ORIGINAL ARTICLE

Evaluation of Cardiovascular Risk in Hypertensive Individuals Attending a Primary Health Care Center

Tiago Ricardo Moreira,[1] Luana Vieira Toledo,[1] Érica Toledo Mendonça,[1] Renata Maria Colodette,[2] Luciana Saraiva Silva,[3] Rosângela Minardi Mitre Cotta[1]

Universidade Federal de Viçosa,[1] Viçosa, MG - Brazil
Escola Nacional de Saúde Pública - Sergio Arouca,[2] Rio de Janeiro, RJ - Brazil
Universidade Federal de Uberlândia (UFU),[3] Uberlândia, MG - Brazil

Abstract

Background: Cardiovascular risk (CVR) stratification has traditionally been used as a strategy for the prevention of cardiovascular diseases in asymptomatic people.

Objective: To identify the CVR in hypertensive patients attending a primary health care center, using the Framingham risk score, and to evaluate possible associations and correlations with sociodemographic, clinical and laboratory variables not included in this score. This cross-sectional study was conducted with hypertensive patients treated in a primary health care center in Brazil (n = 166).

Methods: Data collection, administration of questionnaires, anthropometric measurements and laboratory tests were performed from July to August 2013. Multiple linear regression was used in the analysis. A two-tailed p-value < 0.05 was considered significant.

Results: High CVR was independently associated with male sex (B = 8.73; 95%CI: 6.27: 11.19), high serum levels of total cholesterol (B = 0.05; IC95%: 0.02: 0.08), number of drugs used (B = 0.55; 95%Ci: 0.12: 0.98) and a low glomerular filtration rate (GFR) (B = -0.11; 95%CI: -0.18 : -0.03).

Conclusion: The results of this study reinforce the importance of continuous and longitudinal care practices directed to hypertensive patients aiming at early detection of risk factors and appropriate intervention to improve the prognosis of this population. (Int J Cardiovasc Sci. 2019; [online].ahead print, PP.0-0)

Keywords: Cardiovascular Diseases/mortality; Risk Factors; Hypertension; Life Style; Treatment Adherence anf Compliance; Sedentarism; Obesity; Prevention and Control.

Introduction

Arterial hypertension (AH) has been considered one of the main problems of current public health not only because of its high prevalence, but also because of the impact on the quality of life of the population and the health system. According to international data, it is responsible for 45% of cardiac deaths.[1] In Brazil, approximately 36 million adults are affected by the disease, contributing to 50% of deaths from cardiovascular diseases (CVDs).[2]

AH is sometimes considered asymptomatic, which makes the early diagnosis and individuals' adherence to treatment a challenge. However, when untreated, it represents a risk for cardiovascular complications, such as acute myocardial infarction (AMI), stroke and kidney diseases.[3] In light of this, efforts have been directed to the formulation of public policies seeking to identify and intervene on modifiable risk factors.[4]

For an individualized approach of hypertensive patients, the Ministry of Health proposes the use of

Mailing Address: Tiago Moreira
Av. Peter Henry Rolfs, s/n. Postal Code: 36570-000, Campus Universitário, Vicosa, MG – Brazil.
E-mail: tiago.ricardo@ufv.br

DOI: https://doi.org/10.36660/ijcs.20180078

Manuscript received November 06, 2018; revised manuscript June 28, 2019; accepted September 25, 2019.

risk stratification to define the prognosis and clinical approach to hypertension in primary health care (PHC), including the adoption of the Framingham risk score (FRS). The FRS is an algorithm traditionally used as a strategy for preventing cardiovascular diseases in asymptomatic individuals.[3]

To establish a 10-year CVD risk, the FRS considers the following factors: total cholesterol and HDL cholesterol levels, systolic blood pressure, diabetes mellitus, smoking habit and age.[3,5,6] Studies have shown that the score is a potential instrument to help health professionals in the development of more appropriate approaches to hypertensive patients.[5]

In view of the high prevalence of AH and the impact of cardiovascular diseases, studies aiming at identify the cardiovascular risk (CVR) are needed to contribute to the implementation of effective therapeutic measures.[7] The objective of this study was to identify the CVR in hypertensive patients seen at primary health care centers, using the FRS, and to evaluate possible associations and correlations of CVR with other sociodemographic, clinical and laboratory variables not included in this score.

Methods

This is a cross-sectional study conducted with PHC patients with AH in the municipality of Zona da Mata, located in Minas Gerais State, Brazil, in the period from July to August 2013. For sample calculation, a population of 293 patients who participated in educational activities performed in groups, at the primary health care center of the municipality once a month, with an expected frequency of 50% and an error of 5% was considered. A total of 166 patients were selected by random draw.

Data were collected by individual, semi-structured interview, addressing sociodemographic variables and life habits. The International Physical Activity Questionnaire (IPAQ)[8] was applied to identify and quantify physical activity (PA), consisting of questions about the frequency and duration of physical activities at work (moderate and vigorous walking), while commuting, in domestic activities, and in leisure time. PA was measured in minutes per week by multiplying weekly frequency by each event's duration of each. Anthropometric and biochemical assessments were also performed.

Participants were classified as to leisure-time activities as follows:

- sedentary (< 10 min/week, any PA);
- not very active (≥ 10 min to < 150 min/week of walking, moderate PA and/or 10 min to < 60 min/week of vigorous PA and/or 10 min to < 150 min/week of any combination of walking, moderate and vigorous PA);
- physically active (≥ 150 min/week of walking, moderate PA and/or ≥ 60 min/week of vigorous PA and/or ≥ 150 min/week of any combination of walking, moderate and vigorous PA);
- very active (≥ 150 min/week of vigorous PA, or ≥ 60 min/week of vigorous PA plus 150 min/week of any combination of walking and moderate PA).

For dichotomized analyses, participants classified as sedentary and not very active were considered sedentary, and participants classified as physically active and very active were considered active.

Anthropometric assessment was made by weight, height and waist circumference (WC) measurements. Body weight was obtained using an electronic scale, with a capacity of 150 kg and accuracy of 50 grams; and the height was measured using a portable stadiometer, composed of a metallic platform and removable wooden measuring rod containing and a headboard, according to the techniques proposed by Jellife.[9] The BMI (body mass index) was calculated by the ratio between the weight and squared height, and classified according to the WHO criteria for adults,[10] and Lipschitz for elders.[11]

WC measurement was performed using an inextensible tape and measured in centimeters, at the midpoint between the iliac crest and the external face of the last rib. The results obtained were classified according to CVR and metabolic complications according to the cutoff points proposed by the WHO.

Laboratory analyses included: fasting blood glucose, total cholesterol and fractions, triglycerides, serum creatinine, urea, uric acid, and urine albumin (24-hour urine test). Glomerular filtration rate (GFR) was calculated using the CKD-EPI formula.[12]

Participants were explained about the procedure of 24-hour urine collection, in addition to receiving written instructions and containers for urine collection. On the scheduled day, participants attended the accredited laboratory to deliver the urine collected and to have blood samples collected. Participants were instructed to maintain their usual diets on the day before, and blood collection was carried out after a 12-hour overnight fast. Urine volumes less than 500 mL were not included. The collection and analysis of the biological material was performed in a single accredited laboratory, using commercial kits.

The FRS was applied in all patients to assess the probability of developing a coronary event in 10 years risk of death due to coronary disease. The risk was determined by sex, using the following parameters age, LDL-cholesterol, HDL-cholesterol, smoking, systolic blood pressure, diastolic blood pressure and diabetes.[13]

Analysis

Categorical variables were presented by means of frequency tables (absolute and relative). The Kolmogorov-Smirnov test was used to evaluate the normality of continuous variables. For continuous variables with normal distribution, tables with mean and standard deviation were presented, and, for those with distribution, medians and interquartile intervals were presented.

In the bivariate analysis, the Mann Whitney test for numerical variables with non-normal distribution was used, and the chi-square test was used in the analysis of categorical variables. For correlation between numerical variables, the Spearman correlation was used. Multiple linear regression was performed with CVR as dependent variable, and independent variables that presented a p-value < 0.200 in the bivariate analysis. A two-tailed p-value < 0.05 was considered significant. The necessary assumptions for the application of multiple linear regression were met. The statistical analysis was performed using SPSS for Windows (version 20.0).

The study was approved by the Human Research Ethics Committee of the Federal University of Viçosa, approval number 044/2012. In accordance with Resolution 466/2012 of the National Health Council, which regulates researches involving human beings, the individuals' free and clarified agreement to participate in the study was requested, guaranteeing the confidentiality of the information and anonymity.

Results

Regarding the study sample (n = 166), 130 (78.3%) were female and 36 (21.7%) were male. Mean age of the general population was 62.86 ± 9.3 years, higher in men than in women (64.4 ± 7.36 vs. 61.16 ± 9.68 years, p = 0.034). Median duration of hypertension was nine years with interquartile range (IQR) of 4 to 15 years. Median BMI of the general sample was 28.71 kg/m^2 (IQR: 25.75 - 34.20 kg/m^2). The prevalence of current smokers was 8.4% (n = 14). Sedentary lifestyle was reported by 48 (28.9%) patients. According to the FRS, the median 10-year CVR in the population was 9% (IQR: 7.0 - 15%). Table 1 describes other demographic, clinical and laboratory data of the studied population.

In the bivariate analysis, the CVR was associated with male gender, low educational level, and physical inactivity (Table 2), and exhibited a positive correlation with the number of medications used, and with values of serum urea, glucose, total cholesterol, triglycerides and uric acid. The CVR was negatively correlated with estimated GFR (Table 3).

In stepwise multiple regression model (Table 4), with the risk for a cardiovascular event in 10 years (FRS) as dependent variable, and sex, educational attainment, physical activity, number of medication used, urea, GFR, glucose, total cholesterol, triglycerides and uric acid as independent variables, we observed that sex, serum levels of total cholesterol, GFR and number of medications used by the patients remained independently associated with the FRS (p < 0.05). Male gender increased the risk of cardiovascular event by 8.73%. The increase of 1 mg/dL in cholesterol level and the use of medications increased the risk of cardiovascular event by 0.95% and 0.55% respectively. The one-unit increase in mL/min/1.73 m^2 in GFR decreased the risk of a cardiovascular event by 0.11%.

Discussion

In the present study, most of the hypertensive patients evaluated were female, with low educational level, and mean age of 62.86 years. Such findings may be representative of the national population, similar characteristics were found in a population-based study carried out in 2016, showing that a diagnosis of AH was more frequently reported by women (27.5%) than men (23.6%), especially by individuals with up to eight years of study.[14] Low educational attainment and advanced age may increase the prevalence of AH[15] and affect its monitoring and treatment.[16]

The risk factors for coronary artery disease include modifiable lifestyle habits and non-modifiable factors, such as age and sex.[17] The literature indicates that, among the socioeconomic variables, education is the most correlated with the risk factors for cardiovascular diseases, showing an inverse relationship between the degree of schooling and cardiovascular risk.[18] In the

Table 1 - Demographic, clinical and laboratory characteristics of the studied population

Characteristics	General (n = 166)
Age in years (mean ± standard deviation)	62.86 ± 9.30
Sex (F/M) – n (%)	130 (78.3%)/36 (21.7%)
Marital status (with a partner / without a partner) – n (%)	110 (66.3%)/56 (33.7%)
Education (up to 4 years / more than 4 years) – n (%)	140 (84.4%)/16 (15.6%)
Smoker (yes/no) – n (%)	14 (8.4%)/152 (91.6%)
Use of alcohol (yes/no) – n (%)	25 (15.1%)/141 (84.9%)
Physical activity (active/sedentary) – n (%)	118 (71.1%)/48 (28.9%)
Known hypertension length in years – median (IQR)	9.00 (4.00-15.00)
Number of medications – median (IQR)	4.00 (2.00-5.00)
Diabetes (yes/no) – n (%)	35 (21.1%)/131 (78.9%)
Body mass index - median (IQR)	28.71 (25.75-34.20)
Waist circumference - median (IQR)	95.00 (89.00-106.00)
Glomerular filtration rate (mean ± standard deviation)	67.31 ± 13.39
Serum urea - median (IQR)	36.0 (32.0-40.0)
Serum albumin (mean ± standard deviation)	4.01 ± 0.19
Serum glucose - median (IQR)	96.00 (89.00-109.00)
Serum total cholesterol (mean ± standard deviation)	202.59 ± 38.76
Serum HDL-cholesterol - median (IQR)	47.00 (42.00-53.00)
Serum LDL-cholesterol (mean ± standard deviation)	125.81 ± 32.83
Serum VLDL-cholesterol - median (IQR)	26.00 (19.80-34.40)
Serum triglycerides - median (IQR)	130.00 (99.00-172.00)
Serum uric acid (mean ± standard deviation)	5.23 ± 1.31
24h urinary protein - median (IQR)	118.34 (86.40-163.80)
Microalbuminuria - median (IQR)	21.50 (16.00-29.00)
Cardiovascular event risk in % - median (IQR)	9.00 (7.00-15.00)

IQR: Interquartile range; HDL: high-density lipoprotein; LDL: low-density lipoprotein; VLDL very low-density lipoproptein.

Table 2 - Distribution of cardiovascular event risk determined by the Framingham risk score by sociodemographic characteristics and life habits

	Median (IQR)	p-value*
Sex		
Female	8.00 (6.00-13.00)	< 0.001
Male	18.00 (10.00-22.00)	
Marital status		
Without partner	11.00 (7.00-13.00)	0.517
With partner	8.50 (6.00-17.00)	
Education		
Up to 4 years	11.00 (7.00-17.00)	0.004
More than 4 years	7.00 (5.00-9.00)	
Use of alcohol		
Yes	11.00 (6.00-18.00)	0.803
No	9.00 (7.00-15.00)	
Smoker		
Yes	8.50 (7.00-22.00	0.254
No	9.00 (6.00-15.00)	
Physical activity		
Active	8.00 (6.00-15.00)	0.030
Inactive	11.00 (7.00-19.00)	

*IQR: Interquartile range; * U test of Mann-Whitney.*

present study, educational level was not associated with cardiovascular risk. This may be explained by the low degree of schooling of the sample (about 84% of the sample presented less than 4 years of schooling).

Among life habits, although advanced age may decrease the ability to perform some types of physical activity, exercises of mild and moderate intensity, such as hiking, should be encouraged, especially in elderly people.[19] In the present study, the percentage of individuals with a sedentary lifestyle was lower than that reported in other studies.[6,19] One possible explanation is the fact that our study group was composed of a greater percentage of women who performed domestic activites (cleaning, gardening, sweeping), detected by means of the IPAQ. In addition, most of participants were enrolled in health promotion group activities conducted by the local health system, encouraging the practice of physical activity. In addition, national data show that physical inactivity increases with age, especially among individuals with lower education levels, which contributes to increased CVR in the Brazilian population.[14] In this sense, efforts should be directed towards controlling CVR factors in the population with lower educational attainment.[18,20]

Table 3 - Spearman correlation between e cardiovascular event risk determined by the Framingham risk score and the studied variables

	Correlation coefficient	p-value*
Body mass index	-0.025	0.753
Waist circumference	0.088	0.261
Duration of known hypertension (in years)	0.003	0.967
Number of used medications	0.158	0.042
Glomerular filtration rate (GFR)	-0.204	0.008
Serum urea	0.222	0.004
Serum albumin	0.053	0.500
Serum glucose	0.198	0.010
Serum total cholesterol	0.189	0.015
Serum triglycerides	0.170	0.029
Serum uric acid	0.234	0.002
24h urinary protein	0.074	0.342
Microalbuminuria	0.064	0.416

** Spearman Correlation.*

Classification of the CVR is particularly important for establishing an effective and individualized care plan. In this study, the CVR of hypertensive individuals, measured by the FRS, was considered low (median of 9% in 10 years) and associated with male sex, total cholesterol, number of medications used and GFR. In a study on 50 hypertensive individuals treated in a public, multidisciplinary outpatient clinic in Minas Gerais state, Brazil, 74% had low cardiovascular risk.[17] Similar results were found in the Longitudinal Study of Adult Health (ELSA-Brazil) conducted with public employees of higher education institutions in Brazil, where 82.8% of the individuals presented low CVR.[21]

In our study, CVR was higher 8.73% greater in males than females. In the study of the behavior of cardiovascular diseases, the issue of gender cannot be ignored, given the high prevalence of risk factors for these diseases that are associated with sex. In contrast, a study conducted with elderly patients in Goiânia showed that some risk factors for CVDs are more frequent in elderly women, such as dyslipidemia and sedentary lifestyle.[22] In addition, a survey conducted in São Paulo showed that women presented better blood pressure control than men;[23] such results may be related to the behavior of women in relation to their health condition, not only by seeking more health services, but also because they have a greater tendency to follow the proposed treatments.[24,25] In this context, PHC actions must consider individual characteristics, which can facilitate adherence to treatment and, consequently, reduce morbidity and mortality.

Table 4 - Stepwise multiple linear regression model with cardiovascular event risk determined by the Framingham risk score as dependent variable

	B	Standar error	β	p-value	95%CI	
					Lower	Upper
Sex (male)	8.73	1.25	0.46	< 0.001	6.27	11.19
Total cholesterol	0.05	0.01	0.25	< 0.001	0.02	0.08
GFR	-0.11	0.04	-0.18	0.007	-0.18	-0.03
Number of medications	0.55	0.22	0.17	0.012	0.12	0.98

Note: R2 = 0.19 for model 1 with sex variable; ΔR2 = 0.05 with sex and total cholesterol as independent variables; ΔR2 = 0.04 with sex, total cholesterol and glomerular filtration rate as independent variables; ΔR2 = 0.03 with sex, total cholesterol, glomerular filtration rate and number of medications as independent variables. GFR: glomerular filtration rate.

CVR showed a positive correlation with serum values of total cholesterol. High levels of cholesterol combined with hypertension are associated with an increased risk for coronary disease attributable to CVR fctors,[26] so that educational interventions may be fundamental to reduce cardiovascular morbidity and mortality.[27]

Another important finding of this study was the association between increased use of drugs and increased CVR. A study conducted with patients in northern Minas Gerais found different results, showing a weak correlation between the number of anti-hypertensive drugs and the number of CVR factors in hypertensive patients.[5] In the present study, most hypertensive patients used two or more antihypertensive drugs. This may be explained by an inappropriate use of hypotensive medications, not adjusted to the presence of aggravating factors of cardiovascular risk, and a lack of standardization in the monitoring and management of AH in the PHC.[5]

A study by Egan and colleagues[28] showed that the use of only 1 or 2 antihypertensive, advanced age and a high FRS are independent variables associated with the lack of blood pressure control in hypertensive patients, since individuals with high CVR used other medications, such as aspirin and lipid-lowering drugs. These authors also emphasize the importance of stratifying hypertensive patients using the FRS; once the CVR was identified, patients would benefit from the correct use of medicines, adjusted to their comorbidities, thus contributing to reducing cardiovascular morbidity and mortality, and avoiding the use of unnecessary medications in low-risk patients. Thus, the control of hypertensive patients should not be based solely on blood pressure values, but consist of a comprehensive approach, considering the associated risk factors.[28]

Finally, the increased GFR was associated with reduced cardiovascular risk. According to Go et al.,[29] reduced GFR is associated with the occurrence of cardiovascular events, regardless of the concomitant presence of other classic cardiovascular risk factors. Thus, although the decreased GFR related to age has been considered part of the normal aging process, it represents an independent risk factor for developing cardiovascular disease in elders. [30, 31]

Patients with a GFR between 30 and 45 ml/min/ 1.73 m^2, when compared to those with a GFR above 60 ml/min/1.73 m^2, have 110% increased risk of cardiovascular mortality. Therefore, there is an inversely proportional relationship between GFR and the risk of cardiovascular morbidity, especially cardiovascular mortality.[12,32]

In this sense, actions by interprofessional team at the PHC, must take advantage of the potentialities of the FRS in the classification of CVR, to develop guidelines directed to identify risks, encourage self-care and the shared the responsibility of AH management.[5] In addition, community health workers should be trained for the identification and referral of individuals with CVR factors, contributing to the management of hypertension and its complications. These workers can deal with a more systemized monitoring system and have direct contact with the users of the PHC services.[33] Also, actions of the interprofessional team should be directed to changes in life habits, including the use of technologies in health promotion and prevention of diseases related to AH in hypertensive patients.[34]

This study highlights the important role of regular educational activities aimed at promoting healthier life habits and reducing CVR factors. Nevertheless, although PHC is a potential scenario for managing AH by means of the FRS, studies have revealed that most of hypertensive patients habe not been attended by health teams as advocated by guidelines for the management of chronic diseases,[5,24,35] highlighting the findings of this study to strengthen the appropriate management of these individuals.

The main limitation of this study is related to the study type. Investigations of observational nature do not allow assessing the relationship between cause and effect, despite the association between the studied variables. Another limitation relates to the fact that the study has been performed with a specific sample of hypertensive patients, attending the PHC center of one municipality. Expanding the study to other regions and cities could be useful to analyze the reproducibility of the results.

Conclusion

This survey on CVR factors in hypertensive patients seen in a PHC center determined the health profile of this population, highlighting the need for specific interventions by the interprofessional team. The CVR was associated with male sex and had a positive correlation with the number of medications used and elevated serum values of total cholesterol. In contrast, the risk was negatively correlated with estimated GFR.

Most risk factors identified in this population consist of modifiable factors; however, when ignored, may result in health problems with high social and economic impact. In this sense, actions aimed at health education should be included with more emphasis on the agenda of services of PCH teams.

These findings reinforce the importance of continuous and longitudinal health practices directed to the male population, focusing on the reduction of CVR. In addition, new studies correlating the lifestyle and health behaviors with CVR factors in different regional and care contexts are needed, to justify the development of effective public policies.

Finally, this study stresses out the potential of the FRS as a tool for stratifying the CVR in hypertensive patients attending PHC centers, aiming at improving the management and promoting high-quality care to these paients.

Author contributions

Conception and design of the research: Moreira TR, Silva LS, Cotta RMM. Acquisition of data: Silva LS. Analysis and interpretation of the data: Moreira TR, Toledo LV, Mendonça ET. Statistical analysis: Moreira TR. Writing of the manuscript: Toledo LV, Mendonça ET, Colodette RM. Critical revision of the manuscript for intellectual content: Moreira TR, Colodette RM, Silva LS, Cotta RMM.

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 thesis or dissertation work.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the *Universidade Federal de Viçosa* under the protocol number 044/2012. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

References

1. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2015: update a report from the American Heart Association. Circulation. 2015;131(4):e29-e322.

2. Scala LC, Magalhães LB, Machado A. Epidemiologia da hipertensão arterial sistêmica. In: Moreira SM, Paola AV; Sociedade Brasileira de Cardiologia. Livro Texto da Sociedade Brasileira de Cardiologia. 2ª. ed. São Pauilo: Manole; 2015. p. 780-5.

3. Brasil. Ministério da Saúde. Estratégias para o cuidado da pessoa com doença crônica: hipertensão arterial sistêmica. Brasília: Ministério da Saúde, 2013. (Cadernos de Atenção Básica, n. 37).

4. Reis APA, Pimenta TR, Rossi VEC, Maia MAC, Andrade RD. Hipertensão Arterial e Diabetes Mellitus: sistematização da assistência através da consulta de enfermagem em uma Unidade Escola do Programa de Saúde da Família. Ciência et Praxis. 2014; 7(13): 55-62.

5. Pimenta HB, Caldeira AP. Cardiovascular risk factors on the Framingham Risk Score among hypertensive patients attended by family health teams. Ciênc. saúde coletiva. 2014 Jun; 19(6): 1731-1739.

6. Cichocki M, Fernandes KP, Castro-Alves DC, Gomes MVM. Physical activity and modulation of cardiovascular risk. Rev Bras Med Esporte. 2017 Fev; 23(1): 21-25.

7. SBC. Sociedade Brasileira de Cardiologia. Departamento de Hipertensão Arterial. VII Diretrizes brasileiras de hipertensão. Rev Bras Hipertens. 2016;107(3)supl3:1-103.

8. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira L, Braggion G. Questionário Internacional De Atividade Física (IPAQ): Estudo de validade e reprodutibilidade no Brasil. Rev Bras Ativ Saude. 15out.2012;6(2):5-8.

9. Jelliffe DBI. Evaluación del estado de nutrición de la comunidad. Genebra: OMS; 1968.

10. World Health Organization.(WHO). Obesity: Preventing and managing the global epidemic. Report of a WHO Consulation on Obesity. Geneva; 2000.

11. Lipschitz DA. Screening for nutritional status in the elderly. Prim Care, v. 21, n.1, p. 55-67, 1994.

12. KDIGO. Kidney Disease Improving Global Outcomes. CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. Kidney Int Suppl.2013;3(1):1-150.

13. Girman CJ, Rhodes T, Mercuri M, Pyörälä K, Kjeshus J, Pedersen TR, et al. The metabolic syndrome and risk of major coronary events in the Scandinavian Simvastatin Survival Study (4S) and the Air Force/Texas Coronary Atherosclerosis Prevention Study (AFCAPS/TexCAPS). Am J Cardiol. 2004;93:136-41.

14. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2016. Brasília;2017.

15. Malta DC, Bernal RTI, Andrade SSCA, Silva MMA, Velasquez-Melendez G. Prevalence of and factors associated with self-reported high blood pressure in Brazilian adults. Rev Saúde Pública. 2017; 51(Suppl 1): 1-11.

16. Britto RPA,Florencio TM, Costa ACS, Pinheiro ME. Baixa estatura, obesidade abdominal e fatores de risco cardiovascular em mulheres. Rev Bras Med. 2011; 68(3):1-4.

17. Paula EA, Paula RB, Costa DMN, Colugnati FAB, Paiva, EP. Cardiovascular risk assessment in hypertensive patients. Rev Latino-Am Enfermagem. 2013; 21(3):820-7.

18. Martin RSS, Godoy Ilda, Franco RJS, Martin LC, Martins AS. Influência do nível socioeconômico sobre os fatores de risco cardiovascular. J Bras Med. 2014; 102(2):34-7.

19. Soares-Miranda L, Siscovick DS, Psaty BM, Longstreth Jr WT, Mozaffarian D. Physical Activity and Risk of Coronary Heart Disease and Stroke in Older Adults The Cardiovascular Health Study. Circulation. 2016;133(2):147-55.

20. Nascimento ES, Branco MPFC, Moreira AKF, Hazime FA. Estratificação do risco cardiovascular global em hipertensos atendidos numa unidade de saúde da família de Parnaíba, Piauí. Rev Bras Promoç Saúde, Fortaleza. 2012; 25(3):287-94

21. Freitas RS, Fonseca MJM, Schmidt MI, Molina MCB, Almeida MCC. Fenótipo cintura hipertrigliceridêmica: fatores associados e comparação com outros indicadores de risco cardiovascular e metabólico no ELSA-Brasil. Cad Saúde Pública. 2018;34(4):e00067617.

22. Ferreira CCC, Peixoto MRG, Barbosa MAB, Silveira EA. Prevalence of cardiovascular risk factors in elderly individuals treated in the Brazilian Public Health System in Goiânia. Arq Bras Cardiol 2010; 95(5): 621-8.

23. Silva SSBE, Oliveira SFSB, Pierin AMG. The control of hypertension in men and women: a comparative analysis. Rev Esc Enferm USP. 2016;50(1):50-8.

24. Pierin AMG, Marroni SN, Taveira LAF, Benseñor IJM. Hypertension control and related factors at primary care located in the west side of the city of São Paulo, Brazil. Cien Saude Colet 2011; 16(Supl. 1):1389- 400.

25. Mendes LMO, Barros JST, Batista NNLAL, Silva JMO. Fatores associados a não adesão ao tratamento da hipertensão arterial sistêmica: uma revisão integrativa. Rev Univap. 2014; 20(35):56-68.

26. Peters SA, Singhateh Y, Mackay D, Huxley RR, Woodward M. Total cholesterol as a risk factor for coronary heart disease and stroke in women compared with men: A systematic review and meta-analysis. Atherosclerosis. 2016 May;248:123-31.

27. Nogueira JS, Melo LPL, Sousa SMA, Dias RS, Silva LDC. Fatores de risco cardiovascular e doença coronariana: uma análise em pacientes revascularizados. Rev Pesq Saúde. 2016;17(1):37-41.

28. Egan BM, Zhao Y, Axon RN, Brzezinski WA, Ferdinand KC. Uncontrolled and Apparent Treatment Resistant Hypertension in the United States, 1988 to 2008. Circulation 2011; 124(9):1046-58.

29. Go AS, Chertow GM, Fan D, Mcculloch CE, Hsu CY. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. N Engl J Med. 2004;351(13):1296-305.

30. Shlipak MG, Fried LF, Crump C, Bleyer AJ, Manolio TA, Tracy RP, et al. Cardiovascular disease risk status in elderly persons with renal insufficiency. Kidney Int. 2002;62(3):997-1004.

31. Manjunath G, Tighioaurt H, Coresh J, Macleod B, Salem DN, Griffith JL, et al. Level of kidney function as a risk factor for cardiovascular outcomes in the elderly. Kidney Int. 2003;63(3):1121-9.

32. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Especializada e Temática. Diretrizes Clínicas para o Cuidado ao paciente com Doença Renal Crônica – DRC no Sistema Único de Saúde. Brasília;2014.

33. Rio de Janeiro (ESTADO). Superintendência de Atenção Primária. Prefeitura do Rio de Janeiro. Referência Rápida. Prevenção cardiovascular. [Citado em 2018 mar 18]. Disponível em:http://www.rio.rj.gov.br/dlstatic/10112/4446958/4111922/GuiaCardio.pdf

34. Dias EG, Souza ELS, Mishima SM. Contribuições da Enfermagem na adesão ao tratamento da hipertensão arterial: uma revisão integrativa da literatura brasileira. R Epidemiol Control Infec, Santa Cruz do Sul.2016;6(3):138-44.

35. Costa JMBS, Silva MRF, Carvalho EF. The implementation analysis of the arterial hypertension care by the Family Health teams in Recife city (Pernambuco, Brazil). Cien Saude Colet. 2011;16(2):623-33.