



RESEARCH ARTICLE

Investigating The Effect of Short-Term Karate Training on Some Physical Fitness Parameters in Visually Impaired 10–12-Year-Olds

Belma YAVASOGLU^{1*} and Ceren SUVEREN²

¹Kırşehir Ahi Evran University, Health Sciences Institute, Movement and Training, Kırşehir / Turkey

²Gazi University, Sports Science Faculty, Training and Movement, Ankara / Turkey

*Corresponding author: cerensuveren@gazi.edu.tr

Abstract

The aim of this study is to examine the effects of short-term karate training on some physical fitness parameters in visually impaired children aged 10-12. A total of 15 visually impaired individuals participated in the study. While the study group received karate training together with physical education lessons 1 day a week for 6 weeks, the control group only attended physical education lessons. Within the scope of the Eurofit Special Test, anthropometric measurements, long jump, medicine ball throwing, sit-up, sit-reach (flexibility), walking on the bench, and 25-meter running tests were applied to the participants. According to the research data, while there was a significant difference between the pre-post tests of the anthropometric measurements of the study group ($p < 0.001$), no significant difference was observed in the comparison of the two groups. While it was determined that there was a significant difference between the pretest-posttest values in the Eurofit Special test parameters of the study group ($p < 0.005$), there was no significant difference between the pre-posttest values of the control group. While there was no statistically significant difference between the pretests of Eurofit Special test measurements in which two independent groups were compared, a statistically significant difference was found in favor of the study group in all parameters in the posttest when two independent groups were compared ($p < 0.005$). As a result of the study, it was seen that short-term karate training gave positive results on some physical fitness parameters of visually impaired individuals between the ages of 10-12.

Keywords

Visually Impaired, Karate, Physical Fitness, Eurofit Special

INTRODUCTION

One of the best ways to reintegrate people with disabilities into society is through adapted physical education and sports activities. While sport is an important element for everyone's quality of life, it is much more important for people with disabilities (Yazıcıoğlu et al., 2020; Pekel, 2023). It becomes even more important because of its rehabilitative function, in addition to its effect on mental and emotional development (Savucu, 2019).

If there is no loss of vision from birth or infancy, the individual's developmental processes and physical condition do not cause inadequacy in its characteristics (Sevimay Ozer, 2005). However, the effects of environmental and genetic factors affect the social approach, motor development processes, and physical fitness in some cases, such as obstacle perception problems that develop after an obstacle. Their ability may be adversely affected. This negative effect has an impact on the

body's experience of movement in different environments and conditions. It can be reduced to a minimum with the help of education and physical activity.

Visually impaired individuals are present for recreational sports activities as well as competitive, high-performance disabled people. They can participate in adapted "Para" sports and the Olympics according to their level of vision. United States Blind According to the Athletes Association, visually impaired individuals can participate in sports activities in three different categories (Cengizel et al., 2022).

B1: Even if there is light perception in both eyes, there is no vision. He cannot recognize the shape of a hand from any distance or direction.

B2: The angle of vision is 5 degrees or less than 5 degrees. Visual acuity is no better than 20/600. In other words, you can see the shape of the hand from a distance of about 30 cm.

B3: Angles of vision are between 5-20°. Visual acuity is 20/600–60/600. In other words, you can see the shape of the hand from a distance of about 30 cm to 1 meter.

In 2006, the World Karate Federation (WKF) established the Para-Karate Commission to popularize karate among disabled people and encourage them to take up karate. Since then, Para-Karate has become part of the World Karate Federation's organizations. Para-Karate World Championships were officially held in Germany and Austria in 2014 and 2016, following the Para-Karate competition that was presented to the public in a demonstration competition at the World Championships held for the first time in Paris in 2012 (Argel, 2021). The development of Para-Karate organizations and participation in competitions is constantly increasing. This opens up a new field in which visually impaired people can exercise and improve their physical abilities.

In Para-Karate, competitions are organized in the "Kata" branch for physically handicapped athletes, visually impaired athletes, and mentally handicapped athletes (Argel et al., 2022). According to the WKF Para-Karate Classification, competitions are held in 4 classes and 2 separate categories for each class: men and women (Marin et al., 2022).

The curiosity of this research is to find out how much the branch of karate that uses stance, attack, defense, and walking forms will contribute

to the physical fitness of visually impaired people who start karate training.

Table 1. World Karate Federation Para-Karate Classification

K30	Physically Impairment
K22	Intellectual Impaired (Down-Syndrome) Athletes
K21	Intellectual Impaired Athlets
K10	Visually Impaired Athlets

MATERIALS AND METHODS

Model of the Research

This study is an experimental study with pre-test and post-test evaluations with study and control groups. Anthropometric measurements and the Eurofit Special Test were applied to the students who voluntarily participated in the research. (Ozer, 2020).

Research Group

The population of the research is all visually impaired people between the ages of 10 and 12. The sample consisted of individuals between the ages of 10 and 12 in Ankara who voluntarily agreed to participate in the research. A total of 15 visually impaired people participated in the study. 10 participants were included in the study group (6 boys, 4 girls), and 5 participants were included in the control group (2 boys, 3 girls). While the study group received karate training once a week for 6 weeks in addition to physical education, the control group attended only physical education and continued their daily lives.

The necessary permissions for this research were obtained from the Gazi University Ethics Committee, number 2022-871, dated April 19, 2022.

Inclusion criteria for the participants in the study

- the presence of a visually impaired person
- be between 10 and 12 years old.
- not to have any other disability associated with the visual impairment.
- have never practiced sports or taken part in sports competitions.

Exclusion criteria for the study participants

- had a physical injury or surgery in the last 6 months

- b) Failure to attend 50% of the total number of training sessions
- c) Failure to complete any of the measurements
- d) Voluntary withdrawal from the study at any stage

Limitations:

At the start of the study, the control group started with 9 people, but due to pandemic conditions and serious health problems, 4 people were excluded from the study.

Training Program: The karate training program used in the research for six weeks is given in Table 2.

Table 2. Karate training program for six weeks

KARATE-DO TRAINING	KIHON	DURATION / NUMBER
1 st week	YOI and SEIKEN TSUKI	10X3 / 1 min rest
2 nd week	OI TSUKI CHUDAN	10X3 / 1 min rest
3 rd week	OI TSUKI JODAN	10X3 / 1 min rest
4 th week	AGE OKE	10X3 / 1 min rest
5 th week	UCHI UKE	10X3 / 1 min rest
6 th week	MAE GERI	10X3 / 1 min rest

Data Collection Tools

Height

The height of the participants was measured with a German "Seca" stadiometer with an accuracy of ± 0.1 cm. With the head in the frontal plane, body weight was evenly distributed between both feet, and measurements were taken with bare feet and the heels in contact with the stadiometer (Marangoz et al., 2021).

Body Weight and Body Fat Percentage

Participants' body weight and body fat percentage were measured barefoot in sportswear with an accuracy of ± 0.1 kg using a 'Tanita' brand body composition analyzer developed in Japan (Erikoglu et al., 2019).

Body Mass Index

Body weight (kg) / height² (m). Participants' body mass indexes were calculated as the ratio of their body weight in kilograms to the square of their height in meters (Polat, 2013).

Eurofit Special Test

The Eurofit Special Test, developed for disabled people, was used to assess the physical fitness of the participants. The participants' long jump (tape measure), medicine ball throwing (Sveltus brand 1 kg), sit-up (Tokaido brand

stopwatch / 30 sec.), walking on the bench (3.5 m length, 30 cm height, 30 cm / 10 cm width / 30 sec.), and 25 m running (fox brand whistle, rattle stimulation), sit and reach (flexibility bench), and 25 m running (Fox brand whistle, rattle stimulus, and Tokaido brand stopwatch) were measured (Ozer, 2020).

Analysis of Data

SigmaPlot 11.0 was used to analyze the research data. In pre-test and post-test comparisons, the paired t-test was used for parametric data and the Wilcoxon test for non-parametric data. When comparing two independent groups, the t-test was used for parametric data and the Mann-Whitney U test for non-parametric data.

RESULTS

According to the results obtained from the research data, although there was a significant difference between the pre-test and post-test comparisons of the anthropometric measurements of the study group ($p < 0.001$), no significant difference was observed between the pre-test and post-test comparisons of the anthropometric measurements of the study and control groups

Table 3. Analysis of Study Group Anthropometric Measurement Pre-Post Test and Control Group Anthropometric Measurement Pre-Post Test Values

Anthropometric Measurements		Study Group (n= 10)				Control Group (n=5)				p	
		Pre-test		Post-test		Pre-test		Post-test		study	control
		x	sd	x	sd	x	sd	x	sd		
Height	(cm)	151,190	10,959	151,490	10,983	155,140	12,231	155,260	12,322	<0,001**	0,109
Body weight	(kg)	52,750	10,510	52,220	10,396	57,900	22,817	57,940	22,829	<0,001**	0,625
Body Mass Index	(kg/m ²)	28,080	7,874	27,050	7,772	28,180	12,198	28,200	12,172	<0,001**	0,621
Body Fat Percentage		23,052	3,898	22,735	3,881	23,444	7,090	23,426	7,078	<0,001**	0,595

*p<0,05; **p<0,01

Table 4. Analysis of Anthropometric Measurement Pre-Test and Post-Test Values of the Study and Control Groups

Anthropometric Measurements		Pretest (n=10)				Post-test (n=10)				p	
		Study Group		Control Group		Study Group		Control Group		Pre-test	Post-test
		x	sd	x	sd	x	sd	x	sd		
Height	(cm)	151,190	10,959	155,140	12,231	151,490	10,983	155,260	12,322	0,537	0,557
Body weight	(kg)	52,750	10,510	57,900	22,817	52,220	10,396	57,940	22,829	0,668	0,668
Body Mass Index	(kg/m ²)	28,080	7,874	28,180	12,198	27,050	7,772	28,200	12,172	0,985	0,826
Body Fat Percentage		23,052	3,898	23,444	7,090	22,735	3,881	23,426	7,078	0,951	0,951

*p<0,05; **p<0,01

While it was found that there was a significant difference between the pre- and post-test values for the Eurofit Special test parameters in the study group ($p<0.005$), there was no significant difference between the pre- and post-test values in the control group.

Table 5. Analysis of the Study Group Eurofit Special Test Pre-Post Test and Control Group Eurofit Test Pre-Post Test Values

Eurofit Special Test Parameters		StudyGroup (n = 10)				Control Group (n = 5)				p	
		Pre-test		Post-test		Pre-test		Post-test		study	control
		x	sd	x	sd	x	sd	x	sd		
Long Jump	(cm)	83,480	21,918	132,510	24,707	81,220	14,720	81,300	14,819	<0,001**	0,338
Throwing Medicine Ball.	(cm)	462,000	131,341	693,000	130,725	458,000	172,974	459,000	172,965	<0,001**	0,500
Sit-Up		15,000	5,312	28,400	6,293	15,000	4,183	14,800	4,382	<0,001**	1,000
Walking on Bench	(s)	21,299	2,149	16,427	3,006	20,546	1,570	20,552	1,576	<0,001**	0,305
Sit-Reach	(cm)	7,270	1,149	11,430	1,403	7,880	1,650	7,920	1,657	<0,001**	0,500
25 Meters Run	(s)	18,368	1,865	11,377	1,664	18,326	2,217	18,326	2,220	0,002**	1,000

*p<0,05; **p<0,01

While there was no statistically significant difference between the pre-test values of the Eurofit Special test measurements of the study and control groups, a statistically significant difference

was found in favor of the study group in all parameters in the post-test when two independent groups were compared ($p < 0.005$).

Table 6. Analysis of Eurofit Special Test Pre-Test and Post-Test Values of Study and Control Groups

Eurofit Special Test Parameters		Pre-test				Post-test				p	
		(n=10)		(n=5)		(n=10)		(n=5)			
		Study Group	Control Group	Pre-test	Post-test						
		<i>x</i>	<i>sd</i>	<i>x</i>	<i>sd</i>	<i>x</i>	<i>sd</i>	<i>x</i>	<i>sd</i>		
Long Jump	(cm)	83,480	21,918	81,220	14,720	132,510	24,707	81,300	14,819	0,854	<0,001**
Throwing Medicine B.	(cm)	462,000	131,341	458,000	172,974	693,000	130,725	459,000	172,965	0,668	0,043*
Sit-Up		15,000	5,312	15,000	4,183	28,400	6,293	14,800	4,382	1,000	0,003**
Walking on Bench	(s)	21,299	2,149	20,546	1,570	16,427	3,006	20,552	1,576	0,951	0,014*
Sit-Reach	(cm)	7,270	1,149	7,880	1,650	11,430	1,403	7,920	1,657	0,415	0,003**
25 Meters Run	(s)	18,368	1,865	18,326	2,217	11,377	1,664	18,326	2,220	0,951	<0,001**

* $p < 0,05$; ** $p < 0,01$

DISCUSSION

Physical education, which has an important place in the education of children, has also started to take an important place in the education of children with special needs. Adapted physical education and sport practices included in physical education classes have a positive effect on the anatomical, physiological, and psychological conditions of children with disabilities, as well as on their social adaptation (Koparan, 2003).

Increasing the mobility capacity of visually impaired individuals and reducing their obstacle perception problems play an important role in improving their quality of life (Arslantekin et al., 2016). This study aimed to improve the physical fitness of visually impaired people using the Eurofit Special Test Battery. The results showed that there was a significant difference between the pre- and post-test anthropometric measurements of the study group ($p < 0.001$). However, on the anthropometric post-test comparing the two groups, there was no significant difference between the groups. The short duration of the study may explain this. The significance in the pre-post tests of the anthropometric measurements of the experimental group can be associated with supporting the general developmental processes of the children through karate training ($p < 0.001$).

Considering the significance observed between the pre- and post-test values in the Eurofit Special test parameters of the study group, it can be said that karate training, even for a short period of time, has a positive effect on the physical fitness level of children. ($p < 0.005$). Considering the results of the research, there was no significant difference between the pre-test values of the Eurofit Special test measurements of the study group and the control group, whereas a positive significance level was observed in the long jump, sit-up, flexibility, and speed parameters in favor of the study group in the post-test measurements where the two groups were compared ($p < 0.005$).

In a 2019 study, Mohanty et al. applied yoga training to 41 visually impaired children aged 9–16 years for 16 weeks and examined the participants' muscle strength, flexibility, endurance, coordination, and respiratory parameters at the end of the training. At the end of the 16 weeks of yoga training, they found that the visually impaired group that received yoga training had a significant difference at the $p < 0.001$ level in all physical fitness parameters compared to the control group (Mohanty et al., 2019). In another study conducted by Top in 2007, 29 visually impaired and non-visually impaired children aged 10–12 years participated in a 14-week physical activity program. They found that the visually impaired participants in the study group had a significant

difference at the $p < 0.005$ level compared to the sighted children in terms of BMI, height, claw strength, shuttle, 20 m, and hanging arms with bent arms (Top, 2007).

In the 2006 study by Caliskan et al., the physical fitness characteristics, postural development, and anxiety levels of visually impaired girls and boys aged 10–14 years were assessed at the end of a 12-week goalball sport and

In 2022, Kurtoglu and Konar examined some physiological and motor characteristics of visually impaired students who participate in sports and those who do not in Turkey. It was found that there was a significant difference at the $p < 0.005$ level in the parameters of height, arms-bent hanging, shuttle running, claw strength, vertical jump, flamingo balance, flexibility, standing long jump, and shuttle parameters between visually impaired students who participated in the research and those who did sports (Kurtoglu et al., 2022).

A total of 17 students aged 12–14 participated in Yilmaz's study in 2011. The visually impaired students were given basic judo training for 2 months, and their physical fitness was measured using the Brockport test battery. Considering the post-test parameters of the study, they found a significant difference at the $p < 0.001$ level in the parameters of running-walking, shuttle, and reverse shuttle. As a result of the research, they found that two months of basic judo training had positive effects on the physical development of visually impaired students (Yilmaz, 2011).

In a study conducted in 2016, Kim et al. examined whether taekwondo training is effective in improving the balance performance of children with autism spectrum disorder, unlike visual impairment. As a result of their 8-week taekwondo training, they concluded that taekwondo training can improve balance performance in children with autism spectrum disorder (Kim et al., 2016).

In a study conducted by Ansari et al. in 2021, they examined the effect of karate and water exercises on the balance performance of children with autism spectrum disorder, a different type of disability. They concluded that balance performance improved as a result of the 10-week training process in both groups, but kata training, which is a sub-branch of karate, improved balance performance more (Ansari et al., 2021). As a result of the literature review, no other study was found that examined the effect of karate training on

exercise training program. In the post-test analysis of the participants, they found a statistically significant difference at the $p < 0.001$ level in the shuttle, vertical jump, and 20-meter sprint scores. As a result of the research, they observed that the physical fitness of the visually impaired children who received goalball and exercise training for 12 weeks improved (Çalışkan et al., 2006).

physical fitness parameters in visually impaired individuals by applying karate training to visually impaired individuals as in this study. Therefore, this study is original research.

Conclusion

The results of the study are in parallel with the data in the literature. In this study, a significant difference was found at the level of $p < 0.001$ in the pre-post comparison of the anthropometric measurements of the visually impaired in the study group and the group receiving karate training, at the level of $p < 0.005$ in all pre-post tests of the physical fitness parameters of the study group examined by Eurofit Special Test, and at the level of $p < 0.005$ in favour of the group receiving karate training in the post-tests in which the two groups were compared. As a result, it was concluded that short-term karate training had a positive effect on the physical fitness of visually impaired children aged 10–12 years.

Author Note

This research was presented as a summary paper at the 20th International Congress of Sports Sciences in Antalya from November 28 to December 1.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by the Gazi University and Human Research Ethics Committee of the (Approval Number: 2022/871).

Author Contributions

Study Design; CS-BY, Data Collection; CS-BY, Statistical Analysis; BY Data Interpretation; CS, Manuscript Preparation; CS-BY, Literature Search; CS-BY. Authors have read and agreed to the published version of the manuscript.

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