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EFFECTIVENESS OF A RESPIRATORY REHABILITATION PROGRAM ON FUNCTIONAL CAPACITY IN PEOPLE WITH COPD (QUASI-EXPERIMENTAL STUDY)

EFETIVIDADE DE UM PROGRAMA DE REABILITAÇÃO RESPIRATÓRIA NA CAPACIDADE FUNCIONAL NA PESSOA COM DPOC (ESTUDO QUÁSI-EXPERIMENTAL)

EFECTIVIDAD DE UN PROGRAMA DE REHABILITACIÓN RESPIRATORIA SOBRE LA CAPACIDAD FUNCIONAL EN PERSONAS CON EPOC (ESTUDIO CUASIEXPERIMENTAL)

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RESUMO

Introdução: A pessoa com Doença Pulmonar Obstrutiva Crónica (DPOC) apresenta diminuição da capacidade funcional (CF). O Enfermeiro de Reabilitação (ER), maximiza a CF da pessoa com melhoria da qualidade de vida. Integrado no projeto "A Pessoa com DPOC–(Re)Habilitar na Comunidade", foi implementado um Programa de Reabilitação Respiratória (PRR) à pessoa com DPOC na Comunidade com o objetivo de avaliar a efetividade de um Programa de Reabilitação Respiratória no equilíbrio estático e dinâmico, na capacidade aeróbia para a marcha e na força dos membros inferiores da pessoa com DPOC.

Metodologia: Estudo quási-experimental (grupo único). Amostragem não probabilística (conveniência), decorreu numa UCC da região norte. Participaram 52 pessoas. Implementado um PRR durante 8 semanas (2 vezes/semana). Variáveis avaliadas antes e após o PRR: equilíbrio estático, dinâmico, capacidade aeróbia para a marcha e força dos membros inferiores. Instrumentos de recolha de dados: Escala Poma/Teste de Tinetti; Prova de marcha de 6 minutos e Teste de sentar e levantar em 1 minuto.

Resultados: O PRR influenciou positivamente a CF da Pessoa com DPOC nas variáveis avaliadas, revelando elevada associação positiva entre a pontuação obtida antes e após o PRR. Quanto à força muscular dos membros inferiores, verificamos que, após o PRR, as médias são superiores. Confirmamos a efetividade do PRR nas três variáveis: equilíbrio estático, dinâmico, capacidade aeróbia para a marcha e força dos membros inferiores.

Conclusão: O Enfermeiro de Reabilitação implementa RR, na comunidade, com ganhos efetivos na CF da pessoa com DPOC.

Descritores: Capacidade Funcional; Enfermagem de Reabilitação; DPOC; Reabilitação Respiratória.

ABSTRACT

Introduction: People with Chronic Obstructive Pulmonary Disease (COPD) experience decreased functional capacity (FC). The Rehabilitation Nurse (RN) maximizes the person's FC with improved quality of life. As part of the project "The Person with COPD–(Re)Habilitate in the Community", a Respiratory Rehabilitation Program (RRP) was implemented for the person with COPD in the Community with the aim of evaluating the effectiveness of a Respiratory Rehabilitation Program in static balance and dynamics, aerobic capacity for walking and lower limb strength in people with COPD.

Methodology: Quasi-experimental study (single group). Non-probability sampling (convenience) took place in a CCU in the northern region. 52 people participated. A RRP was implemented for 8 weeks (2 times/week). Variables assessed before and after the PRR: static and dynamic balance, aerobic capacity for walking and lower limb strength. Data collection instruments: Poma Scale/Tinetti Test; 6-minute walking test and 1-minute sit-to-stand test.

Results: The RRP positively influenced the FC of the person with COPD in the variables assessed. A significant correlation was found, revealing a high positive association between the score obtained before and after the RRP. Regarding the muscular strength of the lower limbs, there was no positive association, but we found that, after the RRP, the averages were higher. We confirm hypotheses H1 and H2. H3 is not confirmed, but there was an improvement in the results obtained after the RRP.

Conclusion: The Rehabilitation Nurse implements RR, in the community, with effective gains in the FC of the person with COPD.

Descriptors: Functional capacity; Rehabilitation Nursing; COPD; Respiratory Rehabilitation.

RESUMEN

Introducción: Las personas con enfermedad pulmonar obstructiva crónica (EPOC) experimentan una disminución de la capacidad funcional (FC). La enfermera de rehabilitación (RE) maximiza la FC de la persona con una mejor calidad de vida. Como parte del proyecto "La Persona con EPOC–(Re) Habilita en la Comunidad", se implementó un Programa de Rehabilitación Respiratoria (PRR) para la persona con EPOC en la Comunidad con el objetivo de evaluar la efectividad de un Programa de Rehabilitación Respiratoria en equilibrio estático y dinámica, capacidad aeróbica para caminar y fuerza de miembros inferiores en personas con EPOC.

Metodología: Estudio cuasiexperimental (grupo único). El muestreo no probabilístico (por conveniencia), se realizó en una UCC de la región norte. Participaron 52 personas. Se implementó un PRR durante 8 semanas (2 veces/semana). Variables evaluadas antes y después del PRR: equilibrio estático y dinámico, capacidad aeróbica para la marcha y fuerza de los miembros inferiores. Instrumentos de recolección de datos: Escala de Poma/Test de Tinetti; Prueba de marcha de 6 minutos y prueba de bipedestación de 1 minuto.

Resultados: El PRR influyó positivamente en la FC de la persona con EPOC en las variables evaluadas. Se encontró una correlación significativa, revelando una alta asociación positiva entre el puntaje obtenido antes y después del PRR. En cuanto a la fuerza muscular de los miembros inferiores, no hubo asociación positiva, pero encontramos que, después del PRR, los promedios fueron mayores. Confirmamos las hipótesis H1 y H2. H3 no está confirmado, pero hubo una mejora en los resultados obtenidos tras el PRR.

Conclusión: La Enfermera de Rehabilitación implementa RR, en la comunidad, con ganancias efectivas en la FC de la persona con EPOC.

Descriptores: Capacidad funcional; Enfermería de Rehabilitación; EPOC; Rehabilitación Respiratoria.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is the 3rd leading cause of death worldwide and in Portugal, with an increase in its prevalence over the years, from 54,660 in 2011 to 136,958 people in 2017 [1]. Its prevalence in Portugal is 14.2% for people over 40 years old (approximately 800,000), predominantly in males. It is characterized by persistent respiratory symptoms with airflow limitation, resulting from alterations in the alveoli and airways, as a result of significant exposure to harmful gases and particles [1].

According to the 13th Report of the National Observatory of Respiratory Diseases, in Portugal respiratory diseases are responsible for about 19% of deaths and the main cause of hospital admission. There is indeed a direct correlation between respiratory function, symptoms and quality of life[1]. COPD is characterized by a set of persistent respiratory symptoms that reduce airflow due to prolonged and significant exposure to harmful gases or particles and decrease ventilatory efficiency [1]. The most frequent symptoms are dyspnea, cough, and expectoration, and the associated risk factors are smoking, environmental exposure, environmental pollution, and biomass burning. Genetic factors that may lead to abnormal lung development are also associated [1]. It is a treatable disease, by ensuring a diagnosis to which a specific treatment is adapted, by reducing risk factors, as well as by adapting a respiratory rehabilitation (RR) plan directed to the person's actual needs [2].

In people with COPD, changes occur at the pulmonary level, with extrapulmonary consequences, mainly in the skeletal muscles, resulting in a decrease in tolerance to physical exercise, due to the loss of muscle mass and strength [1].

The person's quality of life is compromised, with the worsening of symptoms, with repercussions on functional capacity, resulting in difficulty in carrying out their daily life activities and negatively interfering with the work and social aspects [3,4]. COPD treatment involves the implementation of pharmacological and non-pharmacological measures, with respiratory rehabilitation (RR) being the non-pharmacological treatment of choice [3,4].

According to the Good Practice Guidelines - Respiratory Rehabilitation[5] and the European Respiratory Society[6], RR aims to maximize the person's independence, improve their physical condition (making them as active as possible), improve participation in their activities, allow for better literacy enabling better decision-making about treatment options, coping mechanisms, with direct effects on improving their quality of life. The same documents add that an individualized and systematic RR program allows minimizing symptoms, maximizing the capacity for physical exercise and promoting improved autonomy. The aforementioned upstream factors favor increased social participation, with direct effects on health-related quality of life and ultimately promote changes that, in the long term, result in improved well-being [5,6].

The Rehabilitation Nurse has scientific, technical and human competence in providing general and specialized care in the area of specialization and through their intervention "designs, implements and monitors differentiated rehabilitation nursing plans, based on the real and potential problems of people. (...) Their intervention aims to promote early diagnosis and preventive rehabilitation nursing actions, (...) as well as provide therapeutic interventions (...) at the level of functions: neurological, respiratory, cardiac, orthopedic and other deficiencies and disabilities" [7].

Studies have shown that the implementation of a RR program, carried out by a specialist rehabilitation nurse, results in clinical gains reflected in functional capacity, and improved ability to perform in various domains of activities of daily living (ADL) and in the quality of life of the person with COPD [8,9,10,11,12].

Given the above, the following research question emerged: what is the effect of a Respiratory Rehabilitation Program implemented by specialist rehabilitation nurses on static and dynamic balance, aerobic gait capacity, and lower limb strength in people with COPD? This study is part of the project entitled "The Person with COPD - (Re)habilitating in the Community".

METHODOLOGY

This study was based on a quantitative paradigm; it is a quasi-experimental, single-group study that was operationalized in a Community Care Unit (CCU) of a Group of Health Centers (ACeS) in the northern region of the country. The non-probabilistic sampling technique (convenience) was used.

In the CCU, people diagnosed with COPD were identified. The following inclusion criteria were considered: person diagnosed with COPD, without complex comorbidities; saturation > 90% at rest; saturation > 85% during the 6-minute walk test; moderate dependence or independence (modified Barthel Index ≥ 10). The exclusion criteria were: person with cognitive impairment; person with COPD, Gold Level, and indication for respiratory rehabilitation in a specialized setting. The sample consisted of 52 people (n=52) who met the inclusion criteria.

The data collection instruments used were: sociodemographic and clinical questionnaire; Poma Scale/Tinetti Test; The Six-Minute Walk Test (6mWT) and the 1-Minute Sit-to-Stand Test (1mStST) assess static and dynamic balance, aerobic walking capacity, and lower limb strength, respectively. The results were analyzed using the SPSS28® program. The parametric t-test (paired samples) was used, and the significance level (p-value) admitted in all situations was $p<0.05$, with a 95% confidence interval.

In the sociodemographic and clinical questionnaire, a checklist was used to assess the inhalation technique during its demonstration. This checklist was developed by the authors, based on the literature [13], in which the phases of the inhalation technique were described and, after observation, it was verified whether the participants performed all the steps (perform a deep exhalation before inhalation; place the device in the correct position, place the mouthpiece correctly in the mouth, perform the inhalation appropriate to the device, pause after inhalation and rinse the oral cavity after inhalation) [13].

A RRP was implemented for 8 weeks (2 times/week). The variables assessed before and after the RRP were: static and dynamic balance, aerobic gait capacity (AGC) and lower limb strength (LLS). The variables (static and dynamic balance, AGC and LLS) interfere with the person's functional capacity and their improvement has repercussions and gains in the achievement of the various domains of activities of daily living (ADL) and in the quality of life of the person with COPD.

The study hypotheses were:

H1: After participation in the Respiratory Rehabilitation Program (RRP), there is an improvement in static and dynamic balance in people with COPD.

H2: After participation in the Respiratory Rehabilitation Program (RRP), there is an improvement in aerobic gait capacity in people with COPD.

H3: After participation in the Respiratory Rehabilitation Program (RRP), there is an increase in lower limb strength in people with COPD.

The sociodemographic and clinical questionnaire was created with the aim of characterizing the participants. The sociodemographic and clinical variables were: diagnosis, GOLD classification of COPD; age; gender; BMI; marital status; educational qualifications; profession; associated diseases; age at COPD diagnosis; oxygen therapy/number of hours of O2; smoking habits; therapeutic adherence/inhalation therapy. Therapeutic adherence was assessed through personal description of its compliance, as prescribed.

Our primary outcome is to evaluate the effectiveness of the intervention of the independent variable (RRP) on static and dynamic balance, and our secondary outcome is to evaluate the effectiveness of the same PRR on AGC LLS. The variables were assessed before and after the RRP.

In the first stage, people with COPD were contacted by telephone, and an initial nursing consultation was scheduled. Exclusion criteria were applied to identify the sample, as well as data collection instruments. Eligible individuals were asked for informed consent. They were invited to join the Respiratory Rehabilitation Program (RRP) after an explanation of the aims. The principles of non-maleficence, beneficence, and autonomy were also taken into account, and participants were informed that they could leave the study at any time. The study received a favorable opinion from a Health Ethics Committee, which issued opinion no. 60/2022. Authorization was also requested from the author of the Poma Scale/Tinetti Test, and a favorable opinion was obtained for its use. All data obtained were coded and processed without the possibility of identifying the participants.

The RRP began with an educational self-management session, through a training session, operationalized by the CCU/ECCI multidisciplinary team (rehabilitation nurse; doctor; nutritionist; technical assistant). This session lasted 30 to 60 minutes and included 5 to 10 participants per session.

Following the educational session, the RRP (Rehabilitation and Restoration Program) lasted 8 weeks (two sessions per week). Each session was held in the CCU gymnasium, in groups of 5 to 10 people, and lasted 45 to 60 minutes. The sessions began with a warm-up period of approximately 10 minutes and ended with a cool-down period of approximately 10 minutes. The program included: relaxation positions; dissociation of breathing times and breath control; diaphragmatic re-education; global costal re-education; rib cage opening with a stick and bilateral band; muscle strength training for the upper and lower limbs, and training for the lumbar and abdominal muscles; training in energy management techniques and instruction on effective coughing and relaxation positions. This program was carried out progressively, with sets of 10 repetitions, increasing as the participants' resistance improved, assessed on a case-by-case basis. Materials used included: dumbbells (0.5kg, 1kg, 1.5kg and 2kg); elastic bands; cycle ergometer, pedals; walking stick and bands and walking in the CCU corridor, according to the person's tolerance. This program was carried out by only one rehabilitation nurse.

After the RRP, the data collection instruments that monitored the functional capacity of the person with COPD were applied again (Poma Scale/Tinetti Test; 6mWT and 1mStST).

In order to answer the research question and the defined aims, descriptive statistics were used: frequencies, measures of central tendency and measures of variability; as well as inferential statistics: hypothesis tests14. The internal validity of the scales was obtained through Cronbach's alpha and compared with the scale value. Cronbach's alpha in the Poma Scale/Tinetti Test: 0.874.

Due to the sample size (n>30) and the central limit theorem, it was not necessary to test the normality of the distribution.

RESULTS

SAMPLE CHARACTERIZATION

We found that, of the 52 participants, 69.2% had a COPD diagnosis classified as GOLD E and 30.8% as

GOLD B. Of the people who were part of the study, 76.9% reported having chronic bronchitis and the rest had pulmonary emphysema. They had an average age of 70.5 years old (± 9.619), a minimum of 43 years old and a maximum of 90 years old. There were 31 males (59.6%) and 21 females (40.4%).

The remaining sociodemographic characteristics are detailed in Table 1.

Table 1 – Distribution of the sample according to gender; BMI; marital status; educational qualifications and profession (n=52)

		ni	%
Gender	**Male**	**31**	**59.6%**
	Female	21	40.4%
BMI	<18.59 (Low Weight)	2	3.8%
	18.6-24.99 (Normal weight)	11	21.2%
	25-29.99 (excess weight)	15	28.8%
	30-34.99 (Obesity Grade I)	**19**	**36.5%**
	35-39.99 (Obesity Grade II)	4	7.7%
	>40 (morbid obesity)	1	1.9%
Marital status	Single	4	7.7%
	Widowed	12	23.1%
	Married/ common-law marriage	**31**	**59.6%**
	Divorced/Separated	5	9.6%
	Not applicable	0	0.0%
Educacional qualifications	**1st Cycle**	**34**	**65.4%**
	2nd Cycle	2	3.8%
	3rd cycle	4	7.7%
	Secondary	8	15.4%
	Higher education	1	1.9%
	He did not attend school.	3	5.8%

		ni	%
Profession	Technical and intermediate level professions	1	1.9%
	Administrative Staff	1	1.9%
	Workers in personal services, protection and security, and sales.	2	3.8%
	Farmers and skilled workers in agriculture, fishing and forestry.	1	1.9%
	Skilled workers in industry, construction, and crafts.	17	32.7%
	Plant and machine operators and assembly workers	0	0.0%
	Unskilled workers	**30**	**57.7%**
	It doesn't fit.	0	0.0%

Participants reported several associated pathologies. The most frequently mentioned were "Diseases of the Circulatory System" (25.8%) and "Diseases of the Osteoarticular System and Connective Tissue" (14.7%), 12.3% mentioned other "Diseases of the Respiratory System", 8.6% with a diagnosis of "Neoplasms/Tumors" and 7.4% with "Endocrine, Nutritional and Metabolic Diseases".

The average age at COPD diagnosis was 48 years old (±15.68). Inhalation therapy was the prescribed treatment for 94.2% of people. This therapy was performed autonomously in more than 90.5% of cases. Regarding therapeutic adherence, 76.9% reported compliance with the prescription. When the inhalation technique was observed, it was inadequate in 90.4%. Of the participants, 13.5% underwent oxygen therapy for 12 to 16 hours/day. Active smokers were 5.8% and ex-smokers were 28.8%. Smokers reported consuming 10 to 20 cigarettes/day. Ex-smokers quit smoking when they were on average 51 years old (± 11.018).

When the Poma Scale/Tinetti Test was applied, we found that participants before the PRR had an average of 19.08 (± 0.70), and after the program they had an average of 26.83 (± 0.27), with a minimum of 18 and a maximum value of 28. Performing an analysis regarding static and dynamic balance, we found improvement in both dimensions of the scale. Static balance before the RRP had an average of 10.23 (±0.37) and after the RRP it was 15.12 (±0.20). Dynamic balance before the RRP was 8.85 (±0.37) and after the RRP was 11.71 (±0.09). Participants showed improvement in static and dynamic balance after the RRP (Table 2).

In the 1mStST, the 52 participants, before the RRP, had an average of 14.38 (± 0.63) and after the PRR 26.09 (± 0.79). It is observed that the results are superior after the program was carried out (Table 2).

Regarding the 6mWT, before the program, people performed an average of 233.98 (± 13.31) and after the RRP an average of 303.56 (± 13.59) was observed (Table 2).

Table 2 – Distribution according to Poma Scale/Tinetti Test, 1mStST and 6mWT, before and after the RRP (n=52)

	N	Average (± Desvio Padrão)	Minimum Maximum
Poma Scale/Tinetti Test before RRP	52	19.08 (±0.70)	5.00 – 26.00
Poma Scale/Tinetti Test after RRP	52	**26.83 (±0.27)**	**18.00 - 28.00**
1mStST, before RRP	52	14.38 (±0.63)	5.00 - 26.00
1mStST, **after RRP**	**52**	**21.67 (±0.79)**	**11.00 - 35.00**
6mWT, before RRP	52	233.98 (±13.31)	40.00 - 400.00
6mWT, **after RRP**	**52**	**303.56 (±13.59)**	**75.00 - 462.00**

HYPOTHESIS TESTING

We found that the RRP positively improved the functional capacity of the person with COPD in aspects related to the LLS (p<0.011), AGC (p<0.001) and static and dynamic balance (p<0.001) (table 3).

Table 3 – Student's t-test for Poma Scale/Tinetti Test, 6mWT and 1mStST, before and after the RRP (n=52)

	Average	dp	dp average	Lower	Higher	t	df	Sig.
Poma scale/Tinetti test before and after RRP	-7.75000	3.76191	0.52168	-8.79732	-6.70268	-14.856	51	**0.001**
6mWT, before and after RRP	-69.57692	38.62811	5.35676	-80.33106	-58.82279	-12.989	51	**0.001**
1mStST, before and after RRP	-11.71154	31.93151	4.42810	-20.60133	-2.82175	-2.645	51	**0.011**

A statistically significant difference was found for static/dynamic balance (p< 0.001); for LLS (p<0.011) and AGC (p< 0.001). Based on the results, we confirm hypotheses H1, H2 and H3 with improved results obtained after the PRR in the person with COPD.

DISCUSSION

After presenting the results, we moved on to their discussion, based on the objectives and hypotheses formulated, aiming to carry out an analysis based on the literature.

In our study, some sociodemographic and clinical characteristics of the person with COPD are described. We found that bronchitis was the most prevalent pathology, followed by pulmonary emphysema. Bronchitis and emphysema contribute to the onset of COPD [15].

The people had an average age of 70.5 years old. More than 60% of the participants were between 60 and 79 years old, and were mostly male. These results corroborate the data released by the Directorate-General for Health (DGH), which states that the prevalence of COPD reaches 30.8% in people over 70 years old [3,4]. Data from the report of the National Observatory for Respiratory Diseases (NORD) adds that COPD is more frequent in men [16].

More than half of the participants were married/in a de facto union. The 2021 CENSUS reveals that, nationally, we have an aging population, with elderly people living alone [17]. We conclude that the participants had a BMI above normal. Obesity and COPD contribute to the presence of dyspnea, tiredness and a feeling of fatigue [18].

The vast majority of people had primary education. In Portugal, there is a high number of people with low levels of education, which reflects low levels of literacy [17].

Almost all participants used inhaler devices. The use of these therapeutic devices is justified, as it allows their deposition directly at the site of action, which are the lower airways [13,19].

Although most participants reported adherence to medication therapy, some cases of non-adherence were observed. There are some factors that can influence therapeutic adherence and the correct use of the inhaler. These factors are associated with the person themselves, namely their age, associated physical problems, the person's inspiratory profile, which can interfere with manual dexterity and reduce the ability to handle the device correctly [19].

Inhalation therapy continues to be the most prescribed therapeutic option, making effective adherence to pharmacological treatment, as well as correct use of the inhaler device, fundamental [1].

We found that more than 90% of participants performed inhalation therapy inadequately. The results of our study reveal worse results than those of the study by Maricoto et al.[19], which revealed that 76% of people who performed inhalation therapy made some kind of error in its execution. Empowering the person to use inhaler devices has a positive impact on their quality of life [20]. Pacheco, Alves & Alves[20] add that a specialized nursing intervention plays a fundamental role in empowering the person, with gains in quality of life. This therapy has become fundamental in the treatment of COPD, both for controlling symptoms, decreasing the frequency and severity of exacerbations, and slowing disease progression, allowing for a reduction in mortality and with direct effects on exercise tolerance, improving the person's quality of life [1].

Some of the participants were receiving oxygen therapy at home. The use of OLD aims to treat and prevent manifestations of hypoxia, with an improvement in cognitive performance and with

reflections on the quality of life, which constitutes a treatment of choice for the person with COPD [20]. A RRP should be adjusted to the needs of the person with COPD and together with OLD allow better exercise resistance [5,12,20].

Few participants reported currently smoking. Smoking habits are the main cause of a person developing airway obstruction, but there are other risk factors that can lead to the onset of the disease, such as: genetic factors, occupational and environmental exposure, dust, fumes, biomass combustion fumes, factors that may affect lung growth and bronchial hyperreactivity [21].

The average age of onset of COPD diagnosis was 48 years old. According to the National Program for Respiratory Diseases, 14.2% of people with this pathology are over 40 years old, with prevalence increasing with age and smoking history, in both genders [16].

Regarding associated clinical pathologies, diseases of the circulatory system, as well as the osteoarticular system and connective tissue, stand out. COPD is a very frequent disease, associated with the aging process, and is associated with other pathologies and comorbidities [17].

The RRP improves static and dynamic balance (primary outcome), AGC and LLS (secondary outcome), assessed before and after the RRP of the person with COPD. These results corroborate findings in the literature, which emphasize that conducting a RRP for people with COPD increases functional capacity, brings benefits in empowerment, in symptom control and allows for better recovery of the person in the face of exacerbation, with a reduction and avoidance of hospital admission [20,23,24,25].

The results, after applying the Poma scale, demonstrated that the average total scores were higher after the PRR. With the implementation of the RRP, a significant improvement was observed in both static and dynamic balance. These results corroborate others found in the literature. The implementation of an appropriate rehabilitation program tailored to the person's needs results in gains in balance, but also in functional capacity [9,10,11,12,20]. RN emerges through a specialized approach, and should be organized and structured with the aim of improving muscle performance, tolerance to effort, with reflections on quality of life [13,23,24,25].

After applying the 1mStST, we observed an increase in the number of elevations achieved after the RRP. The 52 participants presented an average of 14.38 (± 0.63) before the PRR and 26.09 (± 0.79) after the RRP. On average, participants performed 11.71 more lifts, which exceeds the minimum clinically significant difference in this test (3 lifts) [4]. Some studies highlight the importance of the muscles responsible for locomotion, especially the quadriceps, for their contribution in terms of muscle endurance and their fundamental role in the ambulation of people with COPD [8,9,10]. A person with improved lower limb strength reflects an improvement in functional capacity, with positive results in their quality of life [4,22].

When performing the 6mWT, people performed an average of 233.98 meters (± 13.31) before the PRR and an average of 303.56 meters (± 13.59) after the PRR. We found that, on average, participants performed 70 more meters, which exceeds the minimum clinically significant difference in this test (30m), recommended by the literature [4]. Through this test we were able to assess aerobic capacity for walking, with significant improvements when the rehabilitation nurse intervened. According to the literature, improved physical performance has positive effects on a person's ability to perform their daily activities and consequently a positive effect on their quality of life [5,26]. Dyspnea is the main symptom associated with COPD, secondary to pulmonary changes, hyperinflation and atrophy of the respiratory muscles [4,5]. The RN improves the person's physical condition, reduces dyspnea, which results in an increased capacity to perform daily tasks, greater promotion of autonomy, well-being and health-related quality of life [4,5]. The results of our study corroborate the findings in the literature, confirming that after the implementation of a RRP, the person shows a significant improvement in functional capacity and exercise tolerance [26].

We found that the RRP positively influenced the functional capacity of people with COPD in aspects related to LLS ($p<0.011$), AGC ($p<0.001$), and static and dynamic balance ($p<0.001$). Statistically significant differences were found for static/dynamic balance ($p<0.001$); for LLS ($p<0.011$) and AGC ($p<0.001$), which allowed us to confirm hypotheses H1, H2, and H3.

The RRP is recommended for people with COPD, as well as other people with chronic respiratory diseases, since this program has a positive impact on a person's functional capacity.

Some limitations were observed in this study, namely, human resources, which during the holiday period, made it impossible to carry out more RRPs. It is proposed that the RRP be expanded in groups to the community, to other people diagnosed with COPD.

CONCLUSION

People with COPD in the community should have specialized follow-up from a multidisciplinary team, based on structured and coordinated care. Aspects related to the development of self-management skills for the disease are fundamental and positively influence the effectiveness of treatment.

In our study, the sample consisted mostly of people with GOLD E COPD and bronchitis. With the implementation of the RRP, we found that it positively influenced static and dynamic balance, AGC, and LLS.

The RN implements RRP with effective gains in static and dynamic balance, aerobic gait capacity

(AGC), and lower limb strength (LLS). It is up to the RN to intervene actively, based on the body of specific knowledge and skills, through the implementation of RRP that promote an improvement in functional capacity, allowing each person to obtain improvements in functional capacity, respiratory capacity, and physical fitness.

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