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The effect of social support and coping style on depression in patients with continuous ambulatory peritoneal dialysis in southern China

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Abstract
Purpose To explore the effect of social support and coping style on depression in patients on CAPD in Southern China.
Methods The patients undergoing CAPD therapy for more than 3 months were recruited from Jan 1 to May 31, 2009. The Beck Depression Inventory–II (BDI-II), Social Support Rating Scale, Medical Coping Modes Questionnaire, and Medical Outcomes Study Short Form (SF-36) were used to evaluate depression, social support, coping style, and quality of life (QoL), respectively.
Results Of the 191 recruited patients, 65 patients (34.0 %) suffered from depression, with a BDI-II score of 23.8 ± 8.4. The average score of QoL (44.9 ± 13.9 vs. 64.7 ± 14.2, $p < 0.001$), social support (37.9 ± 7.2 vs. 42.1 ± 7.3, $p < 0.001$), and "confrontation" coping style (17.2 ± 3.9 vs. 18.8 ± 3.8, $p = 0.006$) in depressed patients was significantly lower than those in non-depressed patients, respectively. While the depressed patients had significantly higher score of "acceptance–resignation" coping style (12.9 ± 2.5 vs. 10.4 ± 3.5, $p < 0.001$) compared with those of non-depressed patients. Univariate analysis showed that the BDI-II score was negatively associated with social support ($r = -0.284$, $p < 0.001$) and "confrontation" ($r = -0.180$, $p = 0.013$), but positively associated with "acceptance–resignation" ($r = 0.482$, $p < 0.001$). Logistic regression analysis revealed that age (OR = 0.971, $p = 0.038$), female sex (OR = 2.211, $p = 0.039$), diabetes mellitus (OR = 3.046, $p = 0.015$), long PD duration (OR = 1.021, $p = 0.020$), fatigue (OR = 2.500, $p = 0.032$), high Pittsburgh Sleep Quality Index (PSQI) score (OR = 1.143, $p = 0.001$), low social support (OR = 0.945, $p = 0.046$), and high "acceptance–resignation" (OR = 1.096, $p = 0.020$) were independently associated with depression.
Conclusion There was a high prevalence of depression in CAPD patients. Age, female sex, diabetes mellitus, long PD duration, fatigue, sleep disturbance, low social support, and high "acceptance–resignation" coping style were independently associated with depression.

Keywords Continuous ambulatory peritoneal dialysis · Depression · Social support · Coping style

Jianxiong Lin and Qunying Guo have the equal contribution to this article.

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Introduction

The end-stage renal disease (ESRD) patients constitute a high-risk population for psychological disorders, in which anxiety and depression are most common [1–4].

Recent studies showed that ESRD patients treated with dialysis had a high level of depressive symptoms which was independently associated with poor survival and lowered quality of life [5–7].

The reasons of depression in the ESRD patients were not clear. A few studies with small sample sizes had shown that some psychosocial factors, such as the level of social support [8, 9] and coping strategies [10, 11], acted as the possible mediators of depression in ESRD patients. Social support is the perception that an individual is a member of a complex network (family, friends, neighbors, colleagues, and community members) in which one can give and receive affection, aid, and obligation [12–14]. Coping is defined as cognitive and/or behavioral efforts to master, reduce, or tolerate the demands of a situation [15]. Indeed, the presence of a chronic illness might strongly affect the social support which the patients received from their family or society [16], also their coping style [17]. However, few studies investigated the impact of social support and coping strategies on depression in continuous ambulatory peritoneal dialysis (CAPD) patients. The present study aimed to explore the effect of social support and coping style on depression of patients undergoing CAPD in southern China.

Subjects and methods

Patients' selection

This is a single-center study. The CAPD patients who underwent CAPD therapy for more than 3 months were followed from Jan 1 to May 31, 2009. The inclusion criteria were as follows: (1) CAPD $>$ 3 months; (2) age $>$ 18 years; (3)written informed consent to participate in the study. The exclusion criteria were as follows: (1) presence of malignancy, active infection, and uncontrolled heart failure; (2) acute medical or surgical condition that required hospitalization or operation within the prior of 1 month; (3) patients with dementia; (4) serious hearing impairment or anepia. The study protocols were approved by the Ethics Committee of The First Affiliated Hospital of Sun Yat-sen University. Informed consent was obtained from each patient. Totally three hundred and ninety patients were regularly followed at the clinic from Jan 1 to May 31, 2009. One hundred and fourteen patients refused to sign the informed consent to participate in this study. Eighty-five patients excluded from this study according to the exclusion criteria. Finally, 191 PD patients were recruited.

Depression assessment

Depression symptoms were assessed by the Beck Depression Inventory-II (BDI-II). The BDI is a self-report depression questionnaire, which was developed by Beck et al. [18] to evaluate the severity of depressive symptoms. The BDI-II consists of 21 items, each item requires a four-point scale (0–3) in terms of the frequency or degree of severity for a particular depressive symptom, and the highest total score is 63. For the purposes of this study, depression was defined as a BDI-II score $\geq$14, which was based on a diagnosis of depression from Beck's categories for the instrument used in end-stage of renal disease patients [19, 20]. The definition was further subdivided into 3 categories: BDI-14–19 was considered mild depression, BDI-20–28 was moderate depression, and BDI-29–63 was severe depression. The Chinese version of the Beck Depression Inventory had been previously used and validated in Chinese PD patients [21, 22].

Social support assessment

Social support status was assessed using a well-validated social support rating scale designed by Xiao [23, 24]. The scale is a 10-item instrument consisting of three dimensions of social support: objective support (behavior that directly helps the person in need), subjective support (provision of empathy, caring, love, and trust), and degree of social support utility (support actually delivered and received from the social network). A higher score means higher social support received by the patient.

Coping style assessment

The medical coping modes questionnaire (MCMQ) was used to assess coping style of PD patients, which was designed by Feifel [17]. It is a frequently used measure of coping in medical patients [25]. It includes 19 items and three subscales: confrontation, avoidance, and acceptance–resignation. For the confrontation, avoidance, and acceptance–resignation subscales, the Cronbach's α coefficients were 0.70, 0.66, and 0.67, respectively. For the Chinese version, the Cronbach's α

coefficients in confrontation, avoidance, and acceptance–resignation subscales were 0.69, 0.60, and 0.76, respectively [26].

Quality of life assessment

Quality of life was measured using the Medical Outcomes Study 36-Item Short Form Survey (SF-36) questionnaires. The SF-36 is a questionnaire consisting of 36 items and 11 data analysis questions, distributed among eight domains: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). These eight scales are compressed into two primary scales, namely, the Physical Component Scale (PCS) and the Mental Component Scale (MCS). The SF-36 scores range from zero to 100, with a higher score indicating a better QoL. The accuracy of SF-36 using within Chinese PD patients has been previously confirmed [22, 27].

Fatigue and sleep status assessment

The presence or absence of fatigue was studied according to the monthly clinical records of the primary nurses. Sleep status was measured using the PSQI (Pittsburgh Sleep Quality Index), which is a standard tool, with high validity and reliability for evaluating sleep in almost all kinds of clinically assessed conditions[28]. The Chinese version of the PSQI had been used extensively for the study of sleep quality in Chinese dialysis patients [29–31]. The PSQI is a self-administered questionnaire with 19 questions to assess patient's sleep quality during the previous month. From the patients' answers, the scores of seven components, including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medications, and daytime dysfunction, were calculated. Each component was scored from 0 to 3 and a global PSQI score from 0 to 21. PSQI score ≥ 5 was considered "poor sleeper" or sleep disturbance, and PSQI score <5 was considered "good sleeper."

PD adequacy and residual renal function

Patients provided a 24-hour collection of urine and dialysate, completed in the morning of the study visit. Then the fluid was analyzed for volume, urea, and creatinine concentration. Blood sample was also taken from patients to measure urea, creatinine concentration. Weekly Kt/V (total, peritoneal, and renal) and residual renal function were then calculated using PD 2.0 Adequest software (Baxter Healthcare, USA).

Data analysis

Continuous variables were summarized using means and standard deviations or medians with inter-quartile ranges. Categorical variables were described using frequencies and percentages. The parameters were analyzed using an unpaired Student's *t* test or Mann–Whitney U test for continuous variables, Chi-square test or Fisher's exact test for categorical variables, and Pearson's or Spearman's correlation. Binary logistic regression was used for multivariate analysis. A multivariate model adjusting for variables which were significantly correlated with depression in univariate analysis, including age, gender, employment, diabetes mellitus, duration of CAPD, fatigue, PSQI, social support, confrontation, and acceptance–resignation (as shown in the Table 3). All analyses were performed with SPSS 13.0 for Windows software. A p value less than 0.05 was considered to represent a statistically significant difference between compared data sets.

Results

General demographic characteristics and depression status of patients

A total of 191 PD patients were recruited in this study. Among them, 107 (56.0 %) were male. The mean age was 49.5 $\pm$ 15.7 years. The median PD duration was 15.0 months, ranging from 3.0 to 139.0 months. As shown in the Table 1, the primary causes of ESRD included chronic glomerulonephritis (103 cases), diabetic nephropathy (48 cases), hypertension (21 cases), and others (19 cases). Sixty-five patients (34.0 %) had depression, with a BDI-II score of 23.8 $\pm$ 8.4.

Comparisons of baseline demographic and clinical factors between patients with depression and non-depression

The baseline demographic and clinical factors between the depressed and non-depressed patients were shown in the Table 1. Depressed patients were

Table 1 Comparison of baseline demographic and clinical factors between the depressed and non-depressed patients

	Overall ($n = 191$)	Non-depression ($n = 126$)	Depression ($n = 65$)	p value
Age(years) (mean ± SD)[a]	49.5 ± 15.7	48.0 ± 16.0	52.6 ± 14.8	0.05*
Gender, male, *n* (%)[b]	107 (56.0 %)	79 (62.7 %)	28 (43.1 %)	0.01**
PD Duration (months) (median(IQR))[#,z]	15.0 (20.0)	14.0 (17.0)	18.5 (30.8)	0.003**
Marital status, *n* (%)[b]				
Married/living with partner	152 (79.6 %)	96 (76.2 %)	56 (86.2 %)	0.100
Single/widowed	39 (20.4 %)	30 (23.8 %)	9 (13.8 %)	
Educational level (%)[b]				
Illiterate	4 (2.1 %)	3 (2.4 %)	1 (1.5 %)	0.436
Literate	20 (10.5 %)	11 (8.7 %)	9 (13.8 %)	
Middle and high school	111 (58.1 %)	71 (56.3 %)	40 (61.5 %)	
College, university, and upper	56 (29.3 %)	41 (32.5 %)	15 (23.1 %)	
Employment, *n* (%)[b]				
Employed	54 (28.3 %)	40 (36.5 %)	8 (12.3 %)	<0.01**
Unemployed	137 (71.7 %)	80 (63.5 %)	57 (87.7 %)	
Social insurance (%)[b]				
Yes	172 (90.1 %)	117 (92.9 %)	55 (84.6 %)	0.063
No	19 (9.9 %)	9 (7.1 %)	10 (15.4 %)	
Income (%)[b]				
Poor	130 (68.1 %)	83 (65.9 %)	47 (34.1 %)	0.231
Good	61 (31.9 %)	43 (72.3 %)	18 (27.7 %)	
Primary kidney disease, *n* (%)[b]				
Diabetes mellitus	48 (25.1 %)	24 (19.0 %)	24 (36.9 %)	0.007**
Chronic glomerulonephritis	103 (53.9 %)	71 (56.3 %)	32 (49.2 %)	
Hypertension	21 (11.0 %)	16 (12.7 %)	5 (7.7 %)	
Others	19 (10.0 %)	15 (11.9 %)	4 (6.2 %)	
Hb (g/dL) (mean ± SD)[a]	106.0 ± 19.2	106.4 ± 17.4	105.3 ± 22.4	0.707
Albumin (g/L) (mean ± SD)[a]	38.2 ± 4.2	38.6 ± 4.1	37.5 ± 4.2	0.081
CRP (mmol/L) (median(IQR))[#,z]	1.8 (5.4)	1.8 (4.3)	1.9 (9.5)	0.406
Total weekly urea Kt/V(mean ± SD)[a]	2.2 ± 0.5	2.2 ± 0.5	2.2 ± 0.5	0.604
Residual renal function (ml/min) (median(IQR))[#,z]	1.6 (2.8)	1.7 (2.6)	1.4 (2.5)	0.112
Fatigue(%)[b]				
Yes	54 (28.3 %)	21 (16.7 %)	33 (50.8 %)	<0.001***
No	137 (71.7 %)	105 (83.3 %)	32 (49.2 %)	
Sleep status				
PSQI (mean ± SD)[a]	9.3 ± 5.2	7.9 ± 4.5	12.0 ± 5.4	<0.001***
Sleep disturbance(%)[b]				
Yes	150 (78.5 %)	91 (72.2 %)	59 (90.8 %)	0.002**
No	41 (21.5 %)	35 (27.8 %)	6 (9.2 %)	
Social support (mean ± SD)[a]				
Total score	40.8 ± 7.5	42.1 ± 7.3	37.9 ± 7.2	<0.001***
Objective social support	9.3 ± 2.8	9.6 ± 2.8	8.6 ± 2.5	0.011*
Subjective social support	24.0 ± 4.9	24.9 ± 4.9	22.3 ± 4.8	0.001**
Utilization of social support	7.5 ± 1.9	7.7 ± 2.0	6.9 ± 1.8	0.015*
Coping style (mean ± SD)[a]				

Table 1 continued

	Overall ($n = 191$)	Non-depression ($n = 126$)	Depression ($n = 65$)	p value
Confrontation	18.3 ± 3.8	18.8 ± 3.8	17.2 ± 3.9	0.006**
Avoidance	15.7 ± 2.6	15.9 ± 2.8	15.4 ± 2.3	0.150
Acceptance–resignation	11.1 ± 4.8	10.4 ± 3.5	12.9 ± 2.5	<0.001***
SF-36 (mean ± SD)[a]				
Physical functioning (PF)	70.8 ± 22.3	76.7 ± 6.8	58.9 ± 26.7	<0.001***
Physical role functioning (RP) (median(IQR))[#,z]	25.0 (50.0)	50.0 (75.0)	0.0 (25.0)	<0.001***
Bodily pain (BP)	76.4 ± 23.9	81.5 ± 20.4	64.8 ± 27.2	<0.001***
General health perception (GH)	39.3 ± 19.3	44.2 ± 17.9	28.0 ± 17.4	<0.001***
General vitality (VT)	58.9 ± 19.8	54.9 ± 16.5	44.4 ± 18.3	<0.001***
Social functioning (SF)	62.6 ± 22.4	66.9 ± 19.7	50.6 ± 22.9	<0.001***
Emotional role functioning (RE) (median(IQR))[#,z]	66.7 (100.0)	100.0 (66.7)	33.3 (100.0)	<0.001***
Mental health (MH)	67.7 ± 18.8	72.2 ± 16.4	56.9 ± 18.9	<0.001***
Physical Component Scale(PCS)	40.7 ± 7.9	42.9 ± 6.3	36.2 ± 8.9	<0.001***
Mental Component Scale (MCS)	44.0 ± 9.9	47.0 ± 8.9	37.8 ± 8.8	<0.001***
Total score of SF-36	58.0 ± 18.7	64.7 ± 14.2	44.9 ± 13.9	<0.001***

*$p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

[a] Independent-samples t test

[b] Chi-square test

Z, Mann–Whitney U test

#, Median and inter-quartile range

significantly elder, had longer PD duration and higher PSQI score compared with those of the non-depressed patients. In addition, the proportion of male and employed patients was significantly lower, while the proportion of diabetes mellitus and fatigue was significantly higher in the depression group than those in non-depression group. There was no significant difference in the hemoglobin, albumin, C-reactive protein, total weekly urea Kt/V, and residual renal function between the two groups ($p > 0.05$).

The differences between the depressed and non-depressed patients with regard to social support, coping style, and quality of life were shown in the Table 1. The average score of social support in the depressed patients, including the total score, objective social support, subjective social support, and degree of social support utility, was much lower than that of the non-depressed patients. In the respect of the coping styles, the depressed patients had lower score of "confrontation" and higher score of "acceptance–resignation" compared with those of the non-depressed patients. However, there was no significant difference in "avoidance" between the two groups. The score of QoL in the depressed patients was significantly lower than that in the non-depressed patients.

Correlations of depression, social support, and coping style

There was a negative correlation between depression and social support, including the objective social support, subjective social support, and degree of social support utility (as shown in the Table 2). A similar result was also observed between depression and "confrontation" coping style. In contrast, there was a significant positive relationship between depression and "acceptance–resignation" coping style. Multivariate logistic regression analysis revealed that age, female sex, diabetes mellitus, long PD duration, fatigue, high PSQI score, low social support, and high "acceptance–resignation" coping style were the independent factors that predicted depression (Table 3).

Discussion

Depression

Our survey confirmed a high prevalence of depression among PD patients (34.0 %) with an average BDI-II score of 12.1 ± 9.1. A recent study of 178 hemodialysis patients taking the same BDI threshold levels for depression showed a 38.7 % incidence of clinical depression [15]. Some previous studies using different depression evaluation tools and different threshold levels for depression revealed that a high prevalence of depression occurred among PD patients [32, 33]. Riezebos et al. [32] were able to demonstrate that 41.6 % patients had depressive symptoms via hospital anxiety and depression scale (HADS-D ≥ 7) in a European cohort of ESRD patients on renal replacement therapy.

Some recent studies showed that depression demonstrated a marked increase in mortality in dialysis patients [32, 34–37] and could influence the QoL of dialysis patients [5, 38]. In our survey, the scores of all aspects of QoL in the depressed patients were lower than those of the non-depressed patients, which predicated that depression did harm the QoL of CAPD patients. Thus, it was very important to recognize the depression and take measures to deal with it as early as possible to improve the QoL of PD patients.

Social support

We found that low social support was independently associated with depression (OR = 0.945, $p = 0.046$).

Table 2 Correlation of depression, social support, and coping style

Items	Depression (r)	p value
Social support		
Total score	−0.284	<0.001***
Objective social support	−0.180	0.013**
Subjective social support	−0.240	0.001**
Degree of social support utility	−0.258	<0.001***
Coping style		
Confrontation	−0.180	0.013*
Avoidance	−0.036	0.619
Acceptance–resignation	0.482	<0.001***

*$p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

These results were in agreement with the findings of previous studies [39–41]. Gençöz T indicated that lack of perceived social support was positively associated with worsening depressive symptoms in hemodialysis patients [40]. Some studies revealed that social support was associated with health outcomes, increasing the level of social support could improve the clinical outcome [42, 43]. Therefore, the social support network, which covers the patients' families, relatives, managers, and colleagues, should be encouraged to interact with patients to provide advice and help more actively and positively.

Coping style

This was the first report that "acceptance-resignation" coping style was independently associated with depression in PD patients. Our findings showed that the depressed CAPD patients had lower score of "confrontation" and higher score of "acceptance–resignation" compared with those of the non-depressed patients, and high "acceptance–resignation" (OR = 1.096, $p = 0.020$) was independently associated with depression. This fact suggested that depressed patients tended to decrease the usage of "confrontation" coping style and were inclined to non-acceptance of the disease, while they took "acceptance–resignation," which made them suffer from pessimistic emotion [18]. This result was consistent with some previous studies in other chronic diseases [25, 44]. Therefore, it was necessary to carry out coping skills training and psychological intervention into patients management for PD patients with depression. So, the coping intervention should include reconstructing the recognition of the disease and building optimistic belief about adjustment to disease. On the other hand, problem solving and confrontational coping in the medical context should be strengthened [44, 45].

Although some previous studies did not consider age, female sex, and diabetes mellitus as important factors influencing patient's depression [3, 6, 32], our study revealed that age, female sex, diabetes mellitus, and long PD duration were independently associated with depression in PD patients. Ossareh et al. and Liakopoulos et al. [46, 47] demonstrated that fatigue is a common complaint in dialysis patients that may influence their quality of life. Our study also revealed that fatigue was closely associated with depression

Table 3 Binary logistic regression analysis for depression in PD patients

	Univariate logistic regression			Multivariate logistic regression		
	OR	*p* value	95 % CI	OR	*p* value	95 % CI
Age	1.019	0.05*	1.000–1.040	0.971	0.038*	0.944–0.998
Gender (female vs. male)	2.221	0.01**	1.208–4.085	2.211	0.039*	1.039–4.702
Diabetes (yes vs. no)	2.488	0.008**	1.271–4.871	3.046	0.015*	1.247–7.442
PD Duration (months)	1.023	0.003**	1.008–1.038	1.021	0.020*	1.003–1.038
Employment (yes vs. no)	0.244	0.001**	0.107–0.556	0.466	0.144	0.167–1.298
Fatigue (yes vs. no)	5.156	<0.001***	2.625–10.130	2.500	0.032*	1.081–5.785
PSQI	1.179	<0.001***	1.104–1.258	1.143	0.001**	1.055–1.239
Social support	0.920	0.001**	0.881–0.962	0.945	0.046*	0.868–0.999
Confrontation	0.891	0.007**	0.819–0.969	0.919	0.123	0.826–1.023
Acceptance–resignation	1.166	0.003**	1.053–1.291	1.096	0.020*	1.015–1.184

Age, gender, employment, diabetes, duration of CAPD, fatigue, PSQI, social support, confrontation, and acceptance–resignation were included in this logistic regression analysis

*$p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

OR odds ratio; 95 % *CI* 95 % confidence interval

(OR = 2.500, $p = 0.032$). This result was in accordance with some previous reports [22, 48, 49]. Therefore, fatigue and depression were closely interrelated, and depression may manifest as feelings of tiredness of energy in CAPD patients. In addition, we also found a strong association between sleep disturbance and depression (OR = 1.143, $p = 0.001$). Indeed, there was a complex association exists between depression and sleep disorders. Previous authors found that the poor sleepers had higher BDI scores, and the BDI scores were the independent predictors of the patients being poor sleepers [49, 50]. Therefore, when dealing with depression in PD patients, the physicians should also pay considerable attention to their sleep disorders and symptom burdens.

Conclusion and clinical implications

In summary, the results of the present study indicated that there was a high prevalence of depression in CAPD patients, which significantly affected the QoL of these patients. Age, female sex, diabetes mellitus, long PD duration, fatigue, sleep disturbance, low social support, and high "acceptance–resignation" coping style were independently associated with depression. Health-care workers should evaluate the PD patients' attitude and coping styles, and help them to take the active and proper coping style to moderate the happening of the depression.

Limitations

This study did have some limitations. This was a cross-sectional design study. As social support needs and coping style can be dynamic, our data might reflect the needs of patients at the time of research, and further study with longer follow-up period is necessary.

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