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## Prevalence of dementia among brazilian population: systematic review

### *Revisão sistemática sobre prevalência de demência entre a população brasileira*

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**ABSTRACT:** As the elderly population increases worldwide, the age-related diseases, particularly dementia, become more frequent. Knowing that Brazil follows the global trend of aging, it should also present an increasing prevalence of dementia. *Objectives:* the aims of this study are to review the articles of prevalence of dementia in Brazil in recent years, establish comparisons between the studies and identify associations between the dementia prevalence and the population characteristics. *Data sources:* SciELO, Lilacs and Medline. *Methods:* retrieving from original articles about epidemiological studies on prevalence of dementia among Brazilian population samples using specific keywords, exclusion of duplicates, screening, full text assessment and characterization of the selected studies' population samples. *Results:* from the 357 articles retrieved, only 8 remained after the assessment. The prevalence found in the selected articles ranged from 5.1% to 17.5%. *Discussion:* despite the good quality of the articles, the small number of selected studies essentially conducted in the southeast region of Brazil is insufficient for an epidemiological characterization of the Brazilian population as a whole. Alzheimer's disease subtype is shown to be the leading cause of dementia and an association between dementia and age is demonstrated, as well as schooling. *Conclusion:* more studies from other regions of Brazil are necessary to better evaluate the prevalence of dementia and to investigate the more important factors associated with this disease.

**Keywords:** Epidemiology; Prevalence; Dementia/epidemiology; Brazil/epidemiology.

**RESUMO:** À medida que a população idosa aumenta no mundo, as doenças relacionadas ao envelhecimento, particularmente a demência, tornam-se mais frequentes. Tendo em vista que o Brasil segue essa tendência global do envelhecimento populacional, deve apresentar, também, aumento da prevalência de demência em sua população. *Objetivos:* os objetivos desse estudo são revisar artigos sobre prevalência de demência no Brasil nos últimos anos, estabelecer comparações entre os estudos e identificar associações entre a prevalência de demência e características populacionais. *Bases de dados:* SciELO, Lilacs e Medline. *Métodos:* pesquisa por artigos originais sobre estudos epidemiológicos de prevalência de demência em amostras populacionais brasileiras, usando específicas palavras-chaves nas bases de dados com três fases de seleção final dos artigos e caracterização daqueles selecionados. *Resultados:* dos 357 artigos encontrados, apenas 8 foram selecionados após a avaliação. A prevalência encontrada nos artigos variou de 5,1% a 17,5%. *Discussão:* apesar da boa qualidade dos artigos, o pequeno número deles é insuficiente para caracterizar a população brasileira. A doença de Alzheimer é a causa de demência que lidera em número de casos e a associação entre demência e idade é demonstrada, assim como escolaridade. *Conclusão:* são necessários mais estudos de outras regiões do Brasil para avaliar e comparar a população brasileira com outras populações.

**Descritores:** Epidemiologia; Prevalência; Demência/epidemiologia; Brasil/epidemiologia.

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## INTRODUCTION

Since the early 20th century, the world has been undergoing an accelerated process of demographic transition, with a reduction in birth rates and an increase in life expectancy. In Brazil it has not been different<sup>1</sup>. While fertility has fallen around 50% between 1970 and 2000, the elderly population has increased from 5.1% to 8.6% over the same period. In addition, the average annual growth rates of the elderly have been the highest among the age groups, reaching values greater than 3%. It is estimated that in 2045, the elderly population will have passed the child population<sup>2</sup>. Given this situation, it is expected that the epidemiological profile of Brazil will also suffer major changes, with increased occurrence of age-related diseases.

Dementia is one of the main diseases of age, counting in 2010 with more than 35 million cases worldwide. For being a debilitating disease, the impact to the individual and his family is very strong, both in emotional terms, as economic. It is estimated that the world spent on dementia was 604 billion dollars in 2010, which only tends to grow in the coming years, since the number of cases will triple by 2050<sup>3</sup>. This is especially important in the Brazilian context, because, as Brazil has followed the global trend of aging, it should also follow the trend of dementia cases, which will require greater government attention and better trained health professionals.

The aims of this study are:

1. to find and select original articles about prevalence of dementia among Brazilian population published between 2000 and 2014 on online databases;
2. to analyze the data from the articles and compare the results with studies from other countries;
3. to analyze the associated factors found in the studies of dementia prevalence.

## METHODS

### Survey and Selection

Search was done in January 2015 for original articles published between January 2000 and December 2014 that present epidemiological studies on the prevalence of dementia among samples of the Brazilian population. The search occurred on electronic databases, including SciELO (Scientific Electronic Library Online), LILACS (Literatura Latino-Americana e do Caribe em Ciências da

Saúde) and MEDLINE (Medical Literature Analysis and Retrieval System Online), using the following keywords: “epidemiology” (used only in LILACS), “prevalence”, “dementia” and “Brazil”.

To analyze the results from databases we followed three steps:

1. Exclusion of duplicates;
2. Reading of the title, year of publication and abstract (screening);
3. A full text assessment.

Reviews, editorials and articles out of the established period, studies with non community-based samples and articles whose main objective was not the investigation of dementia were excluded. The languages accepted were English and Portuguese. Two independent examiners made the selection on MEDLINE database (M.S.B. and F.S.S.). Furthermore, the examiners screened the references of other systematic reviews to find any other studies that were not found in databases.

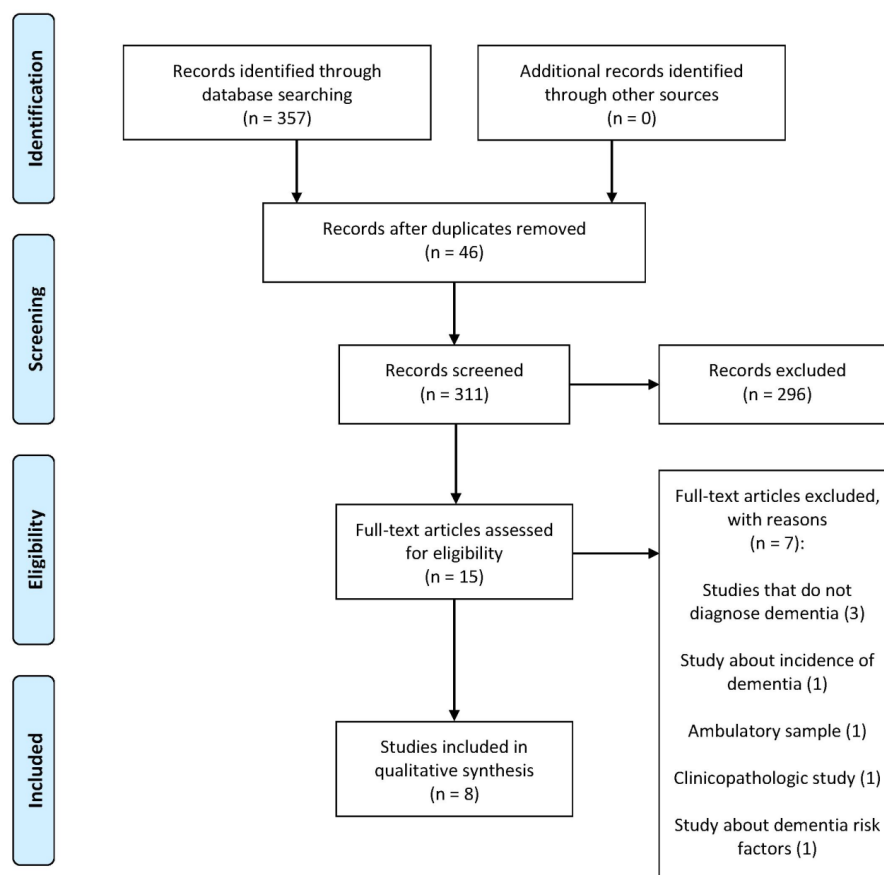
### Characterization and description

The following variables were included in the qualitative analysis: author, year of publication, city, sample, age of studied population, prevalence of dementia, diagnostic instruments, sample data available and evaluation of dementia (subtypes and severity). Furthermore, a brief summary of each study was made and compiled with the most important information about methods and results.

## RESULTS AND DISCUSSION

### Articles findings and selection

A total of 357 references were found (17 from SciELO, 58 from Lilacs and 282 from Medline): 46 references were excluded for being duplicated (1<sup>o</sup> step); 311 were evaluated by title, period, abstract and type of article (screening) and 256 were excluded (2<sup>o</sup> step), resulting in 15 articles, which were fully read. From the full-text assessment (3<sup>o</sup> step), 7 articles were excluded (3 studies about cognitive and functional impairment that do not diagnose dementia<sup>4-6</sup>, 1 study with ambulatory sample<sup>7</sup>, 1 clinicopathologic study<sup>8</sup>, 1 study about dementia risk factors<sup>9</sup> and 1 study about incidence of dementia<sup>10</sup>). No additional papers were identified from others references and just 8 articles remained after full reading, then going for qualitative analysis (Figure 1).



**Figure 1.** Flow of information through the different phases of the systematic review

## Characterization

The studies have, in general, a similar characteristic regarding the methods (design) and sample analyzed. The populations were studied in three different decades (1990, 2000 and 2010). From the eight articles, seven were from southeast region of Brazil, more specifically from the states of São Paulo and Rio de Janeiro, whereas only one study was made in Mato Grosso do Sul. In all selected articles, population samples have more than 60 years and half of them included a large number of participants (over 1000). Demographic characteristics of population such as age group, gender, schooling, skin color, social class, marital status, income and birth area are present in the articles. Regarding the methods used, basically, the studies applied the CAMDEX and DSM-IV criteria for diagnostic of dementia, evaluating, mainly, the subtypes (Alzheimer disease and vascular dementia). In this review, we found prevalence values ranging from 5.1% to 17.5%. These basic characteristics of the studies are presented in the Table 1.

## Description of studies

Bottino et al.<sup>15</sup>: study conducted in São Paulo city, with sample of 1563 subjects aged 60 years old or more.

The community sample was randomly selected from three districts with different social class. This two-phase survey was conducted in the 2000 decade. The first phase screened the subjects with MMSE, FOME, IQCODE and B-ADL instruments. The second phase diagnosed the subjects according to the CAMDEX and DSM-IV criteria. The prevalence found was 6.8%, but it rose to 12.9% when adjusted to the study design. The subtypes of dementia were evaluated. Aging and schooling were reported as associated factors for dementia.

Lopes et al.<sup>16</sup>: study conducted in Ribeirão Preto city, with sample of 1145 subjects aged 60 years old or more. The design of the sample selection and the analysis (screening and diagnosis criteria) were the same applied in Bottino et al., 2008. The two-phase survey was conducted in the 2000 decade. The prevalence found was 5.9% and, when adjusted, rose to 12.5%. The study evaluated dementia subtypes and found association of dementia with aging and schooling.

Correa et al.<sup>17</sup>: study conducted in Rio de Janeiro city, with sample of 683 subjects aged 67 years old or more, clients of a private health plan. A two-phase survey was done in the 2010 decade. The screening phase applied the MMSE and FAQ questionnaires and the diagnosis of dementia was made following the DSM-IV criteria. The

prevalence found was 16.9%. The study evaluated subtypes of dementia and showed an association with ageing and schooling, with the prevalence ratio (raw and adjusted).

Scafuza et al.<sup>18</sup>: study conducted in São Paulo city, designed with only one phase that assessed 2072 subjects

aged 65 years old or more. The evaluation of dementia was made by the 10/66 Dementia Re-search Group protocol in the 2000 decade. The prevalence found was 5.1%. Ageing, schooling and income were associated to dementia. Dementia subtypes were evaluated.

**Table 1.** Data of the included studies

Author	Year	City	Sample	Age	Prevalence <sup>1</sup>	Diagnostic instruments	Sample data	Evaluation of dementia
Bottino et al.	2008	São Paulo, SP	1563	≥60	107 (6.8%)	z x	a b c d e	subtypes
Correa et al.	2013	Rio de Janeiro, RJ	683	≥65	115 (16.9%)	x	a b c f g	subtypes
Cesar et al.	2014	Tremembé, SP	630	≥60	110 (17.5%)	Individual analysis	a b c e	-
Herrera et al.	2002	Catanduva, SP	1656	≥65	118 (7.1%)	x w	a b c d e	subtypes, severity
Scazufca et al.	2008	São Paulo, SP	2072	≥65	105 (5.1%)	x	a b c f g h	subtypes
Lopes et al.	2012	Ribeirão Preto, SP	1145	≥60	68 (5.9%)	z x	a b c e g	subtypes
Meguro et al.	2001	São Paulo metropolitan area	166	≥65	13 (7.8%)	x	b c	subtypes, severity
Yamada et al.	2002	Campo Grande, MS	157	≥70	19 (12.1%)	y	c	subtypes

**Legend:** Sample data: (a) gender, (b) schooling, (c) age group, (d) skin color, (e) social class, (f) income, (g) marital status and (h) birth area. Diagnostic instruments: (z) "Cambridge Mental Disorders of the Elderly Examination" (CAMDEX)<sup>10</sup>, (y) "Diagnostic and statistical manual of mental disorders, 3rd ed. rev" (DSM-III-R)<sup>11</sup>, (x) "Diagnostic and statistical manual of mental disorders, 4th ed." (DSM-IV)<sup>12</sup> and (w) "Clinical Dementia Rating" (CDR)<sup>13</sup>. <sup>1</sup>Prevalence in number of cases and percentage.

Herrera et al.<sup>19</sup>: study conducted in Catanduva city with 1656 subjects aged 65 years old or more that was randomly selected. The screening phase applied MMSE and PFAQ questionnaires and the diagnostic phase followed the DSM-IV criteria. The sample was assessed in 1990 decade. The prevalence found was 7.1%, evaluating subtypes. Ageing, schooling and female gender were associated with dementia.

Meguro et al.<sup>20</sup>: study conducted with 192 Japanese immigrants aged 65 years or more in the São Paulo metropolitan area. The diagnosis was made following DSM-IV criteria and the severity was assessed by CDR scale. The prevalence found was 7.8%. The very older subjects and, in contradiction, the high level of education showed more elevated rates of dementia.

Yamada et al.<sup>21</sup>: study conducted in Campo Grande city with 157 subjects from a Japanese-Brazilian community. The subjects are 70 years old or more. The two-phase survey was made in 2000 decade. The phase of screening applied MMSE and the diagnosis was made following DSM-III-R criteria. The subtypes were evaluated.

César et al.<sup>22</sup>: study conducted in Tremembé city,

with 630 subjects aged 60 years or more, in 2010 decade. The subjects were assessed by clinic, neurologic and psychiatric evaluation and questionnaires were applied. The prevalence found was 17.5%, with association of ageing and schooling.

The studies selected have a good quality, so it is possible to make comparisons between them. Otherwise, there are studies only from two regions, and the Brazilian population is not widely analyzed. Only the population of the São Paulo state is reasonably studied. This scenario is the same of other developing countries, like China, India, Egypt, South Africa, and the countries from Latin America and Caribe, which have insufficient epidemiological studies to characterize their population<sup>23</sup>.

### Prevalence of dementia

In Table 2, the prevalence of dementia among population aged 65 years or more is showed by age group in some studies. The mean prevalence among these studies is 11.15%. In 2001, the prevalence estimates for Latin America was 4.6%<sup>23</sup>, and, to 2013, this estimate almost

doubled to 8.5%<sup>3</sup>, following the trend of developing countries (increasing elderly population and the prevalence of dementia). Despite of the higher prevalence found in Brazilian population, the rates are similar to other Latin America and Caribbean (LAC) studies. In Chile, the rate found is 7.0%<sup>24</sup>, in Argentina, 8.3%<sup>25</sup>, in Mexico, 8.5 to 8.6%, in Cuba 10.8% and in Peru, 6.5 to 9.3%<sup>26</sup>.

The prevalence rates found in the Brazilian studies have a wide interval between than (5.1% to 17.1%) and the mean prevalence of the Brazilian studies shows much higher prevalence rates than other regions of the world<sup>27</sup>, as the LAC rates, that can possibly be explained by sample characteristics (mean age, income, race etc.) and difference in the studies design and methods<sup>28</sup>.

**Table 2.** Absolute number of individuals with dementia in each age group

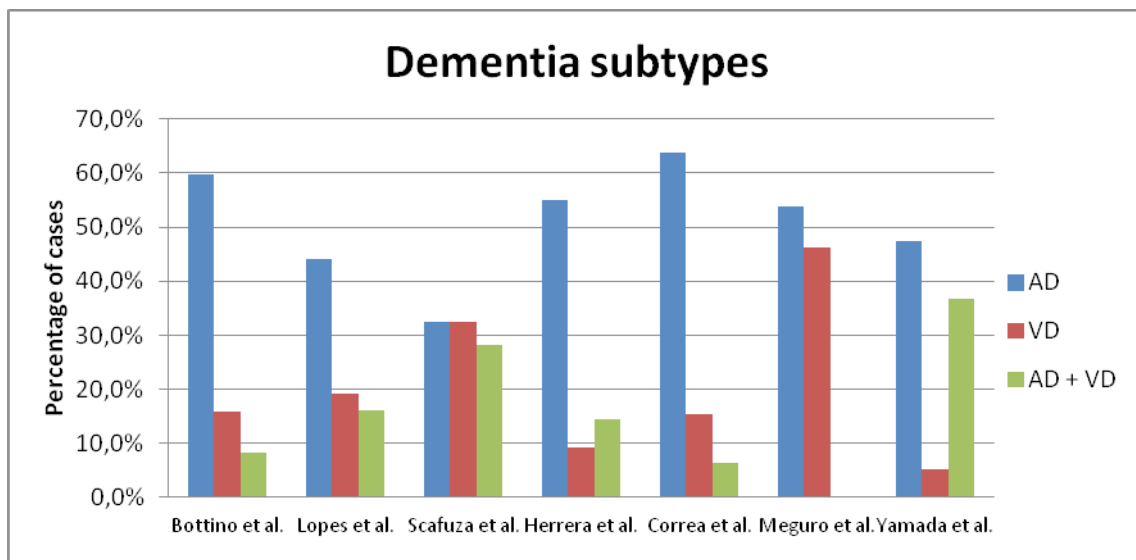
	Bottino et al.		Correa et al.		Cesar et al.		Herrera et al.		Scazufca et al.		Lopes et al.	
	n	d	n	d	n	d	n	d	n	d	n	d
Age groups												
65-69	320	13	79	3	152	16	614	10	889	20	267	6
70-74	311	22	163	8	117	18	470	15	556	11	238	15
75-79	252	24	158	14	101	27	266	21	346	27	156	15
80-84	128	17	154	27	63	19	198	30	169	23	84	13
≥85	98	22	129	63	45	22	108	42	112	24	44	13
Total	1109	98	683	115	478	102	1656	118	2072	105	789	62
Prevalence	8.8%		16.9%		21.3%		7.1%		5.1%		7.8%	

Legend: n) sample and (d) cases with dementia.

**Dementia subtypes**

Regard the evaluation of dementia, most of the studies evaluate three dementia subtypes: Alzheimer’s disease (AD), vascular dementia (VD) and mixed dementia (AD + VD). The rate between the subtypes prevalence is

very different between the studies, but all show AD as the most frequent cause of dementia. A great number of studies and reviews present AD with the most prevalent dementia subtype, despite of the variability of the rates worldwide<sup>27-29</sup>. Brazilian people trends to get higher prevalence of AD, like developed countries.



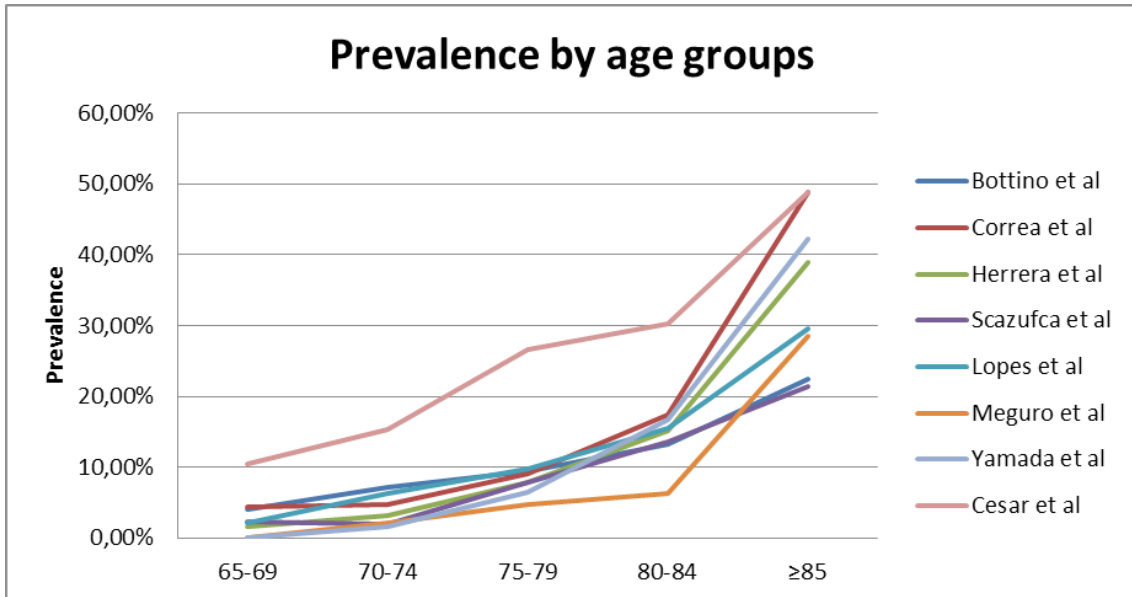
Legend: AD: Alzheimer disease; VD: vascular dementia; AD + VD: mixed dementia.

**Figure 2.** Proportion of the dementia subtypes diagnosed in each study

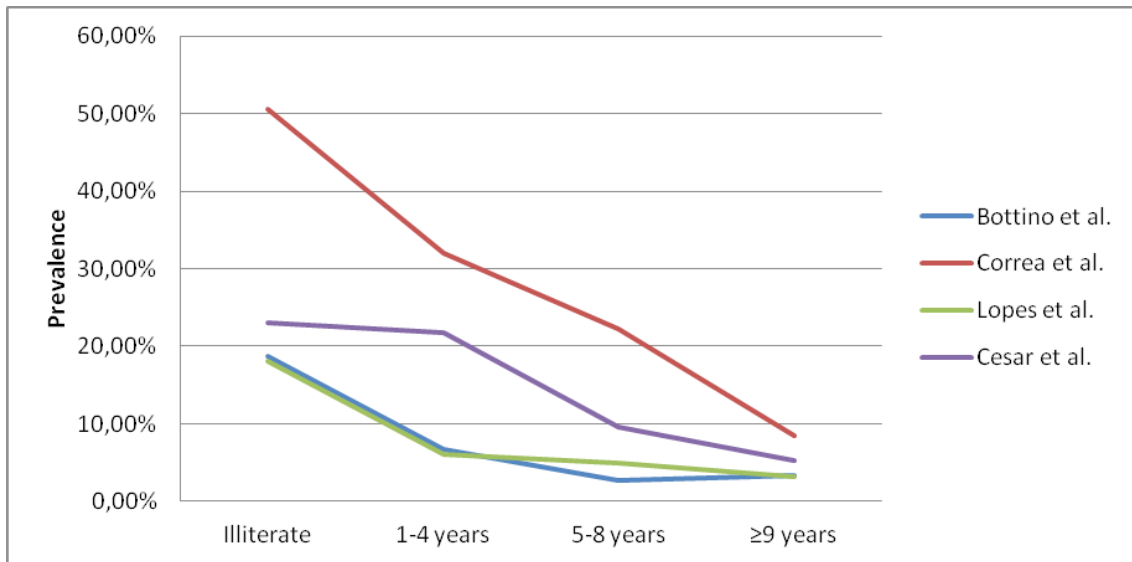
**Associated factors**

Association between dementia and age was demonstrated in all studies; as well as schooling (not analyzed in Yamada et al.<sup>21</sup>). In Figure 3, the prevalence variation regarding the age groups shows a gradient that

is more significant above 80 years old. Figure 4, also, shows a gradient with schooling and a higher prevalence among illiterates. Aging and illiteracy are well correlated with dementia among several studies in developed and developing countries and presents as the most important associated factor to cognitive impairment<sup>24,30</sup>.



**Figure 3.** Prevalence of dementia by age groups



**Figure 4.** Prevalence by schooling

Association with gender is positive in some studies, but negative in others, so it is not possible to establish gender as an associated factor to dementia by this or other prevalence of dementia reviews<sup>27</sup>. Sociocultural factors for women, that, in general, has higher life expectancy and less years of education can explain the

association found in some studies<sup>27,29</sup>. The strength of association is assessed by effect measures like odds ratio and prevalence ratio to some of the sample data. As Table 3 shows, the strength of association is significant (CI higher than 1) to age groups older than 80 years and the illiterates in part of the studies.



**Table 3.** Strength of association between age/schooling and dementia

Odds Ratio (95% CI)	Bottino et al.	Lopes et al.	Scafuza et al.	Correa et al.
Age groups				
<b>60-64 years</b>	1.00	1.00		
<b>65-69 years</b>	1.62 (0.69-3.84)	0.5 (0.13-1.87)	1.00	1.00
<b>70-74 years</b>	2.61 (1.25-5.45)	2.29 (0.74-7.12)	0.88 (0.42-1.84)	1.07 (0.29-3.87)
<b>75-79 years</b>	4.19 (1.99-8.81)	2.64 (0.80-8.66)	3.68 (2.03-6.65)	2.03 (0.61-6.81)
<b>80-84 years</b>	6.74 (2.94-15.46)	6.73 (2.14-21.13)	6.84 (3.66-12.78)	3.93 (1.24-12.43)
<b>85-89 years</b>	7.51 (2.89-19.50)	7.92 (1.47-37.31)		9.17 (2.96-28.45)
<b>≥90 years</b>	34.93 (11.42-106.85)	29.91 (7.12-125.53)		13.89 (4.51-42.74)
Schooling				
<b>Illiterate</b>	5.33 (2.08-13.68)	3.94 (1.23-12.60)		6.48 (3.44-12.21)
<b>1-4 years</b>	2.23 (0.92-5.44)	1.67 (0.61-4.54)		4.09 (2.34-7.18)
<b>5-8 years</b>	0.97 (0.32-2.91)	1.98 (0.55-7.01)		2.84 (1.59-5.09)
<b>9-11 years</b>	1.42 (0.46-4.38)	1.36 (0.38-5.04)		
<b>≥12 years</b>	1.00	1.00		1.00

## CONCLUSION

The studies shows a large variation in prevalence rates (range of raw rates: 5.1% to 17.5%). The difference between the rates can be justified by: the difference between population (regarding area and period of studies), the sample number and the methods applied (one phase or two phase; screening and diagnostic instruments).

The majority of studies selected were from the Southeast region, what shows a lack of cross-sectional

studies in the others regions from Brazil. Thus, this revision does not represent the real situation of the Brazilian elderly population, but is very important considering the state of São Paulo.

More studies from other regions from Brazil are necessary to assess their elderly population and compare with other countries. Future studies must investigate other associated factors, a better characterization of the sample and designs that can allow better dementia prevalence estimates.

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