Sociodemographic and Clinical Characterization of Patients with Cardiac Implantable Electronic Devices

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Research Article

ABSTRACT

Objective: To perform the sociodemographic, economic and clinical characterization of patients with cardiac implantable electronic devices (CIED).

Method: Cross-sectional study with 50 subjects. Sociodemographic, economic and clinical data were collected. To verify an association between the variables, the IMB SPSS-Statistics Software was used using the chi-square and t-student test for paired samples.

Results: The socio-demographic and economic characterization showed prevalence of men, 29 (58%), average age 63 years, incomplete elementary school, 20 (40%), income of a minimum wage, 24 (48%), rural workers, 17 (34%), Catholic religion, 34 (68%). Clinical characterization showed a prevalence of patients with systemic arterial hypertension, 39 (78%), bradycardia, 18 (36%), cardiac device implantation up to five years, 24 (48%), without generator replacement, 31 (62%), use of antihypertensive medications, 41 (82%) and sedentary lifestyle, 34 (68%). The predominant implantable electronic cardiac device was pacemaker, 41 (82%). Only 9 patients (18%) used the implantable cardioverter defibrillator. there was significance in sex (p-value=0.259), household (p-value=0.356) and pacemaker implantation time (p-value=0.07). Other variables did not present statistically significant construction.

Conclusion: There were no patients using resynchronizer. The results are similar to those found in other studies, however, it is suggested that the research proposal be extended to other realities and services.

INTRODUCTION

Cardiac arrhythmias are the result of an abnormality in the generation and/or conduction of electrical impulse, leading to non-rhythmic contraction. The physiopathology involves several mechanisms related to automaticity in impulse generation, post-depolarization and impulse conduction. Normally the electrical activation of the heart arises in the sinoatrial node. In the case of arrhythmias, other subsidiary pacemakers can initiate the electrical impulse, as an alteration that leads to the propagation of the impulse along an abnormal path [1].

These disorders are common in the general population, especially in individuals with cardiac arrhythmias who may go through life without clinical manifestations or without compromising the quality of life. The wide spectrum of arrhythmias' presentation and related risks make patient handling a major challenge for healthcare professionals, facilities and services. The most frequent arrhythmias are sinoatrial node dysfunction, supraventricular tachyarrhythmias, atrial fibrillation, atrioventricular block, ventricular tachycardia and ventricular fibrillation [2,3].

Among the risk factors related to cardiac arrhythmias are inflammatory conditions involving the cardiac muscle, such as myocarditis, coronary artery disease, valve disease and ventricular dysfunction [4]. The clinical presentation of arrhythmias is varied, and the most frequently observed symptoms are palpitation, presyncope, syncope and precordialgia. The diagnosis is based on clinical history, physical examination and electrocardiographic record. Some arrhythmias have specific characteristics on the electrocardiogram, and it is essential to choose the method of electrocardiographic recording, often using the holter (event recorder) and the tilt test (orthostatic inclination). Unlike some other popularly known heart diseases, arrhythmias often lack the approach and care they need [1].

The careful evaluation of users of cardiac implantable electronic devices (CIED)is justified by exposure to risk situations due to the underlying heart disease that resulted in the need to use the device or the presence of such device, which may eventually suffer electromagnetic interference, presenting dysfunctions and leading to unpredictable risk situations, such as shock shots of the implantable cardioverter defibrillators (ICD) [5]

METHODS

This is a descriptive cross-sectional study conducted from June to November 2018. The population consisted of individuals of both sexes, with medical diagnosis of cardiac arrhythmia and attending the Cardiology Ambulatory of a University Hospital in the state of Maranhão, Brazil.

Inclusion criteria were adolescents and adults with CIED for a minimum of four weeks. The determination of this cohort is due to the belief that children would present different situations of the health-disease process, and related to the minimum period of the device, it must be taken into account the adaptation process, being contemplated in the assessment instruments. For the evaluation of physical activity, it was considered active, that is, non-sedentary, the individual who engages in any physical activity twice a week for at least sixty minutes. However, those who do not perform any activity or perform it less than twice a week were considered inactive or sedentary [6].

In compliance with Resolution n° 466/12 of the National Health Council, the project was forwarded to the Research Ethics Committee of the University Hospital of the Federal University of Maranhão [7], having received a favorable opinion under no. 2.605.937.

RESULTS

Table 1 presents the sociodemographic and economic variables (sex, age, race, marital status, education, income, profession, religion and origin).

Males predominated, 29 (58%), age 56 to 76 years, 23 (44%), average age 63 years (± 18.93), brown race, 24 (48%), stable union, 23 (46%), incomplete elementary school, 20 (40%), income equivalent to a minimum wage, 24 (48%), rural workers, 17 (34%), catholic religion, 42 (84%) and coming from the interior of the state of Maranhão, Brazil, 28 (56%) **(Table 1)**.

Table 1. Frequency distribution of sociodemographic and economic variables of patients with cardiac implantable electronic devices.

Variables	N	%
Age		
14 to 34 years	6	12
35 to 55 years	6	12
56 to 76 years	23	46
77 to 86 years	15	30
Sex		
Male	29	58
Female	21	42
Race		
Brown	24	48
Black	19	38
White	7	14
Marital status		
Common-law marriage *	23	46
Single	13	26
Divorced	3	6
Widowed	11	22
Education level		
Illiterate	10	20
Complete primary school	10	20
Incomplete primary school	20	40
Complete high school	6	12
Complete higher education	3	6
Post-graduated	1	2
Income		
1 minimum wage	24	48
2 to 3 minimum wages	22	44
3 to 4 minimum wages	4	8
Profession		
Rural worker	17	34
Fisherman	3	6
General services assistant	2	4
Self-employed	2	4

Merchant	2	4
Others	24	48
Religion		
Catholicism	42	84
Evangelical	8	16
Origin		
Capital city	22	44
Other municipality	28	56
Total	50	100
Source: elaborated by the author (2019). * Married or living with a partner.		

Table 2 shows the frequencies of the clinical variables of the patients: comorbidity, heart disease, time of implantation of the cardiac device, generator replacement, medication use and lifestyle.

Prevailed individuals with systemic arterial hypertension, 39 (78%), bradycardia, 18 (36%), heart device implantation up to five years, 24 (48%), without generator replacement, 31 (62%) and under use of antihypertensive medications, 41 (82%). When asked about lifestyle habits, most denied alcohol consumption, 47 (94%), cigarettes, 44 (88%) and regular physical activity, 34 (68%), as shown in **Table 2**.

Table 2. Frequency distribution of clinical variables of individuals with cardiac implantable electronic devices.

Variables	N	%
Comorbidity *		
Hypertension	39	78
Diabetes	10	20
Dyslipidemia	6	12
Underlying cardiopathy		
Bradycardia	18	36
Total atrioventricular block	12	24
Atrioventricular block 1st or 2nd degree	9	18
Ventricular tachycardia	5	10
Other	6	12
Cardiac device implantation time		
0 to 5 years	24	48
5 to 10 years	15	30
> 10 years	11	22
Generator replacement		
No replacement	31	62
1 to 5 years	17	34
5 to 10 years	2	4

Medications *		
Antihypertensives	41	82
Antidiabetics	6	12
Platelet antiaggregant	10	20
Cholesterol inhibitor	10	20
Antiarrhythmics	6	12
None	6	12
Alcoholism		
Yes	3	6
No	47	94
Smoking		
Yes	3	6
No	44	88
Former smoker	3	6
Physical activity		
Yes	16	32
No	34	68
Total	50	100

Source: Elaborated by the author. (2019).
*Some patients had more than one comorbidity or used more than one medication, being counted more than once.

Regarding prevalent heart disease, in addition to arrhythmias (bradycardia, atrioventricular blocks and ventricular tachycardia), there was less frequent arrhythmogenic right ventricular dysplasia, sinus node disease, dilated cardiomyopathy and chronic atrial fibrillation, characterized as "others". Individuals described as feeling of arrhythmia perception "the heart beating faster" or "feeling faint". **Table 3** shows the types of cardiac implantable electronic devices used in individuals.

Table 3. Types of cardiac implantable electronic devices used by patients. São Luís - MA, 2019.

Device type	N	%
Cardiac pacemaker	41	82
Implantable cardiac defibrillator	09	18

Regarding the types of cardiac implantable electronic devices, pacemaker, 41 (82%) was predominant. Just 9 patients (18%) used the implantable cardiac defibrillator. There were no patients using resynchronizer. In both cases the admitted confidence interval was $p \leq 0.05$. It was observed that there was a significant association in relation to gender (p-value=0.259), origin (p-value=0.356) and device implant time (p-value=0.07). Other variables did not present statistically significant construction.

DISCUSSION

In the present study, men with advanced age, poor education and income prevailed. Studies indicate that there are no modifiable risk factors associated with increased heart disease such as aging, male gender, low education, and unfavorable socioeconomic status. Morbidity and mortality in Brazil is closely related to cardiovascular risk factors, representing 20% of the population over 30 years and mostly male. Healthcare policies have a great challenge, especially in health promotion and identification of individuals susceptible to develop heart disease, especially cardiac arrhythmias, leading to a 44% reduction in mortality [2].

Aging increases the possibility of the individual developing an arrhythmia that culminates in the use of some implantable cardiac device, such as pacemaker or defibrillators [8-10]. These conditions may be detrimental to self-care in individuals with CIED, especially in their health-disease process, which may interfere with treatment adherence [10,11].

Patients denied being alcoholics and/or smokers. However, they recognized not engaging in any regular physical activity. A study conducted at the Cardiology Reference Hospital of 63 cardiac patients, showed that physical activity improved blood flow and endothelial function, suggesting that physical activity positively influences aspects of the patient's quality of life [12].

Individuals with CIED may already have been victims of a potentially fatal arrhythmic event, including recovered cardiac arrest (secondary prevention), or, although they have never experienced such events, are considered at high risk to have it (primary prevention). They may still experience partial or total loss of consciousness, generating safety concerns for performing their daily activities or causing harm to others [13].

It is recognized that restrictions on the use of CIED may limit personal freedom, security and well-being. Some flexibility should be allowed, but the risks associated with recurrence of cardiac arrhythmia should be prioritized and therefore cannot be overlooked. There is a risk of sudden disability in both asymptomatic individuals and those with sudden symptoms. However, most arrhythmia sufferers are unaware of risk situations and may still experience safety concerns when performing daily activities. A study conducted in the United Kingdom points out among the main restrictions of activities, driving vehicles, due to the possibility of partial or total loss of consciousness. Sudden or even fatal disability can compromise the necessary safety margin, interfering with their lives [14].

The same study shows that patients with implantable cardiac devices can count on a more active lifestyle, as it has contributed to improved quality of life and prevention of cardiovascular events. Nevertheless, professional monitoring is essential [14]. Physical inactivity is defined [15] as the absence of activity with appreciable energy expenditure (>2 to 3 times the rest value), whether in work, personal transportation or leisure. Trappé et al. [16], emphasizes the importance to maintaining an active lifestyle on cardiovascular health, especially in individuals with pacemakers or defibrillators, and highlights the monitoring of the professional multidisciplinary team, especially the physical educator, in order to properly program the heart rate of cardiac defibrillator [17].

Similar to this research, it was found in the literature a higher prevalence of systemic arterial hypertension, bradycardia and atrioventricular block, which were the main indications for the use of CIED [10,18]. In the present study, individuals with implantation of the device up to five years of age and who did not need to replace it predominated, which seems to be beneficial as the implantation time is associated with quality of life and greater vitality [9]. The author clarifies that the longer the implantation time, the more decline in quality of life, and emphasizes the need for follow-up with an electrophysiologist to verify the functioning of the cardiac device, and when necessary, after some years, to replace it.

Regarding the types and therapeutic options of the devices, it is clarified that the pacemaker has the capacity of stimulation/sensitization as a therapeutic function of bradyarrhythmias; cardioversion/defibrillation by shock or rapid pacing as a therapeutic function of tachyarrhythmias and cardiac resynchronizer of multisite (biventricular) pacing as a function of ventricular resynchronization. There is also the cardiac defibrillator associated with the resynchronizer, with added functions [19].

CONCLUSION

The socio-demographic and economic characterization showed a prevalence of men, 29 (58%), aged 56 to 76 years, 23 (44%), brown race, 24 (48%), with a stable union, 23 (46%), an incomplete primary education, 20 (40%), a minimum wage income, 24 (48%), being rural workers, 17 (34%), belonging to Catholic religion, 42 (84%) and coming from the interior of the state of Maranhão, Brazil 28 (56%). The clinical characterization showed a prevalence of patients with systemic arterial hypertension, 39 (78%), bradycardia, 18 (36%), cardiac device implantation up to five years, 24 (48%), without generator replacement, 31 (62%), under use of antihypertensive medications, 41 (82%) and having a sedentary lifestyle, 34 (68%).

The results of the research are similar to those found in other studies, however, it is suggested that the proposal of this research be extended to other realities and services. As limitations of the study, it is highlighted the small sample and the location where it was developed, a specialized service.

REFERENCES

1. Carneiro BV, et al. Arritmias: Pathophysiology, clinical and diagnostic picture. Rev Med Saude Brasilia 2012;1:93-104.

2. Ferreira C, et al. Atrial fibrillation and non-cardiovascular diseases: A systematic review. Arq Bras Cardiol 2015;105:519-526.

3. Sacanavaca M. New perspectives on the treatment of cardiac arrhythmias and their application in Brazil. Arq Bras Cardiol 2012;99:1071-1074.

4. Freitas I, Araújo R, Araújo Z. Nurses' performance in the control of atrial fibrillation. Savior. Monography 2016.

5. Martinelli Filho M, et al. Guidelines for implantable electronic cardiac devices of the Brazilian Society of Cardiology. Arq Bras Cardiol 2007;89: e210-e238.

6. Malachias MV, et al. 7th Brazilian Guideline for Hypertension. Arq Bras Cardiol 2016;107:1-83.

7. National Health Council (Brazil). Resolution no. 466, of December 12, 2012. Regulatory guidelines and standards for research involving human beings. Ministry of Health December 2012.

8. Garcia GT, et al. Degree of agreement between cardiovascular risk stratification instruments. Arq Bras Cardiol 2017;108:427-435.

9. Barros RT, et al. Evaluation of patients' quality of life aspects after cardiac pacemaker implantation. Rev Bras Cir Cardiovasc 2014;29:37-44.

10. Fernandes IR, Gallardo ALA, Zaramella VM. Pacemaker and implantable defibrillator: Assessment of the wearer's knowledge for self-care. Arch Med Hosp Fac Cienc Med 2015;60:12-15.

11. Gomes TB, et al. Evaluation of quality of life after artificial cardiac pacemaker implantation. Rev Eletr Enf 2011;13:735-742.

12. Nery RM, Barbisan JN, Mahmud MI. Influence of physical activity on the result of coronary artery bypass graft surgery. Rev Bras Cir Cardiovasc 2007;22:297-302.

13. Fenelon G, et al. Brazilian Society of Cardiology and Brazilian Association of Traffic Medicine. Brazilian recommendations for vehicle driving in patients with implantable electronic cardiac devices (DCEI) and cardiac arrhythmias. Arq Bras Cardiol 2012;99:4.

14. OLÍMPIO et al. Training of physical education professionals in cardiovascular rehabilitation. Rev Carioca by Ed Physic 2017;12:1-11.

15. Cardiology Society of the State of Rio de Janeiro. Cardiovascular Prevention Manual. SOCERJ 2017.

16. Trapé AA, et al. Physical fitness and habitual level of physical activity associated with cardiovascular health in adults and the elderly. Medicine 2015;48:457-466.

17. Herdy AH, et al. Brazilian Society of Cardiology. South American Cardiovascular Prevention and Rehabilitation Directive. Arq Bras Cardiol 2014;103:1-31.

18. Braun S, et al. Quality of life of patients with an implantable cardiac device: A cross-sectional study. Online braz j nurs 2012.

19. Magalhães LP, et al. II Brazilian Atrial Fibrillation Guidelines. Arq Bras Cardiol 2016;106:1-22.