Reliability of the scale of barriers for cardiac rehabilitation in the Colombian population.

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Abstract

Purpose: Determine the internal consistency and reproducibility test-retest of the Cardiac Rehabilitation Barriers Scale (CRBS) in Colombian population. **Methods:** 190 patients (67% men, average age = 65 ± 12 years) completed the scale in two moments, with an average of eight days between applications. Cronbach's Alpha and Intraclass Correlation (ICC) coefficients were calculated. **Results:** The internal consistency of the Colombian version of the CBRS was good (Cronbach's alpha = 0.85). The ICC of the instrument was 0.69 (95% CI 0.61-0.76), 0.78 (95% CI 0.71-0.84) when used in the interview type, and 0.47 (95% CI 0, 21-0.67) when it was self-completing. **Conclusions:** The CBRS has an acceptable reliability in the Colombian population, however, its reproducibility decreases when it is self-directed. Identifying barriers using this scale will allow developing strategies to increase participation and adherence to cardiac rehabilitation programs focused on the real needs of patients.

Key words: Cardiovascular diseases, psychometric testing, Treatment Adherence and Compliance.

Introduction

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Survival rate after a cardiovascular event can be increased by 35% and mortality can be reduced by 25 %, if prompt medical attention, such as surgical, pharmacological and a cardiac rehabilitation program is given. Despite the above, some studies report that only a range of 7.5% to 25% of the population eligible to participate in a Cardiac Rehabilitation Program (CRP) initiates it; and of these, 50% desert prematurely (6-9).

Factors influencing participation can be described as personal barriers such as: age, gender, negative views and reaction to health services, unemployment, socioeconomic status. And contextual barriers, such as: Distance and transport issues and lack of family support (6-10). A study conducted in the city of Bucaramanga, found that functional status and perceived needs are the most important barriers to access to cardiac rehabilitation programs (11). This may suggest that ignoring the benefits of these type of programs and having struggles assimilating the diagnosis into their identities, can affect not only the participation but also the adherence to a CRP.

A Canadian instrument called Cardiac Rehabilitation Barriers Scale (CRBS) was developed to assess patients' perception of the degree to which patient, provider and health system-level barriers affect their participation and adherence to CRP. A translation and cross-cultural adaptation for use in Colombia was performed, followed by a validation process. The Content Validity Index showed and acceptable score for relevance (0.86) and pertinence (0.88) (12-14).

However, it is necessary to continue evaluating the psychometric properties of the instrument by assessing its reliability, and thus, justifying its use in the Colombian context. Therefore, the objective of this research was to determine the internal consistency and reproducibility test - retest of the CRBS in Colombian population of patients undergoing percutaneous revascularization.

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Materials and methods

A diagnostic test study was conducted. Clinical variables were collected by reviewing the digital clinical history of the participants. Sociodemographic variables and characteristics related to the CRP were obtained with a questionnaire administrated within the first day with the patient. The CRBS is originally composed by 22 items, items were rated on a five-point Likert-type scale that ranges from 1 = strongly disagree to 5 = strongly agree. Thus, a high score indicates a greater barrier to participation in cardiac rehabilitation programs. The scale consists of four subscales: comorbidities/functional status, perceived needs, personal/ family problems and conflict with work schedule/time (12-14). After the process of cultural adaptation of the instrument (14), the item 10 "travel (e.g., holidays, business, cottage)".

To determine the reliability of the instrument, a sample of one hundred and seventy-one subjects were included. Subjects were participating in a CRP offered by the rehabilitation center “Profesionales de la Salud y CIA” or at the “University Hospital of Bucaramanga- Los Comuneros”. Subjects were excluded from the study if they had some relative or absolute contraindication to perform physical exercise, were illiterate or had some mental deficiency that limited them from completing the questionnaire. Before signing the informed consent, all patients were informed about the objectives of the study and the confidentiality of the data.

In order to guarantee the reliability, even though questionnaires were self-administered, they were supervised. The interval between the two applications was one week. It should be noted that the

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participants did not have access to the survey applied at the first opportunity. The information was collected between August 2018 and July 2019.

A sample size calculation of 166 was obtained, based on the intraclass correlation coefficient obtained in the pilot study by Sánchez et al. (ICC: 0.71) (15), with a power of 80%, and an alpha level of 0.05). This calculation was done with the software Stata 13.1 ado sampicc

Statistical Analysis

Stata 13.1 was chosen for the statistical analysis, using a confidence level of 0.05. Qualitative variables were presented in absolute and relative frequencies. For quantitative variables, mean and standard deviation were calculated, and then adjusted to a normal distribution according to the Skewness / Kurtosis test. The internal consistency was tested with Cronbach's alpha, values ≥0.7 were considered satisfactory. The reliability of the instrument was determined through a test-retest procedure using the Intraclass Correlation Coefficient (ICC) (16). In order to describe the relative strength of agreement associated with kappa statistic, labels established by Landis and Koch (17) were used: <0 poor; 0–0.20 light; 0.21–0.40 regular; 0.41–0.60 moderate; 0.61–0.80 substantial, and 0.81–1 almost perfect reproducibility. Bland and Altman methodology (18) was used to determine the level of agreement between the first and second evaluation.

Ethical considerations

The study was approved by the Scientific Technical Committee of University of Santander (approval number 002-CBU).

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Results

Table 1 shows study population characteristics. 67% were men, the average age was 65 ± 12 years, 90% were from urban areas; 44% were married; 73% belonged to a contributory health regime. The most prevalent diagnosis was AMI; 69% of the participants were between session 1-11 at the time of the interview, and finally all had received attention from a physical therapist during the rehabilitation process

Table 1. Baseline characteristics of patients

Variable		N=193	%
Sex	Male	129	67
Age	Median (SD)	65	12
Place of origin	Rural	19	10
	Urban	174	90
Marital status	NR	3	1
	Single	28	14
	Divorced	22	11
	Married	84	44
	Widow/er	38	20
	Free Union	18	9
	NR	3	1
Socio-economic status	Low	138	72
	Medium-High	52	27
	NR	3	1
Health insurance	Subsidized	34	18
	Contributive	142	73
	Special/Pre-paid	16	8
	NR	3	1
Education level	None/Primary school	85	44
	Middle school	43	22
	Technician	16	8
	Post-Graduate	49	26
CR Indication	AMI/ ACS	88	46
	Bypass	21	11
	Angioplasty	41	21
	Valvopathy	16	8
	Syncope	2	1

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	Other	25	13
Physical disability	No	180	93
	Yes	13	7
Number of cardiac rehabilitation sessions attended	1 – 11	133	69
	12 - 23	35	18
	24 - 36	17	9
	More	1	1
	NR	7	3
Health professionals involved in CRP	Physiotherapist	193	100
	Psychologist	50	26
	Nutrition	73	38
	Cardiology	165	85
	Nurse	77	40
Survey administration method	Self-report	46	22
	Interview	147	75

AMI: Myocardial acute infarct; ACS: Acute Coronary Syndrome; CR: Cardiac Rehabilitation; SD: Standard deviation

Table 2 shows a Cronbach's Alpha with values greater than 0.80 in all the items of the instrument. Likewise, the overall internal consistency of the EBRC was good with a Cronbach's Alpha of 0.85.

Table 2. Cardiac Rehabilitation Barriers Scale Internal Consistency

CRBS item	Alpha
Health Status Perception	
1) …I didn't know about CR	0.83
2) I dont need CR	0.83
3) …I already exercise at home or in my community	0.83
4) …my doctor didn't feel it was necessary	0.83
5) …many people with heart problems don't go to CR and they are fine	0.83
6) …I can manage on my own	0.83
7) …I think I was referred but the rehab program didn't contact me	0.83
8) …it took too long to get referred and into the program	0.83
9) …I prefer to take care of my health alone.	0.84
Logistic Factors	
1) Distance	0.83
2) Cost	0.83
3) Transportation problems	0.83
4) Family responsibilities	0.83
5) Severe weather	0.83
Work/time conflicts	

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1) Time constraints	0.83
2) Work responsibilites	0.83
Functional Status	
1) I find exercise tiring or painful	0.83
2) I dont have energy	0.83
3) Other health problems prevent me for going	0.84
4) I am too old	0.83
Internal Consistency	0.84

CI: Confidence Interval; CR: Cardiac Rehabilitation; CRBS: Cardiac Rehabilitation Barriers Scale.

In Table 3, shows the reproducibility test retest of each item, ranged between moderate and substantial.

Table 3. Reproducibility test retest of the Cardiac Rehabilitation Barriers Scale

CRBS item	ICC	95% CI
Health Status Perception		
1) …I didn't know about CR	0.61	0.51 - 0.69
2) I dont need CR	0.38	0.25 - 0.50
3) …I already exercise at home or in my community	0.59	0.48 - 0.67
4) …my doctor didn't feel it was necessary	0.46	0.34 - 0.56
5) …many people with heart problems don't go to CR and they are fine	0.39	0.27 - 0.50
6) …I can manage on my own	0.48	0.36 - 0.58
7) …I think I was referred but the rehab program didn't contact me	0.45	0.33 - 0.55
8) …it took too long to get referred and into the program	0.38	0.26 - 0.49
9) …I prefer to take care of my health alone.	0.58	0.48 - 0.67
Logistic Factors		
1) Distance	0.70	0.62 - 0.76
2) Cost	0.70	0.62 - 0.76
3) Transportation problems	0.68	0.60 - 0.75
4) Family responsibilities	0.55	0.45- 0.64
5) Severe weather	0.61	0.52 - 0.69
Work/time conflicts		
1) Time constraints	0.65	0.57 - 0.73
2) Work responsibilites	0.64	0.55 - 0.71
Comorbilities/ Functional Status		
1) I find exercise tiring or painful	0.69	0.61 - 0.75
2) I dont have energy	0.56	0.45 - 0.65
3) Other health problems prevent me for going	0.50	0.39 - 0.60
4) I am too old	0.60	0.50 - 0.68

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ICC: intraclass correlation coefficient; CI: Confidence Interval; CRBS: Cardiac Rehabilitation Barriers Scale.

The reproducibility analysis by domains showed the following results: logistic factor (ICC: 0.76, 95% CI 0.70-0.82); comorbidities / functional status (ICC: 0.62, 95% CI 0.52-0.70); health perception (CHF: 0.63; 95% CI 0.54-0.71); work / time conflicts (ICC: 0.67; 95% CI 0.58-0.74) and an overall ICC of 0.69 (95% CI 0.61-0.76). When analyzing reproducibility according to the modality of completion, an ICC of 0.78 (95% CI 0.71-0.84) was observed when it was developed as an interview and 0.47 (95% CI 0.21-0.67) when it was self-administrated (See table 4).

Table 4. Reliability of the Cardiac Rehabilitation Barriers Scale by domains and type of survey

CRBS item	ICC	95% CI	Interview		Self-reported	
			ICC	95% CI	ICC	95% CI
Health status perpections	0.63	0.54-0.71	0.72	0.63-0.79	0.45	0.19-0.66
Logistic factors	0.76	0.70-0.82	0.82	0.76-0.86	0.60	0.38-0.75
Work/time conflict	0.67	0.58-0.74	0.66	0.55-0.74	0.71	0.53-0.82
Comorbilities/ FS	0.62	0.52-0.70	0.65	0.55-0.74	0.52	0.27-0.70
Total	0.69	0.61-0.76	0.78	0.71-0.84	0.47	0.21-0.67

FS: Functional status; CI: Confidence Interval; CRBS: Cardiac Rehabilitation Barriers Scale; ICC: Intraclass correlation coefficient

Discussion

The EBRC has important reliability in subjects participating in phase II in CRP, however, its reproducibility decreases to moderate when its self-monitoring.

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The literature reviewed identifies that personal and contextual factors affect participation in CRP. Gender, age, the presence of comorbidities, employment status, education level, transportation, no medical prescription to CRP, Lack of awareness of treatment benefits and characteristics of the program. (19). However, to obtain a clearer view of the influence of these factors or the barriers that affect attendance and adherence in CRP, validated instruments are required.

Three instruments were found, with acceptable psychometric properties. First, the Australian Cardiac Rehabilitation Enrolment Obstacles scale showed acceptable internal consistency with a Cronbach's Alpha = 0.89. The second one, designed by Cooper A. et al., shows a Cronbach's Alpha between = 0.70 - 0.79 (20-21). Finally, the CRBS, has shown Cronbach's Alpha between 0.70 to 0.88 and ICC between 0.64 and 0.78 in its different validation processes; these results are in line with the ones obtained in this study (Cronbach's Alpha of 0.84 and an ICC of 0.69) (13, 22, 23).

The psychometric properties of the Cardiac Rehabilitation Enrolment Obstacles scale and the one designed by Cooper A. et al., were evaluated in revascularized subjects with coronary heart disease, therefore its utility in other types of patients is unknown. Moreover, the CRBS has been created for all types of subjects demanding CRP. However, the Brazilian version is the only one that has assessed its psychometric properties in patients with cardiovascular risk factors, coronary heart disease, heart failure, arrhythmias, peripheral arterial disease and chronic obstructive pulmonary disease. Additionally, the CRBS when compared to the last two, is the only one that evaluates factors influencing participation or adherence to CRP (13, 22-26).

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It's important to outline the two evaluation times of the scale, due to its importance to calculate its reproducibility. In the Canadian version, authors used three weeks between measurements, the Brazilian version two and a half months, and the local version eight days. This was stablished taking into account that a prolonged period of evolution can change the perception of the barriers to participating in a PRC and shorter times can lead to a high erroneous ICC, altering significantly scale stability (27).

It's difficult to generalize the results obtained across the different studies, primarily because of the differences between sociodemographic characteristics. In the Canadian version of the scale, the population assessed was from Ontario City, where there´s a fully coverage health system, a variable that can results. In the same way, in the Brazilian version study, the majority of the population had a high schooling level, so their results can't be generalized either (13, 22). And lastly, the Colombian version, the sample was obtained from a single region of the country, which could mean that the results are not generalizable to all of Colombia and may lead to selection bias. Furthermore, the study did not consider patients eligible for CR but not participating in a program.

Finally, the different studies have been evaluated in subjects with average ages between 54 to 67 years, not taking into account other group ages that can demand cardiac rehabilitation services (13, 22-26). On the other hand, the Colombian version showed less stability when it was self-reported (in the presence of an interviewer), which allows us to suggest that it should preferably to be administered through an interview.

Conclusion:

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The Cardiac Rehabilitation Barriers Scale has an acceptable reliability in the Colombian population evaluated, however, its reproducibility decreases when it is self-administrated. Identifying barriers using this scale will allow developing strategies to increase participation and adherence to cardiac rehabilitation programs focused on the real needs of patients.

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Conflict of interest

The authors declare no conflicts of interest.

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