A Comparison Study of Memory Quotient among Active and Inactive Elder Men

Somayeh Golzar¹*, Hassan khalaji², Hamid Rezayan³

1- Department of Physical Education and Sport Sciences, Abadeh Branch, Islamic Azad University, Abadeh, Iran.
2- Professor, Physical Education & Sport Sciences, Arak University
3- Professor, Educational Technology, Arak University

*Corresponding Author, Email: s.golzar60@gmail.com

Abstract

Purpose: The main objective of this study was to investigate and compare the memory quotient among active and inactive elder men (60-75) in Arak province.

Materials and Methods: This research is ex-post facto type and 76 old men were selected as the sample of the study. All of the information was obtained through a Wechsler Memory Scale (WMS) and two other researchers made questionnaires for collecting the personal data and the state of physical activity among the sample. Validity was determined by Cronbach's Alpha method (α= 0.751). Subjects who completed the physical activity questionnaire were divided in to active and inactive groups. And for verifying their memories WMS was used. This questionnaire was able to evaluate the following items: General memory, Orientation, Mind control, Logical memory, Repeating the numbers, Visual memory and Associational learning. After gathering and collecting the data, the independent sample t test with the significance level of 0.05 was used for evaluating the hypothesis. Results: The results with 95% certainty and meaningfulness of p<0.05 showed that the Memory Quotient among active older men is more than inactive ones. Also active older were better than inactive older in four subtests including: 1.Orientation, 2.Logical memory, 3.Mind control and 4.Associational learning. In three other subtests no significant difference was reported including: 1.General memory, 2.Repeating the numbers and 3.Visual memory.

Conclusion: Pointing to the results of this study, it can be concluded that participation in regular physical activity may help older people to maintain their memory and perform better in aging process.

Keywords: Memory, Physical activity, Older, Wechsler Memory Scale.

Introduction

The developmental process of living and aging is an unavoidable fact, but procrastinating this process and replacing it with joyfulness in life could be a positive point. Nowadays, modern sciences don't only look for prolonging the lives; they also want to make the last years of living full of calmness associated with physical and mental health (Majidi, 1986). During the aging process, some physiological and neurological changes occur in most parts of the body and reduce their efficacy, such as muscular volume diminution, osteoporosis and reduction of brain's neurons (Edington and Edgerton, 1976).

According to the cognitive theories, most of the measurable and functional cognitive characteristics such as memory will reduce during the aging process. This fact will lead the older people to avoid participating in educational courses, because they understand the diminution of their memory (James and Coyle, 1998).

Nonetheless, scientific researches shows that designing a good kind of lifestyle can be useful to slow down the wane of cognitive characteristics. Other studies show that doing light physical activities during this period can perfectly restrict some ineptitude. Primary studies of Spirduso (1975) showed that old active men have better reaction time in compare with inactive less aged old ones. Since then, researchers had studied this relationship among many populations with different methods and cognitive scales. Madden and Allen (1989) reported that physical activities may have positive effect on the cognitive abilities, because it increases the blood
circulation; and when more blood reaches the brain, the intake of glucose and oxygen will increase. Some other researchers had tested animals as the samples and find out that aerobic training may have positive effects on the cognitive efficacy and human's memory. Black and Anderson (1990) reported that when rats participated in running program on the treadmill, their cerebellum's density increased. In the other hand, their aerobic readiness had improved due to running on the treadmill and as a result the absorption of Acetylcholine and Dopamine Receptor Density had increased among the older rats. Catman and Berchtold (1995) reported accession on the release of genetic material for brain's Neurotrophin, and also growth of new cells in hippocampus of rats after additional aerobic training. Other researchers reported the effects of physical activities on older rats that increased the levels of neurotic mechanism such as the release of Brain-Derived Neurotrophin (BDNF), Insulin-Link Growth Factor I (IGF – I), and Serotonin; and reduced the levels of Corticosteroids (Berchtold et al., 2001). These studies brought hope for researchers to study the effects of aerobic readiness on brain structure, cognitive efficacy and memory among human (Kramer and Stanly, 2005).

Assessing different studies on this subject, shows that some researchers believes the positive effects of aerobic readiness on human's cognitive efficacy and some others couldn't find this meaningful relationship. Fichter et al (1995) showed that inactive old people have diminution in their intelligent abilities; creativity will reduce among them and they are more likely to demonstrate the signals of mental disorders. Due to the results of this study, when old people stay inactive, their cognitive abilities will be affected. Yaffe et al (2001) studied the conditions of 5925 old women living in the retirement homes (aged more than 60). The range of their physical activity was measured by the distances they walk every week. The research group was looking to find whether women with more physical activity advantage higher preservation in the next 6-8 years or not? After fulfilling this research during 6-8 years, they reported that women with more physical activities will experience less reduction in their cognitive abilities. They also showed that this consistency will resist after grouping the samples due to their age, educational level, general health condition, depression, elapse, diabetes, high blood pressure, tobacco intake and also using estrogens (Yaffe et al., 2001). The results of other research made by Laurin and Lindsay (2001) showed that the rate of physical activities is related to the reduction of cognitive disorders, Alzheimer and diminution of any health condition during the 5 years of study. In another similar study done by Barnes and Yaffe (2003) among 349 samples aged more than 55, it was predicted that people with better aerobic readiness are advantaging less cognitive disorders during the next 6 years. The value of this study is because of evaluating many cognitive characteristics among its population. The revisit on the literature of this subject during the last 30 years showed that researchers are more likely to study the effects of different lifestyles on the cognitive characteristics and among them, studying these changes on the memory as one of the most important aspects of cognitive characteristics is not assessed in Iran.

In this respect, an urge was felt to study and compare the memory quotient among active and inactive elder men, to observe the positive effects of physical activities for having joyful life during elder ages.

Materials and Methods

This research is ex-post facto type. During the study old men who participated in physical activities are compared with inactive samples. The total number of 105 old retired men living in Arak province voluntarily participated in this research. After primary tests 29 cases were eliminated because of suffering from different diseases such as diabetes, depression, brain stroke, cardiovascular and respiratory disorders and tobacco intake. Eventually, 76 old men were selected as the sample of the study. Subjects who completed the physical activity questionnaire were divided in to active and inactive groups due to their scores. The scores of 38 men were enough to put them in the active group. These men took part in regular physical activities whom also reported that they go jogging or climbing at least once a week. The inactive group consisted of other 38 men whom even preferred driving for short distances instead of walking. Finally, both groups participated in Wechsler Memory Scale (WMS) test. The questionnaires used in this research consisted of 3 parts. The first two parts helped the researcher to gain personal information about the Samples and the last part was completed for grouping them in to active and inactive cases. Questions asked in the first part were about the age, educational level, occupation, average monthly income and the number of family members. These questions were asked to find the social and economic states of the samples. The second part (health and hygiene) consisted of some questions about diseases such as diabetes, depression, brain stroke, cardiovascular and respiratory disorders, tobacco intake and etc. It is proven that the mentioned disorders affect the brain and the memory. The third part evaluated the physical conditions of samples by asking about the kind, intensity and amount of activities done by them. The answer of each question was verified by Likert's five levels scale. The total score was 35 and no limitation on the time was determined for the samples to answer the questions. This questionnaire was modeled from lifestyle evaluation questionnaire; Hetler (1984) cited by cooper (1990); and pointing to the Islamic culture of our society and also irrelevant relation of some questions with researcher's objectives, some questions were eliminated or changed under the supervision of experts in this field. Moreover, for measuring the memory, researcher used a standard test, which was selected according to the ecological validity. Eventually, Wechsler Memory Scale –
third edition (Wechsler, 1987) was used. This questionnaire evaluated the following seven items, including the General memory, Orientation, Mind control, Logical memory, Repeating the numbers, Visual memory and Associational learning. Every person achieved its special score for each item and the total sum of them was the net score of the samples. After that an indelible adjusted number originated from the age of samples was added to the net score and finally the "moderated Score" of memory was evaluated. This score made it possible for the researcher to assess the Memory Quotient. Validity coefficient for physical activity questionnaire was determined by Cronbach's Alpha statistical method ($\alpha = 0.75$). WMS had been standardized by Ouraki (1992) in Ahvaz Province of Iran with the validity of $\alpha = 0.67$; but the calculated validity used in this research was $\alpha = 0.81$. Descriptive statistics of central tendency and variability were executed to evaluate the collected data. For studying their comparison, the independent-sample t test with the significance level of 0.05 was used. The validity coefficient for WMS and the questionnaire were determined by Cronbach's Alpha statistical method. All these statistics were calculated by SPSS 11.5 software.

Results

The average age of participants was 66.38 years old (SD = 4.18). Mean age for active group was 64.18 years old (SD = 3.15) and for inactive group it was 68.58 years old (SD = 2.01). The descriptive data about the educational level showed that %38.2 had less than high school diploma, %42.1 received their high school diploma and only %19.7 achieved their college certificate. The frequency distribution of samples due to the number of members in each family showed that %34.2 of participants are living with 5 or more members in their homes, %18.4 of families consisted of 3 members and %23.7 consisted of 2 members.

The average income of samples was divided in tree groups. %23.7 had monthly 400 to 600 thousand Tomans, %44 had monthly 200 to 400 thousand Tomans and%32.3 had monthly less than 200 thousand Tomans. Table 1, shows the mean score of participant's physical fitness calculated from the physical activity questionnaire.

<table>
<thead>
<tr>
<th>Group</th>
<th>Frequency</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>38</td>
<td>23.28</td>
<td>4.07</td>
</tr>
<tr>
<td>Inactive</td>
<td>38</td>
<td>12.07</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Table 2: Deductive statistics indexes for testing the hypothesis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>T- ratio</th>
<th>Meaningfulness</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>General memory</td>
<td>1.80</td>
<td>0.08</td>
<td>74</td>
</tr>
<tr>
<td>Orientation</td>
<td>2.94</td>
<td>0.04</td>
<td>74</td>
</tr>
<tr>
<td>Mind control</td>
<td>3.48</td>
<td>0.01</td>
<td>74</td>
</tr>
<tr>
<td>Logical memory</td>
<td>3.01</td>
<td>0.30</td>
<td>74</td>
</tr>
<tr>
<td>Repeating the numbers</td>
<td>1.39</td>
<td>0.11</td>
<td>74</td>
</tr>
<tr>
<td>Visual memory</td>
<td>1.00</td>
<td>0.91</td>
<td>74</td>
</tr>
<tr>
<td>Associational learning</td>
<td>4.2</td>
<td>0.00</td>
<td>74</td>
</tr>
<tr>
<td>Memory quotient</td>
<td>3.90</td>
<td>0.00</td>
<td>74</td>
</tr>
</tbody>
</table>
Discussion and Conclusion

Since many years ago human beings had found the importance of memory and they were looking for any kind of implements to improve it, because they had enough reasons for this fact. Successfully in many aspects of life depends on human's ability to detect their previous memorized information (Eshghpour, 1991). In the other hand, many studies had shown that aging process will reduce our memorial abilities, which drawback old people from participating in educational courses, because this loss of ability is understood by them. This problem is the bases of feeling the necessity for making more researches and greater studies to find possible ways for maintaining and preserving the memory and other cognitive abilities during the aging process (Fichter et al., 1995). Pointing to the last studies of researchers, lifestyle is one of the most important aspects that affect the loss of memory during the aging process (Solso, 1991).

The results of this study show that there are significant differences among the old people who usually participate in physical activities with inactive elder men. According to the results of WMS and table 2 (independent t-test, p<0.05), and also descriptive and deductive statistical analysis it can be concluded that in five subtests including: Orientation, Logical memory, Mind control, Associational learning and Memory quotient; active old men achieved better scores than inactive ones. But this relation was not proved in three other subtests including: General memory, repeating the numbers and Visual memory. Economic and social conditions, ages, educational level, monthly income and healthiness of the selected samples were almost close to each other. The findings of this research about the relationship between memory's function and physical activity was similar to the findings of Abbot and White (2004) who studied the effects of walking on amnesia among old able men. Instead of the mentioned similarities, the results of this research are similar to the studies of Ahmadiasl et al (2003) who studied the effect of exercise on learning, memory and levels of epinephrine in rats hippocampus; Lambourne (2006) that observed the relationship between working memory capacity and physical activity rates in young adult; Potter and Keeling (2005) who determined the effects of moderate exercise and circuit rhythmic on human memory; Sport and Exercise Psychology; Laurin and Lindsay (2001) who found the relation of physical activity and risk of cognitive improvement and dementia in elder person; Dik and Deeg (2003) who studied early life physical activity and cognition at old age; and Richards and Hardy (2003) who asked if active leisure protects cognition - evidence from a national birth cohort.

It is also predicted that cardio-vascular health can be one of the most important factors for the maintenance of memory's different aspects. Meanwhile, this research has no significant relation with the studies of Blumenthal and Emery (1991) who observed the long-term effects of exercise on psychological functioning in older men and women; and Powel and Pohenford (1971) who studied the comparison of adult exerciser and non-exerciser on fluid intelligence and selected psychological variables.

As it was noted in the results of this study, there were no differences between two groups in three subtests of "General memory, repeating the numbers and Visual memory". The type of questions asked in these three parts may affect the achieved results on finding no significant differences. The questions asked in the first subtest about the General memory were easy for both groups and most of the samples achieved the total score in this part. So, from the sample's point of view, it can be concluded that aging process will not affect the General memory. This statement has conflict with the studies of Cockburn and Smith (1991) who found the relative influence of intelligence and age on everyday memory. In the subtest about Visual memory, most of the participants achieved low scores in both groups and unfortunately we couldn't find any other similar research that studied the effect of aging on the Visual memory, and it is impossible for us to say that the reason of finding no significant differences is because of participant's ages.

This problem may be the result of their tiredness or lack of interest to give correct answer to the questions in this part. In this respect, we suggest you to make further researches in this field. In the other subtest about repeating the numbers, both groups achieved low scores. The emphasis of this subtest is on the short term memory. Human's short term memory imply the short duration of time that keeps limited data for 30 to 45 seconds without practicing or repeating them. In scientific textures, short term memory is known as the victim of aging. This result is supporting the studies of Solso (1991), Potter and Keeling (2005), and also Kramer and Stanly (2005).Eventually, for evaluating the state of physical activity among the participants and consequently their aerobic readiness, a questionnaire was used. Despite the reliability and validity of questionnaires as a testing instrument, answers are given due to personal interests. In this respect, it is suggested to use laboratory instruments executable for old people in further studies. In the other hand, this research had studied the effects of physical activity on memory quotient; but the intensity, kind or rate of physical activities are not determined. So, it is suggested to study the effects of these mentioned criteria on memory quotient.

Kramer and Stanly (2005) made a research about fitness, aging and neuro-cognitive function with more than %50 female participants and finally analyzed that old women are more likely to use the advantages of physical activities during the aging process than old men. As a matter of fact, it is suggested to do further researches about the effects of activity on memory quotient among young or menopause women.
This research is executed due to ex-post facto type, which studied the effects of some aspects which had happened before on the present condition of the samples. It is suggested to make similar studies in future during a long period of time about the effects of long term aerobic physical activities on the reduction of memory quotient. Finally, it is also suggested to pay special attention to different mechanisms of physical activity that make necessary changes on the tissues of brain cells.

References

potter D, Keeling, D, 2005. Effects of moderate exercise and circuit rhythmic on human memory; Sport and Exercise Psychology. 27, 1, 117.