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Comparison of the Effectiveness of Braille Tonik Exercises and Physical Fitness on the Coordination and Memory of Housewives in Mashhad

Somayye Farzane[a]*

[a] Department of Motor Behavior, Faculty of Sport Sciences, Alzahra University, Tehran, Iran.

Keywords

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Somayye Farzane
Email: farzanesomayye@gmail.com

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Abstract

Background: Today, sedentary lifestyle is one of the problems of society, especially among housewives. The aim of the present study was to compare Braille Tonik exercises and physical fitness on coordination and memory of housewives.

Methods: For this purpose, 30 housewives in the age range of 39-19 years were randomly selected and participated in a pre-posttest design of random groups (Braille Tonik exercise and physical fitness group). Both groups practiced for 6 weeks (3 sessions of 60 minutes per week). In the pre-test and post-test, the eye-hand coordination and working memory of the participants were measured by successive tennis ball throwing test and inverted number recall test, respectively.

Results: Despite the increase in coordination between the two groups, there was no significant difference between groups ($p = 0.293$) and during 6 weeks of training, the average memory in the Braille Tonik group increased.

Conclusion: According to the results, 6 weeks of Braille Tonik training and physical fitness improved eye-hand coordination; However, despite the difference in the amount of cognitive conflict and the type of movements between the two types of exercises, there was no difference in their effects on eye-hand coordination and working memory.

Introduction

Activity and mobility is an integral part of human life that is manifested in a special way in each period. Human machine life today has caused him to stay away from activity and this lack of movement, vitality and freshness away from his body and instead has replaced the risk factor of obesity (Baghiani Moghadam, Mazloumi Mahmoudabadi, Rahavi & Niknejad 2017). The importance of physical activity as a complement to a healthy life has expanded, so that regular physical activity as an important health-promoting behavior, prevents a variety of physical and mental illnesses. Women are considered as the main pillar of social development and the main axis of family health and have important duties and roles in the family and society (Mousavi, Zehtab Najafi & Salemi 2014). Although the beneficial role of physical activity is recognized, a large portion of the population is physically inactive. It is very worrying that the known gender gap in physical activity is constantly increasing. Numerous barriers prevent women from engaging in physical activity, while exercise is important for their health, especially during pregnancy and menopause. In addition to the benefits of physical health, physical activity may

also affect health and flexibility and greatly affect the quality of life (Illario, Luca, Cano & Tramontano 2020). The World Health Organization recognizes physical inactivity as a serious and growing public health problem and intends to reduce it by 10% by 2025. An analysis published in a 2018 American journal found that more than a quarter of adults worldwide are inactive enough, the findings of this study showed: Between 2001, and 2016, levels of insufficient activity were stable (28·5%, 23·9–33·9, in 2001; change not significant). The highest levels in 2016, were in women in Latin America and the Caribbean (43·7%, 42·9–46·5), south Asia (43·0%, 29·6–74·9), and high-income Western countries (42·3%, 39·1–45·4), whereas the lowest levels were in men from Oceania (12·3%, 11·2–17·7), east and southeast Asia (17·6%, 15·7–23·9), and sub-Saharan Africa (17·9%, 15·1–20·5). Prevalence in 2016 was more than twice as high in high-income countries (36·8%, 35·0–38·0) as in low-income countries (16·2%, 14·2–17·9), and insufficient activity has increased in high-income countries over time (31·6%, 27·1–37·2, in 2001), (Guthold, Stevens & Riley 2019). Daily physical activity can help prevent cardiovascular disease, heart disease and stroke, and lower blood pressure in people with high blood pressure. In addition, physical activity reduces body fat, which is strongly associated with high blood pressure, thus preventing and controlling diabetes and obesity. By increasing muscle strength and endurance and improving flexibility and posture, regular exercise also helps prevent low back pain (Hendrick, Milosavljevic, Hale, Hurley, McDonough & Ryan 2011). Promoting health and providing a feeling of well-being in each period of a woman's life will determine a better quality of life for her and will bring many fruits to society (Sharifi, Jalili, Najar, Yazdizadeh & Haghighizadeh 2015). Regular exercise will improve the work of the nervous system and the necessary coordination between nerves and muscles. Coordination means the cooperation of the senses, the nervous system and the muscles of the body. In other words, a person can do what the nervous system does in response to a reaction by the muscles of the body, without extra movement and with less energy (Hoeger & hoeger 2004). Coordination depends on the proper functioning of the central nervous system. Proper and regular operation of this system causes the skills to be performed correctly in terms of time and sequence of the muscles involved (Jia, Dahlman-Wright & Gustafson 2015). Research on the effect of selected physical activity (Borujeni, Shadmehri & Pishdar 2017), rope design (Ghelichpoor, Shahbazi & Bagherzadeh 2013) and local computer and indigenous games (Ahmadzadeh, Abdi Moghadam & Farrokhi 2014) on coordination Eyes and hands have paid off and found positive effects. The positive effects of exercise and regular physical activity on the heart and arteries have long been known, but it is now known that exercise is beneficial for the whole body and even the brain (Nasrabadi & Helmi 2018). Researchers generally consider memory to be the ability to store, manipulate, process information, experiences (temporary and permanent) and use them in subsequent interactions with the environment, and include the processes of obtaining, recording,

encrypting, storing and retrieving information (Saadati shamir, Kiamanesh, Kadivar & Hamidi 2010). For this reason, memory is a central ability in the human cognitive system. There are various ways to strengthen memory, one of the best ways is physical activity (Hejbernia, Nazakat Al-Husseini, Asfarjani & Movahedi 2016). Physical activity increases brain comprehension and helps reduce the effects of aging on memory loss and may even prevent Alzheimer's. One of the types of physical activity that has been shown to have a beneficial effect on cognitive functions (including memory) is aerobic exercise (Ebrahimi, Rashidy-Pour, Vafaei & Mohammad Akhavan 2010). Following aerobic activity, the amount of blood flow to the brain increases in the areas responsible for sensory and motor control. Aerobic activity can keep the brain young and active by increasing the growth of nerve cells and expanding intercellular communication, which are necessary for learning and memory (Pourjafar, Movahedi & Musivand 2019) In a study conducted by (Sadeghi, Khalaji, Nowruzian & Mokhtari 2013) the effect of physical activity on memory of 50-70 years old women with memory impairment was examined, also (Eskandarnejad & Rezaei 2018) the effect of aerobic exercise on neural networks of attention and working memory Check out. Doing an aerobic exercise, especially in groups, increases vitality, reduces stress and improves the quality of sleep in housewives, which can be useful in promoting their mental health (Mazloumi, rahavi, Baghiani Moghadam, Niknejad & DehghaniTafti 2017). One of the group and individual aerobic exercises used for housewives is physical fitness. Physical fitness exercises cause these changes: improving body composition (Aliniya, Elmieh & Fadaie 2020), strength (Kazemi, & Ghanbarzadeh 2015), cardiovascular endurance (Hossein pour, Souri & Bahrami 2009) and flexibility (Hosseini, Samamy, Heshmati & Mohammadi 2017). In addition, performing these exercises, especially in groups, increases coordination (Amini, Jaberi Moghadam, Farrokhi & Afshari 2012; Amui, Farsi & Salehi 2015; Rasooli Qara Shiran 2016) and strengthens memory (Bijeh, Saeedi & Mohammad Rahimi 2015; Esmaeily 2017; Babakhani, Besharat Far, Shukri & Yektamanesh 2016). One of the Iranian sports that has become popular in recent years is the Braille Tonik sport, which was invented in the early 2001s by Yasman Moayedi, an Iranian active in affairs (social, cultural, charitable and sports) by combining the rules of alphabetic coding with sports exercises. Braille Tonik Exercise as an individual and group exercise is a method designed based on the coding of the alphabet of different languages. The performance Braille Tonik is in all cases inspired by a 6-cell table related to the "Braille" line for the blind. People visualize the 6-cell table in space or on the floor and perform the exercises by moving their arms and legs on the table cells. The purpose of coding is to match sports exercises and perform coordinated movements. Everyone learns movements easily by relying on codes and increases people's motivation to perform sports. Various researches in this field show the effectiveness of these exercises on improving the motor skills of children with low intelligence (Dehghanizade, Rahmati Arani & Heidari 2018) and natural growth (Tavanapour & Rahbanfard

2015), improving the coordination of children with developmental coordination disorders (Namazizadeh & Banaeei 2018), have shown an increase in women's happiness (Ghasemi, Hadavi & Melanorozi 2016) and a decrease in depression and an increase in self-care (Mokbarian, Golmohammadi & Kashani 2015).

Since Braille Tonik is a newly established Iranian sport, little research has been done on this sport and to see its effectiveness, more research is needed on the physical and psychological components in a wide range of people with different levels of fitness, age and gender. Also, for the effectiveness of this training method, it is necessary to compare it with other training methods that have similar group and individual nature, such as physical training exercises. So the question that arises in this regard is how effective and efficient is Braille Tonik exercise compared to physical fitness? And the question we seek to answer in this study is whether fitness and Braille Tonik exercise increase coordination and strengthen work memory? And what is the effect of each of these exercises?

Method

Subjects

The statistical population of this study was housewives living in a residential complex in Mashhad. The number of women living in this complex was 274 people who were selected from among them by calling 30 women and in two groups of 15 people for tonic with mean and standard deviation (28.53 ± 7.06) and physical fitness with mean and standard deviation of age (27.27 ± 7.07). These subjects were all housewives and did not have any specific diseases in terms of underlying diseases and did not do any specific physical activity. The written permission of the participants to participate in this study was obtained from all subjects using the consent form, then the demographic information of the participants was recorded using the personal information form.

Apparatus and task

Coordination test: To measure coordination, the test of throwing a soft ball or tennis ball was used (Mujtahedi 2015). The execution method was that we draw a goal (in the form of a square) with dimensions of 1 * 1 meter on the wall (the distance from the target to the ground is 2 meters), we draw the same goal at a distance of 3 meters from the wall on the ground. The person standing inside the target and in front of the wall, throws the ball towards the wall with one hand (throwing over the arm) and is received in return with the other hand. The ball is thrown back into the wall with the receiver's hand and must be received with the first hand that made the first throw. This test is performed in a period of 30 seconds. How to score is the number of successful downloads in 30 seconds.

Memory test: The test we used in this study was the inverse number recall test (Pickering 2006). The test was performed in such a way that a number of numbers were read to the participants and they had to be reminded of the numbers in reverse order. The validity of this test has been reported by the

retest method of 0.62 (Gathercole & Alloway 2004). Everyone who said more numbers in 20 seconds got more points. After 6 weeks of training, weight measurement and coordination and memory tests were taken from the two groups again and the results were recorded.

Procedures

The method was that the participants underwent physical training for 6 weeks, three sessions per week and 60 minutes per session. In both groups, physical fitness training included: aerobic training, flexibility training, strength training and weight training. In the experimental group, between these exercises, each session was performed for 10 minutes of Braille Tonik exercises. In fact, the experimental group was the group that did both physical training and Braille Tonik training, and the control group did only physical training. The training time of both groups was the same in each session and the difference between the two groups was that the group also performed Braille Tonik exercises for 10 minutes in each session.

Physical Fitness Exercise Protocol

Selected fitness exercises included: warm-up and flexibility exercises, aerobic exercise, strength training and weight training, which were done for 60 minutes in each session. It should be noted that after flexibility and aerobic exercises, they rested for 10 minutes, then continued strength and endurance exercises and work with weights. Physical fitness exercises performed daily included warm-ups and flexibility exercises (10 minutes), aerobics (10 minutes), endurance strength (20 minutes), and weight training (20 minutes), respectively (Table 1).

Table 1. Selected fitness training protocol.

Types of exercises	How to do the exercise
Warm-up and flexibility	At the beginning of each session, flexibility exercises were performed for 10 minutes. The method was that the participants walked slowly and did dynamic stretching exercises for the head and neck, shoulders, arms, waist and legs, respectively.
Aerobic	Immediately after the flexibility exercises, aerobic exercises were performed for 10 minutes. These exercises included running at different speeds.
Strength endurance	After 10 minutes of rest, endurance strength training was performed for 20 minutes. These exercises included a variety of rhythmic exercises for the limbs, a variety of jumps, rotations, and a total of exercises that increased the heart rate for a relatively long time.
Working with weights	After 10 minutes of rest, weight training was performed for 20 minutes. The weights consisted of two 2 kg weights that were placed on both hands and performed a variety of strength exercises for the hands, arms, shoulders, upper body, waist, thighs and whole body.

Exercise protocol Braille Tonik

Initially, in order for the participants to better visualize the 6-cell table (Table 2) Braille Tonik, we drew this table on a large piece of cardboard and mounted it on the wall facing them. All participants were then asked to visualize the table of 6 houses

under their feet. Each Braille Tonik exercise course consists of several parts (a stretching part, a strength part, a speed part, etc). The movements Braille Tonik also have rhythm and melody, the melody used for each section can include 4, 8, 16 or 32 characters. The exercises used in this study consisted of 6 sections that were performed in a series of sequences, so that order and coordination were clearly visible in all movements. In fact, the Braille Tonik group at each session was 10 minutes of power training - endurance and 10 minutes Braille Tonik exercises, while the physical fitness group performed 20 minutes of strength-endurance exercises. So, the training time was two equal groups.

Table 2. Table 6 House for tonic (start movements to the right of red numbers, start movements to the left of blue numbers).

4	1	1	4
5	2	2	5
6	3	3	6

Data analysis

Mean and standard deviation were used to statistically describe the research variables. Before testing the hypotheses, first the distribution of weight, coordination and memory data was examined through Shapiro-Wilk test. The results indicate that the distribution of weight, coordination and memory variables was normal (p>0.05). Therefore, due to the normal distribution of variables, mixed analysis of variance and independent t-tests were used. All data were analyzed using SPSS software version 16, which for all analyzes was considered a significance level of 0.05. The charts were also drawn using Excel software. Table (3) shows the mean and standard deviation of the studied variables in the experimental groups.

Results

The results of Shapiro-Wilke showed the normal distribution of variables of weight, working memory and coordination in two groups (P>0.05).

The results of 2*2 analysis of variance with repeated measures of the test factor for the weight showed a significant effect of the test (F (1,28) = 14.22, p = 0.001, $\eta 2^p$ = 0.337); But the main effect of the group (F (1,28) = 0.45, p = 0.509, $\eta 2^p$ = 0.016) and the interaction effect of the group* test was not significant (F (1,28) = 1. 48, p= 0.234, $\eta 2^p$ = 0.05). In other words, the average weight of the two groups during the training period significantly decreased from 72.1 to 71.5 kg.

The results of 2*2 analysis of variance of working memory showed the main effect of the test (F (1,28) = 0.33, p = 0.571, $\eta 2^p$ = 0.012), main effect of group (F (1,28) = 0.02, p = 0.833, $\eta 2^p$ = 0.002) and the interaction group* test (F (1,28) = 1.32, p = 0.261, $\eta 2^p$ = 0.045) was not significant.

In the case of coordination variable, there was a significant difference between the coordination of the two experimental groups, which was calculated between the pre-test and post-test of the two groups and compared with independent t-test. Based on the results, there was no significant difference between

the coordination rate of the two groups (t (28) = 1.07, p = 0.293).

Table 3. Mean and Standard deva ion of dependent variables in experimental groups.

Variables	Braille Tonik Group		Physical Fitness Group	
	Pre test	Post test	Pre test	Post test
Weight	73.9 ± 11.8	72.9 ± 11.3	70.6 ± 14.1	70 ±13.5
Working memory	1.6 ± 0.5	1.7 ± 0.5	1.7 ± 0.5	1/6 ± 0.5
Coordination	13.1 ± 5.3	16.5 ± 3.8	9.3 ± 4	14/5 ± 10.2

Discussion and Conclusion

The aim of this study was to compare the effectiveness of two methods of physical fitness training and Braille Tonik on increasing coordination and strengthening the memory of housewives. Statistical results before the intervention indicated that there was no significant difference between the two groups in the measured variables. The first result that was seen after the exercises was an increase in coordination between both groups compared to pre-test, which was consistent with the results of similar research in this field (Taheri 2017; Rahideh & Jalilvand 2015; Jokar, Sheikh & Baqerzadeh 2018). In a study conducted by (Masoomnejad & Hosseini 2017), they examined the effect of a selected Braille Tonik exercise course on children's coordination with autism and found that Braille Tonik exercises had a positive effect on bilateral coordination and upper extremity coordination in children with autism. (Banaian & Namazizadeh 2018), investigated the effect of a course of Braille Tonik exercises on coordination in children with developmental coordination disorder and based on the results of this study, participation in Braille Tonik exercises to increase coordination of students with Recommended effective developmental coordination disorder and the implementation of this program in schools and care centers for these children. (Van Halewyck, Lavrysen, Levin, Boisgontier, Elliott & Helsen 2014) also examined the effect of age and physical activity on eye and hand coordination in a group of elderly people and found that age and level of physical activity both clearly affect eye and hand coordination during discrete hand targeting. (Wicks, Telford, Cunningham, Semple & Telford 2015) who studied the effect of physical activity on eye and hand coordination in children aged 8 to 16 years, as in the present study, used the ball throwing test and received it to measure coordination and concluded that strengthening Eye-hand coordination is associated with greater participation in physical activity. According to the results, physical activity and aerobic exercises have a significant impact on increasing muscular and motor coordination and more beautiful movements.

Another result of the study was the improvement of memory in the Braille Tonik group compared to before exercise, these results with studies that have shown the positive effects of physical interventions on memory enhancement (Khamesan, Koshty Dar & Babakhani 2010; Erickson, Hillman & Powell 2020; Zeidabadi, Arab Ameri, Naghdi & Bolory 2014) is consistent. (Ruscheweyh, et al 2011) in an interventional study examined the effect of physical activity on memory functions in 62 healthy elderly individuals and showed that moderate or low intensity physical activity increased with increasing localized gray matter volume in the prefrontal cortex. It has a positive relationship and these results may have important consequences for preventing cognitive decline in the elderly. On the other hand, (Sjowall1, Hertz & Klingberg 2017) in a 2-year study in two schools on children aged 6 to 13 years examined whether increasing physical activity leads to increased working memory capacity and computational performance? Their results showed that long-term, high-intensity physical activity did not lead to beneficial development of working memory or arithmetic in pre-adolescent children. From the results of the present study and the above research, it can be concluded that exercise can keep the brain young and active by increasing the growth of nerve cells and expanding the intercellular connections that are necessary for learning and memory. Also, the effects of exercise on nerve cells are due to increased blood flow to the brain, which leads to the release of growth factors and can prevent stroke (Bijeh, Saeedi & Mohammad Rahimi 2015). Since the basis of Braille Tonik exercise is to recall the 6-cell table and visualize numbers when performing movements, doing Braille Tonik exercises can be useful and effective in improving and strengthening memory.

In general, the results indicate the positive effects of physical fitness and Braille Tonik exercise on increasing coordination and the positive effect of Braille Tonik exercise on strengthening the memory of housewives. Although the effectiveness of fitness training on coordination and memory variables was evident in the research literature, the results of the present study showed for the first time the effectiveness of Braille Tonik exercise on memory variables. Therefore, due to the simplicity, variety of movements and the lack of need for advanced environment and facilities for Braille Tonik exercises, it is recommended that trainers as well as housewives use these exercises along with other exercises to improve their coordination and memory skills.

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Conflict of interests

The Author declare that there is no conflict of interest.

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