 (6.0 – 68.0)	28.0 (6.0 –69.0)	12.0 (4.0 – 37.0)	P = 0.08
BMI, kg/m2	26.5 (5.6)	28.0 (7.2)	26.8 (4.9)	25.5 (5.6)	P = 0.14
Current smoking, % yes	21	18	16	16	P = 0.72
Causes of ESRD, %					P < 0.01
Diabetes Mellitus	13	33	42	12	
Glomerulonephritis	13	10	8	4	
Renal vascular disease	30	27	20	40	
Other	45	30	29	44	
PCS	36.3 (10.5)	39.1 (10.3)	37.4 (11.4)	34.5 (10.0)	P = 0.08
Comorbidity					
Davies comorbidity, %					P = 0.13
No	31	25	20	31	
Intermediate	51	60	61	65	
Severe	19	15	20	4	
Diabetes Mellitus, % yes	34	51	58	19	P < 0.01
Cardiovascular disease, % yes	29	25	36	35	P = 0.29
Laboratory					
Albumin, g/l	36.6 (5.5)	38.3 (5.1)	37.2 (4.6)	36.1 (5.6)	P = 0.05
Haemoglobin, g/l	7.2 (0.8)	7.1 (0.8)	7.2 (0.8)	7.0 (0.9)	P = 0.49
PTH, pmol/l	26.9 (14.0 – 45.0)	33.5 (16.0 – 52.8)	27.9 (16.0 – 43.0)	23.0 (7.9 – 46.7)	P = 0.10
Ca, mmol/l	2.30 (0.14)	2.27 (0.19)	2.25 (0.16)	2.22 (0.21)	P < 0.01
Phosphorus, mmol/l	1.59 (0.42)	1.54 (0.45)	1.73 (0.58)	1.53 (0.29)	P = 0.01
Ferritin, ug/l	340 (181 – 562)	435 (236 – 736)	355 (168 – 599)	198 (97 – 428)	P = 0.01
Cholesterol, mmol/l	4.2 (1.2)	4.2 (1.3)	4.1 (1.5)	4.0 (1.2)	P = 0.89
Kt/V	1.51 (0.47)	1.46 (0.38)	1.58 (0.53)	1.52 (0.48)	P = 0.33

Data presented as mean (standard deviation) or median (inter quartile range)
ESRD: End-Stage Renal Disease, BMI: Body Mass Index, PTH: parathyroid hormone, CRP: C-Reactive protein PCS: Physical Component Score, * region of origin

REFERENCES

(1)   Palmer S, Vecchio M, Craig JC et al. Prevalence of depression in chronic kidney disease: systematic review and meta-analysis of observational studies. Kidney Int 2013;84:179-191.

(2)   Farrokhi F, Abedi N, Beyene J, Kurdyak P, Jassal SV. Association between depression and mortality in patients receiving long-term dialysis: a systematic review and meta-analysis. Am J Kidney Dis 2014;63:623-635.

(3)   Lacson E Jr, Bruce L, Li NC, Mooney A, Maddux FW. Depressive affect and hospitalization risk in incident haemodialysis patients. Clin J Am Soc Nephrol 2014;9:1713-1719.

(4)   Garcia-Llana H, Remor E, Del Peso G, Selgas R. The role of depression, anxiety, stress and adherence to treatment in dialysis patients health-related quality of life: a systematic review of the literature. Nefrologia 2014;34:637-657.

(5)   Preljevic VT, Osthus TB, Os I et al. Anxiety and depressive disorders in dialysis patients: association to health-related quality of life and mortality. Gen Hosp Psychiatry 2013;35:619-624.

(6)   Kutner NG, Fair PL, Kutner MH. Assessing depression and anxiety in chronic dialysis patients. J Psychosom Res 1985;29:23-31.

(7)   Cukor D, Coplan J, Brown C et al. Anxiety disorders in adults treated by haemodialysis: a single-center study. Am J Kidney Dis 2008;52:128-136.

(8)   Bossola M, Ciciarelli C, Di Stasio E et al. Correlates of symptoms of depression and anxiety in chronic haemodialysis patients. Gen Hosp Psychiatry 2010;32:125-131.

(9)   Zhang M, Kim JC, Li Y et al. Relation between anxiety, depression, and physical activity and performance in maintenance haemodialysis patients. J Ren Nutr 2014;24:252-260.

(10) Feroze U, Martin D, Kalantar-Zadeh K, Kim JC, Reina-Patton A, Kopple JD. Anxiety and depression in maintenance dialysis patients: preliminary data of a cross-sectional study and brief literature review. J Ren Nutr 2012;22:207-210.

(11) de Wit MA, Tuinebreijer WC, Dekker J et al. Depressive and anxiety disorders in different ethnic groups: a population based study among native Dutch, and Turkish, Moroccan and Surinamese migrants in Amsterdam. Soc Psychiatry Psychiatr Epidemiol 2008;43:905-912.

(12) Missinne S, Bracke P. Depressive symptoms among immigrants and ethnic minorities: a population based study in 23 European countries. Soc Psychiatry Psychiatr Epidemiol 2012;47:97-109.

(13) Haverkamp GL, Torensma B, Vergouwen AC, Honig A. Psychological Distress in the Hospital Setting: A Comparison between Native Dutch and Immigrant Patients. PLoS One 2015;10:e0130961.

(14) Tarricone I, Stivanello E, Poggi F et al. Ethnic variation in the prevalence of depression and anxiety in primary care: a systematic review and meta-analysis. Psychiatry Res 2012;195:91-106.

(15) Goodkin DA, Bragg-Gresham JL, Koenig KG et al. Association of comorbid conditions and mortality in haemodialysis patients in Europe, Japan, and the United States: the Dialysis Outcomes and Practice Patterns Study (DOPPS). J Am Soc Nephrol 2003;14:3270-3277.

(16)   van Dijk PC, Jager KJ, de Charro F et al. Renal replacement therapy in Europe: the results of a collaborative effort by the ERA-EDTA registry and six national or regional registries. Nephrol Dial Transplant 2001;16:1120-1129.

(17)   Davies SJ, Russell L, Bryan J, Phillips L, Russell GI. Comorbidity, urea kinetics, and appetite in continuous ambulatory peritoneal dialysis patients: their interrelationship and prediction of survival. Am J Kidney Dis 1995;26:353-361.

(18)   Loosman WL, Hoekstra T, van Dijk S et al. Short Form 12 or Short Form 36 to measure quality-of-life changes in dialysis patients? Nephrol Dial Transplant 2015.

(19)   Statistics Netherlands. Someone with a foreign background. http://www cbs nl/en-GB/menu/methoden/begrippen/default htm?Languageswitch=on&ConceptID=37 [serial online] 2014.

(20)   Stronks K, Kulu-Glasgow I, Agyemang C. The utility of 'country of birth' for the classification of ethnic groups in health research: the Dutch experience. Ethn Health 2009;14:255-269.

(21)   Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961;4:561-571.

(22)   Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol 1988;56:893-897.

(23)   Loosman WL, Siegert CE, Korzec A. Validity of the Hospital Anxiety and Depression Scale and the Beck Depression Inventory for use in end-stage renal disease patients. Br J Clin Psychol 2010;49:507-516.

(24)   Wang MY, Chan SF, Chang LI, Chen TH, Tsai PS. Better sleep quality in chronic haemodialyzed patients is associated with morning-shift dialysis: a cross-sectional observational study. Int J Nurs Stud 2013;50:1468-1473.

(25)   Che HH, Lu ML, Chen HC, Chang S.W., Lee YJ. Validation of the Chinese version of the Beck Anxiety Inventory. Formosan Journal of Medicine 2006;10:447-454.

(26)   Koneru VK, de Mamani AGW, Flynn PM, Betancourt H. Acculturation and mental health: current findings and recommendations for future research. Appl Prev Psychol 2007;12:76-96.

(27)   Ramirez SP, Macedo DS, Sales PM et al. The relationship between religious coping, psychological distress and quality of life in haemodialysis patients. J Psychosom Res 2012;72:129-135.

(28)   Patel SS, Shah VS, Peterson RA, Kimmel PL. Psychosocial variables, quality of life, and religious beliefs in ESRD patients treated with haemodialysis. Am J Kidney Dis 2002;40:1013-1022.

(29)   van Dijk S, van den Beukel TO, Kaptein AA et al. How baseline, new-onset, and persistent depressive symptoms are associated with cardiovascular and non-cardiovascular mortality in incident patients on chronic dialysis. J Psychosom Res 2013;74:511-517.

(30)   van den Beukel TO, Dekker FW, Siegert CE. Increased survival of immigrant compared to native dialysis patients in an urban setting in the Netherlands. Nephrol Dial Transplant 2008;23:3571-3577.

(31)   van den Beukel TO, Verduijn M, le Cessie S et al. The role of psychosocial factors in ethnic differences in survival on dialysis in the Netherlands. Nephrol Dial Transplant 2012;27:2472-2479.