ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Prevalence of Angina Pectoris and Associated Factors in the Adult Population of Brazil: National Survey of Health, 2019

Prevalência e fatores associados da angina do peito na população adulta do Brasil: Pesquisa Nacional de Saúde, 2019

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ABSTRACT: *Objective*: to estimate the prevalence and factors associated with angina pectoris in the Brazilian adult population and per federated units. *Methods*: Cross-sectional descriptive study that analyzed data from the National Survey of Health 2019 and assessed the prevalence of angina in the Brazilian population. Angina was defined as chest pain or discomfort when climbing hills or stairs, or when walking fast on flat terrain (angina I) or when walking at normal speed on flat terrain (angina II). Prevalence, crude and adjusted prevalence ratios were calculated, with a 95% confidence interval, according to sociodemographic characteristics (sex, age group, self-reported race/skin color and region of residence) and federative units. *Results*: The prevalence of mild angina (grade I) was 8.1% and of moderate/severe angina (grade II) was 4.5%, being both more prevalent in women (9.8 and 5.5%, respectively). The prevalence increased progressively with age and was inversely proportional to years of formal study. Grade I angina was higher in individuals self-reportedly black and residents of Sergipe (10,4%). Angina II was more prevalent in people self-reportedly brown and living in Amazonas (6.3%). *Conclusion*: Angina affects more than 10% of the Brazilian population aged 18 years old and more, with higher prevalence in states in the North and Northeast. This is a problem that affects the most vulnerable populations unequally, which places coronary heart disease as a public health problem and points to the need to think about public policies aimed at these strata of the population.

Keywords: coronary disease. atherosclerosis. health surveys. chronic disease. cross-sectional studies. chest pain.

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RESUMO: *Objetivo:* Estimar a prevalência e fatores associados à angina do peito na população adulta brasileira e por unidades federadas. *Métodos:* Estudo transversal descritivo, que analisou os dados da Pesquisa Nacional de Saúde 2019 e avaliou a angina na população brasileira. A angina foi definida como dor ou desconforto no peito ao subir ladeiras ou um lance de escadas, ou ao caminhar rapidamente no plano (angina I) ou em velocidade normal no plano (angina II). Foram calculadas as prevalências, razão de prevalência bruta e ajustada, com intervalo de confiança de 95%, segundo características sociodemográficas (sexo, faixa etária, raça/cor da pele autodeclarada e região de moradia) e unidades federativas. *Resultados:* A prevalência de angina leve (grau I) foi de 8,1% e da angina moderada/grave (grau II), 4,5%, ambas mais prevalentes em mulheres (9,8 e 5,5%, respectivamente). As prevalências aumentaram progressivamente com o avanço da idade e foram inversas aos anos de estudo formal. Angina grau I foi mais elevada em indivíduos da raça/cor da pele autodeclarada preta e residentes em Sergipe (10,4%). A angina II foi mais prevalente em pessoas de raça/cor da pele autodeclarada parda, que vivem no Amazonas (6,3%). *Conclusão:* A angina afeta mais de 10% da população brasileira acima de 18 anos, com maior prevalência em estados do Norte e do Nordeste. É um agravo que atinge de forma desigual as populações mais vulneráveis, revelando a importância da doença coronariana como problema de saúde pública e a necessidade de pensar em políticas públicas voltadas para esses estratos da população.

Palavras-chave: doença das coronárias. aterosclerose. inquéritos epidemiológicos. doença crônica. estudos transversais. dor torácica.

INTRODUCTION

The World Health Organization (WHO) estimates that, in 2016, cardiovascular diseases (CVD) were responsible for 17.9 million deaths worldwide, representing 31% of all global deaths. More than three-quarters of cases were in low- and middle-income countries[1]. CVDs are also the leading cause of death in Brazil[2].

Chronic angina, from the Latin Angina Pectoris (AP), is a common symptom of coronary artery disease (CAD) that impacts an individual's quality of life[3]. It typically expresses as a chest discomfort usually triggered by physical activity or emotional stress, which gets better after rest or use of nitroglycerin and is mostly caused by myocardial hypoxia resulting from obstructive or non-obstructive CAD[4]. Associated with age and gender, the characterization of angina helps to predict the probability of coronary ischemic disease, although in some cases it may result from conditions other than CAD, such as anemia, hyperthyroidism, respiratory diseases and valvular diseases[4].

CAD early detection plays an important role as it leads to early intervention and reduces future risk of serious diseases[5]. The diagnosis of angina is essentially clinical and based on a detailed history of pain characteristics, with investigation of its quality, location, radiation, duration and associated symptoms[6]. Although angina is not directly associated with mortality, it represents an important burden of disability[7].

As there are no specific tests, calculating the prevalence of angina is challenging, and one needs to rely on medical records and analyze the frequency of prescription of nitrates and

self-reported angina experience. In order to characterize angina and chest pain during infarction in a reproducible way, Geoffrey Rose[8] developed a questionnaire in 1962, which was later adopted by the WHO as a general instrument for determining the prevalence of angina[4].

The original questionnaire had seven questions including a male chest diagram and was applied in several countries. A meta-analysis in 31 countries indicated that the prevalence of AP varies between 0.7 and 15% in the general population[3]. In 2003, a short version of the questionnaire was proposed, focusing on three questions about chest pain after effort. In 2012, Bastos et al. adapted this shortened version for Brazil in the pilot project of the Longitudinal Study of Adult Health (Elsa-Brasil), with a 25% sensitivity and 92% specificity, very similar to data reported in the literature[9].

Thus, the simplified version of the questionnaire was applied in Brazil in 2013 and in 2019, in the National Survey of Health (PNS), by the Brazilian Institute of Geography and Statistics (IBGE), providing an opportunity to monitor self-reported data on angina in the country. Differently from the 2013 questionnaire, which excluded individuals who reported not being able to move around, in 2019, the question "In general, what degree of difficulty do you have to move around?" was withdrawn, so that one could estimate the prevalence of angina in the Brazilian population.

This study, then, aims to estimate the prevalence and factors associated with angina pectoris in the Brazilian adult population and per federated units.

METHODS

The study used data from the PNS, a nationwide health survey carried out in 2019 by the IBGE in partnership with the Ministry of Health.

The PNS sampling plan was made by clusters in three stages of selection, with the first encompassing the stratification of the primary sampling units (census sectors). In the second, in each census sector, a fixed number of households from each primary sampling unit (PSU) was randomly selected, ranging from 10 to 14. In the third stage, a resident was randomly selected from all residents aged 15 years or more, based on the list of residents obtained at the time of the interview[10,11]. To calculate the sample size, the mean values, variances and effects of the sampling plan were taken into account, assuming a non-response rate of 20%. The expected sample from PNS 2019 was 108,525 households and the data was to be collected from 94,114 households.

For the analysis of the present study, only the interviews of residents aged 18 and over were considered, totalizing 88,531 individuals[10,11]. Details on the sampling and weighting process are provided in a specific publication[11].

ANGINA PECTORIS ASSESSMENT

To assess angina, the PNS applied the short version of the "WHO Rose Angina Questionnaire", developed by Lawlor[12] and adapted to Brazilian Portuguese[9]. Grade I (mild)

angina included chest pain or discomfort when climbing hills or stairs, or when walking quickly on flat terrain for individuals who can move, according to the positive answer to the question: N4- "When you go up a slope, climb stairs or walk fast on flat terrain, do you feel chest pain or discomfort?". Grade II angina (moderate/severe) involves chest pain or discomfort when walking on flat terrain at normal speed for individuals who can move around, according to a positive answer to question: N5. "When you walk on flat terrain at normal speed, do you feel chest pain or discomfort?". Important to note that cases categorized as grade II were not included in the grade I group.

STATISTICAL ANALYSIS AND ETHICAL PROCEDURES

The point-prevalence estimate and 95% confidence intervals (95%CI) for grade I and grade II angina pectoris were calculated separately. Prevalence ratios (PR) were calculated using the Poisson regression model with robust variance. First, bivariate analyses of the outcomes (angina I and II) and each sociodemographic characteristic (explanatory variables) were performed, with estimates of crude PRs. Then, a multivariate model was applied and adjusted to all sociodemographic characteristics, giving us adjusted PRs for all variables in the model.

The sociodemographic characteristics used were: biological sex (male and female), age group (18-29, 30-59, 60-64, 65-74, and 75 years and over), education (no education and incomplete primary education; complete primary education and incomplete high school; complete high school and incomplete higher education; complete higher education), self-declared race/skin color (white, black, brown, yellow and indigenous), and region of residence (urban and rural). The prevalence of angina grade I and II was also calculated for each federated unit, with 95%CI. The R software (R Core Team, 2020) was used for data analysis by means of the survey package, which considers the effects of the sampling plan.

The PNS was approved by the National Ethics Committee for Research Involving Human Beings of the Ministry of Health (Opinion No. 3.529.376/2019) and its data are available for public access and use.

RESULTS

In 2019, the prevalence of grade I angina was 8.1% (95%CI 7.8-8.4) for the adult Brazilian population. The difference was significant by sex, with higher values among women (9.8%, 95%CI 9.3-10.3; adjusted PR 1.62, 95%CI 1.51-1.65). The prevalence was higher among the aged 60–64 years (10.1%, 95%CI 9.0-11.3; adjusted PR 1.19, 95%CI 1.14-1.24) and the aged 65–74 years (10.1%, 95%CI 9.1-11.2; adjusted PR 1.14, 95%CI 1.09-1.19), decreasing for those aged 75 years and over (8.8%, 95%CI 7.5-10.2; adjusted PR 0.92, 95%CI 0.87-0.97). The population with less education (11.1%, 95%CI 10.5-11.7) had a prevalence almost three times higher (adjusted PR 2.57, 95%CI 2.47-2.68) compared to those with complete higher education (4.2%,

95%CI 3.7-4.8). Taking white skin color as a reference (7.2%, 95%CI 6.8-7.7), being black was a risk factor (9.4%, 95%CI 8.6-10.4; adjusted PR 1.19, 95%CI 1.16-1.22) and being yellow was a protective factor (3.8%, 95%CI 2.4-5.9; adjusted PR 0.56, 95%CI 0.52-0.59). The prevalence was also higher among residents of the rural region (9.8%, 95%CI 9.1-10.5; adjusted PR 1.06, 95%CI 1.04-1.08) compared to those living in the urban area (7.8%, 95%CI 7.5-8.2) (Table 1).

Grade II angina had a prevalence of 4.5% (95%CI 4.2-4.7) and a similar sociodemographic distribution to that of grade I angina, being more frequent in women (5.5%, 95%CI 5.2-5.9; adjusted PR 1.71, 95%CI 1.66-1.77), people aged 75 years and over (7.4%, 95%CI 6.4-8.6; adjusted PR 1.82, 95%CI 1.72-1.94) and with less educational level. In this last item, people without education and with incomplete elementary school (7.2%, 95%CI 6.8-7.7) had a prevalence four times higher (adjusted PR 4.23, 95%CI 3.96-4.52) than those with higher education (1.7%, 95%CI 1.3-2.1). Regarding race/skin color, taking who declared themselves as white as reference (4.0%, 95%CI 3.6-4.4), those who declared themselves as yellow (4.9%, 95%CI 2 .4-9.9) showed higher prevalence (adjusted PR 1.33, 95%CI 0.96-1.85) (Table 2).

Regarding the federative units, the highest prevalence was found in Sergipe (10.4%) for angina grade I, and in Amazonas (6.3%) for angina grade II. The lowest prevalence for both grades of angina was seen in the Federal District (5.9 and 2.8%, respectively) (Figure 1).

DISCUSSION

The 2019 PNS, adopting the Rose Questionnaire for Angina Pectoris, identified prevalences of grade I angina of 8.1% and grade II angina of 4.5%, being the female gender and lower educational levels risk factors for both.

Between 2013[13] and 2019, there were no statistically significant differences between the prevalence of grade I angina (7.6%, 95%CI 7.2-8.0) and grade II angina (4.2%, 95%CI 3.9-4 .5). In 2013, higher prevalence values were also identified among women and the population with low educational levels, and a progressive increase was pointed out with advancing age.

This study found a higher prevalence of grades I and II angina in women, which can be explained by the greater exposure of this group to stress[14], in addition to the fact that men usually present different clinical pictures in coronary heart disease such as acute infarction and sudden death[15].

Grades I and II angina were also more common in people with lower educational levels, a factor directly correlated with higher levels of stress[16] and poor access to health[17], which may explain the association found here with angina.

In Brazil, previous studies have found similar associations. Similar results were identified in Pelotas (Rio Grande do Sul), in 2007, with a higher prevalence among women and people with lower educational levels[15]. In Ribeirão Preto (São Paulo), 2,471 participants over the age of 30 answered the Rose Questionnaire, and there was also a higher prevalence among women and the less educated population[18].

This study identified an association of grade I angina with self-declared black and mixed race/color and with living in rural areas, reinforcing the relationship of social characteristics and poorer access to health promotion and preventive measures[16].

Table 1. Prevalence and prevalence ratios (gross and adjusted) of grade I angina pectoris in the adult Brazilian population, according to sociodemographic characteristics. National Survey of Health, 2019

	Prevalence (95%CI)	Prevalence ratio (95%CI)	
		Gross	Adjusted
Brazil	8.1 (7.8–8.4)	–	–
Sex			
Male	6.2 (5.8–6.6)	1	1
Female	9.8 (9.3–10.3)	1.58 (1.55–1.61)	1.62 (1.59–1.65)
Age group			
18–29	7.1 (6.4–7.8)	1	1
30–59	7.9 (7.5–8.3)	1.12 (1.08–1.16)	1.05 (1.01–1.09)
60–64	10.1 (9.0–11.3)	1.43 (1.38–1.49)	1.19 (1.14–1.24)
65–74	10.1 (9.1–11.2)	1.43 (1.37–1.49)	1.14 (1.09–1.19)
75 and over	8.8 (7.5–10.2)	1.24 (1.18–1.30)	0.92 (0.87–0.97)
Education			
No education and incomplete elementary school	11.1 (10.5–11.7)	2.63 (2.54–2.72)	2.57 (2.47–2.68)
Complete elementary school and incomplete high school	9.2 (8.3–10.3)	2.19 (2.09–2.30)	2.23 (2.12–2.33)
Complete High School and Incomplete Higher Education	6.5 (6.0–7.1)	1.55 (1.49–1.62)	1.57 (1.51–1.63)
Higher education	4.2 (3.7–4.8)	1	1
Race/Skin color			
White	7.2 (6.8–7.7)	1	1
Brown	8.7 (8.2–9.2)	1.20 (1.18–1.23)	1.08 (1.06–1.11)
Black	9.4 (8.6–10.4)	1.31 (1.27–1.34)	1.19 (1.16–1.22)
Yellow	3.8 (2.4–5.9)	0.52 (0.49–0.56)	0.56 (0.52–0.59)
Indigenous	8.6 (5.6–13.0)	1.19 (1.12–1.27)	1.12 (1.06–1.19)
Area of residence			
Urban	7.8 (7.5–8.2)	1	1
Rural	9.8 (9.1–10.5)	1.25 (1.23–1.27)	1.06 (1.04–1.08)

Table 2. Prevalence and prevalence ratios (gross and adjusted) of grade II angina pectoris in the adult Brazilian population, according to sociodemographic characteristics. National Survey of Health, 2019.

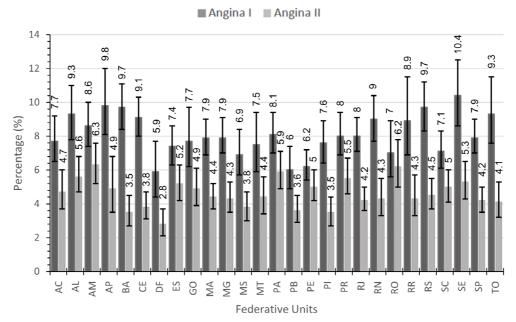|	Prevalence (95%CI)	Prevalence ratio (95%CI)	
		Gross	Ajustada
Brazil	4.5 (4.2–4.7)	–	–
Sex			
Male	3.3 (3.0–3.6)	1	1
Female	5.5 (5.2–5.9)	1.70 (1.66–1.74)	1.71 (1.66–1.77)
Age group			
18–29	2.6 (2.2–3.0)	1	1
30–59	4.4 (4.1–4.7)	1.73 (1.64–1.81)	1.53 (1.46–1.61)
60–64	6.0 (5.1–7.1)	2.36 (2.23–2.49)	1.73 (1.62–1.85)
65–74	6.7 (5.9–7.6)	2.63 (2.49–2.77)	1.80 (1.70–1.90)
75 and over	7.4 (6.4–8.6)	2.91 (2.76–3.08)	1.82 (1.72–1.94)
Education			
No education and incomplete elementary school	7.2 (6.8–7.7)	4.31 (4.06–4.58)	4.23 (3.96–4.52)
Complete elementary school and incomplete high school	4.8 (4.2–5.5)	2.88 (2.70–3.08)	3.21 (3.30–3.43)
Complete High School and Incomplete Higher Education	2.9 (2.6–3.2)	1.73 (1.62–1.85)	1.91 (1.78–2.06)
Higher education	1.7 (1.3–2.1)	1	1
Race/Skin color			
White	4.0 (3.6–4.4)	1	1
Brown	4.9 (4.6–5.3)	1.24 (1.21–1.28)	1.12 (1.08–1.15)
Black	4.3 (3.7–5.1)	1.09 (1.05–1.14)	0.98 (0.94–1.02)
Yellow	4.9 (2.4–9.9)	1.23 (0.90–1.69)	1.33 (0.96–1.85)
Indigenous	4.4 (2.5–7.6)	1.11 (1.02–1.20)	1.04 (0.95–1.13)
Area of residence			
Urban	4.4 (4.1–4.7)	1	1
Rural	4.7 (4.3–5.2)	1.08 (1.05–1.10)	0.83 (0.81–0.85)

■ Angina I ■ Angina II

Figure 1. Prevalence and 95% confidence interval of grade I and II angina pectoris in the adult Brazilian population by federative units. National Survey of Health, 2019.

Among the study's limitations, we highlight a strong association between "positive" responses to the questionnaire and the presence of common mental disorders[4,19,20]. Thus, the positive response could be due to somatization or increased sensitivity to pain in depressed or anxious people, and not exactly to a manifestation of coronary ischemia[4,19]. Also, the study had a cross-sectional design and cannot define the direction of causality.

Our work showed a high prevalence of angina pectoris in the population, being greatly more common among those with low educational level. These data can support CVD prevention and control policies aimed at primary health care, which is capable of managing angina and preventing other cardiovascular risk factors (smoking, dyslipidemia, diabetes, and hypertension), controlling and reducing mortality from CVD[21] and essential to achieve the Sustainable Development Goal of reducing mortality from chronic non-communicable diseases (NCDs) by 30% by 2030.

REFERENCES

1. World Health Organization. Cardiovascular diseases burden. Genebra: World Health Organization, 2017.

2. Colaboradores do GBD 2016 Brasil. Global burden of diseases. Burden of disease in Brazil, 1990-2016: a systematic subnational analysis for the Global Burden of Disease Study 2016. Lancet 2018; 392 (1): 760-75. https://doi.org/10.1016/S0140-6736(18)31221-2

3. Hemingway H, Langenberg C, Damant J, Frost C, Pyörälä K, Barrett-Connor E. Prevalence of angina in women versus men: A systematic review and meta-analysis of international variations across 31 countries. Circulation 2008; 117 (12): 1526-36. https://doi.org/10.1161/CIRCULATIONAHA.107.720953

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4. Tsai CC, Chuang SY, Hsieh IC, Ho LH, Chu PH, Jeng C. The association between psychological distress and angina pectoris: a population-based study. PLoS One 2019; 14 (11): e0224451. https://doi.org/10.1371/journal.pone.0224451

5. Mansournia MA, Holakouie-Naieni K, Fahimfar N, Almasi-Hashiani A, Cheraghi Z, Ayubi E, et al. Risk of coronary heart events based on rose angina questionnaire and ecg besides diabetes and other metabolic risk factors: results of a 10-year follow-up in tehran lipid and glucose study. Int J Endocrinol Metab 2017; 15 (2): e42713. https://doi.org/10.5812/ijem.42713

6. Fihn SD, Blankenship JC, Alexander KP, Bittl JA, Byrne JG, Fletcher BJ, et al. 2014 acc/aha/aats/pcna/scai/sts focused update of the guideline for the diagnosis and management of patients with stable ischemic heart disease. J Am Coll Cardiol 2014; 64 (18): 1929-49. https://doi.org/10.1161/CIR.0000000000000095

7. Russell M, Williams M, May E, Stewart S. The conundrum of detecting stable angina pectoris in the community setting. Nat Rev Cardiol 2010; 7 (2): 106-13. https://doi.org/10.1038/nrcardio.2009.226

8. Rose GA. The diagnosis of ischaemic heart pain and intermittent claudication in fields surveys. Bull World Health Organ 1962; 27 (6): 645-58. PMID: 13974778

9. Bastos MS, Lotufo PA, Whitaker AL, Bensenor IM. Validation of the short-version of Rose Angina Questionnaire in Brazil. Arq Bras Cardiol 2012; 99 (5): 1056-9. https://doi.org/10.1590/S0066-782X2012001400012

10. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde: 2019: percepção do estado de saúde, estilos de vida, doenças crônicas e saúde bucal: Brasil e grandes regiões. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2020.

11. Stopa SR, Szwarcwald CL, Oliveira MM, Gouvea ECDP, Vieira MLFP, Freitas MPS, et al. National Survey of Health 2019: history, methods and perspectives. Epidemiol Serv Saude 2020; 29 (5): e2020315. https://doi.org/10.1590/S1679-49742020000500004

12. Lawlor DA, Adamson J, Ebrahim S. Performance of the WHO Rose angina questionnaire in post-menopausal women: are all of the questions necessary? J Epidemiol Community Health 2003; 57 (7): 538-41. http://doi.org/10.1136/jech.57.7.538

13. Lotufo PA, Malta DC, Szwarcwald CL, Stopa SR, Vieira ML, Bensenor IM. Prevalência de angina do peito pelo questionário de Rose na população brasileira: análise da Pesquisa Nacional de Saúde, 2013. Rev Bras Epidemiol 2015; 18 (Suppl 2): 123-31. https://doi.org/10.1590/1980-5497201500060011

14. Schmidt K, Lima AS, Schmitt KR, Moraes MA, Schmidt MM. Um olhar sobre o stress nas mulheres com infarto agudo do miocárdio. Arq Bras Cardiol 2020; 115 (4): 649-57. https://doi.org/10.36660/abc.20190282

15. Alves L, Cesar JA, Horta BL. Prevalence of angina pectoris in Pelotas, south of Brazil. Arq Bras Cardiol 2010; 95 (2): 179-85. https://doi.org/10.1590/S0066-782X2010005000075

16. Marmot M, Bell R. Social determinants and non-communicable diseases: time for integrated action. BMJ 2019; 364: kl251. https://doi.org/10.1136/bmj.l251

17. Fiório CE, Cesar CLG, Alves MCG, Goldbaum M. Prevalência de hipertensão arterial em adultos no município de São Paulo e fatores associados. Rev Bras Epidemiol 2020; 23: e200052. https://doi.org/10.1590/1980-549720200052

18. Moraes SA, Freitas IC. Ischemic heart disease and correlates in adults from Ribeirão Preto, Brazil. Rev Saude Publica 2012; 46 (4): 591-601. https://doi.org/10.1590/S0034-89102012005000056

19. Zaman MJS, Mola CL, Gilman RH, Smeeth L, Miranda JJ. The prevalence of angina symptoms and association with cardiovascular risk factors, among rural, urban, and rural to urban migrant populations in Peru. BMC Cardiovasc Disord 2010; 10: 50. https://doi.org/10.1186/1471-2261-10-50

20. Ragino YI, Shcherbakova LV, Denisova DV, Kuzminykh NA, Yachmeneva MP, Voevoda MI. Blood lipids and angina pectoris (by epidemiological cardiological Rose questionnaire) in the population of 25-45 years of Novosibirsk. Kardiologiia 2019; 59 (3S): 30-5. https://doi.org/10.18087/cardio.2600

21. Malta DC, Pinheiro PC, Teixeira RA, Machado IE, Santos FM, Ribeiro ALP. Estimativa do risco cardiovascular em dez anos na população brasileira: um estudo de base populacional. Arq Bras Cardiol 2021, 116: 423-31. https://doi.org/10.36660/abc.20190861

Author's contributions: DCM: conceptualization, data curation, formal analysis, writing – first writing, writing – revision and editing. PCP: conceptualization, data curation, formal analysis, writing – first writing, writing – revision and editing. NMV: conceptualization, data curation, formal analysis, writing – first writing, writing – revision and editing. SRS: conceptualization, data curation, formal analysis, writing – first writing, writing – revision and editing. MLFPV: conceptualization, data curation, formal analysis, writing – first draft, writing – revision and editing. PAL: conceptualization, data curation, formal analysis, writing – first draft, writing – revision and editing