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Research Article

Quality of Life in Elders with Suspected Alzheimer Disease: An Urban Health Centers-Based Study from Iran

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Keywords
Elderly · Quality of life · Alzheimer disease · Dementia

Abstract
Background/Aims: Quality of life (QOL) and Alzheimer disease (AD) among older people have been recognized as public health challenges. Here, we investigated the association between QOL and AD in the elders. ***Methods:*** In this cross-sectional study, elderly people were selected from urban health centers (Shiraz, Iran) by multistage cluster random sampling and were interviewed using LEIPAD (for QOL) and Montreal Cognitive Assessment (for AD) questionnaires. The data was analyzed using Mplus (version 6.12) and IBM SPSS (version 25) software. ***Results:*** The participants consisted of 182 elderly with a mean age of 67 ± 5.05 years, and 95 (52.2%) of them were females. There were 161 (88.5%) and 130 (71.4%) cases educated up to 12 years and married, respectively. Furthermore, 46 (25.3%) had low-to-moderate QOL, and 132 (72.5%) were suspected to have AD. QOL was inversely associated with AD, and men (β = −0.310) were more affected than women (β = −0.290). AD (β = −0.298), age (β = −0.288), hypertension (β = −0.267), education (β = 0.260), and body mass index (β = −0.198) were determinants of QOL. Also, physical activity was indirectly associated with QOL (β = 0.076). AD was correlated with the cognitive functioning component of QOL (r = −0.72). ***Conclusion:*** One elder out of 4, did not have desirable QOL and 3 elders out of 4 were suspected to have AD. AD can decrease QOL among the older people. Screening of the elders for AD is recommended to improve their QOL by health centers.

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Introduction

The aging of the population is an inevitable phenomenon which increasingly becomes a public health challenge worldwide [1]. World population growth rate of people aged ≥65 years is expected to increase from 5.7% in 2011 to 9.7% in 2030 and 25.2% in 2060 [2]. In Iran, the population of the elders has increased from 6.6% in 1995 to 10% in 2010 and is predicted to reach to 25.1% in 2061 [3]. Aging increases the risk of mental and physical diseases [4]. Dementia is a devastating disease that brings considerable physical, emotional, and financial burden on patients, and their communities [5]. Alzheimer disease (AD) is the most common cause of dementia which accounts for 50–70% of the patients [6]. It was estimated that 35.6 million people were living with dementia in 2010. The number of patients with dementia is predicted to nearly double every 20 years to 65.7 million in 2030 and 115.4 million in 2050 and its rate increases, especially in the developing countries [7, 8]. Multiple risk factors for AD have been identified, including female gender, age, low level of education, cigarette smoking, and obesity [9]. Quality of life (QOL) influences many aspects of health such as people's mental, physical, and social health and personal belief [1]. AD, due to its effects on the mental and physical health status has a great impact on QOL of the patients with AD, their caregivers and medical expenses [10, 11]. This study was conducted to determine the prevalence of AD and its association with QOL in the elderly people.

Materials and Methods

Subjects

This population-based and cross-sectional study was conducted in 2019 in Shiraz, southwest of Iran. Shiraz is the capital city of Fars province with a population of 2 million that includes 172,000 people aged 60 years and above. These elders distributed proportionally between 2 health networks (Valfajr: 55%; Enghelab: 45%). At least 95% of the elders in Shiraz were covered by these health networks. Each health network covers several urban health centers. The sample size was calculated as 246, considering the prevalence of AD as 80% (based on a pilot test conducted on 30 elders prior this study), CI of 95% and error of 5%. The patients who were not willing to participate in this research were excluded from the study. For sampling, 3 health centers were selected randomly in each health network. Then, considering the numbers of elders covered by each health center, the proportion of total sample allocated to each health center. The phone numbers of registered elders were extracted from their records in the health centers. Then, the trained staff contacted them by phone, introduced themselves, explained the aims of the study, and invited them to come to the medical university-affiliated public clinic called "Motahari Clinic" on Zand Street, Shiraz, if they were interested in participating in the study. Also, they were given the phone numbers of the executive team for any questions about this study.

Data Gathering

Detailed explanations were given to the participants and their companions at the clinic. A comprehensive checklist, including demographic and socioeconomic characteristics was filled according to the history obtained from each interviewee or their companions. Demographic and social characteristics included age, gender, level of education, marital status, and occupation. Clinical and personal characteristics of the participants were collected, such as physical activity, hypertension, diabetes mellitus, and other chronic diseases, sleep disorder, cigarette smoking, and alcohol drinking. Nutritional status was determined by a 72 h recall checklist. The elders' body mass index (BMI) was calculated according to the Bassey's equation [12]. Screening

for AD was done using the Montreal Cognitive Assessment (MoCA). QOL was assessed by the LEIden (the Netherlands), PADua (Italy), and Helsinki (Finland) (LEIPAD) questionnaire. Sleep disturbance was detected by the Pittsburgh Sleep Quality Index (PSQI), and physical activity was measured by the Rapid Assessment of Physical Activity (RAPA) questionnaire. We used the valid and reliable (Cronbach's alpha = 0.79) Persian version of the MoCA questionnaire for screening of AD [13]. This questionnaire consisted of short-term memory (score 5), spatial visualization (score 4), decision-making power (score 4), attention and concentration and behavioral memory (score 6), language (score 5) and orientation to time and place (score 6). The total score of MoCA varies between 0 and 30; the scores ≥26 are considered as normal, and the scores <26 indicate the potential for cognitive impairment. The valid and reliable (Cronbach's alpha = 0.94) Persian version of LEIPAD questionnaire was used to evaluate the QOL of the elders [14, 15]. It comprises 49 items, including 31 core components and 18 moderators. Thirty-one questions of the core part contained several subdomains comprising cognitive function (5 items), physical function (5 items), self-caring (4 items), depression and anxiety (4 items), social function (3 items), sexual contact (4 items), and life satisfaction (6 items). Each item was scored on a four-point categorical scale (0–3) to yield a total score of 93 for the core section of the LEIPAD questionnaire. We considered scores <32 as a low level of QOL, between 32 and 62 as moderate QOL, and scores >62 as high QOL. The valid and reliable (Cronbach's alpha = 0.77) Persian version of the PSQI questionnaire was used to assess the sleep quality of elders [16]. This tool examines sleep quality over the past month and includes 19 questions categorized into 7 subscales, including: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Each subscale was scored between 0 and 3, in which scores of 0, 1, 2, and 3 represented no sleep problem, moderate sleep problem, serious sleep problem, and very serious sleep problem, respectively. Consequently, the total score of the PSQI questionnaire ranges from 0 to 21; a total score >5 indicates poor sleep quality. The valid and reliable RAPA questionnaire was used to measure the physical activity of elders [17]. This questionnaire has 2 parts; the first part consists of 7 questions about the intensity of physical activity, and the second part has 2 questions to assess strength and flexibility. The total score of the first part ranges from 1 to 5 points, and the second part is given 1 point for each positive response.

Data Analysis

The data was analyzed using IBM SPSS (version 25), and Mplus (version 6.12) software. First, the variables that had significant correlation with AD and QOL were selected (p value < 0.2). Then, path analysis was performed for both genders to detect direct determinants of AD and QOL and also indirect determinants of QOL. Indirect associations with QOL were calculated by multiplication of direct correlations with AD and correlation of AD with QOL (Fig. 1–3). In addition, correlation among components of QOL also among components of QOL and AD were determined. In this study, p values <0.05 were considered significant in all steps of the final analysis. Furthermore, the goodness of fit indices, including comparative fit index (CFI), Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA) were used to determine model fit. For CFI and TLI, values >0.90, and for RMSEA values <0.08 indicated the good fitness of the model.

Ethical Considerations

Voluntary participation in this study, designing an anonymous checklist, possibility of access to the executives of this study via 2 exclusive phone lines, and keeping confidentiality regarding all aspects of this research were some of the ethical considerations in the current study. The protocol of this study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Shiraz, Iran) (No. IR.SUMS.REC.1398.1393).

Table 1. Demographic, socioeconomic, anthropometric, nutritional, and medical characteristics of elders

Variable	Women (n = 95)	Men (n = 87)	p value
Age, years	66.6±5.0	67.26±5.1	0.008
Education			
≤12 years	89 (93.70)	72 (82.80)	<0.001
>12 years	6 (6.30)	15 (17.20)	
Marital status			
Single	48 (50.50)	4 (4.60)	0.034
Living with spouse	47 (49.50)	83 (95.40)	
Occupation			
Employed	2 (2.1)	24 (27.6)	0.09
Unemployed	93 (97.9)	63 (72.4)	
Cigarette smoking			
No	94 (98.90)	53 (61)	0.118
Yes	1 (1.10)	34 (39.00)	
Alcohol drinking			
No	95 (100)	86 (98.98)	0.186
Yes	0 (0)	1 (1.10)	
Physical activity			
Sedentary	14 (14.74)	18 (20.69)	0.030
Light physical activity	75 (78.95)	64 (73.56)	
Physically active	6 (6.31)	5 (5.74)	
BMI	59.11±11.80	30.82±5.36	0.080
Hypertension			
No	29 (30.50)	37 (42.50)	0.098
Yes	66 (69.50)	50 (57.50)	
Diabetes			
No	67 (70.50)	63 (72.40)	0.075
Yes	28 (29.50)	24 (27.6)	
Sleep disorder			
No	29 (30.50)	48 (55.20)	<0.001
Yes	66 (69.50)	39 (44.80)	
Other chronic diseases			
No	21 (22.10)	45 (51.70)	<0.001
Yes	74 (77.90)	42 (48.30)	
Manganese, mg daily intake	3.04±1.10	4.12±1.46	0.110
Vitamin C, mg daily intake	100.07±60.08	112.37±89.15	0.008
Vitamin E, mg daily intake	6.72±3.23	7.75±3.98	0.015
Soluble fiber, mg daily intake	0.25±0.22	0.28±0.35	0.176
Insoluble fiber, mg daily intake	1.49±1.46	1.40±1.49	0.110

Data are presented as mean ± standard deviation or n (%). BMI, body mass index. Other chronic diseases included: liver disease, psychological disease, osteoporosis, dermatologic disease, migraine, hematological disease, inability to walk.

Results

Characteristics, QOL, and AD

In total, 182 elders participated in this study, showing a participation rate of 74%. The mean age of the participants was 67 ± 5.05 years, and 95 (52.2%) of them were females. There were 161 (88.5%) and 130 (71.4%) elders educated up to 12 years and living with their spouses, respectively. Socioeconomic, demographic, anthropometric, and medical backgrounds of the participants are shown in Table 1. The mean score related to the core components of the QOL was 71.01 ± 12.31 (out of 93) with a median of 74. In addition, 8 (4.4%) of interviewees had a low level of QOL, while 38 (20.8%) and 136 (74.7%) had moderate and high QOL, respectively. Out of all participants, 132 (72.5%) were suspected to have AD.

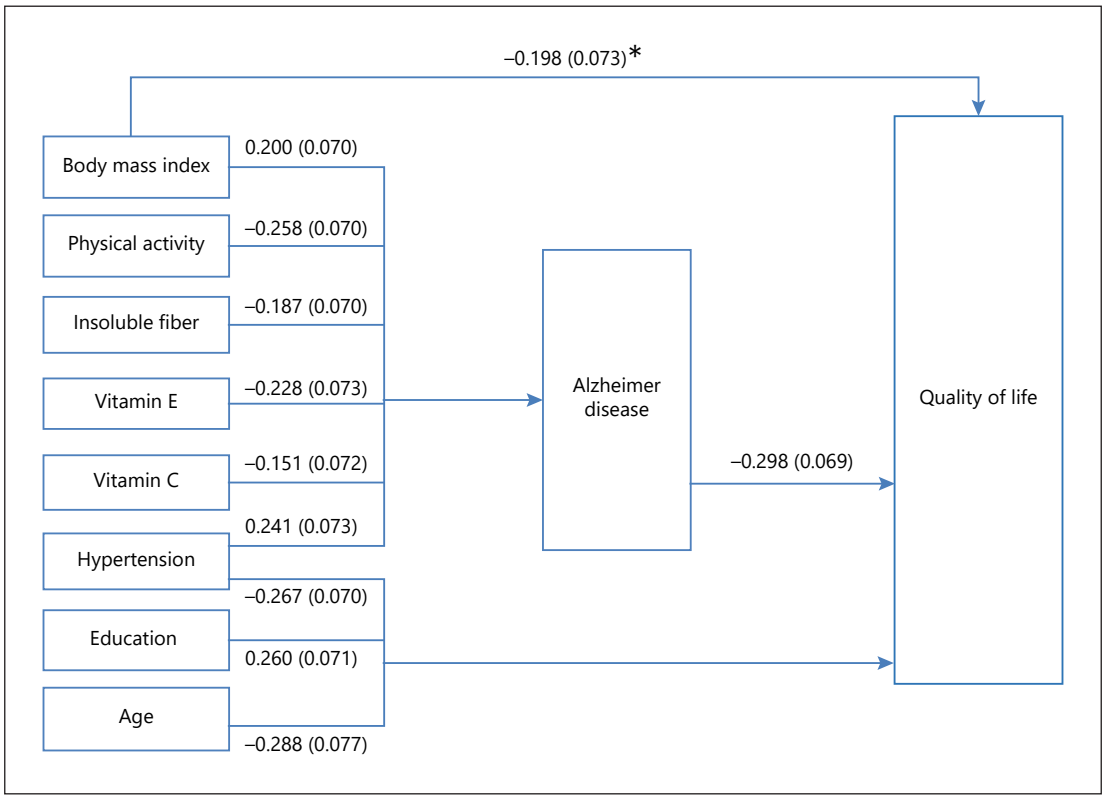

Fig. 1. Path analysis diagram of quality of life in the elderly. * Numbers represent standardized coefficient (SE). All coefficients were significant at 0.05.

Path Analysis Model

The path analysis indicated that AD had a direct and inverse association with QOL (Fig. 1). Among direct correlates of QOL, AD (β = –0.298), age (β = –0.288), hypertension (β = –0.267), level of education (β = 0.260), and BMI (β = –0.198) were the main significant correlates of QOL, respectively (Fig. 1). Also, among the indirect correlates of QOL, physical activity (β = 0.076), hypertension (β = –0.071), vitamin E (β = 0.067), BMI (β = –0.059), insoluble fiber (β = 0.055), and vitamin C (β = 0.044) were strongly associated with QOL through their associations with AD (Fig. 1). The values of RMSEA, CFI, and TLI were 0.078, 0.971, and 0.926, respectively. The results of path analysis of associations of AD and QOL with their correlates among men and women are presented in Figures 2 and 3, respectively.

Path Analysis Model in Men

Among the direct associations of QOL, hypertension (β = –0.340), AD (β = –0.310), level of education (β = 0.300), age (β = –0.272), and BMI (β = –0.226) showed the strongest significant associations with QOL in men, respectively (Fig. 2). Additionally, among indirect associations of QOL in men, cigarette smoking (β = –0.07), hypertension (β = –0.067), BMI (β = –0.062), vitamin E (β = 0.061), physical activity (β = 0.056), insoluble fiber (β = 0.053), and vitamin C (β = 0.039) were strongly associated with QOL through their associations with AD (Fig. 2). The values of RMSEA, CFI, and TLI were 0.074, 0.980, and 0.936, respectively.

Path Analysis Model in Women

Among the direct correlates of QOL, age (β = –0.301), AD (β = –0.290), level of education (β = 0.220), BMI (β = –0.191), and hypertension (β = –0.180) had the strongest direct asso-

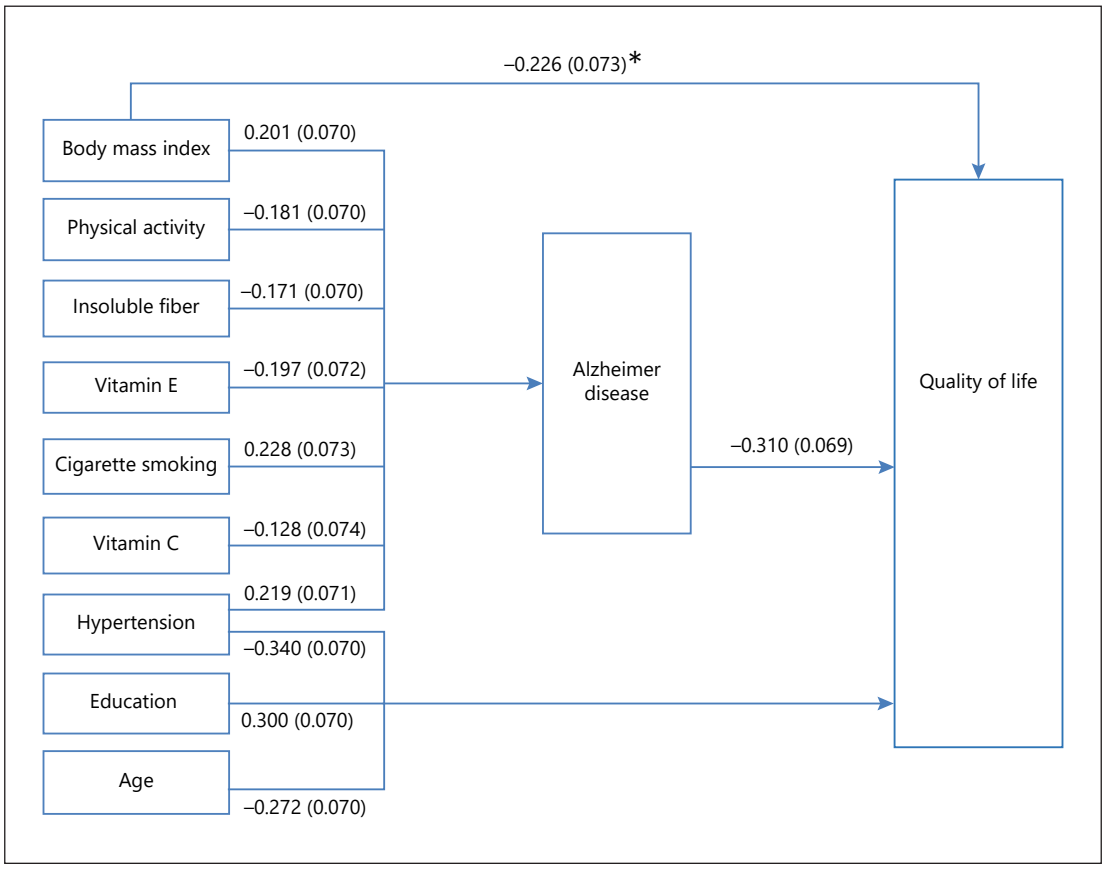

Fig. 2. Path analysis diagram of quality of life in elderly men. * Numbers represent standardized coefficient (SE). All coefficients were significant at 0.05.

Table 2. Correlations among core components of quality of life and Alzheimer disease in the elders

Variable	Component	1	2	3	4	5	6	7	Alzheimer disease
Quality of life	1 Physical functioning	1							
	2 Self-care	0.601***	1						
	3 Depression and anxiety	0.270***	0.161**	1					
	4 Cognitive Functioning	0.562***	0.313***	0.357***	1				
	5 Social functioning	0.135*	0.082	0.380***	0.128*	1			
	6 Sexual contact	0.184**	–0.198***	–0.197**	–0.151**	0.141*	1		
	7 Life satisfaction	0.289***	0.179**	0.144*	0.200**	0.141*	0.300***	1	
Alzheimer disease		–0.105**	–0.161**	0.132**	–0.723***	–0.192*	–0.119**	–0.647***	1

* Significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.001 level.

ciations with QOL in women, respectively. In addition, among the indirect associations with QOL in women, physical activity (β = 0.087), hypertension (β = –0.074), vitamin E (β = 0.074), BMI (β = –0.058), insoluble fiber (β = 0.055), soluble fiber (β = 0.049), and vitamin C (β = 0.047) had the strongest associations with QOL, respectively. The values of RMSEA, CFI, and TLI were 0.04, 0.986, and 0.946, respectively.

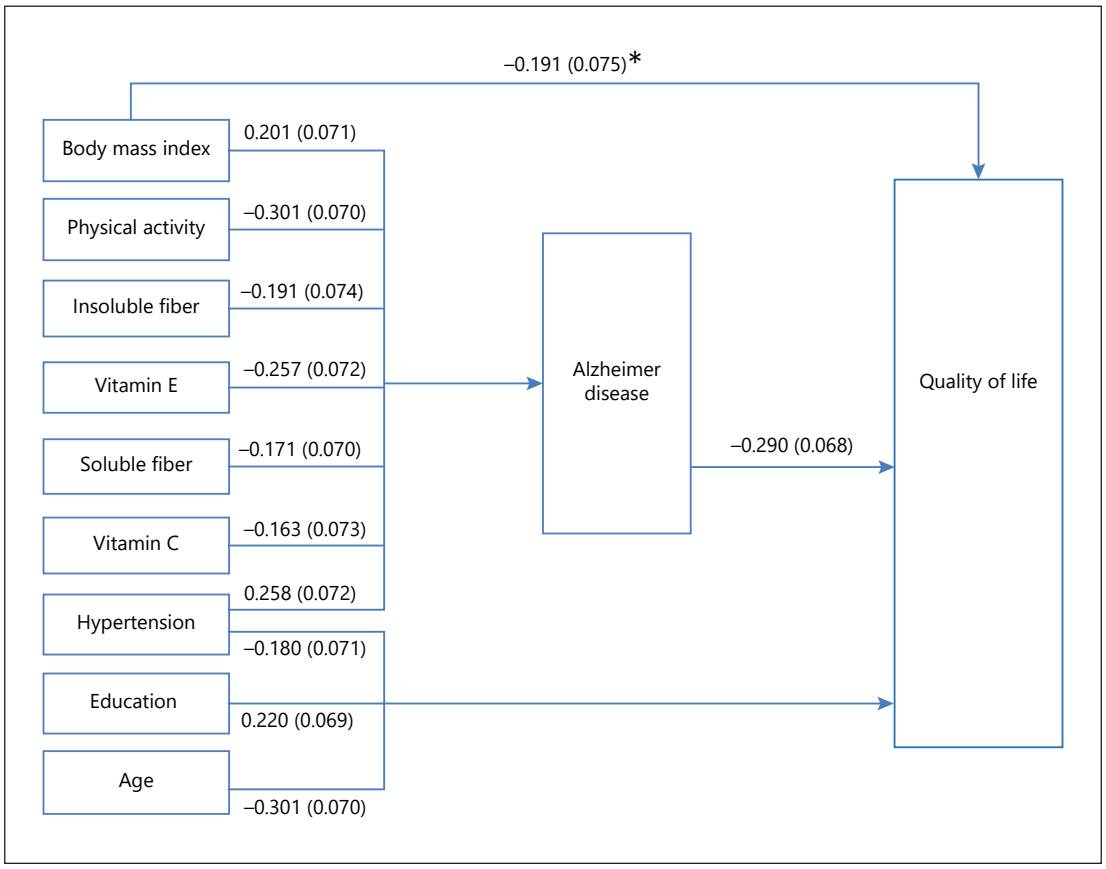

Fig. 3. Path analysis diagram of quality of life in elderly women. * Numbers represent standardized coefficient (SE). All coefficients were significant at 0.05.

Correlation between Core Components and AD

Table 2 shows the inter-correlations between the core components of QOL and between these components and AD. The most significant correlation was found between physical functioning and self-care (r = 0.601), physical functioning and cognitive functioning (r = 0.562), depression and anxiety and social functioning (r = 0.380), depression and anxiety and cognitive functioning (r = 0.357), self-care and cognitive functioning (r = 0.313), and sexual contact with satisfaction (r = 0.3). Regarding the associations between the core components of QOL and AD, the most significant association was found between the cognitive functioning of QOL and AD (β = –0.723, p < 0.001).

Discussion

The results of this study revealed that nearly 1 elder of 4 had low to moderate QOL, and nearly 3 elders of 4 were suspected to have AD. It was also found that AD had a direct and inverse correlation with QOL. Moreover, the strongest directly associated factors with QOL were AD, age, hypertension, level of education and BMI. On the other hand, the main indirect determinant of QOL was physical activity: its effect was mediated by AD. In addition, hypertension and AD were the main and opposite direct determinants of QOL in the elderly men compared to the age and AD, which had an opposite association with QOL in the elderly women. Furthermore, cigarette smoking and physical activity had a strong and indirect

(AD-mediated) association with QOL in the elderly men and women, respectively. Our results revealed that the main association between core components of QOL was between self-care and physical activity. Also, the strongest significant association was found between the cognitive functioning component of QOL and AD.

The prevalence of dementia in the East of Asia has increased from 4.9 to 6.9%, as well as in the sub-Saharan African regions from 3 to 4.7% [18]. Similarly, global reports showed that most of people with AD were >65 years old, and their percentage increases markedly with age; thus, it was reported as 3, 17, and 32% in the people aged 65–74, 75–84, and >85 years, respectively [19]. Due to the aging of the population, the prevalence of AD in Iran will reach to 8–10% over the next 2–3 decades [20].

BMI is one of the most important determinants of AD according to the previous studies [21–24] and in line with our findings. Beckett et al. [25] and Barnes and Yaffe [22] showed a substantial association between AD and physical activity, which is similar to our findings in this research. In another study, Barnes and Yaffe [22] reported that cigarette smoking was associated with AD. We have found a similar result only in the elderly men. This is due to the fact that nearly none of the women in this study smoked cigarettes. Based on a systematic review [26], daily intake of vitamin E was a significant predictor of AD in older people. In contrast with our study, Profenno et al. [21] found that diabetes was a factor for developing AD. Venkataraman et al. [27] and Rehm et al. [28], showed that alcohol consumption is correlated with AD. This result could not be compared to our findings because of very low frequency of alcohol consumption among the participants in this study (n = 1). Wada et al. [29], showed the effect of academic education on AD, while it was not associated with AD in this research.

Logsdon et al. [30] reported that people with dementia cannot engage in many activities, which resulted in reduction of their QOL. In one other study, it was demonstrated that the QOL in the older people with an experience of AD was lower in different domains than persons who are not exposed to AD [31]. Edgerton et al. [32] indicated that formal education was a significant predictor factor of QOL in the older people, which is in line with our results. Several studies revealed that BMI is negatively associated with QOL in elderly people [33, 34], which is similar to our study. According to Groessl et al. [35], physical activity was associated with QOL, which is also found in this study. We also found that there was a positive association between taking of insoluble fiber and QOL, which was also indicated in another study [36]. Similar to our study, Capuron et al. [37], demonstrated that daily taking of vitamin E is significantly associated with QOL. Qin et al. [38], showed that the incidence of hypertension has a negative relationship with QOL in the elders. On the other hand and in contrast to our findings, Dlamini et al. [39] indicated that daily taking of manganese was correlated with QOL. Balasundaram and Ather [40], found that occupation is associated with QOL; however, we did not find such result.

Another study revealed a substantial correlation between sleep quality and QOL [41], while we did not find such relationship in this study. Also, similar to our findings, another study showed that sleep disorders do not have any correlation with AD [42]. It was reported that violence toward elders was correlated with low QOL [43]. However, we did not investigate the correlation of violence and QOL in this study.

The present study had some limitations. If we could conduct a longitudinal study, the results could be interpreted as cause and effect. We also did not assess the elders who were cared in the nursing homes; however, their numbers were not so large. In conclusion, 1 elder out of 4 did not have desirable QOL, and 3 elders out of 4 were suspected to have AD. AD can decrease QOL among the elderly. An integrative care program for screening of AD and appropriate interventions to improve QOL of elders by health centers is recommended.

Acknowledgments

We express our sincere thanks to all elderly who participated in this research and answered our questions honestly.

Statement of Ethics

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The protocol of this study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Shiraz, Iran) (No. IR.SUMS.REC.1398.1393). Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Statement

The authors do not have any conflicts of interest to disclose.

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The present study received no funds.

Author Contributions

B.H.: research concept; B.H., E.K., F.J., and M.H.Z.: data management and analysis; B.H., E.K., F.J., and M.H.Z.: supervision and quality assurance; B.H., E.K., F.J., and M.H.Z.: manuscript writing; B.H., E.K., F.J., M.H.Z., and S.A.: manuscript review and editing.

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