Influence of karate exercises on motor development in pre-school children

Dariusz Boguszewski¹, Małgorzata Socha²
¹Rehabilitation Department, Physiotherapy Division, Warsaw Medical University, Poland
²Section of Physical Culture Sciences, Students’ Scientific Circle of Physiotherapy, Warsaw Medical University, Poland

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Summary

Introduction. The goal of the study was to determine the effect of exercises with karate elements on physical fitness in pre-school children.

Material and methods. The sample comprised 88 children aged 4.5-6.5 years. The study group consisted of boys and girls practising karate (n=30). The comparative groups included children participating in prophylactic-corrective gymnastics classes (n=30) and physically inactive children who did not participate in any form of movement activity (n=28). The applied tests evaluated physical fitness (explosive strength of the upper limbs – medicine ball throw, power of the lower limbs – standing long jump, agility – shuttle run, endurance of the abdominal muscles – sit ups, elasticity – forward bend), adapted for pre-school children.

Results. The girls who practised karate obtained the best results in all tests. The biggest differences (p<0.01) were noted in strength/power of the upper and lower limbs and elasticity. Only no significant differences were noted in abdominal muscle endurance. Among the boys, karate practitioners obtained the best results in the tests assessing elasticity, power of the lower limbs and abdominal muscle endurance (although the differences in the last two parameters were insignificant). The biggest differences between the karate practitioners and physically inactive children were noted in the agility and flexibility tests.

Conclusions. Exercises with karate elements favourably affected motor development in pre-school children. Better results and bigger differences (between the studied groups) may indicate a lower interest in spontaneous motor activities among girls (especially these who did not attend any sport-recreational activities).

Introduction

In pre-school children, motor activity stimulates general development and is a necessary factor in every child’s life. Through motor activity performance, a child has an opportunity to participate in many forms of activity – their favourite plays involving movement. Additionally, motor activity shapes the child’s personality [1,2].

Karate is a martial art which excellently develops physical fitness and can be a form of physical education. Karate training guarantees the trainees a wealth of movements and complexity of the exercises performed. It favourably affects movement coordination and spatial orientation. Exercises with elements of karate are symmetric and use laterally alternant movements, stimulating the nervous system of the child’s developing body. Systematic participation in karate sessions enables comprehensive development of physical fitness. Most of the sport disciplines develop only some motor features and muscle groups. Karate develops endurance, strength, agility, motor coordination and elasticity of the entire body, increases the skeletal system endurance and movement precision and improves metabolism. Parallel development of all parts of the body, strengthening the abdominal and dorsal muscles and improving movement apparatus elasticity contributes to shaping a correct body posture in karate practitioners. The important elements of eastern martial arts include affecting the mental sphere and shaping character, control ability, precision, systematic work and self-discipline [2-5].

During karate sessions children have an opportunity to learn about their body and develop their strength and self-confidence. Exercising in pairs, the children learn how to cooperate with their peers, how to be loyal and reliable. Karate training can also relieve tension in, hyperexcitable, hyperactive or aggressive children [6].

The goal of this study was to investigate the effect of different forms of motor activity on physical fitness in pre-school children.

Material and methods

The sample comprised 88 children aged 4.5 – 6.5 years (43 girls and 45 boys). The children attending sport-recreational karate classes or prophylactic-corrective exercise sessions as well as the children not involved in any movement activity were studied. The study was carried out between October 2010 and January 2011.
The subjects were divided into three groups: I. the study group (n=30) including karate practitioners and two comparison groups – II. The children participating in corrective gymnastics classes (n=30) and III. (n=28) the children who did not participate in any movement activities. The children from Group 1 attended training sessions, on average for 6 months and the children from Group 2 attended their classes for about 18 months.

For the purpose of comparison, the subjects were further divided into subgroups based on their age (5 and 6 year old children) (Table 1).

Physical fitness of the subjects was diagnosed after obtaining the written consent from their parents. The modified versions of the European Physical Fitness Test [7,8], the International Physical Fitness Test [9] and Sekita Test [1,7] were used for the assessment. The motor fitness measurement comprised 4 tests:

- upper limb strength test – throwing a medicine ball (1 kg) forward from behind the head; standing on both legs, slightly straddled, three ball throws, test result: measurement with the accuracy of 0.5 cm;
- lower limb strength – long jump from the start line, landing on both feet maintaining a vertical position; the subject jumped three times; test result: measurement with the accuracy of 0.5 cm;
- agility – 4x5m shuttle run; the subject standing on the start line ran on the command to the post located at 5 m distance, then ran back to the start point and again to the post, then returned to the start line; test result: time measurement with the accuracy 0.1 second.

Results

The best results of the upper limb strength test were obtained by the girls participating in karate classes (on average 235.1 cm). The differences between the results obtained from Group I and the remaining groups were statistically significant (Group II – p=0.014, Group III – p=0.009). The boys were slightly better at throwing the medicine ball. The results obtained from all the three groups were similar (Fig. 1).

In the subgroup of five year old girls, the best mean value of explosive upper limb power (throwing 1 kg medicine ball) was obtained from the children participating in gymnastics classes (on average 213 cm). The lowest values were obtained from the physically inactive girls (169 cm). In the group of six year old girls, the best results were also obtained from the girls participating in gymnastics classes and the worst ones – from physically inactive girls. The differences between the active groups (except the dancing group) and the inactive one were approaching statistic significance. Physically inactive five year old boys obtained the best results in medicine ball...
throw (243 cm). Slightly worse, similar results were obtained in this category by karate practitioners and the boys participating in gymnastics classes. In the group of six-year-old children, the best results were also obtained from karate practitioners (262 cm) and the worst – from the boys participating in gymnastics classes (219 cm). The differences were statistically insignificant.

In the lower limb power test, the best results were obtained from the karate practitioners. Significant differences, however, were noted between the results of Group I and the results of Groups II and III (p=0.000 and p=0.001) – only in the girls. The results of physically active girls and boys were similar while in inactive children they significantly differed (p=0.007) (Fig. 2).

In the age subgroups, among five-year-old girls, the highest values for long jump were noted in the subjects participating in gymnastics classes (on average 104 cm). Slightly lower values were obtained from the karate practitioners, and the lowest ones – from physically inactive girls whose jumps were on average 37 cm shorter than those of the girls participating in gymnastics classes.

In the group of six-year-old girls, these participating in gymnastics classes also obtained the best results in jumping while physically inactive girls obtained the lowest values.

Among the five-year-old boys, the differences in the results between the active and inactive groups turned out statistically significant (p=0.000) while in six-year-olds such sig-
The development of science and technology is connected with the occurrence of phenomena adversely affecting the human organism. They involve reduction of motor activity in favour of sedentary lifestyle, negatively affecting child’s physical development. According to some researchers, children rest in a seated position for about three hours every day and spend about an hour daily in the same position during meals [10,11]. For normal development, a child needs adequately prepared meals, spending a proper amount of time outdoors, adequate amounts of sleep and movement [10]. According to experts, physical activity of children and youth involves an hour of exercise of moderate or high intensity every day. In turn, the minimal level of motor activity is defined as everyday exercise performed for at least half an hour [12]. In the case of children, the time of exercise should amount on average to five hours daily [11].

Systematic motor activity results in multiple favourable changes occurring in the human body. These include the features which one can notice at first glance: normal, slim silhouette, correct gait, better musculature and better well being, and favourable changes occurring in some body systems [11,13]. Apart from the above mentioned advantages, we should also mention the favourable effect of motor activity on body mass control and in obesity prophylaxis [10-14].

Motor activity supports child’s development on the social and didactic basis. It helps with choices, shapes strong will, prepares for competition and group work, develops reflex, intelligence and positive attitudes and reduces stress level [11,14].

Conclusions

1. The study results show a favourable effect of physical activity on motor fitness in children. In most of the fitness tests, physically active children obtained better results than their physically inactive peers.

2. The level of physical activity slightly differed in the children involved in different forms of physical activity. In most of the tests, the children practising karate obtained the best results. Bigger differences were noted in girls who obtained the best results in all the tests. This is indicative not only of the effectiveness of karate in fitness development, but also of the unwillingness of most of the girls (especially these not uninvolved in additional sports-recreational activities) to perform spontaneous motor activities.

3. The analysis of this study results indicates that the children’s age determines their level of physical fitness. The fitness parameters were higher in six year old children than in their five year old counterparts. Bigger differences were noted in physically active children, which may indicate acceleration of their motor development.

References

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Address for correspondence:
Dariusz Boguszewski
Rehabilitation Unit, Medical University of Warsaw
Solec str. 57, 00-424 Warsaw, Poland
phone: +48 (22) 629-46-65, e-mail: dboguszewski@wum.edu.pl

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