Quality of Life Measurements Using a Linear Analog Scale for Elderly Patients with Chronic Lung Disease

Tomoko Hiratsuka and Kozui Kida

We developed a linear analogue scale (QOL Scale) to measure the quality of life (QOL) in elderly patients with chronic lung disease. In this study, the validity of the QOL Scale was assessed and QOL Scale scores were compared with the results of other conventional questionnaires. A total of 76 subjects, aged 65 years or older, divided into three groups according to disease severity, were tested by the QOL Scale and two additional questionnaires. The QOL Scale had the advantages of comprehensibility, acceptability and reproducibility. QOL Scale scores differed among the groups, while the other questionnaires showed no significant differences according to disease severity. QOL Scale scores correlated with the tendency toward neurosis shown by another index. We conclude that the QOL Scale is a practical and useful indicator of QOL in elderly patients with chronic lung disease.

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Key words: QOL scale, manifest anxiety scale, Cornell Medical Index

Introduction

Clinical reports have documented that chronic pulmonary disability has an extensive impact on psychological status and social functioning, or, the quality of life (QOL) of patients (1-6). The necessity for a comprehensive assessment of QOL in such patients has therefore been emphasized in clinical management. As a measure of QOL, a variety of evaluation methods have been used (1-3, 7-9). In addition to the conventional self-report of general health systems, including the Minnesota Multiphasic Personality Inventory (MMPI) (10) and Sickness Impact Profile (SIP) (11), some new tools that focus on patients with chronic pulmonary impairment, such as the Chronic Respiratory Questionnaire (12) and the St George’s Respiratory Questionnaire (13), have recently been devised. However, it is difficult to apply these assessment devices to elderly patients in an outpatient setting. The burden on both the examiners and the examinees is too heavy because the majority of patients have sight or hearing impairments and are often reluctant to concentrate on such questionnaires for more than 15 minutes, the minimum time required to complete the existing measures. Thus, we developed a simple analog scale as a measure of QOL in patients with chronic pulmonary disabilities designed for practical use in the clinical setting. The scale, designated the QOL Scale, originates from a linear analog scale by Priestman and Baum (14) for monitoring the feelings and subjective response to treatment in patients with advanced breast cancer.

The purpose of this study is to test the validity of the QOL Scale and to compare the QOL scores in three groups of elderly patients with different disease severities using this scale and other conventional tests.

Methods

Study population

All subjects in the study were 65 years of age or older and belonged to one of the following three groups. Group A included 27 patients selected randomly from a total of 82 patients receiving continuous home oxygen therapy (HOT) for more than 3 months from the Pulmonary Division of the Tokyo Metropolitan Geriatric Hospital (TMGH). Group B consisted of 30 patients with chronic obstructive pulmonary disease (COPD) selected from 300 consecutive patients who underwent pulmonary tests at TMGH from August to November 1990. The criteria for this group were forced expiratory volume in one second (FEV1) of <1.5 L and FEV1/FVC of <0.6. Although these patients had mild to moderate dyspnea on exertion, they were not judged to be in need of HOT by their managing respiratory physicians. Group C included 21 healthy elderly individuals free of any symptoms of chronic illness, including respiratory disease.

After informed consent was obtained from all subjects regarding the research purpose and methods, all subjects completed the Hasegawa Intelligence Test (HIT) developed by...
Hasegawa and colleagues (15) as a simple measure of the intelligence level of elderly persons. The test, which is widely used in Japan, includes 11 questions including ones about proper orientation (e.g. What day of the month is it today?) and common knowledge (Who is Japan’s present Prime Minister?; When did World War II end?), and calculation problems (100–7=, 93–7=). The full score is 32.5 points with a score above 22.0 considered approximately normal for this age group. Those with scores below 22.0 were excluded from the present study because such subjects were considered unable to complete the questionnaires involved in the present study.

The following three tests were completed by all subjects on the same day.

**QOL Scale**

An analog scale devised as a modification of the Linear Analogue Self-Assessment Technique originally used for advanced breast cancer patients (14). The QOL Scale covers aspects of emotion, respiratory symptoms and daily activity, consisting of the following 8 variables: feeling of well-being, mood, anxiety, dyspnea, headache, appetite, housework or job, and social activities. In preliminary studies to create the QOL Scale, more than 20 items thought to be related to the assessment of QOL in elderly patients with chronic lung disease were assessed. Eight items were found by principle component analysis to yield highly reproducible and statistically significant responses, and thus were selected for the final scale. Briefly, a 10 cm line was given for each item, with the ends of the lines labelled with words descriptive of extremes of the item (Fig. 1). The examinee was asked to mark an X on the line at the point most appropriate to describe his/her feelings at that moment. The distance, in millimeters, from the left end to the examinee’s mark provided the score out of one hundred. The total score on the QOL Scale was the sum of the scores for each of these 8 items out of a possible 800. To test the reproducibility of the QOL Scale, we tested it twice at one-week intervals in another 20 patients with COPD aged 65 years or older and attending the outpatient clinic at the Pulmonary Division of the TMGH.

**Manifest Anxiety Scale (MAS)** (16)

An inventory for assessing the intensity of anxiety. This test consists of 65 statements describing what have been called overt symptoms of this state. The 65 items were originally selected from MMPI.

**Cornell Medical Index (CMI)** (17)

This health questionnaire of 195 questions obtains information about the total medical problems of either the physical or psychiatric nature of a patient. In the present study, we used a well-accepted Japanese version produced by Kanehisa and Fukamachi (26), which attempts to rate the tendency toward neurosis using a discriminating diagram.

**Statistical analysis**

The data were analyzed by standard statistical techniques, including correlation coefficients for paired measurements, unpaired Student’s t-test, ANOVA and Scheffé test for continuous data, and the chi-square test for categorical data. A p-value of <0.05 was accepted as statistically significant. Data are expressed as mean±standard error of the mean (SEM).

**Results**

Two patients from group B were excluded from the study because of low scores (9.0 and 20.5) on HIT. None of the subjects in groups A or C were classified as having dementia or pre-dementia by HIT. Accordingly, the number of subjects in each study group was 27, 28, and 21 for groups A, B, and C, respectively. After excluding the two patients from group B, the mean HIT scores were 30.7±0.6, 30.6±1.0, and 31.0±0.7 for groups A, B, and C, respectively, with no significant differences among the three groups. The respiratory diseases in group A included COPD in 21 patients, post-tuberculosis with permanent sequela in 4 patients, and idiopathic pulmonary fibrosis in 2 patients.

The clinical characteristics of the subjects in each group are listed in Table 1. There were no significant differences with respect to age or PaCO2 among the three groups, whereas PaO2 was significantly lower in group A than in groups B or C (p<0.01); FEV1 and FEV1/FVC were significantly higher in group C than in groups A and B (p<0.01).
The reproducibility of each item on the QOL Scale and the total score expressed as the correlation coefficient of two measurements taken one week apart (n=20) were as follows: feeling of well-being r=0.83 (p<0.01), mood r=0.79 (p<0.01), anxiety r=0.52 (p<0.05), dyspnea r=0.75 (p<0.01), headache r=0.72 (p<0.01), appetite r=0.73 (p<0.01), housework or job r=0.97 (p<0.01), social activity r=0.94 (p<0.01), total score r=0.81 (p<0.01).

None of the eight variables nor the total QOL Scale score showed any significant difference according to sex or type of respiratory disease. The total scores were 474.4±23.5 for males and 437.4±31.7 for females, while COPD patients had scores of 463.2±21.3 and the scores for patients with respiratory diseases other than COPD were 470.5±17.4.

The scores for the eight variables and the total scores for the three patient groups are shown in Table 2. As shown in Fig. 2, the scores on each item were generally higher in group C followed by groups B and A, in that order. Group C had significantly higher scores than either group A or B in the items, ‘feeling of well-being’ (p<0.01), and ‘social activity’ (p<0.01 for A vs C, and p<0.05 for B vs C). Group A had significantly lower scores in ‘dyspnea’ than either group B or C (p<0.01). Significant differences in ‘anxiety’ and ‘housework or job’ were also demonstrated between groups A and C (p<0.05). Group B received a significantly higher score than group A only for ‘dyspnea’ (p<0.01), despite the apparently larger octagon.
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Table 3. Distribution of Three Study Groups According to MAS and CMI Response

<table>
<thead>
<tr>
<th>Group</th>
<th>MAS % (n)*</th>
<th>CMI % (n)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I+II</td>
<td>III+IV+V</td>
</tr>
<tr>
<td>Group A</td>
<td>18 (4)</td>
<td>82 (18)</td>
</tr>
<tr>
<td>Group B</td>
<td>44 (12)</td>
<td>56 (15)</td>
</tr>
<tr>
<td>Group C</td>
<td>26 (5)</td>
<td>74 (14)</td>
</tr>
</tbody>
</table>

Group A, B, and C: same as in Table 1.
MAS: manifest anxiety scale; CMI: Cornell Medical Index.
*I+II, subjects with more anxiety; III+IV+V, subject without anxiety based on MAS scores. **III+IV, neurotic subjects; I+II, subjects without neurotic tendency, based on the classification of CMI scores of Kanehisa and Fukamachi (26).
Percentages were calculated after excluding subjects who were unable to provide data.
Neither MAS nor CMI response was related to the study group (by ordered chi-square test).

Discussion

Health-related quality of life has been measured at a descriptive level to provide data regarding the impact of disease and treatment on the physical, functional, psychological, and social health of various patient populations. More recently, there has been growing interest in incorporating psychosocial or quality of life measures into chronic lung disease management (5–7, 9, 12, 13). Although the prevalence of chronic lung diseases is higher among elderly patients (27), one may encounter difficulties in assessment when previously described methods are used. In consideration of the utility of the present scale in the typical outpatient setting, we adopted a visual analog scale. While this technique was originally used to assess sense or mood in the fields of psychology or psychophysics and has recently proved useful in the measurement of breathlessness (18–20), the QOL Scale is the first visual analog scale to cover the major aspects of QOL in patients with chronic lung disease, particularly in the elderly. We found several advantages of the QOL Scale over existing self-assessment devices:

1) The QOL Scale is readily comprehended and timesaving. It was found to be repeatedly administrable to aged people with average mental ability and took less than 5 minutes to complete, even the first time. On the other hand, MAS and CMI were difficult to complete because of their length and the use of complicated sentences. In fact, the results for 8 subjects on the MAS and 6 on the CMI were ineligible due to incompleteness or marked discrepancies. The QOL Scale was practically superior in terms of administration time, respondent burden, and interviewer training required. 2) The reproducibility of the QOL Scale is excellent, indicating its reliability. 3) Finally, the QOL Scale is potentially a better indicator of QOL in patients with chronic lung disease than other conventional measurements. The QOL Scale was the only test among the three measures used to show poorer QOL in patients with chronic lung disease (groups A, B) than in control subjects (group C) with respect to emotion, symptoms, and daily activity (Table 2 and Fig. 2). A number of reports, including the study of McSweeney and colleagues (2), have also suggested that there is a high prevalence of emotional and psychological disturbance, restriction in daily functioning, and social withdrawal in patients with COPD (5–7, 21, 22).

Anxiety, which is assessed by MAS, has been viewed as a major factor in psychological disturbances in COPD patients (6, 9, 21). The reason that the groups in this study did not differ in their responses on MAS may be that MAS does not refer to the respiratory area (16). Anxiety in COPD patients is considered to be closely associated with dyspnea (6, 9, 21). Moreover, one possible source of bias in the present study is that all the subjects were 65 years or older. It is therefore likely that the subjects have some amount of anxiety in common because aging per se affects QOL in terms of various non-disease-related mobility restrictions or socioeconomic status. Also, it has been pointed out that even accepted measures of QOL in patients with chronic lung disease, such as MMPI and SIP, may be insufficient to reveal drawbacks in QOL specifically experi-
enced by such patients and may leave essential areas of impairment unaddressed (5, 7, 9, 28), because these measures were originally designed to cover a broad range of diseases. This would also be true for MAS and CMI, which were developed as screening tests for the general population (16, 17). When groups A and B were compared, group B tended to score better than group A in almost all items on the QOL Scale, though a significant difference was found only for ‘dyspnea’. The two possible factors that may have contributed to this tendency were the administration of HOT and the more advanced pulmonary impairment in group A. However, it remains speculative whether HOT renders everyday activity to be even more restricted in patients, or whether the HOT actually does improve QOL, particularly in elderly patients. Heaton and colleagues (23) found that oxygen treatment in hypoxemic COPD patients is associated with neuropsychological improvement. However, the patients in group A in the present study were less hypoxemic and older than the patients of their study. In addition, an increased prevalence of depressive symptoms associated with physical illness or adjustment to life stress is known (24, 25). This point necessitates further study.

However, the QOL Scale still requires more investigation. Variables other than those now included might illustrate the physical or emotional status of a subject even more accurately. Also, all items now receive equal weighting and the appropriateness of this weighting remains to be investigated. In a preliminary study, we compared the total score on the QOL Scale with the score produced by principle component analysis. Since there was good consistency between the two, the total score was considered to be a valid measure of QOL (data not shown).

In addition, longitudinal examinations across the initiation of HOT are necessary to evaluate the direct effect of HOT on QOL, exclusive of the influence of the progression of disease. Moreover, studies on the responsiveness of this technique to changes in clinical status are important to analyze therapeutic benefit.

In conclusion, the QOL Scale, which we have developed for preliminary study, we compared the total score on the QOL Scale, and the appropriateness of the QOL Scale was considered to be a valid measure of QOL (data not shown). Since there was good consistency between the two, the total score was considered to be a valid measure of QOL (data not shown).

In conclusion, the QOL Scale, which we have developed for practical use, serves as a useful measure of QOL in elderly patients with chronic lung disease. The QOL Scale shows that the QOL in these patients is impaired in terms of mental status, respiratory symptoms and daily activities.

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References