Investigation of Life Expectancy in Community-Dwelling Elderly Men in Iran and Its Related Factors

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ABSTRACT

Today, increasing life expectancy and years of life without disease is one of the most important issues in health. The aim of this study was to Investigation of Life Expectancy in Community-Dwelling Elderly Men in Iran and its related factors. 424 men aged over 60 years were randomly assigned to different areas of Tehran participated in the study. First, the subjects' body composition and anthropometric indices, including weight, body mass index, waist circumference, and hip circumference, were measured using Omron's digital scale and tape measure. In order to assess the level of life expectancy, physical activity and nutritional status, Snyder's Questionnaire of Hope, Physical activity scale for elderly (PASE) and Mini nutritional assessment (MNA) were used, respectively. For statistical analysis software SPSS version 21 was used. The results of statistical analysis of the data showed a direct relationship between the level of education, nutritional status and physical activity and the inverse and significant relationship between comorbidity with life expectancy. According to the findings of this study, the use of strategies to increase the level of physical activity and healthy lifestyle in the elderly plays an effective role in the health of the elderly and increase life expectancy.

Keywords: Physical activity; Nutritional status; Comorbidity; Lifestyle; Older adults; Life expectancy

INTRODUCTION

Aging is associated with physiological, physical, and psychological changes that occur gradually over time. On the other hand, as age increases, people experience neurological disorders and a significant decline in physical function. The results of recent researches indicated that aging is accompanied by various diseases including type 2 diabetes, cardiovascular diseases, and cancer [1-3]. It has been reported that the population of people over 60 increases from 12% to 22% between 2015 and 2050 [4]. Studies show that Iran, as one of the developing countries in recent years, has been subject to population aging due to declining birth rates and medical advances [5]. So that, in 2011, the number of people with the age of higher than 60 was estimated to be 6,200,000, and it is predicted that by 2020, it will reach more than 20% of the total population of Iran with a dramatic increase [6,7].

Numerous studies have shown that life expectancy is based on two important factors such as genetic and lifestyle that only about 25% of the lifespan of a person is related to inheritance and it is unchangeable, whereas individual behaviors, environmental factors, and overall lifestyle, which are changeable and modifiable, have a greater share in increasing or decreasing lifespan. Also, it is well proved that lifespan has a direct relationship with life expectancy. Life expectancy can be expressed as the average number of years remaining of a person's lifespan at a certain age [8]. Epidemiological studies show that life expectancy in the United States and Germany has increased from 77.4 years to 81.73 years and 77.78 years to 79.41 years, respectively, from 2002 to 2010 [9]. Many factors such as a healthy lifestyle and health of persons are effective in increasing life expectancy. According to global reports, in less than 25 years, life expectancy has risen from 64 to 71 from 1990 to 2013 [10]. Also, according to the World Health Organization, life

expectancy in Iran has increased from 57 years in 1980, increased to 76 years in 2015 [11].

Studies show that factors such as physical activity, nutrition, diseases, education, economic conditions, marital status, living environment, access to health care, and even genetics and gender are involved in the life expectancy of people [12]. In previous studies we have reported that physical activity has many benefits on health, lifespan, quality of life, life expectancy and prevents chronic disorders such as hypertension, cardiovascular and metabolic diseases at all ages, especially elderly [13-16]. Besides, a proper diet also affects people's health and life expectancy [17]. On the other hand, the occurrence of a variety of aging-related diseases, such as diabetes, cardiovascular disease, arthritis, cancer, as well as mental and cognitive diseases, leads to a decrease in quality of life and consequently a decrease in life expectancy and lifespan [18]. In contrast, high levels of education, reduce the risk of cognitive disorders and Alzheimer's disease, which in turn increases life expectancy and prevents early mortality in the elderly [19]. In addition to the above condition, economic status and income are among the important factors, affecting the level of life expectancy that can increase life expectancy with easy access to health and welfare services [12]. Interestingly, a cross-sectional study reported that low-income people, who live in wealthy areas, have significantly higher life expectancy compared to low-income people who live in poor areas [20].

It has been well proved that a healthy lifestyle can increase life expectancy in many countries [21]. Gremeaux et al, showed that high levels of physical activity can reduce the process of aging such as immune dysfunction, non-communicable and Neurodegenerative diseases (psychologically and physiologically), as well as early mortality [22-25]. Li et al, reported that regular physical activity, proper nutrition, and ideal weight led to an increase in life expectancy of 7.4 to 17.9 years in Japan, Britain, Canada, Denmark, Norway, and Germany [21].

Given the literature, regarding the important role of healthy lifestyles in enhancing life expectancy as well as increasing numbers of the elderly in developing countries, we assumed that factors such as physical activity level and education, nutritional status, and health status of elderly are related to their life expectancy, so the present study aimed to investigate the life expectancy of community-dwelling elderly in Tehran and its related factors. But our ultimate goal was to provide strategies based on lifestyle improvements to enhance the health and life expectancy of older men in Tehran.

MATERIAL AND METHODS

Subjects and study design

This is a cross-sectional descriptive-correlational study performed in Tehran, Iran, in 2019 and 424 elderly men participated in the Research Project, Voluntary. Sample size was determined by G-power application according to the F value in ANOVA analysis, 95% confidence interval, a power of 0.79, and an average effect size of 0.15. At first Informed consent was taken from all participants, also researchers ensured that participants' identity

and what they said or did during research was maintained confidential. In addition, they were given a detailed explanation about the study's purpose and methods. After that demographic questionnaire (included age, education level, alcohol consumption, medicine history, supplement and drugs use, and occupation) were completed by subjects. The researcher ensured that participants' identity and what they said or did during research were maintained confidential. In addition, they were given a detailed explanation about the study's purpose and methods. The research protocol was approved by the Health Committee of the Information Services Corporation (Iran).

Exclusion and Inclusion criteria

Exclusion criteria were: Age under sixty, suffering dementia and Alzheimer; having severe hearing, speech and vision deficit; BMI lower than 17 kg/m^2, and infection diseases. Inclusion criteria were: Full vigilance to time and place, able to interview, and absence living in nursing homes.

Measurements

Anthropometric indices: Subjects' weight was measured by OMRON digital scanner with 0.01 g sensitivity and light clothing and no shoes. For height, the individuals were instructed to stand as straight as possible with their back against the wall-sticker tape meter and feet were flat on the floor with shoes removed. BMI was calculated as weight/height squared (kg/m^2). In order to measure the waist and hip circumferences, we used a tape meter to the nearest 0.01 cm, and WHR was calculated as WC (cm) divided by hip circumference (cm).

Life expectancy: Snyder's Questionnaire of Hope was designed in 1991 and has 12 items. Its objective is to assess the level of individual's optimism and hopefulness in life. This questionnaire includes operant and strategy scale. Its scoring mechanism is based on Likert's four multiple-choice scale. The Persian version of Snyder's Questionnaire of Hope was found to have high internal validity (Cronbach's alpha=0.71) [26].

Physical activity: Physical Activity Scale for Elderly (PASE): The modified version of PASE was used to measure self-reported physical activity. It is a brief and easily scored questionnaire designed specifically to assess PA over a week time in epidemiologic studies of elderly. The questionnaire contains three sections regarding the frequency and duration of leisure-time activities, household activities, and work-related activities. The overall PASE score ranges from 0 to 397 or more. The Persian version of PASE was found to have high internal validity (Cronbach's alpha 0.97) [27].

Nutritional status: Mini Nutritional Assessment (MNA) has been revealed as probably the best and appropriate screening tool to detect malnourished in community-dwelling elderly and those at risk of malnutrition. This test classifies the individuals as "mal-nourished", "at risk of malnutrition" and "well nourished". The reliability and validity of Iranian version of Mini Nutritional Assessment have reported(Cronbach's alpha 0.66) [28].

Statistical analysis: At first, we used the Kolmogorov-Smirnov test, for normality of data distribution. Descriptive statistics

methods such as frequency, percentage, mean and standard deviation were used to analyze the data. In order to determine correlation between variables, we used Pearson Spearman correlation coefficient and also, 1-way ANCOVA was used to determine the difference between age, education status, PASE and MNA score in three levels of life expectancy. Data analysis was performed on SPSS version 21.

RESULTS

The demographic indices of subjects are presented in Table 1, the subjects contained 434 elderly men (60-90 years old) and the majority of them aged between 60-70 (57.31%). About half of them (43%) had primary school education. Hypertension (42%) was the most prevalent disease of elderly. And about 92 percent of elderly were married.

Table 1: The demographic characteristics of elderly.

Variables		Mean ± SD	N (%)
Age(years)	-	71.81 ± 6.23	-
	60-70	-	243(57.31%)
	71-80	-	136 (32.08%)
	81-90	-	45 (10.61%)
Height (cm)	-	170.21 ± 5.61	-
Weight (kg)	-	77.83 ± 10.35	-
BMI (kg/m^2)	-	27.17 ± 3.52	-
	Not literate	-	28 (6.67%)
	Primary school	-	177(42.13%)
	Middle school/ diploma	-	102(24.29%)
	bachelor	-	96 (22.86%)
Education	Master/PHD	-	17 (4.05%)
	Single	-	9 (2.12%)
Marriage	Married	-	388(91.51%)

			N (%)
	Widow/Divorced	-	27 (6.37%)
Prescribed Medications	Glucose lowering drugs	-	101(25.83%)
	Lipid lowering drugs	-	127(32.48%)
	Hypertension drugs	-	163 (41.69%)
	Hypertension	-	179 (42.22%)
	CVD	-	141(33.25%)
	Osteoarthritis	-	138(32.55%)
	Diabetes	-	108(25.47%)
Diseases	Kidney	-	51 (12.03%)
	liver	-	25 (5.90%)
	Low	-	14 (3.30%)
	Moderate	-	108(25.47%)
Life expectancy	high	-	302(71.23%)

BMI: Body Mass Index, CV: Cardiovascular Disease

As shown in tables of correlation, there was a significant negative correlation between age with subunits of PASE questionnaire such as household activity($p<0.05$), work activity($p<0.001$) and global PASE score($p<0.05$), as well as education status($p<0.05$). also there was a negative correlation (but non-significant) between age and life expectancy($p<0.65$). But we observed a significant positive correlation between age and comorbidity($p<0.05$). Also there was an inverse significant correlation between comorbidity with MNA score($p<0.001$). On the other hand, a significant positive correlation between life expectancy with household activity($p<0.001$), leisure activity($p<0.001$), work activity($p<0.001$) and global PASE score($p<0.001$), MNA score($p<0.001$) and educational status($p<0.05$) was observed. On the opposite, there was a significant reverse correlation between life expectancy with comorbidity($p<0.05$) and Osteoarthritis disease ($p<0.05$) (Tables 2 and 3).

Table 2: The correlation between parametric variables.

	Age	Education	MNA	PASE-leisure	PASE-household	PASE-work	PASE-global	Comorbidity	Life expectancy

		Age	Education status	MNA score	PASE-leisure	PASE-household	PASE-work	PASE-global	Comorbidity	Life expectancy
Age	R	1	-0.108*	0.053	-0.045	-0.102*	-0.164**	-0.103*	0.110*	-0.027
	p	-	0.026	0.276	0.355	0.036	0.001	0.032	0.025	0.589
Education status	P	-	1	0.006	0.103*	0.032	0.145**	0.103*	0.157**	0.099*
	R	-	-	0.897	0.032	0.514	0.003	0.035	0.001	0.044
MNA score	P	-	-	1	0.08	-0.016	-0.002	-0.007	-0.210*	0.336**
	R	-	-	-	0.1	0.74	0.973	0.879	0	0
PASE-leisure	R	-	-	-	1	0.235**	0.016	0.102*	-0.053	0.231**
	p	-	-	-	-	0	0.744	0.036	0.276	0
PASE-household	R	-	-	-	-	1	-0.013	0.780**	-0.041	0.227**
	p	-	-	-	-	-	0.792	0	0.403	0
PASE-work	R	-	-	-	-	-	1	0.248**	-0.235**	0.135**
	p	-	-	-	-	-	-	0	0	0.005
PASE-global	R	-	-	-	-	-	-	1	-0.110*	0.304**
	p	-	-	-	-	-	-	-	0.025	0
Comorbidity	R	-	-	-	-	-	-	-	1	-0.108*
	p	-	-	-	-	-	-	-	-	0.026
Life expectancy	R	-	-	-	-	-	-	-	-	1
	P	-	-	-	-	-	-	-	-	-

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

Table 3: The correlation between non-parametric variables.

		Osteoarthritis	Kidney disease	Liver disease	CV diseases	Type 2 diabetes	Hypertension	Marriage status	Life expectancy
Osteoarthritis	P	1	0.057	0.147**	0.139**	-0.011	0.155**	0.056	-0.113*
	R	-	0.238	0.002	0.004	0.818	0.001	0.249	0.019
Kidney disease	P	-	1	0.178**	0.140**	0.03	0.066	-0.003	-0.02
	R	-	-	0	0.004	0.54	0.171	0.948	0.68
Liver disease	R	-	-	1	0.072	0.074	0.087	0.013	-0.053
	p	-	-	-	0.135	0.125	0.073	0.785	0.274
Cardiovascular disease	R	-	-	-	1	0.142**	0.248**	-0.045	-0.046
	p	-	-	-	-	0.003	0	0.355	0.346
Type 2 diabetes	R	-	-	-	-	1	0.231**	-0.086	-0.028

	p	-	-	-	-	-	-	-	0	0.075	0.561
	R	-	-	-	-	-	-	-	1	0.049	-0.014
Hypertension	p	-	-	-	-	-	-	-		0.318	0.781
	R	-	-	-	-	-	-	-		1	0.033
Marriage status	p	-	-	-	-	-	-	-		-	0.501
	R	-	-	-	-	-	-	-		-	1
Life expectancy	P	-	-	-	-	-	-	-		-	-

* Correlation is significant at the 0.05 level (2-tailed) ;** Correlation is significant at the 0.01 level (2-tailed).

The results of linear regression analysis indicated that, the level of physical activity (β =0.280, t=6.255, p<0.001), nutritional (β =0.331, t=7.312, p<0.001) and educational status (β =0.139, t=3.088, p<0.002), significantly predicted life expectancy in community-dwelling elderly (Tables 4 and 5).

Table 4: Linear Regression for variables predicting Life expectancy.

Model	B	SE	β	t	P
Age	0.009	0.039	0.01	0.222	0.825
Education	0.173	0.056	0.139	3.088	0.002**
MNA score	1.012	0.138	0.331	7.312	0.000**
PASE score	0.027	0.004	0.28	6.255	0.000**
Comorbidity	-0.014	0.209	-0.003	-0.068	0.946

Dependent Variable: Life expectancy

Table 5: Linear Regression for diseases predicting Life expectancy.

Model	B	t	P
Hypertension	-0.35	-0.017	0.987
Type 2 Diabetes	-5	-0.651	0.516
Cardiovascular diseases	32.101	1.849	0.065
Liver diseases	-7	-1.116	0.265
Kidney diseases	-19	-2.473	0.014*
Osteoarthritis	7	0.911	0.363

Dependent Variable: Life expectancy

Elderly were stratified into three groups (low, moderate and high life expectancy groups), or (LLEG, MLEG and HLEG) to compare age, subunits of PASE score, MNA score, educational status and comorbidity precisely. The results of one-way analysis of variance demonstrated that there was not a significant difference between three groups of life expectancy in age. But there was a significant difference in global PASE score (p<0.001), leisure activity(p<0.015), household activity(p<0.001) and work activity(p<0.019) between MLEG and HLEG. Also MNA score was significantly different between MLEG and HLEG (p<0.001). A significant difference in comorbidity was found between MLEG and HLEG (p<0.038. also, there was a significant difference in educational status between HLEG with MLEG (p<0.03) and LLEG (p<0.016) (Table 6).

Table 6: ANOVA results of life expectancy, regarding age, education, PASE and MNA score, and comorbidity.

Dependent variables		SS	MS	F	P				P
							Moderate		0.359
						High	Low		0.949
Level of life expectancy							High		0.359
	Age	107.326	53.663	1.01	0.365	Moderate	Low		0.725

Variable	SS	MS	F	Sig	(I)	(J)	p
						High	0.949
					Low	Moderate	0.725
					High	Moderate	0.003**
					High	Low	0.016*
					Moderate	High	0.003**
					Moderate	Low	0.203
Education	330.957	165.478	6.762	0.001	Low	High	0.016*
					Low	Moderate	0.203
					High	Moderate	0.000**
					High	Low	0.828
					Moderate	High	0.000**
					Moderate	Low	0.807
PASE	98133.77	49066.88	12.28	0	Low	High	0.828
					Low	Moderate	0.807
					High	Moderate	0.015*
					High	Low	0.999
					Moderate	High	0.015*
					Moderate	Low	0.552
PASE-Leisure	8960.61	4480.31	4.19	0.016	Low	High	0.999
					Low	Moderate	0.552
					High	Moderate	0.000**
					High	Low	0.153
					Moderate	High	0.000**
					Moderate	Low	0.751
PASE-Household	27338.41	13669.21	8.23	0	Low	High	0.153
					Low	Moderate	0.751
					High	Moderate	0.019*
					High	Low	0.298
					Moderate	High	0.019*
					Moderate	Low	0.093
PASE-work	2044.41	1022.2	3.54	0.03	Low	High	0.298

						Moderate	0.093
						Moderate	0.000**
					High	Low	0.209
						High	0.000**
					Moderate	Low	0.891
						High	0.209
MNA	144.91	72.45	19.8	0	Low	Moderate	0.891
						Moderate	0.038*
					High	Low	0.132
						High	0.038*
					Moderate	Low	0.447
						High	0.132
Comorbidity	12.55	6.27	3.04	0.049	Low	Moderate	0.447

*The mean difference is significant at the 0.05 level; **The mean difference is significant at the 0.01 level.

DISCUSSION

The significant advances in medicine and lifestyle changes in recent decades have led to increased life expectancy and the number of the elderly worldwide, so that it has reported, life expectancy level from 64 years in 1990 increased to 71 years in 2013(10).On the other hand, considering the increased risk of afflicting various diseases and their effects on lowering the level of community health and imposing heavy health and care costs, applying strategies to prevent and control these diseases can lead to healthy aging along with increasing life expectancy in these individuals. Examining the effective factors on increasing life expectancy can be associated with improving the quality of life level and well-being in the elderly. To our knowledge, this is the first study to investigate the level of life expectancy and its related factors in the community-dwelling elderly in Tehran.

Physical activity

Global Time Physical Activity (GTPA): In the present study, there was a positive and significant relationship between total physical activity and life expectancy (p<0.000). Also, the level of total physical activity (p<0.000), leisure-time physical activity (LTPA) (p<0.000), household time physical activity (HTPA) (p<0.000) and work time physical activity (WTPA) (p<0.019) in the High Level of Life Expectancy Group (HLEG) were significantly higher than the Moderate Level of Life Expectancy Group (MLEE). Several studies support our findings in this area [29,30]. The benefits of physical activity in preventing early mortality and controlling and treating many diseases in different age groups have been proved [31]. Aging is often associated with increased sedentary behaviors, which in addition to increasing

the risk of afflicting with various physical diseases may also lead to behaviors such as aggression and depression [32]. Meantime, increasing physical activity level is associated with improving the function of body systems, which increases the level of life expectancy in the elderly [29]. Recent studies demonstrate that people over the age of 50 years, who had higher levels of physical activity, in addition to increasing their life expectancy, experienced healthier lives with fewer diseases [33].

Leisure Time Physical Activity (LTPA): In the present study, there was a significant and positive relationship between leisure-time physical activity with life expectancy (p<0.000). In this regard, Warburton et al, (2006) reported that people, who regularly participate in leisure activities such as walking, swimming, cycling, and running have a higher life expectancy of 5 years on average compared to inactive people [34]. Increasing oxidative stress is considered to be the most important factor in developing an aging-associated disease such as neurodegenerative diseases, metabolic and cardiovascular diseases, and ultimately mortality of the elderly [35]. On the other hand, it has been well proved that physical activity and exercise through activation of various molecular pathways result in improving the antioxidant function of the body against oxidative stress, reducing the risk of afflicting with an aging-associated disease, and increasing life expectancy in the elderly [36].

Household Time Physical Activity (HTPA): In the present study, a positive and significant relationship was found between physical activity level at home and life expectancy (p<0.000). Several studies are in agreement with our findings in this area [37,38]. On the other hand, studies have shown that physical

activity at home, such as washing, sweeping, gardening, and caring for other people, as activities which are performed repeatedly on different days, are associated with increasing levels of total physical activity and have many advantages [33]. Also, the elderly experience a sense of usefulness by participating in homework, which plays an important role in preventing depression and increasing the life expectancy level [37].

Work Time Physical Activity (WTPA): In the present study, there was a positive and significant relationship between physical activity level in the work time with life expectancy (p<0.005). Our findings are in line with several studies [33,37,38]. The elderly generally have sedentary lifestyles after retirement; this is associated with detrimental effects on physical and mental health and accelerates the aging process [36]. Also, the elderly who have a light to moderate occupation after retirement are less likely to afflict symptoms of the aging syndrome and aging diseases as well as have a higher life expectancy [29]. Higher physical activity of older people in the workplace, in addition to the enjoyment of physical benefits, is associated with improving the sense of participation and financial independence, leading to increasing levels of life expectancy level.

Malnutrition: In the present study, there was a positive and significant relationship between nutritional status and life expectancy (p<0.000). Also, the mean score of the MNA score in the HLEG group was significantly higher than that of the MLEG group (p<0.000). Furthermore, a significant inverse relationship between the MNA score and the number of diseases was observed (p<0.000). Many studies have been conducted on the relationship between malnutrition and life expectancy. The results of these studies mainly show that malnutrition in the elderly in two ways, firstly increasing the prevalence of diseases and, secondly, direct mortality leads to decrease life expectancy level of the elderly [39]. According to a definition by the World Health Organization, malnutrition refers to a lack of getting calories and essential nutrients in the long-term daily diet that are associated with problems such as weight loss and increased risk of non-communicable diseases [40]. Damiao et al, reported factors including the loss of loved ones, tobacco use, and diseases as the most important indirect factors affecting malnutrition in the elderly [41]. It has also been well proved that aging by increasing inflammatory factors such as interleukin-1 (IL-1) and tumor necrosis factor-alpha (TNF-a), glucocorticoids, and catecholamines changes metabolism, appetite, and nutrient absorption (malnutrition) in the body [42], this can reduce the level of life expectancy in the elderly.

Education: In the present study, there was a positive and significant relationship between education level and life expectancy (p<0.044). Also, the level of education in the HLLE group was significantly higher than that of the MLLE group (p<0.003) and LLEG (p<0.016). Our findings in this area are consistent with the results of several studies [43,44]. Several factors are effective in increasing the life expectancy level in people with higher education. It is well proved that higher education is a key to achieve sustainable and high-paying jobs that result in more enjoyment of educated people from high quality recreational, medical and health care and welfare facilities that this helps to improve life expectancy by preventing

different stresses and better mental states [45]. More importantly, education through the development of a healthy lifestyle can help to increase life expectancy. In this regard, studies show that people with higher education are more likely to follow healthy behaviors, including avoiding alcohol and smoking, regular exercise, and a good diet that this eventually leads to a lower incidence of various diseases such as cardiovascular and neurodegenerative diseases in aging, so higher health is associated with increased life expectancy in them [44]. Also, Hendi et al, reported that higher education improves cognitive functions such as concentration, thinking, communication, data analysis, and problem-solving ability at older ages and can be effective in enhancing life expectancy [46].

Comorbidity: In the present study, there was an inverse and significant relationship between comorbidity with life expectancy (p<0.026). There was also a significant inverse association between osteoarthritis and life expectancy (p<0.019). On the other hand, the mean number of diseases in the HLEG group was significantly higher than the MLEG group (p<0.038). Given the significant increase in life expectancy around the world, it can be argued that the general implementation of health interventions, medical industry developments, and the promotion of community health levels have been major causes of increasing life expectancy in recent years [47]. Also, in recent years, health and medical facilities in many low-income and developing countries have improved and led to increasing life expectancy in these countries. Meanwhile, arthritis and osteoporosis are among the most common diseases in the elderly that increase the risk of bone fractures, home remission, lower life expectancy and mortality [48]. Identifying effective strategies for preventing and controlling this disease by improving motor skills and lifestyle can help in increasing the life expectancy of the elderly.

CONCLUSION

The results of this study showed that factors such as physical activity level, malnutrition, education level, and diseases were factors related to life expectancy level in community-dwelling elderly, in Tehran that the level of physical activity and malnutrition were the most predicted levels of life expectancy in the elderly. As a result, applying strategies such as holding training classes and increasing physical activity level through sports programs for the elderly under the supervision of sports physiologists, as well as holding educational conferences about healthy lifestyles in aging based on increasing mobility or a proper diet have specific importance to prevent, control and treat diseases and also increasing life expectancy in the elderly.

LIMITATIONS

This study was limited to the elderly in Tehran and this reduces the generality of the results. Also, due to the cross-sectional design of the study, causal relationships cannot be well shown. Besides, because of the lack of cooperation of many subjects, we could not evaluate the working conditions and income levels of the elderly to investigate the relationship between one of the possible effective factors on life expectancy in the present study.

CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

REFERENCES

1. Chia CW, Egan JM, Ferrucci L. Age-related changes in glucose metabolism, hyperglycemia, and cardiovascular risk. Circulation research. 2018;123(7): 886-904.

2. Franceschi C, Garagnani P, Morsiani C, Conte M, Santoro A, Grignolio A, et al. The continuum of aging and age-related diseases: common mechanisms but different rates. Front Med. 2018;5: 61.

3. Kushkesthani M, Parvani M, Moradi K, Moghadassi M. Malnutrition is Associated with Cognitive Function, Tiredness and Sleep Quality in Elderly Living Nursing Home. J Aging Sci. 2020;8(3): 1-8.

4. WHO. Global Health and Aging. 2016.

5. Afshar PF, Asgari P, Shiri M, Bahramnezhad F. A review of the Iran's elderly status according to the census records. Galen Med J. 2016;5(1): 1-6.

6. Rashedi V, Asadi-Lari M, Foroughan M, Delbari A, Fadayevatan R. Prevalence of disability in Iranian older adults in Tehran, Iran: A population-based study. J Health Soc Sci. 2016;1(3): 251-62.

7. Rashedi V, Gharib M, Yazdani AA. Social participation and mental health among older adults in Iran. Iran Rehab J. 2014;12(1): 9-13.

8. Bertoni M, Bonfatti A, Celidoni M, Crema A, Dal Bianco C. Life expectancy and health investments. In: Health and socio-economic status over the life course: First results from SHARE Waves 6 and 7. Borsch-Supan A, Bristle J, Andersen-Ranberg K, Brugiavini A, Jusot F, Litwin H, et al. (Eds), De Gruyter Publisher, Berlin Germany, 2019Pp: 289.

9. World D. Longevity: Extending Life Span Expectancy. 2019.

10. WHO. World Health Statistics 2015: WHO; 2015.

11. Manoochehry S, Rasouli HR. Iranian population policy and aging: new health concerns. Inter J Travel Med Global Health. 2017;5(2): 70-71.

12. Kontis V, Bennett JE, Mathers CD, Li G, Foreman K, Ezzati M. Future life expectancy in 35 industrialised countries: projections with a Bayesian model ensemble. Lancet. 2017;389(10076): 1323-1335.

13. Kushkestani M, Parvani M, EbrahimpourNosrani S, Bathaeezadeh Y. The relationship between drug use, sleep quality and quality of life in dormitory students at AllamehTabataba'i University, Iran. Popul Med. 2020;2(2): 1-7.

14. Tartibian B, Kushkestani M, EbrahimpourNosrani S, Parvani M. Relationship between the Level of Physical Activity and Nutritional Status with Fatigue in Elderly Residents of Rest Homes in Tehran. NASS. 2019;1(2): 155-68.

15. Kushkestani M, Parvani M, Nosrani SE, Bathaeezadeh SY. The Relationship between Body Composition with Blood Pressure and Sleep Quality in Male Dormitory Student at AllamehTabataba'i University. NASS. 2020;1(2): 77-92.

16. Tartibian B, Kushkestani M, Nosrani SE. The Effect of 12-Week Endurance Training on Lipid Profiles and Fat Percentage of Overweight Girls. NASS. 2019;1(1): 189-200.

17. Shinkai S, Yokoyama Y, Narita M, Taniguchi Y, Seino S, Amano H, et al. Nutritional status and active life expectancy in a general population of older japanese. Inno Aging. 2017;1: 1125-1126.

18. Rezaei S, Esmaeili M. The effect of physical activities on the quality of life, hope and life satisfaction among the elderly in Ilam city. J Gerontol. 2017;2(1): 29-40.

19. Luo Y, Zhang Z, Gu D. Education and mortality among older adults in China. SocSci Med. 2015;127: 134-142.

20. Chetty R, Stepner M, Abraham S, Lin S, Scuderi B, Turner N, et al. The association between income and life expectancy in the United States, 2001-2014. JAMA. 2016;315(16): 1750-1766.

21. Li K, Hüsing A, Kaaks R. Lifestyle risk factors and residual life expectancy at age 40: a German cohort study. BMC medicine. 2014;12(1): 59.

22. Gremeaux V, Gayda M, Lepers R, Sosner P, Juneau M, Nigam A. Exercise and longevity. Maturitas. 2012;73(4): 312-317.

23. Kushkestani M, Parvani M, Rezaei S. The Relationship Between the Level of Physical Activity and Dementia in Elderly Residents of Nursing Homes in Tehran. BJSTR. 2020;29(3).

24. Kushkestani M, Parvani M, Teixeira A. Physical Activity is a Preventive Factor Against SARS-COV-2 in Healthy Subjects (Possible Cellular and Molecular Mechanisms). BJSTR. 2020;29(3).

25. Kushkestani M, Parvani M, Nosrani SE, Rezaei S. The Physical Activity and Fall Risk Among Iranian Older Male Adults. The Open Nur J. 2020;14.

26. Niyazmand ZA, Abbasszadeh A, Borhani F, Sefidkar R. The relationship between spiritual health and hope in multiple sclerosis patients: A descriptive-correlational study. Electronic Journal of General Medicine. 2018;15(5): em79.

27. Ishaghi R, Mahmoudian SA, Asgarian R. Effect of faith-based education on physical activity on the elderly. Iran J Med Edu. 2011;10(5):1281-1288.

28. Ghazi L, Fereshtehnejad SM, AbbasiFard S, Sadeghi M, Shahidi GA, Lökk J. Mini Nutritional Assessment (MNA) is rather a reliable and valid instrument to assess nutritional status in Iranian healthy adults and elderly with a chronic disease. Ecol Food Nutr. 2015;54(4): 342-357.

29. Reimers CD, Knapp G, Reimers AK. Does physical activity increase life expectancy? A review of the literature. J Aging Research. 2012; 2012.

30. Farahmand B, Broman G, De Faire U, Vågerö D, Ahlbom A. Golf: a game of life and death–reduced mortality in Swedish golf players. Scandinavian journal of medicine & science in sports. 2009;19(3): 419-424.

31. Charansonney OL. Physical activity and aging: a life-long story. Dis Med. 2011;12(64): 177-185.

32. Williams RH, Wirths CG. In: Lives through the years: Styles of life and successful aging. White R (Ed) 1st (edn) Transaction Publishers, New York, USA, 2017.

33. Dhana K, Koolhaas CM, Berghout MA, Peeters A, Ikram MA, Tiemeier H, et al. Physical activity types and life expectancy with and without cardiovascular disease: the Rotterdam Study. J Public Health. 2017;39(4): e209-e18.

34. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. CMAJ. 2006;174(6): 801-809.

35. Liguori I, Russo G, Curcio F, Bulli G, Aran L, Della-Morte D, et al. Oxidative stress, aging, and diseases. ClinInterv Aging. 2018;13: 757.

36. Simioni C, Zauli G, Martelli AM, Vitale M, Sacchetti G, Gonelli A, et al. Oxidative stress: role of physical exercise and antioxidant nutraceuticals in adulthood and aging. Oncotarget. 2018;9(24): 17181.

37. Dhana K, Koolhaas CM, Berghout MA, Peeters A, Ikram MA, Tiemeier H, et al. Physical activity types and life expectancy with and without; Obesity, Physical Activity, and Cardio-metabolic Disorders in Older Adults. 2016; 191.

38. Leskinen T, Stenholm S, Aalto V, Head J, Kivimäki M, Vahtera J. Physical activity level as a predictor of healthy and chronic disease-

free life expectancy between ages 50 and 75. Age Ageing. 2018;47(3): 423-429.

39. Zheng XY, Han YL, Guo C, Zhang L, Qiu Y, Chen G. Progress in research of nutrition and life expectancy. Biomed Environ Sci. 2014;27(3): 155-161.

40. WHO. Malnutrition: WHO; 2018.

41. Damiao R, Santos ÁdS, Matijasevich A, Menezes PR. Factors associated with risk of malnutrition in the elderly in south-eastern Brazil. Rev Bras Epidemiol. 2017;20: 598-610.

42. Hickson M. Malnutrition and ageing. Postgrad Med J. 2006;82(963): 2-8.

43. Smelser NJ, Baltes PB. International encyclopedia of the social & behavioral sciences: Elsevier Amsterdam. 2001.

44. Luy M, Zannella M, Wegner-Siegmundt C, Minagawa Y, Lutz W, Caselli G. The impact of increasing education levels on rising life expectancy: a decomposition analysis for Italy, Denmark, and the USA. Genus. 2019;75(1): 11.

45. Kingston PW, Hubbard R, Lapp B, Schroeder P, Wilson J. Why education matters. SocEdu. 2003;76(1): 53-70.

46. Hendi AS. Trends in education-specific life expectancy, data quality, and shifting education distributions: A note on recent research. Demography. 2017;54(3): 1203-1213.

47. Chen H, Chen G, Zheng X, Guo Y. Contribution of specific diseases and injuries to changes in health adjusted life expectancy in 187 countries from 1990 to 2013: retrospective observational study. BMJ. 2019;364: l969.

48. Abrahamsen B, Osmond C, Cooper C. Life expectancy in patients treated for osteoporosis: observational cohort study using national danish prescription data. J Bone Miner Res. 2015;30(9): 1553-1559.