The effectiveness of the circuit training methodology in developing the physical qualities of young table tennis players during the initial training stage

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Abstract
The article analyzes the results of a questionnaire survey conducted among 36 coaches to examine the current state of physical fitness development in young table tennis players during the initial stage of training. According to the results, 94.4% of the coaches rated physical preparation as highly important, 86.1% functional preparation, 83.3% technical and tactical preparation, and 77.7% psychological preparation. A set of special exercises based on circuit training was also rated highly by 94.4% of the coaches. The findings of the study demonstrate the necessity of reinforcing scientific and methodological approaches to improve the training process of young athletes.
Keywords: table tennis, initial training, young athletes, coaches, physical qualities, circuit training, expert evaluation.

Introduction

The effective organization of the training process for young table tennis players during the initial preparation stage is one of the pressing issues in modern sports pedagogy. At this stage, developing physical qualities—specifically speed, agility, flexibility, strength, and coordination abilities—while taking into account the age and individual characteristics of athletes serves as a crucial factor for achieving high performance in their future sports careers. Therefore, it is of great importance to organize the initial training process on a scientific basis, analyze methodological approaches applied in practice, identify existing problems, and improve them.

The long-term practical experience, knowledge, and pedagogical observations of coaches serve as one of the key sources reflecting the actual state of young athletes' training. Scientifically studying their insights enables the evaluation of the practical effectiveness of methodological approaches applied in developing physical qualities, the identification of existing shortcomings, and the determination of priority areas for enhancing the training process. In particular, utilizing effective training methods such as circuit training during the initial preparation stage provides a significant opportunity for the comprehensive development of young table tennis players' physical fitness.

From this perspective, identifying the current state of physical qualities development in young table tennis players by examining coaches' professional experience and practical perspectives, establishing effective methodological approaches, and developing scientific and practical recommendations for improving future training processes define the relevance of this research.

The purpose of the study is to assess the current state of the process of developing physical qualities in young table tennis players during the initial preparation stage based on the professional experience and insights of coaches, and to develop scientific and practical recommendations for improving the training process.

Based on the research objective, the following **tasks** have been defined:

identifying coaches' opinions through a questionnaire regarding training load volume and intensity, the use of circuit training methodology, the organization of recovery processes, consideration of age-specific characteristics, and the pedagogical control system;

statistically analyzing the obtained data and formulating scientific and practical conclusions based on them.

The object of the study was table tennis coaches working with initial training groups.

The subject of the study is the professional opinions, practical experience, and assessments of coaches regarding the methodology of developing the physical qualities of young table tennis players.

Results and discussion

During the research, methods of scientific and methodological literature analysis, a questionnaire survey (sociological method), pedagogical observation, and mathematical statistics were used. The questionnaire consisted of 15 questions, in which a total of 36 table tennis

coaches participated. For each question, respondents were offered four answer options: "high impact," "moderate impact," "low impact," and "no impact."

Based on the practical experience and professional insights of coaches, the survey results provided a clear understanding of the current state of the training process for young table tennis players at the initial preparation stage. The main indicators of the obtained results are presented in Table 1.

An analysis of the data in the table revealed that the majority of coaches considered physical preparation an important factor in the development of young athletes. In particular, 34 coaches (94.4%) noted that physical preparation has a high level of impact. This finding indicates the necessity of paying special attention to the development of physical qualities during the initial stage of training.

In addition, 31 coaches (86.1%) rated functional preparation, 30 coaches (83.3%) rated technical and tactical preparation, and 28 coaches (77.7%) rated psychological preparation as highly important. These figures demonstrate the importance of harmoniously integrating physical, functional, technical-tactical, and psychological aspects in the process of training young table tennis players.

One of the particularly noteworthy results of the survey was related to assessing the impact of a set of special exercises based on the circuit training method on physical fitness and the development of physical qualities. In response to this question, 34 coaches (94.4%) answered that it "has a high impact." Furthermore, not a single respondent rated the impact of this methodology as "low" or "no impact."

This result indicates that the circuit training methodology is highly valued by coaches. Therefore, it is advisable to conduct a more in-depth scientific and practical study on using this methodology as a means for the comprehensive development of the physical qualities of young table tennis players at the initial stage of training.

At the same time, the results of the questionnaire survey showed that some coaches lack sufficient scientific and methodological knowledge regarding the factors that ensure the consistency of the year-round training process, specifically the mechanisms for progressively increasing training loads and organizing pedagogical monitoring based on specific tests. The relatively high prevalence of responses such as "low level" and "has no effect" on these questions highlights the need to strengthen methodological support in these areas.

This situation confirms the necessity of developing evidence-based and practice-adapted methodological manuals and training programs aimed at developing the physical qualities of young table tennis players at the initial training stage. In this context, integrating the practical experience of coaches with modern scientific and methodological approaches is a key prerequisite for enhancing the effectiveness of the training process.

Table 1. Distribution of responses obtained for selected questions of the coaches' survey (n=36)

Question content (abbreviated)	High level	Moderate level	Low level	No effect
Impact of the annual workload plan	22	6	5	3
Mechanism of gradually increasing	21	7	4	4
Impact of injury risk (ages 10-12)	30	4	2	–
Set of exercises based on the circuit	34	2	–	–
Impact on technical and tactical pre-	33	3	–	–
Impact on psychological preparedness	28	6	2	–
Impact on functional preparedness	31	4	1	–
Impact of monitoring through special	22	8	6	–

In particular, a gradual and consistent increase in training loads serves to steadily develop athletes' level of preparedness. Conversely, failing to plan loads in accordance with age and readiness levels can lead to decreased training effectiveness, overfatigue, and an increased risk of injury. From this perspective, it is of vital importance to enhance coaches' knowledge in designing annual training load plans, implementing progressive load increases, and conducting regular pedagogical monitoring using specialized tests.

Therefore, it is advisable for coach professional development programs to place special emphasis on planning annual training loads, progressively increasing the load, and organizing pedagogical monitoring based on specialized tests. This will help structure the process of developing the physical attributes of young table tennis players during the initial training stage on a more systematic and scientific basis.

Additionally, the survey results showed that technical-tactical and psychological preparation were highly rated by the coaches. However, relatively lower indicators were observed in questions regarding the organization of the pedagogical monitoring system and post-training recovery processes. This situation indicates that in coaching practice, priority is given to physical and technical-tactical preparation, while the assessment of athletes' post-load recovery status and the regular pedagogical monitoring of the training process are not sufficiently systematized.

From this perspective, at the initial training stage, alongside developing the physical qualities of young table tennis players, it is of great importance to develop comprehensive methodological recommendations aimed at monitoring workloads, effectively organizing recovery processes, and regularly assessing the athletes' functional state.

Conclusion

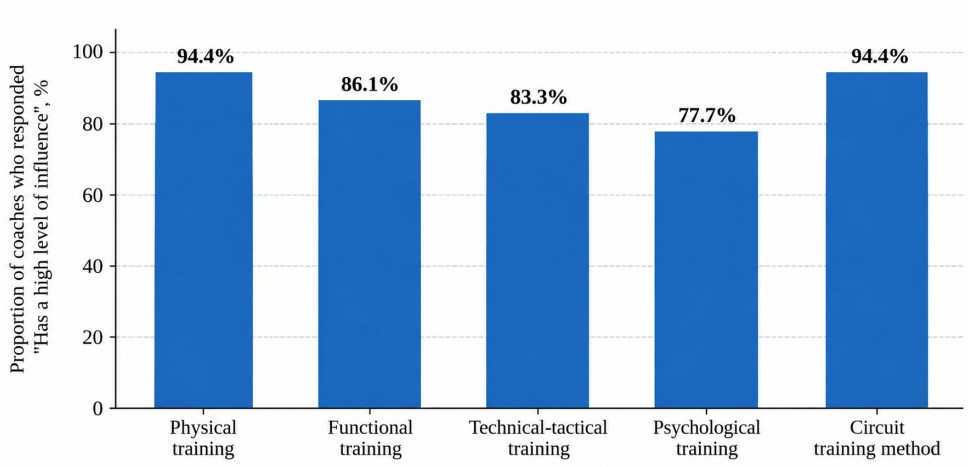
According to the survey results, 94.4 percent of respondents (34 people) rated physical fitness highly as a leading factor in the development of young athletes. In addition, functional readiness was highly rated by 86.1% (31 people), technical-tactical readiness by 83.3% (30 people), and psychological readiness by 77.7% (28 people) of coaches. These results demonstrate the importance of harmoniously integrating these components in the training of young table tennis players.

The set of special exercises based on the circuit training method was highly rated by 34 coaches (94.4%). The absence of "low level" and "has no effect" responses to this question demonstrates the high degree of recognition this methodology has received in coaching practice.

The survey results revealed that some coaches lack sufficient scientific and methodological knowledge regarding the mechanism of gradually increasing the annual training load and organizing pedagogical monitoring based on special tests. The relatively higher frequency of "low level" and "has no effect" responses in these areas indicates the need to improve methodological support.

Overall, the research results demonstrated the necessity of developing a comprehensive,

Fig. Graphical representation of the results of the questionnaire survey conducted among coaches



scientifically grounded training methodology for young table tennis players at the initial stage of preparation, integrating physical, functional, technical-tactical, and psychological training. In particular, utilizing the circuit training methodology—which was highly rated by coaches—as well as phased load planning and improving the pedagogical monitoring system, can be identified as crucial priorities in this process.

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Research interests
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