Investigation of the physical development and the preparedness of children aged 8-12 years old who are going in for sambo

Investigação do desenvolvimento físico e do prontidão de crianças de 8 a 12 anos que vão entrar no sambo

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Abstract
The investigation is devoted to the analysis of the influence of sambo training on the physical development and physical preparedness of 8-12 years old children. The aim of the investigation. To study the physical development and physical preparedness of 8-12 years old children. The material and the method of the research. The object of the study was 100 children aged from 8 to 12 years old training in sambo at the sports club "Alga" in Karakol city and the sports club "Dinamo" in Bishkek city. 20 children from each age threshold were the object of the study. Applied methods: anthropometry, Quetelet, and Erisman indices, as well as physical preparedness tests, such as 30-meter run, dynamometry method, and forward bending test from a sitting position. Results of the research. The physical development indices

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of children aged 8-12 years engaged in sambo were increasing as they grew older. When assessing the physical development of children using the Quetelet and Erisman indices, the indicators were defined as "normal". In terms of physical preparedness of children 8-12 years old: growth and development of such qualities as speed, strength, and flexibility were observed as they grew older. When comparing the indicators of rapidness with the normative values, they were given a rating of "satisfactory".

Keywords: Sambo. Athlete. 8-12 Years Old Children. Physical Development. Physical Preparedness.

Introduction

Physical development and physical preparedness play a key role in shaping the health and full development of children. Modern lifestyle is characterized by a preoccupation with
digital devices, which leads to a decrease in physical activity among children and adolescents. This alarming trend may be accompanied by potential threats to the health of the future generation.

Among the numerous sports disciplines that contribute to the physical development of children, a special place is occupied by sambo, a unique type of martial art that combines elements of wrestling, judo, and other martial arts. Participation in sambo training enables the harmonious development of all muscle groups, coordination of movements, and other physical qualities.

According to Lymar and Abushkevich (2008) "physical development is a regular process of alteration of morphological and functional characteristics of the organism, closely related to age, gender, health, hereditary factors and conditions of life".

In the view of (Shchedrina, 1989; Ananyeva & Yampolskaya, 1993) physical development is one of the leading indicators of the state of health of children and adolescents, which is characterized by different rates, formation of definitive body dimensions, adaptation reserves of the child's organism.

A literature review was conducted based on the analytical description. Despite the wide range of studies related to physical development and preparedness (Bakhrakh, 1991; Korobko, 2002; Kydyrova, 2002; Abdyrakhmanova, 2005; Sabralieva, 2007; Litovchenko & Ishbulatova, 2015; Parshin, 2020) this topic has not lost its relevance to the present day. The study of physical development and physical preparedness of children engaged in sambo is important with regard to sports practice, as it helps to solve such issues as determining the impact of the volume and intensity of training on the organism of children, as well as helps to involve children in sports and to have them choose the type of sport.

**The aim of the research:** To study the physical development and physical preparedness of children 8-12 years old.

### 1.1 Organization of the Research and Applied Methods

The object of the study has become 100 children aged from 8 to 12 years old training in sambo at the sports club "Alga" in Karakol city and the sports club "Dinamo" in Bishkek city. Within the study, in each age category 20 children engaged in sambo have been involved.

**Methods used:** anthropometry (height, weight, and chest circumference were measured), method of indices (Quetelet, Erisman), tests determining physical preparedness:
running for 30-meters, dynamometry, forward bending from a sitting position, as well as mathematical and statistical method has been applied.

**Outcomes of the study:** Physical development is one of the criteria of human health and a demographic indicator of the nation's health (Baranov & Scheplyagina, 2005; Veltischev, 2000).

Body growth is considered the most stable and informative indicator of physical development, as it more fully reflects the complex morphophysiological processes occurring in the body. In addition, among all other morphological features of a person, this indicator is determined by heredity (Sabralieva et al., 2016).

From the results of the study, we can see an increase in the height of 8-12-year-old children engaged in sambo as they grow older (Figure 1).

![Figure 1. Height indices of the children aged 8-12 years who going in for Sambo](image)

Source: Author

If 8-year-old sambists have a height of 127.4 ± 1.8 cm and 12-year-old sambists' height increases to 146.0 ± 1.7 cm, this is confirmed by Figure 1. The 9-year-old sambists are 5.4 cm taller than the 8-year-old sambists, and the 10-year-old sambists are 2.4 cm taller than the 11-year-old sambists, and the 12-year-old sambists are 2.8 cm taller than the 11-year-old sambists. The greatest increase in height is seen at age 9 because this is due to the ongoing challenging period of their growth and development. According to Sabralieva et al. (2016),
"the transition from one age period to another is a complicated stage of development, during which the body moves from one qualitative state to another, a subsequent state in which gender control begins to strengthen.

On the basis of the indicators obtained from the study, it is possible to observe an increase in body weight of 8-12 years old children engaged in sambo as they are becoming older. This can be viewed in Figure 2.

![Figure 2: Weight indices of children 8-12 years old engaged in Sambo](source: Author)

9-year-old sambists weighed 5.2 kg more than 8-year-olds, while 11-year-olds weighed 1.9 kg more than 10-year-olds, and 12-year-olds weighed 2.8 kg more than 11-year-olds. For children who were engaged in sambo from 8 to 12 years of age, the weight indicators increased to 14.6kg. hest circumference is considered one of the most important indicators of torso growth (Figure 3).
According to the results of the study, in child athletes practicing sambo, the resting chest size increased from 61.6±0.8 cm at the age of 8 years to 72.3±0.9 cm at the age of 12 years. The largest jump in this index was observed at the age of 9 years - 4.3 cm. The highest chest volume during inhalation was found to be 77.90±0.70 cm in 12-year-olds and the lowest was found to be 66.3±0.07 cm in 8-year-olds. It was found that the chest volume index during inhalation was 69.9±2.10 cm in 9-year-old sambo wrestlers, while in 10 years olds-3±0.90 cm and 11 years olds-77.5±2.20 cm. During exhalation, the chest volume index was found to be 58.30±0.82 cm at the age of 8 years and 70.03±1.28 cm at the age of 12 years with a difference of 11.73 cm.

When height and weight indices were determined by the Quetelet index in 8-12-year-old children engaged in sambo, there was an increase with age from 207 g/cm to 280 g/cm, which is the "norm" for all ages, as evidenced by Grid 1.
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<table>
<thead>
<tr>
<th>Age</th>
<th>Indices</th>
<th>Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 years</td>
<td>207 g/cm</td>
<td>200-240 g/cm</td>
</tr>
<tr>
<td>9 years</td>
<td>238 g/cm</td>
<td>220-260 g/cm</td>
</tr>
<tr>
<td>10 years</td>
<td>254 g/cm</td>
<td>240-280 g/cm</td>
</tr>
<tr>
<td>11 years</td>
<td>264 g/cm</td>
<td>260-300 g/cm</td>
</tr>
<tr>
<td>12 years</td>
<td>280 g/cm</td>
<td>280-320 g/cm</td>
</tr>
</tbody>
</table>

Grid 1. The indices of the Quetelet index of children aged 8-12 years old involved in Sambo
Source: Author

In children aged 8-12 years who practiced sambo, the Erisman index increased from 0.96 cm to 0.99 cm as they grew older. On the basis of the study, when comparing the obtained indices, it was confirmed that the indices correspond to the "norm", which is presented in Grid 2.

<table>
<thead>
<tr>
<th>Age</th>
<th>Indices</th>
<th>Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 years</td>
<td>0.96</td>
<td>1-3</td>
</tr>
<tr>
<td>9 years</td>
<td>0.99</td>
<td>1-3</td>
</tr>
<tr>
<td>10 years</td>
<td>0.98</td>
<td>1-3</td>
</tr>
<tr>
<td>11 years</td>
<td>0.99</td>
<td>1-3</td>
</tr>
<tr>
<td>12 years</td>
<td>0.99</td>
<td>1-3</td>
</tr>
</tbody>
</table>

Grid 2. The indices of the Erisman index of children aged 8-12 years old engaged in Sambo
Source: Author

"Physical preparedness is an important indicator of human health, a close relationship between which scientists have observed for a long time. The purpose of monitoring physical preparedness is to obtain information necessary to improve the management of the process of physical education and thus improve its quality. Among the main conditioned physical qualities, according to which monitoring was carried out, it is possible to include speed, endurance, and strength" (Yurechko, 2012).
The speed indices obtained from our study in 8-12 years old children engaged in sambo are presented in Grid 3. As a test for the speed qualities of children engaged in sambo, a race of children for 30 m was taken. In 8-year-olds, the values were 7.4±0.12 m/s, and in 12-year-olds they decreased to 6.3±0.8 m/s. As the children grew older, the speed indicators increased. In comparing the performance of children engaged in sambo with the norms, according to the assessment Mamytov et al. (2015), a rating of "satisfactory" was given.

<table>
<thead>
<tr>
<th>Age</th>
<th>8 years</th>
<th>9 years</th>
<th>10 years</th>
<th>11 years</th>
<th>12 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-metre race</td>
<td>7.4±0.12</td>
<td>7.1±0.10</td>
<td>6.8±0.1</td>
<td>6.6±0.2</td>
<td>6.3±0.8</td>
</tr>
<tr>
<td>m/s</td>
<td>σ = 0.4</td>
<td>σ = 0.3</td>
<td>σ = 0.4</td>
<td>σ = 0.3</td>
<td>σ = 0.2</td>
</tr>
</tbody>
</table>

Grid 3. The speed indices of 8-12 years old children who go in for Sambo
Source: Author

While determining the quality of flexibility in 8-12 years old children engaged in sambo, we came to the following conclusion: at 8 years old the flexibility indices were 10.01±0.1 cm, at 9 years old 10.9±1.5 cm. When comparing the flexibility indices between the two age intervals, the difference was 0.9 cm. In addition, the flexibility indices in 10-year-old children corresponded to 12.1±1.3 cm and in 11-year-old children to 12.6±1.2 cm. The difference between the two ages was 0.5 cm (Fig.4).

![Figure 4: Flexibility indices of children 8-12 years old engaged in sambo.](image)
Source: Author

Between the ages of 8 and 12 years, the development of flexibility occurred as the children grew older, with higher deflection and a 3.5 cm increase in the index.
The indices of strength qualities of athletes 8-12 years old engaged in sambo, obtained on the basis of the study, are presented in Figure 5.

![Figure 5. Indices of strength qualities of children 8-12 years old engaged in sambo.](image)

Source: Author

In 8-year-old children practicing sambo, the right arm strength index was 13.1±1.1 kg, and the left arm strength was 13.3±0.7 kg. The difference between right and left arm strength was 0.2 kg, and it was observed that the left wrist strength was slightly higher. In 9-year-olds, the right arm index was equal to 14.5±0.7 kg and the left arm index was equal to 14.2±0.8 kg, thus having a slight difference between the two arms of 0.3 kg. The difference between the right and left hand in 10-year-olds was 0.8 kg. Children aged 11 years had higher left arm indices than right arm's, with left arm strength equal to 20.6±1.4 kg and right arm indices equal to 19.9±1.5 kg, revealing a difference between them of 0.7 kg. In 12-year-old children engaged in sambo, right arm strength was 22.7±0.8 kg and left arm strength 21.1±0.7 kg, revealing a difference between them of 0.6 kg.

The study found that 8- and 11-year-olds who engaged in sambo had slightly greater left wrist strength compared to other age groups. The studies of Grigoriev and Stafeev (2016) also confirm that the training of sambo elements positively influenced the level of physical preparedness and the formation of technical techniques of sambo wrestling. In a comparative analysis with the literature data of Sabralieva (2007) of children who are not engaged in physical training, our indicators, both in physical development and physical preparedness, are slightly ahead.
Thus, the obtained results allow us to conclude that sambo training had a positive effect on the level of physical development and physical preparedness of 8-12 years old children, hence the following conclusions can be drawn.

**Conclusion**

1. The indicators of physical development of 8-12 years old children engaged in sambo grow with age. On the basis of the study, it was confirmed that physical development is rated as "normal" according to the Quetelet and Erisman indices.

2. In children 8-12 years old who practiced sambo, the development of flexibility, speed, and strength qualities was observed as the children grew older, and speed indicators were assessed as "satisfactory" in comparison with the norms.

The obtained results can be used by coaches of children's and youth sports schools in planning training sessions.

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