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Research paper

Escaping most common lethal diseases in old age: Morbidity profiles of Portuguese centenarians

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ABSTRACT

Introduction: Exceptional long-lived individuals, i.e., centenarians, are thought to have survived or escaped diseases that are common causes of death at younger ages. A better understanding of their health profile and health trajectories provides important information for geriatric care provision. This study aims to examine morbidity profiles of a sample of Portuguese centenarians with a particular focus on the characteristics of those who have evaded a list of age-related illnesses.
Materials and methods: Two hundred and forty-one centenarians (M age = 101.16 years; 88% female) from two centenarian studies were considered. They and/or their proxies were asked on their health history and then labeled as "escapers", "survivors" or "delayers" following Evert et al.'s morbidity typology (2003). Sociodemographic characteristics, physical and mental health status of each group were analyzed.
Results: Sensorial impairments and incontinence were the most frequent conditions reported. Considering the three most lethal diseases of the elderly population (heart disease, non-skin cancer and stroke), we verified that 70.6% of centenarians escaped these diseases, and 18.2% experienced a delayed onset of such diseases until the age of 80.
Conclusions: Findings reinforce the great variability of age-related pathologies and overall health status in centenarians, but that a great majority had the ability to evade the most lethal conditions. Management of patients with multimorbidity in very advanced ages has become a major healthcare challenge and our findings provide further evidence for policies and targeted interventions for this population.

1. Introduction

The number of individuals reaching advanced ages is rising rapidly worldwide, and centenarians are one of the age groups with a fastest growing [1]. In Portugal, the number of centenarians almost tripled over the last decade, from 589 centenarians in 2001 to 1526 in 2011 [2], and recent population estimates and projections presented by Statistics Portugal (Instituto Nacional de Estatística [INE]) pointed to the existence of more than 20,000 centenarians by the year 2080 [3]. A recent report on the health profile of Portuguese centenarians pointed to great difficulties in sensory domains and basic daily living activities, and to statistically significant differences between men and women, with women presenting a higher percentage of difficulties [4].

Reaching the age of 100 per se does not necessarily indicate successful aging [5,6], and centenarians' actual physical health is often severely compromised [7]. Findings from the Danish Centenarians Study, for instance, found a high number of centenarians with medical comorbidities, and only one subject was identified as being free from any chronic condition or illness [8]. Most studies comparing centenarians with younger older age groups show an increment of physical difficulties, and identify chronic conditions as very common at the 100+ [9]. Despite the high frequency of chronic conditions, the compression of morbidity hypothesis posits that there will be a delay in the onset of chronic morbidity, and morbidity and disability will become compressed into a shorter duration of time before death [10].

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Understanding health trajectories and the prevalence of diseases that are common causes of death in those achieving extreme longevity are important matters for geriatric care provision [11]. In 2003, Evert et al. conducted a retrospective cohort study of centenarians to explore the timing of most common age-related illnesses and established three distinct morbidity profiles:

- the "escapers", who did not succumb to any age-related illnesses;
- the "delayers", who experienced delayed onset of age-related illnesses until 80 years;
- the "survivors", who survived with disease.

In their study, they found that 38% could be labeled as survivors, 43% as delayers, and 19% as escapers [12]. Using this morbidity classification, Richmond et al. studied Australian centenarians, and found that 46% could be considered as survivors, 34% as delayers, and 19% as escapers [13]. Despite the somehow similar findings in these two studies, the prevalence of certain diseases varied widely. The different disease definitions used, and data collection methods can contribute to these inconsistencies [14].

Along with identifying morbidity profiles and the specific diseases more often present in the centenarian population, of particular importance is to look at the distinctive characteristics (e.g. sociodemographic profile) of individuals that fall into each morbidity profile. But not only little information regarding such aspects is available, as it is often limited to gender differences. On this matter, some studies found that women were more likely to be survivors, and to present a higher mean number of diseases [12], but other studies found no gender differences for any of the conditions [13].

The aims of this study are to determine the most frequent age-related illnesses in Portuguese centenarians, and to investigate their morbidity profiles, with a particular emphasis on the sociodemographic characteristics of those labeled as escapers.

2. Materials and method

2.1. Participants and recruitment

The participants are centenarians who integrated the Oporto Centenarian Study (PT100), and the Beira Interior Centenarian Study (PT100 BI). The first is a population-based study conducted in the Oporto city and its surrounding geographical area (Oporto Metropolitan Area, which comprises a region of approximately 60 km around Porto in Portugal). The second refers to a convenience sample considering the population living in the interior part of the country with similar geographical extension around the city of Covilhã (Beira Interior region). These two studies followed the same study design and methodological approach. Details of the studies' design and recruitment have been described elsewhere [15]. A total of 241 centenarians integrated this particular study (140 from the PT100, and 101 from the PT100 BI). Centenarians were identified through contacts with all the nursing homes listed in the Social Security Institute, parish councils, and parish churches of the regions.

2.2. Measures and procedures

Sociodemographic characteristics regarding age, gender, marital status, schooling, number of children, and living arrangements were collected using a questionnaire. Physical health status was indicated by the ability to perform activities of daily living (BADL and IADL), and was measured with items retrieved from the Older Americans Resources and Services (OARS) Multidimensional Functional Assessment Questionnaire [16], mobility (bedridden vs. non-bedridden), and self-reported health (single question about individuals perception of his/her health status, with 5-point scale). Mental status was indicated by a shortened version of the Mini-Mental State Examination (MMSE) [17] with a maximum score of 21 points instead of 30, and the Global Deterioration Scale (GDS) [18]. Morbidity profiles were analyzed considering a checklist of common age-related illnesses. The checklist included the following health conditions: hypertension, heart disease, diabetes, chronic lung disease, ulcers or other serious stomach issues, cirrhosis or other liver problems, kidney condition, frequent urinary infections, incontinence, prostate problems, problems with vision, problems with hearing, arthritis, osteoporosis, other, and stroke, cancer, pneumonia in the past five years. Participants and/or their proxies reported the existent age-related diagnosis and the approximate age of diagnosis. The morbidity profile of the centenarians was performed according to the classification: diagnosis of age-associated illness prior to the age of 80; diagnosis of age-associated illness after the age of 80; attained the 100th year of life without the diagnosis of common age-associated illnesses. Information was collected during one or two sequential interview sessions directly with the centenarian and/or with a proxy respondent. All procedures of age validation and informed consent were guaranteed, and have been more detailed elsewhere [15].

2.3. Statistical analyses

Descriptive statistics were used to present the sociodemographic characteristics, physical and mental health status, age-related illnesses and morbidity profiles of centenarians. Differences between the escapers and non-escapers for sociodemographic characteristics, physical health and mental status were explored using Chi-Square and *t*-tests. All analyses were performed using IBM SPSS Statistics version 21.0 (IBM Corporation, Armonk, NY, USA) and a *P*-level of 0.05 was considered as significant.

3. Results

Descriptive characteristics are summarized in Table 1. Most centenarians were women (88.0%) with a mean age of 101.16 years (SD = 1.6 years), widowed (82.6%), and 39.6% never attended school (52.3%). More than half lived in the community (54.2%), and were highly dependent (51.5% bedridden). Mean BADL ratings were 7.37 (SD = 4.6), and mean IADL ratings were 2.46 (SD = 3.0), with lower levels indicating more dependency. About 40% of the respondents perceived their health as fair, tough 45.4% rated their health as good, very good or excellent.

3.1. Age-related illnesses and morbidity profiles

The analysis of age-related illnesses (Table 2) revealed that sensorial impairments assume a pivotal importance in this population, with higher frequencies of hearing and vision problems (72.2 and 68.0%, respectively). Following sensorial constraints, incontinence (45.6%), arthritis (40.7%) and hypertension (34.9%) were the three most frequent age-related illnesses.

Considering the morbidity classification of Evert et al., we found that 27.1% of centenarians could be labeled as survivors, 26.5% as delayers, and 46.4% as escapers; the analysis of the morbidity profile based only in the three most lethal diseases, in turn, revealed that 11.2% of centenarians were survivors, 18.2% were delayers, and 70.6% were escapers (Table 3).

Considering the high number of missings to codify the morbidity profiles, we investigated differences between this group