



Applied nutritional investigation

Relationship between mortality and Council of Nutrition Appetite Questionnaire scores in Japanese nursing home residents



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ABSTRACT

Objective: This 1-y cohort study examined whether Council of Nutrition Appetite Questionnaire (CNAQ) scores predicted mortality in 316 elderly Japanese residents of five nursing homes (60 men, 256 women; mean age: 84.9 ± 8.3 y).

Methods: The baseline survey included participant characteristics (e.g., age, sex, height, weight, and medical history), and Barthel Index (BI), Clinical Dementia Rating (CDR), Mini Nutritional Assessment-Short Form (MNA[®]-SF), CNAQ, Simplified Nutritional Appetite Questionnaire (SNAQ; simplified CNAQ), and SNAQ for the Japanese elderly (SNAQ-JE) scores.

Results: Following the baseline survey, mortality data were collected for 1 y; during this time, 62 participants (19.6%) died. The deceased group's CNAQ scores (25.1 ± 4.8) were significantly lower than those of the survival group (28 ± 3.6; $P < 0.001$). After adjusting for age, sex, medical history, BI, CDR, and MNA[®]-SF scores in Cox proportional regression, CNAQ (hazard ratio [HR], 0.91; 95% confidence interval [CI], 0.85–0.97; $P = 0.004$), SNAQ (HR, 0.84; 95% CI, 0.75–0.93; $P = 0.001$), and SNAQ-JE (HR, 0.84; 95% CI, 0.76–0.92; $P < 0.001$) scores were related to mortality.

Conclusions: This study showed that CNAQ scores were inversely associated with 1-y mortality. Furthermore, appetite assessment using the CNAQ predicted the death of Japanese nursing home residents. Similarly, the SNAQ and SNAQ-JE scores were inversely associated with 1-y mortality.

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Introduction

Individuals ages ≥ 65 y comprise $>25\%$ of the Japanese population, and Japan is poised to become the world's first "super-aged" society. Consequently, the number of elderly people who require care is also expected to increase. Additionally, numerous elderly people in urgent need of care are recipients of caregiving services at nursing homes and other residential type facilities [1].

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Moreover, undernutrition is a major cause of reduced quality of life (QoL) in elderly people [2]. Additionally, some reports state that undernutrition is related to infections, hospitalization, and mortality in this population [3,4]. Therefore, the treatment and prevention of undernutrition in elderly people is an important issue.

Hospitals currently use blood tests to evaluate individuals' nutritional status [5]. However, this is infeasible for nursing home residents because of the cost and invasive nature of blood tests. Previous studies evaluating nutritional status have focused on weight loss [6–8] and reduced dietary intake [6]. However, this approach requires actual measurements, which constitute a substantial burden for both dependent elderly people and evaluators, and it is likely to be inappropriate as a screening reference to predict unfavorable outcomes such as death.

Appetite maintenance and increase are essential, as poor appetite could be a factor in undernutrition. However, poor appetite in

elderly individuals occurs because of various factors such as illness and disease, medication use, physical and mental health conditions, lifestyle and living environments, and the physiological changes that accompany aging [9]. Previous studies involving nursing home residents [10] and hospitalized elderly individuals [11] evaluated appetite using questions pertaining to the presence or absence of reduced dietary intake, and the results showed that poor appetite was a predictive factor for death. However, they evaluated only one aspect of poor appetite, namely dietary intake reduction, and did not consider the variety of factors that influence poor appetite.

Wilson et al. created the Council on Nutrition Appetite Questionnaire (CNAQ) to assess appetite and reported that it was a valid appetite-assessment tool for use in predicting weight loss in community-dwelling adults and nursing home residents [12]. However, to our knowledge, few other studies have used the CNAQ to examine appetite in nursing home residents. Additionally, Tokudome et al. created the Japanese version of the CNAQ, which demonstrated validity and reliability as a weight loss index for dependent elderly people and elderly people with cognitive disorders [13]. Wilson et al. also created the Simplified Nutritional Appetite Questionnaire (SNAQ)—a simplified version of the CNAQ—that has demonstrated equal reliability [12]. Furthermore, a study involving community-dwelling older Japanese adults demonstrated the validity of the SNAQ [14], and Tokudome et al. recommend the SNAQ for use with the Japanese Elderly (SNAQ-JE) in elderly-care facilities [13].

Considering the abovementioned issues, we conducted a 1-y cohort study to determine whether CNAQ scores predicted mortality for nursing home residents in Japan. We also examined whether the SNAQ and SNAQ-JE scores would predict mortality. Ethical approval for the study was granted by the Ethics and Conflict of Interest Committee at the Japan National Center for Geriatrics and Gerontology.

Methods

Participants and study design

An explanation regarding the survey was provided for residents at five nursing homes managed by a single social welfare service corporation in Prefecture “A” in Japan. In all, 359 elderly individuals provided informed written consent to participate in the study and completed a baseline survey in January 2014, and their mortality information was collected 1 y thereafter. We excluded individuals who were unable to perform oral ingestion, those for whom a date of death was not provided, and those for whom data regarding age, sex, medical history, or Barthel Index (BI), Clinical Dementia Rating (CDR), Mini Nutritional Assessment-Short Form (MNA[®]-SF), or CNAQ scores were missing. Data for 316 participants (60 men, 256 women; mean age: 84.9 ± 8.3 y) were ultimately included in the analysis.

Survey items

To ensure the uniformity of assessment criteria in the baseline survey, training was provided to nurses, care workers, and dietitians in charge of the residents who participated in the survey. Upon completion of this training, questionnaires were distributed to responsible professionals, basic data (sex, age, height, weight, and medical history) were collected, and the following tools were administered: the BI to assess physical function, the CDR to assess cognitive function, the MNA[®]-SF to assess nutritional status [15–17], and the CNAQ to assess appetite [12].

BI

The BI [18] is used to evaluate physical function and consists of 10 items describing daily activities (i.e., feeding, transfer from a chair to bed and back, grooming, toilet use, bathing, mobility on level surfaces, using stairs, dressing, bowel control, and bladder control). Evaluation is based on the extent of assistance required to perform each activity [19]. Total scores range from 0 to 100, with higher scores indicating greater ability to perform ordinary daily activities.

CDR

The CDR was administered following the evaluation method used by Morris et al. [20]. The CDR includes five grades (i.e., 0, 0.5, 1, 2, and 3) and six items: memory, orientation, judgment and problem solving, community affairs, home and

hobbies, and personal care. Higher grades indicate dementia of greater severity. The final decision regarding the CDR grade is made by a medical specialist such as the clinician or attending physician.

CNAQ

The CNAQ [12] is used to assess appetite in elderly individuals in the community and nursing homes. It consists of eight items used to predict clinically significant weight loss: appetite, feeling full, feeling hungry, food flavors, changes in food flavors, number of daily meals, feeling sick or nauseated when eating, and usual mood. Responses are provided using a 5-point scale ranging from 1 to 5, and total scores range from 8 to 40. Scores between 29 and 40 indicate good appetite; those between 8 and 28 indicate poor appetite [12].

The SNAQ consists of four of the CNAQ eight items: appetite, feeling full, food flavors, and number of daily meals. Responses are provided using a 5-point scale ranging from 1 to 5. Total scores range from 4 to 20, and lower scores indicate a lack of appetite [12]. However, considering that most elderly-care facilities in Japan stipulate that residents should be provided with three meals per day, Tokudome et al. recommended use of the SNAQ-JE, in which the “usual mood” item is used in replacement of “number of meals” [13].

Statistical analyses

Numbers and percentages were calculated for categorical variables, whereas means and SDs were calculated for continuous variables. To avoid multicollinearity, the correlation between variables was examined using Pearson's correlation coefficient, and we selected the MNA[®]-SF (including body mass index [BMI]) in subsequent analyses. To identify factors related to mortality, Cox proportional regression analysis was performed, with the period from the first day of observation to the date of death included as an outcome variable, and age, sex, previous medical history, respiratory disease (including aspiration pneumonia), cerebrovascular disorder, cardiovascular disorder, neoplastic disease, Parkinson's disease, neurologic disorder, BI, CDR, MNA[®]-SF, and CNAQ as explanatory variables (model 1). Additionally, a similar analysis was performed using the SNAQ or SNAQ-JE as an explanatory variable instead of the CNAQ. Furthermore, the sample was divided into a poor appetite (CNAQ ≤ 28) and a good appetite (CNAQ > 28) group based on CNAQ scores [12]. The cumulative survival rate was examined using the Kaplan–Meier method to clarify differences between the two groups, and the log-rank test was performed. C statistics and net reclassification improvement were evaluated to determine which of three appetite assessment tools improved discrimination and risk stratification for mortality. The significance level was set at $P < 0.05$. Statistical analyses were performed using SPSS Statistics version 23 (IBM, Armonk, NY, USA) and SAS version 9.4 (SAS, Cary, NC, USA).

Results

Table 1 shows the participants' characteristics. Of the 316 participants, 62 (19.6%) died during the study period. Table 1 also presents the results of a comparison between the survival and deceased groups. Relative to those in the survival group, the participants in the deceased group were older, and their BMI was significantly lower. Additionally, the deceased group's BI, MNA[®]-SF, and CNAQ were significantly lower relative to those observed in the survival group. Moreover, the survival and deceased groups' CDR grades differed significantly, with grade of 3 being higher in the deceased group.

Figure 1 shows the survival curve obtained using the Kaplan–Meier method. Log-rank test results showed significant differences ($P < 0.001$) in survival time between participants with poor (CNAQ ≤ 28) and good (CNAQ > 28) appetites. With sex; age; medical history; and BI, CDR, MNA[®]-SF, and CNAQ scores adjusted for, the results of the Cox proportional regression analysis showed that CNAQ scores were significantly inversely associated with the mortality rate 1 y after the baseline survey (hazard ratio [HR], 0.91; 95% confidence interval [CI], 0.8–0.97; $P = 0.004$; Table 2).

The results of the analysis of the SNAQ and SNAQ-JE scores were as follows: mean baseline SNAQ and SNAQ-JE scores were 14 ± 2.3 (survival group: 14.3 ± 2 , deceased group: 12.7 ± 2.8 ; $P < 0.001$) and 13.4 ± 2.6 (survival group: 13.8 ± 2.4 , deceased group: 11.8 ± 3 ; $P < 0.001$), respectively. Additionally, comparisons of the survival and deceased groups during the observation period showed that the deceased group's SNAQ and SNAQ-JE scores were significantly lower than those observed in the survivor group.

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