Short Communication
Depression in ESRD Patients: Home HD is Less Depressive than In-Center HD
Hiromichi Suzuki*, Yuusuke Watanabe, Tsutomu Inoue, Tomohiro Kikuta, Tsuneo Takenaka and Hirokazu Okada
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Abstract

Background: Depression is a common, under-recognized and under-treated problem that is independently associated with increased morbidity and mortality in patients with chronic kidney disease (CKD). However, there has been a paucity of simple reliable methods to evaluate the severity of depressive symptoms. Recently the 16-item Quick Inventory of Depressive Symptomatology (QIDS), a new measure of depressive symptoms became available and validated for the evaluation of severity of depression. Until now, there have been no decisive reports in evaluating depression in comparing two dialysis modalities for treatment for patients with end-stage renal disease (ESRD). Methods: We used this questionnaire to examine the patients with ESRD.

Patients: One hundred and twenty four patients undergoing in-center hemodialysis (HD) (65 years; m/f: 75/52), and 45 patients on home HD (HHD) (54 years; m/f: 40/5) were enrolled.

Results: The prevalence of moderate depressive symptoms (more than 11 points of the score) was higher (11%) in HD patients than (4%) in HHD (P<0.01). Among the 16 questionnaires three items: sleep during the night, energy level, and slowed down feeling were significantly less severe in HHD patients than in HD patients.

Conclusion: We conclude that prevalence of depression was high in patients receiving dialysis therapy. It is suggested that HHD therapy is superior to HD for patients with end stage renal disease in psychological aspects.

ABBREVIATIONS

HD: hemodialysis; HHD: home hemodialysis; ESRD: end-stage renal disease; BDI: Beck Depression Inventory; FHN: Frequent Hemodialysis Network; QIDS: Quick Inventory of Depressive Symptomatology; HRQoL: health related quality of life; MCI: Mild Cognitive Impairment; AD: Alzheimer’s disease; SSRIs: Selective Serotonin Reuptake Inhibitors

INTRODUCTION

Depression is the most common psychologic disorder among hemodialysis (HD) patients [1]. In a recent epidemiological study, “probable depression and depressive symptoms” were detected in 43% of HD patients [2]. Also, high mortality rates have been reported in depressed HD patients [3].

Depression is a common, under-recognized and under-treated problem that is independently associated with increased morbidity and mortality in patients with chronic kidney disease [4-6]. The poor mental and physical health of patients undergoing HD may be due to complications related to end-stage renal disease (ESRD) such as anemia, hyperphosphatemia, and secondary hyperparathyroidism in spite of advances in dialysis technology [7]. Recently, a large scale clinical trial in the Frequent Hemodialysis Network (FHN) was carried out in order to mitigate these complications [8]. This clinical trial revealed significant improvements in the self-reported mental health composite score in the FHN compared to the 3-times-weekly HD group. However, results of the FHN clinical trial did not produce a statistically significant reduction in symptoms of depression according to the pre-specified main secondary outcome assessed by the Beck Depression Inventory (BDI) [9]. There was no clear-cut explanation why FHN failed to show improvement of depression in patients who received 6-times-weekly HD, although the dialyzed dose was clearly higher in the 6-times-weekly group than in the 3-times-weekly group. Compared to receiving HD in-center or at a satellite dialysis unit, performing HD therapy at home has been associated with improved survival for ESRD patients and can generally be delivered at a lower cost for the healthcare system. Indeed, the FREEDOM (Following Rehabilitation, Economics

Depression was assessed by using QIDS-J, which was validated by Quick Inventory of depressive symptomology.

All patients were asked to complete QIDS-J.

The 16-item QIDS-SR16 and the matching self-report version were constructed by selecting only items from the 30-item scales that assessed DSM-IV criterion diagnostic symptoms. The scoring system for the QIDS converts responses to 16 separate items into the nine DSM-IV symptoms criteria domains. The nine areas are comprised of: 1) sad mood; 2) concentrations; 3) self-criticism; 4) suicidal ideation; 5) interest; 6) energy/ fatigue; 7) sleep disturbance (initial, middle, and late insomnia or hypersomnia); 8) decrease/increase in appetite/weight; and 9) psychomotor agitation/retardation. The 16 items were answered on a 4-point scale in which 0 represents the absence of a problem, and 3 represents an extreme problem. A total score ranges from 0 to 27, with the higher scores indicating greater severity of depressive symptoms [11]. The standard cutoffs are as follows: 0-5 indicates that a person is not depressed, 6-10 indicates mild, 11-15 indicates moderate, 16-20 indicates severe and 21-27 indicates very severe depression.

QIDS-SR16 has highly acceptable psychometric properties with high internal consistencies.

**MATERIALS AND METHODS**

This study was performed in accordance with the Declaration of Helsinki and written informed consent was obtained from all patients.

**Study participants**

Outpatients receiving HD or HHD were recruited from the Dialysis center in Saitama Medical University Hospital from March 2011 to May 2011. HD patients were delivered to the HD facility three times a week for 4 h. HHD was performed with a Nikkiso system at the patient’s home.

**Data collection**

At enrollment, data collection included demographic information, comorbid conditions, duration of dialysis, and laboratory data (average of three recordings). Criteria for study inclusion were: on HD or HHD for at least 1 year, in a clinically stable condition and in ambulant condition. Exclusion criteria for the study were: evident cerebrovascular disease, major psychiatric illness and major visual or hearing impairment. The QIDS was used to examine patients with ESRD. Patients: Enrolled were 127 patients undergoing in-center hemodialysis (HD) (65 years; m/f: 75/52) and 45 patients carrying out home hemodialysis (HHD) (54 years; m/f: 40/5).

HHD can be performed at home and administered using Nikko DBB-27 (Nikko Co., Tokyo, Japan) with water treatment system MH-500CX (Japan Water System Co., Tokyo, Japan). Typical blood flows were 200 ml/min. Sessions varied in length from 3-5 hrs and were performed on an average of 6x/week. Each patient underwent training on the use of the home dialysis machine for at least 3 months.

Demographic and clinical data were obtained from electrical medical records.

**RESULTS AND DISCUSSION**

Table 1 shows the demographic, clinical, and laboratory data of the 127 HD patients and 45 HHD patients. Mean age of HD patients was younger than that of HD patients (p<0.05). The ratio of male to female was significantly different. In HHD group, male patients were dominant. Also, the prevalence of diabetes was less in HHD patients. The levels of systolic blood pressure, serum creatinine, blood urea nitrogen, serum phosphate, and ESA index in HHD patients were significantly lower than those of HD patients. The levels of serum albumin and hemoglobin in HHD patients were significantly higher than those of HD patients (Table 2). In the (Table 3), the scores of 16 items of QIDS-SR16 are shown. The items of sleep during night, energy level and slowed down feeling were significantly lower in HHD patients than in HD patients. Consequently, the total score was significantly lower.

The prevalence of moderate to severe depressive symptoms...
Table 3: Comparison in laboratory data between HD and HHD.

<table>
<thead>
<tr>
<th></th>
<th>HD</th>
<th>HHD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP (mmHg)</td>
<td>145.3±15.4</td>
<td>122.1±12.6</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>75.2±5.1</td>
<td>71.4±4.4</td>
<td></td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>11.8±1.6</td>
<td>7.3±1.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>BUN (mg/dL)</td>
<td>102.5±13.2</td>
<td>35.1±12.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Calcium (mg/dL)</td>
<td>9.2±0.5</td>
<td>9.0±0.5</td>
<td></td>
</tr>
<tr>
<td>Phosphate (mg/dL)</td>
<td>7.0±0.9</td>
<td>4.3±1.2</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>iPTH (mg/dL)</td>
<td>199±106</td>
<td>142±110</td>
<td></td>
</tr>
<tr>
<td>Total cholesterol (mg/dL)</td>
<td>156.7±35.9</td>
<td>178.9±37.9</td>
<td></td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>3.8±0.5</td>
<td>4.1±0.4</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Hb (g/dL)</td>
<td>9.9±0.6</td>
<td>11.4±1.6</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>ESA index (U/kg per wk per g/dL)</td>
<td>11.2±3.3</td>
<td>3.7±2.7</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Abbreviations: SBP: systolic blood pressure; DBP: diastolic blood pressure; BUN: blood urea nitrogen; iPTH: intact parathyroid hormone; Hb: hemoglobin; ESA: Erythropoietin stimulating agent.

Significance between HD and HHD

<table>
<thead>
<tr>
<th></th>
<th>HD</th>
<th>HHD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falling asleep</td>
<td>0.89±0.94</td>
<td>0.63±0.98</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Sleep during the night</td>
<td>1.34±1.00</td>
<td>0.72±0.97</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Waking up too early</td>
<td>0.58±0.89</td>
<td>0.59±0.97</td>
<td></td>
</tr>
<tr>
<td>Sleeping too much</td>
<td>0.30±0.52</td>
<td>0.19±0.39</td>
<td></td>
</tr>
<tr>
<td>Feeling Sad</td>
<td>0.24±0.53</td>
<td>0.14±0.41</td>
<td></td>
</tr>
<tr>
<td>Decreased appetite</td>
<td>0.21±0.51</td>
<td>0.21±0.46</td>
<td></td>
</tr>
<tr>
<td>Increased appetite</td>
<td>0.29±0.71</td>
<td>0.25±0.76</td>
<td></td>
</tr>
<tr>
<td>Decreased weight</td>
<td>0.16±0.50</td>
<td>0.06±0.24</td>
<td></td>
</tr>
<tr>
<td>Increased weight</td>
<td>0.53±0.77</td>
<td>0.44±0.65</td>
<td></td>
</tr>
<tr>
<td>Concentration/Decision making</td>
<td>0.22±0.50</td>
<td>0.19±0.39</td>
<td></td>
</tr>
<tr>
<td>View of myself</td>
<td>0.83±1.10</td>
<td>0.59±0.92</td>
<td></td>
</tr>
<tr>
<td>Thoughts of death or suicide</td>
<td>0.23±0.54</td>
<td>0.14±0.46</td>
<td></td>
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<tr>
<td>General interest</td>
<td>0.27±0.50</td>
<td>0.19±0.52</td>
<td></td>
</tr>
<tr>
<td>Energy level</td>
<td>0.92±0.74</td>
<td>0.51±0.50</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Feeling slowed down</td>
<td>0.27±0.12</td>
<td>0.12±0.33</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Feeling restless</td>
<td>0.12±0.39</td>
<td>0.12±0.39</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5.46±3.89</td>
<td>4.06±2.97</td>
<td>&lt;0.01</td>
</tr>
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</table>

Table 2: Comparison in items of QIDS between HD and HHD.

**DISCUSSION**

In the present study, patients who received high dose HHD showed a statistically significant reduction in symptoms of depression as assessed by QIDS in comparing those on HD.

Among the 16 items, only 3 items related with sleep disturbance and energy/fatigue were lower in HHD patients than in HD patients. Several investigations carried out in HD patients have demonstrated a remarkable relationship between sleep alterations and depression [12,13]. Iliescu et al. [14] clearly demonstrated that poor sleep is associated with health-related quality of life (HRQoL). Moreover, they found that HRQoL was associated with age, hemoglobin, co-morbidity and depression by bivariate analysis. In addition, Maes et al. [15] reported that major depression was associated with hypoalbuminemia. In the present study, in HHD patients the levels of albumin and hemoglobin were significantly higher than in HD patients. Moreover, these levels were within normal limits, indicating that the HHD modality improved sleep disturbance.

Among symptoms of uremia the overlap of symptoms of depression and disturbed sleep is very common [16] A number of studies of the ESRD population have demonstrated a strong association of sleep quality with depression [13]. In the present study, significant differences were noted in 3 sleep questionnaires on patients with HHD and those with HD.

Increased scores resulted in a significant difference in the whole score of QIDS-J in this study.

Sleep disturbance is also an important predictor of poor health related quality of life (HRQoL). In the present study, HRQoL was not evaluated, although improvement of HRQoL in patients with HHD would be expected. Indeed, this was reported in several previous studies examining HRQoL in patients undergoing at-home short daily HD (Finkelstein, 2012), or frequent in-center HD [8].

Fatigue is a common manifestation of multiple co-existent conditions and health states, most of which are not unique to dialysis [17]. For example, obese subjects frequently complain of fatigue. Moreover, it is generally admitted that obesity has also been related to lower HRQoL [18]. Besides, fatigue is a highly prevalent symptom in patients undergoing HD [19-21]. In addition, Weisbord et al. [17] proposed a significant relationship between depression and fatigue. Malnutrition is closely related to morbidity and mortality in HD patients. Kalantar-Zadeh et al [22] demonstrated that malnutrition; QOL, sleep disorder and depression are intervened, affecting the morbidity and mortality of HD patients. Marked improvement in nutrition by demonstrating higher levels of serum albumin was found in patients on HHD and produced a lower rate of depression.

Study limitations include selection biases that are evident by the recruitment of a relatively younger patient for HHD modality. However, depression is not always prevalent in the elderly. It is likely that ESRD-related negative emotions in younger patients easily lead to depression. A previous study showed that age was correlated with physical health, but not with the mental health [23]. Therefore, the age difference between HD and HHD patients does not explain the difference in prevalence of depression. Second, one challenge of diagnosing depression in dialysis patients is deciding which assessment tool to use. Previously, the Beck Depression Inventory (BDI) was shown to have higher sensitivity and specificity than the gold standard criteria for major depression of the Diagnostic and Statistical Manual, Third Edition (DSM-III), dialysis patients [24]. Recently, Hedayati et al. [25] demonstrated that both the BDI and QIDS-SR16 were effective screening tools for identification of depression in patients with CKD.
score with the best diagnostic accuracy for a major depressive episode on self-report questionnaires was the same as the cut-off scores validated for QIDS-SR16 in the general population, i.e., 10 or higher.

However, in long-term dialysis patients the score of BDI could be higher, because of the more frequent presence of somatic symptoms, such as poor appetite, sleep disturbance and fatigue, which may not yet be manifested at earlier CKD stages [26]. Therefore, the score of QIDS obtained from the HD patients should be interpreted cautiously.

However, only a minority of dialysis dependent ESRD patients successfully sustained HD at home.

Obviously, the comparison the patients between on HD and HHD was based on selection bias. The patients on HHD were younger, male dominant and less proportion of diabetic nephropathy than those on HD. These differences could easily produce a markedly higher score in patients on HD. Therefore, it should be reminded that the current practice for determining dialysis treatment modality and location takes into account the medical suitability and social situation. Collectively, this study had a following limitation: this study was a cross-sectional analysis, and not a prospective controlled study, so a cause-and-effect relationship cannot be drawn from the findings. Second, the sample size was relatively small.

CONCLUSION

We conclude that the prevalence of depression was high in patients receiving dialysis therapy. However, it is suggested that HHD therapy is superior to in-center HD from psychological aspects for patients with ESRD.

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REFERENCES


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