

Prevalence of *angina pectoris* in the Brazilian population from the Rose questionnaire: analysis of the National Health Survey, 2013

Prevalência de angina do peito pelo questionário de Rose na população brasileira: análise da Pesquisa Nacional de Saúde, 2013

Paulo Andrade Lotufo^{I,II}, Deborah Carvalho Malta^{III,IV}, Celia Landmann Szwarcwald^V, Sheila Rizzato Stopa^{III,VI}, Maria Lucia Vieira^{VII}, Isabela Martins Bensenor^{II}

ABSTRACT: *Objective:* To estimate the prevalence of *angina pectoris* in the Brazilian adult population with the use of the Rose questionnaire for angina in the National Health Survey (PNS 2013). *Methods:* Population survey representing the Brazilian population aged 18 years and older, with probability carried out sampling in three stages. The interview records of 60,202 individuals were obtained in the country. The respondent was presented with the short Rose questionnaire with three questions, adapted by Lawlor in 2003 and validated in Brazil, to identify *angina pectoris* grade I (mild) and II (moderate/severe). The prevalence rate was calculated with a 95% confidence interval (95%CI) according to sex, age, education, and race/color. *Results:* The prevalence of mild angina (grade I) was of 7.6% (95%CI 7.2 – 8.0) for the entire population, more frequently in women — 9.1% (95%CI 8.5 – 9.7) — than in men — 5.9% (95%CI 5.3 – 6.4). The frequency of moderate/severe angina (grade II) was of 4.2 (95%CI 3.9 – 4.5), also more common in women — 5.2% (95%CI 4.7 – 5.6) — than in men — 3.0% (95%CI 2.7 – 3.4). The prevalence of angina by age group increased progressively with age. The prevalence of angina of any sort was inverse to years of formal study. Despite the higher value of the presence of angina in black people, there was no significant difference by race/skin color. *Conclusion:* The high prevalence rate of *angina pectoris* in the population aged 18 years and above was consistent with studies in other countries, revealing the importance of coronary heart disease as a public health problem.

Keywords: Coronary disease. Atherosclerosis. Health surveys. Chronic disease. Cross-sectional studies. Chest pain.

^ICenter for Clinical and Epidemiologic Research of the University Hospital, *Universidade de São Paulo* – São Paulo (SP), Brazil.

^{II}School of Medicine, *Universidade de São Paulo* – São Paulo (SP), Brazil.

^{III}Department of Noncommunicable Diseases and Health Promotion, Department of Health Surveillance, Ministry of Health – Brasília (DF), Brazil.

^{IV}*Universidade Federal de Minas Gerais* – Belo Horizonte (MG), Brazil.

^VCenter for Science and Technology Information, Department of Information on Health, *Fundação Oswaldo Cruz* – Rio de Janeiro (RJ), Brazil.

^{VI}Department of Epidemiology, School of Public Health, *Universidade de São Paulo* – São Paulo (SP), Brazil.

^{VII}Brazilian Institute of Geography and Statistics – Rio de Janeiro (RJ), Brazil.

Corresponding author: Paulo Andrade Lotufo. Centro de Pesquisa Clínica e Epidemiológica da Universidade de São Paulo. Avenida Lineu Prestes, 2565, Butantã, CEP: 05508-000, São Paulo, SP, Brasil. E-mail: palotufo@usp.br

Conflict of interests: Paulo Andrade Lotufo received fees from Abbot and Abbvie for lectures – **Financial support:** none.

RESUMO: *Objetivo:* Estimar a prevalência de angina do peito na população adulta brasileira com a aplicação do questionário de Rose para angina na Pesquisa Nacional de Saúde (PNS-2013). *Métodos:* Inquérito populacional representativo da população brasileira acima de 18 anos de idade, com amostragem probabilística conglomerada em três estágios. Foram obtidos registros de entrevistas de 60.202 indivíduos no território nacional. Apresentou-se ao entrevistado o questionário de Rose curto com três questões, adaptado por Lawlor em 2003 e validado no Brasil, para identificar angina do peito grau I (leve) e II (moderada/ grave). Calcularam-se os valores de prevalência com intervalo de confiança de 95% (IC95%) segundo sexo, faixa etária, escolaridade e raça/cor. *Resultados:* A prevalência de angina leve (grau I) foi de 7,6% (IC95% 7,2 – 8,0) para toda população, com frequência maior em mulheres — 9,1% (IC95% 8,5 – 9,7) — do que em homens — 5,9% (5,3 – 6,4). A frequência de angina moderada/ grave (grau II) foi 4,2 (IC95% 3,9 – 4,5), também mais frequente em mulheres — 5,2% (IC95% 4,7 – 5,6) — do que em homens — 3,0% (IC95% 2,7 – 3,4). A prevalência de angina por faixa etária aumentou progressivamente com a idade. A prevalência de angina, de qualquer tipo, foi inversa aos anos de estudo formal. Apesar do valor maior da presença de angina em negros, não houve diferença significativa por raça/cor da pele. *Conclusão:* Os valores de prevalência elevada de angina do peito na população brasileira acima de 18 anos foram compatíveis com estudos em outros países, revelando a importância da doença coronariana como problema de saúde pública.

Palavras-chave: Doença das coronárias. Aterosclerose. Inquéritos epidemiológicos. Doença crônica. Estudos transversais. Dor torácica.

INTRODUCTION

Coronary heart disease — in the clinical presence of acute myocardial infarction and unstable angina — is the leading cause of death in Brazil and in most countries¹. However, the presence of chronic angina (also described in the original Latin as *angina pectoris*) is not directly related to mortality, but represents a considerable amount of discomfort and disability to those affected worldwide². Estimating the prevalence of *angina pectoris* is still a challenge for cardiovascular epidemiology, which uses medical records from primary health care, frequency of prescription of nitrates, self-report of recent experience of angina, and the application of the “Rose Angina questionnaire,” created in 1962 by Geoffrey A. Rose (1926–1993), as data sources³. This instrument allows the estimation of the prevalence of stable *angina pectoris* with a standardized questionnaire that was later recommended by the World Health Organization (WHO) as general instrument for determining the prevalence of angina⁴. Currently, a simplified version of the questionnaire is used in Brazil, with three questions already validated in Portuguese^{5,6}.

Brazilian data regarding the prevalence of angina collected using the Rose questionnaire are restricted to three surveys — in Araraquara, São Paulo, in 1986⁷; in Pelotas, Rio Grande do Sul, in 2000⁸; in Ribeirão Preto, São Paulo, in 2005⁹ — as well as to patients with HIV in Pernambuco¹⁰. The National Health Survey (PNS) applied in 2013 is a unique opportunity

to describe an estimated population prevalence of *angina pectoris* among adults (18 years and above) representative of Brazil, urban and rural areas, macroregions and federative units, education and self-reported race/color.

METHODS

SAMPLING

The PNS is a home-based epidemiological survey, representative of Brazil, macroregions, federative units and capitals, metropolitan areas, and the rest of the federal units. It is part of the Integrated Household Surveys System of the Brazilian Institute of Geography and Statistics, and uses this system's master sample, with greater geographical distribution and greater accuracy of the estimates.

The minimum sample size was of 1800 households per federal unit, with an initial sample of 81,767 households planned. Further, the sample was defined based on the desired accuracy level for estimating indicators of interest (proportion of people in certain categories). After the end of the collection, the interview records of 64,348 households were obtained, with 60,202 individuals interviewed, resulting in a non-response rate of 8.1%.

The sampling plan of PNS was executed in three stages. The primary sampling units were the census tracts or set of sectors, secondary units were households, and tertiary units were adult residents (≥ 18 years). Weighting factors were calculated for each of the three sampling units, considering the probabilities of selection. The weighting factor for the selected resident was also calculated by the weight of the household, non-response adjustment for sex, and calibration by the total population by gender and age groups estimated with the weight of all residents. Details about the sampling and weighting processes are provided in the publication on the results of the PNS¹¹. Data were collected with the use of handheld computers (personal digital assistants).

ANGINA PECTORIS EVALUATION

The short version of the "Rose/WHO Angina questionnaire," developed by Lawlor, was applied, including the first three questions of the original version, translated, and adapted to Brazilian Portuguese in the pilot project of the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)⁶. The definition of angina grade I as a proportion includes pain or discomfort in the chest when climbing hills or a flight of stairs, or walking fast on flat places for individuals with no mobility problems. Angina grade II involves pain or chest discomfort when walking on flat places at normal speed for individuals with no mobility problems.

STATISTICAL ANALYSIS AND ETHICAL PROCEDURES

The point prevalence estimate and the 95% confidence interval (95%CI) were calculated for *angina pectoris* grade I and grade II separately using the sample basis. Frequencies were stratified by sex, age group (18 – 29, 30 – 59, 60 – 64, 65 – 74, and 75 years and more), education (uneducated and incomplete primary education, complete primary and incomplete secondary education, complete secondary education and incomplete superior education, and complete superior education) and race/skin color (white, black, and brown). Prevalence rates were also presented for the country, urban and rural areas, macroregions, and Federative Units. The PNS was approved by the National Research Ethics Commission, under protocol number 328.159 in June 26, 2013. The participation of adults in the survey was voluntary, and the confidentiality of the information was guaranteed.

RESULTS

Table 1 shows a prevalence of angina grade I of 7.6% (95%CI 7.2 – 8.0) for the adult Brazilian population. The difference was significant by gender, with higher values among women. The prevalence by age group increased up to the 60 – 64 years group, and then declined under the influence of different longevity in patients with coronary artery disease. The differences in the frequency of angina grade I were inverted to the years of formal study. Despite the higher value of the presence of angina in black individuals, there was no significant difference by race/skin color. The frequency was significantly higher in rural areas compared to urban areas.

Table 2 shows a prevalence of angina grade II, with values for the whole country, of 4.2%. Women had higher frequency of angina than men. Unlike angina grade I, the prevalence of angina grade II was increased in each age group. As in angina grade I, the frequency of angina grade II was greater with less years of formal education. There were no significant differences by race.

DISCUSSION

The PNS in 2013 showed, in an unprecedented manner, the frequency of positive results from the use of the Rose questionnaire for *angina pectoris*, with high prevalence values and with relevant social and regional differences. The results can now be compared internationally and with local national surveys.

A systematic review of 74 articles published with data from 31 countries showed a total of 13,331 cases of positive response to the Rose questionnaire in women and 11,511 cases in men. The variation in prevalence was in the range of 0.73 – 14.4% (average value adjusted for age = 6.7%) in women and between 0.76 and 15.1% (average value adjusted for age =

Table 1. Prevalence (and 95% confidence interval) of *angina pectoris* (grade I) in the Rose questionnaire in the Brazilian population (≥ 18 years old) according to sex, age strata, race, formal education, and place of residence. The National Health Survey, 2013.

Variables	Angina pectoris grade I	
	n (%)	95% CI
Sex		
Male	4,012 (5.9)	5.3 – 6.4
Female	6,966 (9.1)	8.5 – 9.7
Age group (years)		
18 – 29	2,016 (5.3)	4.7 – 6.0
30 – 59	6,486 (8.0)	7.5 – 8.6
60 – 64	904 (10.9)	8.8 – 12.9
65 – 74	1,080 (9.7)	8.3 – 11.2
75+	492 (7.7)	6.0 – 9.5
Educational level		
Uneducated and incomplete primary education	6,025 (10.8)	10.0 – 11.5
Complete primary education and incomplete secondary education	1,686 (7.5)	6.5 – 8.5
Complete secondary education and incomplete superior education	2,600 (5.5)	4.9 – 6.0
Complete superior education	668 (3.6)	2.9 – 24.4
Race/skin color		
White	4,595 (6.7)	6.2 – 7.2
Brown	5,168 (8.5)	7.8 – 9.2)
Black	1,071 (8.1)	6.9 – 9.3
Place of residence		
Urban	9,110 (7.3)	6.9 – 7.8
Rural	1,866 (9.4)	8.3 – 10.4
Brazil	10,978 (7.6)	7.2 – 8.0

Table 2. Prevalence (and 95% confidence interval) of *angina pectoris* (grade II) in the Rose questionnaire in the Brazilian population (≥ 18 years old) according to sex, age-strata, race, formal education, and place of residence. The National Health Survey, 2013.

Variables	Angina pectoris grade II	
	n * 1.000 (%)	95% CI
Sex		
Male	2,073 (3.0)	2.7 – 3.4
Female	3,974 (5.2)	4.7 – 5.6
Age group (years)		
18 – 29	896 (2.4)	2.0 – 2.8
30 – 59	3,553 (4.4)	4.0 – 4.8
60 – 64	447 (5.4)	4.1 – 6.6
65 – 74	686 (6.2)	5.0 – 7.3
75 +	465 (7.3)	5.4 – 9.2
Educational level		
Uneducated and incomplete primary education	3,639 (6.5)	5.9 – 7.1
Complete primary education and incomplete secondary education	837 (3.7)	3.0 – 4.4
Complete secondary education and incomplete superior education	1,192 (2.5)	2.2 – 2.8
Complete superior education	379 (2.1)	1.5 – 2.6
Race/skin color		
White	2,663 (3.9)	3.5 – 4.3
Brown	616 (4.4)	4.0 – 4.8
Black	2,683 (4.6)	3.7 – 5.6
Place of residence		
Urban	5,012 (4.0)	3.7 – 4.3
Rural	1,035 (5.2)	4.2 – 6.2
Brazil	6,047 (4.2)	3.9 – 4.5

5.7%) in men⁴. In Brazil, we can highlight two recent studies. In Pelotas, Rio Grande do Sul, in 2007, a total of 1,680 adults aged more than 40 years were assessed in population-based survey, with the detection of higher frequencies than those obtained in the PNS and higher prevalence in women and less educated individuals.

Also, in this study, it was possible to characterize significant differences by race/skin color with lower values among white individuals⁸. In Ribeirão Preto, São Paulo, 2,471 participants aged more than 30 years answered the Rose questionnaire with relatively higher frequencies compared to the PNS sample. The results were similar, with a higher frequency in women and inversely in relation to formal education⁹.

The use of the short Rose questionnaire could have been a limitation of the research. However, the SMART study in the Netherlands followed 7,916 people for 5 years, showing that the short version of the Rose questionnaire had the same predictive ability of clinical outcomes than the long version¹². The prognostic value of the Rose questionnaire was confirmed in a cohort of 30,000 apparently healthy middle-aged Norwegian individuals monitored for 23 years, in which the risk ratios for predicting acute coronary syndrome in participants that responded positively for angina in the questionnaire were similar to the risk associated with dyslipidemia or hypertension in the same sample¹³.

An important limitation regarding the use of the Rose questionnaire in surveys to identify angina comes from recent studies in¹⁴, Scotland¹⁵, and from the World Health Survey¹⁶. The results of these studies indicate that there is very strong association between positive response to the Rose questionnaire and the presence of common mental disorders. In addition, the positive response to the Rose questionnaire could be due to somatization, or increased sensitivity to pain in depressed or anxious people, and not just a manifestation of coronary ischemia. These issues will be further developed in future studies in both the PNS and the ELSA-Brasil, in which preliminary data indicated the existence of strong association between positive response to the Rose questionnaire and depression¹⁷.

The diagnosis of *angina pectoris* is basically done in the medical examination and anamnesis, just as William Heberden described two centuries ago¹⁸. It stands out unequivocally that all international guidelines emphasize the role of clinical history with the following adage: “patients with chest pain should undergo a revision of the medical care history before additional tests¹⁹.” The good results in the validation studies of the short questionnaire should also be highlighted, such as the one carried out in 2012 with 116 individuals with an average age of 53 years⁶. In this study, the angina questionnaire of patients who underwent treadmill exercise showed accuracy of 89.7% (95%CI 84.2 – 95.2), sensitivity of 25% (95%CI 17.2 – 32.8), specificity of 92.0% (95%CI 88.1 – 95.9), positive predictive value of 10.0% (95%CI 94.2 – 100), negative predictive value of 97.2% (95%CI 96.9 – 97.5), 3.1 positive likelihood ratio (95%CI 2.1 – 16.6), and 0.82 negative likelihood ratio (95%CI 0.75 – 4.43)⁶.

Support angina medication is relatively inexpensive and available in public pharmacies with β -blockers, calcium channel blockers, and nitrates. In other words, the angina patient

care can and should be done in primary care, mainly because these coronary risk factors such as hypertension, dyslipidemia, smoking and diabetes, are associated with *angina pectoris*.

CONCLUSION

It is important to emphasize that the Rose questionnaire for *angina pectoris* is valid only for prevalence estimates in population-based surveys such as the PNS, without application in clinical medicine.

Data from the PNS showed, in an unprecedented way, the importance of coronary artery disease in its chronic form, *angina pectoris*, in the Brazilian population with a clear socio-economic gradient. These data indicate that the care to *angina pectoris* is another challenge in reducing inequalities in health indicators of the population.

REFERENCES

1. GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015; 385 (9963): 117-71.
2. 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.
3. Rose GA. The diagnosis of ischaemic heart pain and intermittent claudication in fields surveys. *Bull World Health Organ* 1962; 27: 645-58.
4. Hemingway H, Langenberg C, Damant J, Frost C, Pyörälä K, Barret-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.
5. 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.
6. 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.
7. Lolio CA. Prevalência de hipertensão arterial no Município de Araraquara, SP, Brasil, 1987. [Tese de Doutorado]. São Paulo: Faculdade de Medicina da USP; 1989.
8. Alves L, Cesar JA, Horta BL. Prevalence of angina pectoris in Pelotas, south of Brazil. *Arq Bras Cardiol* 2010; 95(2): 179-85.
9. Moraes SA, Freitas IC. Ischemic heart disease and correlates in adults from Ribeirão Preto, Brazil. *Rev Saude Publica* 2012; 46(4): 591-601.
10. Zirpoli JC, Lacerda HR, Albuquerque VM, Albuquerque MF, Miranda Filho DB, Monteiro VS, et al. Angina pectoris in patients with HIV/AIDS: prevalence and risk factors. *Braz J Infect Dis* 2012; 16(1): 1-8.
11. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde: 2013. Percepção do estado de saúde, estilos de vida e doenças crônicas. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2014. Disponível em: <ftp://ftp.ibge.gov.br/PNS/2013/pns2013.pdf>. (Acessado em 22 de dezembro de 2014).
12. Achterberg S, Soedamah-Muthu S, Cramer M, Kappelle L, van der Graaf Y, Algra A. Prognostic value of the Rose questionnaire: a validation with future coronary events in the SMART study. *Eur J Cardiovasc Prev Rehabil* 2012; 19(1): 5-14.
13. Graff-Iversen S, Selmer R, Løchen ML. Rose angina predicts 23-year coronary heart disease mortality in women and men aged 40-49 years. *Heart* 2008; 94: 482-6.
14. 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.

15. Inglis SC, Lewsey JD, Lowe GD, Jhund P, Gillies M, Stewart S, et al. Angina and intermittent claudication in 7403 participants of the 2003 Scottish Health Survey: impact on general and mental health, quality of life and five-year mortality. *Int J Cardiol* 2013; 167(5): 2149-55.
16. Loerbroks A, Bosch JA, Mommersteeg PM, Herr RM, Angerer P, Li J. The association of depression and angina pectoris across 47 countries: findings from the 2002 World Health Survey. *Eur J Epidemiol* 2014; 29(7): 507-15.
17. Lotufo P, Nunes MA, Brunoni A, Barreto SM, Ribeiro ALP, Bensenor IM. Psychiatric morbidity and stable angina pectoris. The ELSA-Brasil. *Eur Heart J* 2013; 34(Suppl 1): 956.
18. Heberden W. Some account of a disorder of the breast. *Med Trans Rl Coll Phys Lond* 1772; 2: 59-67.
19. Fihn SD, Blankenship JC, Alexander KP, Bittl JA, Byrne JG, Fletcher BJ, Fonarow GC, Lange RA, Levine GN, Maddox TM, Naidu SS, Ohman EM, Smith PK. 2014 ACC/AHA/AATS/PCNA/SCAI/STS Focused Update of the Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines, and the American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *J Am Coll Cardiol* 2014; 64(18): 1929-49.

Received on: 05/30/2015

Final version presented on: 06/22/2015

Accepted on: 06/25/2015