A Survey of Opinions and Attitudes Toward Exercise Following a 12-month Maintenance Exercise Program for People with COPD

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ABSTRACT

Purpose: To determine the opinions and attitudes toward exercise in people with chronic obstructive pulmonary disease (COPD) who had completed a randomised controlled trial of 12-months maintenance exercise.

Methods: Participants were eligible for recruitment to the maintenance exercise study if they had COPD and had completed an 8-week pulmonary rehabilitation program. They were randomized into an Intervention Group (IG) that consisted of once weekly, supervised hospital-based maintenance exercise plus home exercise for 12 months or a Control Group that undertook unsupervised home maintenance exercise for 12 months. At the end of the 12 months, participants completed a survey consisting of 23 questions using a visual analogue scale (VAS) of 100 mm.

Results: Forty-eight participants completed the 12 month study and 36 participants (75%) completed the survey [IG mean (SD): age 65 (8) years, FEV₁ 58 (20) % predicted; CG: age 66 (8) years, FEV₁ 67 (17) % predicted]. No between group difference was found for the importance of exercise, the benefits of the program or the importance of support from the physiotherapist. However, the IG reported exercising more regularly, having more enjoyment of being involved in the maintenance exercise program, greater benefit in general well-being, and better physical fitness.

Conclusions: At the completion of the 12 month exercise study, the survey results showed that all participants reported positive attitudes towards both supervised and unsupervised maintenance exercise programs, with the IG reporting greater benefits.

Key Words: COPD, survey, maintenance exercise program

BACKGROUND

Pulmonary rehabilitation programs have been shown to improve exercise tolerance and quality of life in people with chronic obstructive pulmonary disease (COPD).¹ Following the completion of the pulmonary rehabilitation program, if people with COPD continue to exercise regularly, they can maintain exercise capacity and quality of life,²⁻⁶ optimize disease management,⁷ and decrease morbidity, mortality, and use of health care resources.⁸ However, adherence to exercise in people with COPD is difficult to achieve and is often measured by the number of exercise sessions attended without further exploring participant opinion and attitude to the exercise program.⁸

Knowledge of participant opinion regarding exercise may help health professionals identify reasons for adherence and non-adherence to both short and long-term exercise. Furthermore, such information may help health professionals provide exercise strategies that are appropriate to individual needs, thus promoting improvement in self-management.

Feedback from a short-term rehabilitation program (12-week strength-training program) used semi-structured interviews to report participant opinion showing that poor weather and COPD exacerbations reduced adherence, while support from the supervising physiotherapist and the other participants in the training groups enhanced exercise adherence.^{9,10} As well, a recent systematic review identified that transportation difficulties and lack of perceived benefit from rehabilitation were barriers to attendance at pulmonary rehabilitation programs, while depression and current smoking were barriers to the completion of pulmonary rehabilitation programs.¹¹ Feedback following a longer term study (12-month self-management program) used semi-structured interviews to report that participants had positive attitudes to the home exercise program, could do more, felt confident managing exacerbations, and felt safe because of the frequent follow-up visits.¹²

To our knowledge no studies have reported the opinions and attitudes of people with COPD following a longer-term maintenance exercise program. Therefore, the aim of this study was to determine the opinions and attitudes toward exercise in people with COPD who had completed

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a randomized controlled trial of 12-month maintenance exercise program that followed an 8-week pulmonary rehabilitation program.

METHODS

Participants

Forty-eight participants with COPD [(FEV₁/FVC < 70%, FEV₁ predicted < 80%)] who had completed an 8-week pulmonary rehabilitation program and then a 12-month maintenance exercise program were eligible to complete the survey. The study was approved by the Area Health Service Ethics Committee and all participants completed a consent form prior to any data collection.

Randomization

At the end of the pulmonary rehabilitation program, participants were randomized using computerized, random number generation into an Intervention Group (IG) of once weekly, supervised hospital-based maintenance exercise plus unsupervised home exercise or a Control Group (CG) of unsupervised home maintenance exercise only.

Maintenance exercise programs

For 12 months, the IG attended the hospital outpatient facility once per week for supervised exercise plus a home exercise program on 4 other days per week. For 12 months, the CG performed an unsupervised home exercise program 5 days per week. Both groups were given a home exercise booklet and diary to complete. At baseline and at 3, 6, and 12 months, exercise capacity (measured by the 6-minute walk test) and quality of life (measured by St George's Respiratory Questionnaire) were assessed. At the 3-, 6-, and 12-month assessments, the home exercise program was reviewed, difficulties with exercising were discussed, and feedback was given by the supervising physiotherapist. The detailed methodology for the study has been published previously.⁶

Exercise Diary

During the 12-month study, all participants were encouraged to complete a home exercise diary by marking the appropriate boxes to indicate that the exercises or other physical activities had been performed on a particular day. There were 20 boxes in each month that could be marked to represent the maximum number of days of exercise. Participants brought the home exercise diary to each assessment visit to be reviewed by the supervising physiotherapist.

Survey

At the 12-month assessment participants were asked to complete a self-administered survey that consisted of 23 questions with one question (Question 7) consisting of 7 parts. Twenty-one questions were associated with a visual analogue scale (VAS) of 100 mm on which participants were asked to place a mark at the point that best described the answer to the question. Words were placed at each end of the scale as anchors. For example, the question, "How

beneficial was the 12-month exercise program to you?" had anchors of 'not at all beneficial' and 'extremely beneficial.' The remaining two questions asked participants to expand their responses to the above questions.

As part of the survey development, 3 expert pulmonary rehabilitation physiotherapists reviewed the questions. The survey was then administered to a pilot group of 10 people with COPD to determine if the survey could be easily read and comprehended. Following feedback from the pilot group, who had been attending a maintenance exercise program at the hospital outpatient department, one question was rewritten for clarification. A blinded assessor scored the survey responses by measuring the distance from the left-hand side of the VAS line to the mark, as well as noting any additional comments. Twenty-one questions from the survey that related to participants' opinions and attitudes were analyzed and grouped under headings (Table 1).

Statistical analysis

Data were analyzed using SPSS Version 16 for Windows (SAS Corporation, Cary, NC). Nonparametric statistics, using Mann-Whitney U tests, were used. The data for the survey responses are presented as medians and interquartile ranges. A p value of less than or equal to 0.05 was taken as statistically significant. The data for participant characteristics are presented as mean and standard deviation.

RESULTS

Of the 48 participants (IG: n=24; CG: n=24) who completed the 12-month maintenance exercise study, 36 participants (75%) (IG: n=19; CG: n=17) completed the survey and 12 participants (25%) did not [nonsurvey group (NSG)]. Survey participant characteristics are described in Table 2.

The results of the 12-month maintenance exercise program showed that there was no difference between groups at 12 months compared to the end of the pulmonary rehabilitation program. The 6-minute walk distance was maintained at 12 months compared to the end of pulmonary rehabilitation [mean Δ (95%CI) IG: -7m (-33 to 18); CG: -1m (-18 to 17)]. Similarly quality of life was maintained at 12 months compared to the end of pulmonary rehabilitation [mean Δ (95% CI) IG: 2.6 points (-2 to 7); CG: -2 points (-7 to 3)].

Based on the survey responses, the IG reported that they exercised more regularly during the 12-month maintenance exercise program [72 mm (47 – 78)] compared to the CG [45 mm (18 – 72)] ($p = 0.027$) (Figure 1, question 11). Seventy-nine percent of the IG and 53% of the CG reported that they exercised at least 3 days per week. Reported time spent exercising during each session was not significantly different between groups with a VAS of 66 mm (IQR 48 – 86) in the IG and 57 mm (IQR 49 – 77) in the CG (Figure 1, Question 12).

Based on the survey responses, there was no significant difference in diary use reported by the IG [73 mm (10 – 99)] compared to the CG [23 mm (4 – 68)] ($p=0.308$) (Figure 1, Question 13).

Table 1. Survey Questions were Grouped Under Headings

Survey Questions	Anchors for the VAS*
Self-reported adherence to exercise	
Q.11: How many days per week did you exercise?	0 days.....7 days
Q.12: On the days that you exercised, how much time did you spend exercising?	No time.....≥.60 mins
Q.13: How often did you use your diary?	Never.....All the time
Importance of exercise	
Q.23: Finally, how would you describe exercise?	Not important...Extremely important
Enjoyment of the program	
Q.8: Did you enjoy being in the study?	Not at all.....Enjoyed it very much
Benefits from the maintenance exercise program	
Q. 5: How beneficial was the 12-mth program to you?	Not at all.....Extremely beneficial
Q. 7: How beneficial was the program to you in terms of: a). General well-being? b). Physical fitness? c). Ability to handle anxiety & panic? d). Level of tiredness? e). Ability to do things? f). How confident you are? g). Level of breathlessness?	Not at all.....Extremely beneficial Not at all.....Extremely beneficial Not at all.....Extremely beneficial Not at all.....Extremely beneficial Not at all.....Extremely beneficial Not at all.....Extremely beneficial Not at all.....Extremely beneficial
Q. 16: How would you rate your fitness compared to when you started the 12-month program?	Much worse.....Much better
Q. 22: At present, how far can you walk?	Cannot walk Can walk as far as I like outside the house
Other questions	
Q. 9: How difficult was it for you to come to testing?	Not difficult.....Extremely difficult
Q.10: How long did it take you to get to the gym?	≤ 15 mins.....≥ 2 hours
Q.17: Have you had any health problems that made it difficult to exercise?	No illness.....A lots of illness
Q.19: How much contact did you have with the investigator?	Hardly any.....A lot of contact
Q.20: How important was the support you received?	Not important....Very important
Q.21: How important was it that you saw the same person each time?	Not important.....Extremely important

* Anchors: words or phrases that were placed at either end of the 100mm VAS to guide the participant's answer

Based on the survey responses, both groups reported that exercise was important (Figure 2, Question 23). However, the IG reported having more enjoyment at being involved in the study [100 mm (95 – 100)] compared to the CG [89 mm (73 – 100)] ($p=0.013$) (Figure 2, Question 8).

Based on the survey responses, the IG reported experiencing greater benefits in terms of general well-being compared to the CG (Table 3, Question 7a). As well, the IG reported greater benefits in terms of perceived physical fitness (Table 3, Question 7b). Both groups reported that they felt fitter at the completion of the 12-month study (Table 3, Question 16).

Based on the survey responses, there were no differences reported between groups on the amount of contact with the supervising physiotherapist [IG: 99 mm (87 - 100); CG: 87 mm (23 – 100) ($p=0.15$)], the importance of the support received [IG: 100 mm (96 - 100), CG: 100 mm (89 - 100) ($p=0.44$)], the importance of seeing the same supervisor each visit [IG: 93 mm (78 - 100), CG: 94 mm (73 - 100) ($p=0.59$)], time required to travel to the facility for testing [IG: 3 mm (0 - 16), CG: 13 mm (0 - 29) ($p=0.35$)], or any health problems that may have interrupted the exercise program [IG: 50 mm (41 - 68), CG: 46 mm (0 - 57) ($p=0.23$)].

Table 2. Baseline Characteristics Following the 12-month Maintenance Exercise Program

	Did complete survey		Did not complete survey
	IG	CG	NSG
Subjects, n	19	17	12
Male/female	9/10	10/7	8/4
Age, yrs	65 (8)	66 (8)	68 (10)
BMI, kg/m²	25 (5)	27 (7)	24 (5)
FEV₁, % pred	59 (21)	63 (18)	56 (12)
Smokers	5	6	3
Anxiety	5 (3)	5 (3)	4 (3)
Depression	4 (3)	4 (4)	5 (3)
6MWD, m	532 (111)	532 (92)	465 (78)
SGRQ	34 (14)	37 (15)	40 (14)

Abbreviations: IG: intervention group; CG: control group; NSG: nonsurvey group; Data for age, BMI, FEV₁, anxiety and depression (measured using the Hospital Anxiety and Depression Scale) are presented as mean (standard deviation); 6MWD: six-minute walk distance; SGRQ: St George's Respiratory Questionnaire

Figure 1. Survey responses to questions on 'self-adherence.'

Abbreviations: Q, survey question; IG, intervention group; CG, control group
*significantly different, $p < 0.05$

Figure 2. Survey responses to questions on the 'importance of exercise' and 'enjoyment of the program.'

Abbreviations: Q, survey question; IG, intervention group; CG, control group
*significantly different, $p < 0.05$.

DISCUSSION

This is the first study to survey the opinions and attitudes toward exercise in people with COPD following involvement in a 12-month maintenance exercise program. Compared to the CG, the participants in the IG reported greater enjoyment from the maintenance exercise program, greater benefit in terms of perceived physical fitness and general well-being, and they exercised more often.

The reported frequency of weekly exercise was higher in the IG than the CG despite both groups being asked to perform the same frequency of exercise (5 times per week). Seventy-nine percent of the IG and 53% of the CG reported exercising at least 3 days a week, which was higher adherence than previously reported in studies of subjects with COPD.^{3,13} In one of these studies, 44% of patients in the intervention group (monthly exercise sessions plus regular phone calls) and 38% of the control group exercised regularly (walking at least 3 days per week).¹³ Similarly, 31% of subjects in a dyspnea self-management plus exercise group and 33% in the dyspnea management only group walked 4 days per week.³

The higher frequency of weekly exercise in the IG may have been due to the fact that participants exercised under supervision one day per week. Weekly contact enabled the physiotherapist to provide support and encouragement and participants had the opportunity to speak to other patients attending rehabilitation who were not involved in the study. The IG also reported greater enjoyment from being involved in the exercise program than the CG and this may have been due to the regular weekly support and encouragement provided. Another important factor identified by the IG was the peer support from the weekly exercise group.

Both groups had a close relationship with the supervising physiotherapist who assessed all participants at baseline, 3, 6, and 12 months. Regular contact with health professionals has been reported to enhance exercise adherence by providing opportunities to increase participant knowledge,

Table 3. Responses to the Questions About 'Benefits of the Program'

Question	IG Median (IQR)	CG Median (IQR)	p value
Q 5. How beneficial was the 12- month program to you?	92 (78 - 100)	78 (75 - 100)	0.101
Q 7. How beneficial was the program to you in terms of:			
a). General well being?	98 (90 - 100)	84 (76 - 100)	0.027*
b). Physical fitness?	98 (85 - 100)	80 (74 - 100)	0.019*
c). Ability to handle anxiety & panic?	90 (80 - 100)	84 (77 - 94)	0.494
d). Level of tiredness?	91 (78 - 100)	74 (52 - 97)	0.064
e). Ability to do things?	83 (76 - 100)	89 (60 - 100)	0.769
f). How confident you are?	93 (76 - 100)	77 (70 - 95)	0.157
g). Level of breathlessness?	80 (72 - 98)	77 (50 - 95)	0.715
Q 16. How would you rate your fitness compared to when you started the 12-month program?	86 (95 - 100)	93 (73 - 100)	0.831
Q 22. At present, how far can you walk?	93 (76 - 100)	92 (82 - 100)	0.847

Abbreviations: IQR, interquartile range; * = statistically significant, $p < 0.05$; IG, intervention group; CG, control group

provide praise for success, help set achievable goals,^{9,10} and improve the feeling of patient safety.¹² It has been reported that continuous reinforcement is important for learning new skills and intermittent reinforcement (such as regular reviews) may be effective in producing long-term change.¹³ In our study, regular review at 3, 6, and 12 months may have been an important factor in enhancing adherence to exercise in both groups and producing positive responses in the survey.

Other factors that may have enhanced adherence to exercise were participant motivation and expectation of a positive outcome.¹⁵ Participants had successfully completed at least 16 sessions of a supervised pulmonary rehabilitation program and at the time of the survey had completed the 12 months of maintenance exercise, which was shown to maintain exercise capacity and quality of life in both groups.⁶ Expected outcomes have been reported to be a key personal factor in exercise adherence during a 12-week rehabilitation program, ie, participants believed that they would do well.⁹ Participants in our study, having successfully completed a pulmonary rehabilitation program, may have had positive attitudes to their ability to adhere to ongoing exercise.

Although the responses from the surveys showed that diary use at 12 months appeared to be higher in the IG than the CG, there was no significant difference between the groups (Figure 2). However, when the investigator reviewed the diaries at the 12-month assessment, diary use was lower than reported. It has been suggested in a previous study that the longer the participants had symptoms, the less likely they were to complete exercise diaries.¹⁶ This could explain the low diary use in our participants who were involved in a long-term study and had chronic respiratory disease.

Although both groups reported feeling fitter at the end of the study than 12 months earlier (immediately after the completion of an 8-week pulmonary rehabilitation program), self-reported general well-being and physical fitness were higher in the IG than the CG. These findings were in agreement with Berry et al² who reported that participants with COPD reported 12% less disability on a self-reported disability questionnaire following a 12-month weekly, supervised exercise intervention compared to standard care. However, these participants attended supervised exercise 3 times per week as opposed to once per week (in the present study), suggesting that while supervision is important, similar participant outcomes can be achieved with less supervision.

When asked about illness or health issues that may have occurred during the previous 12 months, participants reported that exacerbations of COPD and co-morbidities such as arthritis were the main health problems that interfered with exercise. Some participants expressed a desire to withdraw from the study because the exercise routine had been interrupted due to ill health. They were encouraged to continue to exercise and in many cases, when they observed that their functional exercise capacity had not declined at follow-up assessments, they were motivated to keep going. Despite the long hot Australian summers, par-

ticipants did not comment that the weather interfered with their adherence to exercise in contrast to a previous study by O'Shea et al.¹⁰ However, they did comment that they missed home exercise sessions due to illness, holidays, being busy, and lack of motivation.

There are a number of limitations to this study. First, all participants had completed a pulmonary rehabilitation program as well as 12 months of maintenance exercise and therefore represented a compliant and motivated group. In addition, only surveying those participants who had completed 12 months of maintenance exercise may have limited the information on barriers to long-term exercise. Second, the survey design only allowed for the collection of specific information on participant opinions. This style of self-report may also have inflated the estimate of actual exercise behavior as participant memory over 12 months may have been unreliable,¹⁴ especially if participants failed to complete the exercise diaries.

CONCLUSION

This study is the first to survey participant opinions and attitudes following involvement in a 12-month maintenance exercise program after completion of a pulmonary rehabilitation program. The majority of participants in both groups reported exercising regularly during the 12 months and reported that exercise was important to them. However, compared to the CG, the IG that attended once-weekly supervised exercise sessions reported that they exercised more regularly throughout the 12-month period, enjoyed the program more, and had greater benefits in terms of physical fitness and general well-being. The positive attitudes reported by both groups combined with the maintenance of exercise capacity and quality of life at 12 months,⁶ suggest that continuing to exercise (supervised or unsupervised) with regular reassessment can maintain the benefits achieved during a pulmonary rehabilitation program, at least for 12 months.

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