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Research report

Combined effects of eating alone and living alone on unhealthy dietary behaviors, obesity and underweight in older Japanese adults: Results of the JAGES

Yukako Tani [a], Naoki Kondo [a, *], Daisuke Takagi [a], Masashige Saito [b], Hiroyuki Hikichi [c], Toshiyuki Ojima [d], Katsunori Kondo [c]

[a] Department of Health and Social Behavior/Department of Health Education and Health Sociology, School of Public Health, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan
[b] Department of Social Welfare, Nihon Fukushi University, 5-22-35 Chiyoda, Naka-ku, Nagoya-shi, Aichi 460-0012, Japan
[c] Center for Preventive Medical Science, Chiba University, 1-8-1 Inohana, Chuo-ku, Chiba-shi, Chiba 260-8672, Japan
[d] Department of Community Health and Preventive Medicine, Hamamatsu University School of Medicine, 1-20-1 Handayama, Higashi-ku, Hamamatsu-shi, Shizuoka 431-3192, Japan

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ABSTRACT

We examined whether eating alone is associated with dietary behaviors and body weight status, and assessed the modifying effects of cohabitation status in older Japanese people. Data from the 2010 Japan Gerontological Evaluation Study, with a self-reported questionnaire for 38,690 men and 43,674 women aged ≥65 years, were used. Eating status was classified as eating with others, sometimes eating alone, or exclusively eating alone. We calculated adjusted prevalence ratios (APRs) of unhealthy dietary behaviors, obesity, and underweight, adjusting for age, education, income, disease, and dental status using Poisson regression. Overall, 16% of men and 28% of women sometimes or exclusively ate alone. Among those who exclusively ate alone, 56% of men and 68% of women lived alone. Men who exclusively ate alone were 3.74 times more likely to skip meals than men who ate with others. Among men who exclusively ate alone, those who lived alone had a higher APR than men who lived with others. Compared with subjects who ate and lived with others, the APRs of being obese (BMI ≥ 30.0 kg/m^2) among men who exclusively ate alone were 1.34 (1.01–1.78) in those who lived alone and 1.17 (0.84–1.64) in those who lived with others. These combined effects of eating and living alone were weaker in women, with a potential increase in the APRs among those who ate alone despite living with others. Men who exclusively ate alone were more likely to be underweight (BMI < 18.5 kg/m^2) than men who ate with others in both cohabitation statuses. Eating alone and living alone may be jointly associated with higher prevalence of obesity, underweight and unhealthy eating behaviors in men.

1. Introduction

Population aging is a global trend. In Japan, 32% of the population is aged ≥60 years, the highest rate worldwide (WHO, 2014). Several studies have suggested that social participation and interpersonal interactions are key factors in maintaining the physical and mental abilities of older adults, and reducing mortality (Aida et al., 2011; Glass, de Leon, Marottoli, & Berkman, 1999; Holt-Lunstad, Smith, & Layton, 2010; Takagi, Kondo, & Kawachi, 2013). However, changes in family structures have reduced the interactions among family members in recent decades. In Japan, 4.3% of men and 11.2% of women lived alone in 1980, increasing to 11.1% of men and 20.3% of women in 2010 (Cabinet Office, 2013). There is a concern that older adults who live alone may be vulnerable to developing unhealthy dietary behaviors, such as low vegetable and fruit intake (Conklin et al., 2014).

Eating is a daily activity, and eating with other people, may be an important determinant of physical and mental health (Fulkerson, Larson, Horning, & Neumark-Sztainer, 2014; Goldfarb, Tarver, & Sen, 2014). Eating behaviors might also be affected by cohabitation

Abbreviations: APR, adjusted prevalence ratio; BMI, body mass index; CI, confidence interval; JAGES, Japan Gerontological Evaluation Study.

* Corresponding author.
E-mail address: naoki-kondo@umin.ac.jp (N. Kondo).

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status. People living alone are less likely to have an opportunity to eat with others. Many studies involving shared meals have focused on children and adolescents, and suggest that shared meals may protect against nutritional-related health problems, including obesity, unhealthy eating, and disordered eating (Fulkerson et al., 2014; Hammons & Fiese, 2011). Although several studies among older adults have reported that eating alone is a nutritional risk (Shahar, Shai, Vardi, & Fraser, 2003; Sharkey, 2002), few studies have investigated gender differences and the modifying effects of cohabitation status in older adults.

Using data from a large-scale, population-based, epidemiologic study, we examined the prevalence of eating alone in older Japanese people. Next, we investigated the associations of eating alone with meal skipping and low frequency of vegetable and fruit intake as dietary behaviors. We did so because meal skipping has been found to be associated with an array of unhealthful outcomes, including lower nutrient intake (Redondo et al., 1997), and cardiovascular disease risk (Fabry, Fodor, Hejl, Geizerova, & Balcarova, 1968) among older adults; further, Japanese cohort studies have found low vegetable and fruit intake to be associated with increased risk of cardiovascular disease mortality (Nagura et al., 2009; Okuda et al., 2015; Takachi et al., 2008). Subsequently, we investigated the association of eating alone with not only obesity and dietary behaviors but also underweight. Underweight is a known risk factor for dementia and fracture among older adults (Chen et al., 2010; De Laet et al., 2005; Deschamps et al., 2002). We also examined how cohabitation status, which would influence the likelihood of older adults eating alone, modified the associations of eating alone with body weight status and dietary behaviors.

2. Material and methods

2.1. Study design and subjects

We used data from the Japan Gerontological Evaluation Study (JAGES) performed in 2010. The survey covered 28 municipalities in 11/47 prefectures across Japan. Between August 2010 and January 2012, self-reported questionnaires were mailed to 160,382 community-dwelling individuals aged ≥65 years who were physically and cognitively independent (i.e., they were not receiving any benefits from public long-term care insurance). The survey was conducted using a random sampling method in 15 large municipalities and administered to all eligible residents in the 13 small municipalities. A total of 106,460 subjects returned the questionnaire. The present analyses were carried out using data for 83,364 subjects (38,690 men and 43,674 women), after excluding the following subjects: subjects whose information on sex and age were missing; and subjects who did not complete the questions related to eating status, cohabitation status, height, weight, and dietary behaviors; or medical treatment for cancer, heart disease, stroke, hypertension, diabetes mellitus, hyperlipidemia, osteoporosis, gastrointestinal disease, and dysphagia. Furthermore, subjects who reported limitations in activities of daily living, defined as being unable to walk, take a bath, or use the toilet without assistance (Katz, Downs, Cash, & Grotz, 1970) were also excluded to control for people who were eating alone because of these limitations. The JAGES protocol was approved by the Ethics Committee in Research of Human Subjects at Nihon Fukushi University (No. 10-05). The use of the data was approved by the Ethics Committee of The University of Tokyo, Faculty of Medicine (No. 10555).

2.2. Body weight and diet status

Subjects reported their height and weight in centimeters and kilograms, respectively. Standard categories of BMI (WHO, 2000) were used to characterize subjects as obese (BMI ≥ 30.0 kg/m^2), overweight (BMI = 25.0–29.9 kg/m^2), normal (BMI = 18.5–24.9 kg/m^2), and underweight (BMI < 18.5 kg/m^2). Although this categorization was not specifically developed for older adults, a recent Japanese cohort study reported that both BMI < 18.5 kg/m^2 and BMI ≥30 kg/m^2 were associated with increased risk for mortality among older adults (Matsuo et al., 2008). Dietary factors were assessed by the self-reported questionnaire. Daily meal frequency was assessed using the question "How many meals do you have a day?", for which the responses were "one", "two", "three" or "four or more often", which were used to determine whether the subject regularly ate three meals or skipped meals. Skipping meal was defined as under two times a day because about 95% of the subjects ate three or more times a day (Table 1). The frequency of vegetable and fruit intake was assessed using the question "How often did you eat vegetables and fruit over the past month?", for which the responses were "not at all", "less than once a week", "once a week", "two to three times a week", "four to six times a week", "once a day", or "at least twice a day." Respondents who ate vegetables and fruit less than once a day were categorized as having a low frequency of vegetable and fruit intake. This cutoff point was defined by prevalence to be under 25% of subjects included (Table 1) because the lowest quartile of low vegetable and fruit intake was associated with poor health outcomes (Nagura et al., 2009; Okuda et al., 2015; Takachi et al., 2008).

2.3. Eating and living status

Eating status was assessed using the question "Who do you usually have meals with?" for which the responses were "No

Table 1
Characteristics of subjects and the prevalences of meal skipping, low frequency of vegetable and fruit intake, obesity, overweight and underweight in older Japanese men and women.

		Males (n = 38,690)		Females (n = 43,674)	
		n	%	n	%
Age (years)					
65–69		12,139	31.4	12,975	29.7
70–74		11,380	29.4	12,943	29.6
75–79		8510	22.0	9656	22.1
≥80		6661	17.2	8100	18.6
Eating status					
Eat with others		32,389	83.7	31,509	72.2
Sometimes eat alone		2120	5.5	3312	7.6
Exclusively eat alone		4181	10.8	8853	20.3
Living status					
Living with others		36,023	93.1	36,350	83.2
Living alone		2667	6.9	7324	16.8
Eating and living status					
Eat with others	Live with others	32,277	83.4	31,183	71.4
	Live alone	112	0.3	326	0.8
Sometimes eat alone	Live with others	1909	4.9	2299	5.3
	Live alone	211	0.6	1013	2.3
Exclusively eat alone	Live with others	1837	4.8	2868	6.6
	Live alone	2344	6.1	5985	13.7
Body weight status (BMI, kg/m^2)					
Obesity (≥30.0)		688	1.8	1217	2.8
Overweight (25.0–29.9)		7961	20.6	8113	18.6
Normal (18.5–24.9)		27,929	72.2	30,516	69.9
Underweight (<18.5)		2112	5.5	3828	8.8
Daily meal frequency (n/day)					
≥ 3		36,717	94.9	42,248	96.7
≤2 (meal skipping)		1973	5.1	1426	3.3
Frequency of vegetable/fruit intake (n/day)					
≥1/day		29,180	75.4	37,020	84.8
< 1/day (low vegetable/fruit intake)		9510	24.6	6654	15.2

BMI = body mass index.