ORIGINAL

Study of life satisfaction and quality of life of patients receiving home oxygen therapy

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Abstract: An investigation was conducted by mail using a questionnaire regarding the life satisfaction and quality of life (QOL) of patients receiving home oxygen therapy (HOT) to evaluate their support. QOL was evaluated according to 4 scales : (1) activities, (2) state of health and quality of living, (3) physical symptoms, and (4) economic state. The answers of 90 patients (recovery rate : 60%) who responded to the investigation were analyzed, and the following points were clarified.

1. **Most of the subjects visited the hospital regularly, and about half the subjects (50.6%) had been treated by hospitalization during the 3 years prior to the investigation.**
2. **A large majority of the subjects (77.4%) answered they were satisfied with life.**
3. **Life satisfaction was closely related to the patients' roles and hobbies, and their activities in their communities and families.**
4. **The quality of living and the state of health were closely related to mental activity.**
5. **The economic state was closely related to all items of life satisfaction, quality of living, and state of health.**

From these results, expansion of the range of activities of patients receiving HOT and providing an economic basis for their living as well as preventing exacerbation of the disease are considered to be important for improving their life satisfaction.
J. Med. Invest. 50 : 55-63, 2003

INTRODUCTION

Recently, the disease structure of developed nations has changed markedly, and the importance of life management has increased. The place of care has rapidly shifted to the home during the past few years, particularly in diseases with a chronic course. Improving the quality of life (QOL) is an important task of nursing services for home-cared patients. Concerning the QOL of patients receiving home oxygen therapy, there are reports that even meals, which are one of the few enjoyments in their life, are affected by the disease (1), and that home oxygen therapy does not necessarily contribute to improvement in the QOL (2). In these circumstances, research on care for patients using home oxygen therapy and their families (3) may reveal implications about the support of home-cared patients, who are highly dependent on medical support and are expected to increase in the future. A

goal of care for patients using home oxygen therapy is considered to be "to continue safe, prolonged, and more consistent home care," as proposed by Fukanogi (3). There have been studies from the viewpoint of the patients' living (4-7), and QOL is an important factor of home care (8).

We, therefore, studied the state of QOL and evaluated the relationship between life satisfaction and the QOL in patients receiving home oxygen therapy, in whom long-term treatment is needed and activities are markedly restricted due to dyspnea. The objective was to obtain basic date for evaluation of their support. In this study, life satisfaction was defined as something that spiritually supports the patient's life and an object or matter that the patient considered important, and the QOL was defined as the adequacy of the environment in which the patient lives, consisting of 4 scales : (1) activities, (2) state of health and quality of living, (3) physical symptoms and (4) economic state (9). The QOL was understood as a comprehensive concept that encompasses the "quality of living" contained in one of the scales.

METHODS

1. Subjects and methods

The investigation was carried out in August 1999. The subjects were members of an association of patients with reduced pulmonary function (mean age ; 71 years) living in a prefecture with a high percentage of elderly. A questionnaire was sent to the 151 members of the association with a stamped return envelope enclosed, and responses were received from 90 members (recovery rate : 60%).

2. Ethical considerations

The investigation was carried out with the agreement that it benefits the association by increasing its understanding of the state of its members and that the authors would publish the results as a scientific report. The contents of the investigation were determined by conferences between the authors and representatives of the association according to the principle that answering the questionnaire would not be an excessive burden to the elderly subjects. The questionnaire was anonymous, and items that might lead to identification of the responders were excluded. It was mailed to each subject, and return of the questionnaire by the subjects was regarded as their consent to the investigation.

3. Contents of investigation

The purpose of the investigation was to clarify the levels of self-management, life satisfaction and QOL of each patient. As for self-management, the experience of hospitalization, regular visits to the hospital, management of water intake, exercise and going out were investigated. The QOL was measured using the Japanese version of the European Organization for Research and Treatment of Cancer (EORTC) scoring manual. The EORTC questionnaire, the validity and reliability of which as a scale of QOL have been established, can be completed in about 10 minutes, does not markedly burden the respondents, and is reported to yield consistent results whether it is carried out by self-completion or by interview (10, 11). Permission to use the EORTC was obtained from Karen West (manager of the original version) and Dr. Shimozuma (creator of the Japanese version) on the basis of the International Association Under Belgian Law (August, 1999). The questionnaire consisted of 30 questions, divided into 4 major scales : (1) activities, (2) 2 items of comprehensive QOL (state of health, quality of living), (3) 12 items of physical symptoms and (4) economic state. The comprehensive scale of QOL was represented by the question, "How good or bad was the quality of the general contents of your living and the state of your health during the past week?" and answers were given by checking on a scale from 1 ("very bad") to 7 ("very good"). The other questions, which concerned the state during the past week, were answered using a 4-point scale from "never" (1 point) to "very often" (4 points). Patients indicate the extent to which they have experienced specific symptoms or functional limitations during the past week.

4. Analytical methods

Answers were regarded as valid even when the subject did not answer all the questions, and they were totaled item-wise. Cases were counted concerning the answers to items related to self-management and life satisfaction. As for the relationship between life satisfaction and the QOL, the difference in the mean value of each scale was compared between those who felt satisfied and those who did not, and multiple regression analysis was carried out using life satisfaction as the criterion variable and various scales of the EORTC as explanatory variables.

Also, the "quality of living" and "state of health," as scales of comprehensive QOL, were used as criterion variables to evaluate their relationships with other scales. Moreover, to examine which symptoms affected the "state of health," multiple regression analysis was carried out using the "state of health" as the reference variable and the 12 items reflecting symptoms as explanatory variables.

Statistical analyses were performed using the software Excel 2000 Ver. 5.

RESULTS

Table 1 outlines the subjects' profile. Answers concerning the sex were absent in 20 of the 90 subjects. Of the 70 who gave their sex, 50 (71.4%) were males and 20 (28.6%) were females. The mean age of the males was 71.2± 14.6 years, while that of the females was 71.2± 13.9 years. The patients gave the name of their disease, and they included emphysema, old tuberculosis, bronchial asthma, etc. The percentages of those who had a history of hospitalization during the 3 years prior to the investigation and those who did not were nearly equal. Most subjects (88.5%) regularly visited the hospital, and only 11.5% did not. Regarding the water intake,

77.5% were careful, but 22.5% were indifferent. Concerning exercise, 58.4% exercised, but 41.6% did not. With regard to going out, the most frequent answer, given by 51.1% was "sometimes," 33.3% answered "every day," and 15.6% answered "seldom or never."

1. Relationship between life satisfaction and QOL scales

Table 2 shows the contents of life satisfaction in the 65 subjects who answered that they were satisfied with life. Two or more items, including enjoying contact with family and friends and hobbies,

Table 2. Contents of Life Satisfaction

Item	Number	%
Family	8	12.3
Family and hobby	5	7.7
Family and friends	8	12.3
Family/hobby/friends	16	24.6
Friends	7	10.8
Friends and hobby	14	21.5
Friends and study	1	1.5
Reading	1	1.5
Hobby	5	7.7
Total	65	100.0

Table 1. Profile of Subjects

		Number (%)
Sex	Male	50 (71.4)
	(Age	71.2± 14.6 years)
	Female	20 (28.6)
	(Age	71.2± 13.9 years)
Disease	Pulmonary emphysema	31 (34.4)
	Old tuberculosis	23 (25.6)
	Asthma bronchial	14 (15.6)
	Bronchiectasis	8 (8.9)
	No answer	14 (15.5)
Hospitalization during the last 3 years	yes	45 (50.6)
	no	44 (49.4)
Visited the hospital regularly	yes	77 (88.5)
	no	10 (11.5)
Water intake	careful	69 (61.4)
	not careful	20 (17.8)
Exercise	yes	52 (46.3)
	no	37 (32.9)
Going out	Every day	30 (27.0)
	Sometimes	46 (41.4)
	Seldom or never	14 (12.6)

The name of their disease was reported by the patient.

were raised by many of them. "Family" was included as a content of life satisfaction in 56.9% of them, and "friends" were included in 70.7% Enjoying contact with family or friends was mentioned in varying combinations by 90.8%

Table 3 compares the mean values of various scales of EORTC according to whether the subjects were satisfied with life or not. Significant differences were observed between those who were satisfied and those who were not in role activities, social activities, and economic state. When role activities were compared separately according to work and hobbies, significant differences were observed according to both work (p<0.05) and hobbies (p<0.01). As for social activities, significant differences (p<

0.05) were observed in both community activities and family activities. For all scales, the mean value was lower, indicating a higher QOL, in those who were satisfied.

Table 4 shows the results of multiple regression analyses using life satisfaction as the criterion variable. "Social activities" and "role activities" were extracted as significant (p<0.01) with a multiple correlation coefficient (after correction for the degree of freedom) of 0.33. The standardized partial correlation coefficient was 0.21 for both items.

2. Relationships among scales of QOL

Table 5 shows the relationships of "quality of living" and "state of health" with the other scales of

Table 3.　Comparison of the Mean Values of Various Scales of EORTC

| | | Life Satisfaction | | |
	Range	Satisfied n=65 Mean (S.D.)	Not satisfied n=19 Mean (S.D.)	Significant (t-test)
Quality of living	1-7	4.3 (1.8)	3.7 (1.7)	ns
State of health	1-7	4.1 (2.1)	3.7 (2.0)	ns
Physical activities	5-20	10.7 (12.6)	12.3 (8.2)	ns
Role activities (work)	1-4	2.2 (1.2)	2.9 (1.2)	
(hobby)	1-4	2.3 (1.1)	3.0 (1.0)	
Mental activities	4-16	7.3 (8.5)	8.7 (14.1)	ns
Cognitive activities (memory)	1-4	2.4 (0.7)	2.8 (1.0)	ns
(concentration)	1-4	1.9 (0.6)	2.2 (0.8)	ns
Social activities (in community)	1-4	1.9 (1.0)	2.7 (1.5)	
(in home)	1-4	1.7 (0.7)	2.4 (1.2)	
Economic state	1-4	1.5 (0.6)	2.1 (0.9)	

"Quality of living" and "State of health" were represented by the question, "how good or bad was the quality of the general contents of your living and the state of your health during the past week?" Answers were given by checking on a scale from 1 ("very bad") to 7 ("very good").

Activities and economic state, which concerned the state during the past week, were answered using a 4-point scale from "never" (1 point) to "very often" (4 points). Patients indicate the extent to which they have experienced specific symptoms or functional limitations over the past week.

The significant difference was confirmed in both calibrations.　　: p<0.01 ;　: p<0.05

Table 4.　Results of Multiple Regression Analyses Using Life Satisfaction as the Criterion Variable (N=87)

Explanatory Variable	Partial regression coefficient	F value	P value	Partial correlation coefficient
Social activities	0.21	3.29	0.073	0.20
Role activities	0.21	3.28	0.074	0.19
Contribution rate (after correction for the degree of freedom) (%)	0.11	Standard error		0.12
Multiple correlation coefficient (after correction for the degree of freedom)	0.33	Level of signif-cance		0.003

Explanatory variables : These were selected from 8 items.

QOL. The multiple correlation coefficients (after correction for the degree of freedom) for the "state of health" and "quality of living" were 0.65 and 0.60, respectively, and they were significantly related (p <0.001) to the explanatory variables. Both the "state of health" and "quality of living" showed significant partial correlation coefficients with "mental activities" (p<0.05) and "economic state" (p<0.01).

Table 6 shows the results of multiple regression analysis using the "state of health" as the criterion variable and the 12 items of symptoms as explanatory variables performed to identify symptoms that affect the "state of health." The multiple correlation coefficient was 0.71 (p<0.001), and "shortness of breath," "fatigue," "sleep," "pain" and "restriction of activities due to pain" were extracted. Among them, the standardized partial regression coefficient

was significant for "shortness of breath" (p<0.01) and "sleep" (p<0.05).

DISCUSSION

Because the quality of care for patients receiving home oxygen therapy is evaluated according to the QOL in some reports (12), the QOL is an important element of support for home-cared patients. However, evaluation of the QOL has not been widely conducted (13, 14). Tsuji *et al.* (5), who studied the QOL in patients receiving home oxygen therapy, evaluated it from physical, social, mental and psychological aspects, and Fukanogi (3, 7) used the PGC scale. Kobayashi *et al.* (10) mentioned the physical health, psychological wholesomeness

Table 5. Relationships of "Quality of Living" and "State of Health" with the Other Scales of QOL (N=87)

Explanatory Variable	State of Health		Quality of Living	
	Partial regression coefficient	P value	Partial regression coefficient	P value
Physical activities	-0.19	0.112	-0.18	0.165
Role activities	-0.23	0.071	-0.17	0.206
Cognitive activities	0.09	0.423	0.16	0.177
Mental activities	-0.28	0.025	-0.27	0.036
Social activities	0.03	0.768	-0.03	0.777
Economic state	-0.29	0.009	-0.30	0.009
Contribution rate (after correction for the degree of freedom) (%)	0.42		0.36	
Multiple correlation coefficient (after correction for the degree of freedom)	0.65		0.60	
Standard error	0.51		0.51	
Level of significance	<0.001		<0.001	

Table 6. Results of Multiple Regression Analysis Using the "State of Health" as the Criterion Variable

Explanatory Variable (question)	Partial regression coefficient	F value	P value	Partial correlation coefficient
Were you short of breath?	-0.27	7.78	0.007	-0.30
Were you tired?	-0.19	3.63	0.060	-0.21
Have you had trouble sleeping?	-0.22	5.81	0.018	-0.26
Have you had pain?	-0.17	3.00	0.087	-0.19
Did pain interfere with your daily activities?	-0.17	2.56	0.114	-0.18
Contribution rate (after correction for the degree of freedom) (%)	0.50	Standard error		0.37
Multiple correlation coefficient (after correction for the degree of freedom)	0.71	Significant level		P<0.001

Explanatory variables : These were selected from 12 items.

and proper social responses and psychosocial activities as elements of the QOL. Fukuhara (15) also mentioned "physical functions" as one of the basic elements of QOL along with "mental health," "functions of social living" and "functions of everyday roles." Self-respect was included as an element of the QOL in another study (16). In our study, the EORTC, a scale that is reliable and places no great burden on the subjects, was selected in consideration of the nature of this study carried out using a mailed questionnaire in elderly patients receiving home oxygen therapy. The EORTC is a scoring manual that is widely used to assess the status of cancer patients (10, 11, 17). The EORTC was selected for use in the present study for comparison with the QOL of cancer patients and because it uses a QOL scale that includes items relating to evaluation of the economic state of the patient. In patients with chronic diseases, it is important to have a stable of their lives, and the economic state is considered to be a key factor therein. However, in earlier studies carried out in patients with respiratory diseases, the SF-36 scale has been widely used (18 22). Among those reports, Grimmer *et al.* (21) even used the SF-36 scale to evaluate the QOL of caregivers. In addition, the CRDQ (Chronic Respiratory Disease Questionnaire), SGRQ (St. George's Respiratory Questionnaire), etc., are used as QOL assessment scales specifically designed for patients with respiratory diseases (19, 23). Chang *et al.* (19) and Yamada *et al.* (20) reported using the SF-36 and SGRO scales especially for the evaluation of patients with chronic respiratory diseases. For asthma patients, the AQLQ (Asthma Quality of Life Questionnaire) allows assessment of the psychological state as well, and it has been reported to be useful for the diagnosis of outpatients (24).

First, the relationship between the QOL and life satisfaction was evaluated. The higher mean values of role activities, social activities and economic state in those who answered they were satisfied with life indicated their better QOL. Particularly, role activities and social activities were shown by multiple regression analysis to be closely related to life satisfaction. Therefore, individuals who were satisfied may be in a stable economic state, have roles and maintain ties with people (society). This was reflected by the result that a majority of subjects who were satisfied mentioned contact with friends and families as key contents of their life. These were in agreement with the characteristics of individuals with high levels of life satisfaction

observed by Fukanogi (3) : (1) continuation of work and (2) clear roles in the family. Therefore, supporting patients to develop their roles and to increase occasions of social contact that promote their activities is necessary for improving their QOL. Having a role may lead to retention of the sense of self-respect and a feeling of having something to live for.

Next, concerning the relationships of the quality of living and the state of health with the other scales, both were found to be closely related to mental activities and the economic state. This is in agreement with the report by Tsuji *et al.* (4) that the mental QOL was better, and the psychological and social QOL tended to be better, in those with a higher home-care rate among patients receiving home oxygen therapy. Moreover, the economic state, which was reported to be an important element of the QOL of elderly individuals (16, 25), was also suggested to be important by the results of this study. This result is similar to the finding of Ritva *et al.* (26), in their study of asthma patients, that the patients' QOL was influenced by their economic state. Thus, maintenance of a high level of mental QOL and provision of an adequate economic basis were suggested to be important for the quality of living and state of health of patients receiving home oxygen therapy. Appropriate use of social systems in cooperation with other health-worker and welfare professions is needed to provide economic support.

Concerning the relationship between the state of health and the symptoms, the standardized partial regression coefficient was highest for "shortness of breath" among the 5 items extracted from the 12 items, probably because the subjects had respiratory disorders. Dyspnea and symptoms that affect sleep markedly influenced the patients' evaluation of their state of health. Therefore, it is important to prevent exacerbation or improve respiratory functions by measures such as the introduction of pulmonary rehabilitation proposed by Tsuji *et al.* as well as to teach the patients about activities that do not cause dyspnea (5). The fact that about half (49.4%) of the subjects experienced hospitalization during the 3 years prior to the investigation suggests that their self-management was not adequate. The need for improvement is especially high in relation to exercise and going out compared with regular hospital visits or control of water intake. Exercise has been reported to be effective for improving the QOL in elderly individuals because it

leads to enhancement of the sense of self-respect (27). The report that internal motivation is necessary for elderly individuals to exercise (28) also applies to patients receiving home oxygen therapy. Salvany *et al.* (18) reported that the prognosis was poor in patients with a low QOL, but we did not investigate the relationship between the QOL and the prognosis. However, acceptance of the proposition that there is a correlation between the QOL and the prognosis results in greater awareness of the importance of intervention to improve the QOL.

On the other hand, a limitation of the present study was that evaluation was restricted to life satisfaction and QOL scales, without adequate evaluation of their relationships with the basic profile of patients or the state of self-management of their lives. Also, since the recovery rate of the questionnaire was 60% and the subjects were limited to those who were judged able to participate in the investigation, the findings in this study may not be applied directly to all patients receiving home oxygen therapy.

A major conclusion of our study was that having roles related to work or a hobby and being involved in activities in the community or the family were important for life satisfaction of HOT patients. Also, the quality of living and the state of health were closely related to mental activities. Furthermore, the economic state was closely related to all items of the life satisfaction, quality of living and state of health. Therefore, expansion of the range of activities of patients receiving HOT and providing an economic basis for their living as well as preventing exacerbation of the disease are considered to be important for their life satisfaction. Thus, a stable economic basis, a sense of life satisfaction and roles in the family or the community were confirmed to be important for the spiritual well-being of patients receiving HOT. We confirmed the importance of the viewpoint of home-cared individuals in evaluation of their care rather than paying attention exclusively to the disease that has made them dependent on home oxygen therapy. Patients receiving HOT require support so that the improvement in their respiratory function brought about by the oxygen treatment will translate into a greater range of activities and increased joy of life and feeling of satisfaction with their lives. Such intervention can be thought to include devising ways to expand the patient's ADL, enable them to carve out a meaningful role and increase their opportunities for so-

cial interactions. Accordingly, after starting HOT, the patient's actual quality of living and change in the QOL should be continuously assessed, and it is necessary to devise methods for periodic or continuous intervention at the time of outpatient visits to the hospital or in cooperation with the local public health nurse. It can be surmised that this approach will further elevate the significance of home oxygen treatment.

As a future problem, the selection of the QOL assessment scale represents a problem in QOL research. The authors hope to carry out follow-up surveys to elucidate whether the EORTC scale is truly suitable for the assessment of the QOL in patients undergoing home oxygen treatment.

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