



Adherence to Dietary Guidelines Positively Affects Quality of Life and Functional Status of Older Adults

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ABSTRACT

Background Nutritional parameters could influence self-perceived health and functional status of older adults.

Objective We prospectively determined the association between diet quality and quality of life and activities of daily living.

Design This was an observational cohort study in which total diet scores, reflecting adherence to dietary guidelines, were determined. Dietary intakes were assessed using a food frequency questionnaire at baseline. Total diet scores were allocated for intake of selected food groups and nutrients for each participant as described in the Australian Guide to Healthy Eating. Higher scores indicated closer adherence to dietary guidelines.

Participants/setting In Sydney, Australia, 1,305 and 895 participants (aged ≥ 55 years) with complete data were examined over 5 and 10 years, respectively.

Main outcome variables The 36-Item Short-Form Survey assesses quality of life and has eight subscales representing dimensions of health and well-being; higher scores reflect better quality of life. Functional status was determined once at the 10-year follow-up by the Older Americans Resources and Services activities of daily living scale. This scale has 14 items: seven items assess basic activities of daily living (eg, eating and walking) and seven items assess instrumental activities of daily living (eg, shopping or housework).

Statistical analyses performed Normalized 36-Item Short-Form Survey component scores were used in analysis of covariance to calculate multivariable adjusted mean scores. Logistic regression analysis was used to calculate adjusted odds ratios and 95% CIs to demonstrate the association between total diet score with the 5-year incidence of impaired activities of daily living.

Results Participants in the highest vs lowest quartile of baseline total diet scores had adjusted mean scores 5.6, 4.0, 5.3, and 2.6 units higher in these 36-Item Short-Form Survey domains 5 years later: physical function ($P_{\text{trend}}=0.003$), general health ($P_{\text{trend}}=0.02$), vitality ($P_{\text{trend}}=0.001$), and physical composite score ($P_{\text{trend}}=0.003$), respectively. Participants in the highest vs lowest quartile of baseline total diet scores had 50% reduced risk of impaired instrumental activities of daily living at follow-up (multivariable-adjusted $P_{\text{trend}}=0.03$).

Conclusions Higher diet quality was prospectively associated with better quality of life and functional ability.

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DIETARY PATTERN ANALYSIS EXAMINES THE OVERALL diet and could have potential advantages.¹ For instance, dietary pattern analysis can capture the complexity of the diet because it accounts for the high correlation among intakes of specific foods or nutrients, which are often interdependent in their bioavailability.¹ Dietary indexes assess diet quality by

grouping foods a priori into a single measure that is representative of current nutrition knowledge in the form of dietary guidelines or other dietary recommendations.² This may be a useful tool in public health practice to assess a population's adherence to current dietary guidelines based on empirical evidence.³ Older adults with poor overall diet quality are likely to have suboptimal levels of nutrition biomarkers; this could negatively affect quality of life and functional independence. For example, individuals with lower diet quality are likely to have an inadequate antioxidant status and greater inflammation, which can lead to an increased risk of a range of chronic conditions⁴ and, in turn, negatively affect health-related quality of life and functional ability.

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Health-related quality of life is an important aspect of physical, social, and mental well-being.⁵ Research regarding the influence of adherence to dietary guidelines on quality of life, however, is limited. A cross-sectional study of adults aged 35 to 74 years showed that greater adherence to a Mediterranean-style dietary pattern was associated with higher self-perceived mental and physical health scores.⁶ Recently, self-perceived mental and physical quality of life was shown to be positively associated with adherence to a Mediterranean-style diet during a 4-year follow-up among 11,015 Spanish adults (aged 18 to 101 years).⁷

Inability to perform instrumental activities of daily living (IADL) (ie, activities required to function in the community such as shopping) and basic activities of daily living (BADL) (eg, eating and washing) often precedes dependency.⁸ Only a handful of population-based studies have assessed the relationship between diet quality and activities of daily living disability. Among middle-aged adults, lower dairy, fruit, and vegetable consumption was associated with poorer IADL scores over 9 years.⁹ A US cross-sectional study of a representative sample adults aged ≥ 60 years showed that participants with higher diet quality were less likely to experience IADL disability and lower extremity immobility.¹⁰

Given that there is a paucity of prospective data from population-based studies of older adults on the relationship between overall diet quality and quality of life and activities of daily living functioning, the purpose of this study was to answer the following key questions using a large cohort of adults aged 55 years and older: Does adherence to dietary guidelines have a beneficial effect on quality of life scores in the long term? and, Is overall diet quality prospectively associated with functional status as assessed by an activities of daily living scale?

METHODS

Study Population

The Blue Mountains Eye Study (BMES) is a population-based cohort study of common eye diseases and other health outcomes in a suburban Australian population living west of Sydney. Study methods and procedures have been described elsewhere.¹¹ Participants were noninstitutionalized residents aged 49 years or older invited to attend a detailed baseline eye examination after a door-to-door census of the study area. Selection bias at baseline was minimized after multiple call-back visits, including door-knocking, telephone reminders, and letters at recruitment. Baseline examinations of 3,654 residents aged >49 years were conducted during 1992–1994 (BMES-1, 82.4% participation rate). Surviving baseline participants were invited to attend examinations after 5 (1997–1999, BMES-2), 10 (2002–2004, BMES-3), and 15 years (2007–2009, BMES-4), at which time 2,334 (75.1% of survivors), 1,952 (75.6% of survivors), and 1,149 (55.4% of survivors) participants were re-examined, respectively, with complete data. The University of Sydney and the Western Sydney Area Human Ethics Committees approved the study, and written informed consent was obtained from all participants at each examination.

Nutrition Assessment

Dietary data were collected using a semiquantitative, 145-item self-administered food frequency questionnaire (FFQ).¹² At all four BMES examinations, participants used a 9-category

frequency scale to indicate the usual frequency of consuming individual food items during the past year. For our study, FFQ data collected at BMES-2 and BMES-3 were used in the analyses. The FFQ was validated by comparing nutrients from the FFQ to 3 \times 4-day weighed food records collected over 1 year to allow for seasonal variation. Most nutrient correlations were between 0.50 and 0.60 for energy-adjusted intakes.¹³ A dietitian coded data from the FFQ into a customized database that incorporated the Australian Tables of Food Composition 1990 (baseline FFQ data) and follow-up FFQ data used NUTTAB95.^{14,15}

A modified version of the Australian diet quality index,¹⁶ based on the Dietary Guidelines for Australian Adults (DGAA)¹⁷ and the Australian Guide to Healthy Eating (AGHE),¹⁸ was used to establish the total diet score (TDS), assessing adherence to the DGAA. The methodology used to develop total diet scores has been previously reported.³ Briefly, a total diet score was allocated for intake of selected food groups and nutrients for each participant as described in the AGHE¹⁸ (see Table 1). The total diet score is divided into 10 components, and each component has a possible score ranging from 0 to 2. A maximum score of 2 was given to subjects who met the recommendations with prorated scores for lower intakes. These were then summed, providing a final score ranging between 0 and 20 with higher scores indicating closer adherence to the dietary guidelines.

The total diet score accounts for both food intake and optimal choice with scores allocated to reflect intake characteristics from both sources. Food intake scores were based on total intakes of vegetables, fruit, cereals and breads, meat, fish, poultry, and dairy as well as sodium, alcohol, sugar, and extra foods intakes. Optimal choices scores determined intakes of foods with greater dietary benefits, including servings of whole-grain cereals, lean red meat, low-fat or reduced-fat milk vs full-fat milk, low saturated fat intake, and fish consumption. Cut-points for scores were determined from the recommended number of serves given in the AGHE, with some exceptions.¹⁸ We replaced the AGHE's recommended two servings per day of fruit with three servings per day and the number of vegetables consumed per day from five servings to seven servings to allow for self-reported FFQ overestimation as determined by the validity study.¹³ Moderate intakes of sugar were determined from the DGAA, which found no evidence that consuming a diet with up to 15% to 20% of energy from sugar was detrimental to a healthy diet.¹⁷ Extra foods were defined as foods that were energy dense containing higher levels of sugar, fat, or salt, with one serving equivalent to 600 kJ.¹⁸ Examples described in the AGHE include cookies, cakes, soft drinks, ice cream, pies, hot chips (ie, french fries) and high-fat takeaway items. The alcohol cut points reflect guidelines about alcohol consumption in Australia, in which it is recommended that men consume a maximum two standard drinks per day and women consume a maximum one standard drink per day.¹⁷

The nondietary component of the AGHE, preventing weight gain, was included in the total diet score. Half the score component was assigned to energy balance, calculated as the ratio of energy intake to energy expenditure with a maximum score given for ratios falling between 0.76 and 1.24 (Table 1), defined as the 95% confidence levels of agreement between energy intake and expenditure.¹⁹ The other half of the score was assigned to leisure time physical activity. Details of walking exercise and the performance of moderate or

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