

Validation into Portuguese of the Maugerl Cardiac prevention-Questionnaire (MICRO-Q)

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Abstract

Background: The Maugerl CaRdiac preventiOn-Questionnaire (MICRO-Q) is a validated specific tool used to assess the knowledge of the patient with coronary disease on aspects related to the secondary prevention of coronary artery disease (CAD).

Objective: To translate, adapt and validate the MICRO-Q to Brazilian Portuguese.

Methods: Two initial independent translations were carried out into Brazilian Portuguese. After their comparison, the reverse translation was carried out, which was reviewed by a committee and generated the final version that was tested in a pilot study. The tool was applied to 212 coronary patients, with a mean age of 60 to 71 years (standard deviation = 9.4; range: 35-86) that participated in cardiac rehabilitation programs. The internal consistency was verified by Cronbach's Alpha Coefficient, correlation through Spearman's Rho and the validity of the construct was verified through exploratory factorial analysis. The means were analyzed by comparing the scales of the correct questions in relation to variables such as age, sex, associate comorbidities, degree of schooling, family income, among others.

Results: The Brazilian version of the MICRO-Q has 25 questions. The reliability of this version presented a Cronbach's Alpha Coefficient of 0.64 and a Spearman's Rho of the correct answers of 0.65. The factorial analysis showed 6 factors related to the domains of knowledge of the questionnaire. The analysis of the population characteristics regarding the scales of the correct questions presented significant differences only in relation to monthly family income and degree of schooling.

Conclusion: The approved Brazilian version of the MICRO-Q presents adequate validity and reliability for its use in future studies. (Arq Bras Cardiol 2010; 94(3):372-378)

Key words: Coronary artery disease; rehabilitation; knowledge; questionnaires.

Introduction

Programs directed at disease control, defined as “the combination of correct and practical use of protocols, visits, medications, auxiliary services and education” are increasingly advocated as a means to improve patients' habits, positively interfering with treatment. Most of these programs – such as cardiac rehabilitation – include the secondary prevention and are developed by a multidisciplinary team^{1,2}.

Studies have shown that when the objectives of the cardiac rehabilitation programs are put into practice – and that include patient education – there is an improvement of the cure process, decrease in the number of hospital admissions, improvement in the functional picture and increased quality of life of these patients³⁻⁷.

The use of assessment tools is an important resource in these programs, as it allows the measurement of the effects of the teaching and learning processes and possible changes in attitudes as well as a way to learn about the individuals' needs and the conditions to implement the educational process^{8,9}.

Therefore, we sought in the literature a validated instrument in the Portuguese language that could be used in the Brazilian population, as the statistical data have shown that the incidence of coronary artery disease (CAD) has been increasing in Brazil.

The MICRO-Q (Maugerl CaRdiac preventiOn-Questionnaire) is a tool used to evaluate the level of knowledge regarding the secondary prevention of patients with CAD, originally written in the Italian language¹⁰. Therefore, it was necessary to submit it to the international rules of translation, cultural adaptation and validation to the target-language. These phases are necessary to evaluate the equivalence of the questionnaires in different languages¹¹.

Thus, the objective of the present study was to make the MICRO-Q available in the Brazilian Portuguese language through a process of translation, adaptation and validation.

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Methods

About the tool

The MICRO-Q is a self-applicable questionnaire that consists of 26 statements (18 true and 8 false ones) with the following answer options: “true”, “false” and “I do not know”, used to evaluate the level of knowledge of patients with CAD. Patients with other surgical cardiopathies can also be assessed with this tool, as long as the diagnosis of CAD is associated.

Initially, the MICRO-Q was developed, validated and applied to 250 patients who were undergoing intra-hospital cardiac rehabilitation in different regions in Italy. The questions are divided in 4 domains: risk factors (9 items); diet (8 items), pre-hospital admission (4 items) and cardiac disease (5 items).

Three scales were computed separately, each varying from 0 to 26: correct (number of questions correctly answered); incorrect (number of questions incorrectly answered) and uncertain (number of questions answered with the option “I do not know”). The participants are characterized through a personal data file, attached to the tool¹⁰.

Translation and transcultural adaptation

The process of translation and adaptation of the MICRO-Q, authorized by the author, followed strict norms aiming at making the tool available for the Brazilian population taking into account the cultural differences. The entire process of translation of the MICRO-Q, from the Italian language to the Brazilian Portuguese language was carried out based on a protocol proposed by Guillemin et al¹¹: initial translation, reverse translation and a review by a specialists' committee.

The initial translation of the tool (in Italian) to the target-language (Brazilian Portuguese) was carried out by two professionals proficient in both idioms, who did not have contact between them. The translators were aware of the objectives and concepts subjacent to the study and sought to detect the ambiguities and the unexpected meanings in the original items. The conceptual translation, rather than the strictly literary one, was emphasized.

The translated versions were compared, generating a single consensual version, called Version 1. The semantic equivalences (grammatical and vocabulary) were assessed, as well as the cultural ones of the items (experiences lived within the cultural context of the society), in addition to the specific care regarding questionnaire completion instructions and the presentation coherence.

Version 1 was submitted to the reverse translation to Italian by a fluent translator who was blinded to the objectives of the study and the original version of the tool. This new version (Version 2) was compared to the original tool and there were no discrepancies at the comparison.

At the following phase, an assessment committee with 7 professionals from the health area revised Version 1 of the tool, verifying semantic, idiomatic, cultural and conceptual equivalence. The objective was to identify errors that could lead to differences in meaning and therefore, to be able to adapt and rewrite expressions until a consensus was reached,

guaranteeing the sense equivalence, without impairing the understanding of the population to which it was directed.

Therefore, Version 3 was generated and a pilot study was carried out with 18 patients, with the objective of evaluating the understanding of the questions (clarity) and verifying doubts on the structure of the question. Using a scale varying from 0 to 10, each patient had to assign a grade corresponding to the question clarity, originating the clarity index according to Pasquali's criterion of clarity¹².

Hence, the final version was generated, the one used for validation.

Validation

Data collection occurred in the capital city of Florianopolis, state of Santa Catarina, Brazil, with a total of 212 coronary patients that had been participating in cardiac rehabilitation programs for at least one month.

The Brazilian Portuguese version of the MICRO-Q was applied with supervision. The data were analyzed through the statistical software SPSS 13.0 – Statistical Package for the Social Sciences, and the level of significance was set at 0.05 for all tests.

Psychometric analyses were carried out with the objective of evaluating the validity and the reliability of the Brazilian version of the MICRO-Q.

The construct validity was analyzed through exploratory factorial analysis, which identifies the common components among a large number of variables. This evaluation allows us to determine how much the scale is related to the theoretical concepts on which it is based^{13,14}.

The main component method for factor extraction was used, considering only those that presented *eigenvalues* > 1.0. After the selection of the factors, a correlation matrix was generated, where the associations between items and factors were observed through factorial loads. The Varimax orthogonal rotation method was used to interpret the matrix, which maximizes the high correlations and minimizes the low ones, facilitating the analysis¹³.

The internal consistency was assessed by Cronbach's Alpha Coefficient. The correlation was evaluated through Spearman's Rho and tested through test-retest, by applying the MICRO-Q tool again, after 4 weeks, to 25 individuals from the sample.

To verify the results of the use of MICRO-Q regarding some characteristics pointed out by the author (age, sex, profession, associated comorbidities, surgical procedures related to CAD, type and time of cardiac rehabilitation, degree of schooling and monthly family income), we compared the scales of the correct questions in relation to these variables. When testing the data distribution through Kolmogorov-Smirnov test, it was observed that the variables resulting from the scale presented a normal distribution ($p > 0.1$). Considering that, ANOVA and Bonferroni's post-hoc tests were used.

The study was carried out according to the standards required by the Declaration of Helsinki and it was approved by the Committee of Ethics in Human Research of the University of the State of Santa Catarina (UDESC), according to Resolution CNS 196/96. All individuals were informed on

the objective of the research, data confidentiality and all of them signed the Free and Informed Consent Form prior to study enrollment.

Results

Translation and transcultural adaptation

During the process of translation and adaptation, it was observed that question 15 did not fit the Brazilian dietary habits ("It is good for you health to eat a little cheese after the meals") and the question was excluded from the questionnaire in Brazilian Portuguese, with the author's consent. Therefore, the Brazilian Portuguese version of the MICRO-Q consists of 25 questions.

At the pilot-test carried out in 18 patients, in a scale from 0 to 10, the mean clarity index¹² of the questions was 9.1 (SD=1.3), indicating that the questionnaire is easily understandable by the target-population.

Validation

The sample consisted of 212 patients, with 144 males and 68 females, who had been participating in cardiac rehabilitation programs (48.1% from private hospitals; 51.9% from public hospitals), for a minimum time of one month and a maximum time of 216 months ($x = 28.44$; $SD = 41.20$). Age varied from 35 to 86 years ($x = 60.72$; $SD = 9.4$). Only 16.5% of the sample did not present comorbidities associated to CAD, with systemic arterial hypertension (SAH) being the most common comorbidity observed (58%), followed by congestive heart failure (CHF) (38.2%) and dyslipidemia (26.5%). Regarding the performance of surgical procedure associated to the disease, 141 individuals were submitted to some type of surgery. Other cardiopathies were not observed.

The socioeconomic level was characterized by monthly family income and degree of schooling. At the analysis of the two types of rehabilitation – public and private – it was observed that patients participating in public programs presented lower income and degree of schooling, with 62.3% of them receiving between 1-5 minimum wages/month and 37% had not completed Elementary School. On the other hand, patients participating in private programs presented higher income and degree of schooling, with 39.8% receiving > 20 minimum wages/month and 48.5% had finished College or University.

The characteristics of the studied population are shown in Table 1.

Validity

The construct validity was evaluated through factorial analysis. The Kaiser-Meyer-Olkin (KMO) and Bartlett Sphericity tests indicate the degree of susceptibility, or the adjustment of the data to the factorial analysis, that is, the level of confidence that can be expected from the data when the factorial analysis method is successfully employed¹⁴.

In this study, the significance value of the Bartlett Sphericity test showed to be < 0.0001, which allows the possibility of use and adequacy of the factorial analysis method for the treatment

of data. The KMO value was 0.590, which is considered regular. Due to fact that the tool was multidimensional¹⁰, the factors are not necessarily correlated, which makes the regular index acceptable. Therefore, the factorial analysis was performed.

The exploratory factorial analysis by the Main Component Method resulted in 6 factors (using the criterion of considering the same with *eigenvalue* > 1.0). These factors, as a group, were responsible for 66.35% of the total variation of data and the first of them is responsible for 27% of the variance. Table 2 shows the factorial loads of each question in the 6 factors extracted (hospital pre-admission, diet, risk factors, psychological factors, physical exercise and cardiac disease), taking into account that factorial loads < 0.40 are little significant¹³.

In Table 2, the first factor corresponds to the items directly related to hospital pre-admission, as questions 20 to 23 present factorial loads > 0.50. The factor "hospital pre-admission" refers to questions on what to do when faced with signs and symptoms of acute coronary events. The second factor points out to the items directly related to diet (questions 9, 10, 13 to 16, 18), with factorial loads > 0.40. The factor "diet" brings questions regarding the type of diet for coronary patients and its influence on the disease. The third factor corresponds to the items related to CAD risk factors, as questions 1, 2, 3 and 8 presented factorial loads > 0.50.

The factor "risk factors" is about conditions that predispose an individual to a higher risk of developing heart and blood vessel diseases, such as dyslipidemia and smoking. The fourth factor also corresponds to items related to risk factors (questions 4, 11 and 12, with factorial loads > 0.50); however, it is about "factors focused on psychological aspects", such as beliefs and stress. The fifth factor is equivalent to the items directly related to physical exercise, as the questions 4, 17, 19 and 24 present factorial load > 0.40. The factor "physical exercise" refers to items on the influence of the practice of physical exercises on CAD and on cardiac rehabilitation. The sixth and last factor corresponds to the items related to the management of the heart disease, as questions 5, 6 and 25 presented factorial loads > 0.40. The factor "heart disease" brings information regarding surgical procedures, diagnostic methods and physiopathology.

Internal consistency and correlation

The internal consistency was tested through Cronbach's Alpha Coefficient. This coefficient varies from 0 to 1.0 and the higher the value, the higher the reliability. The Alpha coefficient was 0.64.

The Spearman's Rho correlation index for the correct answers was 0.65, 0.102 for the incorrect ones and 0.62 for the uncertain ones.

Such values are similar to those found in the validation of the original tool (Spearman's Rho for correct answers of 0.72 and Alpha coefficient of 0.68)¹⁰.

Descriptive analysis

The following characteristics of the population were analyzed in relation to the scales of the correct questions:

Table 1 – Characteristics of the coronary patients enrolled in the study (n=212)

Variable	Category	N	% total
Gender	Male	68	32.1%
	Female	144	67.9%
Age	<65 years	132	62.3%
	>65 years	68	32.1%
	Did not answer	12	5.7%
Comorbidities*	SAH	123	58%
	CHF	81	38.2%
	DMI	13	6.1%
	DMII	43	20.3%
	POAD	34	16%
	Dyslipidemia	56	26.5%
	None	35	16.5%
Surgeries**	MR	54	25.5%
	Angioplasty	59	27.8%
	MR+Angioplasty	28	13.2%
	None	71	33.5%
Rehabilitation type	Private	102	48.1%
	Public	110	51.9%
Monthly family income	Up to 1 MW	11	5.2%
	From 1 to 5 MW	75	35.4%
	From 5 to 10 MW	34	16%
	From 10 to 20 MW	41	19.3%
	Above 20 MW	43	20.3%
	Did not answer	8	3.8%
Degree of schooling	Illiterate	3	1.4%
	Incomplete Elementary School	43	20.3%
	Complete Elementary School	11	5.2%
	Incomplete High School	13	6.1%
	Complete High School	37	17.5%
	Incomplete College/ University	14	6.6%
	Complete College/University	62	29.2%
	Post-Graduation	26	12.3%
Did not answer	3	1.4%	

*SAH = Systemic Arterial Hypertension; CHF = Congestive Heart Failure; DMI = Diabetes Mellitus Type I; DMII = Diabetes Mellitus Type II; POAD = Peripheral Obstructive Arterial Disease; MW=minimum wage;**MR = Myocardial Revascularization

Table 2 – Factorial values for each question in the six factors extracted from the MICRO-Q

Questions	Factorial values					
	F1	F2	F3	F4	F5	F6
Q20	.735					
Q21	.766					
Q22	.819					
Q23	.586					
Q9		.739				
Q10		.822				
Q13		.764				
Q14		.476				
Q15		.480				
Q16		.471				
Q18		.845				
Q1			.575			
Q2			.861			
Q3			.500			
Q8			.782			
Q7				.767		
Q11				.560		
Q12					-.599	
Q4						.480
Q17						.733
Q19						.854
Q24						.545
Q5						-.557
Q6						.470
Q25						.754

Obs: level of significance > 0.40

age, sex, profession, associated comorbidities – SAH, CHF, diabetes mellitus type I (DMI), diabetes mellitus type II (DMII), peripheral obstructive arterial disease (POAD), dyslipidemia – surgical procedures related to CAD, type of cardiac rehabilitation (public or private), time of cardiac rehabilitation, degree of schooling and monthly family income.

There were no significant differences regarding the correct answers due to age ($p = 0.405$), sex ($p = 0.482$), profession ($p = 0.585$), associated comorbidities – having or not SAH ($p = 0.847$); having or not CHF ($p = 0.589$); having or not DMI ($p = 0.673$); having or not DMII ($p = 0.795$); having or not

POAD ($p = 0.285$); having or not dyslipidemia ($p = 0.563$) –, having been or not submitted to surgical procedure related to CAD ($p = 0.513$), between private and public rehabilitation ($p = 0.310$) and time of cardiac rehabilitation ($p = 0.616$).

As for the correct scores, they showed a significant difference in relation to monthly family income ($p < 0.001$) and degree of schooling ($p = 0.002$), which demonstrates the influence of the socioeconomic level on the knowledge of the patient, as reported in other studies¹⁵⁻²¹.

The questions of the MICRO-Q are shown in Table 3. The frequency of each one of the questions in the three scales is reported in details in Table 4. For the correct scores, the mean was 19.84 (SD = 2.4); for the incorrect ones, the mean was 3.06 (SD = 1.49); and for the ones answered with the “I do not know” option, the mean was 2.10 (SD = 2.24). Questions 2 and 21, which deal with risk factors and pre-hospital admission, respectively, are noteworthy as they are critical items (with the highest degree of error, with 81.1% in question 2 and 74.1% in question 21).

Discussion

The process of translation and validation of a tool in the health area requires a great effort. It is necessary not only to adapt the instrument from a conceptual and cultural point of view, but also bring it close, as much as possible, to the reality of the target-population^{9,11,22}. In the case of Brazil, there is a wide regional, social and cultural diversity, which was taken into account when carrying out this study²³⁻²⁵.

The psychometric analyses carried out during the process of validation presented satisfactory results when compared to the validation of the original tool. The MICRO-Q in the Brazilian Portuguese language showed to be valid regarding the clarity and presented adequate reliability and validity, demonstrated by the observed coefficients and factorial loads.

Regarding the descriptive analysis, the scales of the correct questions presented significant differences when compared in relation to the parameters that represent the socioeconomic level (degree of schooling and family monthly income). That demonstrates that the socioeconomic level is one of the main factors that influence the knowledge of patients on the disease, as it has been demonstrated by many studies¹⁵⁻²¹.

Although only the characteristics associated to the socioeconomic level presented significant differences, other factors, such as age, sex, associated comorbidities, time of cardiac rehabilitation and surgical interventions associated to the disease must be analyzed together with the use of this questionnaire, as they can also have an impact on the attainment of knowledge by coronary patients^{4,10,22,24}.

As for approaches such as the proportion of myocardial revascularization surgeries (MRS), either on or off-pump, alterations generated by associate comorbidities (such as SAH and CHF) and time of hospitalization, even though they have an important role in the process of cardiac rehabilitation, they were not considered in the present study, as they were not part of the original tool^{1,5,10}.

The critical items (questions 2 and 21) reflect the lack of knowledge on the part of the patients regarding important

Table 3 – Questions of the Brazilian version of the MICRO-Q

Questions	
Q1	The risk of infarction is reduced by treating the cholesterol, high blood pressure and glycemia, by abstaining from smoking and by practicing a regular physical activity.
Q2	The risk factors are the cause of infarction and angina.
Q3	A risk factor is a condition that must be kept under control and treated in order to reduce the probability of atherosclerotic disease progression.
Q4	The infarction does not necessarily imply in limitations in physical or sexual activity after the convalescence/recovery phase.
Q5	The pacemaker implantation surgery is an intervention that definitively solves the problem of ischemic cardiopathy.
Q6	The objective of the angioplasty is to dilate the arterial narrowing and, consequently, to once again get blood flowing to the parts of the heart that need it.
Q7	Individuals with cardiac disease can blame it all on fate.
Q8	If someone smokes and has good health, he/she can continue smoking.
Q9	Individuals with high cholesterol, diabetes or overweight can learn to cook foods in different ways.
Q10	Individuals with high cholesterol, diabetes or overweight can learn to choose the adequate foods.
Q11	Individuals who feel stressed can learn how to face stress.
Q12	Individuals who feel stressed cannot do anything to change the situation.
Q13	The diet of a patient with cardiopathy must contain moderate amounts of table salt.
Q14	The diet of a patient with cardiopathy must be rich in fibers (fruit, vegetables and legumes).
Q15	It is advisable to eat legumes two to three times a week, as they are low in fat and rich in fibers.
Q16	It is advisable to use unheated olive oil as to not modify its natural state.
Q17	The physical activities learned during the cardiac rehabilitation period, after the discharge, must be carried out continuously and at long term.
Q18	Fish must be consumed at least three times a week.
Q19	During one's free time it is interesting to take long walks, take care of the garden and go bike riding.
Q20	If one feels chest pain again, it is necessary to take sublingual nitrate (Propatylnitrate or Isordil).
Q21	If the chest pain does not decrease after the sublingual use of nitrates (Propatylnitrate or Isordil), it is necessary to call the family doctor.
Q22	If the chest pain does not decrease after the sublingual use of nitrates (Propatylnitrate or Isordil), it is necessary to call an emergency service.
Q23	If the chest pain does not decrease after the sublingual use of nitrates (Propatylnitrate or Isordil), you must drive to the Emergency Service.
Q24	The stress test (ergometric test) can define the type and intensity of the physical activity that can be performed by someone who has had an infarction.
Q25	The coronary angiography is a useful diagnostic examination that can be used to visualize the narrowing of the coronary arteries.

Table 4 – Frequencies and means of the questions of the MICRO-Q in the three scales.

Questions	Frequency n(%)		
	Correct	Incorrect	I do not know
Q1	203 (95.8)	5(2.4)	4(1.9)
Q2	15 (7.1)	172(81.1)	25(11.8)
Q3	190(89.6)	5(2.4)	17(8.0)
Q4	149(70.3)	41(19.3)	22(10.4)
Q5	108(50.9)	27(12.7)	77(36.3)
Q6	189(89.2)	4(1.9)	19(9.0)
Q7	198(93.4)	7(3.3)	7(3.3)
Q8	192(90.6)	10(4.7)	10(4.7)
Q9	185(87.3)	14(6.6)	13(6.1)
Q10	210(99.1)	1(0.5)	1(0.5)
Q11	181(85.4)	15(7.1)	16(7.5)
Q12	189(89.2)	14(6.6)	9(4.2)
Q13	204(96.2)	6(2.8)	2(0.9)
Q14	210(99.1)	2(0.9)	0
Q15	168(79.2)	36(17)	8(3.8)
Q16	193(91.0)	5(2.4)	14(6.6)
Q17	205(96.7)	2(0.9)	5(2.4)
Q18	191(90.1)	12(5.7)	9(4.2)
Q19	171(80.7)	29(13.7)	12(5.7)
Q20	168(79.2)	5(2.4)	39(18.4)
Q21	26 (12.3)	157(74.1)	29(13.7)
Q22	185(87.3)	5(2.4)	22(10.4)
Q23	154(72.6)	46(21.7)	12(5.7)
Q24	189(89.2)	8(3.8)	15(7.1)
Q25	153(72.2)	6(2.8)	53(25)
Mean	19.84(SD = 2.4)	3.06(SD = 1.49)	2.10(SD = 2.24)

Obs: the questions in bold show critical items.

information (risk factors and pre-hospital admission) and emphasize the use of this tool in the routine care of coronary patients.

The MICRO-Q, in its Brazilian Portuguese language version, is a self-applicable tool, which consists of 25 questions that comprehend 4 domains of knowledge: risk factors and life style; diet; pre-hospital admission; and physical exercise. As well as the original version, each statement has three answer options: "correct", "false" and "I do not know", each one with its respective scores.

The importance of the education of the coronary patient has increased in last years^{26,27}; however, publications of specific tools to evaluate this knowledge in the Portuguese language are scarce. The performance of this study with the MICRO-Q allows the use of such tool to evaluate the level of knowledge of patients regarding the secondary prevention of coronary disease in future studies and in clinical practice.

The knowledge tools have been created with yes/no questions and true/false questions – such as the MICRO-Q –, which demonstrates that the focus of the studies is on "How much you know", rather than "What you know". That might not reflect the real understanding of the patient concerning the disease; thus, new studies must be encouraged to create tools that express the actual knowledge of coronary patients on CAD and on related aspects²⁸.

Studies of this nature can be quite useful in the creation of strategies to stimulate patient adherence to cardiac rehabilitation programs and can also interfere in the success of this intervention. Additionally, the association between CAD and knowledge can collaborate to optimize treatment, with a change in beliefs, bad habits and risk factors^{2,6,10,24,29}.

Conclusion

The translated and adapted version of the MICRO-Q (Maugerl CaRdiac preventiOn-Questionnaire) showed aspects of adequate reliability and validity and that it can be used to evaluate not only coronary patients undergoing cardiac rehabilitation, but also those undergoing clinical treatment.

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 study is not associated with any post-graduation program.

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