

Prevalence of dementia in the oldest old: The Monzino 80-plus population based study

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Abstract

Background: Epidemiological studies commonly include too few of the oldest old to provide accurate prevalence rates of dementia in older age groups. Estimates of the number of those affected, necessary for healthcare planning, are thus flawed. The objective is to estimate the prevalence of dementia and levels of dementia severity in a very large population of oldest old and to investigate the relation between age and dementia prevalence in the extreme ages.

Methods: The Monzino 80-plus is a population-based study among residents 80 years or older in Varese province, Italy. Dementia cases were identified using a one-phase design. The survey was conducted in the participant's place of residence, whether home or institution. Both participants and informants were interviewed. Information was available for 2504 of the 2813 residents (89%).

Results: In all, 894 individuals (714 women and 180 men) met the *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition) criteria for dementia, for a standardized prevalence of 25.3% (95% confidence interval [CI]: 23.4, 27.2%), 28.5% (95% CI: 26.2, 30.9) in women and 18.6% (95% CI: 15.2, 21.9) in men. Age-specific prevalence estimates of dementia increased with age from 15.7% at age 80 to 84 years to 65.9% at age 100 years and higher. For women, prevalence continued to rise after age 100 years, from 64.8% at age 100 to 101 years to 76.1% at age 102 to 107 years. After age 85 years prevalence rates tended to rise linearly, on average 2.6% per year in women and 1.8% in men. About 80% of the cases were moderate or severe. The frequency of mild dementia decreased and that of severe dementia increased with age.

Conclusion: One-quarter of 80-plus year olds are affected by dementia, mostly moderate or severe. Prevalence rates of dementia do not level off, but continue to rise gradually even in the extreme ages.

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Keywords:

Dementia; Epidemiology; Prevalence; Population-based study; Oldest old

Conflict of interest disclosure: The authors have no potential or actual conflicts of interests to report.

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1. Introduction

The oldest old, variously defined as persons aged 80, 85, or even 90 years and older, are largely overlooked in research, in spite of being the fastest growing segment of the population and the one with the highest morbidity

burden. Research in the oldest old does in fact pose serious challenges because the prevalence of health problems and sensory impairments, with the resulting functional disability, is high, frailty and fatigue are common, and the assessment of cognitive, occupational, and social functioning is problematic [1,2]. Despite the marked shift toward a much older population structure, the natural narrowing at the very top of the pyramid makes it very difficult to include sufficiently large numbers of oldest individuals even in sizeable population-based studies. As a result individuals aged 80 years and older are under-represented not only in clinical research but also in epidemiological surveys on dementia [3,4].

Many population-based studies on the prevalence of dementia have been conducted worldwide. Most have included a wide age range but only have small numbers of the oldest old and no or too few participants in the extreme age groups [1,2,4,5]. Prevalence and incidence estimates in the oldest old are therefore imprecise and consequently often inadequate to reach trustworthy conclusions. Accurate estimates of dementia in this age group are crucial for a better understanding of the heterogeneous pathological mechanisms of dementia and its relationship with aging [6,7]. These estimates are also indispensable for planning health and social policy [8], especially because, as the world population ages, the social and economic costs of dementia are bound to grow in the near future.

The Monzino 80-plus is a prospective population-based study specifically designed to investigate cognitive decline and dementia in a very large, representative population of oldest old, including a considerable number of individuals in the extreme age groups. Aims of the present study were to estimate the prevalence of dementia and its severity levels in the oldest old and investigate the relationship between age and dementia prevalence in the extreme ages.

2. Methods

Study design, methods, and measurements have already been described in detail [9]. Briefly, the Monzino 80-plus Study is an ongoing, prospective door-to-door population-based study among the oldest old residents in the province of Varese, Italy.

2.1. Population and setting

Lists of residents were obtained from the municipal registry offices. All individuals 80 years or older residing in Castellanza, Gorla Maggiore, Gorla Minore, Marnate, Olgiate Olona, and Solbiate Olona and 85 years or older residing in Fagnano Olona on February 12, 2002 were eligible for the study. To increase the number of individuals in the extreme age groups, the survey was subsequently extended to all individuals aged 90 years or older residing in the neighboring municipality of Gallarate on January 1, 2005 and, more recently, to all those aged 100 years or older

($N = 272$) residing in the remaining municipalities of the province of Varese in 2009. In view of the low number of men aged 95 years or over, the study was further extended to include a random sample of men aged 95 to 99 years ($N = 110$), resident in the same municipalities as the centenarians, in the first 9 months of 2010. The study remained confined to the small area of Varese province, historically and culturally very homogeneous, particularly considering the age classes investigated [9]. No exclusion criteria were used, but all individuals in the age groups of interest resident in the study area were included.

Study procedures were in accordance with the principles outlined in the Declaration of Helsinki of 1964 and amendments. The study protocol was approved by the local research ethics committee (Azienda Sanitaria Locale of Varese Province). Written informed consent was obtained from participants and informants.

2.2. Study design

The survey was conducted in the participant's place of residence, whether home or institution. All the information was gathered at first visit (one-phase study design) by trained, skilled psychologists using a standardized, reliable questionnaire [9–12]. A proxy informant interview was sought systematically and was available for 90% of participants. For 209 participants living alone and with no informant available, all the information was gathered from the participants. Of these 209 individuals 205 definitely had normal cognitive functioning (mean Mini-Mental State Examination [MMSE] score 27.4) and only four were affected by dementia (mean MMSE score 17.0). During the same visit, testable participants were also administered a multidomain cognitive test battery. For participants physically or mentally unable or unwilling to be tested and for those whose relatives did not consent to have them tested ($N = 354$), the information was gathered mainly from the proxy informant and, for individuals in nursing homes, also from the institution's records.

2.3. Measurements

All tests and scales used are widely employed measures with good validity and reliability [9]. Test norms had been previously determined in a sizeable representative population which included large numbers of elderly in the extreme age groups [13]. Tests and scales were administered and scored by specifically trained psychologists, according to standardized criteria [9]. Instruments used in the Monzino 80-plus Study and their psychometric properties have already been reported [9] and will be briefly described here.

2.3.1. Cognitive performance and competence

Global cognitive performance was evaluated with MMSE [14]. A set of cognitive tests, mainly from the Consortium to Establish a Registry for Alzheimer's Disease

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