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Effectiveness of Otago Exercise Program on Successful Aging within Older Women with Migrant Children Referring to Public Health Centers in Shiraz City, Iran

Maryam Ghaedi[1], Seyyed Mansour Kashfi[1], Leila Ghahremani[1], and Abdolrahim Asadollahi[1,2]

Abstract

Background: Successful aging (SA) is considered an indicator of satisfaction of older people. This study aimed to evaluate the effectiveness of the Otago Exercise Program (OEP) on SA among older women. **Materials and Methods**: quasi-experimental research with a control group was conducted in 2021 on 120 older women in Shiraz city, south Iran. Eligible samples were selected by a three-stage cluster sampling method and were classified into two equal intervention and control groups. Eight training sessions (exercises) were conducted for the intervention group using the OEP. SA questionnaire was completed at the beginning and 2 months after the intervention. The data were analyzed using the IBM-SPSS version 26, and the effect sizes were extracted. **Results**: The mean age of samples in the intervention and control groups was 69.71 + 59.59 and 68.83 + 5.08 years, respectively. Although there was no significant difference in the mean scores of SA between the two groups at the beginning of the study, 2 months after the intervention implementation, the mean scores of SA increased significantly in the intervention group ($t = 8.57$, $p \leq .001$). **Conclusion**: It seems that OEP is an effective strategy for supporting SA in older people.

Keywords

successful aging, otago exercise program, migrant child, older women

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Introduction

Population aging is not a phenomenon limited to a country or region but a global phenomenon. It should be considered a human success because it results from adaptation in which longevity and life expectancy have increased due to medical, economic, social, and development advances (Fernández-Ballesteros et al., 2013). According to United Nations estimates, the World's Older Adults have increased from 350 million in 1975 to 1.1 billion in 2015, and the number of people over 60 is expected to double by 2025. The estimates of the World Health Organization indicate that the world's older adults will reach 973 million people in 2030 and 2 billion people in 2050, about 80% of which will be in less developed countries (WHO, 2023). In Iran, according to the 2020 census, the population of older citizens aged 65 and over has reached 7.2% of the total population, which, compared to 2022, has grown by 8.1%. It is predicted that in 2030 there will be an explosion of aging in Iran, and 25% to 30% of the population will be over 50 years old (Heidari et al., 2016; Mohammad & Abbas, 2012).

Diverse and often harmful consequences accompany this unprecedented increase in older adults in various aspects of society. For this reason, the aging of the population is at the top of society's daily issues. In order to reduce the various consequences of population aging on various institutions of the country, it is necessary to target health plans at the community level to have healthy, active, and cheerful older women (Yousefi et al., 2020).

Therefore, the discussion about SA includes searching for factors and conditions that help better understand

[1]Shiraz University of Medical Sciences, Shiraz, Iran
[2]The Middle East Longevity Institute in Abyad Medical Centre, Tripoli, Lebanon

Corresponding Author:
Abdolrahim Asadollahi, Department of Gerontology, School of Health, Shiraz University of Medical Sciences, Razi Avenue, P.O. Box: 7163615, Shiraz, Iran.
Email: a_asadollahi@sums.ac.ir

the potential opportunities of aging and identifying ways to change the negative nature of aging (Heckhausen et al., 2010). SA is considered one of the important concepts in the field of aging, and it is a process in which a person adjusts himself to compromise and adapt properly to the changes caused by old age and not relying on others (Rowe & Kahn, 1997). The SA is an ability that includes three key characteristics or behaviors (1) reducing the possibility of illness and disability, (2) high mental and physical activity, (3) adapting to life's tensions and crises (Ouwehand et al., 2007). Sometimes the phenomenon of SA has been equated with other concepts, such as satisfaction with life and morality, and sometimes it has been equated with survival and health (Ozer, 2004). SA includes life satisfaction, longevity, lack of disability, positive understanding of aging changes, effective adaptation to life, happiness, and independence in life (Motamedi, 2005). SA effectively adapts older people to age-related changes, a positive, and happy life, and health (Willcox et al., 2007). The efforts of researchers during the last few decades in identifying the factors that determine SA led to the creation of two viewpoints, a researcher perspective and a general viewpoint. However, both views often agree upon good health conditions, exercising, and close relationships with family and children. In the study conducted by Zanjari et al. (2016), the factors related to SA in older Iranian people were investigated. It was shown that having a good relationship with children and receiving support from them affects SA (Zanjari et al., 2016). Also, in Hilton et al. (2012), having pleasures such as being with children and grandchildren was among the factors determining SA (Hilton et al., 2012). The ability to cope with important changes in life, such as children leaving home, in the study of Reyes-Uribe (2015), was considered an influential factor for success in old age, which was emphasized by the majority of Mexican Older Women (Reyes-Uribe, 2015). Therefore, the important role that children can play in ensuring a SA was noticed by researchers. It seems that the migration of children is one of these influential factors that change the level of social support for older parents (Zarghami & Mahmoudian, 2017).

Considering that Iran has started the experience of aging, it is very important to consider and address issues related to the health of older people. It is obvious that identifying the health status of older people and examining the factors affecting SA is the first step to improving their health (Goli et al., 2016). The general effects of immigration on the population and economy of societies have been widely investigated and tested, but attention to its effects on a special population group, namely older people, has been done to a small extent; Considering the limitations of related studies regarding SA and OEP, the research team in this study decided to investigate the relationship between OEP in Older Women with immigrant children living in Shiraz and SA. The Otago Exercise Program (OEP) consists of 17 strength and balance exercises and a walking program, performed three times a week by the older adult in the home, outpatient, or community setting. Exercises can be done individually or in groups (National Council on Aging, 2023). The migration of children and grandchildren plays an effective role in the mental health of the elderly. Empty nest syndrome is one of the events of this period of life of the elderly (Muhammad, Sulaiman, & Srivastava, 2022). Successful aging is directly affected by the mental health of the elderly. The feeling of satisfaction and happiness can change under the influence of children's migration (Bastia et al., 2022). The destructive link between immigration and successful aging can be moderated by physical activity and sports exercises. Otago exercises are one the beneficial exercises in this regard.

Materials and Methods

The method of conducting this study is one of the types of interventional research of the randomized controlled cluster clinical trial conducted on older women in Shiraz city, south Iran, in the second mid-2022. The research population includes older women (over 60 years old) with immigrant children covered by all health centers in Shiraz city. According to the latest census of Shiraz city in 2022, the population of older women in the central district is more than 83 thousand inhabitants.

In this research, all 12 public Health Centers (PHC) of Shiraz city formed the research environment. From the mentioned population, according to the purpose of the research and taking into account the confidence level of the study equal to 95% and the power of 90% and with a standard deviation of 0.59 in the study of Gutierrez et al. (2018), the amount of sample size for RCT studies of two groups and above was calculated. The number of subjects in each group of 50 and 100 people was calculated. Also, considering the 5% drop in subjects, each group increased to 60 people.

Sampling was a multi-stage cluster, so the participants in the first stage were randomly selected from two public health centers in Shiraz city. In the second stage, eight district health centers (DHCs) were selected, equally divided into two intervention and control groups (four DHCs for each group).

Inclusion and Exclusion Criteria

Inclusion criteria for study participants were the age of 60 and above, do not has an effective cognitive impairment through MoCA's (Range = 0–30) score + 26 for assessment of cognitive disorders, ability to communicate with interviewers, and have the verbal ability, willingness to participate in the study, having at least one migrant children overseas, and being a permanent member of PHC. The exclusion criteria were dying during the study, leaving the membership of PHC,

non-participation caused by severe illness upon his/her physician's decision, and unwillingness to participate and leave the interview.

Instrumentation

In order to collect the necessary information, standard demographic and migration questionnaires and the Persian version of the Successful Aging Instrument (SAI)as a self-rated questionnaire were completed. The demographic and migration questionnaire included age, marital status, employment, economic status, education, history of chronic diseases, and various aspects of migration, such as migration type, duration, and distance. The Persian version of the SAI was validated by Seif et al. (2019) among Iranian samples and compiled into 22 items with a 5-point Likert scale of never (1 point), sometimes (2 points), to some extent (3 points), most of the time (4 points) and always (5 points). The reliability of the SAI questionnaire was reported to be 86% in the original version and 87% for the Persian version (Asadollahi et al., 2019). The questionnaire has five subscales of physical performance, psychological factors, maturity, spirituality, the meaning of life, and satisfaction. The lowest possible score is 22, and the highest is 110. The questions are written positively, and a higher score indicates a higher quality of life and success. For the intervention group, eight training sessions were held twice a week using the OEP. Two months after the end of the intervention, according to Di Larito et al. (2021) , the questionnaires were completed again for both groups (Di Lorito et al., 2021). After collecting the questionnaires and entering the data into IBM-SPSS v. 26, data were analyzed using appropriate statistical tests.

The OEP Protocol

In this Saerang et al. (2021) protocol was used for the OEP. According to recent studies, OEP is more comfortable for older people to prevent falls, increasing their balance and mental health status versus other physical activities and exercises, for example, Tai Chi (Hale et al., 2019; Son et al., 2016). It includes strength retraining exercises and balance, which in the present study was conducted by the OEP group in the form of 8 weeks, three sessions per week for 50 min. It should be mentioned that the protocol used in the current research originated from simple daily functional exercises. The strength exercises of the OEP focused on the large muscles of the lower body, including the strengthening of the knee extensors and flexors, thigh abductors, thigh flexors, and plantar and ankle dorsi flexors. Balance retraining exercises in this protocol include knee bends, backward walking, English Figure 8 walking, sideways walking, tandem standing, tandem walking, standing on one leg, walking on heels, walking It was on the paw, walking on the heel backward, sitting to standing and walking on the stairs (Samuel et al., 2011).

The participants participated in the present study after signing the informed consent form. Before completing the questionnaire, the participants were given information about the research and the questions related to the questionnaires. In order to comply with the ethical standards, after explaining the objectives of the study and working methods and ensuring the confidentiality of the information, the questionnaires were distributed anonymously to older people.

Results

First, the normality of the collected data was checked using the Kolmogorov-Smirnov test. After confirming the normal distribution of the data (the value obtained for the p value was more than .05 in the scores of the variables), the independent t-test and chi-square test were used to examine the quantitative and qualitative variables between the intervention and control groups and the paired t-test to examine The average score change in each of the study groups was used.

The average age of the Older Women participating in the study in the intervention and control groups was $69.71 + 5.59$ and $68.83 + 5.08$ years, respectively. According to the independent t-test, there was no statistical difference between the intervention group participants and the control group regarding average age ($p = .9$, $t = 0.632$).

Table number one shows the demographic variables of the study participants. As shown in Table 1, based on Fisher's exact test, the participants in the two groups of the present study in terms of ethnicity, education level, marital status, chronic diseases, and type of chronic disease, lifestyle, and perceived health status, consumption Smoking and the number of children have no significant difference ($p \geq .05$). They are also, based on the chi-square test between the participants of the two study groups, in terms of the number of immigrant children, the reason and location of immigrant children's migration, the type of migration, the way of communicating with children, emotional connection with children, the emotional impact of immigration, the frequency of communication with children, the improvement of children's conditions. Moreover, improving individual lifestyles is not a significant difference ($p \geq .05$).

Table 2 compares the average scores of SA and its subscales among the two groups of study participants. As mentioned, in the comparison between groups, at the beginning of the study, there was no significant difference in the mean scores of SA between the intervention and the control groups. In the intra-group comparison, 2 months after the OEP intervention implementation, the average SA scores were significantly higher in the intervention group (from 64.84 to 70.59) than in the control group (from 64.40 to 64.08). $p \leq .001$). In the intervention group, following a significant increase in SA scores, SA subscale scores, including; Physical performance scores (from 6.10 to 7.5), psychological factors (from

Table 1. Socio-Demographic Characteristics of Participants before Intervention ($n = 120$).

Variables	Subdomains	Groups		Chi-squared test	p**
		Intervention (60)	Control (60)		
		n (%)	*n* (%)		
Nationality	Persians	57 (95.0)	53 (88.3)	5.4	.641
	Arabs	1 (1.7)	1 (1.7)		
	Lors	2 (3.3)	1 (1.7)		
	Turks	0 (0)	5 (8.3)		
Education level	Elementary	4 (6.7)	3 (5.0)	.9	.819
	Secondary	8 (13.3)	6 (10.0)		
	High School	34 (56.7)	39 (65.0)		
	Graduated	14 (23.3)	12 (20.0)		
Marital status	Married	38 (63.3)	40 (66.7)	2.17	.537
	Widow	15 (25.0)	17 (28.3)		
	Divorced	1 (1.7)	1 (1.7)		
	Separate Life	6 (10.0)	2 (3.3)		
Chronic disease	Yes	50 (83.3)	51 (85)	.60	.830
	No	10 (16.7)	9 (15)		
Type of disease	Osteoporosis	8 (13.3)	5 (8.3)	1.15	.885
	Heart disease	17 (28.3)	16 (31.4)		
	Arthritis	6 (10.0)	7 (11.7)		
	Diabetes	16 (30.8)	19 (31.7)		
	Depression	5 (8.3)	4 (6.7)		
Life Style	Alone	8 (13.3)	5 (8.3)	.77	.378
	With other	52 (86.7)	55 (91.7)		
Smoking	Yes	3 (5.0)	2 (3.3)	.02	.648
	No	57 (95.0)	58 (96.7)		
Perceived health status	Weak	9 (15.0)	10 (16.7)	.07	.995
	Medium	21 (35.0)	21 (35.0)		
	Good	24 (40.0)	23 (38.3)		
	Very Good	6 (10.0)	6 (10.0)		
Number of children	Two children	16 (26.7)	15 (25.0)	2.03	.680
	Three children	20 (33.3)	17 (28.3)		
	Four children	18 (30.0)	17 (28.3)		
	Five children	6 (10.0)	10 (16.7)		
	Six children	0 (0.0)	1 (1.7)		
Number of immigrant children	One child	13 (21.7)	15 (25.0)	.91	.823
	Two children	29 (48.3)	25 (41.7)		
	Three children	15 (25.0)	18 (30.0)		
	Four children & more	3 (5.0)	2 (3.3)		
Reason for migration	Education	17 (28.3)	14 (23.3)	.42	0.934
	Job seeking	10 (16.7)	10 (16.7)		
	Social political issues	2 (3.3)	2 (3.3)		
	Family issue	31 (51.7)	34 (56.7)		
Destination	Asian countries	14 (23.3)	15 (25.0)	.54	.973
	European countries	20 (33.3)	20 (33.3)		
	American countries	26 (43.3)	25 (41.7)		
Type of migration	Permanent	33 (55.0)	29 (48.3)	.53	.465
	Temporary	27 (45.0)	31 (51.7)		
Connection to the children	No connection	41 (68.3)	42 (70.0)	.03	.843
	Having connection	19 (31.7)	18 (30.0)		
Level of emotional connection with children before migration	Low	1 (1.7)	6 (10.0)	4.04	.098
	Good	15 (25.0)	18 (30.0)		
	Very good	44 (73.3)	36 (60.0)		
Negative emotional impact	Low	0 (0.0)	3 (5.0)	6.4	.091
	Medium	20 (33.3)	11 (18.3)		
	Much	18 (30.0)	24 (40.0)		
	Very much	22 (36.7)	22 (36.7)		

(continued)

Table 1. (continued)

Variables	Subdomains	Groups: Intervention (60) *n* (%)	Groups: Control (60) *n* (%)	Chi-squared test	*p***
Time of connection with children before immigration	Almost daily*	1 (1.7)	3 (5.0)	1.03	.589
	Weekly	54 (90)	52 (86.7)		
	Monthly	5 (8.3)	5 (8.3)		
Improving children's conditions	So Bad	1 (1.7)	2 (3.3)	1.05	.872
	Bad	4 (6.7)	6 (10.0)		
	Without change	9 (15.0)	11 (18.3)		
	Good	39 (65.0)	33 (55.0)		
	Very good	7 (11.7)	8 (13.3)		
Improving older parents' lifestyle	Very low	1 (1.7)	4 (6.7)	2.08	.728
	Low	18 (30.0)	16 (26.7)		
	Medium	28 (46.7)	26 (43.3)		
	Much	9 (15.0)	10 (16.7)		
	Very much	4 (6.7)	4 (6.7)		

*Five days a week or more, ** Statistically non-significant at the 1% level (*p*-value ≥ .01).

Table 2. Comparison of Mean Scores of SA and its Subscales between Intervention and Control Groups.

Variables			Intervention (57) Mean	Intervention (57) *SD*	Control (60) Mean	Control (60) *SD*	Student's *t*-test[a]	Effect Size: Cohen's *d*	Effect Size: ES correlation *r*	Effect Size: Cohen's *U3*[b]
SAI total score	Pre-test		64.84	5.04	64.04	5.61	$t(118) = 0.29^{n.s.}$	—	—	—
	Post test		70.59	2.09	64.8	4.98	$t(115) = 8.57^{***}$	1.56	.76	94.1%
Subdomains of SAI	Physical activity	Pre-test	6.10	1.02	6.11	1.81	$t(118) = 0.15^{n.s.}$	—	—	—
		Post test	7.15	0.79	6.15	1.17	$t(115) = 5.39^{***}$	0.72	.61	76.4%
	Psychological	Pre-test	17.94	2.67	17.58	2.98	$t(118) = 0.51^{n.s.}$	—	—	—
		Post test	21.31	1.19	17.83	2.68	$t(115) = 8.98^{***}$	1.67	.83	95.3%
	Maturity	Pre-test	25.52	1.60	25.06	1.05	$t(118) = 0.41^{n.s.}$	—	—	—
		Post test	26.12	1.36	25.03	1.46	$t(115) = 3.14^{***}$	0.77	.67	77.9%
	Spirituality	Pre-test	6.05	0.81	6.05	0.67	$t(118) = 0.01^{n.s.}$	—	—	—
		Post test	6.35	0.48	5.86	0.79	$t(115) = 3.97^{***}$	1.02	.74	84.6%
	Life Satisfaction	Pre-test	9.21	1.29	9.05	1.48	$t(118) = 0.66^{n.s.}$	—	—	—
		Post test	9.64	0.89	8.93	1.52	$t(115) = 3.07^{***}$	0.57	.46	71.6%

[a]Statistical paired t-test, 2. Statistical independent *t*-test, $DF \geq 51$.
[b]Percentage of the "treatment" group will be above the mean of the "control" group.
***Statistically significant at the 1% level (*p*-value ≤ .001).
ES = Effect size; n.s. = Not statistically significant; ES Correlation *r* = effect size correlation using Pearson coefficient.

21.31 to 17.9), maturity (from 25.5 to 26.12), spirituality (from 6.0 to 6.35), and Life satisfaction increased significantly (from 9.21 to 9.64); however, in the control group, the scores of SA subscales including; Physical performance scores (from 6.11 to 6.15), psychological factors (from 2.98 to 2.68), maturity (from 25.60 to 25.30), spirituality (from 6.05 to 5.86), and There was no significant increase in life satisfaction (from 9.05 to 8.93).

Discussion

This research investigated the effectiveness of sports exercises in the SA of Older Women with immigrant children. According to the results, the present study showed that OEP intervention is significantly effective on SA in general and its components. In this regard, the results of Gopinath et al.'s (2018) study, which was conducted to investigate the relationship between physical activity and SA, showed that people with intense physical activity compared to people with a minimum amount of physical activity have twice the chance of SA in 10 years. They have a future. It also states that a high level of physical activity reduces the possibility of cognitive, chronic diseases, and functional disabilities, increases life span, delays aging, and can provide the basis for SA (Gopinath et al., 2018). The World Health Organization also considers participation in

moderate-intensity physical activity of at least 150 min per week necessary for positive health outcomes. In the current study, the participants exercised for 150 min according to the OEP protocol, which can provide positive results on health and SA. Therefore, it can be stated that the mentioned results are consistent with the present study (Bull et al., 2020).

Another finding of this research is the effectiveness of OEP intervention in improving physical performance. In this regard, Shubert et al. (2020), which investigated the effect of OEP intervention on physical performance, showed that physical performance increases by receiving OEP (Shubert et al., 2020). Also, this finding is in line with the results of various studies that show the effectiveness of educational intervention on increasing and improving physical performance, for example, studies by Mendoza-Ruvalcaba and Arias-Merino (2015) and Kerr et al. (2018) (Kerr et al., 2018; Mendoza-Ruvalcaba & Arias-Merino, 2015).

In justification of this issue, it can be stated that considering that OEP focuses on physical balance, correcting unsafe positions in older people leads to improving physical performance (Naczk et al., 2020). It can also be argued that physical activity and having an active life, in addition to improving the functions of old age, Along with positive results on the physical health status of Older Women, intervention in people's lifestyle and changing it toward a healthy lifestyle has a positive effect on the physical and mental health status of the person for a long time (Yi et al., 2018). that the results of this part of the research were compared with the results of Dastmanesh & Karimi (2019), which was conducted to investigate the effect of 8 weeks of OEP and Tai Chi programs on fall risk and balance of older people men, and showed that OEP has a significant effect on the fall and balance risk index; In addition to balance factors, OEP also takes into account other factors such as physical strength or functional skill, it is in the same direction (Dastmanesh & Karimi, 2019).

Also, this study showed that sports intervention could improve older people's mental health. Gutierrez et al.'s (2018) study showed that exercise significantly affects achieving a better and more SA. This effect can be applied directly by influencing health and life satisfaction and indirectly by influencing social and psychological aspects (Gutierrez et al., 2018). In the explanation of this research, it can be argued that an exercise is a valuable tool for maintaining physical health. It is closely related to mental health, especially in preventing mental abnormalities. Exercise reduces anxiety and depression, and participating in sports activities helps to socialize and acquire skills and mental competence (Sorriento et al., 2021).

In addition, the study's results showed that OEP intervention leads to improved life satisfaction in older people. In explaining the findings of this research, it can be argued that exercise and physical activity have an effective role in the life satisfaction of older people, and regular exercise can be used to improve their health. Regular physical activities have the potential to be a promising and somewhat inexpensive intervention to reduce the burden of aging. Focusing on physical activity by adopting a healthy lifestyle in old age can significantly improve the quality of life in this group of Older Women. The study by de Oliveira et al. (2017) titled the effect of physical activity on anxiety, depression, and quality of life in older people concluded that physical activity leads to an increase in life satisfaction and quality of life is the same (Oliver et al., 2017).

Conclusion and Limitations

In addition, this study showed that OEP training could increase the degree of maturity in older people. In this regard, in a study conducted by Bosnes et al. (2019) to investigate the effects of lifestyle determinants in middle age on SA in the next 20 years, the results indicated that lifestyle (physical activity, obesity, social support, smoking) and alcohol) are related to SA (Bosnes et al., 2019). Therefore, it can be claimed that there is a direct relationship between a healthy lifestyle and the amount of physical activity with the degree of maturity in older people. Finally, the present study showed that OEP intervention significantly increases the dimensions of spiritual health. This finding is in line with the results of Davodzadeh & Mahmoudi (2018), who stated that health-related education improves older people's psychological and spiritual aspects of older people (Davodzadeh & Mahmoudi, 2018).

The OEP can increase health as a protective factor among Older Women, so the suggestion is that regular participation in OEP can reduce the incidence of illness, falls, and disability and improve independence. The participants in the research were mainly young old and middle-aged (≤80 years old). Moreover, the age classification was not considered in the inclusion criteria, which could be a limitation of our study. Hence, it was suggested to consider old-old persons (+80) in future research. Also, the study is gender-based research; all participants were women. Future research needs to attend the older men in the OEP intervention.

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Author Contributions

All authors contributed to the study conception and design. Material preparation was performed by AA and SMK, data collection was performed by MGH, data analysis were performed by AA. The first draft of the manuscript was written by MGH and all authors commented on previous versions of the

manuscript. All authors read and approved the final manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (Code No.: IR.SUMS.REC.1399.609).

Consent for Publication

None.

ORCID iD

Abdolrahim Asadollahi https://orcid.org/0000-0003-2265-5641

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author, AA.

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