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Diet Quality and Associated Factors Among Eldercare Workers in Long-Term Care Facilities

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Abstract

Background: Eldercare workers have a higher prevalence of poor health status, especially in terms of dietary behavior, than general workers. Therefore, the objective of this study was to investigate diet quality and related factors among eldercare workers in long-term care facilities.

Methods: We conducted a cross-sectional study on 466 employees in seven long-term care facilities. All participants completed a brief food frequency questionnaire. Diet quality was assessed using three indexes: the American Heart Association healthy diet score (AHA-HDS), the World Health Organization healthy diet index (WHO-HDI), and the Mediterranean diet score (MDS).

Results: Eldercare workers had significantly lower AHA-HDS and MDS than general workers. Although no differences were seen between the two groups in WHO-HDI scores, a significant positive association was found between all three indexes and combined healthy lifestyle scores (sum of four items: no overweight/obesity, no smoking, adequate alcohol intake, and regular exercise).

Conclusions: This is the first study to report that AHA-HDS and MDS are low in eldercare workers compared with general workers. Assessing dietary quality and improving adherence to healthier dietary patterns in eldercare workers could therefore be expected to aid health promotion.

Keywords: Diet quality; Eldercare; Mediterranean diet

Abbreviations

AHA-HDS: American Heart Association Healthy Diet Score; BDHQ: Brief Self-administered diet History Questionnaire; BMI: Body Mass Index; DASH: Dietary Approaches to Stop Hypertension; MDS: Mediterranean Diet Score; WHO-HDI: World Health Organization Healthy Diet Index

Introduction

The eldercare working environment can be burdensome and stressful, especially for elderly residents with dementia [1]. Several studies have reported that adverse working conditions in eldercare, such as stress, a heavy workload, and working in an uncomfortable posture may contribute to an unhealthy lifestyle [2,3]. Job strain has also been linked to unhealthy dietary habits because stress induces food selection changes, uncontrolled eating, intake of high-calorie snacks, and more frequent consumption of fast food [4,5]. It is therefore important to pay more attention to dietary behavior among caregivers and healthcare staff. However, only a few studies have examined dietary behavior in such populations; these studies have reported finding reduced intake of fruits and vegetables [6,7], high-fat diets [6], high intake of sweets [7], and poor dietary diversity [8]. Traditional approaches focusing on specific foods or nutrients were used in these studies, but the findings may be problematic because people consume meals consisting of a variety of foods and complex combinations of nutrients [9]. Recently, increasing comprehensive approaches have emerged to investigate diet quality, resulting in the proposal of several new diet quality indexes and reports of an association between diet quality and health [10]. However, evidence demonstrating an association between diet quality and work settings is limited [11,12], with only one study finding an association between adherence to the dietary approaches to stop hypertension (DASH) diet and obesity among female nurses [13]. To our knowledge, no studies have assessed overall diet quality among eldercare workers. Therefore, the objective of this study was to investigate diet quality and related factors among eldercare workers in long-term care facilities.

Methods

Participants

A total of 478 employees at seven long-term care facilities (five nursing homes and two group-living facilities for dementia care) were recruited into this cross-sectional study. After excluding eight participants who had implausibly low or high estimated caloric intake (<700 or >4500 kcal per day for men and <600 or >3500 kcal per day for women, respectively), and four who had incomplete information, 466 were finally included in the analysis. The participants were then divided into the following two groups: eldercare workers (n=343; 309 formal caregivers, 28 nurses, and six assistants) and general workers

(n=123; primarily office workers, plus a few kitchen staff, dietitians, janitorial staff, and drivers from the same facilities). The study protocol was approved by the institutional review board of Kio university and written informed consent was obtained from all participants.

Dietary assessments

Habitual food consumption and nutrient intake were assessed using a brief self-administered diet history questionnaire (BDHQ) [14]. The BDHQ used in this study was a 4-page fixed-portion questionnaire; food and beverage items were selected from foods commonly consumed in Japan, mainly from the food list used in the national health and nutritional survey of Japan [15]. The questionnaire was composed of items on the frequency of consumption of 58 different foods and beverages and required participants to recall their dietary habits over a 1-month period. Participants were asked to indicate how often they had consumed a variety of specific foods over the past month (never, less than once a week, once a week, 2-3 times a week, 4-6 times a week, once-daily, or more than twice a day). Combined with standard serving sizes, the intake frequencies were converted into average daily intake for each food item. Nutrient and energy intake values were then estimated based on questionnaire responses and the corresponding food composition list in the standard tables of food composition in Japan [16].

American Heart Association Healthy Diet Score (AHA-HDS)

The American Heart Association (AHA) developed five components for a healthy diet score [17]. In this study, the AHA healthy diet score (AHA-HDS) was modified for the Japanese population to include the following five components: ≥4.5 servings of fruits and vegetables per day, ≥2 servings of fish (at least one oily fish) per week, whole grain intake as ≥25% of total grain consumption, <8 g of salt intake per day for men and <7g for women (following Japanese dietary reference intake values), and <1,065 g of sugar-sweetened beverages per week (equivalent to the original AHA definition of <36 oz per week). This resulted in scores ranging from 0-5.

World Health Organization Healthy Diet Index (WHO-HDI)

The WHO-HDI consists of one food group and eight nutrient components, including fruits and vegetables, carbohydrates, saturated fatty acids, polyunsaturated fatty acids, cholesterol, protein, fiber, free sugar, and sodium [18]. When an intake value was within the range recommended by WHO guidelines [19], a score of 1 was assigned; otherwise, participants received a score of 0. This resulted in scores ranging from 0-9.

Mediterranean diet score (MDS)

According to positions in the updated Mediterranean diet pyramid [20], we constructed an MDS adapted to the Japanese population, as has been described elsewhere [21]. Briefly, the MDS included the following 13 components: fruits, vegetables, grains, legumes, fish, red meat and processed meat, dairy products, potatoes, eggs, poultry, sweets, alcohol, and the ratio of monosaturated to saturated fatty acids. Values of 0 or 1 were assigned for each component, resulting in scores ranging from 0-13.

Other variables

Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters, and overweight/obesity was defined as BMI ≥25 kg/m^2. Self-reported questionnaires were used to assess current smoking status (yes, no) and regular exercise (≥30 minutes of sweat-inducing exercising at least 2 days a week). Adequate alcohol intake was defined as 10 g to 30 g per day for men and 5 g to 15 g per day for women. Finally, we developed a combined healthy lifestyle score comprising the following four components: not overweight/obese, no smoking, gets regular exercise, and has adequate alcohol intake. A total score was generated for each item (scored 1 or 0), and the sum of the items resulted in a combined healthy lifestyle score (range 0-4).

Statistical Analysis

Data are presented as means ± standard deviations or percentages. Differences between groups in mean values of continuous variables were tested using the Students t test, and percentages were compared using chi-square analysis. Differences in nutrient intake, food consumption, and diet quality scores between eldercare and general workers were adjusted for age, and then the age-adjusted means for these dietary variables were compared between groups using analysis of covariance. Linear trends across the graded categories were evaluated with categorical grade as a continuous variable using Spearman's correlation coefficient. Values of $p<0.05$ were considered statistically significant. All statistical analyses were performed using SPSS (version 21.0; IBM Corp, Armonk, NY).

Results

The participants' characteristics, nutrient intake, food intake, and scores on the three diet quality indexes are shown in Table 1. Mean age was higher in general workers than in eldercare workers, but BMI was similar between the two groups. Total fat and saturated fatty acid intakes and sweets consumption were significantly lower, and sugar-sweetened beverage consumption was significantly higher, in eldercare workers than in general workers. Eldercare workers had significantly lower AHA-HDS and MDS than general workers. On the other hand, no differences were seen in WHO-HDI scores between the two groups.

Table 2 shows the factors related to diet quality in eldercare workers. Men had lower AHA-HDS than women, and younger subjects had lower AHA-HDS and MDS than older subjects. Smokers also had lower AHA-HDS and WHO-HDI scores than nonsmokers. Adequate alcohol intake was related to a higher MDS. A significant positive association was observed between all three diet quality indexes and combined healthy lifestyle scores.

Discussion

Eldercare workers have a higher prevalence of poor health status, especially in terms of dietary behavior, than general workers [22]. Previous studies have reported that stress is associated with more frequent consumption of sweets and reduced consumption of fruits and vegetables [23].

	Eldercare workers	General workers	p
n	343	123	-
Age (years)	41.2 ± 12.4	45.9 ± 12.2	<0.001
Women (%)	72.6	75.6	0.517
Body mass index (kg/m^2)	22.2 ± 3.6	22.5 ± 3.3	0.456
Nutrient intake			
Total energy (kcal/day)	1845 ± 647	1778 ± 655	0.306 *
Protein (% energy)	14.5 ± 2.8	14.7 ± 2.8	0.562 *
Fat (% energy)	25.9 ± 5.7	27.2 ± 5.8	0.042 *
Carbohydrates (% energy)	54.3 ± 7.8	54.3 ± 8.8	0.956 *
Saturated fatty acids (% energy)	7.04 ± 2.04	7.51 ± 1.99	0.028 *
Salt (g/day)	12.3 ± 2.9	12.0 ± 3.0	0.350 *
Food consumption			
Grains (g/day)	481 ± 178	471 ± 180	0.589 *
Vegetables (g/day)	256 ± 135	277 ± 135	0.143 *
Fruits (g/day)	115 ± 120	100 ± 121	0.223 *
Meat (g/day)	85 ± 42	89 ± 43	0.443 *
Fish (g/day)	85 ± 50	81 ± 49	0.447 *
Dairy products (g/day)	142 ± 124	152 ± 124	0.453 *
Sweets (g/day)	54 ± 42	64 ± 43	0.032 *
Sugar-sweetened beverage (g/day)	129 ± 177	77 ± 179	0.006 *
Diet quality indexes			
AHA-HDS	1.97 ± 0.92	2.22 ± 1.00	0.019 *
WHO-HDI	4.07 ± 1.11	3.97 ± 1.22	0.393 *
MDS	5.08 ± 1.67	5.42 ± 1.55	0.044 *

Data are expressed as mean ± standard deviation (SD) or %. * p-value adjusted by age.

AHA-HDS, American Heart Association Healthy Diet Score; WHO-HDI, World Health Organization Healthy Diet Indicator; MDS, Mediterranean diet score.

Table 1: Participants' characteristics, nutrient intake, food intake, and scores on the three diet quality indexes used in this study.

In the present study, the consumption of sugar-sweetened beverages was higher among eldercare workers than general workers, but no differences were seen between groups in the consumption of fruits and vegetables. Conversely, although previous studies reported that individuals ingest more fat following exposure to stress [4,5], in the present study, we found that eldercare workers consumed significantly lower amounts of sweets, total fat, and saturated fatty acids than general workers. These findings might be explained by the fact that eldercare workers experience both physical fatigue and mental stress, and these conditions may affect dietary behavior, such as promoting a preference for lighter foods or sugar-sweetened drinks, or an avoidance of greasy/oily foods such as Western-style confectioneries or high-fat snacks.

Recently, the use of diet quality index has emerged as an alternative to single food- or nutrient-based approaches to examine associations between dietary behavior and health [10]. The primary strength of our study was the use of comprehensive measures of diet quality that can provide a more accurate picture of overall dietary habits. This approach allows information regarding food and nutrient consumption to be combined into a simple numerical score.

Factor		n	AHA-HDS	p	WHO-HDI	p	MDS	p
Sex	Male	94	1.73 ± 1.03	0.023	4.18 ± 1.02	0.275	5.29 ± 1.69	0.106
	Female	249	2.02 ± 1.03		4.03 ± 1.20		4.97 ± 1.59	
Age (years)	≥50	93	2.31 ± 0.86	0.001	4.15 ± 1.14	0.432	5.39 ± 1.55	0.021
	<50	250	1.80 ± 1.07		4.04 ± 1.16		4.93 ± 1.65	
Obesity	Yes	69	1.88 ± 0.92	0.607	3.94 ± 1.26	0.304	4.75 ± 1.50	0.085
	No	274	1.96 ± 1.07		4.10 ± 1.13		5.13 ± 1.65	
Smoking	Yes	106	1.63 ± 0.99	0.001	3.83 ± 1.02	0.010	5.05 ± 1.63	0.950
	No	237	2.08 ± 1.03		4.18 ± 1.20		5.06 ± 1.63	
Adequate alcohol intake	Yes	31	2.00 ± 1.21	0.744	4.32 ± 1.25	0.202	5.74 ± 1.63	0.014
	No	312	1.94 ± 1.02		4.04 ± 1.14		4.99 ± 1.62	
Regular exercise	Yes	127	1.96 ± 1.04	0.856	4.11 ± 1.18	0.648	5.06 ± 1.68	0.948
	No	215	1.94 ± 1.03		4.05 ± 1.14		5.05 ± 1.61	
CHLS	0-1	99	1.76 ± 1.83	0.001*	3.90 ± 2.13	0.034*	4.95 ± 2.99	0.010*
	2	160	1.99 ± 1.44		4.01 ± 1.68		5.00 ± 2.35	
	3-4	84	2.06 ± 1.99		4.38 ± 2.31		5.29 ± 3.26	

Data are expressed as means ± SD. * p-value adjusted for age and sex. AHA-HDS, American Heart Association Healthy Diet Score; WHO-HDI, World Health Organization Healthy Diet Indicator; MDS, Mediterranean diet score; CHLS, combined healthy lifestyle score.

Table 2: Factors related to diet quality in eldercare workers.

We used three indexes to assess diet quality in this study. The first, the AHA-HDS is one component of the AHA's seven metrics for ideal cardiovascular health [17]. It was developed with the aim of reducing cardiovascular disease mortality and improving cardiovascular health by 20% by the year 2020 and beyond [17]. With only five components, this index is very simple and easy to apply in clinical practice. To the best of our knowledge, no previous studies have compared adherence to the AHA-HDS between eldercare and general workers. In the present study, we found that eldercare workers had lower AHA-HDS than general workers. Indeed, it has been recognized that dietary patterns differ by nationality, and traditional Japanese dietary habits differ from those in Western populations. However, the contemporary diet of most Japanese adults has come to resemble Western diets. Therefore, we believe that it is reasonable to assess AHA-HDS in the Japanese population.

The second index, the WHO-HDI, is a tool developed to assess compliance with the WHO's dietary guidelines for the prevention of chronic disease [18]. This index has been used worldwide and studied in relation to all-cause mortality, overall cancer risk, and cardiovascular disease risk [24]; however, no studies have investigated the association between this index and the dietary behaviors of caregivers. In the present study, no differences were seen in WHO-HDI scores between eldercare and general workers. Although the AHA-HDS is based mostly on food groups, the WHO-HDI is primarily based on nutrients, except for the component for consumption of fruits and vegetables. This indicates that that dietary behavior among eldercare workers might be more strongly associated with diet quality based on food groups.

The third index, the MDS, is widely known for its use in assessing the habitual intake of a Mediterranean-style diet. It could be said that Japanese people have not adopted a Mediterranean-style diet, and little is known about habitual adherence to such a diet in Japan [25]. However, it is well documented that Japanese people traditionally eat high quantities of fish, vegetables, and legumes, and low quantities of meat. Some components of this dietary pattern are similar to that of a Mediterranean-style diet. We therefore speculate that a considerable number of Japanese people might adhere to a Mediterranean-style diet. We demonstrated that Japanese eldercare workers had significantly lower MDS than general workers. A Mediterranean-style diet includes high levels of antioxidants and anti-inflammatory compounds, and its beneficial effects include a reduction of risk for metabolic and cardiovascular diseases. There is little doubt that the habitual intake of a Mediterranean-style diet provides significant health benefits [26]. This suggests that eldercare workers with low adherence to a Mediterranean-style diet should be encouraged to adopt healthier dietary behaviors.

In the present study, all diet quality indexes were significantly associated with a combined healthy lifestyle score. This means that eldercare workers with an adherence to high quality diet may have a healthy lifestyle. There has been a growing interest in the combined impact of habitual healthy behaviors on overall health [27]. Previous studies also reported an association between diet quality and a clustering of healthy lifestyles [28,29]. But, causality between diet quality and other healthy behaviors cannot be drawn from the present study. Further study is needed to determine the association between

the combined lifestyle factors including diet quality and health outcomes in eldercare workers.

This study did have several limitations. First, because this was a cross-sectional study, the analysis cannot prove a causal relationship between the dietary quality indexes and the healthy lifestyles of eldercare workers. Second, because our results only showed associations among workers at a small number of long-term care facilities, our findings may not be generalizable to other care populations in different work areas. Third, chronic stress at work is known to be associated with unhealthy dietary habits, but the present study did not evaluate the degree of caregiver burden. Finally, olive oil is an important component of a Mediterranean-style diet, but Japanese people are known to consume relatively low amounts of olive oil. In addition, the BDHQ used in the present study did not estimate olive oil intake. As opposed to olive oil consumption, we used an indirect parameter, the monounsaturated/saturated fatty acid ratio, which is frequently used in the traditional MDS.

In conclusion, eldercare workers had an overall low diet quality, especially according to the AHA-HDS and MDS. Eldercare workers with low diet quality also had unhealthy lifestyles. Assessing dietary quality and improving adherence to healthier dietary patterns could therefore be expected to aid health promotion among eldercare workers.

Author Contribution

MK designed the study, researched the data and wrote the manuscript. KK contributed to the data collection and the discussion. All authors approved the final version for submission.

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