Archives of Gerontology and Geriatrics 60 (2015) 334–343

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Influence of socio-demographic features and apolipoprotein E epsilon 4 expression on the prevalence of dementia and cognitive impairment in a population of 70–74-year olds: The InveCe.Ab study

Antonio Guaita [a,*], Roberta Vaccaro [a,b], Annalisa Davin [a], Mauro Colombo [a,b], Silvia Francesca Vitali [a,b], Letizia Polito [a], Simona Abbondanza [a], Eleonora Valle [a,b], Gianluigi Forloni [c], Virginia Valeria Ferretti [d], Simona Villani [d]

[a] Golgi Cenci Foundation, Corso San Martino 10, 20081 Abbiategrasso, Italy
[b] "C.Golgi" Geriatric Institute, Piazza Golgi 11, 20081 Abbiategrasso, Italy
[c] "Mario Negri" Institute for Pharmacological Research, Via La Masa 19, 20156 Milan, Italy
[d] Unit of Biostatistics and Clinical Epidemiology, Department of Public Health, Experimental and Forensic Medicine – University of Pavia, Via Forlanini 2, 27100 Pavia, Italy

ARTICLE INFO

Article history:
Received 5 June 2014
Received in revised form 14 November 2014
Accepted 18 November 2014
Available online 25 November 2014

Keywords:
Dementia
Alzheimer's disease
Risk factors
Prevalence
Cognitive impairment
ApoE-ε4

ABSTRACT

The age-specific prevalence rates of dementia vary widely. Studies focusing on specific age groups are needed to provide reliable estimates for healthcare providers and policy makers.

We estimated the prevalence of dementia, dementia subtypes and cognitive impairment in "InveCe.Ab" (ClinicalTrials.gov, NCT01345110), a single-step multidimensional population-based study of 70–74-year olds living in Abbiategrasso (Milan, Italy). We also looked for associations with socio-demographic factors and the presence of the apolipoprotein E-ε4 allele.

The overall dementia prevalence was 3% (95%CI: 2.1–4.1%) [Alzheimer's disease (AD): 1.2% (95%CI 0.6–1.9%); vascular dementia (VD): 1.4% (95%CI: 0.8–2.2%)]. Being single was found to be a risk factor for vascular dementia; subjects born in southern Italy were shown to be at greater risk both of overall dementia and of vascular dementia. The prevalence of cognitive impairment, with or without subjective cognitive complaints (cognitive impairment, no dementia, CIND) was 7.8% (95%CI: 6.4–9.4%). As regards the CIND subgroups, the prevalence of subjects with subjective cognitive complaints (mild cognitive impairment, MCI) was 5.0% (95%CI 3.9–6.3%), while the prevalence of those without MCI (CIND-other) was 2.8% (95%CI: 1.9–3.8). The males had a higher risk of MCI and CIND-other; the older subjects were more likely to have MCI, and those born in north-eastern Italy to have CIND-other. The prevalence of AD was higher among the apolipoprotein E-ε4 carriers.

Our data highlight the importance of dementia and cognitive impairment in the transitional period from adulthood to old age, and reveal the presence of different associations with socio-demographic and genetic factors.

Abbreviations: MCI, mild cognitive impairment; CIND, cognitive impairment, no dementia; ApoE-ε4, apolipoprotein E- ε4; AD, Alzheimer's disease; VD, vascular dementia; DLB, dementia with Lewy bodies; FTD, frontotemporal dementia; DSM-IV-TR, Italian version of the Diagnostic and Statistical Manual of Mental Disorders IV; NINCDS/ADRDA, National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association; NINDS-AIREN, National Institute of Neurological Disorders and Stroke and Association Internationale pour la Recherché et l'Enseignement en Neurosciences; MMSE, mini-mental state examination; ISTAT, Italian National Institute of Statistics; MD, mixed dementia; PDD, Parkinson's disease dementia; Crude Prev., crude prevalence; Adj. Prev., adjusted prevalence; 95%CI, 95% confidence interval; OR, odds ratio.

* Corresponding author. Tel.: +39 029466409; fax: +39 0294608148.
E-mail address: a.guaita@golgicenci.it (A. Guaita).

http://dx.doi.org/10.1016/j.archger.2014.11.006

1. Introduction

Dementia and cognitive impairment are among the leading causes of disability and dependence in the elderly and they constitute a major economic burden for public health systems (Gustavsson et al., 2011; Wimo, Jönsson, Bond, Prince, & Winblad, 2013).

In an aging population, reliable estimates of the prevalence of dementia and cognitive impairment are needed in order to guarantee efficient healthcare and social welfare policymaking, planning and resource allocation. Furthermore, identifying modifiable risk factors and diagnosing patients earlier could lead to more efficient screening and care and therefore lower health costs (Prince et al., 2013).

The prevalence of dementia worldwide shows slight variations, generally ranging between 5% and 7% (e.g. 5.57% in Asia and 6.92% in Western Europe) (Prince et al., 2013), which is in line with the 5.9–6.5% reported in the most of Italian prevalence studies in the over 60s (De Ronchi et al., 2005) and over 65s (Ravaglia et al., 2002; Tognoni et al., 2005). However, comparison of age-specific rates reported in the literature reveals marked differences between Italy and other countries. In Western Europe the prevalence of dementia in 70–74-year-olds has been found to be 4.3% (Prince et al., 2013), but in most of the Italian studies it was considerably lower: 1.4% (Tognoni et al., 2005), 1.6% (Cristina et al., 2001) and 1.8% (Ravaglia et al., 2002).

Cognitive impairment has been variously defined, but the most commonly used definitions are "cognitive impairment, no dementia" (CIND) and "mild cognitive impairment" (MCI). The broad definition of CIND includes demonstration of an objective cognitive impairment and excludes dementia (Chertkow et al., 2008), while MCI is defined by the presence of a subjective cognitive complaint and an objective demonstration of cognitive deficit in the absence of dementia and of dependence in activities of daily living (Petersen, 2004). Thus, providing the term is correctly applied, MCI can be considered a subgroup of CIND.

The prevalence of cognitive impairment, either CIND or MCI, reported in epidemiological studies varies considerably: in one systematic review, the prevalence of MCI ranged between 3% and 42% while that of CIND ranged between 5.1% and 35.9% (Ward et al., 2012). In Italian studies the prevalence of MCI in the over sixties ranged between 3.2% and 7.7%, and in 70–74-year-olds between 0% and 5.6% (Ravaglia et al., 2008; Solfrizzi et al., 2004); CIND had a prevalence of between 5.1% and 9.5% (De Ronchi et al., 2005; Di Carlo et al., 2007), with a rate of 4.2% recorded in 70–74-year olds (Di Carlo et al., 2007).

This heterogeneity in prevalence estimates is probably due to the use of different diagnostic tools and criteria, both for dementia and for cognitive impairment, different study designs and small sample sizes.

Although these limitations could be overcome by large multicentre studies, such studies can be difficult to implement for various reasons: difficulties conducting surveys across different centers, the risk of introducing diagnostic and information biases, and different prevalence rates between geographical areas. Single-center population studies would avoid these issues, providing the population studied was, as far as possible, homogeneous for age and residence (Launer, 2011; Misiak, Cialkowska-Kuzminska, Frydecka, Chladzinska-Kiejna, & Kiejna, 2013).

Aging is one of the main factors influencing prevalence estimates of dementia and MCI (DeCarli, 2003). Studies in the elderly generally focus on the over 65s, although single-age cohort studies often concentrate on70-year-olds (Persson, 1980; Sacuiu et al., 2010; Takata et al., 2012). Since people are now living longer and enjoying better health, with declining rates of disability, it has recently been suggested that the threshold age for studies in the elderly should be raised to 70–74 years (Waidmann & Liu, 2000). This five-year span may be considered a "transitional age" between late adulthood and old age, and a particularly useful period for the identification of risk factors for late-onset cognitive impairment and dementia (Andrieu et al., 2011).

Indeed, with reference to the life course conceptual model of epidemiology, these five years, while not "critical", could constitute a "sensitive" period for cognitive changes (Ben-Shlomo & Kuh, 2002). By profiling the status of 70–74-year olds, it could prove possible to identify factors potentially influencing successful or unsuccessful cognitive aging as people approach their eighties. Many risk factors for dementia and cognitive impairment that have been identified in this age range (such as education) indicate the need for preventive interventions at an earlier age. However, from the perspective of age-specific preventive intervention in dementia, they also provide pointers for planning interventions, mainly geared at enhancing protective factors like social activities or diet, that specifically target this age group (Fratiglioni, et al., 2004).

The influence of socio-demographic factors on dementia and cognitive impairment has been investigated in several studies, but the results are not univocal, and in some cases are even conflicting. This is true of data on widely studied factors such as education and occupation (Andel et al., 2007; Bonaiuto et al., 1995; Bosma et al., 2003; Helmer et al., 2001; Karp et al., 2004; Kröger et al., 2008; Marengoni, Fratiglioni, Bandinelli, & Ferrucci, 2011; Meng & D'Arcy, 2012; Ravaglia et al., 2002) and gender (Andersen et al., 1999; Katz et al., 2012). Interpreting these results can be difficult given that these factors may act differently at different ages (Schoenmaker & Van Gool, 2004). In previous studies, a gender difference in the prevalence both of dementia (Katz et al., 2012) and of cognitive impairment (Petersen et al., 2010; Ravaglia et al., 2002; Sharp & Gatz, 2011) was found only in the oldest subjects investigated. Due to the rapid technological advances of recent decades, it is possible that members of the youngest and oldest sections of the elderly population, despite having done the same job, had very different working experiences in terms of physical effort and mental engagement – two aspects that can influence the risk of developing dementia and cognitive impairment in old age (Andel et al., 2005, 2007; Bosma et al., 2003; Kröger et al., 2008; Smyth et al., 2004). Thus, consideration of a narrow age band, despite the unavoidable limitations of this approach, may allow better analysis (in the age class considered at least) of the association of these variables with dementia and cognitive impairment. Other socio-demographic factors, such as marital status (Håkansson et al., 2009) and place of birth, have rarely been considered. The latter could be a particularly interesting aspect to study in Italy, given the large number of people who migrated from all over Italy to the north-western part of the country after the Second World War. Several studies have highlighted a role, in dementia, of genetic risk factors; one of these is the presence of the apolipoprotein E-ε4(ApoE- ε4) allele (Sadigh-Eteghad, Talebi, & Farhoudi, 2012; Saunders et al., 1993). A relationship exists between ApoE and age: indeed, because the ApoE- ε4 allele is associated with increased mortality, coronary disease, atherosclerosis, the frequency of ApoE-ε4 homozygosity has been shown to decline with increasing age (McKay et al., 2011).

The heterogeneity in prevalence estimates of dementia and cognitive impairment is also due to the large number of studies that used a two-step methodology i.e. that adopted a screening test of global cognition to select subjects suitable for further in-depth neuropsychological and medical evaluation. The literature contains powerful arguments for one-step over two-step designs (McNamee, 2003; Prince, 2003). There is currently a need for well-designed, single-step, multidimensional, population-based studies involving homogeneous cohorts of people in order to provide