

# Quality of Life and its Relationship With Healthy Eating Index Among Elderly People

Ali Aghanuri <sup>1</sup>; Hamideh Salehi <sup>2</sup>; Mahmood Mahmoudi <sup>3</sup>; Farzad Faraji Khiavi <sup>4</sup>; Kurosh Djafarian <sup>5,\*</sup>

<sup>1</sup>Health Center of Ashtiyan, Arak University of Medical Sciences, Arak, IR Iran

<sup>2</sup>Hospital of Tafresh, Arak University of Medical Sciences, Arak, IR Iran

<sup>3</sup>Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, IR Iran

<sup>4</sup>Department of Health Management, School of Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, IR Iran

<sup>5</sup>Department of Clinical Nutrition, School of Nutritional Sciences and Dietetic, Tehran University of Medical Sciences, Tehran, IR Iran

\*Corresponding author: Kurosh Djafarian, Department of Clinical Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences, Tehran, IR Iran. Tel: +98-218897344150, Fax: +98-2188974462, E-mail: kdjafarian@tums.ac.ir

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**Background:** Since the population of Iran is aging, there is a growing need for more information about the quality of life (QOL) of this group. Proper planning for this age group with the aim of increasing their quality of life depends on the identification of factors associated with QOL.

**Objectives:** The purpose of this study was to determine if there is a relationship between quality of life (QOL) and healthy eating index (HEI) in healthy elderly people living in urban areas of the Markazi Province, Iran.

**Patients and Methods:** A two-stage stratified sampling design was adopted for this survey. The HEI 2005 scores were calculated based on three 24-hour dietary recalls and the SF-36 questionnaire was used to assess QOL. Body weight and height of the subjects were measured and body mass index was computed.

**Results:** Men had significantly higher quality of life in all dimensions and components compared to women ( $P < 0.01$ ), while there was no sex difference in the HEI scores. The HEI scores were positively correlated with the QOL total score ( $P < 0.05$ ) and its physical health dimensions ( $P < 0.01$ ); the significant correlation was eliminated after adjusting the data for age and gender. The HEI and QOL scores had no significant relationship with BMI.

**Conclusions:** The findings of this study do not show a significant relationship between quality of diet assessed by HEI and QOL in elderly people. We suggest for future researchers to design comprehensive food guidelines and related Iranian eating indexes in order to precisely assess the dietary pattern of Iranians.

**Keywords:** Aging; Elderly; Health; Diet Habits; Quality of Life; Nutrition

## 1. Background

Quality of life (QOL) as a good global indicator of desired patient outcome has been used in health and social researches (1, 2). Quality of life is inevitably subjective and not visible by others because it is an individual's perception of his/her position in life in terms of culture, value system in which people live, goals, expectations, standards and priorities (3). However, in health and medical fields, health related quality of life (HRQL) has increasingly attracted the attention of researchers in the recent years. Several questionnaires have been used to assess HRQL over the past two decades, and most scientists agree that the 36-item Short Form Health Survey (SF-36) is more sensitive to health changes (4, 5).

Due to improvements in living condition, health care, social protection and etc., the number of people over 60 years of age in Iran like other developing countries is growing (6, 7). At the same time, total fertility and premature death during childhood in Iran have had decreased

rates (8). Therefore, the average life expectancy is increasing steadily in Iran similar to other parts of the world. These changes in population composition require more attention for improving the QOL, especially in the elderly population. Several factors affecting the QOL of older adults have been studied by researchers. However, a few studies have assessed the relationship between QOL and nutrition. Thus, this area requires a broader focus of research.

Numerous factors, including aging, affect individuals' nutritional status and eating patterns. On the other hand, eating patterns have an influence on the aging process and probably on the QOL of elderly people in many ways. Loss of taste and smell, changes in eating habits, day-to-day variations in food intake, reduced muscle mass, declines in physiological function and metabolism may be partly responsible for the observed decline in the QOL of elderly people. In addition, elderly people have poor

sensory-specific satiety (a variety-seeking mechanism) and face reduced sensory enjoyment of foods, which may explain why some elderly people restrict their food choices and adopt a monotonous diet. These factors may decrease the quality of diet in this age group. However, the exact effects of eating patterns and nutrition on QOL or vice versa are complex. Common approaches such as considering individual foods and nutrients cannot completely capture the actual relationship between the entire diet and QOL. There is now more criticism claiming that the quality of diet gives a better picture of eating habits rather than a single food or nutrient because it reflects patterns of nutrients, foods and food-groups as a whole (9). In addition, the quality of the overall diet takes account of the interactions between dietary components. Therefore, it can be considered as a holistic approach. A large number of predefined diet quality indices have been proposed. The vast majority of these indices have been constructed based on nutrients, food/food groups, or both in combination. Dietary recommendations of the Iran Ministry of Health (IMH) and Iranian Nutrition Society (INS) are profoundly derived from the dietary guidelines of USA with minor modifications in foods. The Healthy Eating Index (HEI) is an index developed according to the USA dietary guidelines. Therefore, it measures the compliance of individuals with the guidelines (9).

Elderly face the challenge of poor appetite and many other eating problems such as difficulty of chewing, swallowing, loss of smell or taste, oral problems, etc (10, 11). In addition to eating problems, elderly people suffer from many chronic diseases, physical and mental disabilities, poor economic status, isolation, depression, loss of control over one's environment that may cause poor diet quality and poor QOL (12). Many of the current nutritionists focus on identifying the relationships between single nutrients or foods and several health outcomes while it is clear that using the quality of diet approach may reveal the complexity of their relationships. In this regard, the aim of the current study was to evaluate the association between QOL and HEI-2005 in elderly living in the Markazi Province, Iran. To the best of our knowledge, this is the first research that investigates the relationship between QOL and diet quality measured by the HEI-2005 of elderly people.

## 2. Objectives

The purpose of this study was to determine if there is a relationship between quality of life (QOL) and healthy eating index (HEI) in healthy elderly people living in urban areas of the Markazi Province, Iran.

## 3. Patients and Methods

In total, 165 elderly people participated in this study from March to August 2010. Both sexes participated in the study, aged 60 years and older, living in urban areas of the Markazi province, Iran. Cluster random sampling

was used to select six cities (Saveh, Khomein, Shazand, Tafresh, Komijan and Ashtiyan) from the 26 cities of this province. In each city, three health care centers and 28 individuals from each center were chosen randomly. Some participants were excluded from the study for different reasons and were replaced with new individuals. In the selected health care centers, subjects were chosen using health care records from families who had at least one member aged 60 years or over. The selected individuals were interviewed in their homes using the SF36 questionnaire to measure their quality of life as well as their 24-hour food recall to calculate their HEI score and a general questionnaire was designed to obtain the subjects' demographic information. The study protocol was approved by the Tehran University of Medical Sciences, and all participants provided written informed consents.

### 3.1. Quality of Life

The Iranian version of the SF-36 questionnaire, which has been translated and validated for the Iranian population, was used to measure QOL (5). The SF-36 questionnaire assesses physical and mental health status in the past 12 months and contains 36 questions covering eight domains: (i) physical functioning; (ii) role-physical; (iii) role-emotion; (iv) vitality; (v) social functioning; (vi) bodily pain; (vii) mental health; and (viii) general health. Further information about the application and scoring of the SF-36 questionnaire is available elsewhere (13). The total score obtained from this questionnaire is between 0 and 100 and a lower score represents a poorer health status.

### 3.2. Healthy Eating Index

The subjects' quality of diet was calculated using the HEI-2005 developed by the US Department of Agriculture (9). The HEI consists of 12 components: total fruit, whole fruits (i.e. forms other than juice), total vegetables, dark green and orange vegetables and legumes, total grains, whole grains, milk including soy beverages, meat and Beans, oils (non-hydrogenated vegetable oils and oils in fish, nuts, and seeds), saturated fat, sodium intake and the calories from solid fat, alcoholic beverages and added sugar. The maximum scores for each component ranged between 5 and 20. A higher score in three of the 12 HEI dietary components (saturated fat, sodium, and Solid Fat, Alcohol, and Added Sugar (SoFAAS)) represents lower consumption while a higher score for the rest indicates consumption at levels close to the recommended amounts or ranges. The scores assigned to each of the components were summed and the index for healthy eating ranged between 0 and 100. The food intake data were based on the average of three 24-hour dietary recalls, administered by a previously trained interviewer. Further information on the Healthy Eating Index 2005 (HEI-2005) components and scoring system and its measurement properties are available elsewhere (9).

**Table 1.** Mean Scores for the Total Sf-36, Physical and Mental Health Dimensions and HEI-2005 <sup>a</sup>

Scores	Total SF-36	Mental Health Dimensions	Physical Health Dimensions	HEI-2005
<b>Total (165)</b>	55.66 ± 22.2	57.30 ± 24.97	51.32 ± 21.6	54.09 ± 8.8
<b>Men (74)</b>	64.32 ± 22.3	66.83 ± 24.5	59.90 ± 21.9	53.6 ± 8.4
<b>Women (91)</b>	48.62 ± 19.5	49.54 ± 22.5	44.34 ± 18.8	54.4 ± 9.0

<sup>a</sup> All values are presented as Mean ± SD.

**Table 2.** Correlations between the Healthy Eating Index Scores, Quality of Life Dimensions and Other Variables in the Elderly Subjects

Variables	HEI-2005	Total SF-36	Mental Health Dimensions	Physical Health Dimensions
<b>HEI-2005</b>	1	0.169 <sup>a</sup>	0.140	0.202 <sup>a</sup>
<b>Total SF-36</b>	0.169 <sup>a</sup>	1	0.952 <sup>a</sup>	0.941 <sup>a</sup>
<b>Mental health dimensions</b>	0.140	0.952 <sup>a</sup>	1	0.806 <sup>a</sup>
<b>Physical health dimensions</b>	0.202 <sup>a</sup>	0.941 <sup>a</sup>	0.806 <sup>a</sup>	1
<b>Body Mass Index</b>	0.127	-0.046	-0.016	-0.071
<b>Age</b>	-0.277 <sup>a</sup>	-0.098	-0.012	-0.175 <sup>a</sup>
<b>Weight</b>	0.199 <sup>a</sup>	0.082	0.046	0.123
<b>Height</b>	0.124	0.190 <sup>a</sup>	0.173 <sup>a</sup>	0.204 <sup>a</sup>
<b>Time spent watching TV</b>	0.158 <sup>a</sup>	-0.050	-0.085	-0.011

<sup>a</sup> P < 0.05.

### 3.3. Statistical Analysis

All analyses were done using the SPSS software for Windows, version 18. The data are presented as means and standard deviations. Moreover, the significance of the difference between the mean of variables was determined using the two-sample Student's t tests and ANOVA, and associations between the QOL and HEI scores were determined using Pearson's correlation coefficients and both simple and multiple regressions. All statistical tests were based on the two-tailed hypothesis and a P value of < 0.05 was considered significant.

## 4. Results

The mean age of the subjects was 70.7 (ranging from 60 to 91 years) years. There were 74 (44.8 %) males and 91 (55.2%) females. The men were significantly older than the women (P < 0.05). The majority of the subjects (63.6%) were illiterate and only 6.8 % had completed high school or had an academic degree. Furthermore, 35.2% of the studied sample had a total household income of less than \$250 per month; 57.6% reported \$250 to \$750, and only 7.2% of the participants reported an income of \$750 and over per month. Overall, 15.2% lived alone, 32.7% lived with their spouse, 40.6% with their spouse and children, and 11.5% with their children and other relatives. The mean scores for the total SF-36, physical and mental health dimensions and the HEI-2005 are shown in Table 1.

Healthy individuals and those who exercised as well as those with higher education levels, previous state job and higher income had higher QOL scores. Also, those

who had higher education levels, previous state job and higher income had higher HEI scores.

Table 2 presents the correlations between continuous variables and SF36, its two major subcategories (physical and mental health), and the HEI scores. Our study indicates a significant direct correlation between the HEI and the total SF36 scores and the physical health dimensions (r = 0.202, P < 0.01). However, after adjusting the data for age and gender, all significant correlations between the HEI scores and the total SF36 score as well as its dimensions disappeared. The HEI score had a significant inverse correlation with age and positive correlations with weight and time spent watching TV. There were also positive correlations between height and total SF36 score as well as its two main dimensions. We found no significant correlations between BMI, SF36 and HEI scores.

## 5. Discussion

The results of the current study do not support the link between healthy eating and quality of life in the elderly. Many factors including genetic, demographic, social and environmental variables influence elderly's health and functioning, which are major challenges to public health. However, quality of diet is an important and modifiable factor. However, the contribution of quality of diet to the quality of life is not entirely clear. Many different methods and tools have been proposed for measuring the quality of diet, among which the HEI has received

considerable attention. The HEI, first developed by Kennedy in 1995, assesses how well the diets adhere to Dietary Guidelines and Food Guide Pyramid (14). The last revised version of the HEI, namely HEI-2005, was introduced in 2006 (9). Although previous studies have indicated that the quality of diet is related to QOL (15, 16), as far as we know this is the first study that assessed the association between healthy eating index and QOL. Most previous studies focused on a single-food or single-nutrient approach in diet-QOL relations. In addition, the focus has been mostly on the relationship between malnutrition or nutrient deficiency and relevant health outcomes. However, the complexity of the true relationship between diet and health or QOL cannot be captured by this approach. In fact, physical and psychological well-being are related to many factors including the possible interactions of different nutrients and quality of diet. We found a positive correlation between HEI, quality of life (total SF-36 score) and physical health that disappeared after adjusting the data. In contrast to our results, a study reported a significant association between diet quality and higher mental health score (17). Ruano et al. also found a significant inverse association between saturated fatty acid intake and physical functioning of QOL (18). These findings show that QOL and quality of diet are two complex issues and their associations need to be investigated in different dimensions. The HEI-2005 probably cannot properly reflect Iranian dietary patterns. Moreover, the nutritional recommendations of the Iranian Ministry of Health, which are based on the US dietary guidelines, may need to be revised and improved.

The mean QOL score in the current study was similar to most previous results reported from other regions of Iran (19) while it was lower than the results obtained from most developed countries (20). To the best of our knowledge, this is the first study that has used the new version of HEI (HEI-2005) in the Iranian population. The elderly in this study had a lower HEI score (mean = 54) than individuals over 60 years old in the study of Savoca and NHANES, 2003 - 2004 (21, 22). These findings show that our subjects may need to improve their diet quality. It should be mentioned that the validity and reliability of the HEI were not determined for Iranian subjects.

The QOL and HEI in elderly people may also vary according to many sociodemographic variables including age, gender, education, job and exercise. Some of these variables are modifiable and thus raising elderly's awareness about such variables is essential for the improvement of their QOL and diet quality. Although we found no significant association between age and total QOL score in this study, there was a significant negative correlation between age and physical health dimensions. We obtained lower QOL in all domains and summary scales for older adults than younger individuals in our previous study in Tehran (1). Most previous studies indicated a remarkable decrease in QOL with increasing age (23, 24). Also, we found a negative association between HEI score and age.

Optimum nutrition at older age is vital for maintaining good mental and social health. The negative correlation between the HEI scores and age may be due to low income, tooth retention, health status, and low educational attainment (25).

The women in the current study had significantly lower QOL scores compared to the men but there was no significant gender difference for the mean HEI scores. These results are comparable with other studies from Iran (1, 21). We reported lower QOL in all domains for elderly women compared to elderly men in Tehran (1). Similar results have been reported from other countries (26-28). Due to longer life expectancy, level of disability, risk of institutionalization, social isolation, elderly women's health status is generally worse than that of men especially in developing countries. In contrast to our results, most previous studies reported a higher mean HEI score for women than men (11, 29). However, these findings are in agreement with another study, which involved elderly living in Tehran (21). Despite transitional changes in Iran, most food shopping and cooking is still done by women. This might, in part, explain why there is no gender difference in HEI scores of the current study.

This study suggests that living arrangements, previous job and smoking are not associated with QOL and HEI. The absence of any significant association between the QOL and living arrangements in the present study do not support the findings of our previous study in Iran (1) and other studies done in other countries (30, 31). A few studies have addressed the association between living arrangements and quality of diet (2, 25). Davis and colleagues reported that elderly people living alone compared to those who live with a spouse did not make poorer food choices (2). In contrast to our findings, Ervin indicated that older adults with living arrangements other than living with a spouse had lower HEI scores (25). Many physical issues influence the elderly's quality of life, yet some social factors such as previous and current job, which are interconnected with personal identity during this life stage, cannot be ignored. Although in our study the difference in QOL between smokers and non-smokers was not significant, most other studies reported a negative relationship between QOL and smoking (32, 33). The results of a 36-year Finnish study indicated that smoking has a significant negative impact on QOL in the elderly (33). Similar findings were obtained for HEI. In contrast to this study, Ervin reported a negative association between smoking and HEI (25). The small sample size of the present study may partly explain the discrepancies between our results and those of others.

In summary, we found a significant association between HEI and QOL, which was subsequently eliminated by adjusting the data for age and gender. These results indicate that age and gender may mediate the association between the HEI and QOL in the elderly. The negative association between aging and HEI in our study may be partly explained by the aging process. The aging process has

been associated with altered sensations of hunger, satiety, inability to feed oneself, poor oral health and changes in eating habits. Gender was another factor, which mediated the above associations as in the current study women had lower QOL scores compared to men. Socio-demographic and socio-economic differences between males and females may contribute to gender differences in QOL. Little has been known about the association of diet quality and QOL in elderly people and, to the best of our knowledge, this is the first study that examined this relationship using HEI, as the most common tool for assessing quality of diet. Our findings show that the subjects' QOL and HEI total scores are somewhat low; therefore, proper planning is needed for improving these important issues in older adults. Lower QOL scores of the women in this study need more attention. Due to the cross-sectional design of the present study, we could not infer causal relationships; further investigations with longitudinal designs are required. We propose that more research should be done in this field in different populations with larger sample sizes to determine the relationship between QOL and eating index. Finally, we insist on doing research for compiling the Iranian comprehensive food guidelines and also providing a unique Iranian Eating Index for assessing nutrition status of Iranian individuals.

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