

Fatigue and Quality of Life after Pulmonary Rehabilitation Program

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ABSTRACT

BACKGROUND. Fatigue and poor quality of life can play an important role in chronic obstructive disease and treatment outcomes. The aim of this study was to examine the levels of fatigue and quality of life (QoL) among chronic obstructive pulmonary disease patients before and after a pulmonary rehabilitation program. **METHODS.** In this experimental study, 31 chronic obstructive pulmonary disease patients at a large hospital of Athens were randomly followed a pulmonary rehabilitation program and completed two questionnaires pre- and post-intervention: the Fatigue Assessment Scale designed for measuring fatigue and the Missoula-Vitas Quality of Life Index-15 designed for measuring QoL. Statistical analysis of the data was performed via the Statistical Program SPSS version 19.0. The statistical significance was set up at 0.05. **RESULTS.** The results showed decreased levels of fatigue after the completion of the Pulmonary Rehabilitation Program compared to pre-intervention. Moreover, although QoL did not seem to change after the intervention, however the dimension "Transcendent" seemed to be increased for the majority of the participants. After the participation in the rehabilitation program a statistically significant and negative correlation was observed between mental fatigue and total score of quality of life ($r = -0.436$, $p = 0.014 < 0.05$) as well as between physical fatigue and the dimensions of "Interpersonal" ($r = -0.470$, $p = 0.008$), "Well-Being" ($r = -0.615$, $p = 0.000$), "Transcendent" ($r = -0.636$, $p = 0.000$) and total score of QoL ($r = -0.543$, $p = 0.002$). **CONCLUSIONS.** A pulmonary rehabilitation program seems to be a successful and innovative clinical prevention program leading to a lower level of fatigue for those patients who suffer from chronic obstructive pulmonary disease. *Pneumon 2019, 32(3):72-80.*

INTRODUCTION

Fatigue seems to be a main symptom among Chronic Obstructive Pulmonary Disease (COPD) patients which leads to restricted physical activity

and decreased exercise levels. Fatigue related to COPD seems to be acute, severe and more intense compared to fatigue which is only associated to aging for instance. More specifically, it influences individuals' functionality in a daily basis.¹ Therefore, fatigue contributes to a low Quality of Life (QoL) and may be the cause of high hospitalization levels or even death². According to a study that was conducted in Canada and recruited 2.4 million COPD patients from six sites which followed Pulmonary Rehabilitation Program (PRP) programs, fatigue seemed to be one of the most common symptoms along with dyspnea and pain with a prevalence of 77%, 93% and 74% respectively.³ In the same study fatigue seemed to be highly associated to a low QoL.

For people who suffer from COPD, fatigue seems to be associated to lung's pathological changes that can result to lack of cardiovascular capacity. Moreover, the repetition of fatigue symptom followed by pain or dyspnea may affect individual's perception and modify their ability regarding differentiation between harmful stimuli.³ Decreased physical activity is the result of dyspnea which by itself causes anxiety, panic and further aggravation of COPD symptoms. This repetitive process leads COPD patients towards a vicious cycle of refusal since they deny taking part in any exercise by also causing further deconditioning to their muscles and physical inactivity.⁴

Overall, since COPD is estimated as an incurable disease, it also seems to affect patients' QoL seriously. QoL can be severely worsened for individuals who suffer from COPD due to lung dysfunction as well as decrement on physical performance. COPD seems to decrease patients' QoL through various ways, from being non-functional in a daily basis and experience difficulties in completing routine tasks, to postpone socializing and not being in mood and physical condition for enjoying time and activities with family and friends.⁵ Apart from the physical obstacles, patients who suffer from COPD may also face various psychological limitations including depression and anxiety.⁶ In a daily basis the majority of the patients referred fatigue, exhaustion, restriction and exclusion in basic daily living activities such as dressing, bathing, walking and eating. At the same time, they had difficulties in housework, leisure activities, and work-related activities

as well as in their sexual life. Almost one third of the same study reported that it was affected to such an extent that it was forced to change a profession. Stopping an activity depends not only on the symptoms that are caused by the disease but also on the subjective importance and significance that patients show to these symptoms.⁷ Often patients do not realize that their activities have been reduced by assuming that this happens due to the fact that they "get older".⁸

THE PULMONARY REHABILITATION PROGRAMS

An effective and holistic treatment that would enhance patients' QoL includes Pulmonary Rehabilitation Program (PRP). Pulmonary rehabilitation is focused on the prevention of COPD progression and on development regarding exercise and symptoms' tolerance. There are various treatment programs and interventions for those patients who suffer from COPD including tobacco quit, ventilation maintenance, complementary oxygen, palliative support, pharmacological treatment or even surgical therapy when is needed.⁹ However, PRP seems to minimize COPD patient's fatigue levels by also improving their QoL. According to the literature review and the existing international instructions and guidelines, PRP seems to hold a vital character in the COPD therapy. More specifically, according to a study¹⁰ among high and low fatigue groups, it was found that physical fatigue such as walking and physical exercise improved for both groups after the PRP. Dyspnea had also decreased until the end of the program and at one year later. In a study,¹¹ patients showed significant improvement in their QoL and self - efficacy regarding their physical symptoms during a PRP. With a range between 0-100, patients scored 30% in their physical activity, 51.3% in their social functioning and 66.3% in their psychological functioning with and overall increment of 5.3% in their total QoL. More specifically, PRP provided by an interdisciplinary team includes pulmonologists, cardiologists, physiotherapists, nurses, ergophysicists, psychologists and dieticians. Several studies^{12,13} have indicated that such an organized program tailored to the needs of each patient could improve functional ability to exercise, reduce symptoms of dyspnea and fatigue and improve COPD patients' QoL at all stages of the disease.

The purpose of the current study was to examine whether fatigue and QoL are either improved or not after the completion of a PRP. Thus, it was expected that fatigue

Abbreviations:

COPD: Chronic Pulmonary Obstructive Disease

FAS: Fatigue Assessment Scale

MVQoLI-15: Missoula Vitas Quality of Life Index

PRP: Pulmonary Rehabilitation Program

would be decreased and QoL would be improved after the PRP integration. The results of this research could shed more light on how a PRP could benefit patients who suffer from COPD as well as what seems essential in order to decrease their levels of fatigue. At the same time, little or no research has been conducted in the past in Greece regarding fatigue and QoL levels before and after a PRP. For this reason and since "Sotiria" Hospital offers a unique and distinct PRP intervention to the Greek population that is applied to each patient's needs, it is very likely that the effects of PRP lead to decreased levels of fatigue.

METHODS

Design and sample

The study followed the convenience sampling. Among the 70 patients at the "Sotiria" hospital, 41 were eligible. Taking into account the inclusion criteria, all patients were adults and were diagnosed with COPD. Exclusion criteria were related to age (<18 and >65 years) and those patients who could suffer from severe diseases (heart or kidney or hepatic failure or other physical disabilities or mental illness) which could alienate the results. Another exclusion factor included language. Since the questionnaires were both translated in Greek, participants should also be native speakers or know the Greek language.

Finally, thirty-one (31) patients took part. Figure 1 shows the patients' selection process. The rehabilitation

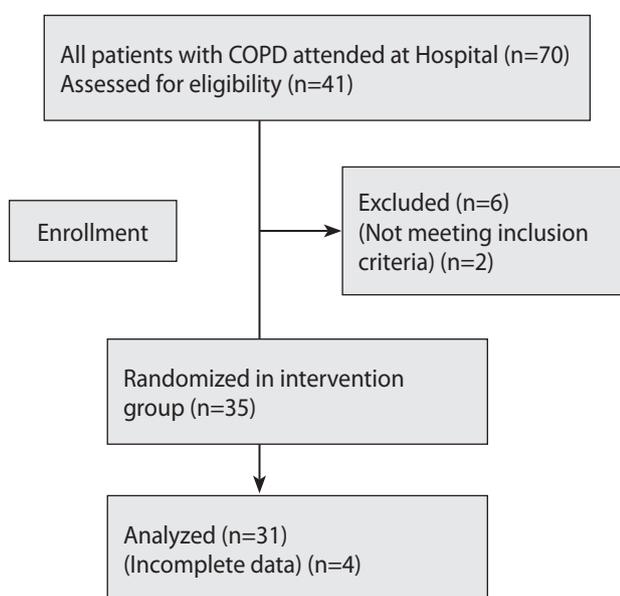


FIGURE 1. Flow diagram for the patients' selection process.

program was conducted by the researchers who are health care professionals and have frequent contact with patients.

Ethics

Before the beginning of the research, license from the Scientific Council of the General Hospital of Athens (Greece) "Sotiria" was obtained. Participants were informed about the anonymity of their participation would, that the research is conducted for academic purposes, their participation is voluntary and that they could withdraw from participation anytime they wished, without having to give any explanations. In addition, if they desired, they could, also, get the results after the completion of the research project. Each participant was asked to read, and sign two copies of the consent form – one for him/her to keep and one for the researcher.

Stage I

After the patients' selection process, the researchers distributed a form of demographic data and two questionnaires:

Demographic data form

The demographic form included the followings: age, gender, the first letter of his/her name, the first letter of his/her surname, educational level and marital status.

Fatigue Assessment Scale

For the purpose of the current study, the Fatigue Assessment Scale was applied. FAS is a 5-point Likert-type scale (1=Never, 2=Sometimes, 3=Regularly, 4=Often, 5=Always) consists of 10 items that refers on how patients usually feel regarding fatigue that is followed by relevant complaints. The score ranges from 10 (minimum) to 50 (maximum). FAS scores from 10-21 indicate no fatigue (normal), 22-34 fatigue and ≥ 35 indicate extreme fatigue. The Greek version of the FAS questionnaire was evaluated for its psychometric properties.¹⁴ At the same time, this scale is considered as a tool, which evaluates fatigue as a unidimensional experience. According to studies¹⁴ which were conducted for patients who were suffering from chronic illness and for renal disease patients who were receiving hemodialysis¹⁵ the Greek version of the FAS was found to be valid and reliable.

Missoula-Vitas Quality of Life Index-15 (MVQoLI-15)

Missoula-Vitas Quality of Life Index-15 (MVQoLI-15)¹⁶ is an evaluation tool that gathers information about patients'

QoL during an advanced disease. MVQoLI-15 is a 15-item questionnaire which consists of 5 dimensions of QoL, in particular, *Symptoms* (3 items), *Function* (3 items), *Interpersonal* (3 items), *Well-Being* (3 items) and *Transcendent* (3 items). A 5-point Likert-type scale (from Strongly Agree to Strongly Disagree) is employed to assess the range to which respondents believe that are related with the items or not. The questionnaire is specifically designed to evaluate each patient's subjective experiences regarding QoL in each of these dimensions. It also seeks to describe each patient's qualitative and subjective experience in a way that can be quickly interpreted by health professionals.¹⁷ For the purpose of the current study, the Greek version of the MVQoLI-15 questionnaire was used which was translated and evaluated for its psychometric properties.¹⁸

The Pulmonary Rehabilitation Program

After the first completion of the questionnaires, the PRP was carried out. The program was taking place at the Pulmonary Clinical Center for Research and Tobacco Control at "Sotiria" Hospital (Athens, Greece), every Monday, Wednesday and Friday from 01:00 P.M. to 03:00 between March-May 2018 through 36 sessions. The minimum number of sessions each patient could join was 20 but no less than that. Each session, and always according to each patient's needs, included an application of the following: (i) individualized physical exercises (exercise on bicycle and exercises for strengthening the upper and lower limbs) with the supervision of an ergophysiotherapist (ii) Respiratory physiotherapy and relaxation techniques provided by a physiotherapist. Breathing physiotherapy aimed to educate COPD patients on the following: how to deal with dyspnea, how to breathe more effectively and with less dyspnea, how to synchronize their respiration with various stereotypical movements of everyday life, such as walking or climbing the ladder and finally how to eliminate their sputum through a more effective cough (iii) Nutritional support provided by a nutritionist aimed to increase muscle mass and control body weight either in the cases of weak and underweight patients or in the cases of obese patients (iv) Psychosocial support provided by a psychologist, aimed to eliminate anxiety, depression or any kind of phobia and/or panic attacks that may affect the patient negatively (v) Information and education on the nature and progression of the disease (anatomy, physiology, pathology, pharmacology, oxygen therapy, dyspnea) and the proper medication provided by physicians and nurses as well as training in long-term

self-care (bronchial drainage techniques, relaxation, coping with dyspnea, addressing daily difficulties) and how to deal with exacerbations of the disease. Education aimed in making the patient aware of his/her current situation and teaches him/her new ways to control the disease.

Stage II

It took place after the completion of the rehabilitation program (3 months after the first completion of the questionnaires). The patients were given the questionnaires (FAS and MVQoL-15) for second time.

Data analysis

The mean values and standard deviations were used to describe the quantitative variables. Absolute (N) and relative (%) frequencies were used to describe the qualitative variables. A paired sample t-test was conducted in order to investigate the possible differences of fatigue and QoL before and after completing the PRP. To test the relationship of two quantitative variables, the correlation coefficients of Pearson (r) was used. The statistical significance was set at 0.05. The statistical program IBM SPSS 19.0 was used for the analysis.

RESULTS

The age range of participants was between 48-65 years old ($M=58.61$, $SD=7.63$). Most of them were males ($n=21$, 67.7%), married ($n=22$, 71%) and graduated from Secondary School ($n=10$, 32.3%).

Regarding the scores of FAS and MVQoLI-15 pre- and post- intervention, there was a significant difference in the scores before and after the PRP for physical fatigue ($t(30)= 2,271$, $p=0.031$), "Transcendence", mental fatigue ($t(30)= 2,979$, $p=0.006$), total score of fatigue ($t(30)= 3,276$, $p=0.003$), "Transcendence" score ($t(30)= -1,981$, $p=0.05$). Table 1 shows the descriptive statistics for all the variables that were explored.

Table 2 shows the frequencies of participants who seemed to be fatigued, non-fatigued or extremely fatigued before and after the PRP.

Correlations

Before the participation in the rehabilitation program, a statistically significant and negative correlation was observed between mental fatigue and total score of MVQoLI-15 ($r= -0.438$, $p=0.014 <0.05$). Correlations of FAS score and MVQoLI-15 are presented in table 3.

TABLE 1. Descriptive Statistics and t-test results for physical fatigue, mental fatigue, total fatigue and quality of life (N=31)

Outcome	Pre		Post		P*	95% CI for Mean Difference	t	df
	M1	SD2	M	SD				
Physical fatigue	14.12	2.89	12.77	3.50	0.031	0.13, 2.57	2.27	30
Mental fatigue	9.80	2.61	8.12	2.78	0.006	0.52, 2.82	2.97	30
Total Fatigue	23.93	4.87	20.90	5.50	0.003	1.14, 4.92	3.27	30
Transcendent	9.58	10.50	14.74	11.56	0.05	-10.48, 0.15	-1.98	30
Symptoms	7.93	6.78	6.70	4.72	0.41	-1.82, 4.27	0.82	30
Function	1.51	10.31	-0.29	11.07	0.40	-2.54, 6.15	0.84	30
Interpersonal	15.90	11.67	19.09	10.18	0.12	-7.31, 0.92	-1.58	30
Well-being	-6.16	13.74	-0.80	16.27	0.19	-11.16, 0.45	-1.88	30
Total MVQoL-15 Score	35.15	23.60	41.18	21.14	0.19	-15.34, 3.28	-1.32	30

Notes: ¹Mean; ²Standard Deviation; *p<0,05

TABLE 2. Descriptive characteristics of fatigue before and after the PRP (N=31)

	Pre		Post	
	Frequency	%	Frequency	%
<22 non fatigued	8	25,8	17	54.8
Higher or equal to 22 fatigued	23	74,2	13	41.9
Higher or equal to 35 extremely fatigued	0	0	1	3.2

After the participation in the rehabilitation program, a statistically significant and negative correlation was observed between mental fatigue and total score of MVQoLI-15 a ($r = -0.436, p = 0.014 < 0.05$). Moreover, there was statistically significant and negative correlation be-

tween physical fatigue and the dimensions of "Interpersonal" ($r = -0.470, p = 0.008$), "Well-Being" ($r = -0.615, p = 0.000$), "Transcendent" ($r = -0.636, p = 0.000$), and total score of MVQoLI-15 ($r = -0.543, p = 0.002$). Statistically significant and positive correlation took place between physical fatigue and the dimension of "Function" ($r = 0.461, p = 0.009 < 0.05$), a statistically significant and negative correlation between total fatigue and the dimensions of "Interpersonal" ($r = -0.444, p = 0.012$), "Well-Being" ($r = -0.550, p = 0.001$), "Transcendent" ($r = -0.568, p = 0.001$) and total score of MVQoLI-15 ($r = -0.567, p = 0.001$) (Table 4).

Regarding the differences between non fatigued (<22) and higher or equal to 22 fatigued patients before the participation in the rehabilitation program, the results showed that there was a statistically significant difference in QoL and specifically in the dimension of "Interpersonal" ($M = 23.12$ versus $13.39, p = 0.040$).

Regarding the differences between non fatigued (<22), higher or equal to 22 fatigued patients and higher or equal to 35 extremely fatigued patients after the participation

TABLE 3. Correlations between dimensions of fatigue and QoL before the intervention

		Symptoms	Function	Interpersonal	Well-Being	Transcendent	Total QoL
Physical fatigue	r	.099	.117	-.046	-.087	-.305	-.007
	p	.597	.530	.806	.643	.095	.970
Mental fatigue	r	-.149	-.221	-.315	-.224	-.275	-.438*
	p	.423	.231	.084	.227	.134	.014
Total fatigue	r	-.021	-.049	-.197	-.171	-.329	-.239
	p	.909	.793	.289	.357	.071	.195

Notes: *p<0,05

TABLE 4. Correlations between dimensions of fatigue and QoL after the intervention (N=31)

		Symptoms	Function	Interpersonal	Well-being	Transcendent	Total QoL
Physical Fatigue	r	-.223	.461**	-.470**	-.615**	-.636**	-.543**
	P	.228	.009	.008	.000	.000	.002
Mental Fatigue	r	-.209	.013	-.285	-.313	-.322	-.436*
	P	.258	.944	.120	.087	.077	.014
Total Fatigue	r	-.248	.300	-.444*	-.550**	-.568**	-.567**
	P	.178	.101	.012	.001	.001	.001

* $p < 0,05$, ** $p < 0,01$

in the rehabilitation program, the results showed that there was a statistically significant difference in quality of life and specifically in the dimension of "Transcendent" ($p=0.013$) as well as the total score of MVQoL-15 ($p=0.046$). Patients with no fatigue presented better QoL.

DISCUSSION

The aim of this study was to compare the levels of fatigue and QoL (QoL) before and after the completion of a PRP in "Sotiria" public hospital. More specifically the focus of this research was to examine whether these two variables could be affected and/or improved by COPD patients who were attending a PRP. It was hypothesized that PRP seems to be a successful and innovative clinical prevention program leading to lower levels of fatigue and a better QoL for those patients who suffer from COPD.

In order to examine the aforementioned hypothesis, a paired sample t-test was performed. Results showed that compared to the initial measurement, fatigue dimensions such as physical, mental as well as total fatigue scores were decreased in the second measurement that took place after the completion of the PRP. Similarly, QoL dimension such as transcendence seemed to be improved in the second and final measurement compared to the initial one. Therefore, lower levels of physical, mental and total fatigue but also higher levels of transcendence seem to confirm the hypothesis of the current research.

Thus, hypothesis was validated as the results showed that there is a significant difference between the two measurements regarding the levels of fatigue and Transcendence. Most of the patients reported lower levels of fatigue and a better transcendence dimension regarding QoL after the completion of the PRP. This is not a surprising finding. According to the literature, fatigue is the effect of a complicated interplay among individuals' physical and

behavioral characteristics. Various physical situations may lead to fatigue, thus, when an efficient therapy is applied, fatigue levels seem to decrease.^{19,20}

On the other hand, transcendence that could be related to the sanctuary and is defined as "a search for meaning, at times of pressure"²¹ seems to be as an internal belief system or a way out of which COPD patients could gain strength and consolation. According to the literature, whether transcendence is framed by the values of humanity, nature, or religion it also contributes to the individuals' "ego" by providing them with strength and helping them to deal with increased anxiety.²²

According to a study²³ that was conducted, regarding the relation of transcendence and physical activity for COPD patients, it was indicated that the practice of transcendence contributes to a statistically significant physical health. Another significant correlation was found between social functioning and transcendence practice. Therefore, each individual acquires a transcendent and spiritual dimension. According to a study that was conducted by Kayahan²⁴ after the completion of a PRP, COPD patients who belonged to rehabilitation group seemed to show significant improvements in dyspnea, physical activity and their overall QoL compared to those patients who belonged to the control group.

Apart from the fact that the hypothesis was confirmed, another advantage of the current research is that this is the first time in Greece that a PRP uses these two instruments together in order to compare the possible differences in fatigue and QoL before and after the completion of the program.

Some limitations of this research include the following; the total sample of 31 participants which does not seem to be large enough may decrease the power of the research and raise at the same time the margin of error by leading to a possible meaningless study. Another limitation is as-

sociated to the fact that the female participants were less than male participants, and more specifically they were only the one third of the total number that took place in the research. This factor cannot provide very accurate results regarding gender differences.

Moreover, the program's limited time (3 months) could not guarantee an improved QoL with significant dimensions. In other words, a PRP that would last for more than three months could benefit the patients' QoL by probably showing significant results regarding interpersonal relationships, wellbeing, symptoms, and/or function dimensions. Finally, future research should be performed regarding fatigue and QoL in pulmonary rehabilitation for COPD patients in order to investigate whether there are differences before and after the PRP. For instance, a research could be focused on the differences between fatigue and QoL before and after a six month to one year PRP.

CONCLUSION

Therefore, PR is an extensive intervention based on a patient's meticulous assessment by providing exercise and education applied to each patient's needs and by aiming to an individual's behavioral change through a healthier lifestyle and a better QoL. PRP improves COPD patients' physical and psychological state by offering long-term attachment to health-promoting behaviors.⁴

The results of the current study may aid health care professionals, COPD patients and academic community to enrich their knowledge about PR strengths and opportunities regarding the Greek population. More specifically, health care professionals may strengthen and support COPD patients to follow a routine, join constantly and complete the PRP in order to gain the program's benefits by becoming more active and decrease their levels of fatigue. Since it seems to be the first time that the academic community may be benefited by such an innovative PRP that is applied in Greece, it seems that the program's advantages could cause the spread of other new, sufficient and more efficient Pulmonary Programs that will be ready to serve the Greek population in the future.

COPD patients should be helped by doctors and health care professionals by applying the principles of PRP and face patients through a multidimensional way with special regard to their QoL. There should be a cooperation

between professionals of the health care area and exploit every method towards this direction by taking seriously each patient's particular problems in order to achieve relief from the chronic disease's symptoms.

Furthermore, it seems to be essential to observe how the difference of fatigue and QoL levels could affect the results before and after the PRP measurement. Hence, future research should be conducted in order to develop strategies that they could diminish the fatigue in COPD patients and by improving at the same time their QoL. If, according to the literature, breath is related to the soul and mind is conceptually related to the soul,²⁵ then doctor and specialized scientists in lung diseases should perform further research to the transcendent needs of COPD patients.

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COMPLIANCE WITH ETHICAL STANDARDS

Conflict of Interest

The authors declare that they have no conflict of interest.

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Ethical approval

Ethical approval was granted by the Scientific Council of General Hospital of Athens "Sotiria". All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

ΠΕΡΙΛΗΨΗ

Κόπωση και Ποιότητα Ζωής μετά από Πρόγραμμα Πνευμονικής Αποκατάστασης

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Εισαγωγή. Η κόπωση και η φτωχή ποιότητα ζωής μπορούν να διαδραματίσουν σημαντικό ρόλο στην χρόνια αποφρακτική ασθένεια και τα θεραπευτικά αποτελέσματα. Σκοπός αυτής της μελέτης ήταν η εξέταση των επιπέδων κόπωσης και ποιότητας της ζωής μεταξύ ασθενών με Χρόνια Αποφρακτική Πνευμονοπάθεια πριν και μετά από πρόγραμμα πνευμονικής αποκατάστασης. **Μέθοδος.** Σε αυτή την πειραματική μελέτη, 31 τυχαία επιλεγμένοι ασθενείς με Χρόνια Αποφρακτική Πνευμονοπάθεια προερχόμενοι από Τριτοβάθμιο νοσοκομείο της Αθήνας συμπλήρωσαν, πριν και μετά από πρόγραμμα πνευμονικής αποκατάστασης, δύο ερωτηματολόγια: Την κλίμακα *Fatigue Assessment Scale* για τη μελέτη των επιπέδων κόπωσης και την κλίμακα *Missoula-Vitas Quality of Life Index-15* για τη μελέτη της ποιότητας ζωής. Η στατιστική ανάλυση διεξήχθη μέσω του στατιστικού πακέτου *SPSS 19.0*. Το επίπεδο στατιστικής σημαντικότητας τέθηκε στο 0.05. **Αποτελέσματα:** Τα αποτελέσματα έδειξαν μειωμένα επίπεδα κόπωσης μετά την ολοκλήρωση του προγράμματος πνευμονικής αποκατάστασης σε σύγκριση με αυτά προ της παρέμβασης. Επιπλέον, αν και η ποιότητα ζωής δε φαίνεται να μεταβάλλεται μετά την παρέμβαση, η διάσταση «Πνευματικότητα» φαίνεται να αυξάνεται για την πλειονότητα των συμμετεχόντων. Μετά τη συμμετοχή στο πρόγραμμα αποκατάστασης παρατηρήθηκε στατιστικά σημαντική και αρνητική συσχέτιση μεταξύ της ψυχικής κόπωσης και της συνολικής βαθμολογίας της ποιότητας ζωής ($r = -0,436$, $p = 0,014 < 0,05$), καθώς και μεταξύ της σωματικής κόπωσης και των διαστάσεων της ποιότητας ζωής «Διαπροσωπικές Σχέσεις» ($r = -0,470$, $p = 0,008$), «Ευεξία» ($r = -0,615$, $p = 0,000$), «Πνευματικότητα» ($r = -0,636$, $p = 0,000$) και της συνολικής βαθμολογίας της ποιότητας ζωής ($r = -0,543$, $p = 0,002$). **Συμπεράσματα:** Ένα πρόγραμμα πνευμονικής αποκατάστασης φαίνεται να αποτελεί ένα επιτυχές και καινοτόμο πρόγραμμα πρόληψης που οδηγεί σε χαμηλότερα επίπεδα κόπωσης σε ασθενείς με Χρόνια Αποφρακτική Πνευμονοπάθεια.

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Λέξεις - Κλειδιά: Χρόνια Αποφρακτική Πνευμονοπάθεια, Κόπωση, Πρόγραμμα πνευμονικής αποκατάστασης, Ποιότητα ζωής

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