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ORIGINAL PAPER

Different short-term and longitudinal results on perceived health status for asthma and COPD patients after pulmonary rehabilitation. Patients living alone have the largest improvements in perceived quality of life

E Haave[1] and ME Hyland[2]
[1]Cand Psychol, Glittreklinikken, Hakadal, Norway; and [2]University of Plymouth, Plymouth, Devon, UK

A combined sample (n = 132) of asthma (70%, n = 92) and chronic obstructive pulmonary disease (COPD) (30%, n = 40) patients was assessed for short-term and longitudinal changes in perceived health status (HS), quality of life (QoL), and trait anxiety after a 4-week inpatient pulmonary rehabilitation program (PRP). The total sample improved on HS (P = 0.009, effect size (ES) = 0.12) and QoL (P = 0.011, ES = 0.16) immediately after rehabilitation but improvements diminished at 6 months follow-up. Trait anxiety scores changed very little. The COPD group improved on HS immediately after the rehabilitation program (P = 0.005, ES = 0.16) but scores had deteriorated at follow-up. The asthma group had only a small and non-significant HS improvement immediately after the program but got better during the follow-up period and improved significantly on HS (P = 0.040, ES = 0.21) from before rehabilitation to follow-up 6 months after the program. Within both diagnosis groups, patients who were living alone had the largest improvements in QoL scores. PRP may have different longitudinal effects for patients with asthma and COPD. After-care procedures are probably important in rehabilitation of patients with COPD. *Chronic Respiratory Disease* 2008; **5**: 69–73

Key words: asthma; cohabitation; COPD; pulmonary rehabilitation

Introduction

Lung-specific health status instruments quantify patients' experiences of how a disease affects daily functioning, whereas quality of life instruments and anxiety/depression scales measure more general satisfaction with life and levels of negative affect–appraisals that may or may not be influenced by the pulmonary disease. Beneficial outcomes of pulmonary rehabilitation programs (PRPs) are well documented,[1–4] and previous research has indicated that pulmonary rehabilitation can enhance patients' perceived health status (HS), perceived quality of life (QoL), and psychological well-being.[5–11] Improvements in psychological well-being and QoL have tended to be weaker and less consistent than improvements in HS.[12–16] The majority of PRP studies have been conducted for samples of patients with chronic obstructive pulmonary disease (COPD), and only a few reports have used asthma samples[17] or combined samples of COPD and asthma patients.[18,19] Therefore, although both these diagnoses represent obstructive lung disease, it is still an open question whether patients in the two groups react similarly to PRPs. In this study, we measured changes in scores after a 4-week inpatient rehabilitation program for a combined sample of asthma and COPD patients. We wanted to compare the short and long-term changes in HS, QoL, and anxiety scores for either type of patient. This was the main purpose of the study.

Methods

Ethics

The regional ethical committee had approved the study in advance.

Correspondence to: Einar Haave, Glittreklinikken, Pb 104, 1488 Hakadal, Norway. Email: einar.haave@glittreklinikken.no

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Patients and procedures

Patients with asthma and COPD between 18 and 70 years of age were consecutively recruited from the waiting list of a hospital for treatment and rehabilitation of lung patients in Norway. Patients who had been given a diagnosis of asthma or COPD before hospitalization, and who also did not have any known serious somatic or psychological problems in addition to their pulmonary disease, were included. Two weeks before entering the PRP, patients received a letter that described the project and asked for their participation. It was stated that participation was voluntary, that all the information would be treated confidentially and that one could withdraw from the study at any time without any consequences for treatment or rehabilitation. The letter also contained a written consent form and the first set of questionnaires to be returned before entering the hospital. Two weeks and 6 months after the PRP, patients received the second and third sets of questionnaires. Patients received no rewards for their participation apart from gratitude.

Of the 354 patients who were asked to participate, 221 agreed and returned questionnaires and written consent forms before entering the hospital. Eighty-five patients withdrew from the study on the way, either by not coming, interrupting their stay or by not returning questionnaires after the PRP. Finally, four patients had to be excluded because they changed their diagnoses during their stay at the hospital, thus leaving 132 patients to be included in the data analyses.

Rehabilitation program

Patients participated in a 4 weeks inpatient, multidisciplinary PRP. All patients were exposed to the same 4 weeks activity plan, which comprised of physical exercise, educational lectures, lifestyle change support, and social sharing with other patients with COPD. The program consisted of three to four 45-min educational or exercise group sessions all weekdays. Physical exercise was conducted individually and group-wise; outdoors, in a gymnasium and in a warm swimming pool. Educational lectures were given by physicians, nurses, physiotherapists, psychologists, occupational workers, and social workers. The lectures covered topics such as: causes, mechanisms and treatment of COPD, living with chronic disease, optimal physical exercise, and social rights for pulmonary patients. Patients were seen at least weekly by their attending physician, and issues such as medication or nutrition were followed up regularly by nurses. All patients were given individual appointments with physiotherapist. Individual appointments with social worker or psychologist were given as needed. While still at the clinic, patients were encouraged to continue with physical exercise after discharge, but no maintenance program was applied in the follow-up period 6 months after leaving the clinic.

Measures

The outcome variables in the study – HS, QoL, and anxiety – were measured at three points in time:

t1 = 2 weeks before the PRP
t2 = 2 weeks after the PRP
t3 = 6 months after the PRP

Perceived health status

Perceived HS for all patients was measured by the short version of the Breathing Problems Questionnaire (BPQ), which measures the impact of pulmonary disease on patients' daily functioning and well-being. The BPQ short version[20] has 10 items, each with a scoring range 0–3, which can be added to a BPQ total score that ranges from 0 to 30. Higher BPQ scores mean worse HS.

Perceived quality of life

Perceived QoL was measured by the Perceived Quality of Life Scale (PQoL), which measures people's satisfaction with life over several different domains. The PQoL[21] includes 19 items in which the participants rate their satisfaction on an 11-point end-anchored scale from 0 (extremely dissatisfied) to 10 (extremely satisfied), plus one extra item that measure happiness. The PQoL total score was calculated as the mean of the first 19 different items. Higher PQoL scores mean better-perceived QoL.

Anxiety

We used the trait part of the Spielberger State and Trait Anxiety Inventory (STAI)[22] to measure anxiety. The scale consists of 20 questions, each with a scoring range 1–4, some of them in reversed order, which can be added to calculate a trait anxiety total score that ranges from 20 to 80. Higher STAI scores mean higher anxiety levels.

Cohabitation

Cohabitation was a dichotomous variable defined by asking patients to answer yes or no to the question: "Are you living alone?"

Statistics

We used Pearson chi-square test to check for difference in female percentage and *t*-test for independent samples to analyze age difference between the two diagnostic groups. Changes in BPQ, PqoL, and STAI for the whole sample from t1 to t2 and from t1 to t3 were assessed by *t*-tests for paired samples. ANCOVAs for repeated measures assessed group × time effects. In the group × time analyses for asthma versus COPD patients, gender and cohabitation were used as covariates. We also tested whether PRP effects were different for patients with different cohabitation status. In these analyses, gender and diagnosis were used as covariates. Cohen's *d* was used as an estimate of effect size (ES); calculated by dividing the mean change score for a variable with the pooled standard deviation of that variable from the two instances of measurement. Values of *d* were interpreted as follows: $d < 0.2$ = small effects, $0.2 \le d < 0.5$ = medium effects, $d \ge 0.5$ = large effects. SPSS version 14.0.1 (http://www.spss.com) was used for all statistical analyses.

Results

There were 46 men (50%) and 46 women (50%) in the COPD group and 9 men (22%) and 31 women (78%) in the asthma group (chi-square = 8.67, $P = 0.003$). Mean age was 59.0 in the COPD group and 43.0 in the asthma group ($t = 10.52$, $P < 0.001$).

For the total combined sample of asthma and COPD patients, BPQ scores ($P = 0.009$, ES = 0.12) and PQoL scores ($P = 0.011$, ES = 0.16) improved from immediately before to immediately after the PRP. STAI scores changed very little ($P = 0.269$, ES = 0.05), although in a positive direction. The immediate improvements in BPQ and PQoL for the whole sample had decreased at follow-up and there were no significant improvements as measured from t1 to t3 when asthma and COPD patients were considered together.

Table 1 shows scores over time for the two patient groups. Patients with asthma and COPD had different longitudinal development on the BPQ, whereas not on the PQoL or STAI. For patients with COPD, BPQ had improved immediately after PRP ($P = 0.005$, ES = 0.16) but then relapsed at t3. On the contrary, asthma patients had little immediate improvement on the BPQ but made progress in the follow-up period and improved significantly from t1 to t3 ($P = 0.040$, ES = 0.21).

Table 2 shows that QoL changes were small for patients living together with someone, whereas patients living alone improved their QoL immediately after PR and the improvement was sustained in the follow-up period. For patients living alone, there was a significant QoL improvement from t1 to t3 ($P = 0.017$, ES = 0.36), and this tendency existed within both groups of patients because there was no significant interaction effect diagnosis × cohabitation × time. Effect sizes for PQoL change from t1 to t3 were 0.37 for patients with COPD living alone and 0.31 for patients with asthma living alone.

No significant cohabitation × time effects was observed for the BPQ or STAI.

Discussion

Although effect sizes were small, HS and QoL had improved significantly immediately after PRP for the whole sample. These improvements, however, faded through the subsequent 6 months. Trait anxiety levels, on the whole, did not change much. Considering the relatively short rehabilitation program, such results were not very surprising. When results

Table 1 Mean scores at t1, t2, and t3 for the COPD ($n = 92$) and asthma ($n = 40$) group

Variable	*Diagnosis*	*t1*	*t2*	*t3*	*Group × time*
BPQ	COPD	10.3 (4.9)	9.5 (5.2)	10.2 (5.7)	$P = 0.013$
	Asthma	9.8 (5.0)	9.6 (5.3)	8.7 (5.1)	
PQoL	COPD	5.2 (1.5)	5.4 (1.6)	5.3 (1.5)	$P = 0.491$
	Asthma	5.5 (1.8)	5.8 (1.7)	5.8 (1.8)	
STAI	COPD	42.8 (10.8)	42.4 (10.9)	43.0 (11.3)	$P = 0.350$
	Asthma	42.2 (10.8)	40.9 (10.8)	40.2 (11.6)	

BPQ, Breathing Problems Questionnaire; PQoL, Perceived Quality of Life Scale; STAI, Spielberger Trait Anxiety Score.

Table 2 Mean scores at t1, t2, and t3 for patients living alone ($n = 35$) and patients not living alone ($n = 97$)

Variables	*Cohabitation*	*t1*	*t2*	*t3*	*Group × time*
BPQ	Alone	10.6 (5.0)	10.3 (5.7)	10.6 (5.9)	$P = 0.617$
	Not alone	10.0 (4.9)	9.3 (5.0)	9.4 (5.5)	
PQoL	Alone	4.8 (1.6)	5.4 (1.7)	5.4 (1.7)	$P = 0.039$
	Not alone	5.4 (1.6)	5.6 (1.6)	5.5 (1.6)	
STAI	Alone	43.4 (8.7)	43.7 (9.9)	42.7 (10.9)	$P = 0.341$
	Not alone	42.3 (11.5)	41.3 (11.2)	42.0 (11.6)	

were analyzed separately for the two diagnosis groups, however, a different pattern emerged for HS scores: patients with COPD improved immediately after the PRP but relapsed at follow-up, whereas patients with asthma had most of their HS improvements during the follow-up period. Additionally, patients with asthma had somewhat better longitudinal results on QoL and anxiety, but this trend was much weaker and not statistically significant.

A positive short-term effect and subsequent relapse of HS in the COPD group was comparable with previous research. In one study,[23] HS had improved 2 weeks after PRP but deteriorated during the subsequent 6 months; another study found no improvements in HS 1 year after the program.[15] Follow-up regimes may produce better longitudinal results. For example, HS improvements were still present at 6 months but not 1 year after PRP in a study comprising monthly follow-up sessions.[24] A maintenance procedure of weekly telephone calls and monthly reinforcement visits after a PRP, however, produced only modest improvements.[25] Because no systematic after-care was applied for our patients, it was no great surprise that the COPD group had lost their gains in HS scores 6 months after the PRP. It is reasonable to believe that short programs have only transient effects for patients with COPD and that efficient maintenance procedures should be implemented if possible; modification of behavioral patterns and coping styles probably requires much time and effort for patients with COPD.[26]

For our group of patients with asthma, the lack of significant HS improvement immediately after the PRP – but gradual progress in the follow-up period – was unexpected, because an earlier PR study reported similar short-term effects and follow-up results for patients with asthma and COPD.[27] A plausible explanation is that there is a real difference between the two diseases. COPD is chronic and progressive whereas asthma represents an airway obstruction that is fully reversible; the chance of actually becoming healthier is certainly greater in asthma than in COPD. Age may also be important; the patients with asthma were on average much younger than the patients with COPD and therefore may be more motivated for lifestyle changes such as regular physical exercise and self-management routines. The stamina of self-management skills among patients with asthma has been reported earlier. One study reported that all participants continued using such skills to one degree or another 7 years after they had been learned.[28] A qualitative study that followed patients with asthma for a long period after rehabilitation[29] concluded that after 3 years, patients' lives were characterized by better self-management, more physical activity, and a sense of security. Although our study had less-comprehensive procedures, results pointed in the same direction. If it is true that patients with asthma can benefit longitudinally from a relatively short PRP, this is positive.

It was unexpected that the main part of QoL improvements was discovered among patients living alone. A useful variable could be social support, which has proven to be important for QoL in earlier studies.[30,31] Because of distressing symptoms, pulmonary disease can reduce social activities for patients with or without a partner. What's more, the negative effect of this on QoL may be larger among patients living alone, an assumption that was supported by the fact that single patients had lower average QoL before entering the PRP.

Four weeks at the hospital may have counteracted feelings of isolation, which indirectly suggests that social sharing can be an important aspect of a rehabilitation program. However, there are other possible explanations. For example, patients living alone may have been more unconcerned about self-care and healthy lifestyle before PRP, making them more receptive for the program interventions. Also, because patients living alone had lower baseline QoL scores, there was probably a larger potential for improvement in this group. Nevertheless, a QoL improvement sustained over 6 months for this subgroup of patients was a surprising observation.

The study design was quasi-experimental, many patients did not want to participate and – as expected – there was a considerable dropout from the project because patients were informed that they could withdraw from the study at any time without any consequences. Additionally, improvements in scores were only small or moderate, as shown by the effect sizes. These aspects weaken our conclusions. In spite of these limitations, there were some interesting implications that future studies may explore further.

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