Validation of the Functional Assessment of Anorexia/Cachexia Therapy Instrument to Assess Quality of Life in Maintenance Hemodialysis-Treated Patients with Cachexia

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Abstract

Background Cachexia is the ultimate state of many maintenance hemodialysis (MHD)-treated patients. Functional Assessment of Anorexia/Cachexia Therapy (FAACT) is a tool used to evaluate the quality of life of patients with cachexia related to various diseases, but its effectiveness in MHD-treated patients has yet to be verified. This study aims to explore the applicability of FAACT in MHD-treated patients.

Methods Qualified MHD-treated patients were selected for FAACT and The Kidney Disease Quality of Life Short Form 36 (KDQOL-36) questionnaire survey, and their demographic data and biochemical test results were collected from electronic medical records. Then, data were analyzed using statistical methods.

Results This study enrolled 299 effective patients. The reliability of FAACT and its anorexia-cachexia subscale (ACS) were 0.904 and 0.842, respectively, and their retest exceeded 0.85. A reasonable correlation was found between FAACT and its items, and a reasonable calibration validity was identified between FAACT and KDQOL-36 subscale. FAACT and its subscale ACS showed good discriminant validity in the comparison of patients with different cachexia states and inflammatory states.

Conclusions FAACT and ACS have good reliability and validity in MHD-treated patients and are suitable to measure the quality of life of MHD-treated patients with cachexia.

Background

Cachexia, a complex metabolic syndrome associated with various diseases, is characterized by muscle loss with or without fat loss^[1]. However, this syndrome is poorly defined in patients treated with hemodialysis and in patients with end-stage kidney disease (ESKD) typically present with anorexia, muscular dystrophy, and protein energy waste (PEW)^[2, 3]. These symptoms are consistent with cachexia observed in other chronic diseases, such as cancer, heart failure, and HIV^[3]. Clinically defined as loss of appetite, anorexia^[4] can exacerbate the PEW of hemodialysis-treated patients, resulting in malnutrition and increased mortality^[5]. Cachexia is conceptually similar to PEW and is the most severe stage of PEW^[3, 6]. Up to 75% of patients with ESKD undergoing hemodialysis suffer from wasting/cachexia^[3]. Cachexia is generally similar in different diseases. The diagnostic criterion for cancer cachexia is weight loss greater than 5% or weight loss greater than 2% in individuals showing depletion according to current body weight and height (body mass index [BMI] < 20 kg/m²) or skeletal muscle mass (sarcopenia)^[7].

However, a clinical tool to assess cachexia in MHD-treated patients is lacking. FAACT is a tool used to assess the quality of life of patients with cancer, AIDS, and some chronic diseases^[8, 9]. However, its availability in MHD-treated patients has not been demonstrated. KDQOL-SF, KDQOL-36, and KDQ scales have been used to evaluate the quality of life of hemodialysis-treated patients^[10–12], but they have no specific dimension for cachexia.

Therefore, this study aimed to assess the reliability and validity of the FAACT scale in evaluating the quality of life of MHD-treated patients with cachexia.

Methods

Participants and data collection

Patients from three blood purification centers were selected as research subjects. The patients must be no less than 18 years old, have regular hemodialysis at least twice a week for 6 more months, and could read and understand our questionnaire. Those patients with non-terminal kidney disease, recent major surgery, or concurrent tumors were excluded. This study was approved by the ethics committee of research institution, and all participants read and signed the informed consent.

The demographic and clinical characteristics of the patients were obtained from electronic medical records. The weight change of the patients over the past 6 months was determined on the basis of their records during each hemodialysis session. Then, patients with cachexia were determined in accordance with the evaluation criteria. The presence of infection was determined on the basis of C-reactive protein (CRP) concentration ($\text{CRP} > 8 \text{ mg/L}$), white blood cell count ($\text{WBC} > 10^{10}/\text{L}$), and physician's most recent diagnosis. The patients completed the FAACT and KDQOL-36 questionnaires under the guidance of a researcher and a nurse. A second survey was conducted using the FAACT questionnaire to assess the test–retest after a week.

Assessment schedule

FAACT is an instrument used to assess the quality of life of patients with anorexia and cachexia. This instrument includes 39 terms in five dimensions: physical well-being (PWB; 7 items), social well-being (SWB; 7 items), emotional well-being (EWB; 6 items), functional well-being (FWB; 7 items), and anorexia-cachexia subscale (ACS; 12 items)^[8]. Most of the items (PWB, SWB, EWB, and FWB) were drawn from the general chronic illness questionnaire FACT-G^[9,13]. ACS is the core of questionnaire evaluation of cachexia. All items were rated as a five-level scoring system: not at all, a little bit, somewhat, quite a bit, and very much. Higher FAACT scores corresponded to better quality of life, and lower ACS scores corresponded to severe cachexia^[8].

KDQOL-36, a simplified version of the KDQOL-SF questionnaire, was used to enhance the completion rate of the questionnaire. This scale is widely used to assess the quality of life of hemodialysis-treated patients, and its authority has been recognized by many researchers^[14-16]. The validity of the Chinese version of KDQOL-36 has also been verified^[17]. It comprises 36 items, including the generic 12-Item Short-Form Health Survey to provide two summary scores assessing impact on the physical and mental dimensions, and 24 items to provide three disease-specific subscales: symptom/problem list, effects of kidney disease, and burden of kidney disease^[18,19].

Statistical analysis

Patient characteristics were summarized using conventional descriptive statistical methods. Then, the reliability and validity of FAACT in all patients who completed the questionnaire were evaluated. For reliability evaluation, standardized Cronbach's alpha coefficients were used to assess the internal consistency of FAACT and test–retest. For validity assessment, the divergence and convergence of the questionnaire were evaluated by calculating the Pearson correlation coefficients among FAACT, its dimension scale, and the five subscales of KDQOL-36, including the correlation coefficients of FAACT and its subscales with each of their own items. The patients were divided into different subgroups (i.e., infection and no infection, cachexia and no cachexia), and their summary scores were compared to analyze the sensitivity of FAACT. Then, independent t test was conducted. Data were analyzed using SPSS 24.0 statistical software, and statistical significance was considered at $P < 0.05$.

Results

Descriptive analysis

Among 310 patients, 299 were included in the study. The other 11 patients did not finish the questionnaire and thus were excluded. The demographic and clinical characteristics of the patients are listed in Table 1. The largest proportion of primary diseases in MHD-treated patients was occupied by chronic glomerulonephritis (44.1%), followed by hypertensive nephropathy (21.4%), and diabetic nephropathy (16.1%). About 28.1% of the patients were infected on the basis of CRP concentration, WBC count, and doctor's diagnosis, and 19.4% of the patients were diagnosed with cachexia. The median age of all patients included in the analysis was 54.6 years old, and their median BMI was 22.4.

Table 1
Demographics and clinical characteristics of MHD-treated
patients (n = 299)

Variable	n	%
Gender		
Female	111	37.1
Male	188	62.9
Primary disease		
Chronic glomerulonephritis	132	44.1
Hypertensive nephropathy	64	21.4
Diabetic nephropathy	48	16.1
Others	55	18.4
Inflammatory status	84	28.1
Inflammatory	115	71.9
No inflammatory	58	19.4
Cachexia status	241	80.6
Yes	Mean(SD)	Range
No	54.6(15.4)	19–91
Clinical characteristics	22.4(3.7)	14.1–40.01
Age, years	60.0(12.3)	29.6–86.4
Body mass index	60.9(12.6)	28.6–87.4
Body weight, kg		
Body weight 6 months ago		

Reliability

Table 2 presents the standardized Cronbach's alpha coefficients and test–retest reliability. The Cronbach's alpha coefficients of PWB and FWB are lower than 0.7, whereas the other Cronbach's alpha coefficients are acceptable, where ACS is 0.842 and FAACT is 0.904. After a week, 100 patients were randomly selected for test–retest, and the test–retest reliability of FAACT and its subscale exceeded 0.8.

Table 2
Cronbach's alpha coefficients (standardized) and test–retest reliability

Instrument	Item number	Cronbach's Alpha	Test–retest reliability
PWB	7	0.675	0.840
SWB	7	0.867	0.868
EWB	6	0.734	0.906
FWB	7	0.629	0.827
ACS	12	0.842	0.858
FACT-G	27	0.868	0.928
FAACT	39	0.904	0.921

Clinical validity

As shown in Table 3, the structural validity of FAACT was evaluated by calculating the Pearson correlation coefficients between all subscales and their own items. Except for GP1, GP7, GS7, GF5, and ACT13, the correlation coefficients of FAACT and their dimensions were all less than 0.3, the other 34 items were between 0.3 and 0.7, and the correlation coefficient of ACS exceeded 0.5 for all items except ACT11 and ACT13. The correlation coefficient between FAACT and all its subscales exceeded 0.5, and that between ACS and FAACT was 0.814.

Table 3
Item-subscale correlation and correlation among subscales (n = 299)

FAACT	Item—own scale correlation(range)	PWB	SWB	EWB	FWB	ACS	FACT-G	FAACT
PWB	0.384–0.633	1	0.158	0.404	0.354	0.526	0.667	0.692
SWB	0.530–0.850		1	0.238	0.324	0.217	0.658	0.551
EWB	0.384–0.633			1	0.350	0.424	0.710	0.677
FWB	0.366–0.722				1	0.363	0.729	0.663
ACS	0.192–0.770					1	0.543	0.814
FACT-G	0.171–0.595						1	0.930
FAACT	0.146–0.631							1

All subscales of KDQOL-36 strongly correlated with FAACT, with a correlation coefficient greater than 0.4, and relatively strongly correlated with ACS. The specific results are listed in Table 4.

Table 4
Correlation between FAACT and KDQOL-36 (n = 299)

FAACT	PWB	SWB	EWB	FWB	ACS	FACT-G	FAACT
Symptom/problem list	0.543	0.231	0.348	0.302	0.609	0.505	0.617
Effects of kidney disease	0.509	0.126	0.336	0.420	0.440	0.489	0.531
Burden of kidney disease	0.421	0.154	0.397	0.283	0.483	0.444	0.519
SF12-PCS	0.436	0.057	0.158	0.385	0.446	0.361	0.446
SF12-MCS	0.346	0.176	0.522	0.265	0.362	0.465	0.481

Tables 5 and 6 list the results of additional analyses on the basis of the different symptoms of hemodialysis-treated patients. FAACT and ACS showed high sensitivity in patients with cachexia ($P < 0.001$), with effect values of 0.54 and 0.6, respectively. In the presence of inflammation, all dimensions except SWB and FWB were statistically significant, among which FAACT and ACS showed good performance ($P < 0.001$).

Table 5
Means (standard deviation) of the symptom and quality of life instruments by MHD cachexia category, at baseline

Instrument	Cachexia (n = 58)	Non- cachexia (n = 241)	Total (n = 299)	<i>P</i>	Effect size
PWB	16.2(4.0)	18.8(3.8)	17.5(3.8)	<i>0.004</i>	0.68
SWB	15.4(4.6)	16.1(4.7)	15.9(4.7)	0.283	0.15
EWB	13.4(3.7)	14.2(4.1)	14.1(4.1)	0.186	0.19
FWB	9.2(3.7)	10.8(4.1)	10.5(4.1)	<i>0.011</i>	0.39
ACS	26.3(7.8)	30.7(6.9)	29.8(7.3)	<i>0.001</i>	0.60
FACT-G	54.3(10.9)	58.9(11.5)	58.0(11.5)	<i>0.006</i>	0.40
FAACT	80.5(16.2)	89.6(16.3)	87.8(16.6)	<i>0.001</i>	0.54
Effect size was calculated as (non- cachexia mean – cachexia mean)/SD of the total sample. Italicized numbers denote statistical significance at a threshold of $P < 0.05$					

Table 6
Means (standard deviation) of the symptom and quality of life instruments by MHD inflammation category, at baseline

Instrument	Inflammation(n = 84)	No inflammation(n = 215)	<i>P</i>
PWB	16.0(4.1)	18.1(3.6)	<i>< 0.001</i>
SWB	15.8(5.1)	16.0(4.5)	0.675
EWB	12.8(4.2)	14.6(3.9)	<i>0.001</i>
FWB	9.8(4.2)	10.7(4.0)	0.073
ACS	25.7(7.8)	31.5(6.4)	<i>< 0.001</i>
FACT-G	54.4(13.0)	59.4(10.6)	<i>0.001</i>
FAACT	90.9(15.0)	80.0(18.2)	<i>< 0.001</i>
Symptom/problem list	67.6(11.9)	74.5(11.2)	<i>< 0.001</i>
Effects of kidney disease	48.3(11.6)	53.3(11.9)	<i>0.001</i>
Burden of kidney disease	10.0(11.8)	17.2(14.1)	<i>< 0.001</i>
SF12-PCS	33.0(6.3)	35.6(6.4)	<i>0.002</i>
SF12-MCS	34.3(5.2)	37.7(5.5)	<i>< 0.001</i>
Italicized numbers denote statistical significance at a threshold of <i>P</i> < 0.05			

Discussion

Cachexia is an important factor affecting the quality of life of patients treated with MHD^[20]. Many MHD-treated patients suffer from anorexia, PEW, malnutrition, and eventually cachexia. At present, few studies evaluated the cachexia of patients with ESKD, and a standard evaluation tool for these patients remains lacking. Therefore, exploration of the evaluation tools of cachexia in MHD-treated patients is of high clinical significance. FAACT has been verified as a tool to measure the quality of life of patients with cachexia related to many diseases^[8, 9]. This study may serve as a reference for the evaluation of cachexia in MHD-treated patients and for the development of FAACT scale.

This study assessed the reliability and validity of FAACT in MHD-treated patients. In terms of reliability (Table 2), Cronbach's alpha was acceptable, but PWB and FWB were less than 0.7, and FAACT and ACS performed better than other disease detection areas^[8, 21]. The performance of FAACT test–retest was also outstanding, with the retest coefficients of all dimensions exceeding 0.8. In specific, the test–retest coefficients of EWB, FACT-G, and FAACT exceeded 0.9. These results proved the reasonable internal consistency of FAACT. Therefore, FAACT and ACS have a stable reliability to measure the quality of life of MHD-treated patients.

In terms of validity, strong correlations were found between the subscales PWB, EWB, SWB, FWB, and ACS and their items, and the items of the subscale itself were more correlated with the subscale than other scales. However, a low relevance was found between individual items, such as ACS and ACT13, in MHD-treated patients with a chronic illness, relatively stable condition, and rare large fluctuations in health. In general, the convergence of FAACT is acceptable but worse than that of patients with cancer^[21]. In addition, a correlation was found between PWB, EWB, SWB, FWB, and ACS (0.158–0.526), and the correlation between PWB and ACS was 0.526. Quality of life should be evaluated from various aspects; thus, the presence of correlation is understandable. Cachexia can greatly affect the body function of hemodialysis-treated patients^[22, 23]. This result explains the relatively large correlation of PWB with ACS. KDQOL-36 is an authoritative scale to measure the quality of life of hemodialysis-treated patients. This scale correlated with FAACT in all dimensions. A large correlation was also found between KDQOL-36 and FAACT in similar dimensions, proving the clinical effectiveness of FAACT.

Comparison of the FAACT scores of MHD-treated patients in different states showed that all dimensions except SWB and EWB were statistically significant in different cachexia states ($P < 0.05$), and ACS and FAACT performed the best ($P < 0.001$), with effect sizes of 0.60 and 0.54, respectively. FWB also performed excellent, with an effect size even greater than those of ACS and FAACT. This result indicated that cachexia significantly affected the physical conditions of MHD-treated patients, which further proves the above conclusion. However, FWB had unsatisfactory internal consistency and poor reliability in the evaluation of patients with cachexia only. Inflammation is an important factor causing cachexia. In fact, cachexia is usually accompanied by inflammation^[24–26]. Therefore, inflammation and severity of patients are important indicators of cachexia. Comparison of the results of inflammatory state in hemodialysis-treated patients revealed that all dimensions except SWB, FWB, FAACT, and KDQOL-36 were statistically significant and that ACS and FAACT also performed well ($P < 0.001$). These data demonstrate that ACS and FAACT have higher sensitivity in patients with anorexia in MHD.

FACT-G and its dimension is a chronic disease common dimension of quality of life. FACT-G, SWB, and EWB in MHD-treated patients show good reliability and verify the validity of some diseases, especially cancer^[9, 21]. However, their sensitivity was not high as that in the inflammation group (Table 6) of KDQOL-36 in similar dimensions. Thus, KDQOL-36 is a good choice when assessing the quality of life in conventional dimension. FACT-G and its dimensions are not recommended as the only tool for evaluating the quality of life of MHD-treated patients.

This study has some limitations. First, the international consensus in cancer cachexia was used as a basis because a standard diagnostic criterion for patients with cachexia is unavailable. The patient's skeletal muscle loss was not calculated because of the clinical conditions, which can cause slight deviation. Second, only a cross-sectional survey was performed, and the influence of changes in the condition of MHD-treated patients on the FAACT score was not analyzed. Finally, only the application of the Chinese version of FAACT in hemodialysis-treated patients was analyzed, which may affect the generalization of the present results.

Conclusion

The assessment of MHD-treated patients with cachexia has great clinical significance, and FAACT and ACS have good reliability and validity. Thus, FAACT and ACS are suitable to measure the quality of life of MHD-treated patients with cachexia in different states. In the future, a large-scale, multi-center, and language version of the longitudinal study may be performed to prove further the applicability of FAACT in MHD-treated patients.

Abbreviations

MHD
maintenance hemodialysis ;FAACT=Functional Assessment of Anorexia/Cachexia Therapy=KDQOL-36=The Kidney Disease Quality of Life Short Form 36=ESKD=end-stage kidney disease=PEW=protein energy waste=PWB=physical well-being=SWB=social well-being=EWB=emotional well-being=FWB=functional well-being=ACS=anorexia-cachexia subscale.

Declarations

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Consent of publication:

Not applicable

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Authors' contributions

YZ participated in research design, data collection and manuscript writing. Guidance of HY's participation in the research; LH and ZP participated in data entry and analysis; HL and WH participated in the data collection. All authors have read and approved the manuscript.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Prior to the study, this study was approved by the Ethics Committee of the First Affiliated Hospital of Guangxi Medical University, with the approval number 2019 (KY-E-33). All researchers signed informed consent.

Competing interests

The authors declare that they have no competing interests.

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