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# Relationship between symptom clusters and quality of life in patients at stages 2 to 4 chronic kidney disease in Korea<sup>☆</sup>



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## ABSTRACT

**Purpose:** This study was conducted to identify the relationship between symptom clusters and quality of life (QOL) in patients with stages 2 to 4 chronic kidney disease (CKD) in Korea.

**Methods:** Using self-reported questionnaires, data were collected from 143 patients who underwent treatment for CKD at one hospital in Korea. The 17-item Patient Outcome Scale was used to measure symptoms, and the 36-item Short Form Health Survey Instrument Version 2 (SF-36v2) was used to measure the QOL. Data were analyzed using factor analysis to draw symptom clusters.

**Results:** Among five symptom clusters, the energy insufficiency and pain cluster was found to have the highest prevalence and greatest severity. The severity of symptom clusters showed negative correlations with both physical and mental component summary (PCS and MCS) scores. Elderly patients scored low on PCS, whereas younger patients in their 30s and 40s scored low on MCS. Negative correlations were found between symptom clusters and PCS as well as MCS. The severity of symptoms and QOL had stronger relationships with subjective perception of symptoms and psychological factors than with objective clinical indicators.

**Conclusion:** As the effects of physical and psychological symptoms on the QOL in patients with stages 2 to 4 CKD were identified in this study, nurses should develop strategic nursing plans focused on symptom clusters and patients' subjective perception of symptoms rather than objective clinical indicators in order to improve the QOL in patients with CKD.

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## 1. Introduction

The morbidity and mortality rates of chronic kidney disease (CKD) have increased worldwide, and the number of patients who undergo dialysis treatment for CKD in Korea has doubled in the past 10 years (Jin et al., 2012). Patients with CKD suffer from a wide range of physical and psychological symptoms (Thong et al., 2009), such as fatigue, lack of energy, drowsiness, pain, and pruritus (Almutary, Bonner, & Douglas, 2013; Murtagh, Addington-Hall, Edmonds et al., 2007), all of which emerge at different stages during the course of the disease. In patients with CKD, multiple symptoms occur simultaneously as a cluster rather than in isolation (Lee, Lin, Chaboyer, Chiang, & Hung, 2007). For example, fatigue occurs in association with the co-existing symptoms of pruritus, sleep disturbance, and depression (Jablonski, 2007; Thong et al., 2009). Furthermore, a symptom constellation is affected by the complexity of the severity of isolated single symptoms (Gift, Jablonski, Stommel, & William Given, 2004). As a result, patients who have multiple symptoms bear an aggravated symptom burden from the

complexity of isolated single symptoms, which, in turn, leads to the deterioration of their quality of life (QOL) (Murtagh, Addington-Hall, & Higginson, 2007).

If nursing plans for patients with CKD are instituted based on a disease-oriented approach to change the clinical indicators of a characteristic set of signs, it will not be effective in decreasing the severity of symptoms that are perceived by patients (Kimmel, Cohen, & Weisbord, 2008; Murtagh, Addington-Hall, Edmonds et al., 2007). Therefore, it is important for nurses to provide nursing care for patients with CKD based on a patient-oriented approach customized to patients' symptom clusters perceived by the patients.

A symptom cluster is referred to as a group of symptoms of a disease, which co-occurs with more than three symptoms in the form of a pathophysiological and psychological constellation (Dodd, Janson et al., 2001; Miaskowski, Aouizerat, Dodd, & Cooper, 2007). Symptom clusters have an adverse effect on patient outcomes and morbidity (Dodd, Miaskowski, & Paul, 2001). Therefore, it is important for nurses to understand not only isolated single symptoms of CKD, but also symptom clusters that occur simultaneously with various symptoms.

Although numerous studies have been conducted with patients at end stage renal disease (ESRD) to derive symptom clusters from a wide range of characteristic symptoms of CKD (Jablonski, 2007; Thong et al., 2009; Yong et al., 2009; Yu, Huang, & Tsai, 2012), little research has been done to identify the symptom clusters of patients with CKD,

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who are neither at ESRD nor on dialysis (Murtagh, Addington-Hall, Edmondset al., 2007). Patients with stages 2 to 4 CKD who are not yet on dialysis also experience multiple symptoms or co-morbid conditions such as anemia, hypertension, depression, and symptom burden, all of which affect their QOL. Therefore, it is critical to identify symptom clusters and their effect on QOL before beginning dialysis treatment.

An instrument was recently developed to measure the symptom clusters of CKD (Agarwal, 2010). However, Agarwal's (2010) instrument is tailored to Western, mostly male patients, and contains too many questions to be easily utilized in a clinical setting. In light of addressing the issue of the lack of applicable and replicable measuring instruments for Korean patients who have different physical and psychological make-ups from their Western counterparts, there needs to be a study to identify which symptom clusters are related to the QOL for Korean patients.

Therefore, the purpose of this study was to derive symptom clusters from multiple symptoms experienced by patients with stages 2 to 4 CKD in Korea through factor analysis, assess the prevalence and severity of symptoms and symptom clusters, compare the differences in cluster scores by demographic and clinical characteristics, and identify the relationship between the severity of symptom clusters and QOL.

## 2. Methods

### 2.1. Study design

This study utilized a cross-sectional survey design that has descriptive and correlational characteristics in analysis.

### 2.2. Sample and setting

Among those who agreed to participate in this study, 143 patients who underwent treatment for stages 2 to 4 CKD at a hospital in Korea were selected as study participants. Power analysis with version 3.1.2 of the G\*power program indicated that a sample of 143 patients would provide a power of .84 for detecting group differences using independent t-test at an alpha level of .05 and a medium effect size of 0.5.

### 2.3. Data collection

Before this study was conducted, the approval of the institutional review board (IRB) was obtained from a hospital under study. After the full explanation of study purpose and confidentiality principles for information and data was given to the participants, consent forms were collected from the participants. Data were collected from October 1 to November 30, 2013, using a self-reported questionnaire filled out either directly by the participants or with assistance from the research assistant for those who were illiterate. It took approximately 10 minutes to complete the questionnaire, and a small gift was provided to each participant as a token of gratitude for participating in this study.

### 2.4. Instrument

#### 2.4.1. Demographic and clinical characteristics

Demographic characteristics of participants in this study included age, gender, educational background, marital status, and occupation. The disease-related characteristics included whether the patients had diabetes mellitus, hypertension, and cardiovascular diseases. Clinical indicators included creatinine, blood urea nitrogen (BUN), hemoglobin, and estimated glomerular filtration rate (eGFR). The level of eGFR was calculated using the original Modification of Diet in Renal Disease (MDRD) formula:  $eGFR = 186 \times (\text{serum creatinine})^{-1.154} \times (\text{age})^{-0.203} \times 0.742$  (in female) (Levey et al., 2003).

#### 2.4.2. Symptoms of chronic kidney disease (CKD)

In order to measure the symptoms of patients with CKD in this study, the Patient Outcome Scale (POS), a symptom module, was used; this module was revised by Murphy, Murtagh, Carey, and Sheerin (2009) who added more items for patients with CKD, consisting of 17 items on a 5-point Likert-type scale. The patients were asked to rate the severity of symptoms that they had experienced for the last 3 days before the survey, ranging from zero to four points, with the higher score indicating more severe symptoms.

#### 2.4.3. Quality of life

The QOL of participants in this study was assessed with the 36-item Short Form Health Survey Instrument Version 2 (SF-36 v2) form (Ware, Kosinski, Dewey, & Gandek, 2000), which consists of eight dimensions of health-related QOL (HRQOL). In this study, the QOL was assessed by the following two sets of scores: physical component summary (PCS) and mental component summary (MCS) scores. The PCS score was calculated by including scores on physical functioning, role limitations due to physical problems, body pain, and general health perception, whereas the MCS was calculated by role limitations due to emotional problems, social functioning, mental health, and vitality. In this study, both PCS and MCS were calculated using the Quality Metric Health Outcomes™ Scoring Software 4.5, which ranged from 0 to 100, thereby indicating that the higher the score, the better the QOL in the participants.

### 2.5. Data analysis

Data collected were analyzed using the Predictive Analytics Software (PASW) Statistics version 18 (SPSS Inc., Chicago, IL, USA). Demographic and clinical characteristics, severity of symptoms, and QOL were analyzed by descriptive statistics. Before entering factor analysis, the Kaiser–Meyer–Olkin (KMO) test and the Bartlett's test of sphericity were employed to evaluate whether or not the study variables were appropriate for factor analysis. In order to verify construct validity, principal component analysis was conducted using item analysis and Varimax rotation. Factor analysis included variables whose factor loadings were higher than 0.4. For internal consistency or reliability of the study instrument, Cronbach's alpha coefficients were calculated. Additionally, differences in symptom clusters and QOL by demographic and clinical characteristics were analyzed by independent t-test and ANOVA. The Mann–Whitney U Test and the Kruskal Wallis Test were used for only second symptom cluster that showed non-normal distributions. The Pearson correlation coefficient was further employed to estimate the correlations between clinical characteristics, symptom clusters, and QOL.

## 3. Results

### 3.1. Demographic and clinical characteristics, and quality of life

A total of 54 patients (37.8%) were female, and the mean age of the participants was 66.3 years ( $SD = 14.29$ ). Those who had occupations accounted for 36.6% (52 participants). Almost two-thirds of the participants had hypertension, 43.3% had diabetes mellitus, and 2.1% cardiovascular disease. As many as 22 patients (15.4%) had eGFR over 60 mL/min/1.73 m<sup>2</sup>, and 38 (26.6%) had eGFR between 15.1 and 29.9 mL/min/1.73 m<sup>2</sup> (see Table 1). Among those with stage 4 CKD, nine participants were in their 30s and 40s (39.1%), 12 were aged between 50 and 70 (27.3%), and 17 were over 70 (22.4%). The differences in the age groups were statistically significant in that those between 30s and 40s showed more advanced stages of CKD ( $\chi^2 = 9.524, p = .049$ ).

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