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Health literacy: application of SAHLPA-18 in patients with acute coronary syndrome

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Abstract

Aim: To evaluate the health literacy (HL) of patients with acute coronary syndrome (ACS) admitted to a public hospital of high complexity in the interior of Minas Gerais, Brazil, through the application of the instrument Short Assessment of Health Literacy for Portuguese Speaking Adults (SAHLPA)-18.

Methods: Retrospective cross-sectional study, from the Good Clinical Practices (GCP) project developed in a tertiary hospital. The 175 patients with ACS were analyzed, in which the profile and the SAHLPA-18 were evaluated.

Results: It was found that 55.43% (97 among 175; 95% CI: 48.07–62.79) were considered with inadequate HL, and 40.00% of patients who have completed elementary school or higher education had inadequate HL (36 among 90). Female sex and complete primary education or higher increased the HL, and diabetes decreased the HL.

Conclusions: We observed low literacy even in the presence of formal education, which, combined with the presence of diabetes, may represent a risk to patients with ACS, highlighting the need for continuous health education in this group regardless of the profile.

Keywords

coronary artery disease, health literacy, acute myocardial infarction

Introduction

Cardiovascular diseases (CVDs) are diseases that affect the heart and blood vessels, presenting high mortality rates worldwide [1]. According to Oliveira et al. [2], about 30% deaths are caused by heart disease and represent a serious health problem in Brazil. Acute coronary syndrome (ACS) is a disease that

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affects the coronary arteries, generating an acute imbalance in the oxygen supply and demand in the cardiac muscle, which can lead to serious cardiovascular events, such as acute myocardial infarction (AMI) [1, 3].

The individual's ability to acquire, process, and understand basic information and make self-care decisions with health is in the context of the definition of health literacy (HL), a descriptor originated from English HL and first cited by Simonds in 1974 [4, 5].

HL is an important social determinant; however, it is not only linked to the level of formal education of the individual, because the individual can present an adequate level of education and still not understand the medical guidelines on their health status [6]. Studies show that individuals with inadequate HL tend not to perform self-management satisfactorily of the disease of which they are a carrier, thus presenting higher hospitalization and mortality rates [7].

Due to the lack of instruments in the Portuguese language that assess the level of HL, researchers validated, for use in Brazil, the instrument Short Assessment of Health Literacy for Portuguese Speaking Adults (SAHLPA)-18, a test that performs the analysis of comprehension of individuals on medical terms commonly used in health [7].

The evaluation of HL in individuals with ACS is of great relevance because, in addition to being a chronic condition with high rates of morbidity and mortality globally, these subjects need adequate medical care after hospital discharge and uninterrupted care. Thus, an adequate understanding of the guidelines and health information determines the patient's clinical outcome [6]. This data is scarce, and its impact on the group is little known in Brazil. The objective of this study is to evaluate the HL of patients with ACS, admitted to a high complexity hospital in the interior of Minas Gerais, Brazil, through the application of the SAHLPA-18 instrument.

Materials and methods

Study characteristics and ethical aspects

A retrospective cross-sectional study was conducted from data originating from the Good Clinical Practices (GCP) project, which was developed in a high-complexity and tertiary public hospital in the interior of Minas Gerais, Brazil. The hospital serves a population of more than 3 million individuals from 27 municipalities in the region. GCP is a multicenter, longitudinal, and prospective project/study, developed by the Brazilian Society of Cardiology, American Heart Association and Heart Hospital, through the Institutional Development Program of the Brazilian National Health System (Programa de Apoio ao Desenvolvimento Institucional do Sistema Único de Saúde in Portuguese—PROADI-SUS) [8].

The GCP project aims to increase adherence rates to national and international cardiology guidelines and improve care indicators [8]. The project was approved by the Research Ethics Committee of the Federal University of Uberlândia, under the number of opinion 2496296 (CAAE: 48561715.5.2013.5152) as part of a multicenter study. Here was presented only one center's data with limited objective analyses. All patients signed the informed consent form for the study itself. The study complies with the Declaration of Helsinki.

Procedure for data collection

The data of this study were collected from the GCP project, using only the ACS data collected from August 2018 to March 2020. Individuals aged more than or equal to 18 years, of both sexes, with a primary diagnosis of ACS at admission or during hospitalization were included in the project; patients with ACS undergoing coronary artery bypass grafting or other major surgical procedures during the same hospitalization were excluded.

A total of 176 patient records were analyzed by convenience, excluding one with incomplete data. In these, the application of the questionnaire SAHLPA-18 was analyzed, and the data were tabulated and analyzed. In addition, clinical and sociodemographic information were collected.

Description of the instrument

The Short Assessment of Health Literacy for Spanish Speaking Adults (SAHLSA) is an instrument of Spanish origin, developed with the aim of minimizing health problems related to low schooling, which allows the quick assessment of the HL level of Spanish-speaking individuals [9]. The test, in turn, was based on the short version of Rapid Estimate of Adult Literacy in Medicine, an English instrument that evaluates the ability to understand, pronounce and read common medical words and was validated for the Portuguese population [7, 10].

In order to evaluate the HL of the Brazilian population, researchers validated the SAHLSA-50 instrument in Portuguese, giving rise to SAHLPA-50. Soon after, the instrument suffered a reduction of 32 items out of 50, resulting in SAHLPA-18. This last version corresponds to a multiple-choice test composed of 18 medical terms and two associated words for each, one being considered the correct association and the other the distractor. In addition, the expression "I do not know" was also included in order to avoid guessing the answers [7, 9].

The application of the test requires the examinee to read the terms aloud and associate them correctly with words of similar meaning, thus demonstrating proper understanding and pronunciation [8]. Regarding the score, each correct item adds a point to the total score, ranging from 0 to 18, measuring the level of HL according to the number of correct answers, and individuals with a score less than or equal to 14 have an inadequate HL, and between 15 and 18 have an adequate HL [7].

However, since the GCP project is a multicenter study [8] and the original center did not take into account the choice and pronunciation analysis performed with the SAHLPA-18 instrument, this study also disregarded the evaluation of pronunciation. Therefore, participants were asked to associate only the medical term with words of similar meaning according to their understanding, and if they did not know, consider the answer "I do not know", performing only the analysis of understanding. This decision was maintained to allow comparability of the centers, and it is believed to have little impact on the results and patient outcomes.

Statistical analysis

The sampling was done by convenience sampling without any associated power calculation. Qualitative data were described with absolute and relative frequency. Quantitative data were described as the mean. The 95% confidence interval (CI) was included when necessary. When it was necessary for the analyses, the original variables were dichotomized or recategorized to better describe the data due to the representativeness or adjustment of the inferential analyses.

For SAHLPA-18, the inadequate option or the fact of having answered "I do not know" was considered as the wrong answer, since they demonstrate the absence of health reading. From this, the number of correct answers and mistakes in the items was counted and calculated as a percentage of correct answers in HL. For the prediction of literacy accuracy percentage, these data were adjusted to multiple linear regression models, based on ordinary least squares. For the reduced model, it was decided to keep the most parsimonious model with only significant predictor variables, with 10.00% probability of exclusion by the backward method. Only variables without data loss and with more than twenty individuals at each level were included in the case of qualitative variables to avoid estimation problems. The model was proposed in a descriptive perspective and not for predicting other populations.

For the prediction of HL (score of 15 points or more), multiple logistic regression analysis was used. The variables of the clinical and sociodemographic profile with theoretical justification, and without data loss and with adequate sample size were included to avoid problems in estimating the parameters of the model. From the complete multiple model, we used the backward variable selection method, based on the exclusion criterion of the model, the probability of the Wald test was less than 5%. Moreover, the odds ratio and its 95% CI were calculated.

For all analyses, the data were analyzed in the software Statistical Package for the Social Sciences version 20.0. Significance of 5% was adopted for all analyses, except when described.

Results

The analysis included 175 patients who participated in the GCP project, hospitalized between August 2018 and March 2020, in a public hospital of high complexity in the interior of Minas Gerais state, Brazil.

The mean age of the patients was 58.02 years, and most of the participants were male (70.86%). The main comorbidities in patients with ACS were systemic arterial hypertension 51.43%, dyslipidemia 30.86%, and diabetes mellitus 24.00%, as shown in Table 1.

Table 1. Clinical and sociodemographic profile of individuals with acute coronary syndrome assessed for health literacy.

Variable	No, % (*n*)	Yes, % (*n*)
Elderly (> 60 years)	54.86 (96)	45.14 (79)
Female sex	70.86 (124)	29.14 (51)
Arterial hypertension	48.57 (85)	51.43 (90)
Diabetes mellitus	76.00 (133)	24.00 (42)
Dyslipidemia	69.14 (121)	30.86 (54)
Acute myocardial infarction	83.43 (146)	16.57 (29)
Depression	88.00 (154)	12.00 (21)
Procedures	87.43 (153)	12.57 (22)
Physical activity	68.00 (119)	32.00 (56)
Smoking	29.14 (51)	70.86 (124)
Alcoholism	61.14 (107)	38.86 (68)
Education	48.57 (85)	51.43 (90)
Family income	45.14 (79)	54.86 (96)
Angioplasty	88.00 (154)	12.00 (21)

Regarding the clinical profile of the 175 patients included, 4.57% (n = 8) were diagnosed with unstable angina; 78.86% (n = 138) with AMI with ST-segment elevation [requiring > 1 mm of ST elevation at the J-point in two contiguous leads on the 12-lead electrocardiogram, ST-segment elevation myocardial infarction (STEMI) patients] [3]; and 16.57% (n = 29) with AMI without ST-segment elevation [all AMI patients without ST-segment elevation, or no STEMI (NSTEMI) patients]. Regarding life habits, 70.86% (n = 124) of the sample used tobacco, and 68.00% (n = 119) did not practice physical activity, as shown in Table 1.

Regarding the level of education, 51.43% of the participants had completed elementary school or higher education, while 48.57% were illiterate or had incomplete elementary school. As for family income, 54.86% of individuals had income above two minimum wages; in contrast, 45.14% had income less than or equal to two minimum wages, as shown in Table 1.

Despite the high level of education in the sample, we still observed a high rate of inadequacy in literacy, probably associated with other factors. Regarding the SAHLPA-18 instrument, adopting the criterion of 15 correct answers or more, 55.43% of individuals were considered with inadequate HL (97 among 175; 95% CI: 48.07–62.79). Among the patients who have completed elementary school or higher education, 40.00% of patients had inadequate HL (36 among 90).

Among the medical terms that make up the instrument, the items colitis, incest, and testicle had a higher percentage of mistakes, while the items convulsion, osteoporosis, and menstrual had a higher percentage of correct answers among the other test items, as shown in Table 2.

Concerning the predictive variables, in this study, the fact that the participant has completed elementary school or higher education, and/or has a family income higher than two minimum wages, increases by 12.66% and 5.90%, respectively, the percentage of correct responses in the SAHLPA-18 instrument, as shown in Table 3.

Table 2. Stratification of the SAHLPA-18 instrument for individuals with acute coronary syndrome.

Item	Correct answer		Stratification of No[1]			
	No, % (*n*)	Yes, % (*n*)	Answer	Wrong, % (*n*)	Answer	I do not know, % (*n*)
Osteoporosis	8.57 (15)	91.43 (160)	Bone	5.71 (10)	Muscle	2.86 (5)
Pap smear	14.29 (25)	85.71 (150)	Test	5.71 (10)	Vaccine	8.57 (15)
Abortion	12.00 (21)	88.00 (154)	Loss	8.57 (15)	Marriage	3.43 (6)
Hemorrhoid	10.29 (18)	89.71 (157)	Veins	3.43 (6)	Heart	6.86 (12)
Not normal	20.57 (36)	79.43 (139)	Different	12.00 (21)	Similar	8.57 (15)
Menstrual	9.14 (16)	90.86 (159)	Monthly	6.86 (12)	Daily	2.29 (4)
Behavior	24.57 (43)	75.43 (132)	Conduct	21.71 (38)	Thought	2.86 (5)
Convulsion	4.57 (8)	95.43 (167)	Dizzy	2.86 (5)	Quiet	1.71 (3)
Rectal	32.57 (57)	67.43 (118)	Suppository	17.14 (30)	Watering can	15.43 (27)
Appendix	12.00 (21)	88.00 (154)	Pain	9.14 (16)	Itch	2.86 (5)
Arthritis	27.43 (48)	72.57 (127)	Articulation	22.29 (39)	Stomach	5.14 (9)
Caffeine	26.29 (46)	73.71 (129)	Energy	21.71 (38)	Water	4.57 (8)
Colitis	50.86 (89)	49.14 (86)	Intestine	22.29 (39)	Bladder	28.57 (50)
Gallbladder	18.29 (32)	81.71 (143)	Organ	10.86 (19)	Artery	7.43 (13)
Jaundice	24.00 (42)	76.00 (133)	Yellow	10.86 (19)	White	13.14 (23)
Prostate	22.29 (39)	77.71 (136)	Gland	16.57 (29)	Circulation	5.71 (10)
Incest	54.29 (95)	45.71 (80)	Family	27.43 (48)	Neighbors	26.86 (47)
Testicle	56.57 (99)	43.43 (76)	Sperm	49.14 (86)	Egg cell	7.43 (13)

[1]: The percentage was calculated based on the total *n* (175 subjects). SAHLPA: Short Assessment of Health Literacy for Portuguese Speaking Adults.

Table 3. A multiple linear regression model was applied to the percentage of correct answers on the SAHLPA-18 to assess the health literacy of individuals with acute coronary syndrome.

Complete model					
Predictor	**B_i**	**SE**	***p***	**95% CI LL**	**95% CI UL**
Constant	65.53	4.02	< 0.001	57.59	73.48
n of comorbidities (risk factors)	1.22	1.63	0.455	–2.00	4.45
Over 60 years old	–2.46	2.64	0.351	–7.67	2.74
Female	5.17	3.05	0.091	–0.84	11.19
Systemic arterial hypertension	–3.37	3.28	0.307	–9.85	3.12
Diabetes mellitus	–4.63	3.55	0.194	–11.64	2.38
Dyslipidemia	2.47	3.18	0.439	–3.81	8.75
Acute myocardial infarction	–5.35	4.82	0.269	–14.87	4.17
Depression	–0.10	4.23	0.982	–8.44	8.25
Procedures	14.42	17.41	0.409	–19.96	48.79
Physical activity	3.23	3.19	0.312	–3.06	9.52
Smoker or former smoker	–1.60	3.23	0.621	–7.98	4.78
Alcoholic or former alcoholic	–0.31	3.20	0.924	–6.63	6.02
Angioplasty	–17.82	16.90	0.293	–51.19	15.55
Complete primary education or higher	11.09	2.58	< 0.001	5.99	16.19
More than two minimum wages	6.96	2.62	0.009	1.77	12.14
Reduced model					
Predictor	**B_i**	**SE**	***p***	**95% CI LL**	**95% CI UL**
Constant	66.44	2.06	< 0.001	62.39	70.50
Complete primary education or higher	12.66	2.44	< 0.001	7.85	17.47
More than two minimum wages	5.90	2.45	0.017	1.07	10.74

SAHLPA: Short Assessment of Health Literacy for Portuguese Speaking Adults; B_i: i-th parameter estimate; SE: standard error of the estimate; *p*: probability based on Student's *t*-test; CI: confidence interval; LL: lower limit; UL: upper limit.

In addition, the fact that the individual is female and has completed elementary school or higher education level increases by 2.04 times (95% CI: 1.00 and 4.21) and 3.74 times (95% CI: 1.96 and 7.15), respectively, the chances of the individual having an adequate HL while the fact that the patient has diabetes mellitus decreases the chances in 0.42 times (95% CI: 0.19 and 0.95) of the client having an adequate HL, as shown in Table 4.

Table 4. Multiple logistic regression analysis and odds ratio (OR) for predicting adequate health literacy (15 points or more), based on SAHLPA-18 of individuals with acute coronary syndrome.

Complete model						
Predictor variables	**B_i**	**SE**	***p***	**OR**	**LL**	**UL**
n of comorbidities	0.00	0.18	0.993	1.00	0.71	1.42
Over 60 years old	0.45	0.36	0.209	1.57	0.78	3.19
Female	0.97	0.42	0.020	2.63	1.17	5.92
Systemic arterial hypertension	–0.50	0.42	0.233	0.61	0.27	1.38
Diabetes mellitus	–0.63	0.47	0.180	0.53	0.21	1.34
Dyslipidemia	–0.20	0.44	0.654	0.82	0.35	1.93
Acute myocardial infarction	0.21	0.63	0.735	1.24	0.36	4.26
Physical activity	0.44	0.41	0.292	1.55	0.69	3.47
Smoker or former smoker	0.26	0.44	0.552	1.30	0.55	3.10
Alcoholic or former alcoholic	0.15	0.41	0.714	1.16	0.52	2.59
Complete primary education or higher	1.29	0.36	< 0.001	3.62	1.81	7.26
More than two minimum wages	0.52	0.36	0.155	1.67	0.82	3.40
Constant	–1.65	0.57	0.003	0.19		
Reduced model						
Predictor variables	**B_i**	**SE**	***p***	**OR**	**LL**	**UL**
Female	0.72	0.37	0.051	2.05	1.00	4.21
Diabetes mellitus	–0.85	0.41	0.036	0.43	0.19	0.95
Complete primary education or higher	1.32	0.33	< 0.001	3.74	1.96	7.15
Constant	–0.94	0.28	0.001	0.39		

SAHLPA: Short Assessment of Health Literacy for Portuguese Speaking Adults; B_i: i-th estimate of model parameters; SE: standard error of the B_i estimate; OR: odds ratio; Wald: Chi-square statistic of the Wald test; *p*: probability based on the Wald test; LL and UL: lower and upper limit, respectively, of the OR confidence interval at 95%.

These results reinforce that formal education alone is not able to predict the HL of the sample. This reflects how other social (income) and personal aspects (sex and other disease presence) can interact together to define the literacy of these patients. We found that individuals of male sex, with diabetes, with incomplete primary education, or with less than two minimum wages show higher risks of inadequate HL, as shown in Table 5.

Table 5. Stratification of significant predictor variables for adequate health literacy (15 points or more), based on SAHLPA-18 of individuals with acute coronary syndrome.

Predictor variables	**Level**	**% of health literacy (*n*)**	
		Inadequate	**Adequate**
Sex	Male	59.68 (74)	40.32 (50)
	Female	45.10 (23)	54.90 (28)
Diabetes mellitus	No	51.13 (68)	48.87 (65)
	Yes	69.05 (29)	30.95 (13)
Complete primary education or higher	No	71.76 (61)	28.24 (24)
	Yes	40.00 (36)	60.00 (54)
More than two minimum wages	No	63.29 (50)	36.71 (29)
	Yes	48.96 (47)	51.04 (49)

SAHLPA: Short Assessment of Health Literacy for Portuguese Speaking Adults.

Discussion

The sample was composed predominantly of male individuals, with a mean age of 58.02 years, with a diagnosis of AMI, life habits prone to smoking and sedentary lifestyle, with complete elementary school or higher education, and family income higher than two minimum wages, presenting, as main comorbidities, systemic arterial hypertension, diabetes mellitus, and dyslipidemia.

The occurrence of ACS predominantly in males, as evidenced in the study, can be explained by the poor preventive actions, more unhealthy risk factors, and poor lifestyle in this group [11, 12]. This fact may be directly related to the habits of life and the social construction of masculinity and invulnerability, linked to the thought that men tend to care less about health than women, which results in low demand for health prevention and promotion services by males. These factors reinforce the need for more effective health actions aimed at this public [11, 12], in particular males.

The average age of the current study was 58.02 years. This finding is similar to that found in the study by Chehuen Neto et al. [6], with chronic CVD carriers, with a mean age of 55 years. This demonstrates that the older the age, the greater the risks of developing CVDs, the higher the hospitalization rates, and the lower the chances of survival, then the age variable is considered a predictor of higher cardiovascular risks [13].

Systemic arterial hypertension, dyslipidemia, diabetes mellitus, and sedentary lifestyle are considered potential modifiable risk factors for the development of CVDs, including ACS. A study that analyzed the profile of Brazilian patients with CVDs also highlighted the comorbidities mentioned above, and systemic arterial hypertension had a higher prevalence (69.51%) [14]. The same occurred in the current study, with a prevalence of 51.43% [14].

Smoking is also a major modifiable risk factor that can lead to a fatal cardiovascular event. Evidence shows that individuals aged < 50 years and who use tobacco are 5 times more likely to develop a CVD [15]. Smoking cessation is one of the most effective preventive measures, significantly reducing the occurrence of AMI and morbidity and mortality rates due to CVD. Therefore, measures such as guidance on pharmacological therapy, providing individual and family support, and encouraging participation in collective or individual therapies can be effective health strategies in this rehabilitation process [16]. The presence of multifactorial risks gradually increases the chances of the individual being affected by an AMI. Thus, in order to reduce morbidity and mortality rates due to heart disease, cardiovascular risk prevention can occur in various ways, such as changing lifestyle, regular physical activity, adequate nutrition, and good adherence to pharmacological therapy [16].

Regarding the level of education of the participants, 51.43% of the study participants had completed elementary school or higher education, which differs from the literature. A study that also aimed to evaluate the functional HL of ACS patients of a cardiological hospital in Fortaleza, Brazil, using data from the GCP project, showed that about 52.6% of the sample had incomplete elementary education, and 85.5% of participants obtained inadequate HL from the analysis of the SAHLPA-18 instrument [17].

Chehuen Neto et al. [6] also analyzed the level of HL in patients with chronic CVDs, and the findings corroborate those of Costa et al. [17] regarding the prevalence of inadequate HL. The authors associate this finding with low education, low socioeconomic status, and the advanced age of the population studied. Another study that evaluated the HL of a diabetic population, using the SAHLPA-18 instrument, demonstrated that the lower the level of education, the lower the level of HL and, consequently, the glycemic control is inadequate [18]. The association between low literacy and diabetes is concerning in this group, as these patients are likely to have a poorer ability to process health education and change behaviors. Over time, they are also expected to have lower adherence to treatments, leading to worse outcomes, especially for conditions like heart diseases and stroke, for which diabetes itself is already a risk factor.

In the present study, although 51.43% of the participants had completed elementary school or higher education, 55.43% of the participants had inadequate HL, as measured by the SAHLPA-18 instrument.

Apolinario et al. [7] showed in their study that, although 30% of the elderly in the sample had a high school education, they presented inadequate HL through the SAHLPA-18 instrument, leading to the conclusion that it is not possible to assume that every individual with a good level of formal education will present appropriate HL. This means that even with a good level of formal education, individuals are not always able to effectively understand their disease and state of health, the importance of good adherence to pharmacological treatment and the adoption of preventive measures, communication with health professionals, and their ability to put into practice medical guidelines [19]. These factors become even more critical in a scenario where risk factors are modifiable, and the capacity to understand health education may be impaired.

Although seen in this study that the degree of formal education of individuals will not always predict that they will have adequate HL, when performing a survey of the variables that predicted a higher percentage of success in the SAHLPA-18, as seen in Table 3, the variables schooling and family income were highlighted. Thus, it is concluded that the better the level of education and financial conditions of individuals, the greater the chances of them presenting adequate HL; however, even in this scenario, these individuals will not always have a good HL [20]. Eventually, in this population, individuals with high formal education are uncommon, due to the public nature of the institution; although in Brazil, the population with graduate and postgraduate degrees is still a minority.

In association with the aforementioned variables, in the current study, belonging to the female sex was also considered a weight factor for a good HL. This finding corroborates those found in other studies, which can be explained by the fact that women tend to seek health services more in relation to the male population and are more aware of their health status [6].

A peculiar variable, evidenced in the study, which negatively impacted the HL is the fact that the participant has diabetes mellitus. This can be justified by the cognitive damage that can occur throughout the development of the disease. The literature shows that patients with type 2 diabetes mellitus are more prone to cognitive impairment caused by oxidative stress, inflammation, macro and microvascular changes, and accumulation of neurotoxic substances promoted by the disease, neurological changes, and impairment of some brain functions, such as attention and memory. In addition, there may be a decrease in the speed of information processing, which significantly influences the patient's process of understanding about his/her health situation [21–23].

We emphasize that health professionals should assess their patients' literacy. Without this information, the entire process of health education, post-discharge guidance, and even treatment adherence can be compromised, resulting in the worst outcomes. Our data also reinforce that even patients with some level of formal education may have impaired HL and demand specific health education, which can be further exacerbated by the presence of diabetes. Understanding patients' literacy and its associated factors can allow for a better proposal of their care plan. HL also improves the quality of life, enhancing self-management, treatment adherence, decreasing CVD hospital admissions, and reducing costs to the public health sector in ACS patients [24, 25]. Positive significant associations also were observed between HL and levels of health system competence, social support, cardiac self-efficacy, and health-related quality of life [26].

Conclusions

The study showed that HL does not always correlate with the level of formal education of patients. Thus, it is recommended that health professionals, in their various fields of activity, identify the level of HL of individuals through the application of simple, specific tools, so that they can better and more effectively plan educational and therapeutic actions, as a way of promoting excellent care and empowering the patient in relation to the most effective care in disease control.

Study limitations

It is important to emphasize that the study presented limitations in relation to the application of the SAHLPA-18 questionnaire. One of them includes the pronunciation analysis that was not taken into account

during the application of the test. Thus, the present study evaluated only the participants' own understanding. Moreover, although the SAHLPA-18 instrument has good psychometric properties, it does not evaluate some important aspects of HL, such as numerical, interactive, and critical skills. Unfortunately, the impact of HL was not measured on patient outcomes in the present population, nor was it determined whether the evaluation had changed the practices of the institution's professionals. As part of a multicenter study, other outcomes may be evaluated in the future; these specific objectives may be tested in the future, adjusting for confounders such as sex, comorbidities, and income, since our study was not planned for this.

Abbreviations

ACS: acute coronary syndrome

AMI: acute myocardial infarction

CI: confidence interval

CVDs: cardiovascular diseases

GCP: Good Clinical Practices

HL: health literacy

SAHLPA: Short Assessment of Health Literacy for Portuguese Speaking Adults

SAHLSA: Short Assessment of Health Literacy for Spanish Speaking Adults

STEMI: ST-segment elevation myocardial infarction

Declarations

Author contributions

MEOF: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. SAA: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. FAG: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. ROF: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. GSM: Writing—review & editing, Supervision. ESR: Validation, Writing—review & editing, Supervision. FPT: Validation, Writing—review & editing, Supervision. CMR: Validation, Writing—review & editing, Supervision. All authors read and approved the submitted version.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical approval

The study complies with the Declaration of Helsinki. The project was approved by the Research Ethics Committee of the Federal University of Uberlândia, under the number of opinion 2496296 (Certificate of Presentation for Ethical Review: 48561715.5.2013.5152). All patients signed the informed consent form for the study itself.

Consent to participate

Informed consent to participate in the study was obtained from all participants.

Consent to publication

Not applicable.

Availability of data and materials

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