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ORIGINAL ARTICLE

Physical fitness, balance and quality of life in the elderly with and without medication usage

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Purpose: The purpose of this study was to determine the effects of medication usage on physical fitness, balance and quality of life in elderly individuals.
Methods: A total of 88 elderly individuals were enrolled: 49 were women and 39 were men, with a mean age of 72.13±5.3 years. Of these, 75 individuals had at least one chronic illness. Individuals were studied in 3 groups according to his or her number of daily medication usage: those who do not use medication, those who use 1-3 medications per day and those who use 4 or more medications per day. The Senior Fitness Test (Chair Stand Test, Up And Go Test, 2 Minute Step Test, Biceps Curl Test, Chair Sit And Reach Test, Back Scratch Test, the pulse of the individuals was checked and recorded before and after the 2-Minute Step Test), Berg Balance Test and Nottingham Health Profile were used to evaluate physical fitness, balance and quality of life, respectively. Differences between the groups were analysed with Kruskal Wallis.
Results: In our study, medication routines within the elderly population did not show a statistically significant change in physical fitness, balance, quality of life, flexibility and heart rate ($p>0.05$).
Conclusion: According to the results of our study, medication usage was not affecting physical fitness, balance and quality of life; with proper prescribing, elderly people who use medications can be kept at the same level of physical fitness, balance and quality of life as their peers who do not use medication.
Keywords: Aging, Drug therapy, Drug interaction, Chronic disease, Physical fitness.

İlaç kullanan ve kullanmayan yaşlı bireylerde fiziksel uygunluk, denge ve yaşam kalitesi

Amaç: Bu çalışmanın amacı, yaşlı bireylerde ilaç kullanımının fiziksel uygunluk, denge ve yaşam kalitesine etkisini araştırmaktır.
Yöntem: Çalışmamıza, yaş ortalamaları 72.13±5.3 yıl olan 49 kadın 39 erkek olmak üzere, toplam 88 yaşlı birey dahil edildi. Bunlardan 75 bireyin en az bir kronik hastalığı bulunmaktaydı. Bireyler günlük ilaç kullanma sayılarına göre; ilaç kullanmayanlar, 1-3 adet arası ilaç kullananlar ve 4 adet ve üstü ilaç kullananlar olarak 3 grupta incelendi. Bireylerin fiziksel uygunluğunu değerlendirmek için; Senior Fitness Testi (sandalyeye oturup kalkma testi, kalk yürü testi, iki dakika adımlama testi ve ağırlık kaldırma testi, sandalyeye otur uzan testi ve sırt kaşıma testi, iki dakika adım alma testinden önce ve sonra bireylerin nabızları kontrol edildi); dengeyi değerlendirmek için Berg Denge Testi, yaşam kalitesini değerlendirmek için Nottingham Sağlık Profili kullanıldı. Kruskal Wallis testi ile gruplar arası farklılıklar analiz edildi.
Bulgular: Çalışmamızda yaşlı popülasyonda ilaç kullanımının fiziksel uygunluk, denge, yaşam kalitesi, esneklik ve kalp hızı üzerinde anlamlı bir değişiklik yaratmadığı gösterildi ($p>0.05$).
Sonuç: Araştırmamızın sonuçlarına göre, ilaç kullanımı fiziksel uygunluk, denge ve yaşam kalitesini etkilemediğinden; doğru reçetelendirme ile ilaç kullanan yaşlı bireylerin fiziksel uygunluk, denge ve yaşam kalitesi bakımından ilaç kullanmayan yaşıtları ile aynı düzeyde kalmaları sağlanabilir.
Anahtar Kelimeler: Yaşlanma, İlaç tedavisi, İlaç etkileşimi, Kronik hastalık, Fiziksel uygunluk.

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The World Health Organization notes that in most developed countries, "the elderly" tends to refer to people who are 65 years or older.[1] The elderly comprised about 4 percent of Turkey's entire population in the 1970's. By 2023, that figure is expected to rise to 10 percent, making factors which accompany aging and related coping methods increasingly important for our country.[2] Non-communicable chronic diseases and falls are the cardinal issues at hand.[1,3] When we check the distribution of chronic diseases seen in the elderly for our country, it is shown that hypertension is the leading cause with about 31%, followed by chronic heart failure and osteoarthritis with 14%, and diabetes mellitus with 10%.[4] Chronic diseases, decreased physical activity, muscle weakness and impaired balance may increase the risk of falling through direct and indirect reasons.[5,6] Depending on the impairment of balance, each year one out of every three individuals over 65 years of age falls, and half of these falls are repeated falls.[7,8] Functional regression and increased inactivity relates with older age.[6,8] In addition, muscle weakness, decreased muscle mass, walking difficulties and impaired balance cause poor physical fitness. In order to improve the quality of life in geriatric cases, it is necessary to develop the ability to perform daily life activities. Likewise, performing daily physical activities requires a certain level of physical fitness.[9] Because the decrease in physical activity is also a risk factor for falls, physical fitness becomes increasingly important for the elderly.[8] Physiological changes due to aging usually cause diseases to occur, the response to the treatment and the complications that may be seen are also affected by the situation.[10]

Nowadays, elderly patients are at risk for medication ineffectiveness, adverse medication reactions, medication interactions, overdose or inadequate dosage during treatment for different reasons. On the other hand, avoiding the use of medications with proven effects can also lead to inappropriate medication regimens.[11] Aforementioned chronic diseases usually treated with the prescription of common medications like cholinesterase inhibitors, diuretics, vosodilatators, beta blokers, eritromisins, oral corticosteroids or opioids and these may lead to some other complaints such as urinery incontinence, dizziness, hypertension, cough, cardiac arythmy, nausea, osteoporosis etc.[12]

The aim of this study was to determine the effects of medication on physical fitness, balance and quality of life in the elderly. Thus, all physicians and especially family physicians will be able to provide reliable, evidence-based scientific information. The results should also obtain information depending on medication usage about the physical fitness and balance parameters of the patients that already started physical therapy sessions.

METHODS

Our study was carried out with the permission of the Bolu Abant Izzet Baysal University Clinical Research Ethics Committee and the approval of the Bolu Provincial Health Directorate (2011/ 43). The elderly was informed about the purpose, method and expected benefits of the study in accordance with the Declaration of Helsinki.[13] Their approval for voluntary participation was also collected. Effect size (ES: 0.35) was calculated from the Senior Fitness Test (SFT) results $\alpha<0.05$ and $\beta=0.80$ of A. Toraman and N. Ü. Yildirim's publication, effect size found as 84 people.[14] Inclusion criteria were; enrolment to the 12 Kasim Public Health Centre, 65 or more years of age and using prescribed medication only. Exclusion criteria were; cognitive impairment, congestive heart failure, uncontrolled hypertension, 24 points or less for the Mini Mental State Examination. The study was planned as a prospective cohort study and started with 124 volunteers. Three patients with significant cognitive impairment, 6 patients with congestive heart failure, 4 patients with uncontrolled hypertension and 19 patients with a score of 24 points or less from the Mini Mental State Examination were not included in the study. Prior to physical fitness tests, blood pressure, heart rate, respiratory frequency was checked and recorded. Four individuals whose results were too high for blood pressure (> 140/90 mm/Hg) and heart rate (> 100 beats/min) were excluded from the study.[15] Eighty-eight individuals (age 65 and over) with an average age of 72.13 (SD 5.30) who live in Bolu with their families were included in the study.[16-18] Of the

individuals included in the study, 39 were male and 49 were female (Figure 1).

Individuals were questioned about their name, surname, age, gender, height, body weight, dominant hand, marital status, education status, sight and hearing status, use of assistive device or cane, fall history in the last one year, chronic diseases and personal backgrounds.

The Mini Mental State Examination was used to assess cognitive functions. The test consisted of 21 questions: 2 questions for record memory, 1 for attention and calculation, 1 for memory recall, 6 for language, and 10 for orientation. The maximum score was 30, indicating good mental status.[19]

The SFT protocol was used to evaluate physical fitness. SFT protocol consists of 6 stations. Before the test was started, the physical conditions under which the SFT protocol could be applied (regulation of the area so that the tests can be done in a proper way and individuals not be restricted in their movement during the test) were provided.[20] The time required to complete the test was between 30 and 40 minutes. Each individual was tested after 5-8 minutes of warm-up exercise. Stations were as follows: chair stand test and 2-minute step test for lower limb strength, bicep curl test for upper limb strength, chair sit and reach test for hamstring flexibility, back scratch test for upper limb flexibility, up and go test for agility and dynamic balance.

The Turkish version of the Nottingham Health Profile (NHP) was used to evaluate health-related quality of life. The NHP is a general quality of life questionnaire that measures the health problems perceived by an individual and the degree to which these problems affect daily living activities. The questionnaire assesses six dimensions of health status and scored between 0-100 in each section. The best status corresponds to 0, and the worst to 100. The total score was obtained from the sum of the subscores and the total NHP score was evaluated in the study.[21]

The Berg Balance Test (BBT) was a common test tool for the elderly and used to evaluate balance and determine the risk of falling.[22-24] BBT consists of 14 items and the total score is 56. High, medium and low risks of fall were denoted if the individual's score was in any interval from 0-20, 21-40 and 41-56, respectively.

Statistical analysis

Descriptive statistics were made for the demographic characteristics of the individuals participating in the study. Individuals were divided into 3 groups according to his or her daily medication habits (no medication, 1-3 medications per day (medication group) and 4 or more medications per day (polypharmacy group).[13] Differences between groups were measured using the Kruskal Wallis test. The SPSS 17 demo statistics program was used to evaluate the obtained data and level of significance was accepted as $p<0.05$.

RESULTS

A total of 88 individuals, 49 female (55.7%) and 39 male (44.3%), were included in the study. The average age and body mass index of the individuals were calculated as 72.13 years (SD: 5.3) and 30.49 kg/m^2 (SD: 5.73) respectively. While 10 (11.4%) of the individuals were using different assistive devices, 78 (88.6%) were not. When the fall histories were conducted, 16 (18.2%) individuals stated that they fell at least once and the remaining 72 individuals had not. According to the groups, distribution of assistive device usage, presence of vision problems, presence of hearing problems and history of falling within the past year are shown in Table 1.

Seventy-five (85.2%) of the individuals stated that they had at least 1 chronic illness and 13 (14.8%) had not. Of those with chronic disease, only those with cardiovascular disease were ranked first with 38 individuals (43.2%), those with cardiovascular diseases with musculoskeletal diseases together ranked second with 11 patients (12.5%) and those with metabolic disease with cardiovascular diseases together were in third place with 10 (11.4%). Distribution of individuals according to chronic diseases are shown in Table 2.

There was no statistically significant difference between groups for BBT, chair stand test, up and go test and the 2-minute step test ($p>0.05$) (Table 3).

There was no statistically significant difference between groups for NHP, biceps curl, chair sit and reach and back scratch tests

(p>0.05) (Table 4).

There was no statistically significant difference between groups for pulse rate at rest or activity (p>0.05) (Table 5).

DISCUSSION

Our study indicated that medication usage did not significantly change physical fitness in the elderly. Even though it was not statistically significant, the 1-3 medication(s) group had better scores at every test parameter, and the 4 or more-medication group was at the lowest level for physical fitness parameters. These results suggested that the amount of medication should not cause drug interactions yet should be effective enough to control the chronic diseases of the elderly.

Soyuer et al. reported that in a study carried out in 2012 with 124 elderly people in Kayseri, Turkey there was a negative interaction between balance and the amount of medication. They also identified the group at risk for balance and physical activity as the illiterate, married women with chronic diseases.[25] Hatch J. et al reported that in 2003, balance disorders were seen with lower degrees of confidence in balance skills, and that this situation has caused a negative spiral by reducing functionality and balance.[7] Our results takes attention to the point that elderly individuals whose chronic diseases were controlled by correct medication showed physical fitness and balance performance at the same level as those who do not need medication. But it must be noted that factors like physical capacity of the individual prior to the chronic disease, genetic background, environment, alcohol and cigarette consumption can alter the progression of the chronic disease.

In their 2013 review Karlsson et al. advised regulating the use of psychotropic medication and the modification of the use of multiple medicines for the regulation of balance and reduction of falls in the elderly.[26] From the same point of view, medication usage showed no difference for dynamic and static balance parameters in our study, so we suggested that rational multiple medication is an effective way to ameliorate and prevent balance disorders.

Mhatre et al. reported that over-the-counter medicine usage without a prescription may lead to a significant decrease in the quality of life. This decrease was largely due to the interactions of medications without a doctor's supervision.[27] Olsson et al. concluded their study with 140 elderly people in Sweden and stated that the quality of life increases with proper prescribing and that quality of life decreases as the medication quality reduced.[28] Anderson et al. in their study with 975 elderly hypertension patients in the United States found that physical symptoms were the most influential factor for quality of life and that the most effective method to increase a quality of life score in elderly patients with hypertension was the use of medications appropriate for symptom aetiology.[29] It was indicated in our study that the quality of life values of the elderly participants were not statistically significantly changed as the number of medications increased. It is thought that the reason for the emergence of this situation was that the elderly regularly followed the same family physician, that they were not using non-prescription medication, and their medication was aimed for the correct aetiology.

In our study, it was shown that the amount of medication usage had no effect on the flexibility of the elderly. It is assumed that aging is often accompanied by a decrease in muscle flexibility, which can cause balance problems and falls, demonstrating the need for flexibility-enhancing exercises in treatment approaches.[30,31] However, there was no high quality study examining muscle shortening in relation to medication usage in chronic diseases. In this respect, the results of our study should be tested in a larger scale group of subjects in further studies.

In our study, there was no significant difference in the pulse increments of individuals before and after the 2-minute step test. It was thought that the pulse of the elderly with a heart disease could be controlled with proper medication protocols and that this may lead to a similar pulse for the elderly when compared to peers without a heart disease.

Limitations

The low numbers of elderly people who do not use medication, not questioning in detail

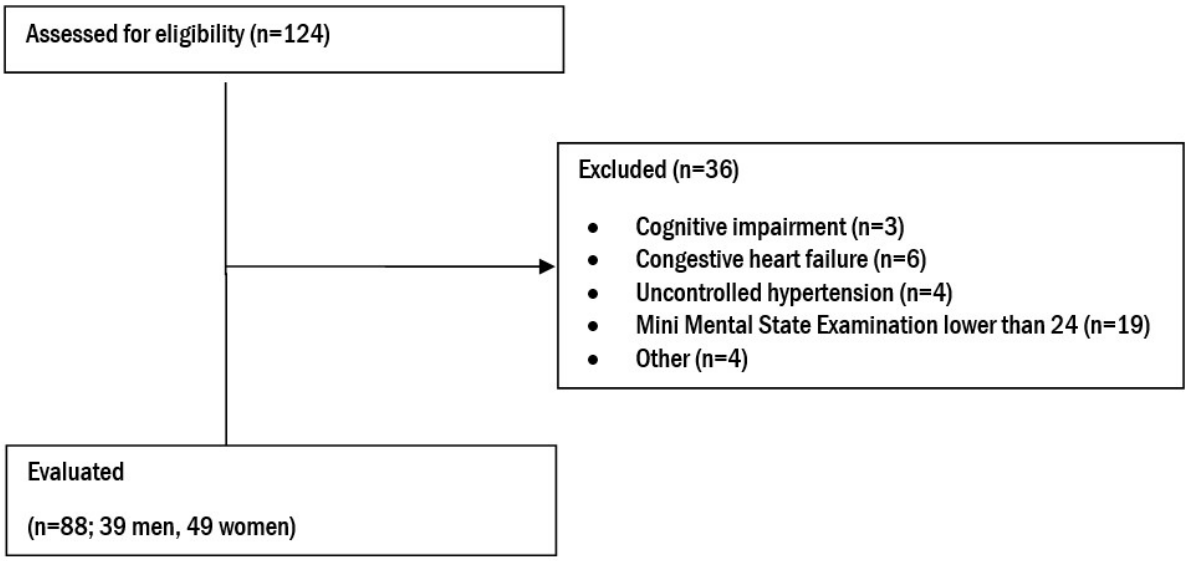

Figure 1. Flow chart of the participants.

Table 1. Distribution of assistive devices, vision and hearing problems and falling histories over the past year according to the medication groups

		None (N=9) n (%)	1-3 (N=41) n (%)	>4 (N=38) n (%)
Are you using an assistive device?	Yes	1 (11)	2 (5)	7 (18)
	No	8 (89)	39 (95)	31 (82)
Do you have a visual impairment?	Yes	6 (67)	27 (66)	26 (68)
	No	3 (33)	14 (34)	12 (32)
Do you have auditory impairment?	Yes	2 (22)	18 (44)	18 (47)
	No	7 (78)	23 (56)	20 (53)
Have you fallen over the past year?	Yes	1 (11)	9 (22)	6 (16)
	No	8 (89)	32 (78)	32 (84)

Table 2. Distribution of diseases in participants.

	Elderly with the disease n (%)	Elderly without the disease n (%)
Visual	2 (2.3)	86 (97.7)
Cardiovascular	69 (78.4)	19 (21.6)
Musculoskeletal	19 (21.6)	69 (78.4)
Metabolic	16 (18.2)	72 (81.8)
Chronic pulmonary	7 (8)	81 (92)
Cerebrovascular	3 (3.4)	85 (96.6)

Table 3. Comparison of Berg Balance Test, Chair Stand Test, Up and Go Test, and 2 Minutes Step Test between medication groups.

	Medication Groups	N	Median	Range (Min-Max)	p
Berg Balance Test	None	9	56	39-56	
	1-3	41	55	35-56	0.169
	>4	38	55	38-56	
Chair Stand Test	None	9	11	5-18	
	1-3	41	12	0-21	0.720
	>4	38	11	0-20	
Up and Go Test	None	9	6.7	4.2-14.9	
	1-3	41	6.82	0-14.91	0.610
	>4	38	7.5	4.7-13	
2 Minutes Step Test	None	9	33	0-67	
	1-3	41	35	0-80	0.271
	>4	38	30	0-68	

Kruskal-Wallis test, $p<0.05$.

Table 4. Comparison of Nottingham Health Profile, biceps curl, chair sit and reach, and back scratch tests between medication groups.

	Medication Groups	N	Median	Range (Min-Max)	p
Nottingham Health Profile	None	9	64.9	0-316.76	
	1-3	41	95.4	12.6-265.6	0.663
	>4	38	78.2	0-385.7	
Bicep Curl Test	None	9	16	5-25	
	1-3	41	17	11-28	0.644
	>4	38	16	8-29	
Chair Sit And Reach	None	9	7	-15-19	
	1-3	41	4	-35-18	0.828
	>4	38	3.5	-17-22	
Back Scratch Test	None	9	14.5	-32-6	
	1-3	41	15	-47-7	0.257
	>4	38	20	-49-30	

Kruskal-Wallis test, $p<0.05$.

Table 5. Comparison of heart rate measurements during rest and activity between the groups.

	Medication Groups	N	Median	Range (Min-Max)	p
Rest Pulse/minute	None	9	72	64-104	
	1-3	41	76	52-92	0.292
	>4	38	80	60-104	
Activity pulse/minute	None	9	100	88-112	
	1-3	41	96	64-128	0.673
	>4	38	100	76-128	

Kruskal-Wallis test, $p<0.05$.

for the types of the medications used by the elderly, not using special tests or equipment for the pulse control were the limitations of our study.

Conclusion

Consequently, there was no negative effect of reasonable medication usage on physical fitness, balance, quality of life and flexibility in the elderly. We thought that with proper prescribing, the elderly using medication could be kept at the same level as those who do not use medication in terms of balance, quality of life and flexibility. The choice of medication types and dosages of the elderly who use multiple medicines can ensure the continuity of the quality of life and physical fitness by making the right choices with doctors who are regular followers of the individuals and have enough knowledge and experience on the subject.

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