Original Article

Spirituality, Functional Gain, and Quality of Life in Cardiovascular Rehabilitation

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Abstract

Background: **Religiosity and spirituality have been associated with higher recovery rates, greater adherence to treatments, and better levels of quality of life in patients with heart disease.**

Objectives: **To evaluate the association between spirituality, functional gain, and improved quality of life in patients in a cardiovascular rehabilitation program.**

Methods: **This prospective cohort study evaluated the association between functional and quality of life gains during a cardiovascular rehabilitation program and a religiosity/spirituality index based on a validated scale. Depression, anxiety, and stress symptoms were screened for control purposes. P values < 0.05 were considered significant for all analyses.**

Results: **The study followed 57 patients (66 ± 12 years old; 71.7% male; 76% with coronary artery disease). The Spearman correlation coefficient did not show any associations between increases in functional capacity and organizational (rs = 0.110; p = 0.421), non-organizational (rs = −0.007; p = 0.421), or intrinsic (rs = −0.083; p = 0.543) religiosity. Furthermore, no associations were detected between the results of a quality of life score and organizational (rs = 0.22; p = 0.871), non-organizational (rs = 0.191; p = 0.159), or intrinsic (rs = 0.108; p = 0.429) religiosity.**

Conclusion: **No association was detected between functional and quality of life gains and organizational, non-organizational, or intrinsic religiosity in this sample of patients undergoing cardiovascular rehabilitation.**

Keywords: **Cardiovascular Diseases/mortality; Cardiac Rehabilitation/methods; Spiritualit; Spiritual Therapies/methods; Quality of Life.**

Introduction

Cardiovascular diseases (CVD) have held first place among the causes of mortality worldwide for decades.[1] The combination of ischemic heart disease and stroke has been responsible for approximately 17.5 million deaths/year, more than three quarters of which are in low- and middle-income countries. In Brazil, as in the rest of the world, considering the period prior to 2020, CVDs, were the leading cause of mortality, accounting for 29.8% of all registered deaths, according to data from the Brazilian Ministry of Health.[2] The COVID-19 pandemic has further highlighted the importance of investments to address these diseases, which are first-order risk factors for the development of severe cases of the virus.

Efforts have been made to modify this scenario, with some success. In Brazil, the mortality rate due to ischemic heart disease dropped from 120.4/100,000 inhabitants in 2000 to 92/100,000 in 2013.[3] Among the clinical approaches that contribute to reduced morbidity and mortality secondary to CVD, there are cardiovascular rehabilitation programs, designed 4 decades ago, with the initial purpose of providing patients affected by myocardial infarction with a return to their usual activities, through physical exercise combined with educational and therapeutic actions aimed at improving health and quality of life.

Currently, the spectrum of indications for including patients in cardiovascular rehabilitation includes systemic arterial hypertension, heart failure, cardiomyopathies, heart valve diseases, pacemaker or cardioverter-defibrillator implants, myocardial revascularization, heart transplantation, and peripheral arterial disease of the lower limbs. These programs must be conducted by multidisciplinary teams that seek to promote an integrative vision of care in their practices.[4,5]

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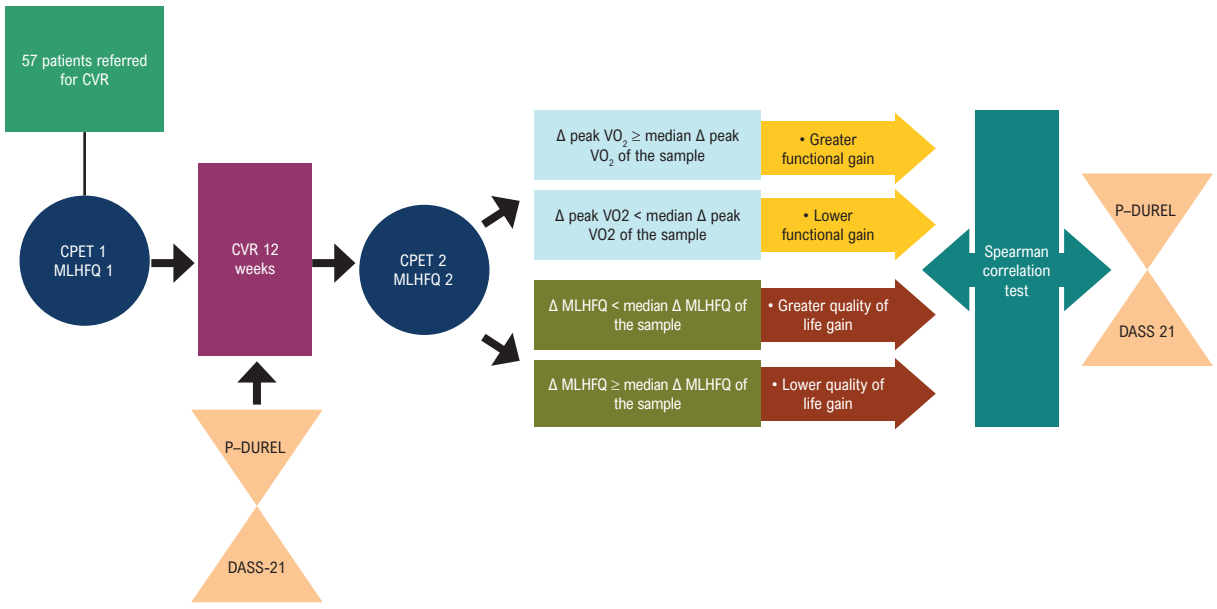
Manuscript received September 09, 2021, revised manuscript October 05, 2022, accepted November 16, 2022

DOI: https://doi.org/10.36660/abc.20220452

Central Illustration: Spirituality, Functional Gain, and Quality of Life in Cardiovascular Rehabilitation



Arq Bras Cardiol. 2023; 120(3):e20220452

Study design.

About 80% of the world population has a religious affiliation,[6] and a growing body of evidence has demonstrated an association between religiosity and spirituality (R/S) and reduced all-cause mortality, especially due to CVD.[6] The 2019 Updated Cardiovascular Prevention Guideline of the Brazilian Society of Cardiology[6] emphasizes the importance of including the spiritual dimension in the treatment and prevention of CVD, including in the context of cardiovascular rehabilitation. However, in most services, the performance of teams does not have this scope, possibly due to the scarcity of studies in this area.[7]

This study sought to explore the impact of R/S on functional and quality of life gains, which are the primary objectives of cardiovascular rehabilitation programs, in addition to describing the levels of R/S in the population and their relationship with adherence to the program.

Methods

A prospective cohort study was conducted based on the population of patients who remained in the rehabilitation program of the Hospital Cárdio Pulmonar da Bahia, located in Salvador, Bahia, Brazil, for a minimum of 12 uninterrupted weeks, between September 2018 and January 2020. Participants were referred by their attending physicians, and they answered questionnaires about quality of life (Minnesota Living with Heart Failure Questionnaire [MLHFQ]); R/S (Brazilian Portuguese version of the Duke University Religion Index [P–DUREL]); and depression, anxiety, and stress (Brazilian version of the Depression, Anxiety, and Stress Scale [DASS-21]).

The population consisted of 57 individuals of both sexes, over 18 years old, with diagnosis of CVD characterized by a history of previous acute myocardial infarction, unstable or stable angina, coronary angioplasty, heart valve disease, heart failure, postoperative cardiac or vascular surgery, and implantation of devices such as pacemakers, resynchronizers, and defibrillators, assessed by a cardiologist and physiotherapist at the beginning, followed up for 12 weeks of participation in the program, and reassessed after this period. For both assessments, cardiopulmonary exercise testing (CPET) was performed, and the MLHFQ was applied. The P–DUREL and DASS-21 were applied at any time during the program, since these scales are characterized by stability for 6 months, in the event that new relevant stressors do not occur.

The study excluded patients who, despite meeting the inclusion criteria, did not respond to the research questionnaires or who had a new acute event, hospitalization, or cardiovascular intervention during the course of the study. The presence of a patient in 36 sessions was considered 100% adherence.

The sample calculation was based on the calculation of Pearson's correlation coefficient or non-parametric equivalent, in order to reach an estimated correlation of 0.35 with alpha of 0.05 and power of 80%, considering the 3 domains of the P–DUREL and functional and quality of life gains.

All participants received detailed information about the study objectives and signed a free and informed consent form. The study was approved by the Prof. Celso Figueiroa Research Ethics Committee under CAAE number 57813016.0.1001.5520.

The Cardiovascular rehabilitation program

The study was carried out in a private cardiovascular, pulmonary, and metabolic rehabilitation service in the city of Salvador, Bahia, Brazil, which aims to provide comprehensive care to its patients, with a multidisciplinary team composed of cardiologists, pulmonologists, physiotherapists, and nutritionists. In accordance with the clinical protocol of the local program, all patients are evaluated at the beginning of the program, from a clinical and functional point of view, by a physician specialized in exercise cardiology and a physiotherapist. The patients underwent CPET, in addition to conventional clinical consultations, and the MLHFQ was applied.

The CPET, considered the gold standard for cardiorespiratory functional assessment,[4] in the most frequent forms of application, consists of subjecting the individual to gradually increasing intensity exercise, usually on a treadmill, until exhaustion occurs or until limiting symptoms and/or signs appear. These have been adopted as criteria for interrupting the exam in the rehabilitation service where the study was carried out. During exercise, ventilation, oxygen consumption (VO_2), carbon dioxide production, and other variables of a conventional stress test, such as hemodynamic data and electrocardiographic tracing, are measured. For this study, the variable of interest obtained from CPET was peak VO_2 (expressed in mL/kg/min), which, in practice, is used as the maximum VO_2 measured. Its result may be influenced by central (cardiovascular and/or or pulmonary) and peripheral (skeletal muscles) mechanisms. Normality values vary according to age, sex, weight, height, level of physical activity, genetic variability, and race. Peak VO_2 is considered abnormal when it is below 85% of the predicted percentage, and it has been used as a universal marker of disease severity in patients with heart failure, hypertrophic cardiomyopathy, pulmonary hypertension, chronic obstructive pulmonary disease, and restrictive pulmonary disease, as well as a marker of degree of physical conditioning.[8] This standardization was adopted in our study, in both the initial and final assessment of each participant.

The MLHFQ is a questionnaire validated in Brazil in 2009, consisting of 21 questions related to limitations imposed by heart failure on quality of life. To answer it, patients must consider their experiences from the past month. The response scale for each question ranges from 0 (no or without limitations) to 5 (too much or with maximum limitation). The sum of the results provides the score, which varies from 0 to 105. The lower the score, the better the quality of life.[9]

Throughout the follow-up, patients perform supervised physical exercises, in 1-hour sessions, 3 times a week or more, consisting of a warm-up phase, an aerobic exercise phase, a resistance exercise phase, and a cool-down phase. Aerobic exercise is performed based on the ventilatory thresholds detected in CPET, and it is continuously applied at a load between thresholds 1 and 2 for a period of 30 minutes. Resistance exercises involve major muscle groups at a load of 40% to 50% of maximum voluntary ventilation. The entire program is developed in an exclusive unit duly equipped for this purpose.

After a minimum of 12 weeks of follow-up, patients undergo a global reassessment consisting of a new medical assessment, a new CPET, and a new functional assessment by the physiotherapist, with the application of the MLHFQ. In this program, functional gain is measured by calculating the difference between the initial peak VO_2 and the final peak VO_2 (Δ peak VO_2), and the gain in quality of life is measured by the difference between the initial and final MLHFQ scores (Δ MLHFQ).

Religiosity/spirituality: concept and evaluation

The concept of spirituality in the context of health has been the subject of discussions among scholars, and it is currently under construction. This study adopts the following concept proposed by the consensus formulated at an international conference held in Geneva in 2013:[10]

"A dynamic and intrinsic aspect of humanity through which persons seek ultimate meaning, purpose, and transcendence and experience relationships to self, family, others, community, society, nature, and the significant or sacred. Spirituality is expressed through beliefs, values, traditions, and practices." (Puchalski, 2014, p 15)

This concept makes it clear that spirituality is not necessarily linked to religiosity. However, since spirituality is an individual and entirely subjective experience, in the vast majority of studies, it has been evaluated based on religious contexts, thus treating religiosity and spirituality as synonyms.[11] To assess R/S, the P–DUREL was applied. It is a questionnaire consisting of 5 multiple-choice questions, on a Likert scale, which addresses the levels of R/S in the "organizational," "non-organizational," and "intrinsic" aspects.[12] Organizational religiosity (OR) is measured through attendance at religious meetings, such as mass, service, ceremonies, and diverse rituals and through participation in study or prayer groups. Non-organizational religiosity (RNO) is assessed through the frequency of private religious activities, such as prayer, meditation, reading of religious texts, listening to music or teachings related to R/S, or even following religious programs through the media. Intrinsic religiosity (IR) refers to the search for intimate contact with God and the experience of religiosity as a guiding factor in an individual's life.

In order to calculate the P–DUREL score, it is recommended that the 3 individual domains be analyzed separately and not added together.[12] The scores for the RO and RNO domains range from 1 to 6, and the score of the IR domain ranges from 3 to 15. In the Brazilian version, lower scores indicate greater religiosity in each domain.

The DUREL is a simple, easy-to-use instrument that provides a brief R/S measurement. The scale has been validated for more than 10 languages, and it has been widely used. The validation study of the Brazilian version showed that the instrument had adequate internal consistency and test-retest reliability for the sample in which it was tested.[12,13]

Assessment of depression, anxiety and stress

In order to control psycho-emotional variables such as depression, anxiety, and stress, the DASS-21 was applied. This self-administered depression, anxiety, and stress scale,

translated and validated in Brazilian Portuguese in 2014,[14] is intended to screen symptoms of the 3 conditions of depression, anxiety, and stress, without the objective of making a diagnosis.

Participants are asked to use a 4-point scale of severity/frequency to assess the degree to which they have experienced each state in the past week. The questionnaire consists of 7 items per scale. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to non-specific chronic arousal levels, and it assesses difficulty relaxing, nervous arousal, irritability, restlessness, hyperreactivity, and impatience.

Both the P–DUREL and the DASS-21 were applied only once, at any time during the program, by the researchers themselves, in an environment suitable for the authors' ethical and technical recommendations.

Data analysis and interpretation

After data collection, the median of the Δ peak VO_2 peak of the sample was calculated, according to which patients were divided into the following 2 groups: greater functional gain (Δ peak VO_2 peak greater than or equal to the median of the sample) and lower functional gain (Δ peak VO_2 less than the median of the sample).

With respect to quality of life gain, the median of the Δ MLHFQ of the sample was calculated and, based on this, the following 2 groups were formed: greater quality of life gain (Δ MLHFQ lower than the median of the sample) and lower quality of life gain (Δ MLHFQ greater than or equal to the median of the sample).

The levels of religiosity in the OR, NOR, and IR domains were compared between the groups. Subsequently, a correlation analysis was performed between functional and quality of life gains, with levels of religiosity in each aforementioned spectrum.

Central Illustration displays the study design.

Descriptive and Inferential Statistics

In the descriptive analysis, continuous variables with normal distribution are presented as mean ± standard deviation, and those with non-parametric distribution are presented as median and interquartile range (IQR), with the Kolmogorov-Smirnov normality test used to characterize the distribution of variables, in addition to visual analysis of histograms. Categorical variables are presented as proportions or percentages.

The clinical characteristics of the groups with greater and lesser functional and quality of life gains were compared using unpaired Student's t test or the Mann–Whitney test for continuous variables (parametric and nonparametric, respectively). Categorical variables were analyzed comparatively using the chi-square test or Fisher's exact test.

Since the data violated the parametric assumptions, Spearman's correlation coefficient was calculated to verify whether there was an association between the domains of OR, NOR, and IR and the Δ peak VO_2 or between these domains and the Δ MLHFQ.

P values < 0.05 were considered significant for all analyses, and the analyses were conducted using SPSS software, version 10.0 (SPSS Inc., Chicago, IL, USA).

Results

The population consisted predominantly of men (75%), self-declared white (82%), aged 66 ± 12 years; 76% had coronary artery disease, and 58% had heart failure, New York Heart Association functional class II being the most frequent (46%). With regard to psycho-emotional aspects, they had mild symptoms of stress, but not anxiety or depression, according to the DASS-21 screening. Regarding religiosity, they were predominantly Catholic, and, according to the P–DUREL scores, they had low/medium OR index: 4.0 (IQR 2.0 to 4.0) and high NOR index: 2.0 (2.0 to 4.2) and IR: 4.0 (3.0 to 6.0). Median adherence to the program was 70% (IQR 50% to 80%).

Table 1 provides a detailed description of these characteristics, in addition to other demographic and clinical data.

The patients were followed up for a median period of 18 weeks (IQR 15 to 25), which corresponded to a median number of 34 sessions (IIQ 29 to 39). Based on the medians of Δ peak VO_2 and Δ MLHFQ, groups with greater and lesser functional and quality of life gains were formed.

The distributions of R/S, in relation to the 3 domains of P–DUREL (OR, NOR, and IR), as well as in relation to depression, anxiety, stress, and adherence were similar between the groups, as shown in Table 2.

The sociodemographic and clinical characteristics were similar both between the groups with higher and lower gains in functional capacity, and between the groups with higher and lower gains in quality of life. Table 3 contains the most relevant data related to these aspects.

Finally, correlation analysis was performed, the results of which are shown in Table 4.

No association was observed between functional gain and OR, NOR, or IR, and no association was detected between quality of life and any of the 3 domains of the P–DUREL scale.

Discussion

In this study, R/S did not impact the functional and quality of life gains of patients followed for 12 weeks in a cardiovascular rehabilitation program.

According to the theoretical model proposed by Koenig,[11] R/S influences health through three basic mechanisms: reducing depression, anxiety, and stress; encouraging the development and maintenance of healthy lifestyle habits; and social support. Apparently, in our population, these mechanisms did not find "substrates" to act, or their extent was reduced due to the interference of other factors, given that the R/S levels found were medium for OR and high for

Table 1 – Clinical and demographic characteristics of study participants (N = 57)

Variable	Total
Demographic data	
Male sex	42 (75)
Age (years) *	68 ± 12
Married	17 (30)
Catholic religion	23 (25)
Prior sedentarism	32 (56)
Self-reported skin color	
White	46 (82)
Mixed	7 (12)
Black	3 (5)
Heart disease and cardiac function	
Coronary artery disease	43 (76)
Heart failure	31 (58)
New York Heart Association functional class II	23 (46)
Heart valve disease: mitral stenosis	6 (10)
Ejection fraction *	0.52±0.18
Comorbidities and risk factors	
Dyslipidemia	41 (73
Arterial hypertension	32 (57)
Overweight	28 (49)
BMI (kg/m^2)	28 ±4
Diabetes mellitus	15 (26)
Medications	
Statins	41 (93)
Beta blocker	35 (62)
Acetylsalicylic acid	30 (56)
Angiotensin receptor blocker	20 (47)
Angiotensin converting enzyme inhibitor	14 (25)
Clopidogrel	14 (25)
Ticagrelor	7(12)
Anxiolytics/antidepressants	3 (5.2)
Interventions	
Angioplasty	22 (38)
Myocardial revascularization	16 (28)
Functional capacity, oxygen consumption	
Initial peak VO_2 (mL/kg/min) †	15 (IIQ 13 –19)
Final peak VO_2 (mL/kg/min) †	17 (IIQ 14 –21)
Δ peak VO_2 (mL/kg/min) †	1.6 (IIQ −0.6 – 4.1)
Quality of life - Minnesota Living with Heart Failure Questionnaire (MLHFQ)	
Initial †	26 (IIQ 15–42)
Final †	11 (IIQ 5.0 – −19)
Δ MLHFQ †	−11 (IIQ −25 – −19)
Depression, Anxiety, and Stress Scale (DASS-21) †	4.0 (IIQ 1.0 – 12)
Measures of religiosity/spirituality (P–DUREL)	
OR †	4.0 (IIQ 2.0 – 4.0)
NOR †	2.0 (IIQ 2.0 – 4.2)
IR †	4.0 (IIQ 3.0 – 6.0)
Adherence †	70 (IIQ 50 – 80)

Data presented as absolute frequency n (%), mean ± standard deviation (*) or median (interquartile range) (†); BMI: body mass index; OR: organizational religiosity; NOR: non-organizational religiosity; RI: intrinsic religiosity.

NOR and IR, but these were not associated with functional or quality of life gains.

According to the symptoms screened by the DASS-21, the study participants, even when beginning rehabilitation, had only mild stress, and some of their lifestyle habits to which we had access were relatively healthy; for example, they did not have obesity and did not use tobacco. The majority were sedentary, but the prevalence of active patients (44%) exceeded the world data released by the World Health Organization (30%), and they correspond to more than twice the Brazilian index, which is 19%, according to the Brazilian Institute of Geography and Statistics.[15]

In relation to social support, the patients were able to rely on the kindness and welcoming of the professionals at the service and on the empathetic support of their peers, in a very similar manner to what is observed, for example, in congregations and religious groups. Perhaps this constitutes an indirect effect of cardiovascular rehabilitation programs, namely, the creation of group spaces, where patients are able to count on the support of professionals who give them a feeling of safety and to exchange experiences with other patients whose health conditions mirror theirs. This hypothesis may be further investigated in future studies.

It is possible that the reduced interaction between the instruments applied had some influence on the results regarding the association. The MLHFQ assesses quality of life based on functional data related to aerobic capacity and, therefore, dialogues very well with the CPET results, but it contemplates few psycho-emotional aspects and does not include the spiritual dimension. In turn, the P–DUREL measures OR and NOR by means of 1 question for each domain, related to the frequency of collective or individual practices. The IR domain explores the interviewee's relationship with beliefs and values, evoking, therefore, some degree of subjectivity, always on behavioral grounds. Nonetheless, these data actually reflect the confluence of physical, psychodynamic, systemic, socioeconomic, and cultural factors; rather than exclusively spiritual or even religious involvement, which would be beyond the scope and possibilities of this study to control. This would also occur if a greater number of scales were applied.

As would be expected, most patients evolved with functional gain and quality of life gain. The results obtained seem to have resulted from the practice of physical

Table 2 – Religiosity/spirituality, functional capacity, quality of life, depression, anxiety, stress, and adherence in groups with greater and lesser functional and quality of life gains

Variable	Groups					
	Greater functional gain (n=29) Δ peak VO_2 ≥ 1.6 mL/kg/min	Lower functional gain (n=28) Δ peak VO_2 < 1.6 mL/kg/min	p	Greater quality of life gain (n=28) Δ MLHFQ ≤ -11	Lower quality of life gain (n=29) Δ MLHFQ > -11	p
Religiosity/spirituality (P–DUREL)						
OR*	3.5 (IQR 2.0-4.0)	4.0 (IQR 2.0-4.0)	0.42	4.0 (IQR 2.0-4.0)	2.0 (IQR 2.0-4.0)	0.84
NOR*	2.0 (IQR 1.5-3.7)	2.0 (IQR 2.0-5.7)	0.19	2.0 (IQR 1.0-3.5)	2.0 (IQR 1.0-3.5)	0.27
IR*	4.0 (IQR 3.0-5.0)	4.0 (IQR 3.0-7.7)	0.23	4.0 (IQR 3.0-6.0)	4.0 (IQR 3.0-5.0)	0.72
DASS-21*	4.0 (IQR 2.0-19)	2.5 (IQR 0.0-11)	0.20	3.0 (IQR 0.0-11)	7.0 (IQR 2.0-19)	0.19
Adherence*	0.71 (IQR 0.48-0.73)	0.60 (IQR 0.52-12)	0.05	0.71 (IQR 0.51-0.82)	0.61 (IQR 0.51-0.69)	0.24

Data are shown as median (IQR) (*). DASS-21: Depression, Anxiety, and Stress Scale; IQR: interquartile range; IR: intrinsic religion; MLHFQ: Minnesota Living with Heart Failure Questionnaire; NOR: non-organizational religion; OR: organizational religion; P–DUREL: Brazilian Portuguese version of the Duke University Religion Index; VO_2: oxygen consumption.

Table 3 – Sociodemographic and clinical characteristics of groups with greater and lesser gains in functional capacity and greater and lesser gains in quality of life

Variable	Groups					
NYHA I in the group with lower functional gain was 43.8%, and in the group with higher gain it was 42.4%.	Greater functional gain (n=29) Δ peak VO_2 > 1.6 mL/kg/min	Lower functional gain (n=28 Δ peak VO_2 < 1.6 mL/kg/min	p	Greater quality of life gain (n=28) Δ MLHFQ ≤ -11	Lower quality of life gain (n=29) Δ MLHFQ > -11	p
Sociodemographic characteristics						
Male sex	20 (71)	22 (78)	0.95	20 (69)	22 (82)	0.30
Age*	62 ± 4	71 ± 2	0.35	67 ± 13	66 ± 23	0.78
Catholic religion	8 (22)	6 (29)	0.27	13 (27)	1 (10)	0.11
Clinical data						
Coronary artery disease	20 (71)	23 (82)	0.84	22 (76)	21 (78)	0.30
Heart failure	14 (54)	17(63)	0.84	14 (52)	17 (65)	0.56
NYHA I	12 (42)	12 (44)	0.78		11 (46)	0.78
NYHA II		14 (58)	0.72	14 (56)		0.55
Ejection fraction*	0.50 ± 0.40	0.50 ± 0.20	0.84	0.60 ± 0.20	0.45 ± 0.20	0.90
Dyslipidemia	20 (71)	21 (75)	0.90	23 (79)	18 (79)	0.85
Arterial hypertension	18 (64)	14 (50)	0.60	19 (66)	13 (48)	0.62
Diabetes mellitus	7 (25)	8 (29)	0.71	7 (24)	8 (30)	0.86
Tobacco use	2 (6.5)	2 (9.5)	0.55	4 (8.3)	0 (0)	0.34

Data are presented as absolute frequency n (%) and mean ± standard deviation (*); MLHFQ: Minnesota Living with Heart Failure Questionnaire.

Table 4 – Correlation of functional and quality of life gains with religiosity/spirituality measures

Variable	Δ peak VO_2		Δ MLHFQ	
	r_s	p	r_s	p
OR	0.110	0.421	0.22	0.871
NOR	0.007	0.421	0.191	0.159
IR	0.083	0.543	0.108	0.429

IR: intrinsic religion; NOR: non-organizational religion; OR: organizational religion; r_s: Spearman correlation coefficient ; MLHFQ: Minnesota Living with Heart Failure Questionnaire.

exercises: body movements designed to provide increases in both the aerobic components of physical fitness and the non-aerobic ones, such as muscle strength, flexibility, and balance. However, it is noteworthy that there was no statistically significant difference in relation to adherence between the groups with greater and lesser functional gain, which leads us to assume that other factors, perhaps not explored in the study, had an impact on the results obtained.

Regarding study limitations, it is worth mentioning that, in the city of Salvador, Bahia, there is only one cardiovascular rehabilitation service, and it is private (which was directly related to the sociodemographic characteristics of the sample). Carrying out similar studies, involving populations with more diversified sociodemographic characteristics, may provide more information about possible interferences of psychosocial factors in the question we analyzed.

From the statistical point of view, we used the absolute gain in VO_2 as it had been defined a priori, based on previous studies on rehabilitation that use this reference; the calculation of the relative gain (percentage) could bring different results and be proposed in future studies.

Finally, we also consider the fact that we opted for an exclusively quantitative approach as a limitation. During the application of the questionnaires, we perceived that the patients, for the most part, welcomed the research, praised the initiative with enthusiasm, and spoke of their spiritual experiences during the course of their illness and rehabilitation. Unfortunately, this material could not be utilized in our work.

Conclusions

In a cohort of patients with heart disease followed in a cardiovascular rehabilitation program for 12 weeks, functional and quality of life gains were not associated with OR, NOR, or IR, as measured by the P–DUREL scale. The patients had a mean OR index and high NOR and IR indexes, but these did not have any impact on adherence or on the results obtained in the program.

Acknowledgements

The authors would like to thank the Cardiology of Exercise Center and the Center of Studies in Cardiology of the Hospital Cárdio Pulmonar.

Author Contributions

Conception and design of the research, Analysis and interpretation of the data, Writing of the manuscript and Critical revision of the manuscript for important intellectual content: Von Flach MRT, Ritt LEF, Ladeia AM, Rocha MS, Stein R; Acquisition of data: Von Flach MRT, Ritt LEF, Santana Junior FG, Correia MVF, Claro TC, Oliveira QB, Santos M, Feitosa CM; Statistical analysis: Von Flach MRT, Ritt LEF.

Potential conflict of interest

No potential conflict of interest relevant to this article was reported.

Sources of funding

There were no external funding sources for this study.

Study association

This article is part of the thesis of master submitted by Maria do Rosário Toscano Von Flach, from Escola Bahiana de Medicina e Saúde Pública.

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*Supplemental Materials

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