

# Satisfaction and Adherence of COPD Patients to a Conventional Training Associated with Functional Exercises and to a Conventional Training Isolated: A Qualiquantitative Study

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**Purpose:** To verify, through quali-quantitative analysis, the satisfaction and adherence of patients with Chronic Obstructive Pulmonary Disease (COPD) to the insertion of functional circuit training into conventional training.

**Patients and Methods:** 23 patients with COPD from a randomized clinical trial were invited to participate in a quali-quantitative analysis after the training finalization, divided into FTG (Functional Training Group) and CTG (Conventional Training Group). A total of 21 patients participated [(FTG: n=10; 65.80±7.31 years; FEV<sub>1</sub>/FVC: 56.44±12.67%) and CTG (n=11; 70.36±7.02 years; FEV<sub>1</sub>/FVC: 55.89±8.20)]. For the qualitative evaluation, focus groups were performed, using a previously developed script. Adherence was verified by the presence in the training sessions that were prescribed, and the quantitative analysis was performed using questionnaires with multiple-choice questions (evaluation of the aspects that can interfere in a training). The participants were asked to define a grade between zero and ten regarding the aspects of the training (satisfaction).

**Results:** In both groups, there was similar adherence (p=0.965) and satisfaction (p=0.341). The qualitative analysis identified seven themes and 17 codes, representing factors related to satisfaction and negative aspects, as follows: factors associated with satisfaction: self-efficacy management, physical and psychosocial improvement, interpersonal relationships, and proposed exercises. Negative aspects: pains, comorbidities, beliefs, and personal demotivation. In the quantitative analysis, was verified that an increase in the symptoms, the distance between home and training center, and personal problems were not factors that interfered in the adherence of the participants (p<0.05).

**Conclusion:** Similar satisfaction and adherence of patients with COPD were observed in the FTG and CTG and patients from FTG reported higher fatigue.

**Keywords:** Chronic Obstructive Pulmonary Disease, physical exercise, patient satisfaction, patient adherence, qualitative research, quantitative evaluation

## Introduction

Chronic Obstructive Pulmonary Disease (COPD) is characterized by airflow limitation, respiratory symptoms,<sup>1</sup> functional limitations,<sup>2</sup> and associated comorbidities.<sup>1</sup> According to the World Health Organization (WHO), by 2030, COPD will be the third cause of death in the world.<sup>3</sup>

The need to insert patients with COPD into a Pulmonary Rehabilitation Program (PRP) to control the disease and improve or maintain their clinical status is well defined in the literature.<sup>4-6</sup> Further, PRPs have several interventions and one of them is physical exercise, considered grade “A” evidence in the treatment of these patients.<sup>7</sup> Aerobic and



resistance training (conventional training) are conventional modalities of physical training used in PRPs,<sup>2,8,9</sup> that increase muscle strength, functional capacity, quality of life, and reduce dyspnea.<sup>4-6</sup>

Even though the benefits of physical training during PRP for COPD patients,<sup>5,9</sup> the adherence and conclusion rate of these programs are still poor.<sup>10,11</sup> Due to that, several qualitative and quantitative studies have sought to understand the reasons for these facts, some of which are personal compromises, and changes in routine and work.<sup>12,13</sup> Studies have shown that body mobility limitation<sup>14</sup> and the monotony of the PRPs<sup>15</sup> are barriers to adherence, which are associated with exercise intolerance, which can influence negatively the treatment adhesion.<sup>10,12,13,15</sup>

Functional exercise is considered a modality of exercise that includes muscle work and coordinated multi-joint movements with dynamic exercises, simulating routine activities.<sup>16</sup> Preview study showed that functional exercises promote functional benefits to COPD.<sup>17,18</sup> Sewell et al performed a physical training program composed of aerobic and home training associated with functional exercises, which promoted physical benefits to COPD patients. Although, no adherence analysis was performed.<sup>18</sup>

Hence, considering that functional exercise is a different modality that simulates routine activities (eg: simulating drying the back, sweeping the floor, and tying a shoe), is more dynamic than the conventional ones (aerobic training in cycle ergometers and static strength exercises),<sup>18</sup> and that exercise programs with multiple modalities can produce higher adherence than programs with poor exercises varieties,<sup>19</sup> the functional training associated to the conventional training could be an alternative to improve treatment adherence to the physical training in patients with COPD.

Also considering that functional exercises in a circuit format can promote an increase in muscle strength,<sup>20</sup> functional capacity,<sup>18</sup> and quality of life,<sup>17,18</sup> this may be an interesting and viable alternative to the cited problems.

Qualitative analysis, searching for attitudes related to human behavior, demonstrates that the investigation of satisfaction with the subject's treatment is extremely important,<sup>21</sup> not only investigating the disease, but searching for the meaning for these patients, and their characteristics and way of living, in all contexts.<sup>22</sup>

Quantitative studies differ from qualitative regarding the methodology to data collection and the analysis and interpretation of the variables.<sup>23</sup> While quantitative data is submitted to multivariate analysis and techniques for statistical predictions, qualitative studies promote deep participation of the participants that consequently produce a specific knowledge related to these individuals' experiences, which can be an important key to understanding their feelings and beliefs about a specific treatment program.<sup>23</sup>

Thus, from this analysis, we could understand the factors involved in the process of disease acceptance to the proposed treatment, making it possible to develop new strategies to improve adherence and satisfaction. Therefore, the present study aimed to verify the satisfaction and adherence of patients with COPD to the insertion of a functional circuit into conventional training and compare this with isolated conventional training.

## Materials and Methods

### Sample Selection

This study is a secondary analysis composed of a convenience sample from a prior randomized clinical trial (RCT).<sup>24</sup> From July 2018 to January 2020, patients with COPD were recruited to participate in physical training to decrease their disease symptoms, through invitations at doctor's offices, health centers, and hospitals. The inclusion criteria of this study were: (1) patients with COPD diagnosed according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD); (2) clinically stable patients without exacerbations or changes in medications for at least 30 days; (3) patients who did not use long-term oxygen therapy at home; (4) patients without pathological conditions that prevented the performance of physical activity; (5) absence of severe or unstable heart disease and (6) patients that did not have been included in another structured exercise program.

After agreeing to participate, the patients were randomized into training groups. Thirty-five patients with COPD were randomized into: Functional Training Group (FTG) [11 patients], Conventional Training Group (CTG) [12 patients], and Usual Care Group (UCG) [12 patients]. Twenty-three patients from this randomized clinical trial were invited to participate in qualitative and quantitative analysis (only patients from FTG and CTG - because this qualitative study is

a secondary analysis that was restricted only to verify and compare the satisfaction and adherence of the exercise training groups).

Twenty-one of these patients participated in the present study, which consisted of focus groups (FTG: 10 patients and CTG: 11 patients) to collect the qualitative data and questionnaires to collect the quantitative data. All patients of these training (FTG and CTG) were invited to participate in these evaluations, only one patient of FTG did not perform the quali-quantitative evaluation due to personal problems, and all patients of CTG participated.

The randomized allocation sequence of the RCT related to this study was performed by a researcher who was not involved in the recruitment, evaluation, or patient training. An online platform ([www.sealedenvelope.com](http://www.sealedenvelope.com)) and concealed brown envelopes were used. The randomization process was carried out in blocks defined a priori. Evaluators were blinded to the allocation of participants to interventions. The training was supervised by trained physiotherapists not involved in the randomization process or evaluations. In the qualitative and quantitative evaluation, the moderator was blinded to the participants' training allocation.

The sample size of the RCT was determined based on a prior study, based on the primary physical activity of daily life variable. Considering this variable, the sample size was 25 individuals in each group.<sup>24</sup> Nonetheless, it is reasonable to reinforce that the present study is a secondary analysis with a convenient sample of this study.<sup>24</sup>

This work complies with the Declaration of Helsinki and was approved by the Research Ethics Committee of the Faculty of Sciences and Technology of UNESP, Campus of Presidente Prudente, SP, Brazil (CAAE: 77909317.2.0000.5402) and the patients signed the Consent Form. This study was registered at [ensaiosclinicos.gov.br](http://ensaiosclinicos.gov.br) (ID: RBR-3znh3r).

## Training Groups

The FTG performed 24 sessions of aerobic and resistance training combined with a functional circuit ([Supplementary Material](#) - Circuit of functional exercises), and the CTG performed 24 sessions of aerobic and resistance training. UCG performed only conventional respiratory physiotherapy. All the training sessions were conducted by physiotherapists with experience in COPD physical training. The training protocol was previously published elsewhere.<sup>24</sup>

The patients performed aerobic training on a treadmill (Movement LX170/LX 3.0, Brazil) for 30 minutes, with the prescription determined by the Six-Minute Walk Test (6MWT).<sup>25,26</sup> The initial intensity of the training was defined as 80% of the speed achieved in the 6MWT.<sup>5</sup> The patients were required to maintain their dyspnea between values four and six (moderate intensity) on a Borg Scale<sup>4</sup> during the training.<sup>27</sup> If the values on the Borg Scale were less than four, a 5% increase in training intensity was applied in the next session.

In the resistance training, conventional weight machines (Ipiranga, Brazil) were used, and knee flexion and extension and elbow flexion were performed. The load prescription was defined according to the One Maximum Repetition Test (1MR).<sup>28,29</sup> The training intensity was between 60% and 80% of the 1MR test, with three series of 10 repetitions, and an increase of 5% in the load for every four sessions performed.<sup>4</sup> This training was carried out according to the recommended protocol for COPD.<sup>4</sup>

In the functional training, patients performed the conventional training (aerobic and resistance combined) and functional exercises in a circuit form, that simulated the Activities of Daily Living ([Supplementary material](#)- Circuit of functional exercises), which were developed according to prior identification of the main routine activities are limited in patients with COPD (to this identification, patients not related to this study were interviewed). The patients were required to perform each exercise for two minutes and thirty seconds and maintain their dyspnea between four and six on the Borg Scale.<sup>4</sup> If the values were less than four, the patients were asked to increase the exercise speed and if the values were above six, they were asked to decrease the speed. Sticks, balls, chairs, cones, hula hoops, stairs, and ramps were used for this training. In general, the functional exercises simulated the following tasks: drying the back; sweeping the floor; tying a shoe; passing a squeegee on the floor; picking up objects in high and low places; squatting; walking on uneven ground using ramps and stairs; standing up and sitting in a chair; changing clothes; simulate the avoidance of obstacles during gait and picking up objects. The functional exercises are present in more detail in the supplementary material - Circuit of functional exercises.

The training program lasted eight weeks, three times per week, with a session duration of 60 minutes. Global stretches were performed before each session. The CTG performed aerobic and resistance training in three sessions per week and the FTG performed aerobic and resistance training in two sessions per week and functional and resistance training in one session.

### Adherence Evaluation

To evaluate adherence, each individual's presence in the sessions was counted. Adherence was determined as the presence in six weeks of training, in other words, 18 sessions, this number has been defined as necessary to represent adherence to treatment in patients with COPD by a previous guideline.<sup>30</sup> We also assigned an adherence score to each individual based on the proportion of attending sessions that were prescribed: high adherence (>85% of the prescribed sessions), moderate adherence (35–85% of the prescribed sessions), and low adherence (<35% of the prescribed sessions), according to Oates et al.<sup>31</sup>

### Qualitative Evaluation

After the finalization of the training groups, the patients were invited to participate in a focal group to collect qualitative and quantitative data. Focus groups were conducted by a researcher using a previously developed script, with open questions (Supplementary material - Qualitative evaluation questions). The moderator was female, a Ph.D. student, with previous experience in physical training and qualitative research. A second researcher was present in the focus groups to detail notes of the participant's answers. The patients had previous contact with the moderator and before participation, all patients were informed about the aims of the study and how it would be accomplished.<sup>32,33</sup>

The focus groups were performed in a classroom at the university where the research was conducted. The focal group meetings were recorded using a recording device (OLYMPUS / VN-8100PC, Tokyo, Japan) and transcribed verbatim.

Figure 1 presents the flowchart of the study.

Following the methods for qualitative studies that allow a limited number of patients in a focus group,<sup>32,33</sup> the patients in this study were divided into four focus groups. Four patients from the FTG participated in the first focus group of the FTG evaluation, and five from the CTG participated in the first focal group of the CTG evaluation. After that, another six patients from the FTG participated in another focus group to qualitatively evaluate the functional training

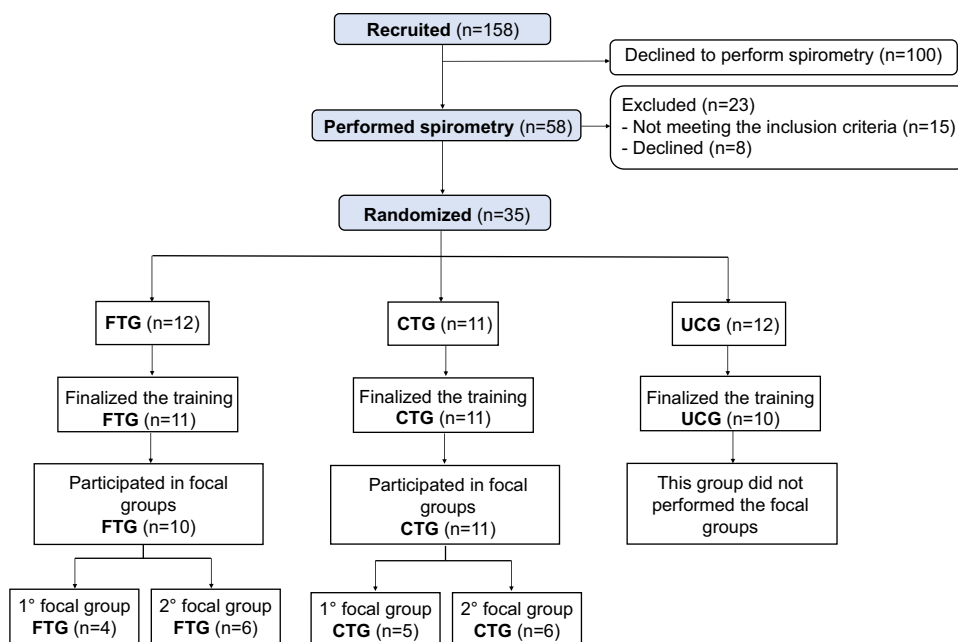


Figure 1 Flowchart of the study.

Abbreviations: FTG, Functional Training Group; CTG, Conventional Training Group.

associated with the conventional training and six from the CTG participated in a focus group to evaluate the conventional training isolated. The data were collected until no new information was obtained (saturation point).<sup>32,33</sup>

## Quantitative Evaluation

After the finalization of the focus groups, participants answered a quantitative questionnaire (developed by the authors) with multiple-choice questions, related to reasons to seek medical assistance, which medical specialist sought, and possible reasons that interfered with attendance at training sessions. This questionnaire was developed by the researchers based on previous qualitative studies related to patients' satisfaction and adherence to pulmonary rehabilitation programs,<sup>11,34</sup> in other words, was developed and applied based on a preview of patients' beliefs and experiences in pulmonary rehabilitation. In that way, we formulated these multiple-choice questions only to understand our patients' profiles and to verify if the aspects presented in these questionnaires were relevant to them.

Participants were asked to define a grade between 0 (zero) and 10 (ten) related to training aspects, such as structure offered, relationship with the therapists, training offered, materials used, the process of evaluation, and general satisfaction.

## Analysis of Qualitative and Quantitative Data

Qualitative data were analyzed using content analysis, related to a systematic analysis of the description of the phenomena, which allows researchers to improve their understanding of the data, by refining words into fewer categories related to the content obtained in the focus groups.<sup>35</sup>

The transcriptions of the focus groups were analyzed by three independent researchers who identified and classified categories related to the research question. The analysis was developed by the categorization, organization, and compaction of the data. After this analysis a triangulation was performed, which consisted of a discussion about the differences in the results, to reach a consensus, identifying themes which include the codes (demonstrate the main points reported by the patients). Subsequently, the results were forwarded to 10% of the participants to confirm whether the results were following the focus groups, and the patients confirmed this. The focus groups ranged from 16 to 51 minutes.

For quantitative data analysis, we used the Shapiro–Wilk test to verify the normality of data, the Student *t* test for independent data to compare the groups regarding the continuous data (data expressed as mean and standard deviation), and the Chi-square test for categorical data analysis (data expressed in absolute numbers). The statistical software SPSS 23.0 version was used, and the level of significance was set at 5%.

## Results

In total, 21 patients participated in the evaluation process: FTG [n=10 (6 men)] and CTG [n=11 (6 men)]. **Table 1** shows the anthropometric and spirometric characteristics of the groups, the data are expressed as mean and standard deviation. The mean presence of the patients in the sessions was 19 sessions (79.16%) in both groups. Seventy percent of the patients from the FTG presented moderate adherence and 30% of the patients presented high adherence. While the patients from the CTG presented 72% of moderate adherence and 27% of high adherence.

**Table 2** shows each question and answer on the quantitative questionnaire, with questions related to the specialty sought and possible reasons that interfered with attendance at training sessions, also it is possible to verify the number of patients that answered each question in both groups.

**Table 2** shows there were no statistical differences between groups. The majority of the patients sought medical assistance due to shortness of breath, at a doctor's office or hospital with a pneumology specialist. Furthermore, the distance between home and the treatment center, transportation, problems related to an increase in respiratory symptoms, and personal problems were not limiting factors to attending the treatment.

**Figure 2** presents the grades defined concerning training aspects, with no statistical differences between groups (FTG and CTG): structure offered ( $p=0.439$ ), relationship with the therapists ( $p=1.000$ ), training offered ( $p=0.19$ ), materials used ( $p=0.90$ ), the process of evaluation ( $p=0.614$ ), and general satisfaction with the training offered ( $p=0.341$ ). The grades are expressed as median.

**Table 1** Anthropometric and Spirometric Characteristics of the Groups. Data Expressed as Mean and  $\pm$  Standard Deviation or in Percentage (%)

	FTG [n= 10 (6 Men)]	CTG [n=11 (6 Men)]	p-value
<b>Anthropometric variables</b>			
Age	65.80 $\pm$ 7.31	70.36 $\pm$ 7.02	0.161
Weight (Kg)	69.70 $\pm$ 14.12	75.54 $\pm$ 14.44	0.361
Height (m)	1.64 $\pm$ 0.98	1.61 $\pm$ 0.79	0.489
BMI (Kg/m <sup>2</sup> )	25.78 $\pm$ 4.50	29.00 $\pm$ 5.30	0.153
<b>Pulmonary function</b>			
FEV <sub>1</sub> (L)	1.64 $\pm$ 0.54	1.34 $\pm$ 0.46	0.193
FEV <sub>1</sub> % pred	58.40 $\pm$ 16.48	51.36 $\pm$ 14.95	0.318
FVC (L)	2.93 $\pm$ 0.76	2.39 $\pm$ 0.65	0.990
FVC % pred	80.20 $\pm$ 12.19	71.54 $\pm$ 16.98	0.200
FEV <sub>1</sub> /FVC (%)	56.44 $\pm$ 12.67	55.89 $\pm$ 8.20	0.905
<b>Adherence – sessions attended</b>			
Total sessions attended (n° of sessions)	19.30 $\pm$ 3.40	19.36 $\pm$ 3.23	0.965
Total sessions attended (%)	80.4	80.6	–
<b>Adherence - presence in prescribed sessions</b>			
Low (<35% of prescribed sessions)	0.0	0.0	–
Moderate (36–85% of prescribed sessions)	70.0	72.7	–
High (>85% of prescribed sessions)	30.0	27.0	–

**Abbreviations:** FTG, Functional training group; CTG, Conventional training group; Kg, Kilograms; m, meters; Kg/m<sup>2</sup>, kilogram per square meter; L, Liters; BMI, Body Mass Index; FEV<sub>1</sub>, Forced expiratory volume in the first second; FEV<sub>1</sub>% pred, Forced expiratory volume in the first second percentage predicted; FVC, Forced vital capacity; FVC % pred, Forced vital capacity percentage predicted; FEV<sub>1</sub>/FVC, Ratio between forced expiratory volume in the first second and forced vital capacity; %, percentage.

**Table 2** Subjects' Answers to Quantitative Questionnaire

Questions	FTG (n=10)	CTG (n=11)	p
<b>1. What made you seek medical assistance?</b>			
Shortness of breath	10	10	1.000
Difficulty in carrying out my activities of daily life	0	0	
From a request by relatives, friends, or parents	0	1	
<b>2. What was the first type of treatment you sought for your disease?</b>			
Hospital	4	5	0.480
Health center	0	2	
Doctor's office	6	4	
<b>3. What medical specialty did you seek?</b>			
Pneumologist	8	9	0.510
Cardiologist	1	0	
Orthopedist	1	2	
General practitioner	0	0	
<b>4. Was the distance between your home and treatment center a problem to come to the treatment?</b>			
Yes	3	1	0.311
No	7	10	
<b>5. Was transportation a problem/limitation to come to the treatment?</b>			
Yes	1	2	1.000
No	9	9	

(Continued)

**Table 2** (Continued).

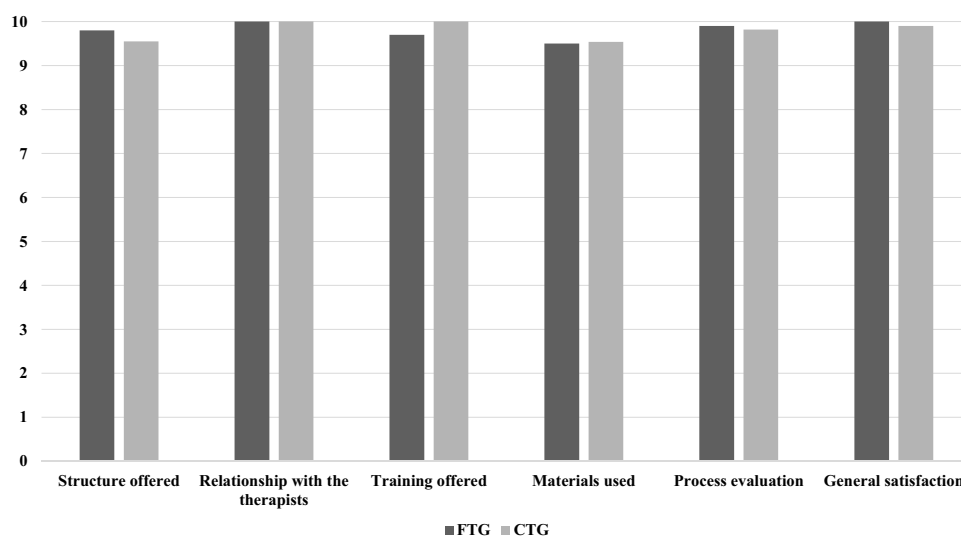
Questions	FTG (n=10)	CTG (n=11)	p
<b>6. Did not you come to the treatment using transportation?</b>			
Yes	1	2	1.000
No	9	9	
<b>7. Were personal problems or your work limitations not come to treatment?</b>			
Yes	3	2	0.635
No	7	9	
<b>8. Was shortness of breath or some limitation in your body a problem to come to treatment?</b>			
Yes	5	7	0.670
No	5	4	
<b>9. Were increases in coughing, mucus, or shortness of breath factors that limited your coming to treatment?</b>			
Yes	4	2	0.361
No	6	9	

**Abbreviations:** FTG: Functional Training group; CTG: Conventional Training Group.

Qualitative analysis identified seven themes according to the codifications: 1) “knowledge about the disease and treatments”; 2) “perceived benefits from the treatment”; 3) “satisfaction with the treatment”; 4) “complications during the treatment”; 5) “suggestions”; 6) “possible reasons to leave the treatment”; 7) “perceptions during the treatment”.

## Theme I - Knowledge About the Disease and Treatments

This theme contains all information obtained about the patients’ prior knowledge of the diseases before beginning the treatment. The transcription demonstrates that patients did not have previous knowledge about the available treatments for disease management and they started to gain this after the therapist’s knowledge transmission (Code 1). They learned to control the disease symptoms, such as dyspnea (Code 2).



**Figure 2** Quantitative analysis of satisfaction of the subjects with the training.

**Abbreviations:** FTG, Functional Training Group; CTG, Conventional Training Group.

## Theme 2 - Perceived Benefits from the Treatment

This theme is related to patients' perceptions about improvements in physical (Code 1) and psychosocial aspects (Code 2). The patients reported benefits from the treatment, such as improvement in physical aspects, decrease in dyspnea, improved quality of sleep, and daily activities of life, such as taking a bath, walking, and cleaning the house. Further, they reported improvements in psychosocial aspects, such as decreased anxiety and distress due to the disease.

## Theme 3 - Satisfaction with the Treatment

In this theme, the reports related to the proposal of exercise type (Code 1), the relationship between COPD patients (Code 2), and therapists (Code 3) during the treatment, the desire for continuity in treatment (Code 4), and treatment indication to other patients (Code 5), were considered for satisfaction with the proposed treatment. The reports on this theme demonstrated general satisfaction with the offered treatment. Regarding the proposed exercises, the CTG showed great satisfaction with the treadmill in aerobic training, while the FTG patients (seven patients) reported more fatigue during the functional circuit training when compared to aerobic and resistance training. The relationship between patients and therapists, the opportunity of creating new friendships with patients with the same disease, and the therapist's attention and concern for them were reported by patients.

## Theme 4 - Complications During Treatment

This theme contains information related to complications during the training (Code 1). Comorbidities, such as heart and orthopedic problems were reported.

## Theme 5 - Suggestions

Questions related to patient suggestions to improve the training, such as altering the intensity (Code 1) and frequency of training (Code 2) are in this theme. The patients suggested alterations in training intensity and frequency. The CTG suggested that the intensity and repetitions in the resistance training could be higher. The FTG reported that the session frequency was adequate.

## Theme 6 - Possible Reasons to Leave the Treatment

This theme contains information related to possible reasons that interfere with attendance for treatment, such as health complications during the treatment (Code 1), beliefs (Code 2), and personal motivation (Code 3). A couple of patients reported difficulty in the exercises due to previous disease pain, these were determined as health complications. The beliefs, like being scared of performing the exercises on the treadmill and fear of the health professionals wearing white clothes were reported as possible reasons to leave the treatment.

## Theme 7 - Perceptions During the Treatment

Finally, this theme presents information about the patients' positive (Code 1) and negative impressions (Code 2) during the training. In the CTG the patients reported they liked the proposed exercises, as positive perceptions. In the FTG one subject reported the functional circuit was good due to their high blood pressure and dyspnea during aerobic training as in the functional training their blood pressure was lower.

Regarding negative perceptions, the CTG patients reported high fatigue on the treadmill. In the FTG, the majority of the patients affirmed that some functional exercises were difficult to perform, due to fatigue and dyspnea, such as exercises that simulated "tying shoes" and "getting dressed".

The themes, codes, and transcriptions are presented below in [Table 3](#).

## Discussion

The addition of circuit training to conventional training (aerobic and resistance combined) led to great satisfaction and adherence of COPD patients, in the same way as the isolated conventional training. Patients from the functional training associated with the conventional training experienced more fatigue than the patients submitted to the conventional training isolated. Also, the following positive factors related to satisfaction, such as learning about disease management, improvement in physical and psychosocial conditions, the possibility of interpersonal relationships, and some details of



**Table 3** Themes, Codes, and Transcriptions Were Obtained from Focus Groups

Theme	Code	Transcriptions
Knowledge about the disease and treatments	Knowledge about available treatments	- "I took so much medicine, but there was no effect, the effect happened here...And I thought it was funny the physiotherapy that I went to do, that was strength, but how can I, I have a problem? I do strength in legs and arms, and I have a problem with respiration, I thought this an absurdity and I got so much better." (CTG, person 1, male, 76 years). - "That was in March 2018, then I went to a private doctor and he indicated me to come here, and since then, thank you." (FTG, person 3, male, 57 years).
	Symptom control	- "Me too, I learned so much to breathe here. I didn't know before." (CTG, person 4, female, 72 years). - ".We learned to breathe, we didn't know, we are learning, you are teaching..." (FTG, person 6, female, 62 years).
Perceived benefits from the treatment	Improvement in physical aspects	- "In my case, I have a lot of shortness of breath, I could not take a bath due to shortness of breath, and after I started to do the treatment, at least the bath I am succeeding and I started to trek, which I did not do...then I am feeling better...in the shortness of breath."(CTG, person 7, male, 74 years). - ".There was a wonderful improvement, more than shortness of breath, there was a significant improvement, I believe this works, for sure...I had a significant improvement in shortness of breath and sleep..." (FTG, person 11, male, 54 years).
	Improves in psychosocial aspects	- "Because I could not speak on the phone, I was distressed, I was shy, avoided talking, I started talking, and now, in my head, I have learned to breathe, because I did not know the right way, I did it wrong, I keep my attention on my anxiety level that increases my shortness of breath, try to stay calm, which I could not, and increased my hope...we get more self-confident."(CTG, person 2, female, 62 years). - "Do normal activities, that were difficult, we have an improvement too, because the worst thing for people who have this problem is you cannot breathe and do not have air, it's so frustrating, it's complicated, and you realize, certainly there was an improvement." (FTG, person 11, male, 54 years).
Satisfaction with the treatment	Proposed exercises	- "It was great, the treatment was great."(CTG, person 12, male, 68 years). - "I would not change anything. just the ball, that I need to improve. I feel excited for the day to come. I like everything."(FTG, person 9, female, 64 years). - "For me, I think it's good, I think there it couldn't be better." (FTG, person 15, female, 64 years).
	Relationship between persons	- "For me all was good...new friends, right?" (CTG, person 16, male, 80 years). - "We see that our problems are so little compared to other people's, right? Then, you start appreciating yourself!" (FTG, person 6, female, 62 years).
	Relationship with the therapists	- ". also, there is a lot of attention from the people, the way they treat us, gives us the willpower to continue, right?" (CTG, person 17, male, 76 years). - "I liked them, especially I will miss them and the exercises...they are the main things to treat us here because you treat us so good." (FTG, person 14, male, 70 years).
	The desire for continuity in treatment	- "If I can, I want to come back, I think I have so many things to improve." (CTG, person 1, male, 76 years). - "I would do it, dude! On vacation." (FTG, person 9, female, 64 years).

(Continued)

**Table 3** (Continued).

Theme	Code	Transcriptions
	Possibility of treatment indication to other persons with the same disease	- "If I knew another person with the same problem as mine, I would recommend it so fast." (CTG, person 1, female, 76 years). - "I would recommend it as much as I could, right?" (FTG, person 4, male, 57 years).
Complications during treatment	Comorbidities	- "In the three or four final sessions, I had a heart problem and I couldn't come, but I didn't have any alterations in shortness of breath, there was the arrhythmia problem." (CTG, person 7, male, 74 years). - "My legs hurt a lot...because of the heart surgery, that took out my leg' veins, then my legs hurt a lot because of that." (FTG, person 3, male, 57 years).
Suggestions	Training intensity	- "I think those leg strength physical activities I think could be higher...I don't even get tired or have to stop...it's so light." (CTG, person, male, 80 years). - "I agree. Because we have so much strength...It's a little light, we could have more exercises...more repetitions." (CTG, person 12, male, 68 years).
	Training frequency	"I think...three times per week we are doing...it's great." (FTG, person 20, male, 74 years). - "But three times per week I think it's right, I think...I think less than that would not produce effects." (FTG, person 11, male, 54 years).
Possible reasons to leave the treatment	Health Complications during the treatment	- "I missed due to cervical spine and low back pain, and one time because of a stronger crisis...due to physical questions, I missed a session." (CTG, person 2, female, 62 years). - "Because of the legs...I didn't feel good...and, I thought of giving up." (FTG, person 15, female, 64 years).
	Beliefs	- "I didn't like the treadmill very much because I was very afraid of it, I have a heart problem." (CTG, person 4, female, 72 years). - "But if it depended on me, I wouldn't come, I saw you wearing white clothes, I was scared...I fainted, I saw those girls encouraging me, I said: Oh my God." (FTG, person 21, female, 69 years).
	Personal motivation	- "Some days I was discouraged...I think it happened with everyone, to feel discouraged like that, but not to leave." (CTG, person 2, female, 62 years).
Perceptions during the treatment	Positive perceptions	- "I liked to reach the maximum, but the load, didn't represent, right? You need to go to the maximum, do your best." (CTG, person 16, male, 80 years). - "I liked all the exercises, you know?" (CTG, person 19, female, 55 years). - "It was so great." (FTG, person 20, male, 74 years). - "For me, it was the opposite because for me the treadmill was a big problem due to blood pressure and shortness of breath, then, in the exercise circuit I had more facility, but I needed to do the treadmill, and because I persisted, I improved..."(FTG, person 11, male, 54 years).
	Negative perceptions	- "The treadmill got me tired..." (CTG, person 17, male, 76 years). - "The most difficult is the exercises...those that have a ball? That was the most difficult. I couldn't do it, the leg hurt a lot...start to do strength and the shortness of breath triplicates." (FTG, person 6, female, 62 years). - "The problem is the ball...I liked all the exercises...the most difficult for me is with the ball." (FTG, person 9, female, 64 years). - "I wish those with the hula hoop didn't exist...those almost killed me." (FTG, person 15, female, 64 years).

**Abbreviations:** CTG, Conventional training group; FTG, Functional training group.

the proposed exercises were reported. Although, negative aspects such as pain, comorbidities, beliefs, and personal motivation were also pointed out.

Both groups adhered to the training, considering that the FTG and the CTG had an average presence of 19 sessions and that the patients from these groups had moderate adherence (>70% of the patients attended the prescribed sessions) and high adherence (>27% of the patients attended the prescribed sessions) we can affirm that both training had a great influence on the adherence to the treatment. Great adherence to physical training programs is extremely important to this population, that can experience beneficial gains in exercise training programs.<sup>30,31</sup>

Conventional training is commonly prescribed in patients with COPD, considering the benefits obtained, such as improvement in dyspnea, functional capacity, routine activities, and quality of life.<sup>4-6,33,36</sup> These improvements were reported by patients in both groups, evidencing the satisfaction with the treatment. Psychosocial improvements, such as a reduction in anxiety levels, were perceived by patients as benefits obtained from the training.<sup>37</sup>

Complaints about the difficulty of disease management are common in patients with COPD, especially dyspnea control.<sup>37</sup> It is reasonable that patients with COPD started to deal with the disease with strategies learned during the treatment,<sup>34,35</sup> considering that improvement in disease control leads to a better social life and quality of life.<sup>11</sup> Which is following the reports of the patients in the present study since they mentioned improvement in disease control and how good this aspect was for them.

Interpersonal relationships were demonstrated as positive aspects by the patients in both training groups. This is a factor that can influence the adherence and satisfaction of patients with COPD in a physical training program. Relationships between the patients with the same disease are considered a positive aspect, considering the complicity, sharing the same feelings, as well as the advice and reassurance among the patients,<sup>13,34</sup> it is also a place to form new friendships. Moreover, the relationship with the therapists is a positive aspect reported by patients that positively influences satisfaction with treatment, considering demonstrations of confidence, support, and attention to the patients by the therapists.<sup>13,34,36,37</sup>

In the Desveaux et al study,<sup>30</sup> the participants from physical training in a PRP demonstrated satisfaction with structured training programs, with adequate equipment that allowed the correct performance of the exercises,<sup>36</sup> which is following reports of the patients in the present study, considering the satisfaction with the proposed exercises in both groups.

In the CTG, there was a preference for aerobic training, and the patients suggested that the resistance training intensity could be higher. Therefore, we suggest that the resistance training intensity may be higher than imposed in the present study (from 60% to 80% Maximum Repetition - MR) in samples with similar perceptions.

In the FTG, the patients reported high fatigue during functional exercises, this may be justified by the fact that functional exercises simultaneously work several body structures, promoting balance between the upper and lower parts of the limbs and trunk, and consequently better neuromuscular activation and higher musculoskeletal adaptation,<sup>38</sup> as well as simulating routine activities,<sup>18</sup> which the patients have difficulty performing due to the characteristics of the disease.<sup>39</sup> In addition, the functional exercises were formulated by the most difficult activities to execute, reported by patients with COPD.

The exercises in the FTG that simulated “tying shoes” and “getting dressed” were considered very difficult to accomplish due to dyspnea. This may be explained by the fact that the exercise that simulates “tying shoes” leads to shallow, rapid, and irregular breathing with lower values of oxygen saturation.<sup>40</sup> In addition, the exercise that simulates “getting dressed” promotes higher minute ventilation and, consequently, a decrease in oxygen saturation and hypoxemia, which could explain the increase in dyspnea during these exercises.<sup>41</sup> These results are following another study, which verified that patients with COPD have difficulty in performing exercises that simulate daily activities with trunk flexion and movements with upper limbs.<sup>42</sup>

Pain during the exercises, such as fatigue after training, and associated comorbidities are negative aspects, considering factors that influence subject adherence<sup>43-45</sup> and training satisfaction, bearing in mind that pain from prior conditions and associated comorbidities are factors that interfere in the participation of these patients in physical training.<sup>11,14,43</sup> However, even though these are negative points, they did not interfere with the adherence and satisfaction of the patients with the training offered.

Previous studies have verified that questions related to personal demotivation create psychosocial barriers that interfere with the adherence of patients with COPD to physical training.<sup>43,44</sup> In the present study this fact was reported by some patients with personal demotivation to attend the sessions. Besides this, the beliefs before the treatment, that the patients were not capable of performing the proposed exercises, are factors that may create negative influences. On the other hand, studies indicate that after starting physical training in PRP, patients become more confident and overcome their expectations related to prior beliefs.<sup>11,34</sup> Therefore, since the satisfaction and adherence of patients to the training were similar between the groups, the insertion of a functional circuit into conventional training, could be an alternative form of training to perform routine activities, which the patients find difficult to execute.

As limitations of the present study, we can mention the fact that the patients who performed functional training were only submitted to conventional training in isolation, while the patients of the other group did not perform any session with functional exercises, thus, the patients did not experience both training types, and so, they could not perform comparisons between the training methods. Further, even though qualitative research generally has small sample sizes, we present the size of our sample and the time of the focus groups as possible limitations, which should be considered when our results would be translated into clinical practice. Added to that, despite that the questionnaire was developed by the research team based on previous studies,<sup>11,34</sup> the questionnaire was not validated. Finally, the patient's dropout can be considered a limitation of our study, although, it is reasonable to explain that many recruited patients had distance and transport difficulty to attend the spirometry evaluation, which made them decline to perform the spirometry.

As a suggestion to future studies, we highlight the possibility of COPD patients performing one or two sessions of a functional exercise program associated with conventional training and another day of only conventional training isolated, to verify the beliefs and satisfaction of the patients that experienced both training.

As clinical implications in this study, considering the satisfaction and adherence of the participants to this type of training, we mention the possibility of inserting a functional circuit associated with a conventional training into treatments for patients with COPD in outpatient clinics, rehabilitation centers, and hospitals, when the therapist aims to work on the execution of routine activities.

## Conclusion

Patients with COPD presented great satisfaction and adherence to the insertion of a functional circuit into conventional training. Although the patients reported high fatigue during functional exercises, the satisfaction and adherence were similar to isolated conventional training.

## Abbreviations

COPD, Chronic Obstructive Pulmonary Disease; FTG, Functional training group; CTG, Conventional training group; FEV<sub>1</sub>/FCV, Ratio between forced expiratory volume in the first second and forced vital capacity, WHO, World Health Organization; PRP, Pulmonary Rehabilitation Program; UCG, Usual Care Group; Kg, Kilogram; m, meters; Kg/m<sup>2</sup>, kilogram per square meter; L, Liters; BMI, Body Mass Index; FEV<sub>1</sub>, Forced expiratory volume in the first second; FEV<sub>1</sub> % pred, Forced expiratory volume in the first second percentage predicted; FVC, Forced vital capacity; FVC % pred, Forced vital capacity percentage predicted; MR, Maximum Repetition.

## Data Sharing Statement

The datasets used and/or analyzed during the study are available from the corresponding author on reasonable request.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

The authors report no conflicts of interest in this work.

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