Available online at http://www.ijashss.com

International Journal of Advanced Studies in Humanities and Social Science

Volume 1, Issue 1, 2013: 12-19

The effect of the time of day (morning and afternoon) on the elderly balance

Reyhaneh Foroughi Far

School of Physical Education and Sport Sciences, University of Isfahan, Isfahan, Iran

ABSTRACT

Aging is a phenomenon that can be assumed of the natural course of human life. During aging, some changes in all organs that led to increase impairment in balance meanwhile the circadian cycle also isn't ineffective. The aim of this study was to detective the effect of a balance training program in the morning and afternoon on static and dynamic balance in healthy elderly. This quasi-experimental study in 24 healthy elderly subjects with no history of regular exercise (5.5 ± 68.7 years old, height 8.2 ± 1.6 m, weight 8.9 ± 68.4 kg) were selected as available. The subjects were randomly divided into two groups of 12 each divided into morning and afternoon groups were subjected to 8 weeks of balance training. To assess dynamic balance used the stars test and statistical calculations were performed using SPSS version 20. Comparisons between groups based on the pre-test and post-test for the overall dynamic balance, the effect of exercise on balance provided in the morning and afternoon. It is not seen the improvement in the star test after a period of exercise training, between two groups ($p > 0.05$). The results of the two groups showed improved balance training, after the training. Comparisons between groups based on the pre-test and post-test values for the general dynamic balance, the effect of exercise on balance provided in the morning and afternoon. It can be seen that after a period of exercise training improved the dynamic balance test star general in the internal anterior, internal, posterior, external posterior and external is not in any of the two groups ($p>0.05$), and in anterior and external anterior Afternoon practice is a good time ($p<0.05$). According to this study, balance training in the morning rather than in the afternoon, except for the South and South West of dynamic balance was not significantly different between people, so special time to do some exercises to improve balance and dynamic balance in the elderly is not recommended.

Key words: Aging, Balance, Morning and afternoon.

INTRODUCTION

Principles of hygiene and safety, reduced fertility and increased life expectancy in the elderly population are increasing, so that 17% of the world's population in 2006 was elderly. It is predicted that by 2050 this figure is expected to rise to 2 billion people (Carter *et al*, 2001). In Iran, according to the latest statistics, 7 percent of the population is the elderly constitute (Sadeghi *et al*, 2009). Therefore, identification of problems and issues of the elderly is necessary to improve their health level. With increasing age the risk of falling that one of the most common problems among the elderly (Downton *et al*, 1998) increase that physical consequences (broken, damaged muscle - skeletal morbidity and mortality), psycho (loss of confidence, loss of independence, self-esteem and life expectancy) gives. The great outcome of the socio - economic (cost of maintenance and cure) has for families and communities (Jorgensen *et al*, 2012). Due to researches did in this field imbalance in falls among the elderly is a major factor, the balance between these phenomena, in this age group (Sadeghi *et al*, 2009). Physiological balance, interaction between mechanisms of balance

Corresponding Author E-mail: reyhoon.67@gmail.com

control and the biomechanical balance as the body's ability to maintain and back center of gravity is determined by the level of support is defined (Carter *et al*, 2001).Thus, the ability of the body to maintain balance in a static or dynamic mode usually in two ways, static balance and dynamic balance will be evaluated. In static balance the individual must be able to balance your body in static position, like the stork balance and balance gymnastics (Carter *et al*, 2001) and in dynamic balance, a balance must be maintained during movement, such as walking or balancing in stick landing after beating in volleyball. Therefore, it is important to preserve the position of dynamic postural body. Dynamic balance in doing daily activities such as walking and doing everyday tasks is essential in many ways. Research has shown that dynamic balance in elderly people may be affected by the aging process (Jorgensen *et al*, 2012). System of checks and balances is a complex mechanism, which consists of three systems (vestibular, proprioceptive and visual) is also part of this process by (CNS) and spine (alpha motor neurons and muscles) is performed that all of which can be affected by sleepiness, daytime fatigue, and hormone levels (Downton *et al*, 1998). One of the push factors that is associated with the body's internal environment and how perform in different hours a day is a day and night cycle an example of a basic rhythm that is environmentally friendly (Downton *et al*, 1998). Many biological rhythms in humans have been identified and some of them are directly affected by the environment while some of the automated features such as a heart rhythm that is controlled by the sinus node (Cote *et al*, 2005). Peripheral circadian rhythm by external factors such as daylight, temperature and social interactions by the timing of meals are affected (Downton *et al*, 1998) and possibly on resting levels of motor receptors, perception functions, changes in nerve - muscle, cardio - vascular, metabolic and behavioral are affects (Hoyer *et al*, 2007). During the 24 hours, day and night cycles due to a wide range of physiological functions in the human body systems (cognitive and metabolic status), (Downton *et al*, 1998) the variation is caused by the body's physiological functions (Hoyer et al, 2007). So that the relationship between body temperature and hormones play an important role (Hoyer *et al*, 2007) and in turn affect our ability to conduct a variety of activities (3). So how to cope with them is an important factor in athletic performance (Sadeghi *et al*, 2009). This improvement may be due to increased motor performance in the evening than in the morning as a result of the body's cycle of day and night (Reilly *et al*, 2000). In addition, plasma levels of the hormones epinephrine and norepinephrine in the evening reaches its peak (Atkinson *et al*, 1996). Physical activity and exercise as ways to prevent, delay or treat problems of the aging process is used and its impact on people's lives is well documented (Lac *et al*, 2006). Use exercise as a means of inexpensive, readily available, non-invasive (Lac *et al*, 2006) in maintaining and improving the cardiovascular system - cardiovascular, bone health, reduced muscle mass and strength associated with aging remedy, maintain or restore balance and prevent of falling, increased flexibility (Bellew *et al*, 2001), increases in life expectancy (Bressel *et al*, 2007), particularly for the elderly is accepted and recommended. Teresa et al (2004) believes that exercise in improving physiological weaknesses such as poor balance, reduce the risk involved can be effective (Timothy *et al*, 1998). To solve this problem usual training methods, the elderly, the use of exercises and physical activities such as strength training, tai chi, yoga and balance (Lac *et al*, 2006). Regarding the importance of issue of balance in older adults, the aim of this study was to investigate the effects of balance exercises on balance in elderly people.

MATERIALS AND METHODS

This quasi-experimental study in which the effects of balance training on static and dynamic balance through a pre-test - post-test were measured. A total of 24 elderly people in the city parks of the selected and randomly divided into two groups of 12 persons training exercise in the morning and afternoon groups. A summary of the study to the persons were explained and the personal and health information forms were given to the subjects. After receiving the forms, the health status and personal information participants by the physician were assessment and from each participant was asked to every possible dislocation of joints and falling explains to record. If During the past 12 months, participants had a history of falls or suffers any act of displacement or dislocation or chronic arthritis or dizziness were excluded from the study. After

explaining the objectives of the research and researcher's expectations of the process of the research the participant's informed consent participation in the study completed. A day before the start of training, static balance with eyes open and closed top and non-dominant leg was tested subjects.

To measure the dynamic balance star test (Star Excursion Balance Test) were used. This test is a network with 8 lines in different directions with the angle of 45 degrees. This test is a network with 8 lines in different directions with the angle of 45 degrees. 8 Line is included the anterior (A), anterior - medial (AM), medial (M), posterior - medial (PM), posterior (P), posterior - lateral (PL), lateral (L) and anterior - lateral (AL). Star network using adhesive tape (Fig. 2), and a conveyor tape non-polished surface were plotted directly on a surface. The subjects were asked to identify the dominant leg shot the ball in front of her leg on the ground.

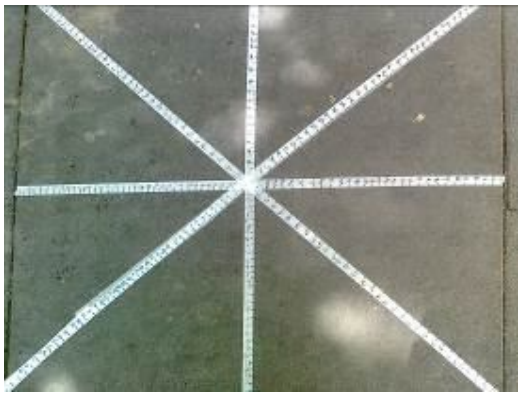

Figure 1: Star balance test

Once the examiner has provided the necessary explanations about the test. Each sample practice test does 6 times to learn methods. After 5 minutes of stretching exercises (quadriceps, hamstrings, soleus and gastrocnemius) and warm-up, subjects stood with one foot in the center of the network, and while his hands were on the lumbar, the other foot moved on the bottom of the 8 lines to the extent possible. Subjects in each direction and three times moved his foot and maintain that position about 1 second. After each move the subjects returning to standing on two feet, before next move, 1 second remains on that situation (Figure 3). All moves in a direction were completed and 5 minutes rest in between moves in both directions was considered. Examiner, errors that may occur during the test explained to the participants. These errors include: Subjects darning foot from the central star networks, subjects unable to maintain returning and starting position for 0 seconds. Foot at any point while the subjects are based on weight bearing on the foot is in contact with the line (Stewart *et al*, 2005).

Normalization of star test (Star Excursion Balance Test)

Length of the lower limb has an impact on the achievement distance. The mean distance between reach, lower limb length of each subject was multiplied by 100 divided by the number. Anterior superior iliac spines along the lower limb of the medial malleolus were measured with a tape measure. To this end, subjects were placed in a supine position, while at the knees and ankles were extension were 15 cm apart (Teresa *et al*, 2004). The elderly in both the morning and afternoon group began an eight-week balance training (3 sessions per week). Balance exercises included: supported angel balance, standing with one leg bent knees and put your hands crossed over the chest, unsupported angel balance and a few other moves were performed three times a week, and duration of training sessions of 30 minutes to 40 minutes until the end of exercises was increasing. Training was started with ten minutes stretching, walking and jogging and to continue balance training was run and the final ten minutes of stretching to cool down would be assigned.

Statistical methods: For measurements mean and standard deviation of age, height and weight for each sample from descriptive statistics was used and report the results to determine data normality test

Kolmogorov - Smirnov test was used. To determine differences between pre-test and post-test, paired t test and independent t-test for comparison between groups for morning and evening was used.

RESULTS AND DISCUSSION

Personal Information collected from the experimental group in Table 1 in the morning and afternoon groups are shown in Table 2.

Table 1: Descriptive statistics of the variables measured in morning samples (P<0/05)

	Age	leg length	weight	Height
Average	69.9	85.4	66	162.7
SD	6.3	4.5	9.5	9

Table 2: Descriptive statistics of the variables measured in subjects afternoon (P<0/05)

	Age	leg length	weight	Height
Average	67.7	87.8	70.8	167.3
SD	4.1	8.1	7.2	6.2

Dynamic balance

Significant difference between pre-test and post-test overall dynamic balance in the morning (0.05> p, 2.3 = t) and afternoon (0.05> p, 2.2 = t) was observed. So the balance of about 49% in the morning and in the afternoon, about 26% increase. The significant difference between morning and afternoon (0.05 <p, 1.3 = t), respectively (Figure 7).

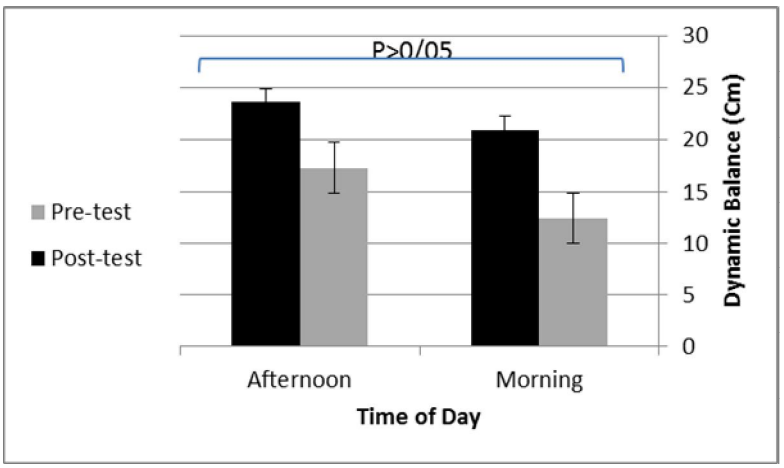

Figure 2: Dynamic Balance, pre-test and post-test in the morning and afternoon

:al dynamic bala	Time	Pre-test		Post-test	
		Min	SD	Min	SD
	Morning	12.4	8	17.3	3.9
	Afternoon	21	7.7	23.6	4.6
Anterior	Morning	29.9	19.3	41.2	25.4
	Afternoon	39.2	10.9	42.7	12.4
Internal anterior	Morning	1.4	19.3	3.15	25.4
	Afternoon	5.1	4.4	8	5.9
Internal	Morning	5.8	5.9	8.6	5.1
	Afternoon	10.8	4.1	13.3	5.2
South East	Morning	9.3	8.2	6.9	7.4
	Afternoon	17.6	4.2	15.1	3.8
South	Morning	5.4	5.7	11.3	6.8
	Afternoon	15.4	4.7	19.2	6
South West	Morning	13.3	12.7	18.4	12.1
	Afternoon	22.5	5.20	24.6	5.1
West	Morning	29.6	6.6	21.1	7.7
	Afternoon	29.6	6.6	31.6	5.8
North West	Morning	21	12.1	25.1	13.6
	Afternoon	29.9	7.5	32.1	7.6

Significant difference between pre-test and post-test overall dynamic balance in the morning (0.05> p, 2.3 = t) and afternoon (0.05> p, 2.2 = t) appears as a balance in the morning and about 69% increased approximately 36% in the afternoon. The significant difference between morning and afternoon (0.05 <p, 1.3 = t) were found. In the north, a significant difference between pretest and posttest in dynamic equilibrium in the morning (0.05> p, 2.3 = t) and afternoon (0.05> p, 2.2 = t) was observed in the morning, so the balance of 37.3% and in the afternoon at about 8% increase. However, no significant difference was observed between morning and afternoon (0.05 <p, 1.2 = t).

In the North East the difference between pre-test and post-test in the morning group dynamic balance (0.05> p, 2.4 = t) and afternoon (0.05> p, 2 = t) so that the balance in the morning was about 120% group and 50% in the afternoon. but no significant difference was observed between morning and afternoon (0.05 <p, 0.7 = t). In the East no significant difference between pre-test and post-test groups in dynamic equilibrium in the morning (0.05> p, 2.6 = t) and afternoon (0.05> p, 2.5 = t) so that equilibrium was observed in the morning and about 50% increased approximately 23% in the afternoon. However, no significant difference was observed between morning and afternoon (0.05 <p, 0.1 = t). In the South East the difference between pretest and posttest groups in dynamic equilibrium in the morning (0.05> p, 5 = t) and afternoon (0.05> p, 2.9 = t) so that equilibrium was observed in the morning for about 36% and in the afternoon, about 16% increase., but no significant difference was observed between morning and afternoon (0.05 <p, 0.1 = t).

In the south, a significant difference between pretest and posttest groups in dynamic equilibrium in the morning (0.05> p, 6.9 = t) and afternoon (0.05> p, 4.7 = t) so that the balance in the morning was about 100% and increased by approximately 24.6% in the afternoon, but no significant difference was observed between morning and afternoon (0.05 <p, 1.7 = t). In the South West showed significant differences between pretest and posttest groups in dynamic equilibrium in the morning (0.05> p, 3.2 = t) and afternoon (0.05> p, 3.6 = t) was observed in the morning, so the balance of 38.3% and in the afternoon, about 10% increase. No significant differences were observed between morning and afternoon (0.05> p, 1.7 = t). The significant difference between pre-test and post-test for the West in a dynamic balance of the morning group

(0.05> p, 2 = t) and afternoon (0.05> p, 1 = t) so that equilibrium was observed in the morning and about 28% increased by about 7% in the afternoon., but no significant difference was observed between morning and afternoon (0.05> p, 0.6 = t). In the North West the difference between pre-test and post-test in the morning group dynamic balance (0.05> p, 3.3 = t) and afternoon (0.05> p, 3.2 = t) so that equilibrium was observed in the morning for about 20% decreased approximately 8% increase in the afternoon. Therefore, no significant difference was observed between morning and afternoon (0.05 <p, 1.4 = t). The main purpose of this study was to evaluate a training program on dynamic balance in the morning and afternoon was elderly. The findings showed that the results of perturbation training in South and South-West in the afternoon than in the morning on dynamic balance in elderly affected. Mousavi *et al*, (2009), the effect on the dynamic control were evaluated in male and female athletes. The present research findings Mahdavi et *al*, (2011), Abbasi *et al* (2012) and Rasteh and colleagues (2010) demonstrated the impact of balance exercises to improve balance in elderly agreement (Gauthier *et al*, 2001, Gribble *et al*, 2004, and Carter *et al*, 2001). A study by Jorgensen and colleagues (2012) was to show that postural balance in the elderly can be affected by time of day. The important scientific and clinical relevance of these findings, we suggest that the time of day as a factor in the control of postural balance in the elderly should be considered when evaluating (Mahdavi *et al*, 2011). Time of day effects on postural balance is related to the circadian of sleep, awake time, and hormones are affected. Sleepiness in morning and evening peak 7-2 5-2 in the afternoon is the (Agarwal, 2001, Mahdavi *et al*, 2011). Thus, during drowsiness, postural oscillation amplitude is wider than ever, and their balance is affected (33-28, 31-26, 20, 19-16, 13-12, 7-5, 4-1) interestingly, other physiological variables such as body temperature, blood pressure (Nakano *et al*, 2001), plasma magnesium ion concentration (Souissi *et al*, 2002) days during a similar effect on the balance of the show. In addition, Gribble an inverse relationship between time of day and day of the first and second dynamic performance observed in this study, and the dynamic performance of the day was impaired (Stewart *et al*, 2005). The results of this study show that young people healthy balance dysfunction may be observed in the afternoon (Stewart *et al*, 2005). One reason for this is due to muscle fatigue, impaired postural balance, and is in the afternoon increases (Mahdavi *et al*, 2011). According to several studies, postural balance (postural) to be positively affected by an increase in plasma estrogen levels (Mahdavi *et al*, 2011). In addition, with increased plasma levels of estrogen in the morning on the day following a daily pattern gradually reduced (Mahdavi *et al*, 2011). Gauthier *et al* (2001) and Switzerland (2002), about the eccentric and concentric strength using a dynamometer at different times based on their research in the age of peak power was observed in these studies (Newhouse *et al*, 2002, Sadeghi *et al*, 2009). Gribble and colleagues (2007) reported that significantly more time to balance the static 20:00 is consistent with the results of the present study (Gribble *et al*, 2004). Assessment of record-breaking shows at international sporting events of World Records has a circadian oscillator (Maki *et al*, 1991). More from Health paved the course of life (Hoyer *et al*, 2007). However, studies by Gribble (2007) fully agree with these results. The research studies of the effects of circadian and physiological variables change at different hours of the day will be confirmed as compatible (31-30, 27-26, 24, 13-11, 1).

Conclusion

The results of this study demonstrated a significant impact in improving dynamic balance training in older adults in the afternoon due to the improvement in the external posterior and posterior marginal band rehearsal in the morning, better performance of the results of the afternoon the group This effect is attributed. But as a whole and other dynamic counterbalance to these significant changes were observed. In fact, balance exercises with the transmission of information via the sensory overload on the three central nervous system (visual, sensory - atrial depth) will improve balance, but given the short period of training (weeks) Further studies to evaluate the long-lasting effects and long-term consequences of this practice are suggested.

Acknowledgement

We need to everyone who helped us in this study sincere appreciation and thanks.

REFERENCES

Carter, ND., Kannus, P., Khan, KM, (2001). Exercise in the prevention of falls in older people: a systematic literature review examining the rationale and the evidence. *Sports Med*, 31 (6): 427-38.

Sadeghi, H., Norouzi, HR., Karimi, Asl., AMontazer, MR. (2009). Functional Training Program Effect on Static and Dynamic Balance in Male Able-bodied Elderly. *J Salmandi* Iran, 3(8): 565-571.

Downton, JH., Falls, In. (1998). Tallis R, Fillit H, Brocklehurst JC, editors. Geriatric Medicine and Gerontology. 5th ed. Edinburgh, Scotland: *Churchill Livingstone*, 1359–1370.

Jorgensen, MG., Rathleff, MS., Laessoe, U., Caserotti, P., Nielsen, OB., Aagaard, P. (2012). Time-of-day influences postural balance in older adults .*Gait Posture*, 35(4):653-657.

Cote, KP., Brunet, ME., Gansneder, BM., Shultz, SJ. (2005). Effects of pronated and supinated foot postures on static and dynamic postural stability. *J Athl Train*, 40(1):41-46.

Hoyer, D., Clairambault, J. (2007). Rhythms from seconds to days. Physiological importance and therapeutic implications .*IEEE Eng Med Biol Mag*, 26(6): 12-3.

Reilly, T., Atkinson, G., Waterhouse, J. (2000). "Chronobiology and physical performance". In: Garrett, W.E., Jr., Kirkendall, D.T. eds. Exercise and sport science. Philadelphia: *Lippincott Williams and Wilkins*, 351-372.

Atkinson, G., Reilly, T. (1996). Circadian variation in sport performance. *Journal Sport Med*, 21(4): 292-312.

Lac, G., Chamoux, A. (2006). Do circannual rhythm of cortisol and testosterone interfere with variations induced by other events?]. *Ann Endocrinol* (Paris), 67(1):60-63.

Bellew, JW., Yates, JW., Gater, DR. (2003). The initial effects of low-volume strength training on balance in untrained older men and women. *J Strength Cond Res*, 17(1):121-8.

Bressel, E., Yonker, JC., Kras, J., Health, EM. (2007). Comparison of static and dynamic balance in female collegiate soccer, basketball and gymnastics athletes*". J Athl train*, 42(1): 42-46.

Timothy, GL., Alex, FR., Reynaldo, M. (1998). Anthropometric Standardization reference Manual**,** Chapter 2:15-17.

Manini, T., Marko, M., VanArnam, T., Cook, S., Fernhall, B., Burke, J., Ploutz-Snyder, L. (2007). Efficacy of resistance and task-specific exercise in older adults who modify tasks of everyday life. *J Gerontol A Biol Sci Med Sci* ,62(6): 616-23.

Teresa, LA., Kban, KM., Eng, JJ., Janssen, PA., Lord, SR., Mckay, HA. (2004). Resistance and agility training reduce fall risk in women aged 75 to 85 with low bone mass: A 6-month randomized, controlled trail. J Ame Geri Soc, 52:657-665.

Mahdavi, z., Molabashi, L., Safavi Bayat, Z., Yaghmaei, F., Mehrabi, Y. (2011). Effect of balance training on balance in elderly nursing home resident in Tehran in 2010 – 2011. J Salmandi Iran, 9(4): 33-9.

Abbasi, A., Sadeghi, H., Berenjian Tabrizi, H., Bagheri, K., Ghaseminejad, A R. (2012). Effect of balance training in water and non-training on neuromuscular function and elderly male balance. Koomesh, 3(43): 44-9.

Raste, H., Aliaei, GH., Abdolvahab, M., Jalili, M., Jalaei, SH. (2010). Review coxy and kavtoron training to improve balance in elderly men in Mashhad elderly center. Tehran University of Medical Sciences Journal, 3(1, 2): 49- 53.

Kammerlind, AS., Håkansson, JK., Skogsberg, MC. (2012). Effects of balance training in elderly people with nonperipheral vertigo and unsteadiness. BMJ, 345:45-47.

Armstrong Lawrence, A. (2003). "Impact on the environment, sports activities," translated by Gaeini, Abbas Ali and colleagues, published by the Semat .

Gribble, PA., Tucker, WS., White, PA.(2007). Time-of-day influences on static and dynamic postural control . J Athl Train ,42(1): 35-41.

Gribble, PA., Hertel, J. (2004). Changes in postural control during a 48-hr. sleep deprivation period. Percept Mot Skills, 99(3 Pt 1):1035-1045.

Nakano, T., Araki, K., Michimori, A., Inbe, H., Hagiwara, H., Koyama, E. (2001). Nineteen-hour variation of postural sway, alertness and rectal temperature during sleep deprivation. Psychiatry Clin Neurosci, 55(3): 277-278.

Agarwal, R. (2010). Regulation of circadian blood pressure: from mice to astronauts. Curr Opin Nephrol Hypertens, 19(1):51-58.

Newhouse, IJ., Johnson, KP., Montelpare, WJ., McAuliffe, JE. (2002). Variability within individuals of plasma ionic magnesium concentrations. BMC Physiol, 26: 2-6.

Souissi, N., Gauthier, A., Sesboüé, B., Larue, J., Davenne, D. (2002). Effects of regular training at the same time of day on diurnal fluctuations in muscular performance. J Sports Sci, 20(11): 929-37.

Gauthier, A., Davenne, D., Martin, A., Van Hoecke, J. (2001). Time of day effects on isometric and isokinetic torque developed during elbow flexion in humans. Eur J Appl Physiol, 84(3): 249-52.

Borzoo, S., Arastoo, A.A., Ghasemzade, R., Zahednejad, Sh., Habibi, A., Latifi, S M. (2009). Effect of aerobic training on elderly quality of life in Ahvaz. J Salmandi Iran, 3(2), 43-5.

Munch, M., Knoblauch, V., Blatter, K., Schroder, C., Schnitzler. C., Krauchi, K. (2005). Age-related attenuation of the evening circadian arousal signal in humans .Neurobiol Aging. Epub, 26(9):1307-19 .

Maki, BE., Holliday, PJ., Topper, AK. (1991). Fear of falling and postural performance in the elderly. J Gerontol, 46(4), 123-31.

Lord, SR., Castell, S., Corcoran, J., Dayhew, J., Matters, B., Shan, A, Williams, P. (2003). The effect of group exercise on physical functioning and falls in frail older people living in retirement villages: a randomized, controlled trial. J Am Geriatr Soc, 51(12):1685-92.