# Prevalence of anaemia in a sample of elderly northeastern brazilians

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## Keywords:

## Abstract

Population growth is a worldwide phenomenon responsible for significant changes in the population pyramid. In this context, the increase in life expectancy has contributed significantly to the growth of the elderly population. Considering that this age group is associated with a decline in the functional reserve of multiple organic systems, a condition capable of causing dysfunctions and diseases in the elderly, the best clarification about the implications of aging becomes essential. The present research aimed to study the prevalence of ane-

mia in a sample of elderly people in northeastern Brazil. To that, 90 elderly residents in Mossoró-RN, belonging to groups of elderly people assisted by Family Health Strategy teams and arranged in different Family Health Care Centers, completed a questionnaire with socioeconomic data and a a biochemical test that evaluated serum hemoglobin (Hb) concentrations. The study found a prevalence of 12.2% of anemia in participants (Hb <12 g / dl in women and Hb <13 g / dl in men), which was was in agreement with other Brazilian studies that involved elderly enrolled in the Family Health Unit. However, a lower prevalence of the disease was observed when compared to studies that evaluated elderly people living in long-term institutions. In addition, it was found that 7.8% were illiterate; 47.2% had incomplete 1st grade; 16.7% had completed 1st grade; 16.7% had incomplete secondary education; 13.3% were in the 2nd grade; and 3.3% had 3rd grade. Besides that, attention to anemia in the elderly would help to improve the quality of senile life while reduces their impact on the global burden of diseases, explained in part by its correlation with poor nutritional status and major cognitive impairments, which are capable of interfering with daily activities and interaction of patients.

## Introduction

The dynamics of population growth are studied in the light of the Demographic Transition theory, as described by Vasconcelos & Gomes (2012). In Brazil, Bassler & Lei (2008) and Toral et al. (2006) affirm that the changes occurred in the population pyramid, with an increase in life expectancy, fall in fertility and mortality rates, and growth of the elderly population. Data from the Brazilian Institute of Geography and Statistics - IBGE (2010) indicate that Brazil has more than 20 million older people over 60 years of age, representing 10.8% of the total population. In 2050, it is estimated that for every 100 people in the age group 0 to 14 years old there will be 173 elderly people. That said, it makes essential the work on the aging process and the

implications associated with it.

According to Schaan et al. (2007), aging is related to the progression of functional functionality of multiple types of rules, the ability to increase dysfunctions and diseases in the elderly. Bassler & Lei (2008) proposes that the associated use of medications, physiological reflections that interfere with the appetite and nutrient absorption, chronic diseases, besides the social issues, opportunities and experiences that hinder the accomplishment of a health experience are just some of the aggravations that affect a population with more than 60 years of age.

Benoist et al. (2008) shows that the overall prevalence of anaemia in the elderly is around 24%, which corresponds to approximately 164 million individuals affected. Physiological changes associated with aging, according to Folstein & Folstein (1975), include the body's resistance to erythropoietin, a hormone produced in the kidneys and responsible for regulating the production of erythrocytes in the bone marrow, and the increase of proinflammatory cytokines capable of inhibiting erythroid cell response to this hormone. In this way, knowing that the World Health Organization (WHO) (1968) defines anaemia as the pathological reduction of circulating hemoglobin (Hb) levels below 12 g / dL in women and 13 g / dL in men, the imbalance of the aforementioned hematopoietic modulation corroborates to an increased risk of developing anaemia with increasing age.

In a published report, WHO (2008) highlights the knowledge gap about anaemia in the elderly population, which makes it difficult to produce data at regional and national levels on the subject. In addition, the clinical diagnosis of this condition, which is based on classic signs such as skin--mucous pallor, tachycardia and dyspnea, may be masked by the characteristics of senescence, by the use of certain medications or by the presence of comorbidities, alert Silva et al. (2014). Thus, the epidemiological importance of obtaining data on the prevalence of anaemia in the elderly at local levels is understood, in order to guide the implementation of health actions and public policies that

are more effective for this public.

The present study aimed to evaluate the prevalence of anaemia in elderly participants of the Family Health Strategy in the city of Mossoró, Rio Grande do Norte. Therefore, considering the multifactorial character of this disease, the biochemical profile of serum hemoglobin of the participants was studied not only by investigating the comorbidities associated with it, but also by correlating the educational level of the elderly with the prevalence of anaemia.

## Materials and Methods

### 4.1 Population to be studied

The study was performed with elderly residents of the city of Mossoró, Rio Grande do Norte (RN). These were divided equally among the areas covered by the Family Health Support Centers (FHSC), since there is a nutritional support service in this care policy. Thus, 90 elderly were included, which were divided in five groups, covering each of the five existing NASFs. In order to favor the execution of an effective recruitment plan, the Family Health Units (FHU) with consolidated groups of elderly people were prioritized within the FHSC's.

### 4.2 Method to be used

### 4.2.1 Study design:

The proposed research design is characterized as individual observational-sectional and will be developed in Basic Units of the Family Health Strategy (FHS), in the city of Mossoró, RN. It is a descriptive, cross-sectional, quantitative and population-based study.

### 4.2.2 Recruitment plan:

Initially, at the time of the meeting of the elderly group, the researchers made an explanation about the project (purpose, methods and purposes of the research) and questioned those who had interest. Later, the elderly were invited to participate in the research, clarified about their ethical guarantees and about the measures that guarantee comprehension and verbal communication (peo-

ple with dementia in the advanced stages).

### 4.2.3 Sources of material, specific collection and data collection instruments:

The evaluation of nutritional status will be based on a questionnaire. It will deal with data of general identification, economic, social and cultural data, and at the same time the biochemical investigation will be carried out through the established partnership between the researchers and the doctor of the FHS, who was informed of the need for their cooperation in requesting biochemical tests (Fasting Glucose, Total Cholesterol and Fractions, etc.). It is emphasized that the researchers will not have access to the biological samples of the participants, but to the results. It is important to reinforce that prior to the accomplishment of these established protocols, the free and informed consent of the participants will be obtained through the Free and Informed Consent Form. Thus, the study was approved by the institutional ethical and research committee of University of the state of Rio Grande do Norte (CAAE: 64387517.0.0000.5294 – Parecer: 2183623).

### 4.2.4 Place of research:

The research was developed in groups of elderly people assisted by FHS teams and arranged in different FHCCs and comprising extreme points of the municipality of Mossoró, RN. Those are: FHCC 1 - Family Health Team of the Alto de São Manoel (South Zone), FHCC 2 - Family Health Team of Santa Delmira (North Zone), FHCC 3- Family Health Team of the Evangelical Clinical Center (Center), FHCC 4 - Family Health Team of Pintos (East Zone) and FHCC 5 - Family Health Team of Ouro Preto (West Zone). It was used with selection criteria those teams that have fixed elderly groups in each of the health areas of the city. The data collection was performed in the places where the meetings of the elderly groups occur, specifically in a reserved room (consulting room), with isolation, so that the participant feels at ease and, above all, with their

guaranteed privacy.

### 4.2.5 Data collection period:

The data / documents from this research (questionnaires and Free and informed consent forms) are archived in the form of a sealed folder for a period of five years. The storage location is in a closed bookcase at the Microscopy Laboratory of the Faculty of Health Sciences at University of the state of Rio Grande do Norte, under the responsibility of the Researcher Prof. Dr. José Rodolfo Lopes de Paiva Cavalcanti.

### Results

Of the 135 elderly people enrolled in the Family Health Unit of the city of Mossoró, Brazil, estimated to comprise the sample, 45 were excluded from the study. Thus, the study had 90 elderly people, of which 11 had anaemia, what shows a total prevalence of 12.2%.

In Table 1, the distribution of the elderly according to the educational level is presented. There is a greater relative frequency of people with incomplete 1st grade and a lower frequency of seniors with 3rd grade. It is noteworthy that, among the participants of the study, 83.57% did not complete the 2nd grade, and 55% did not finish their 1st grade.

**Table 1:** Distribution of the elderly studied according to the educational level.

| Schooling | Absolute Frequency (n=90) | Relative Frequency (100%) |
|---|---|---|
| Illiterate | 07 | 7,8% |
| 1st grade incomplete | 38 | 47,2% |
| 1st grade complete | 15 | 16,7% |
| 2nd grade incomplete | 15 | 16,7% |
| 2nd grade complete | 12 | 13,13% |
| 3rd grade | 03 | 3,3% |

### Discussion

The present study found prevalence of anaemia of 12.2% in the elderly studied. These findings are in line with other brazilian studies that involved elderly people enrolled in the FHU, developed by Buffon et al. (2015), Barbosa et al. (2006) and Sousa et al. (2018), who reported rates between 8, 8% and 12.5%. Moreover, when com-

pared to the 10.6% prevalence of anaemia founded by Le (2016) in the developed non-institutionalized civilian population of the United States, the value observed in most of the brazilian studies cited remains higher, which is reaffirmed by the fact that the US study only analyzes individuals over 65 years old, which would tend to raise the prevalence found.

Discordant to the data founded, Falcã et al. (2011), Nakashima et al. (2012) and Silva et al. (2016) studies with elderly residents in long-term institutions reported higher prevalence of anaemia, with results varying between 29.7% and 38.0%. In this context, in a systematic review published by Gaskell et al. (2008) that considered only those with 65 years or more, there was an average prevalence of anaemia of 47% in institutionalized elderly and 40% in those admitted to hospitals. Also, when analyzing elderly hospitalized in wards, the predominance of those with anaemia reaches 84%, according to Muñoz et al. (2016). These data, much higher than the findings in the non-institutionalized senile population, express the

commitment of this vitality when not inserted in its social and family context

From this perspective, in order to analyze the conditioning factors of the life and health situation, REDE (2008) affirms that the level of schooling can be used as an indicator of the socioeconomic status of the population. Several studies correlate a lower level of schooling with a higher prevalence of anaemia in the elderly, among which are Buffon et al. (2015), Muñoz et al. (2016), Costa et al. (2016), Corona et al. (2014), Milagres et al. (2015) and Santos et al. (2012). This fact is observed in the quantitative analysis of the schooling of the sample of the present study, which revealed a higher relative frequency of the elderly with the incomplete 1st grade, which was 55%. In line with what has been put, BUFFON et al (2015) reports a higher prevalence of anaemia in the group of elderly individuals who have until the 1st grade incomplete, being 93.75% of the anemic components of this group.

Anaemia has a negative impact on the health and economics

of individuals, families and nations, reports Quah (2016). According to Mathers et al. (2004), she is responsible for 2% of all years experienced with disability, which represents 68.4 million years, and for 1% of the years of life adjusted for Disability (DALYs). Recent studies published by Culleton et al. (2006), Eisenstaedt et al. (2006), Lucca et al. (2008) and Riva et al. (2009) have related low hemoglobin levels in the elderly population to reduced physical performance, functional dependence and increased mortality from other diseases.

Thus, the association of low serum hemoglobin levels and lower quality of life of the elderly is perceived. That is reaffirmed when Silva et al. (2012) and Zakai et al. (2005) correlate anaemia to the worst nutritional status and when Peters et al. (2008) and Shah et al. (2008) connect it with important cognitive disorders, such as depression, dementia, memory impairment and Alzheimer's disease cited by Shah et al. (2012) and Shah et al. (2011). Those associations interfere in the accomplishment of daily activities and social interaction, shows Chaves et al

(2015) and Lucca et al. (2008). In view of these impacts on the global burden of diseases, especially when in the elderly, it is evident the importance of concentrating resources and mechanisms to reduce the prevalence of anaemia in this population, improving the quality of senile life.

## Conclusions

The present study elucidated the prevalence of anaemia among the elderly participant of the FHS in the city of Mossoró, Rio Grande do Norte, which reached 12.2%. Moreover, the level of schooling was used as an indicator of the socioeconomic status of the population, which revealed a higher relative frequency of the elderly with incomplete 1st grade (55%). These data, coupled with the fact that low serum hemoglobin levels in the elderly have a negative impact on their health and economy, reaffirm the correlation between lower schooling and a higher prevalence of anaemia as well as the importance of concentrating resources and mechanisms to reduce the prevalence of this injury in this

public. At the same time, attention to anaemia in the elderly would help reduce their impact on the global burden of diseases, explained in part by its correlation with poor nutritional status and major cognitive impairments, which are capable of interfering with daily activities and interaction of patients. In this way, the quality of senile life would be improved.

## Acknowledgements

## Conflicts of Interest statement

The authors declares that there is no conflict of interest regarding the publication of this paper.

# References

Barbosa, D.; Arruda, I. & Diniz, A. Prevalência e caracterização da anemia em idosos do Programa de Saúde da Família. Revista Brasileira de Hematologia e Hemoterapia, 28(4):288–292, 2006.

Bassler, T. & Lei, D. Diagnóstico e monitoramento da situação nutricional da população idosa em município da região metropolitana de Curitiba (PR). Revista de Nutricao, 21(3):311–321, 2008.

Benoist, B.; McLean, E.; Egll, I. & Cogswell, M. Worldwide prevalence of anaemia 1993-2005: WHO global database on anaemia. Worldwide Prevalence of Anaemia 1993-2005: WHO Global Database on Anaemia, 7:444–454, 2008.

Buffon, P.; Sgnaolin, V.; Engroff, P.; Viegas, K. & Carli, G. Prevalência e caracterização da anemia em idosos atendidos pela Estratégia Saúde da Família. Revista Brasileira de Geriatria e Gerontologia, 18(2):373–384, 2015.

Chaves, A.; Santos, A.; Alves, M. & Filho, N. Associação entre declínio cognitivo e qualidade de vida de idosos hipertensos. Revista Brasileira de Geriatria e Gerontologia, 18(3):545–556, 2015.

Corona, L.; Duarte, Y.; Lebrão, M. Prevalence of anemia and associated factors in older adults: evidence from the SABE Study. Revista de Saúde Pública, 48(5):723–431, 2014.

Costa, E.; Soares, M. & Oliveira, C. Prevalence and characterization of anemia in elderly assisted in medical center in the interior of Sergipe state. Nutr. clín. diet. hosp., 36(4):65-72, 2016.

Culleton, B.; Manns, B.; Zhang, J.; Tonelli, M.; Klarenbach, S. & Hemmelgarn, B. Impact of anemia on hospitalization and mortality in older adults. Blood, 107(10):3841–3846, 2006.

Eisenstaedt, R.; Penninx, B. & Woodman, R. Anemia in the elderly: Current understanding and emerging concepts. Blood Reviews, 20(4):213–226, 2006.

Falcã, V.; Macedo, O.; Correia, L.; Magalhã, F.; Scoralick, E.; Macêdo, V.; Correia, L.; Scoralick, F.; Piazzolla L.; Macêdo, D. Prevalência de anemia em idosos de instituição de longa permanência em Brasília/DF. Geriatrics, Gerontology and Aging,

5(4):214–219, 2011.

Folstein, M. & Folstein, S. A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res, 12:189–198, 1975.

Gaskell, H.; Derry, S.; Moore, R. & McQuay, H. Prevalence of anaemia in older persons: Systematic review. BMC Geriatrics, 8(1):1, 2008.

IBGE. Censo Demográfico 2010.Rio de Janeiro,2011.

Le, C. The prevalence of anemia and moderate-severe anemia in the US population (NHANES 2003-2012). PLoS ONE, 11(11):e0166635, 2016.

Lucca, U.; Tettamanti, M.; Mosconi, P.; Apolone, G.; Gandini, F.; Nobili, A.; Tallone, M.; Detoma, P.; Giacomin, A.; Clerico, M.; Tempia, P.; Guala, A.; Fasolo, G. & Riva, E. Association of mild anemia with cognitive, functional, mood and quality of life outcomes in the elderly: The "health and anemia" study. PLoS ONE, 3(4): e1920, 2008.

Mathers, C.; Bernard, C.; Iburg, K.; Noue, M.; Fat, D; Shibuya, K.; Stein, C.; Tomijima, N.; Xu, H. Global Burden of Disease: data sources, methods and results. Survey, 54: -----, 2004.

Milagres, C.; Moraes, K.; Franceschini, S.; Sant'Ana, L.; Lima, L.; Ribeiro, A. Prevalência e fatores associados à presença de anemia em idosos do município de Viçosa (MG), Brasil. Ciência & Saúde Coletiva, 20(12):3733–3741, 2015.

Muñoz, R.; Sousa, G.; Lucena, G.; Grigório, M. & Etto, L. Prevalência de anemia em idosos internados em enfermarias gerais de um hospital universitário. Revista Brasileira de Ciências Do Envelhecimento Humano, 13(1):25-34, 2016.

Nakashima, A.; Moraes, A.; Auler, F. & Peralta, R. Anemia prevalence and its determinants in Brazilian institutionalized elderly. Nutrition, 28(6):640–643, 2012.

Peters, R.; Burch, L.; Warner, J.; Beckett, N.; Poulter, R. & Bulpitt, C. Haemoglobin, anaemia, dementia and cognitive decline in the elderly, a systematic review. BMC Geriatrics, 8(12): 18, 2008.

Quah, S. International encyclopedia of public health. 2nd ed. New York, Elsevier, 2016.

REDE Interagencial de Informação para a Saúde. Indicadores Básicos para a Saúde

no Brasil: Conceitos e Aplicações. 2nd ed. Brasília, Organização Pan-Americana da Saúde, 2008.

Riva, E.; Tettamanti, M.; Mosconi, P.; Apolone, G.; Gandini, F.; Nobili, A.; Tallone, M.; Detoma, P.; Giacomin, A.; Clerico, M.; Tempia, P.; Guala, A.; Fasolo, G. & Lucca, U. Association of mild anemia with hospitalization and mortality in the elderly: The Health and Anemia population-based study. Haematologica, 94(1):22–28, 2009.

Santos, I.; Scazufca, M.; Lotufo, P.; Menezes, P. & Benseñor, I. Anemia and dementia among the elderly: the São Paulo Ageing &amp; Health Study. International Psychogeriatrics, 24(1):74–81, 2012.

Schaan, M.; Schwanke, C.; Bauer, M.; Luz, C. & Cruz, I. Hematological and nutritional parameters in apparently healthy elderly individuals. Revista Brasileira de Hematologia e Hemoterapia, 29(2):136–143, 2007.

Shah, R.; Buchman, A.; Wilson, R.; Leurgans, S. & Bennett, D. Hemoglobin level in older persons and incident Alzheimer disease prospective cohort analysis. Neurology, 77(3):219–226, 2011.

Shah, R.; Schneider, J.; Leurgans, S. & Bennett, D. Association of lower hemoglobin level and neuropathology in community-dwelling older persons. Journal of Alzheimer's Disease. 32(3):579-86, 2012.

Shah, R.; Wilson, R.; Tang, Y.; Dong, X.; Murray, A.; Bennett D. Relation of hemoglobin to level of cognitive function in older persons. Neuroepidemiology, 32(1):40–46, 2008.

Silva, C.; Lima-Costa, M.; Firmo, J. & Peixoto, S. Nível de hemoglobina entre idosos e sua associação com indicadores do estado nutricional e uso de serviços de saúde: Projeto Bambuí. Cadernos de Saúde Pública, 28(11):2085–2094, 2012.

Silva, C.; Lima-Costa, M.; Firmo, J. & Peixoto, S. Anemia e nível de hemoglobina como fatores prognósticos da mortalidade entre idosos residentes na comunidade: evidências da Coorte de Idosos de Bambuí, Minas Gerais, Brasil. Cadernos de Saúde Pública, 29(11):2241–2250, 2014.

Silva, E.; Roriz, A.; Eickemberg, M.; Mello, A.; Côrtes, E.; Feitosa, C.; Medeiros, J. & Ramos, L. Factors associated with anemia in the institutionalized elderly. PLoS ONE, 11(9):e0162240, 2016.

Sousa, N.; Menezes, T.; Silva, N.; Eulálio, M. & Paiva, A. Prevalência de anemia e correlação da concentração de hemoglobina com fatores cognitivos em idosos. Ciência & Saúde Coletiva, 23(3):935–944, 2018.

Toral, N.; Gubert, M.; Schmitz, B. Perfil da alimentação oferecida em instituições geriátricas do Distrito Federal Profile of the food offered in the elderly homes of Distrito Federal. Revista de Nutrição, 19(1):29–37, 2006.

Vasconcelos, A. & Gomes, M. Transição demográfica: a experiência brasileira. Epidemiologia e Serviços de Saúde, 21(4):539–548, 2012.

World Health Organization. Nutritional Anaemias: report of a WHO scientific group [meeting held in Geneva from 13 to 17 March 1967]. X ed. Geneva, 1968

Zakai, N.; Katz, R.; Hirsch, C.; Shlipak, M.; Chaves, P., Newman, A. & Cushman, M. A prospective study of anemia status, hemoglobin concentration, and mortality in an elderly cohort: The cardiovascular health study. Archives of Internal Medicine, 165(19):2214–2220, 2005.