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Effect of Prayer (Salat) Movements on Daynamic Balance

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ABSTRACT

Background: falls among persons often occur due to the deterioration of the ability to control postural balance when standing and walking. Control of posture is dependent on several systems, all of which are vulnerable to age or disease-related changes. Purposes: to examine the effect of regular prayer movements (Salat movements) on improving the dynamic balance. **Subjects:** Thirty subjects were selected from both sexes according to inclusive criteria from Faculty of Physical Therapy, Cairo University, from workers and patient's relatives, aged from 55 to 67years. **Methods:** Subjects were divided into two groups, fifteen in each group. Group (A): people who regularly pray at least from the age of ten. Group (B): people who don't pray). The Biodex Balance System was used to assess dynamic stability. **Results:** There were a statistical significant differences between the two groups in overall stability index where the P-value = 0.031 < significant level α = 0.05, anterior-posterior stability index (APSI) where the P-value = 0.024 < significant level α = 0.05, and medial-lateral stability index (MLSI) where the P-value = 0.014< significant level α = 0.05, where the prayer group (A) showed greater improvement. **Conclusion:** the regular prayer movements (Salat movements) have a positive effect on improving postural balance of adults.

Keywords: Biodex Balance System, Dynamic balance, Regular prayer movements, Salat movements.

INTRODUCTION

Balance is a major issue facing the geriatric population. In the 65 and old population, one in every three persons will experience a significant fall. These falls contribute greatly to morbidity and are a leading cause of death in this population. Between 2001 and 2003, falls occurred at a rate of 51 persons per 1000 individuals among those 65 years and older [1].

Simultaneous performance of a balance and another cognitively demanding task has been shown to be more impaired among elder people with history of imbalance or falls than among non-fallers [2].

The control of standing posture depends on motor-sensory information, based on the body internal representation by the central nervous system, which guarantees the system stability through adequate strategies [3].

Standing balance can be classified into three hierarchical phases: static standing balance; dynamic standing balance; and postural response. Static balance indicates postural stability in the static stance. Dynamic balance indicates the ability to control posture during active motion; i.e., keeping the center of pressure (COP) of the body mass within the allowable area of the base of support. When the (COP) deviates beyond the allowable area in standing balance, the postural response of the whole body is elicited to return the (COP) to within the controllable area of the base of support [4].

Situations requiring divided intentional resources such as when doing several tasks concurrently occur regularly in everyday life. Among elder people, maintaining a stable upright posture when standing or walking may be compromised when they simultaneously become engaged in another task, for example talking or solving an intellectual problem [5].

Standing balance is considered one of the important physical factors in falling. Therefore, any intervention that improves standing balance is an essential constituent of community-based interventions against falling. Recent reports describe the efficiency of various exercises in the prevention of falling, such as muscle strengthening exercises, stretching of the muscles, dancing and Tai Chi Chuan. Aerobic exercise and physical activity have been suggested as effective means to maintain independent living in old age [4, 6].

However, although a recent systematic review confirmed the beneficial role of exercise on balance in an older population, there was a degree of uncertainty about the efficacy of some of the investigated exercise interventions because of a lack of standardized outcome measures to determine balance ability. Furthermore, although the evidence for benefits derived from interventions that included training activities, such as gait, balance, coordination, and functional tasks, with general

physical activity, strength training, and multiple exercise types was good, evidence from research that used activities such as Tai Chi, yoga, and dance was less convincing [7].

Salat is the Arabic word for prayers offered by Muslim worshippers, and is the second pillar of the Islamic faith. The various aspects of the prayer movements include standing, bowing, prostration and sitting. Before performing the prayers, worshippers must do ablutions (Wudhu), as they brush their teeth, wash the oral and nasal cavities, face, raise the hands up to elbows, and feet up to the ankle. These types of self-care tasks are performed routinely by able -bodied persons, but they can become extraordinary challenges for persons with cognitive, motor, or sensory impairments and disability [8].

The gentle exercises performed in prayer movements improve physical fitness, emotional well-being and increase the longevity of the Mosali. When a little extra effort is made, as in performing the prayers, there will be betterment in the endurance, stamina, flexibility and strength. It was noted that the five daily prayers (Salat) produce the same physiological changes without any undesirable side effects as those produced by jogging or walking at about three miles per hour [9].

SUBJESTA AND METHODS

Subjects:

Thirty subjects were selected from Faculty of Physical Therapy, Cairo University, from workers, faculty staff, and patient's relatives. The subjects were (22 male & 8 female), their age were ranged between 55-67 years, and their body weight average according to body mass index (BMI) was (25-30 kg /m2). The subjects were free of musculoskeletal, neurological, hearing, and vision disorders. They assigned in two different groups, fifteen in each group. Group A: people who were regularly pray since their age was ten years old at least. Group B: people who didn't pray all over their live. The subjects at Group A were maintaining the same sequences of prayer movements.

Informed consent form were read and signed by each subject before starting the study.

Exclusion Criteria:

Subjects with the following criteria were excluded from the study:

1- Subjects who had history of musculoskeletal and neurological disorders.

2- Subjects with hearing or visual disorders.

3- Over weight subjects with (BMI) more than (30 kg/m2).

4- Subjects at group (A) who didn't maintain the various aspects of the prayer movements (such as subjects who pray from setting on chair).

5- Subjects take medications affect on the balance.

Instrumentations:

1- Weight and height scale: in order to measure weight and height to calculate the body mass index according to (BMI = weight (kg) / height (m2) [10].

2- Biodex balance system (Biodex medical systems, inc. Brookbaven technology centre, 20 Ramsa Rod Box 702, New York, SN is 0515285, model 945-302 : This testing machine consists of a multiaxial standing platform which can be adjusted to provide varying degrees of platform tilt or platform instability. A maximum of 20º of platform surface tilt can be selected. With this degree of surface tilt, a dynamic situation is created, similar to actual functional activities that result in instability [11].

Screening Tests:

1- Each subject came to the laboratory was informed about the purpose of the study, procedures, and devices that were used, and any question was answered.

2- Each subject in both groups was examined separately.

3- Medical history that was related to this study was obtained from each subject.

4- Tests as passive and active range of motion of the trunk, palpation of the skin, muscles, and spine were performed to rule out any postural disorders.

5- Age was checked, and body mass index (BMI) of the subject was measured.

The assessment Procedures:

Preparation of the Subject:

1- The test was explained to the subject in detail. The footwear was taken off. Subjects were pre-informed to wear untaught clothes in order not to restrict their mobility on the device.

2- For optimal operation we ensured subject centering. The subject was centered on a slightly unstable foot platform assuming the test position. Subjects progressed from hands-on to hands-off the support rails when they have an adequate understanding of the balance system to protect them against sudden or unexpected movement of the platform.

3- Subjects was instructed to achieve a centered position on the platform once the platform is released, by shifting position of feet until it is easy to keep the cursor centered on the screen grid while standing in a comfortable, upright position, subjects then were instructed that the platform will now be released.

4- Once centering is achieved on the unstable foot platform and the cursor is in the center of the display target, subject was instructed to maintain position and the platform was stabilized, then subject's foot position on the foot platform grid was measured.

5- Heel coordinates were measured from the center of the back of the heel. Foot angle is determined by finding a parallel line on the platform to the center line of the foot passing through the 2nd toe.

6- Three trials were done before testing for learning.

Preparation of the Instrument:

Three adjustments were addressed to accommodate each subject

1- Support rails were adjusted according to the subject's comfort and safety.

2- Display height and tilt was adjusted so that the subject could look straight at it. This is to help ensure good posture during the test.

3- Test parameters were adjusted as follow:

- Initial stability level or platform firmness was set at level 8 which is the maximal level of stability i.e. the platform is most firm and stable.
- End stability level was set at level 4 which is the minimal level of stability i.e. the platform is least firm.
- Test duration was set as 40 seconds.

The subject's weight, height, and foot position (heel coordinates and foot angle) were recorded on the test parameter screen.

Testing Procedures:

1- When all values were set, the stability test screen was displayed, and test protocol was checked.

2- Once all test protocols were correct on the stability test screen, tracing was toggled on to ensure that the subject received visual feedback to where he is moving.

3- Subject then was instructed that the test will begin and the foot platform will advance to an unstable state (the initial stability level of the test) then a countdown clock at the lower right of the screen would provide a 3-second countdown time.

4- When the countdown was complete, the test trial began. The platform stability would decrease from the initial to end setting as determined by test protocol and duration. Subject was instructed to keep the cursor directly in the middle of the screen. Subject's arms were positioned at sides.

5- During the test, the stability level was noted at the bottom right corner of the dynamic balance test screen. The time left in the test appears at the lower left corner of the screen as it counts down from the selected starting value.

6- Once the time left clock in the lower left corner of the screen counts down to 0.00, the test trial ended and the foot platform automatically returned to the locked position. At this point, the percent of time subject spent in each zone of the stability test grid was displayed at the bottom right of the screen, along with a stability index reading which reflects the subject's overall performance in terms of foot platform deviations from the level position. Then a comprehensive report was printed.

7- Three indices were electronically generated:

a) Overall stability index (OSI) (index of overall balance performance).

b) Anterior/posterior stability index (APSI) (anterior and posterior movement in the sagittal plane).

c) Medial/lateral stability index (MLSI) (side-to-side movement in the frontal plane).

1. The stability index is believed to be the best indicator of the overall ability of the subject to balance the platform. The output from this machine is such that the larger the numerical value of the stability index, the greater the degree of difficulty or instability in balancing the platform.

2. Three test trials were done with a 1 minute rest period between trials and averages were calculated to avoid excessive balance deviations.

Statistical analysis:

The collected data were statistically analyzed using descriptive analysis in form of mean and standard deviation was performed to measure the tendency and homogeneity of each variable. Unpaired t -Test to determine significant differences in each variable between the two groups.

The level of significance was setted at ($P< 0.05$).

RESULTS

1- Demographic data of subjects in both groups:

A total of 30 elderly subjects participated in this study. Subjects were divided into two groups.

Group A (prayer group):

Fifteen subjects were included in this group 11 male and 4 female. Their age ranged from 55 to 67 years with mean age was (60.47) years, their weight ranged from 50 to 94 kg with mean weight (78.41) kg, their height ranged from 155 to 182 cm with mean height (169.59) cm and BMI average (27.26) kg/m2. Characteristics of subjects in group A are shown in table (1) and Figure (1).

Group B (non prayer group):

Fifteen subjects were included in this group 11 male and 4 female. Their age ranged from 55 to 64 years with mean age was (61.77) years, their weight ranged from 64 to 89 kg with mean weight (76.65) kg , their height ranged from 157 to180 cm with mean height (163.65) cm and BMI average (28.62) kg/m2.Characteristics of subjects in group B are shown in table (1) and Figure (1).

Table (1): Demographic data of subjects in both groups.

	Group A Prayer group		Group B Non prayer group		P-Value	Sig.
	Mean	S.D	Mean	S.D		

Age (yrs)	60.47	5.41	61.77	4.25	0.444	NS
Weight (Kg)	78.41	11.67	76.65	8.49	0.618	NS
Height (cm)	169.59	8.83	163.65	6.22	0.331	NS
Body mass index (Kg/m2)	27.26	0.150	28.62	0.219	0.416	NS

NS.: Non Significant

Independent t-Test between the two groups showed no significant differences between groups for age (where P-value was 0.444), weight (where P-value was 0.618), height (where P-value was 0.331) and BMI (where P- value was 0.416) as shown in table (1).

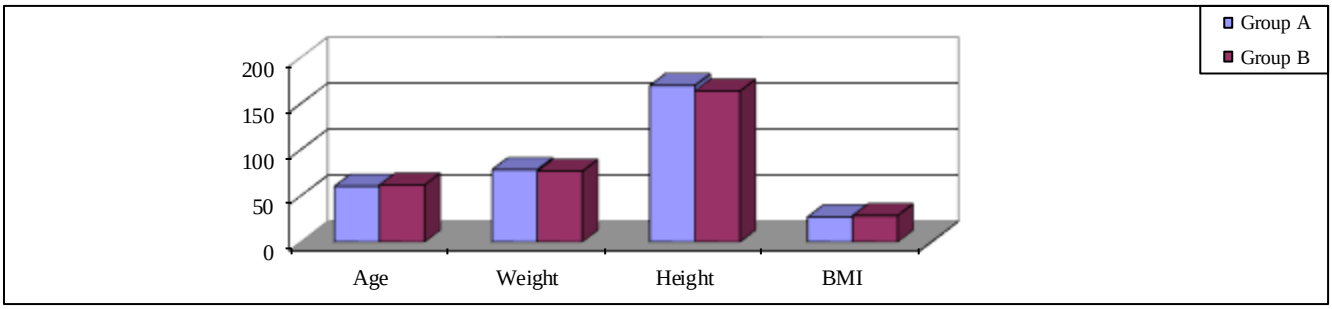

Fig. (1): The mean values of demographic characteristics of patients in each group.

2- Measurement of Dynamic Balance

A) Differences in Overall stability index in group A and group B:

Group A:

The Overall stability index (OSI) was calculated for all subjects in the group A. The average of the overall stability index (OSI) was 5.31 and the standard deviation was ± 2.06 as shown in table (2) and figure (2).

Group B:

The Overall stability index (OSI) was calculated for all subjects in the group B. The average of the overall stability index (OSI) was 7.5 and the standard deviation was ±5.24. As shown in table (2) and figure (2).

Table (2): Overall stability index of group (A) and group (B).

	Group A	Group B
Mean	5.31	7.5
SD	± 2.06	±5.24
t	0.01	
P	0.031	
Sig.	S	

P: P-value S: Significant SD: Standard deviation t: t-value

The unpaired t-test revealed that there were significant differences in Overall stability index in group A and group B where the P-value = 0.031 < significant level α = 0.05 as shown in table (2) and figure (2).

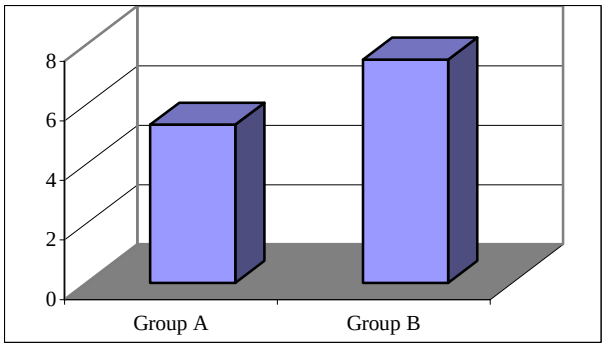

Fig. (2): Mean of overall stability index between group A and B.

B) Anterior-posterior stability index (APSI):

Group A:

The anterior-posterior stability index (APSI) was calculated for all subjects in the group A. The average of the anterior-posterior stability index (APSI) was 3.91 and the standard deviation was ± 1.69. As shown in table (3) and figure (3).

Group B:

The anterior-posterior stability index (APSI) was calculated for all subjects in the group B. The average of the anterior-posterior stability index (APSI) was 5.48 and the standard deviation was ± 3.67. As shown in table (3) and figure (3).

Table (3): Anterior-posterior stability index of group (A) and group (B).

	Group A	Group B
Mean	3.91	5.48
SD	±1.69	±3.67
t	- 0.98	
P	0.024	
Sig.	S	

P: P-value S: Significant SD: standard deviation t: t-value

The unpaired t-test revealed that there were significant differences in anterior-posterior stability index (APSI) between group A and group B where the P-value = 0.024 < significant level α = 0.05 as shown in table (3) and figure (3).

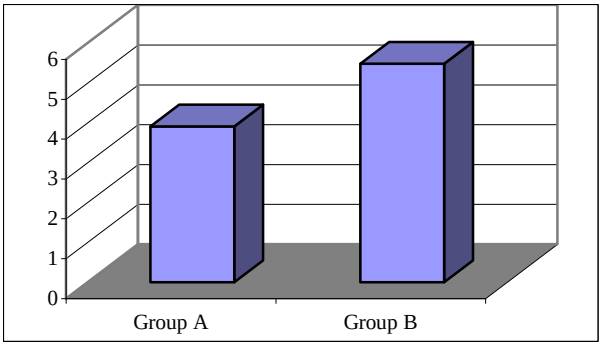

Fig. (3): Mean of Antro-posteriorl stability index between group A and B.

C) Medial-lateral stability index (MLSI)

Group A:

The medial-lateral stability index (MLSI) was calculated for all subjects in the group A. The average of the medial-lateral stability index (MLSI) was 3.75 and the standard deviation was ±1.34. As shown in table (4) and figure (4).

Group B:

The medial-lateral stability index (MLSI) was calculated for all subjects in the group B. The average of the medial-lateral stability index (MLSI) was 5.28and the standard deviation was ± 2.33. As shown in table (4) and figure (4).

Table (4): Medial-lateral stability index of group A and group B.

	Group A	Group B
Mean	3.75	5.28
SD	±1.34	±2.33
t	-1.16	
P	0.014	
Sig.	S	

P: P-value S: Significant SD: standard deviation t: t-value

The unpaired t-test revealed that there were significant differences in medial-lateral stability index (MLSI) between group A and group B where the P-value = 0.014< significant level α = 0.05 as shown in table (4).

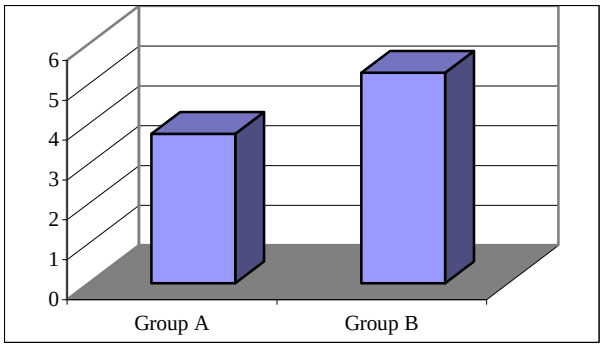

Fig. (4): Mean of Medial-lateral stability index between group A and B.

DISCUSSION

This study was conducted to investigate the effect of prayer (Salat) movements on dynamic balance of old people. Good balance is considered necessary to perform activities with great force, with great speed or in a great amount [12].

The results of this study suggested that the overall stability index in prayer group (group A average OSI 5.31) was less than non prayer group (group B average OSI 7.5), this indicated that the dynamic balance for group A was better than group B in all directions (table 2), the anterior-posterior stability index for group A (average APSI 3.91) less than group B (average APSI 5.48), that indicated that the dynamic balance for group A was better than group B in anterior –posterior direction (table 3), and the medial-lateral stability index for group A (average MLSI 3.75) was less than group B (average MLSI 5.28) this indicated that the dynamic balance for group A was better than group B in medial-lateral direction (table 4). There were significant differences which indicated that the dynamic stability level in prayer group was better.

This results was supported by many studies that prayer has a positive effect on different body systems as indicated by Reza et al. [13], which conducted his study over prayers and examined (cerebral blood flow, ROM and postural reflexes) and he found that there was an improvement in joints mobility, musculoskeletal fitness and cerebral circulation.

El Reweny [14] investigated the effect of selected balance training program on balance in elderly. Balance measured by BBS, she found a statistically significant improvement in dynamic balance in all indices (OSI, APSI and MLSI) responses after eight weeks of balance training intervention. This intervention included three sections: stretching exercises, strengthening exercises for the lower limbs and balance training program.

Wolf et al., [15] demonstrated that Tai Chi training (a form of Chinese martial arts) completed two times per week for fifteen weeks served to reduce falls by 47.5% among seniors 70

years and older compared to control group(not perform exercise).

Buchner et al., [16] introduced a program designed to increase seniors' strength and endurance. Their exercise program entailed having participants ride stationary bicycles and use weight machines three times per week over six months. Participants received training in either strength or endurance, or a combination of these. Compared to a non-exercising control group, participants in the three exercise groups combined were less likely to have fallen at least once over the one year follow-up (60% in the control group versus 42% in the exercise group).

Campbell et al., [17] had an occupational therapist provide four home visits over a two month period to old women (70 subjects) to prescribe an individualized exercise program that included moderate intensity strengthening, balance, and range of motion exercises as well as encouragement to engage in brisk walking three times per week. Participants were also telephoned regularly to maintain motivation. Forty-three percent of the participants experienced at least one fall compared to 53% of the control group, and only 19% of the exercise group had multiple falls compared to 30% of the control group. The same exercise program was also found to be effective in reducing falls in a second study where the population was seniors taking or withdrawing from psychotropic medication [18]. In this study, after controlling for taking psychotropic medications and for falls in the year prior, there was a significant reduction in falls from 71 falls per person-year in the exercise group, compared to 97 falls per person-year in the non-exercise group.

Tatjana B, et al., [19] introduced a programmers designed to assess the effect of a group-based exercise program on balance in elderly. Participants received a weekly 1-hour functional balance training class for 8 weeks in a small group setting (4–5 participants) by using Berg Balance Scale, Limits of Stability (LOS) and modified Clinical Test of Sensory Interaction on Balance (mCTSIB), they found a significant improvement in the Berg ($P < 0.0001$) and Composite Reaction Time ($P < 0.0004$) after the intervention. They concluded that eight week group functional balance training class was safe and effective in improving balance outcomes in elderly had risk for falls.

Gregg, et al., [20] found consistent evidence from a series of prospective and case-control studies linking physical activity with a 20%–40% reduced risk of hip fracture. Balance exercise programs can be effective in improving gait and balance, as well as reducing falls and fall-related injuries.

Functional balance training is a type of exercise that combines muscle strengthening and balance activities with functional gait activities. Regular balance training exercises for a short period as 9 weeks improved postural control in a study group of persons aged 70–75, as measured by various clinical tests and dynamic posturography, when compared to age-matched control [21].

A 6-week enhanced balance training program consisting of a series of tasks of increasing difficulty which are related to functional balance versus "standard" physical therapy for adults with balance and mobility deficits reported positive results in a sample of 199 older adults [22].

All these studies confirmed that the different types of exercises had a positive effect on increasing balance and decreasing risk of falling on old people and confirmed the effect of prayer as an aerobic exercise and balance training.

Overall, the evidence suggests that exercise can be effective in reducing falls among seniors. However, many questions still remain concerning how to optimize exercise programs to prevent falls. The programs reviewed varied in the type of exercises, level of intensity, and population targeted. Therefore, there is insufficient evidence at this point, to recommend one particular type of exercise program over another. All studies that demonstrated a positive effect for reducing falls used different types of exercise programs –Tai Chi (balance), (Salat-movements), strength, endurance and a one-to-one individualized program. Further, the programs varied in their level of intensity in terms of the frequency of sessions, length of sessions and difficulty of exercises. These differences indicate the potential of different types of programs for reducing falls, but more research is needed before a definite conclusion can be reached.

Based on the findings of this study group A (prayer group) that perform Salat regularly since childhood, showed significant positive gains in over all stability dimension, anterior-posterior stability dimension and medial-lateral stability dimension, these results were supported by[13,14,16,17,18,19,21,22,23,24,25]

CONCLUSION

From the results of this study it can be concluded that prayer movements may have a significant effect on improving dynamic stability in elderly.

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الملخص العربي

تأثير حركات الصلاة علي التوازن الحركي

الخلفية : يكون سقوط الأشخاص عادة بسبب اختلال في التوازن الحركي للشخص أثناء الوقوف و المشي. يعتمد التحكم في القوام علي أجهزه الجسم المختلفة والتي تتأثر بدورها نتيجة تقدم السن والمرض . **الأهداف :** يهدف هذا البحث إلى دراسة تأثير حركات الصلاة المنتظم ة علي تحسن التوازن الحركي . **الأشخاص :** وقد أجرى هذا البحث على 30 شخص من الجنسين تم اختيارهم تبعا لمعايير داخلي ة من العاملين وأهالي المرضي في كلية العلاج الطبيعي جامعة القاهرة حيث تراوحت أعمارهم من 55 إلى 67 سنة . **الوسائل :** تم تقسيم الأشخاص إلى مجموعتين متساويتين ، تضم كل مجموعه 15 فرد وهما المجموعة (أ) وتضم أشخاصا منتظمين في أداء الصلاة يوميا منذ العاشرة من عمرهم والمجموعة (ب) وتضم أشخاصاً لم يصلوا نهائيا ، وتم استخدام جهاز قياس التوازن الحركي (البيودكس) لقياس التوازن الحركي للمجموعتين . **النتائج :** أسفرت النتائج بعد تحليلها إحصائيا عن وجود اختلافات ذات دلالة إحصائية بين المجموعتين وذلك في المعيار الكلي للتوازن والتوازن الأمامي الخلفي والجانبي . وكان التحسن في متوسط التوازن الحركي لصالح المجموع ة (أ) عن المجموعة (ب) . **الخلاصة :** تعتبر ممارسة حركات الصلاة المنتظمة ذات تأثير ايجابي علي التوازن الحركي لكبار السن .
الكلمات الدالة : جهاز بيودكس للتوازن - التوازن الحركي - حركات الصلاة المنتظمة .