Maturitas 76 (2013) 160–164

Contents lists available at ScienceDirect

Maturitas

journal homepage: www.elsevier.com/locate/maturitas

Dietary patterns and functional disability in older Korean adults

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ARTICLE INFO

Article history:
Received 29 March 2013
Received in revised form 2 July 2013
Accepted 8 July 2013

Keywords:
Diet
Dietary patterns
Disability
Older adults

ABSTRACT

Objectives: This study examined the relationship between dietary patterns and disability in the Korean elderly.
Study design: We used data from a cross-sectional study of 327 men and 460 women aged ≥65 years who completed the 2005 Korea National Health and Nutrition Examination Survey.
Main outcome measures: A single 24-h dietary recall method was used to assess dietary intake and dietary patterns were identified by cluster analysis. Functional disability was assessed by the activities of daily living (ADL) and instrumental ADL (IADL) scales. The association of dietary patterns with ADL and IADL disability was analyzed by logistic regression adjusting for age, marital status, education, household income, region, chronic conditions, body mass index, smoking, alcohol drinking, physical activity, and energy intake.
Results: Two dietary patterns were identified in both men and women: the modified traditional dietary pattern, characterized by a relatively lower consumption of white rice, but higher consumption of fruits, dairy products, and legumes, and the traditional dietary pattern, characterized by high consumption of white rice. After controlling for covariates, in men, those who engaged in modified traditional dietary pattern, compared with traditional dietary pattern, showed a lower likelihood of ADL disability (odds ratio [OR] = 0.17, 95% confidence interval [CI]: 0.05–0.56). In women, the modified traditional dietary pattern compared with the traditional pattern was associated with a significantly decreased risk of ADL (OR = 0.45, 95% CI: 0.23–0.90) and IADL disability (OR = 0.45, 95% CI: 0.28–0.72).
Conclusions: The modified traditional dietary pattern is associated with a decreased risk of functional disability in older Korean adults.

1. Introduction

Korea's population is rapidly aging, with those aged 65 years or older comprising 11.8% of the total population in 2012, and it is projected to increase to 32.3% by 2040 [1]. With aging of the population disability has become a critical public health issue. Disability is a well-known predictor of health care utilization, institutionalization, and mortality in the elderly and can lead to poor quality of life [2]. Maintaining high physical function is, therefore, considered a major contributor to successful aging [3].

Diet is discussed as an important modifiable risk factor of functional disability [4]. Previous epidemiological studies have examined single foods or nutrients in relation to disability [5,6]. However, because people usually consume various foods with complex combinations of nutrients through meals it is difficult to examine the effects of a single nutrient on health outcomes. The dietary pattern approach, which examines the overall diet, is an alternative method that can better characterize foods and nutrients consumed in combinations [7]. Only few studies have assessed dietary patterns and their relationship with disability. In a study of French women aged 65 and over, greater adherence to the Mediterranean diet was predictive of less functional disability [8]. In the NHANES, Healthy Eating Index-2005 (HEI-2005) scores were associated inversely with disability among older Americans [9].

Abbreviations: KNHANES, Korea National Health and Nutrition Examination Survey; ADL, activities of daily living; IADL, instrumental ADL; HEI-2005, Healthy Eating Index-2005; KDRIs, dietary reference intakes for Koreans.

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http://dx.doi.org/10.1016/j.maturitas.2013.07.011

Dietary patterns of older people in Asia tend to differ from those in western countries. Asian populations, including Koreans, typically consume rice as a staple food and high plant foods [10,11]. Thus, results from previous studies may not directly apply to Asian countries, including Korea. Moreover, the relationship between dietary patterns and disability among the older Korean population is not established. The aim of the current study was to examine the association between dietary patterns and functional disability in older Korean adults, using a nationally representative data source.

2. Methods

2.1. Study population

Data came from a cross-sectional study of the 2005 Korea National Health and Nutrition Examination Survey (KNHANES) of non-institutionalized residents in the Republic of Korea, conducted by the Korea Centers for Disease Control and Prevention. Detailed information of the survey design is provided elsewhere [12]. KNHANES employs a multistage cluster sampling for the selection of household units. Prior to the survey, all participants signed the informed consent forms.

KNHANES is composed of four surveys: the Health Interview Survey, Health Behavior Survey, Health Examination Survey, and Nutrition Survey. Among the 3730 aged ≥65 years who completed the Health Interview Survey one third was randomly selected to participate in the other surveys. The study sample consisted of 796 (330 men, 466 women) aged ≥65 years who completed four surveys. We excluded those with missing values on marital status (1 men), household income (2 women), and anthropometric measures (2 men, 4 women). The final sample for the analysis comprised of 327 men and 460 women.

2.2. Dietary assessment

Dietary intake was assessed by an interviewer-administered, single 24-h dietary recall. Trained staffs instructed the participants to describe all the foods and beverages they consumed in the previous day. Food models, bowls, cups, and spoons were used to assist in estimating portion sizes. To conduct a dietary pattern analysis, individual foods were consolidated into 16 food groups based on the food groups classified in the food composition table [13]: grains and grain products, potatoes and starches, sugar and sweets, legumes, nuts and seeds, vegetables, mushrooms, fruits, meat and its products, eggs, fish and shellfish, seaweeds, milk and dairy products, oils, beverages, and seasoning. The food groups were then reconsolidated into 20 food groups. Because the intake of grains and grain products is high in Koreans, this food group was divided into four subgroups [14]: white rice, other grains, noodles and dumpling, and flour and bread. Because kimchi (traditionally fermented cabbage) is a national side dish in Korea it was separated into a single vegetable group. Mushrooms were included as vegetables and alcohol was separated from the beverages. Energy and nutrient intake of each food was calculated using the food composition table [13] and summated up for each food group. The percentage of energy contributed by each food group was calculated and used in the dietary pattern analysis.

2.3. Functional disability

Functional disability included the activities of daily living (ADL) and instrumental ADL (IADL). Disability in ADL was assessed by 7 items: dressing, washing, bathing, eating, transferring, using the toilet, and incontinence. Disability in IADL was assessed by 10 items: grooming, housework, preparing meals, doing laundry, going outside, using public transportation, shopping, managing money, using the telephone, and taking medicine. The response options to individual items included no difficulty, some difficulty, were unable, or did not do the activities (never done in life or can do the activity but chose not to), without other's help or use of aids. Individual responses were dichotomized as either not disabled (0 = no difficulty or did not perform the activity) or disabled (1 = some difficulty or unable to do). ADL or IADL disability was defined as disabled in one or more ADL or IADL items.

2.4. Covariates

Sociodemographics included age (65–74, ≥75 years), marital status (married vs. not married, including single, widowed, divorced, or separated), education (less than elementary school vs. elementary school or higher), monthly household income (<50, 50–99, ≥100 in ten thousand Korean won), region (rural, city, or metropolitan), and physician-diagnosed chronic conditions (diabetes mellitus, hypertension, stroke, angina or myocardial infarction, and arthritis). Smoking status (never, former, or current), drinking of alcoholic beverages (never, former, or current), and physical activity were obtained by self-report. Physical activity was categorized as sedentary, low (below the recommended level), and recommended (≥150 min/week of moderate-intensity and/or ≥75 min/week of vigorous-intensity aerobic physical activity) [15]. Body mass index (BMI) was calculated as measured weight (kg) divided by height squared (m^2).

2.5. Statistical analysis

All data were analyzed using IBM SPSS Statistics 19.0 (International Business Machines Corp. Armonk, NY, USA), taking into account the survey's complex sampling design. Because gender differences in disability have been widely reported [16], and a significant interaction between dietary patterns and gender with respect to disability was observed in our data, all analyses were performed separately by gender.

Cluster analysis was conducted using the *K*-means method to generate the dietary patterns. The descriptive characteristics of the study population were presented as mean and standard deviation (SD) or percentage. Difference in percentage of energy from food groups and in nutrient intake by dietary patterns was analyzed using the *t* test. Difference of participants' characteristics between dietary patterns was determined using the *t* test for continuous variables and chi-square test for categorical variables. Using logistic regression analysis, risks of functional disability, with the traditional dietary pattern as the reference group, were shown as odds ratio (OR) with 95% confidence interval (CI), adjusting for covariates. Significance was defined as 2-sided *P* value < 0.05.

3. Results

3.1. Percentages of energy from food groups and daily nutrient intakes by dietary patterns

In men, the modified traditional dietary pattern (41.6%) and traditional dietary pattern (58.4%) were identified by cluster analysis (Table 1). The modified traditional dietary pattern received 34% of energy from white rice and consumption of most food groups was significantly higher in this pattern than in the traditional dietary pattern. In contrast, the traditional dietary pattern received 67% of energy solely from white rice and consumption of white rice and kimchi in this pattern was significantly higher, compared with the modified traditional pattern. With respect to nutrients, men in the traditional dietary pattern, compared with the modified traditional dietary pattern, showed a significantly higher percentage of energy from carbohydrate (more than 75% of energy) but lower