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EFFECTS OF ANOREXIA ON MORTALITY AMONG OLDER ADULTS RECEIVING HOME CARE: AN OBSERVATIONAL STUDY

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Abstract: *Purpose:* We describe the prevalence of secondary anorexia in a population of older people living in community and receiving home care. In addition, we examined the relationship between secondary anorexia and mortality. *Methods:* We analyzed data from a large collaborative observational study group, the Italian Silver Network Home Care project, that collected data on patients admitted to home care programs. A total of twelve Home Health Agencies participated in such project evaluating the implementation of the Minimum Data Set for Home Care (MDS-HC) instrument. A total of 2757 patients were enrolled in the present study. The main outcome measures were the prevalence of anorexia, weight loss and survival. *Results:* More than 25% (744 subjects) of the study sample suffered from anorexia. During a mean follow-up of 10 months from initial MDS-HC assessment, 468 patients (17%) died. There was uneven distribution of the risk. After adjusting for age, gender and for all other possible risk factors for death (living alone, physical and cognitive disability, behavior problems, urinary incontinence, pressure ulcer, hearing impairment, congestive heart failure, hypertension, depression, diabetes, renal failure, cancer), subjects with anorexia were more likely to die relative to patients without anorexia (RR, 1.83; 95% CI 1.45-2.31). Even though the risk of mortality was higher among subjects suffering from anorexia and weight loss, the anorexia per se was associated with higher risk compared with subjects without anorexia (RR, 1.45; 95% CI 1.01-2.19). *Conclusions:* Anorexia is associated with a significant higher risk of all-cause mortality. The present findings support the possibility that anorexia has an independent effect on survival even among old people receiving home care.

Key words: Anorexia, mortality, geriatric assessment, MDS, home care, elderly.

Introduction

Scientific evidence indicates that a significant number of elderly subjects fail to get proper amount of food necessary to meet essential energy and nutrient needs. Weight loss due to anorexia of aging has been mentioned as one of the most prevalent problem in older populations (1, 2) and is acknowledged as an independent predictor of morbidity and mortality among adult and geriatric patients in various clinical settings (3, 4). In most of cases, anorexia is associated with cachexia, sarcopenia, poor endurance, impaired gait speed, and decreased mobility (5, 6).

Anorexia is not an inevitable side effect of aging but many changes associated with the process of aging can promote it. Age-related diseases, lifestyles, social and environmental factors may have considerable effects on nutritional habits and status. Nevertheless, nutritional problems are frequently unrecognized or disregarded (7-9), and too often an "ageist" perspective of physicians toward geriatric patients could restrict diagnostic and therapeutic efforts.

Nonetheless, a number of issues related to the assessment of anorexia, its consequences in term of functional impairment and mortality, and possible interventions for elderly subjects with anorexia need to be addressed (10). Thus, the aim of the present study was to explore the relationship between anorexia and the risk of all-cause mortality in a large population of older people living in community and receiving home care.

Methods

Study population

Data were collected as part of the national home care program named Silver Network Home Care project, under the sponsorship of the Italian Gerontology and Geriatrics Society and the Italian General Practitioners Society (11). The purpose of this project was to reorganize the care of the older people living in community, adopting an integrated social and medical care program along a case management approach and using, as screening and geriatric assessment tool, the Minimum Data Set for Home Care (MDS-HC) instrument (12).

This population-based, longitudinal, multi-linked database comprises: (1) data collected with Minimum Data Set for Home Care (MDS-HC) on over 3000 patients in more than twelve Home Health Agencies in Italy, (2) data on all the medications used by each patient at the time of the MDS-HC assessment – drugs were coded using the Anatomical Therapeutic and Chemical (ATC) codes, and (3) data on vital status.

The study population consisted of all patients admitted to home care programs in twelve Home Health Agencies from 1998 to 2000 who participated in the National Silver Network project (n=3103). For the present analyses, we excluded 243 subjects aged less than 65 years and other 73 subjects with missing data at baseline assessment. As a result, the final

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analyses sample consisted of 2787 patients.

All patients in the sample were assessed by a trained staff (medical doctor and nurses) who collected data on the MDS-HC form following the guidelines published in the MDS-HC manual (12), independent of the study protocol. The project was approved and monitored by the steering committee of the Catholic University and the local state authorities. All patients provided written informed consent at baseline MDS-HC assessment authorizing the use of data for research purpose. In the case of cognitive impairment, informed consent was obtained from patient family. The characteristic of the specific components of the Silver Network Home Care database have been described in detail elsewhere (11) and are briefly summarized herein.

MDS-HC assessment data

The MDS-HC (12) contains over 350 data elements including socio-demographic variables, numerous clinical items about both physical and cognitive status, as well as all clinical diagnoses. The MDS-HC also includes information about an extensive array of signs, symptoms, syndromes, and treatments being provided (12). A variety of different, multi-item summary scales are embedded in the MDS-HC measuring, for example, physical function (activities of daily living – ADLs; instrumental activities of daily living - IADLs) (13) and cognitive status (cognitive performance scale – CPS) (13). MDS items have been found to have excellent inter-rater and test-retest reliability when completed by nurses performing usual assessment duties (average weighted Kappa = .8) (13, 14). Furthermore, the MDS-HC has already paved the way to a representative database that proved a powerful tool for health researches (15-17).

Anorexia

At the baseline visit, two different single-item measures relative to food intake and appetite were directly administered to all the participants (18). Subjects were assessed considering if “In at least four of the last seven days, the client ate one or fewer meals a day ", rating as “No” or “Yes”. The second question was "In last three days, noticeable decrease in the amount of food client usually eats", rating as “No” or “Yes”.

Anorexia status was defined as the presence of decreased food intake (answer “Yes” to the first question) or the presence of poor appetite (answer “Yes” to the second question) (3, 18). Assessing anorexia in term of reduced food intake is in accordance with the Nutrition-Day Audit Team suggestions that stated food intake may be considered a surrogate marker for anorexia (19). Furthermore, defining anorexia as the reduction and/or loss of appetite is in accordance with the recent European consensus definition of anorexia in chronic wasting diseases (6). Finally, it is important to highlight that these two specific MDS-HC items have previously used to investigate the effect of anorexia on different outcomes among elderly people (18, 20).

Furthermore, according to the MDS-HC manual, weight loss was defined as the unintended weight loss of 5% or more in the last 30 days or 10% or more in the last 6 months (18, 21).

Survival status

Vital status was obtained from general practitioners and confirmed by the National Death Registry. Time to death was calculated from the date of first MDS-HC assessment to the date of death. All subjects were followed-up for at least 12 months.

Analytic approach

All demographic variables, measures of physical and cognitive function and multimorbidity were gathered at initial MDS-HC assessment on admission to the home care program. Patients were divided into two groups based on the presence of anorexia: subjects with anorexia (n=744), subjects without anorexia (n=2043).

Data were analyzed first to obtain descriptive statistics. Continuous variables are presented as mean values ± standard deviation. We evaluated the differences between anorexia and no anorexia groups of socio-demographic variables and indicators of disease severity using the Fisher exact test. Differences between continuous variables were assessed by ANOVA comparisons for normally distributed parameters; otherwise, the Kruskal-Wallis test was adopted. A $p < 0.05$ level was chosen for statistical significance.

Time to death was calculated from the date of first MDS-HC assessment to the date of death. We examined all events which occurred through December 2001, with a mean follow up of near 10 months (range 1–12). Cox proportional hazard analyses, adjusted for age, gender, living alone, physical and cognitive disability, behavior problems, urinary incontinence, pressure ulcer, hearing impairment, congestive heart failure, hypertension, depression, diabetes, renal failure, and cancer were performed to assess the relative risk of death. Hazard rate ratios (RRs) and corresponding 95% confidence intervals (95% CIs) were derived from the final models. The impact of anorexia on survival was also tested comparing the survival curves obtained with the Kaplan-Meier method. Differences between curves were evaluated using the log-rank test.

All analyses were performed using SPSS software (version 10.1, SPSS Inc., Chicago, IL).

Results

The principal characteristics of the study population are shown in Table 1. Patients were Caucasian, predominately female (60%) with a mean age of 80.4 ± 7.5 years. More than 55% of the individuals were aged 80 years or older. Overall, patients had a moderate-to-severe impairment in basic and instrumental activities of daily living; similarly, cognitive function was compromised in a large number of patients (more than 50% showed a CPS score more than 2, indicating moderate to severe cognitive impairment). More than 25% (744 subjects) of the study sample suffered from anorexia, as defined

by the presence of decreased food intake or the presence of poor appetite.

Table 1
Descriptive analysis of baseline sociodemographic, functional, and clinical parameters according anorexia *

	Total sample (n=2787)	Anorexia (n=744)	No- Anorexia (n=2043)	p
Socio-demographic characteristics				
Age (years, mean ± SD)	80.4 ± 7.5	81.0 ± 7.8	80.1 ± 7.4	<0.01
Gender (Female)	1677 (60)	423 (57)	1254 (62)	0.01
Marital status				
Married	1284 (46)	344 (46)	940 (46)	0.25
Widowed	1234 (44)	333 (45)	901 (44)	
never married	269 (10)	67 (9)	202 (10)	
Living alone	524 (19)	122 (16)	402 (20)	0.02
Alcohol abuse	29 (1)	5 (1)	24 (1)	0.43
Smoking habit	198 (7)	54 (8)	144 (7)	0.32
Functional characteristics				
ADL score (mean ± SD)	4.7 ± 2.7	5.3 ± 2.4	4.5 ± 2.7	<0.001
CPS score (mean ± SD)	2.4 ± 2.2	2.7 ± 2.2	2.3 ± 2.1	<0.001
Behavior problems	510 (18)	121 (16)	389 (19)	0.05
Urinary incontinence	1529 (55)	446 (60)	1083 (53)	0.01
Pressure ulcer	528 (19)	197 (27)	331 (16)	<0.001
Hearing impairment	715 (25)	209 (28)	506 (24)	0.04
Vision impairment	1085 (39)	299 (40)	786 (39)	0.21
Chewing problems	1191 (43)	362 (49)	829 (41)	<0.001
Clinical conditions				
N. of diseases (mean ± SD)	3.8 ± 2.3	3.8 ± 2.3	3.7 ± 2.3	0.50
N. of drugs (mean ± SD)	3.8 ± 2.5	3.7 ± 2.7	3.8 ± 2.5	0.37
Coronary heart disease	500 (18)	128 (17)	372 (18)	0.29
Congestive heart failure	19 (521)	17 (339)	25 (182)	<0.001
Hypertension	1050 (38)	222 (30)	828 (40)	<0.001
Dementia	523 (19)	145 (20)	378 (18)	0.29
Depression	1606 (57)	459 (61)	1147 (56)	<0.01
Lung disease	626 (23)	175 (24)	451 (22)	0.22
Diabetes	515 (19)	113 (15)	402 (29)	<0.01
Parkinson's disease	223 (8)	60 (8)	163 (8)	0.49
Renal failure	215 (8)	69 (9)	146 (7)	0.03
Cancer	412 (15)	197 (27)	215 (11)	<0.001

* Data are given as number (percent) unless otherwise indicated; ADL: Activities of Daily Living (range 0-7, a higher number indicates higher impairment); CPS: Cognitive performance Scale (range 0-6, a higher number indicates higher impairment)

Participants with anorexia were more likely to be older (mean age 81 vs. 80) and to have a higher level of impairment in functional and cognitive performance (mean ADL score 5.3 vs. 4.5, CPS score 2.7 vs 2.3). Also, compared to subjects without anorexia, they had a higher rate of chewing problems, urinary incontinence, pressure ulcer, and sensory impairment. In particular, several health conditions (congestive heart failure, hypertension, depression, diabetes, renal failure, and cancer) were more common among participants with anorexia.

During a mean follow-up of 10 months from initial MDS-HC assessment, 468 patients (17%) died. There was an uneven distribution of the risk. After adjusting for age, gender and for all other possible risk factors for death (living alone, physical and cognitive disability, behavior problems, urinary incontinence, pressure ulcer, hearing impairment, congestive heart failure, hypertension, depression, diabetes, renal failure, cancer), subjects with anorexia were more likely to die relative to patients without anorexia (RR, 1.83; 95% CI 1.45-2.31) (Table 2). Similarly, this relationship was significant in male and female subjects (Table 2). To verify the influence of dementia on the results obtained, two different model adjusted for the same previous described variables were constructed. The association between anorexia and mortality was still statistically significant among cognitive impaired subjects and subjects without cognitive impairment (Table 2).

Table 2
Crude and adjusted relative risks (RRs) of mortality

	Dead (n=468)	Alive (n=2319)	Crude Model RR (95% CI)	Adjusted Model* RR (95% CI)
All patients				
No anorexia	260	1783	1.0 (Referent)	1.0 (Referent)
Anorexia	208	536	1.82 (1.45-2.60)	1.83 (1.45-2.31)
Male				
No anorexia	128	661	1.0 (Referent)	1.0 (Referent)
Anorexia	98	223	2.26 (1.67-3.07)	1.54 (1.09-2.17)
Female				
No anorexia	132	1122	1.0 (Referent)	1.0 (Referent)
Anorexia	110	313	2.98 (2.25-3.96)	2.10 (1.53-2.88)
Cognitive impairment				
No anorexia	172	975	1.0 (Referent)	1.0 (Referent)
Anorexia	130	339	2.17 (1.67-2.81)	1.55 (1.16-2.02)
No cognitive impairment				
No anorexia	88	808	1.0 (Referent)	1.0 (Referent)
Anorexia	78	197	3.63 (2.58-5.11)	2.29 (1.53-3.43)
All patients				
No anorexia	260	1783	1.0 (Referent)	1.0 (Referent)
Anorexia without weight loss	37	148	1.59 (1.13-2.29)	1.45 (1.01-2.19)
Anorexia and weight loss	171	388	2.76 (2.27-3.35)	1.98 (1.53-2.54)

* Adjusted for age, gender and for all other possible risk factors for death (living alone, physical and cognitive disability, behavior problems, urinary incontinence, pressure ulcer, hearing impairment, congestive heart failure, hypertension, depression, diabetes, renal failure, cancer)

The impact of anorexia on survival was also tested comparing the survival curves obtained with the Kaplan-Meier method. As shown in Figure 1, survival curves for subjects in the study according to their anorexia status differed at the log-rank test (p<0.001).

Finally, we tested the additive effect of weight loss since more than 75% (n=559) of subjects with anorexia showed an involuntary and significant weight loss (more or equal 5% during the last month or more or equal 10% during the last six months before the baseline assessment). Table 2 reports the associations between mortality and the presence of anorexia with and without weight loss. Even thought the risk of mortality was higher among subjects suffering from anorexia and weight loss, the anorexia per se was associated with higher risk compared with subjects without anorexia (RR, 1.45; 95% CI 1.01-2.19). Figure 2 shows survival curves for subjects in the study according to their anorexia and weight loss status, respectively.

Figure 1

Survival curves of study participants according to anorexia at baseline assessment. Survival curves differed significantly at the log-rank test (p<0.001)

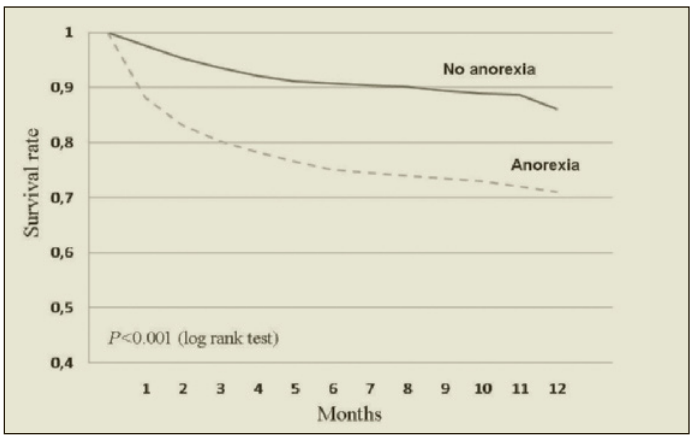
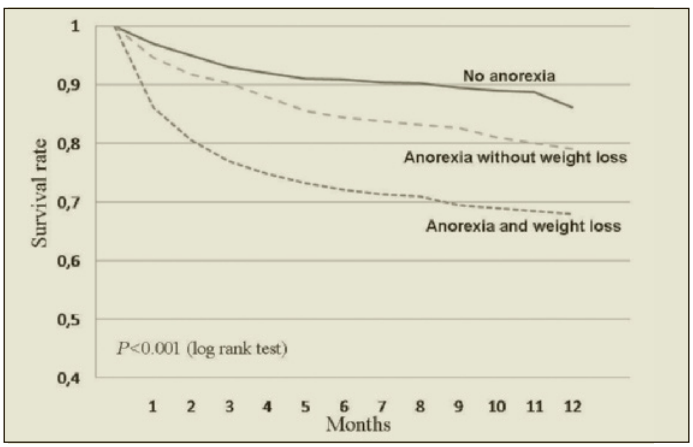


Figure 2

Survival curves of study participants according to anorexia at baseline assessment and weight loss (more or equal 5% during the last month or more or equal 10% during the last six months before the baseline assessment). Survival curves differed significantly at the log-rank test (p<0.001)



Discussion

The evaluation of the impact of anorexia and weight loss on survival among elderly subjects is an important and intricate issue. In the present study, we explored the association of anorexia and weight loss in a large sample of community-dwelling subjects aged 65 years or older. Our findings show that anorexia exerts an important influence on mortality in older adults living in the community, independently of age, weight loss and other clinical and functional variables. In particular, after adjusting for several potential confounders, such as living alone, physical and cognitive disability, behavior problems, urinary incontinence, pressure ulcer, hearing impairment, congestive heart failure, hypertension, depression, diabetes, renal failure, and cancer, anorexia emerged as a strong risk factor for death, independently of functional disability and multimorbidity.

Anorexia is clinically defined as the reduction and/or loss of appetite (3, 6, 22). Unlike anorexia nervosa, anorexia of aging (i.e. disease-related) is a rather common symptom, and frequently accompanies chronic diseases (22, 23). Anorexia is a multifactorial health condition correlated with multiple causations that occurs when the accumulated effects of impairments in multiple systems make an older person more vulnerable. The major risk factors of anorexia are the ageing process itself, biological changes, behavioural factors, social and environmental conditions, many acute and chronic diseases and treatments (24, 25).

Anorexia is frequently under-diagnosed and may significantly contribute to the nutritional deterioration of cachexia, if not properly treated either pharmacologically or with oral nutritional supplementation (6, 26, 27). Numerous clinical consequences are correlated to anorexia: impaired wound healing, impaired immune response to infections, hypoalbuminemia, decreased coagulation capacity, reduced gut function, intestinal bacterial translocation, muscle wasting, decreased function of respiratory muscles (28).

Furthermore, anorexia is highly predictive of incident disability, poor quality of life and all-cause mortality (3, 20, 29). In particular, as our results suggest, even though worse results have been observed when anorexia is associated with significant weight loss, anorexia per se is an important mortality risk factor. In fact, the anorexia not accompanied by weight loss confers increased risk for mortality, too. The results of our study are also supported by those of a large survey conducted in European hospitals, which showed that reduced food intake is an independent negative prognostic factor for 30-day in-hospital mortality, more robust than weight loss (19). It is possible to hypothesize that in the early stage, the anorexia doesn't determine an evident status of malnutrition (i.e. significant weight loss) but it determines selective nutritional lacks (i.e. deficit of vitamins and/or micronutrients). Several studies have demonstrated the negative role of selective malnutrition on functional outcomes and survival among elderly subjects (30, 31).

In this respect, it is important to highlight that nutrition remains important throughout life. Some studies have documented that a “good” diet helps both in reducing the risk of diseases and in managing the diseases’ signs and symptoms (10, 26). This contributes to a better quality of life, enabling older people to maintain their independence and physical performance. On the other hand, poor nutrition and anorexia of aging can prolong recovery from acute illnesses, increase the rate of institutionalization, expand the costs of health care, lead to a poorer quality of life and higher morality (3, 19, 20).

Some methodological issues should be taken into account in the interpretation of results. Anorexia makes a major contribution to multimorbidity, such as anemia, malnutrition, osteoporosis, and dementia. On the other hand, severe and chronic diseases may be associated with anorexia. In this respect, we cannot completely exclude that this reverse

causation may play an important role in the association between anorexia and elevated mortality risk observed in our sample. Reverse causation is particularly likely with diseases with a long natural history preceding death, such as anemia, dementia, and osteoporosis. However, because of the use of MDS-HC, a multidimensional assessment instrument, the present study could comprehensively investigate the different domains of elderly status influencing anorexia and survival. For this reason and to permit an analysis taking care of the largest number of potential confounders, we incorporated in our model a whole series of variables, including multimorbidity and measures of cognitive and functional status. Second, anorexia has been defined only with assessment of two domains: presence of decreased of food intake and/or poor appetite. In this respect, it important to underline that anorexia has not been confirmed by an estimation of energy intake. Furthermore, another limitation of the present study is determined by the lack of any documentation concerning the duration of anorexia status and by the unavailable data about the presence of anorexia at the time of the death. For this reason we cannot exclude that selective survivorship explains all or part of the results observed. Finally, a more critical consideration is that our sample was composed by only patients considered eligible for home care programs, indicating that a health problem was in place. In this respect we are not authorized to extend the results to all community dwelling elderly individuals.

In conclusion, the present study shows that anorexia is common among old subjects receiving home care. Our results suggest that among old-old subjects the presence of anorexia is associated with higher mortality risk. Anorexia is not an inevitable side effect of aging but many changes associated with the process of aging can promote it. Age-related diseases, lifestyles, social and environmental factors may have considerable effects on nutritional habits and status. Nevertheless, nutritional problems are frequently unrecognized or undertreated (7-9). Specific interventions, i.e. nutritional supplementation or modified diet, could considerably improve the quality of life and longevity (26, 27). Overall, even though the treatment of anorexia is a difficult challenge, preventing and treating anorexia may decrease the risk of mortality in the elderly population. However, further studies are warranted to better understand the benefit of specific nutritional interventions in patients with multimorbidity.

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Conflict of interest: None

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