JAMDA xxx (2017) 1.e1–1.e9

JAMDA

journal homepage: www.jamda.com

Original Study

Prevalence of Frailty Assessed by Fried and Kihon Checklist Indexes in a Prospective Cohort Study: Design and Demographics of the Kyoto-Kameoka Longitudinal Study

Yosuke Yamada PhD [a,*], Hinako Nanri RD, PhD [a], Yuya Watanabe PhD [b], Tsukasa Yoshida MS [c,d], Keiichi Yokoyama MS [e], Aya Itoi RD, PhD [f], Heiwa Date PhD [g], Miwa Yamaguchi RD, PhD [a], Motoko Miyake PhD [h], Emi Yamagata RN, PhD [i], Hajime Tamiya RPT, MS [j], Miho Nishimura MS [k], Mami Fujibayashi PhD [l], Naoyuki Ebine PhD [b], Mitsuyoshi Yoshida DDS, PhD [m], Takeshi Kikutani DDS, PhD [n], Eiichi Yoshimura RD, PhD [o], Kazuko Ishikawa-Takata RD, PhD [p], Minoru Yamada RPT, PhD [q], Tomoki Nakaya PhD [r], Yasuko Yoshinaka MS [e], Yoshinori Fujiwara MD, PhD [s], Hidenori Arai MD, PhD [t], Misaka Kimura PhD [h]

[a] *Department of Nutrition and Metabolism, National Institutes of Biomedical Innovation, Health and Nutrition, Tokyo, Japan*
[b] *Faculty of Health and Sports Science, Doshisha Unviersity, Kyotanabe, Japan*
[c] *Graduate School of Science and Technology, Kyoto Institute of Technology, Kyoto, Japan*
[d] *Senior Citizens' Welfare Section, Kameoka City Government, Kameoka, Japan*
[e] *Department of Business Administration, Kyoto Gakuen University, Kameoka, Japan*
[f] *Department of Health, Sports and Nutrition, Kobe Women's University, Kobe, Japan*
[g] *Faculty of Data Science, Shiga University, Hikone, Japan*
[h] *Department of Health and Sports Sciences, Kyoto Gakuen University, Kameoka, Japan*
[i] *Faculty of Nursing, Doshisha Women's College of Liberal Arts, Kyotanabe, Japan*
[j] *Nikko Medical Center, Dokkyo Medical University, Nikko, Japan*
[k] *Kyoto Prefectural University of Medicine, Kyoto, Japan*
[l] *Division of Physical and Health Education, Setsunan University, Osaka, Japan*
[m] *Department of Advanced Prosthodontics, Institute of Biomedical & Health Sciences, Hiroshima University, Hiroshima, Japan*
[n] *Division of Rehabilitation for Speech and Swallowing Disorders, Nippon Dental University, Tokyo, Japan*
[o] *Department of Food and Health Sciences, Prefectural University of Kumamoto, Kumamoto, Japan*
[p] *Department of Nutritional epidemiology and Shokuiku, National Institute of Biomedical Innovation, Health and Nutrition, Tokyo, Japan*
[q] *Graduate School of Comprehensive Human Sciences, University of Tsukuba, Tokyo, Japan*
[r] *Department of Geography and Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University, Kyoto, Japan*
[s] *Research Team for Social Participation and Community Health, Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan*
[t] *National Center for Geriatrics and Gerontology, Morioka-cho, Obu, Aichi, Japan*

Keywords:
Long-term care insurance
prospective cohort
study design
prevalence
frailty
Kihon Checklist

A B S T R A C T

Objective: The Kyoto-Kameoka Study was launched in 2011–2012 to identify the associations among food intake, nutritional status, physical activity, oral function, quality of life or social capital, the use of long-term care insurance (LTCI) system, and healthy lifespan in community-dwelling older people as a part of the World Health Organization Safe Community program.
Design: A prospective cohort study, reporting baseline demographics (cross-sectional data).
Setting and participants: We conducted 2 mailed self-administered questionnaire surveys; one is a complete population survey with a comprehensive survey of needs in the sphere of daily life (NSDL) that included 2 different frailty indexes, the Kihon Checklist (KCL) and the Fried phenotype, socioeconomic

Y. Yamada and H. Nanri contributed equally as first authors.

The Kyoto-Kameoka Study was made possible by JSPS KAKENHI with a research grant provided to M.K. (24240091) and Y.Y. (15H05363); grant and administrative support from Kyoto Prefecture Community-Based Integrated Elderly Care Systems Promotion Organization since 2011; grant and administrative support from Kameoka City under the program of Long-term Care Insurance and Planning Division Health and Welfare Bureau for the Elderly of the Ministry of Health, Labor, and Welfare and the WHO Collaborating Center on Community Safety Promotion.

* Address correspondence to Yosuke Yamada, PhD, Department of Nutritional Science, National Institute of Health and Nutrition, National Institutes of Biomedical Innovation, Health and Nutrition, 1-23-1 Toyama, Shinjuku-ku, Tokyo 162-8636, Japan.
E-mail address: yamaday@nibiohn.go.jp (Y. Yamada).

http://dx.doi.org/10.1016/j.jamda.2017.02.022

status, general and psychological health, and social relationships; followed by the more detailed Health and Nutrition Survey. A slightly modified NSDL survey was conducted again in 2013. Survival time, LTCI certification, and medical and long-term care costs after the baseline survey will be followed.

Results: Of 18,231 NSDL questionnaires distributed, 13,294 people responded (response rate: 72.92%; mean age 73.7 ± 6.4 and 75.1 ± 7.2 years for men and women, respectively; 12,054 people without and 1240 with LTCI certification). In people without LTCI, the proportion of robust, prefrail, and frail were 30.3%, 59.8%, and 9.9% in men and 25.3%, 64.7%, and 10.0% in women, according to the Fried index. The proportion of frail people as defined by KCL ≥7 was 30.8% in men and 33.3% in women.

Conclusions: The study is the first to document frailty prevalence using both Fried and KCL measures with a complete city population survey among older Japanese in the community as a part of World Health Organization Safe Community program. The study is expected to provide valuable evidence of the effects of lifestyle habits on long-term care prevention and healthy life span.

The world population of older people has just exceeded that of children younger than 5 years of age, and more people are living longer and to more extreme ages than ever before.[1] The prevalence of frailty increases with age [2,3]; therefore, the total worldwide population of frail elderly and those needing long-term care is predicted to increase dramatically.[4–6]

The Japanese national and local governments have been enforcing policies related to aging,[7] and the long-term care insurance (LTCI) system was implemented in 2000 and revised in 2005 to place emphasis on care prevention. The integrated community care system was introduced as of the LTCI system's 2011 revision. The system aims to promote inclusive support for healthcare and care prevention, so that the elderly can live independently and for as long as possible at their current residence.

Kameoka City, Kyoto Prefecture, is a very unique city because it has been certified as the first Safe Community in Japan since 2006 by the World Health Organization (WHO) initiative.[8,9] As an International Safe Community, Kameoka City has to play the leading role to promote safety as well as health (eg, injury, violence, suicide prevention covering all age groups, genders, and areas) in a part of an international network. The city government must monitor injury records including falls, accidents, suicides, and ambulance service for elderly people and must try to decrease their occurrences. Thus, the city government collaborates with the government of Kyoto prefecture as well as many collaborative universities and national research institutes.

The Kyoto-Kameoka Study was initiated in 2011 as a prospective cohort study of falling/freak accidents and reduction in the need for long-term care among community-dwelling elderly. This study was carried out based on a complete survey of needs in the sphere of daily life (NSDL) created by the Ministry of Health, Labor, and Welfare (MHLW) as a baseline survey for people aged 65 years and over. The survey includes 2 nationally used frail indexes: the 25-item Kihon Checklist (KCL)[10–15] and the 5-item Fried frailty phenotype measure.[2,16] The MHLW stresses the importance of population approaches to address preventive care needs that have arisen in Japanese communities because of the rapid increase in the elderly population. The MHLW released a manual for the prevention of care-need status in older adults, which includes improvement of physical, oral, and cognitive function; nutritional status; homebound status and social relationships; and depression. Several empirical publications related to this manual have been produced.[17–24] Most recently, Toyama et al[22] documented that the Japanese dietary pattern was associated with a decreased risk of incident dementia in older Japanese people. However, the complex interactive effects between them on healthy lifespan is still unknown.

Collaborating with city and prefectural governments, and using previously well-validated questionnaires, we conducted a more detailed additional survey, linked with the baseline survey, about the environment for activities of daily living (ADL),[25,26] general and mental health,[27] geriatric depression,[28] sleep quality,[29] oral health,[30,31] nutrition status,[32] and food intake frequency.[33–36] Furthermore, the follow-up survey has been also completed after 2 years in this cohort. This cohort profile paper describes the research design and properties of the participants who were investigated in the baseline survey and reveals the prevalence of frailty based on the KCL and on the frailty phenotype.

Methods

Study Design, Setting, and Participants

We organized the Kyoto-Kameoka (cohort) Study in cooperation with Kameoka City as a part of the WHO Safe Community program. In this prospective cohort study, the source population for the baseline survey comprised community-dwelling individuals aged 65 years or older who lived in Kameoka City, Kyoto Prefecture, Japan. Kameoka City is located in the central area of Kyoto Prefecture and is about 25 km west of Kyoto City (Figure 1). The land area of the city is 224.90 km^2. As of July 1, 2012, it had a population of 93,306, with 19,424 (20.8%) of individuals 65 years of age or older.

The survey was conducted by postal mail (Figure 2). Details of study participants are shown in Figure 3. First, the NSDL survey (baseline survey) was conducted on July 29, 2011. The source population of people aged 65 years and older comprised 19,424 persons, as of July 1, 2011. From this sample, people with long-term care certification level ≥3 and those who died or were living outside the city between July 1 and July 28, 2011, were excluded. Eligible candidates were recruited with their name, sex, date of birth, and address on the resident register in the city office. Those who responded to a mail survey conducted by the Kameoka City office were enrolled in the study. A total of 18,231 people were invited to participate, and 13,294 responded (a total response rate: 72.92%: 12,054 people without and 1240 with LTCI certification, 73.2% and 70.6% respectively; Figure 4).

The Health and Nutrition Survey (additional survey) was conducted on February 14, 2012 (Figure 3). After 1240 people with long-term care certification levels 1–2 and certification of needed support levels 1–2, and 69 people who had died between July 29, 2011 and February 13, 2012 were excluded, a total of 11,985 people were sent surveys and 8370 responded (response rate: 69.84%). After merging the data from the baseline survey with the data from the additional survey, 30 individuals who could not be identified with certainty and 21 who reported their sex inconsistently on the 2 surveys were excluded. Therefore, 8319 individuals remained as the additional survey sample (valid response rate = 69.41%). There were no incentives to encourage participation in the cohort. For data analysis, we added an identification number to baseline data files, and then deleted participants' names and addresses from those baseline files. Thus, our researchers were able to use only anonymous data.