Analysis of the initial physical and functional fitness indicators of 10-12-year-old table tennis players during the preliminary training period

https://doi.org/10.65149/eajss.2026.v6i6.a007

[1]Ilyosova Maftunakhon Soyibjon kizi
[1]Uzbekistan state university of physical education and sport, Chirchik, Uzbekistan

Abstract
The article analyzes the results of preliminary pedagogical testing conducted to determine the physical fitness level of young table tennis players aged 10-12 during the initial training period. A total of 150 young athletes participated in the study, divided into age groups of 10, 11, and 12. Within each age category, they were further separated into experimental (n=25) and control (n=25) groups. The athletes' speed, agility, strength, endurance, and flexibility were assessed through a 3x10-meter shuttle run, 30- and 60-meter sprints, forward bend, throwing a sports implement, sit-ups, and rope skipping tests. No statistically significant difference was found between the experimental and control groups in any age category ($P>0.05$). The coefficient of variation was $V\approx16$-19%, confirming the homogeneity of the sample. The results indicated that the initial conditions for both groups were equal at the start of the experiment, which allows for an objective evaluation of the effectiveness of the methodology to be applied in the next stage.

Keywords: table tennis, preliminary training period, 10-12-year-old athletes, pedagogical test, speed, agility, flexibility, experimental and control group.

Introduction

Today, achieving high athletic results in table tennis requires not only an athlete's technical skill but also the systematic development of their physical and functional fitness from an early age. The period of 10–12 years is a particularly crucial stage when young athletes actively develop physical qualities such as motor coordination, speed, agility, flexibility, strength, and endurance. Therefore, a critical scientific and practical task during the initial training period is the regular assessment of young table tennis players' physical and functional capabilities and the determination of training loads based on their individual characteristics.

The uniqueness of table tennis lies in its demand for rapid movements in a short period, a high level of coordination, quick reaction time, balance, and the ability to perform repetitive actions. The degree to which these qualities are developed directly influences a young athlete's effective mastery of technical movements, adaptation to training loads, and ability to show consistent results in competitive activities. In this respect, determining the initial state of physical and functional fitness at the initial training stage serves as an important diagnostic foundation for organizing the subsequent training process on a scientific basis.

Furthermore, in organizing pedagogical experiments, it is particularly important to establish the baseline indicators for the experimental and control groups. Statistically evaluating the physical and functional state of the groups before the experiment makes it possible to identify differences in their initial level of preparedness, ensure the reliability of the research findings, and justify that the changes observed at the end of the experiment are due to the effectiveness of the applied pedagogical intervention.

Therefore, a comprehensive assessment of the initial physical and functional fitness indicators of young table tennis players aged 10–12, a comparative statistical analysis of the obtained results across groups, and the determination of their initial preparedness level are essential for improving the training methodology for young table tennis players.

The aim of the study is to determine the baseline physical fitness indicators of young table tennis players aged 10-12 during their initial training period and to statistically substantiate the equivalence of the baseline conditions of the experimental and control groups.

Objectives: to assess the qualities of speed, agility, strength, endurance, and flexibility across age groups (10, 11, and 12 years) through pedagogical tests; to conduct a comparative statistical analysis of the results of the experimental (EG) and control (CG) groups; and to determine the statistical significance (t, P) of the observed differences.

Object of the Study A total of 150 young table tennis players aged 10, 11, and 12. The subject of the study is the physical fitness indicators of these players during their initial training period and a comparative analysis of their dynamics across different groups.

Methods

The study employed the following methods: pedagogical testing (3x10 m shuttle run for agility; 30 m run for speed; 60 m run for speed endurance; forward bend from a gymnastics bench for flexibility; throwing a 150 g sports implement for strength; sit-ups for general physical fitness; rope skipping for coordination and endurance), pedagogical observation, and mathematical statistics (arithmetic mean, standard deviation σ, coefficient of variation V%, Student's t-test, and confidence level P). A total of 150 athletes aged 10, 11, and 12 were involved in the study. For each age category, an experimental group (EG) of 25 athletes and a control group (CG) of 25 athletes were formed.

Results and discussion

The results of the initial pedagogical testing, conducted with young table tennis players aged 10–12, showed no significant difference in the physical fitness levels between the experimental and control groups. In analyzing the obtained results, the athletes' ages, the focus of the tests, and the average indicators for the experimental and control groups were taken into account. The results identified at this stage serve as an important criterion characterizing the baseline level of preparation for the subsequent pedagogical experiment.

In the 3×10 meter shuttle run test, the results for 10-year-old athletes were 9.79±... seconds in the experimental group and 9.58±... seconds in the control group. Although the control group's result was slightly better than the experimental group's, this difference was found to be statistically insignificant (t=0.45; P>0.6). Therefore, the 0.21-second difference between the groups does not indicate a practically significant difference in the athletes' agility and ability to change direction quickly. The specificity of this test lies in its requirement for acceleration, stopping, restarting, and changing the direction of movement over a short distance. These aspects are directly related to the footwork in table tennis and the ability to quickly assume a favorable position for a shot.

A similar situation was observed in the 30 -meter dash test. The average result in the experimental group was 6.85 seconds, while in the control group, it was 6.94 seconds. The difference between the groups was only 0.09 seconds, and statistical analysis yielded values of t=0.25 and P>0.8. This result indicates that the short-distance running and acceleration capabilities of the 10-year-old athletes in the experimental and control groups were nearly identical. Furthermore, the slightly better result in the experimental group is within the range of random individual differences and cannot be considered a real advantage between the groups.

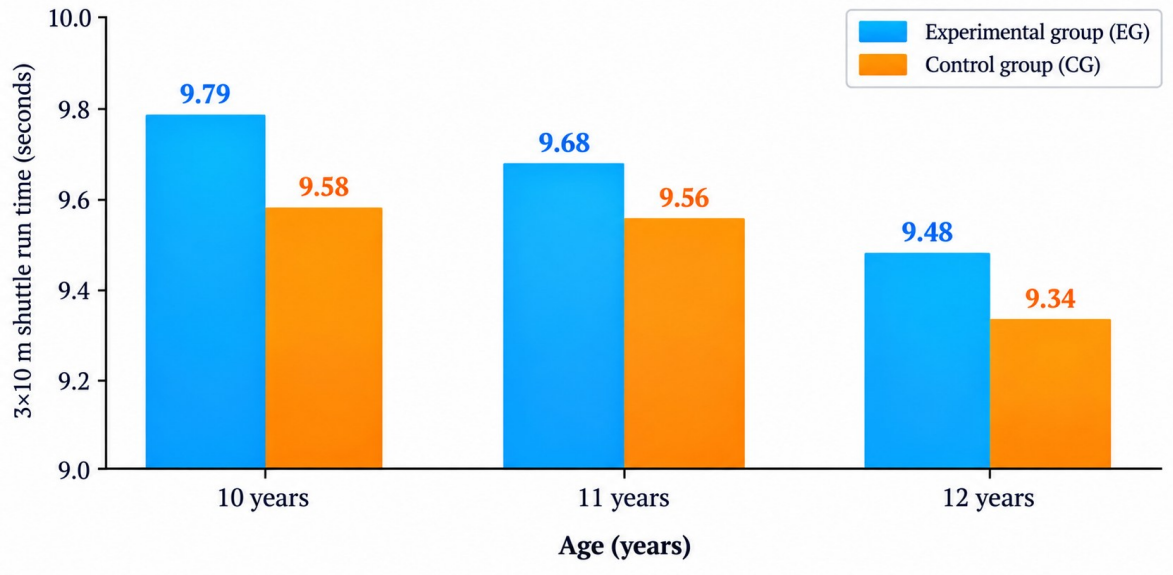
The results of the 11-year-old athletes also confirmed the close initial preparation levels between the groups. In the 3x10-meter shuttle run test, the experimental group recorded a time of 9.68 seconds, and the control group recorded 9.56 seconds. The difference between the groups was 0.12 seconds, which is statistically insignificant at the P>0.05 level. This indicator shows that the baseline status of the 11-year-old athletes regarding their abilities for rapid movement, turning, and re-acceleration was almost the same.

In the 30-meter run results of 11-year-old athletes, the experimental group recorded 5.89 seconds and the control group recorded 5.94 seconds. The difference of 0.05 seconds, with a P>0.05 value, indicates that there is no statistically significant difference between the groups. This suggests that the short-distance speed running ability was developed almost identically in both groups. At the same time, the improvement in 30-meter run results from age 10 to 11 can be explained by the natural physical development and the enhancement of motor skills in young athletes. Among 12-year-old athletes, the results for the 3×10 meter shuttle run were 9.48

Table 1. Initial test indicators for the experimental (EG) and control (CG) groups of 10–12-year-old athletes

Age	Test	EG, average	CG, average	t	P
10 years	3×10 m shuttle run, s	9.79	9.58	0.45	>0.6
10 years	30 m run, s	6.85	6.94	0.25	>0.8
11 years	3×10 m shuttle run, s	9.68	9.56	—	>0.05
11 years old	30 m run, s	5.89	5.94	—	>0.05
12 years old	3×10 m shuttle run, s	9.48	9.34	—	>0.05

Fig 1. Initial 3×10 m shuttle run performance of the experimental (EG) and control (CG) groups among young athletes (P > 0.05).



seconds in the experimental group and 9.34 seconds in the control group. The 0.14-second difference between the groups is not statistically significant (P>0.05). The results indicate that the baseline agility levels of the experimental and control groups were also similar at age 12. The improvement in the average results of this test with age may be attributed to the athletes' natural biological development, increased motor experience, and the formation of initial sports training.

As the table data indicates, the differences between the experimental and control groups were statistically insignificant across all age categories. In particular, for the 10-year-old athletes, the recorded values of P>0.6 for the 3×10-meter shuttle run and P>0.8 for the 30-meter run show that the initial difference between the groups was very small. The observation of P>0.05 values in 11- and 12-year-old athletes also confirms that the existing differences did not reach the level of statistical significance.

It is advisable to evaluate these results not only in the context of individual tests but also from the perspective of age-related dynamics. In the 3×10-meter shuttle run, the experimental group's time of 9.79 seconds at age 10 improved to 9.68 seconds at age 11, and to 9.48 seconds at age 12. In the control group, results of 9.58, 9.56, and 9.34 seconds were recorded, respectively. Thus, a positive trend in agility and rapid movement ability was observed in both groups with increasing age. However, these changes are not significant enough to disrupt the initial parity between the experimental and control groups.

The 30-meter dash results also indicate that the speed capabilities of the young athletes are developing. At age 10, a result of 6.85 seconds was recorded in the experimental group and 6.94 seconds in the control group, while at age 11, these figures were 5.89 and 5.94 seconds, respectively. These data show that the ability to run short distances improves with age. At the same time, biological maturation, anthropometric characteristics, and individual rates of development should also be considered when interpreting these results.

An important aspect of the initial test results is that some indicators in the experimental group were higher than in the control group, while in others, the results of the control group were better. For instance, in the 3x10-meter shuttle run test for 10-year-old athletes, the control group was ahead by 0.21 seconds, whereas in the 30-meter dash, the experimental group showed a better result by 0.09 seconds. At age 11, the control group also had a slight advantage in the 3x10-meter shuttle run, while the experimental group was slightly superior in the 30-meter dash. Such minor, opposing differences suggest that there is no systemic disparity in the overall level of preparedness between the groups.

The results of the statistical analysis also support this conclusion. The recorded P>0.05 values across all main tests indicate that there is

no statistically significant difference between the experimental and control groups. Furthermore, the coefficients of variation being within the range of approximately 16–19% show that the results have a moderate degree of dispersion. This suggests that the physical fitness indicators of the athletes in the sample do not differ too drastically and that the groups were formed with a relatively homogeneous composition.

From this perspective, the results of the initial testing are a crucial factor in ensuring the methodologically sound organization of the pedagogical experiment. The absence of a significant difference between the groups before the experiment begins increases the likelihood of attributing any subsequently identified changes to the applied training methodology. If, at the conclusion of the experiment, the performance of the experimental group improves to a statistically significant degree compared to the control group, a sufficient methodological basis will exist to explain this difference by the effect of the pedagogical intervention applied during the experiment, rather than by disparities in initial fitness levels.

Given the specific demands of table tennis, evaluating initial preparedness solely through running tests is insufficient. In this sport, skills such as reacting swiftly to an opponent's shot, accelerating over short distances, maintaining a stable body position, changing direction sharply, preserving balance, and assuming an optimal position to strike are critically important. Therefore, in addition to agility and speed, a comprehensive approach must include the assessment of flexibility, strength, coordination, and the body's overall functional capabilities.

Flexibility is particularly important for young table tennis players, as sufficient mobility in the upper and lower body allows an athlete to maintain optimal posture during a stroke and effectively control their range of motion. Strength conditioning, meanwhile, is linked to the support and movement functions of the legs, torso stability, and the efficient transfer of power during a strike. For this reason, it is advisable in subsequent analyses to consider the results of flexibility and strength tests separately, comparing the baseline data from the experimental and control groups.

Overall, the preliminary testing results indicated that the experimental and control groups of 10–12-year-old table tennis players were at a relatively similar baseline in terms of their physical fitness levels. In tests measuring speed and agility, the differences between the groups were minor and did not reach a statistically significant level. This provides the necessary methodological basis for an objective assessment of the effectiveness of the special training methodology to be applied in the next stage of the pedagogical experiment.

Furthermore, the data obtained indicate the need for the comprehensive development of physical qualities in young table tennis players during their initial training period. Specifically, the harmonious development of speed, agility, coordination, flexibility, and strength creates an important foundation for an athlete's subsequent technical and tactical training. Therefore, a primary focus of the research should be the consistent application of an exercise system aimed at developing these physical qualities in the next experimental stage, as well as the statistical evaluation of its effectiveness based on preliminary and final results.

The results of the preliminary pedagogical testing showed that there were no statistically significant differences ($P>0.05$) between the experimental and control groups in the main indicators characterizing the physical fitness level of young table tennis players aged 10–12. This confirms that the fitness levels of the athletes involved in the study were relatively uniform before the experiment began.

Among 10-year-old athletes, the results for the 3×10 m shuttle run were 9.79 s in the experimental group and 9.58 s in the control group ($t=0.45$; $P>0.6$), while in the 30 m run, they were 6.85 s and 6.94 s, respectively ($t=0.25$; $P>0.8$). 11-year-old athletes recorded results of 9.68 s and 9.56 s in the 3×10 m shuttle run, and 5.89 s and 5.94 s in the 30 m run. For 12-year-old athletes, the 3×10 m shuttle run results were 9.48 s and 9.34 s, respectively. The minor discrepancies between these indicators did not reach the level of statistical significance, indicating that there was no systemic difference between the initial physical fitness of the groups.

When the results were analyzed from the perspective of age-related dynamics, a trend of improvement in the 3x10 m shuttle run performance was observed in the 10-to-12-year-old age group. This indicates the natural development of speed, agility, the ability to change direction quickly, and motor coordination in young athletes. At the same time, the similarity of the results in the experimental and control

groups suggests that this developmental dynamic occurred under similar conditions for both groups.

The results of the statistical analysis showed that a coefficient of variation between approximately 16% and 19% indicated a moderate degree of dispersion in the test results, while individual differences within the groups were within normal limits. The determination of $P>0.05$ values for all key indicators provided a statistical basis for concluding that the differences between the experimental and control groups were random in nature.

Thus, the results of the initial testing confirmed that the experimental and control groups were methodologically comparable in terms of their baseline physical fitness. This comparability is a crucial methodological prerequisite for objectively evaluating the effectiveness of the circuit training-based methodology to be applied in the next experimental stage. It allows any positive changes observed at the end of the experiment to be attributed to the impact of the applied training methodology, rather than to initial differences between the groups.

Overall, the initial findings indicate the need for the comprehensive development of strength, endurance, flexibility, and coordination abilities, in addition to speed and agility, in the training process of 10-12-year-old table tennis players. The harmonious development of these physical qualities is one of the necessary conditions for young athletes to effectively master technical skills, move quickly and precisely around the table, and prepare thoroughly for subsequent stages of their athletic development.

References

Mannonova, S. S. (2024). O‘quv mashg‘ulot guruhidagi uch hatlab sakrovchilarning jismoniy rivojlanganlik darajasini o‘rganish. *Fan-Sportga*, (6), 70–73.

Mannonova, S. S. (2026). O‘quv-mashg‘ulot guruhidagi uch hatlab sakrovchilarning yillik tayyorgarlik mashg‘ulotlarini takomillashtirish uslubiyati. *Fan-Sportga*, (3), 10–14.

Korobeinikova, L., Akramov, J., Matkarimov, R., Korobeynikov, G., Mambetnazarov, I., Ulizko, V., ... & Aliyev, I. (2025). Gender features of psychophysiological state in handball players. *Health, sport, rehabilitation*, *11*(4), 6-16.

Shopulatov, A. N. (2021). Problems of training qualified personnel for the sphere of physical culture and sports. *Eurasian Journal of Sport Science*, *1*(2), 234.

AUTHOR BIOGRAPHY:



Maftunakhon Soyibjon kizi ILYOSOVA

Employment
Student of PhD at Uzbekistan state university of physical education and sports

Degree
MD

Research interests
Table tennis, young athletes, physical education and sport, Theory of physical education, Analyzing of sport competitions

E-mail:
maftuna1444@icloud.com