Research Article

The Postural Balance of Elderly Men is Enhanced by Islamic Prayer

Seyed Shahab Mirhajian[1], Gila Pirzad Jahromi[1], Abolfazl Mirani[2], Sousan Salari[3], SettingsSaeed Talebian[4], Hossein Mozaffari[1], Boshra Hatef[1*]

***Corresponding author:** Boshra Hatef, Associate Professor
Neuroscience research center, Baqiyatallah University of medical sciences, Mollasadra, Tehran, Iran
Tel: 98+2188040060
Email: boshrahatef@bmsu.ac.ir

1- Neuroscience Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran.
2- Biomedical Engineering, Research Institute of Clinical Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran.
3- Department of Clinical Psychology, Shahed University, Tehran, Iran.
4- Department of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran.

ORCID ID:
Seyed Shahab Mirhajian: 0009-0002-8944-4355
Gila Pirzad Jahromi: 0000-0002-2683-1625
Abolfazl Mirani: 0000-0001-8799-2038
Sousan Salari: 0000-0001-9439-7130
Saeed Talebian: 0000-0002-4945-8085
Hossein Mozaffari: 0009-0006-2090-2628
Boshra Hatef: 0000-0002-2638-3463

Article info:
Received: 6 Jan 2026
Accepted: 5 May 2026

Citation: Mirhajian SS, Pirzad Jahromi G, Mirani A, Salari S, Talebian S, Mozaffari H, et al. The Postural Balance of Elderly Men is Enhanced by Islamic Prayer. Journal of Modern Rehabilitation. 2026;20(3):?-?

Running title: Prayer affects on postural balance

Abstract

Introduction: The Islamic prayer has several components that enhance physical and mental health. The study's aim was to evaluate how prayer impacts balance control.

Materials and methods: Thirty healthy elderly men were split into two groups in the study: One group (n= 15) consisted of people who regularly prayed (WP). Another group of people (n=15) who did not pray (WOP) was matched in various factors with the praying group, such as demographics, lifestyle, physical and psychological abilities, cognitive abilities, and heart rate variability (HRV) indices. The balance indexes were recorded by Biodex in simple and dual task

conditions. Mann-whitney and Pearson Chi-square test were used for non-parametric variances, while t-test and ANCOVA were used for parametric variances and balance variables. From 9 to 13 o'clock, the tests were conducted.
Results: ANCOVA analysis showed that the amount of overall, Ant-Post, and Med-Lat balance index in simple and dual task conditions were significantly lower in the WP group than in the WOP group ($p<0.05$). Age was considered a covariate. The other variables that influence balance control, consisted of demographics, lifestyle, psychological and physical health, and cognitive abilities and change of HRV during tests, did not showed any significant differences between the groups.
Discussion: The Islamic prayer is related to improving balance control in elderly men independently of other effective factors. There is the possibility of using it as a physiotherapy intervention for the elderly.
Keywords: Islam; Postural balance; Cognition; Health status

Introduction

Balance control and falls in the elderly population are significantly affected by physical performance and mental health in lifestyle (1, 2). Maintaining and improving balance control as people age requires an active lifestyle that includes regular physical activity, especially exercises that target strength, balance, coordination, and flexibility (3).
Islamic prayer can provide balance training to the elderly and others due to its physical postures and movements that are repeated several times a day. Prayer posture changes act as slow, moderate exercises that help strengthen muscles, improving flexibility especially in the spine and lower limbs, and enhancing dynamic balance by promoting better displacement of the center of gravity around the base of support (4, 5). The risk of falls and related injuries in the elderly can be reduced by improving their balance.
A case control study consisted of eighty-one elderly participants in two groups: one group who regularly performs prayer in all positions compared to an age and BMI matched group without performing prayer, showed that regular prayer involves a series of movements such as standing, bowing, prostrating, and sitting, which stimulate and challenge the body's balance systems, including the visual, vestibular, and proprioceptive systems. They found that prayer improves functional balance scores based on the Berg scale and decreases the fear of falling (6). Unfortunately, this study did not consider other confounding factors such as physical, mental, and general health levels, psychological status, and cognitive functions, and did not examine the balance responses in the device with high precision. Another study showed that the seventeen participants who regularly performed Islamic prayer did not have high or medium risk of falling based on the Berg Balance Score, compared to ten participants who did not pray regularly (7). Although these studies did not control for lifestyle factors and cognitive abilities, they may influence balance performance. Cognitive function and balance are linked to physical performance in middle-aged and older adults (8).
Furthermore, Islamic prayers incorporate physical and meditative components, which together enhance physiological functions related to balance and fall prevention. According to Hatef et al, Islamic prayer can improve cortisol concentration and HRV to optimal levels after 4 rakats of prayer in participants who regularly pray (9, 10). Therefore, Islamic prayer has several potential benefits for improving mental and physical health (11) that need more controlled studies.
The aim of the study was to compare the biodex balance indices in simple and dual tasks between elderly men who pray and those who do not pray, matching them by age, BMI, lifestyle,

psychological and physical health factors, cognitive abilities and HRV state. The hypothesis of the study was that although many interaction factors were controlled, prayer still had an effect on balance control.

Materials and Methods

Study design

The design of the study was matched observational study. Two groups of elderly men were compared. The men who regularly perform Islamic prayer (WP) and men who do not perform prayer (WOP). Dependent variables include the amount of angular displacement of subjects on the biodex device in the medial-lateral, anterior-posterior, and overall planes, as well as the duration of stay in each quadrant of the plane. Confounding variables that were controlled for included age, weight, height, marital status, employment status, income, physical activity level, dietary habits, recreational use of the Internet, recent stressors, common diseases of aging, stress, anxiety, and depression levels, health subscales based on SF-36, cognitive ability scores of flexibility, attention, and inhibition, control, and heart rate variability before and after cognitive tests.This study was performed in line with the principles of the Declaration of Helsinki. All subjects entered the study with consent and signed a consent form after being informed about the experimental procedures. Study approval was granted by the Ethics Committee of Baqiyatallah University of Medical Sciences (2024-11-09/ IR.BMSU.BAQ.REC.1403.180).

Subjects

The participants in this study were men living in Tehran, aged 63 to 70 years old. The inclusion criteria for all of them included the ability to perform physical activities and a normal cognitive level. None of them had a history of spine or skull surgery. They had no heart disease that required the use of heart medications. They had no pain in the spine or joints that prevented them from doing daily activities. They had no psychological disorders that required the use of medications. The WP prayer group performed all prayer movements correctly and completely three times a day. Overall, they performed at least 17 rakats of prayer for 20-30 minutes every day for a year ago. The WOP group has not performed Islamic prayers for at least a year.

Study Prodedure

To prevent confounding factors, several questionnaires were asked about demographic characteristics (age and BMI), lifestyle components such as employment status, income level, type of diet, new stressful events, common diseases (diabetes, high blood pressure, low back pain, and knee pain), and enlargement activities on the Internet before the subjects entered the study. Then, the SF-36 questionnaires were taken from the subjects to examine physical and mental health components, and the DASS Questionnaire was used to determine levels of anxiety, stress, and depression, and the IPAQ Questionnaire was used to scale physical activity. Any WOP participant who had a large difference from the average value in respect to age, BMI, physical activity level, SF-36, and DASS scores in relation to the WP group was excluded from the study. After that, the subjects began the testing process. First, their ECG was recorded for two minutes in a sitting position. Then, three computerized cognitive tests (Flanker, Wisconsin Sorting Cards, and Oddball Test) were taken from them. The ECG was recorded for two minutes (10) in a sitting position again. After that, the subjects were placed on the Biodex device. The tests on Biodex were carried out after a thorough explanation. From 9 to 13 o'clock, the tests were conducted The study's process is shown in Figure 1.

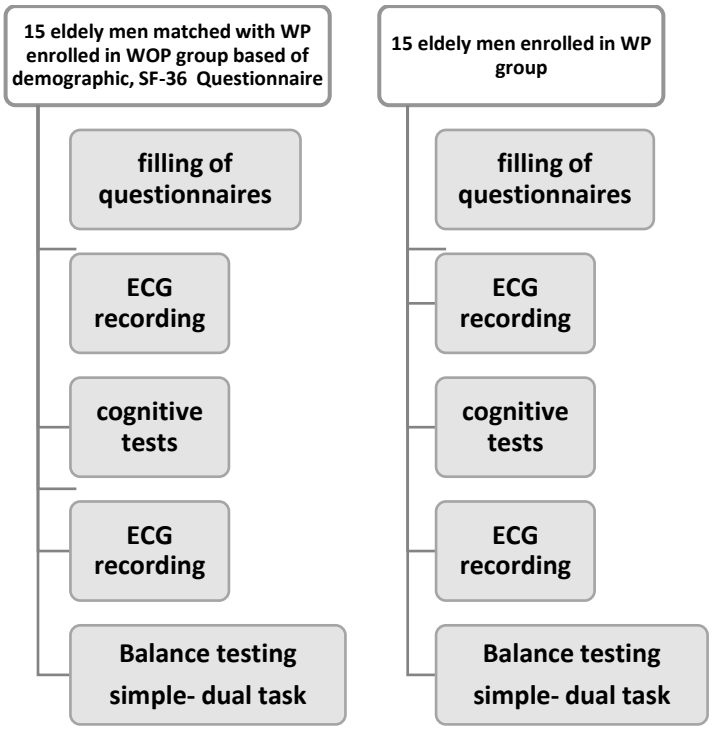

Fig. 1. The steps of study in both groups

Depression and Anxiety Stress Score-42 Questionnaire (DASS-42)

The DASS-42 questionnaire was accomplished in the calm atmosphere of the exam room. The questionnaire was completed by the participants after being carefully instructed to do so according to their living conditions. In three sections, the form contained fourteen questions that reported levels of depression, anxiety, and stress based on scores obtained on a 4-point scale (12).

Short Form Health Survey (SF)-36 Questionnaire

The SF-36 is a questionnaire that can be self-administered and contains 36 items. It measures health on 8 multi-item scales, covering functional status, well-being, and overall evaluation of health. Physical functioning consists of physical functioning (PF), role limitations (physical) (RP), pain (P), general health (GH). Mental functioning consists of social functioning (SF), emotional role limitations (ER), mental health (MH), and energy (E). The Cronbach's α for each summary measurement was 0.79. In addition, Cronbach's α for the 8 scales was 0.87 for the Persian version of SF-36 (13).

International Physical Activity Questionnaire (IPAQ)

The IPAQ is used to assess habitual PA during the past 7 days. The short form contains seven items, including the number of days per week, the amount of time spent on moderate, vigorous, and walking activities, and the time spent on moderate and vigorous activities. The questionnaire asks two questions regarding sitting time as an indicator of sedentary behavior. The IPAQ data was transformed into metabolic equivalent scores (MET-min-week) by combining the minutes dedicated to each activity category with the specific MET score for that activity. The MET score

measures the energy expenditure of each type of activity. In adults, one MET is equivalent to energy expenditure during rest and is approximately equal to 3.5 ml O2/kg/min. The IPAQ's scoring system classified physical activity levels into three groups: inactive, minimally active, and health-enhancing physically active. The Iranian version of IPAQ is consistently based on Cronbach's Alpha coefficient (0.7). The Spearman Brown correlation coefficient (0.9) also demonstrated excellent reliability in test retests (14).

.

Cognitive tests

Three cognitive tasks were done in this study: flanker, oddball, and Wisconsin Card Sorting Test. They were conducted using the PEBL battery (https://pebl.sourceforge.net/) in a random sequence for participants. Figure 2 shows the screen for each test. To measure attention and inhibition control, the Flanker test is a psychological assessment tool. The Flanker test, which was created by psychologist B.A. Eriksen in the 1970s, serves as the foundation for it (15). The participants are presented with a central stimulus (typically an arrow) that is flanked by distractor stimuli on either side. Responding to the central arrow requires them to ignore the surrounding distractors. The flanker test in this study consisted of 200 trials in four blocks. In each block, three randomly chosen conditions were shown to detect the direction of the arrow. Types of Trials:

1. Congruent trials - The flankers point in the same direction as the target.
   - Example: >>>>> (respond to the middle arrow)
2. Incongruent Trials – The flankers point in the opposite direction of the arrow.
   - Example: <<><< (respond to the middle arrow and ignore <)
3. Neutral trials - the flankers are not present.

The score for this task was derived by dividing the average reaction time of the Incongruent Trials by the average reaction time of the Congruent Trials with correct responses.

Executive functions, particularly cognitive flexibility, abstract reasoning, and set-shifting ability, are measured by the widely used neuropsychological assessment tool, the Wisconsin Card Sorting Test (WCST). (16). The structure of the test is:

- Stimuli: Participants are shown four reference cards that differ in color (red, blue, green, yellow), shape (triangle, star, cross, circle), and number of symbols (1–4).
- Task: Participants must sort response cards under the reference cards based on an unstated rule (e.g., Color, shape, or number). Feedback ('correct' or 'incorrect') is given after each trial.
- Rule Shifts: After 10 consecutive correct sorts, the sorting rule changes without warning, requiring the participant to adapt. In this study, a 64-card version was utilized.

Performance indices are generated by the test:

- The number of Perseverative Errors: Continuing to use an old rule after it changes (a marker of inflexibility).
- Time of test: total time used to complete the 64 sorting cards.

The visual oddball task was employed to evaluate attention. During the task, the participant will be asked to categorize shapes. Only one circle or square is displayed at a time. Each trial participant should decide what shape is shown. And press one of the two keys. When he sees a circle, press the left shift key, and when he sees a square, press the right shift key. The amount of oddball cost that consists of deviate reaction time minus standard reaction time was considered as an index of this test.

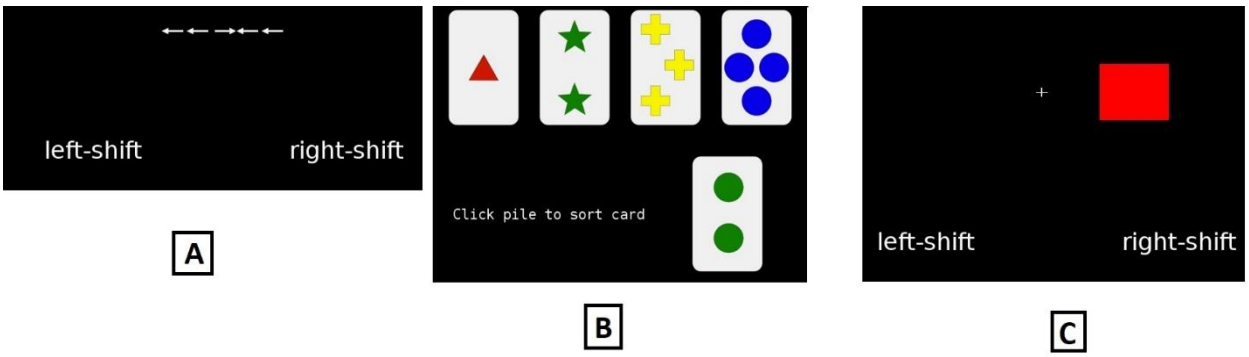

Fig. 2. The screen of three cognitive tasks was done in this study: flanker (A), Wisconsin Card Sorting Test (B) and oddball (C).

ECG recording

A biomedical wireless ECG (made in Iran, Liv Intelligent Technology Co.) was used. (17). The three lids cardiogram system requires one electrode to be placed on the left midclavicular line above the heart position, and the other electrode should be placed on the left sternal border below the heart position. The third electrode was attached to the lower right quadrant of the abdomen. (18). A chest lid and belt were used to fix the electrodes. The data was saved for 2 minutes in each test and then transferred to an ADC with a 500 Hz sampling rate. To calculate heart rate variability (HRV), we employed the HRV Toolbox of MATLAB software version 2018. Initial processing and signal preprocessing involve removing noise and artifacts (such as body movements and electrical noise), using high-pass (0.5 Hz) and low-pass (30 Hz) filters to remove unwanted frequencies, and finding QRS peaks in the ECG signal, which represent the heart rate. RR intervals are obtained by extracting the time intervals between the detected QRS peaks. The HRV signal is produced by utilizing the RR intervals. In the time domain, the mean and SD of the RR were extracted from the RR series. In the frequency domain, the percent amount of high frequency (PHF) power (0.15 – 0.5 Hz), low frequency (PLF) power (0.05 – 0.15 Hz), and very low frequency (PVLF) power (0 – 0.04 Hz) of all power of frequency and the ratio of LF/HF components was measured. The power of frequency was computed using the Fast Fourier Transform method. The nonlinear features extracted were the SD1 and SD2 of the Poincare plot (SD1 PP and SD2 PP), approximate entropy (App_Ent), spectral entropy (Spec_Ent), the alpha and Alpha 1 of the Detrended fluctuation analysis (DFA), petrosian and katz fractal dimention (FD) (17-19).

Biodex balance test

Dynamic balance tests were done using a computerized posturography platform (Biodex Balance System SD Sw 945-300-e627, Canada) with eyes open and arms at the sides of the body. A postural stability test assesses balance index scores, which reflect the subject's weight asymmetry (% time in quadrants) and how much they sway in the anterior/posterior and medial/lateral directions. The analysis used a mean balance index from 3 trials, and a lower score signified a good balance.

Dynamic balance involves the free tilting of the circular foot plate depending on weight shift. The stability level of the device was 8, and it was tested three times with a duration of 20 seconds and a 1-minute rest between each test. The model plate was divided into quadrants and a green line was traced for body weight shifts. Each distance (degree) of the overall, anterior/ posterior, and medial/lateral body weight shifts was also measured. The results were recorded as the overall

stability index (overall index), the anterior/posterior stability score (AP index), and the medial/lateral stability index (ML index). The AP index is a measure of the difference in platform displacement in degrees for motion in the sagittal plane. The ML index represents the variance in platform displacement for motion in the frontal plane, and the overall index was determined based on the AP and ML indices. A line was drawn on the model plate to indicate body weight shifts, and the time spent in each zone was indicated in percentages (% of time). The time percent in the left with the right and in the anterior with the posterior were measured and compared. (20). The dual task consisted of trying to control the balance on the Biodex device and calculate simultaneously. In order to increase cognitive load, the individual was instructed to add three numbers from one and continuously provide the answer.

Statistical Analysis

Different variables were used in this study. Quantitative continuous variables were used to measure the time spent on cognitive tests, Biodex balance, and HRV indices. The questionnaire scores and the number of errors is quantitatively discrete variables. To determine normality, the One-Sample Kolmogorov-Smirnov Test was carried out on quantitatively continuous data. Parametric tests like T-test and ANCOVA were utilized if the data distribution was normal such as balance indices. Quantitative discrete variables and HRV indices were analyzed using the nonparametric Mann-Whitney test. Despite not having a significant difference in age between the two groups, an ANCOVA was conducted to examine the balance indices using age as a covariate because age was correlated with balance indices. General property, job status, monthly income, stressful events, type of disease, diet style, and internet use for entertainment were measured using the Pearson Chi-square test. P-values that were less than 0.05 were considered to be significant.

Results

After the volunteers arrived, suitable individuals were selected, and tests and questionnaires were administered. Fifteen people in each group (WP and WOP) were analyzed. Table 1 reveals that there were no significant differences in general demographic characteristics like age, BMI, employment status, diseases, eating style, recreational internet use, and stressful events between the two groups. Only the income distribution differed significantly between them. Regarding the cognitive ability tests, which measure inhibition control, flexibility, and attention, there was no difference between WP and WOP groups. Regarding psychological characteristics to assess the level of stress, anxiety, and depression based on the DASS and mental health based on SF-36 in the dimensions of emotional health, fatigue, social functioning, pain, and general health, there was no significant difference between the two groups. In terms of the physical health subscale on the SF-36, the WP group had a higher score than the WOP group. There was no significant difference in physical activity level between the IPAQ and IPAQ sittings.

Table 1: The mean, standard deviation, and p-value for comparing of two groups, WP and WOP, based on demographic, cognitive abilities, physical, and psychological properties.

Variables		**WP(n=15)**	**WOP(n=15)**	**p-value**
General property	**Age**	65.6±1.6	66.9±2.2	0.074
	BMI	0.27±0.3	0.27±0.1	0.918
	Job status N (employee/retired)	7/8	5/10	0.35

	Monthly income N (poor/moderate/good/very good)	0/5/10/0	0/10/1/4	**0.001**
	stressful events N (economic/ family and emotional/both)	0/2/1	1/3/0	0.35
	Disease N (diabetes/ blood pressure/both)	2/2/2	3/3/2	0.94
	Diet style N (fast food more than one in a week/ High consumption of high-fat and salt foods/ Low consumption of dairy products andfruits Loss of appetite)	3/0/1/2	2/1/1/2	0.75
	internet use for entertainment N (less than 20 hours in the week/ more than 20 hours in the week)	12/3	10/5	0.34
Cognitive tests	**Flanker index**	87.88±42	99.56±40	0.44
	Wisconsin error percent	11.56±3.1	12.9±3	0.2
	Wisconsin time (s)	197.62±70	207.81±61	0.34
	Oddball error	1.4±1.1	1.2±0.9	0.74
	Oddball cost	40.3±109	49.65±326	0.21
Psychological and physical factors	**DASS-42**	14.73±9.4	16.13±8	0.46
	DASS-stress	7.86±5.5	8.26±5.1	0.53
	DASS-anxiety	1.93±3.3	2.26±1.6	0.16
	DASS-depression	4.93±3.3	5.6±3.3	0.87
	SF36-total	84.55±6.7	78.92±10.6	0.13
	SF36-PF	88±6.2	79.33±9.7	**0.02**
	SF36-RP	93.33±11.4	88.33±15.9	0.48
	SF36-P	82.66±15.4	84.5±14.5	0.71
	SF36-GH	74.66±11.2	77.66±16.3	0.48
	SF36-ER	95.55±11.7	84.44±24.7	0.34
	SF36-MH	78±13.7	80.66±11.3	0.59
	SF36-E	85.86±15.4	87±9.5	0.74
	SF36-SF	92.5±12.3	83.33±16.8	0.30
	IPAQ	37±8.8	29.65±12.9	0.11
	IPAQ_sitting	5.2±1.8	4.46±0.9	0.17

DASS: depression anxiety stress score, SF36: short form health survay, -PF: physical functioning, -RP: role limitations (physical), -P: pain, -GH: general health, -ER: emotional role limitations, -MH: mental health, -E: energy -SF: social functioning, IPAQ: International Physical Activity Questionnaire, Significant numbers are shown in bold.

Mean and standard deviation of HRV features before and after the cognitive tests. According to the results, there was no significant distinction between the groups before and after the cognitive tests, and between the groups.

Table 2 shows the mean and SD of HRV indices in two groups, WP and WOP, before and after of cognitive tests.

Variables	**WP**				**WOP**			
	B		**A**		**B**		**A**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**

MEAN R-R	0.9	0.311	0.888	0.305	0.859	0.136	0.862	0.11
SD R-R	0.153	0.062	0.153	0.06	0.179	0.06	0.206	0.077
PVLF	78.883	40.861	82.213	29.754	95.462	35.82	90.648	29
PLF	31.479	6.382	33.088	6.572	34.071	3.537	34.476	4.869
PHF	68.521	6.382	66.912	6.572	65.929	3.537	65.524	4.869
LF/HF	0.471	0.135	0.507	0.138	0.521	0.08	0.535	0.121
SD1_PP	0.187	0.083	0.179	0.081	0.203	0.056	0.212	0.048
SD2_PP	0.097	0.059	0.106	0.068	0.139	0.092	0.184	0.128
APP_ENT	0.767	0.225	0.814	0.252	0.841	0.242	0.819	0.197
SPEC_ENT	6.674	0.327	6.708	0.282	6.794	0.241	6.822	0.253
DFA_ALPHA	0.087	0.096	0.083	0.063	0.089	0.075	0.104	0.074
DFA_ ALPHA1	0.087	0.096	0.083	0.063	0.089	0.075	0.104	0.074
PETROSIAN _FD	0.999997	0.000004	0.999997	0.000003	0.999995	0.000004	0.999996	0.000002
KATZ_FD	6.581	4.145	6.665	4.865	5.899	4.029	5.116	2.316

PHF: percent high frequency, PLF: percent low frequency, PVLF: percent very low frequency, LF/HF: low frequency/high frequency, SD1 PP and SD2 PP: SD1 and SD2 of the Poincare plot, App_Ent: approximate entropy, Spec_Ent: spectral entropy, DFA: Detrended fluctuation analysis, FD: fractal dimention.

Analysis of balance indicators showed that the WOP group had significantly weaker control in maintaining balance, which means they have more displacement in the overall (p-value=0.006, partial Eta squared= 0.245), Ant-Post (p-value=0.05, partial Eta squared= 0.130), and Med-Lat (p-value=0.009, partial Eta squared= 0.227) balance index after the plate was titled (figure 3).

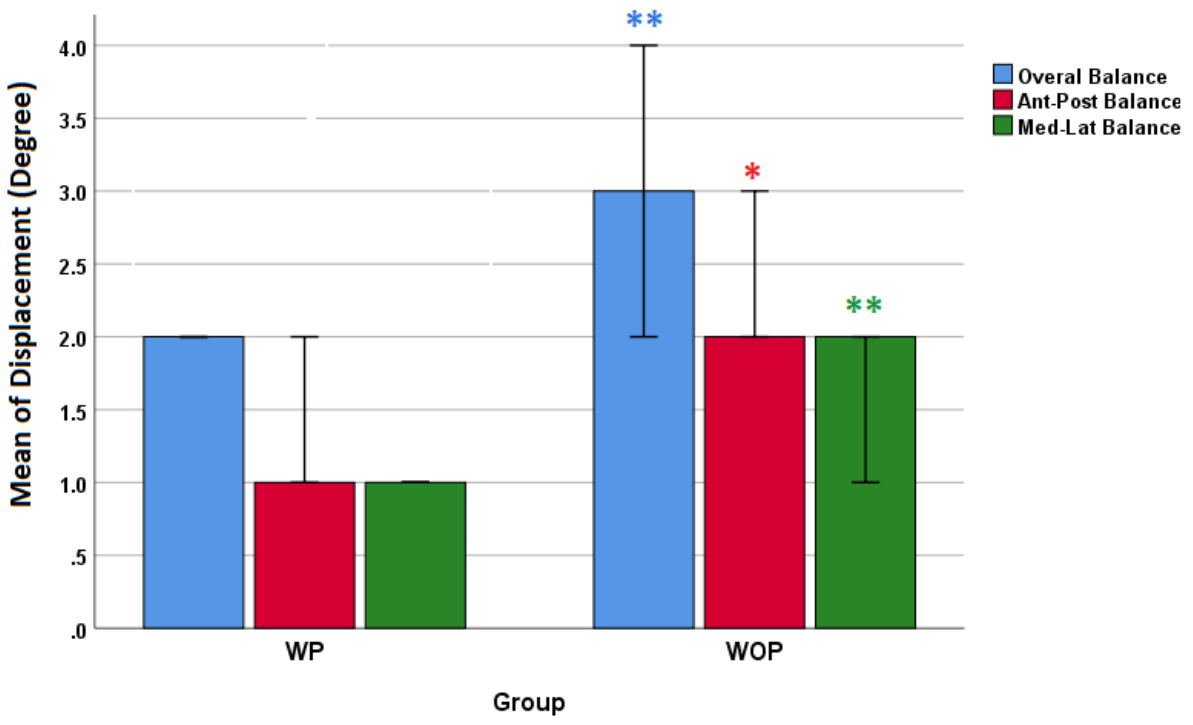

Fig. 3. The mean and 95% CI of three balance indexes, overall, ant-post, and med-lat balance index, in the WP and WOP groups. According to ANCOVA, the WP group had significantly superior balance indexes than the WOP group. The stars display significant color changes depending on the variables. **: p< 0.01 and *: p<0.05

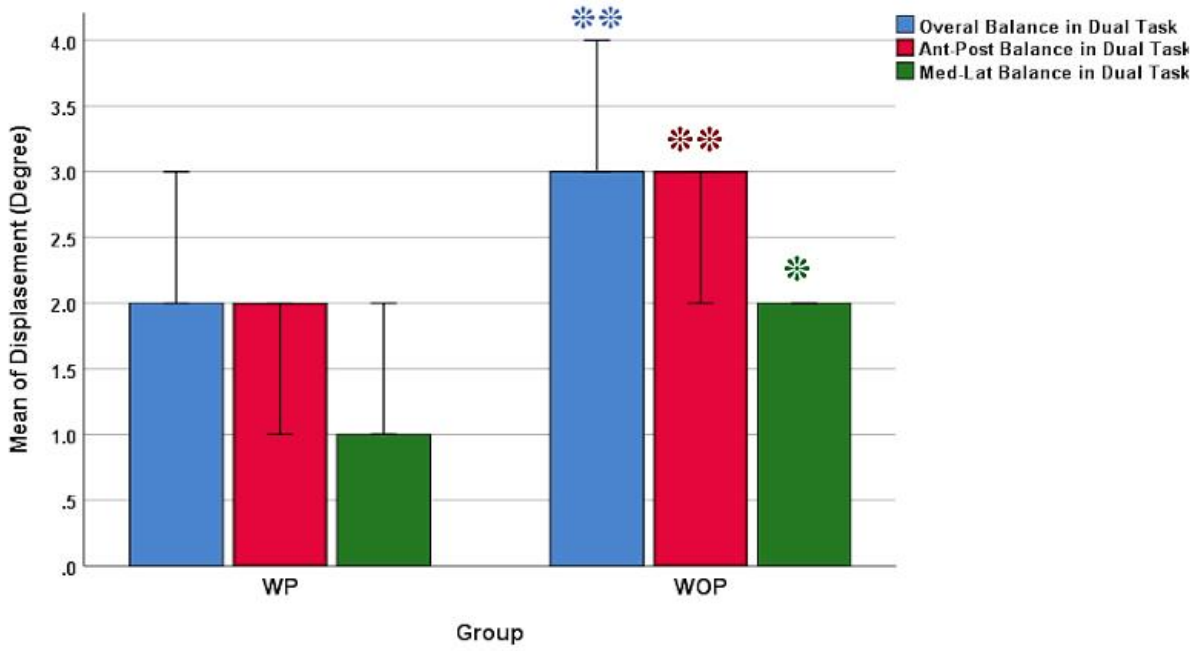

Fig 4. The mean and 95% CI of three balance indexes, overall, Ant-Post, and Med-Lat balance index, in dual tasks in the WP and WOP groups. According to ANCOVA, the WP group had balance indexes that were significantly superior to those of the WOP group. The stars exhibited significant color changes based on the variables. **: p< 0.01 and *: p<0.05

In the double task (balance control with cognitive load), the WOP group had significantly greater deviations in three overall (p-value=0.002, partial Eta squared= 0.316) Ant-Post (p-value=0.003, partial Eta squared= 0.277), Med-Lat (p-value=0.049, partial Eta squared= 0.136) indices of Biodex test (figure 4). However, there was no significant difference between the two groups in terms of the percentage of time spent on the right or left side, as well as in front or back.

Discussion

In this study, confounding factors in balance control in elderly men were controlled to examine the impact of prayer on postural balance. The results showed that demographic factors such as age, BMI, occupation, type of diet, spending time on the Internet, common diseases, severe stress, except for income level, did not differ significantly between the two groups of WP and WOP. On the other hand, there was no significant difference in terms of physical activity levels, pain, mental

health measures, stress, anxiety, and depression levels, and finally, the cognitive abilities examined in terms of inhibition control, flexibility, and attention. Even the response of their autonomic system, which was examined using HRV, did not differ significantly before and after performing cognitive tests that are slightly stressful. However, in terms of balance indices both in simple and dual-task conditions, the WP group had a significantly better ability to maintain balance than the WOP group, considering age as a covariate factor. Thus, there is a relationship between prayer and the control of balance. Previous studies also showed that subjects who regularly pray had better scores on the Berg balance test than those who did not perform prayer, but they did not control several confounding factors that interact with balance control. (6, 7). Prayer has many elements such as physical, physiological, and mental elements that make it a good balancing exercise to repeat many times throughout the day. (4, 11). When praying, the center of mass of the body moves forward and backward with a certain distance from the base of support. This change, especially during the transition from bowing to standing and vice versa, and from sitting to standing, increases the need for worshipers to maintain balance. Furthermore, when a person bows and prostrates, the head being in line with and lower than the heart makes it easier for blood to flow to the brain. As a result, the parasympathetic tone rises, which aids in enhancing brain and heart functions and is beneficial for overall health (9, 10, 21, 22).

Compared to Tai Chi, which is considered a gentle but effective exercise for training balance control and requires at least 45 minutes of practice twice a week. (23). Prayer repeats 3 to 5 times a day, each time taking about a few minutes. The length of all daily prayers must not exceed 30 minutes. The most significant aspect of prayer is its repetition throughout the day and its daily performance. The limitation of the study was that women and young people did not assess it.

Conclusion

The elderly men who perform praying regularly had better balance control in simple and dual task conditions more than matched men in terms of age, BMI, occupation, type of diet, spending time on the Internet, common diseases, severe stress, physical activity levels, pain, mental health state, stress, anxiety and depression levels, and finally, the cognitive abilities, inhibition control, flexibility and attention and even the response of their autonomic system, which was examined by HRV. Age was also considered as a covariate. The act of praying does not take more than a few minutes but has several effects on health. It is suggested to compare people who perform prayer with those who perform Tai Chi in the future studies about balance control in elderly and young people.

Data availability

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

Acknowledgments

The authors thank the technical assistant of Dr Mohammad Saleh Khaje Hosseini and the neuroscience laboratory of Baqiyatallah University of Medical Sciences.

Author' contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by S.S.M., G.P.J, A. M., S.S. and H.M. The first draft of the

manuscript was written by B.H. and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Conflicts of interest
There is no conflict of interest.

Funding statement
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors**.**

References
1. Papalia GF, Papalia R, Diaz Balzani LA, Torre G, Zampogna B, Vasta S, et al. The Effects of Physical Exercise on Balance and Prevention of Falls in Older People: A Systematic Review and Meta-Analysis. Journal of Clinical Medicine. 2020;9(8):2595.
2. Burns RA, Byles J, Mitchell P, Anstey KJ. Positive components of mental health provide significant protection against likelihood of falling in older women over a 13-year period. International Psychogeriatrics. 2012;24(9):1419-28.
3. Chang JT, Morton SC, Rubenstein LZ, Mojica WA, Maglione M, Suttorp MJ, et al. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials. Bmj. 2004;328(7441):680.
4. İmamoğlu O. Benefits of prayer as a physical activity. International Journal of Sport Culture and Science. 2016;4(Special Issue 1):306-18.
5. AlAbdulwahab SS, Kachanathu SJ, Oluseye K. Physical activity associated with prayer regimes improves standing dynamic balance of healthy people. Journal of physical therapy science. 2013;25(12):1565-8.
6. Khan RMA, Joseph RS. The Impact of Regular Salah Practice on Balance and Fall Prevention among Community Dwelling Elderly Population. Indian Journal of Physiotherapy & Occupational Therapy Print-(ISSN 0973-5666) and Electronic–(ISSN 0973-5674). 2023;17(2):19-26.
7. Tariq T, Inam R, Hayat MK, Anwar A, Karim I. Effects of Salah Postures on Balance in Geriatric Population; A Descriptive Study: Salah Postures and Balance in Geriatric Population. The Healer Journal of Physiotherapy and Rehabilitation Sciences. 2024;4(3):991-7.
8. Xiao T, Yang L, Smith L, Loprinzi PD, Veronese N, Yao J, et al. Correlation between cognition and balance among middle-aged and older adults observed through a tai chi intervention program. Frontiers in Psychology. 2020;11:668.
9. Sobhani V, Mokari EM, Aghajani J, Hatef B. Islamic praying changes stress-related hormones and genes. Journal of Medicine and Life. 2022;15(4):483.
10. Shaverdi Y, Jahromi GP, Meftahi GH, Sharif MS, Mojabi N, Hatef B. The effect of Islamic praying on heart rate variation in adult Muslims. Journal of Modern Rehabilitation. 2024;18(2):179-88.
11. Sarkingobir Y, Sharu AU, Sahabi M, Ashafa NA. Religious and health benefits of salah/Prayer: A review. International Journal of Emerging Issues in Islamic Studies. 2022;2(2):59-71.
12. Sungkono MH, Nooryanto M, Arianti DE. Association of social support with Depression and Anxiety Stress Score (DASS) and salivary cortisol level in women post curettage due to

first-trimester miscarriage. The Journal of Obstetrics and Gynecology Science. 2020;1(1):18-22.
13. Motamed N, Ayatollahi A, Zare N, Sadeghi-Hassanabadi A. Validity and reliability of the Persian translation of the SF-36 version 2 questionnaire. East Mediterr Health J. 2005;11(3):349-57.
14. Moghaddam MB, Aghdam FB, Jafarabadi MA, Allahverdipour H, Nikookheslat SD, Safarpour S. The Iranian Version of International Physical Activity Questionnaire (IPAQ) in Iran: content and construct validity, factor structure, internal consistency and stability. World Appl Sci J. 2012;18(8):1073-80.
15. Eriksen CW. The flankers task and response competition: A useful tool for investigating a variety of cognitive problems. Visual Cognition. 1995;2(2-3):101-18.
16. Fortuny LiA, Heaton RK. Standard versus computerized administration of the Wisconsin Card Sorting Test. The Clinical Neuropsychologist. 1996;10(4):419-24.
17. Ashtiani AA, Shaygannejad V, Ghobadi F, Bathaie R, Shahyad S, Hatef B. Acute Response of Stress System in Multiple Sclerosis. Archives of Neuroscience. 2021;8(4):9.
18. Mirzaee O, Saneian M, Vani JR, Shahrivar K, Peyravi M, Shariat A, Hatef B. The Psychophysiological Responses of the Chronic Ischemic Stroke Patients to the Acute Stress were Changed. Brazilian Archives of Biology and Technology. 2019;62.
19. Mohammadi A, Emamgoli A, Shirinkalam M, Meftahi GH, Yagoobi K, Hatef B. The persistent effect of acute psychosocial stress on heart rate variability. The Egyptian Heart Journal. 2019;71(1):18.
20. Sohn MK, Jee SJ, Hwang P, Jeon Y, Lee H. The Effects of Shoulder Slings on Balance in Patients With Hemiplegic Stroke. Ann Rehabil Med. 2015;39(6):986-94.
21. Hatef B, Meftahi GH, Rezvani Z, Jahromi GP, Sahraei H. EEG spectral and complexity indices change during Islamic praying in 5th Iranian Symposium on Brain Mapping Updates 2021. Frontiers in Biomedical Technologies. 2021;8(Supple 1):10-4.
22. Yousefzadeh F, Jahromi GP, Manshadi EM, Hatef B. The effect of prostration (Sajdah) on the prefrontal brain activity: A pilot study. Basic and clinical neuroscience. 2019;10(3):257.
23. Cui Z, Xiong J, Li Z, Yang C. Tai chi improves balance performance in healthy older adults: a systematic review and meta-analysis. Frontiers in Public Health. 2024;Volume 12 - 2024.