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The Impact of the COVID-19 Pandemic on the Preparation of a High School Handball Team: Adaptation and Challenges

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Abstract

Handball is a high-intensity team sport characterized by rapid gameplay, requiring agility, coordination, and strategic decision-making. It integrates fundamental motor skills such as running, throwing, and jumping with complex movement patterns that enhance both physical and cognitive performance. The sport's dynamic nature demands a combination of strength, speed, endurance, and technical precision, making it an effective means of developing overall athletic ability.

The objective of this study is to investigate the potential impact of the COVID-19 pandemic on the training process and performance development of a high school handball team. Specifically, the research examines whether the pandemic negatively influenced athletes' physical preparedness and sports performance over a six-month training period conducted as part of the physical education and sports curriculum.

The study sample consisted of 18 male students, born between 2007 and 2008, who actively participated in the training program.

The findings indicate that the pandemic did not have a detrimental effect on the athletes' performance. A comparative analysis of pre- and post-training assessments demonstrated an improvement in key performance indicators. Based on the arithmetic mean values derived from centralized data tables, the 50-meter sprint performance showed an enhancement, with the mean time decreasing from 7.9 seconds in the initial assessment to 7.8 seconds in the final assessment, reflecting a 0.1-second improvement. Additionally, the standing long jump results

improved by 5 cm in the final evaluation compared to the initial test. Technical execution speed also exhibited positive changes, with a recorded improvement of 0.9 seconds between the initial and final assessments.

These results suggest that the structured training program implemented during the study period contributed to enhanced physical performance, despite the disruptions caused by the pandemic. Further research with larger sample sizes and extended training periods is recommended to validate these findings and explore additional performance parameters.
Keywords: school, physical education, physical effort, handball.

Introduction

The initial cases of coronavirus disease 2019 (COVID-19), caused by the SARS-CoV-2 virus, were identified in Wuhan, China, in late 2019 (Singhal, 2020). Due to the rapid transmission of the virus and its significant health impact, various countries implemented strict quarantine measures and isolation protocols, requiring citizens to remain at home. In Spain, a state of alarm was declared on March 15, affecting the entire population (Mon-López et al., 2020). At the sporting level, all regional, national, and international competitions were suspended. In handball, the last official matches were played on March 7 and 8, 2020, after which all players were required to remain at home until at least May 4, 2020 (Mon-López et al., 2020). Competitions did not resume until August 2020, and even then, only elite teams competing in national and European tournaments were allowed to return.

Handball is a physically demanding sport that requires high levels of strength, speed, and aerobic endurance to sustain both training and competition (Buchheit et al., 2009; Karcher & Buchheit, 2014; Nikolaidis & Ingebrigtsen, 2013; Gorostiaga et al., 1999). Furthermore, high-intensity training is increasingly emphasized due to the growing number of possessions per game and the increased pace of play (Karcher & Buchheit, 2014; Мухаметов, 2021; Gogean et al., 2024).

Sports games, particularly handball, play a vital role in promoting a healthy lifestyle and enhancing students' overall well-being. However, participation in sports alone is insufficient for achieving balanced physical development. Complementary activities such as gymnastics and other athletic disciplines are recommended to ensure holistic physical

fitness (Kholova, 2021).

Handball is one of the most widely practiced sports and serves as an effective method for fostering physical development and overall health among school-aged children. It is a popular activity among various age groups, including adolescents and young adults, and remains an accessible and inclusive sport (Мухаметов, 2021; Man et al., 2024).

Engaging in structured handball training has a positive impact on the development of multiple functional systems within the body. Training enhances essential attributes such as reaction speed, agility, creative thinking, and decision-making, all of which contribute to improved cognitive function and mental acuity in competitive settings. Additionally, handball, as a structured sports activity, fosters essential attributes such as willpower, tactical thinking, and adaptability, as well as promoting different forms of movement, including running, jumping, and high-speed maneuvers, while also contributing to weight management (Tashpulatov & Shermatov, 2021).

Handball is extensively integrated into modern educational institutions as a key component of physical education curricula. Handball competitions serve as an effective tool for encouraging students to participate in regular physical education classes while simultaneously enhancing their sports-related skills. Effective pedagogical organization of handball lessons requires the optimal use of lesson time and structured training strategies. As with other physical education disciplines, handball training provides a foundational and structured approach to physical development within an academic setting (Alisherovich & Toshboyeva, 2021; Karimov, 2021).

Materials and methods

Participants

A total of 18 male students from the 7th and 8th grades, born between 2007 and 2008, participated in the study.

Study design

This study was conducted during the 2021-2022 academic year. To achieve the research objectives and fulfill the study requirements, test samples and control norms were administered in two phases: the initial assessment in November 2021 and the final assessment in April 2022.

At the conclusion of the study, the collected data from both

assessments were analyzed and compared to determine whether the participants demonstrated improved performance in the final testing compared to the initial evaluation.

Methods of evaluation

Two assessment modalities were used in this study.

General motor ability tests

50-Meter Sprint: This test evaluated sprinting speed over a 50-meter distance. Each participant performed the test individually on flat ground, starting from a stationary position at the sound of the buzzer. The test was administered twice—once during the initial assessment and again in the final assessment—separated by several days. The best recorded time was used for analysis.

Standing Long Jump: This test assessed lower-body explosive strength. Each participant was given three attempts to perform the standing long jump within a designated, level testing area. The longest recorded jump was measured in meters and centimeters and used for evaluation (Table 1).

Table 1. *Tests of general motor ability / Initial testing - Final testing*

No.	Name	TI - Sprint – 50 m	TI - Standing long jump	TF - Sprint – 50 m	TF - Standing long jump
1.	A.R.	7,9	1,80	8,2	1,75
2.	C.Ş.	7,9	1,90	8,1	1,85
3.	C.M.	7,6	1,90	7,9	1,90
4.	C.D.	8,0	1,85	8,3	1,75
5.	C.S.	7,6	1,90	7,8	1,80
6.	D.Ş.	7,6	1,95	7,7	1,95
7.	F.M.	7,5	2,15	7,8	2,00
8.	M.M.	7,6	1,90	7,9	1,90
9.	P.C.	7,5	1,80	8,2	1,75
10.	O.R.	7,6	1,90	7,6	1,95
11.	P.M.	8,0	1,85	8,3	1,75
12.	S.P.	7,5	1,95	7,8	1,95
13.	G.M.	7,4	1,90	7,9	1,85
14.	P.A.	7,8	1,75	8,0	1,75
15.	G. C	7,8	2,10	7,7	2,00
16.	T.B.	7,4	1,90	8,0	1,75
17.	T.C.	7,5	2,00	7,9	1,95
18.	B.I.	7,6	1,95	7,8	1,85
	Arithmetic mean	7,8	1,90	7,9	1,85

Handball-Specific Test

The technical structure assessment was designed to evaluate fundamental handball skills and consisted of the following sequential procedures:

1. Movement – Transitioning into the basic position along the 6-meter semicircle.
2. Ball Retrieval – Collecting the ball from the opposite side of the semicircle.
3. Dribbling – Maneuvering the ball between the goalposts using both the dominant and non-dominant hand.
4. Passing – Delivering a pass to a teammate positioned 3 to 4 meters away.
5. Ball Reception and Shooting – Receiving the ball and executing a shot toward the goal, using additional steps, a running motion, or a jump shot, based on individual preference.

The test was administered twice for each participant, with performance measured against a stopwatch. The best recorded time was used for analysis. The evaluation was not contingent upon the accuracy of the goal attempt, and results were recorded in seconds and tenths of a second (Table 2).

Table 2. *The results of the technical structure test / Initial testing – Final testing*

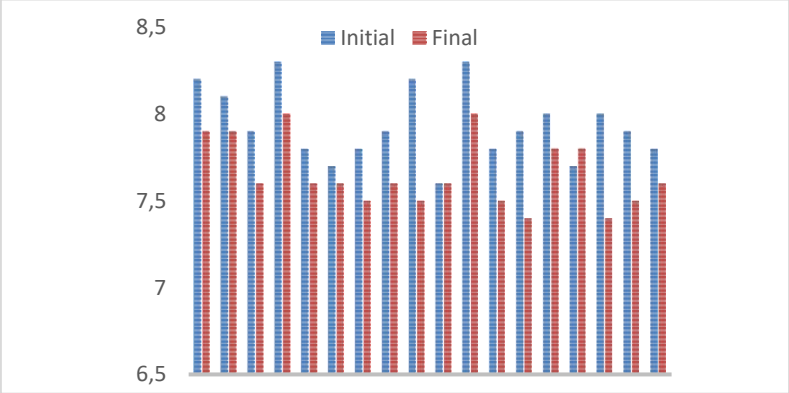
No.	Name	Initial testing	Final testing
1.	A.R.	15,2	14,5
2.	C.Ș.	16	15,3
3.	C.M.	14,8	13,5
4.	C.D.	15,2	14,3
5.	C.S.	14,2	13,1
6.	D.Ș.	14,6	13,4
7.	F.M.	15	14,5
8.	M.M.	15,3	14,6
9.	P.C.	16,2	15,5
10.	O.R.	15,4	14,3
11.	P.M.	17	15,9
12.	S.P.	16,2	15,5
13.	G.M.	14,9	14
14.	P.A.	17,3	16,1
15.	G. C	15,2	14,5
16.	T.B.	14,9	14
17.	T.C.	15,3	14,3
18.	B.I.	15,7	15
	Arithmetic mean	15,46	14,57

Results

The data obtained from the measurements were analyzed using the arithmetic mean as the primary measure of central tendency for both the initial and final assessments.

In the **50-meter sprint test**, the arithmetic mean of the final assessment showed an improvement of 0.1 seconds compared to the initial assessment.

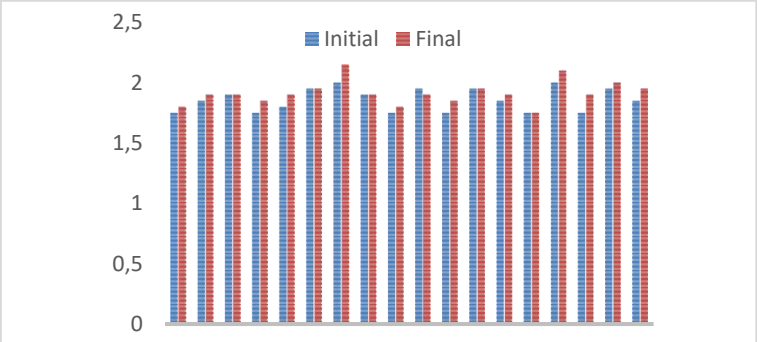
Figure 1. *Comparison between the initial and final test at the running speed of 50m*



The progress observed is considered typical for this age group and can be attributed to the enhancement of reaction speed, movement execution, and repetition indices. These improvements occurred alongside the structured activities outlined in the specific learning unit, with a focus on refining key technical elements such as the starting position, take-off mechanics, coordination, and landing techniques.

In the **standing long jump test**, this assessment was used to evaluate force production in a speed-strength context. The observed improvement of 5 cm between the initial and final assessments was influenced not only by the enhancement of speed-strength indices but also by the refinement of execution techniques specific to this test (Figure 2).

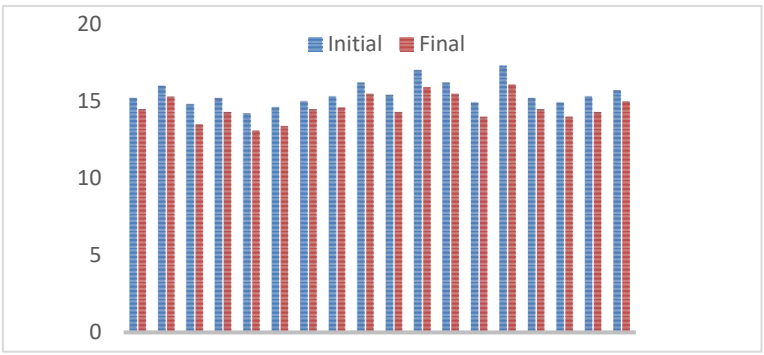
Figure 2. *Comparison between the initial and final test for standing jump*



The arithmetic mean of the times recorded in the final assessment demonstrated an improvement of 0.9 seconds compared to the initial assessment.

This progress can be primarily attributed to the refinement of execution techniques for the included procedures. Additionally, at this developmental stage, most exercises were conducted within **technical-tactical structures** that closely resembled real-game scenarios, further enhancing players' efficiency and adaptability in performing the required skills.

Figure 3. *Comparison between the initial and final test at technical structure*



Statistical Analysis of Performance in the 50-Meter Sprint

In addition to the improvements observed in execution speed and specific skill indices, a statistical analysis was conducted to evaluate the level of homogeneity within the study sample. This analysis focused on the 50-meter sprint performance during the final assessment, with the following central tendency parameters calculated:

1. Mode = 7.6 seconds

2. Median = 7.6 seconds
3. Arithmetic Mean = 7.8 seconds

Dispersion Indicators:
1. Range (Amplitude) = 1.4 seconds
2. Mean Deviation = 0.24 seconds
3. Standard Deviation = ± 0.3 seconds
4. Coefficient of Variation = 3.84%, indicating a high level of homogeneity within the study sample.

These results suggest that the group exhibited consistent performance levels, with minimal variability in the sprint test outcomes. The high homogeneity confirms that the sample was well-balanced in terms of physical ability, allowing for reliable conclusions regarding performance improvements across the study period.

Based on the results obtained, it can be concluded that the COVID-19 pandemic did not have a negative impact on the training and performance development of the athletes in this study. The statistical analysis and graphical representations clearly illustrate a positive evolution in their physical training, demonstrating consistent improvements in speed, strength, and technical execution throughout the study period.

These findings suggest that, despite the disruptions caused by the pandemic, the structured training program implemented was effective in maintaining.

Discussions

To effectively implement the bilateral game as the primary methodological focus for teaching handball in physical education and sports classes at the secondary school level, it is essential to ensure that students attain a high degree of proficiency in all fundamental technical procedures.

One of the defining characteristics of handball training in middle school education is the necessity of adhering to training principles and methodologies specific to physical education and sport, with a strong emphasis on awareness, intuition, and systematic acquisition of skills.

For students to master technical methods effectively and react appropriately in game situations, the use of intuitive teaching methods is highly beneficial. These methods include demonstrations, tables,

diagrams, chironograms (motion analysis), and the observation of friendly or official matches, all of which facilitate a deeper understanding of handball techniques and tactics.

During training sessions, the coach plays a crucial role in monitoring individual and team performance, making necessary adjustments to technique and strategy to ensure optimal learning and skill acquisition. This personalized feedback approach enhances the students' ability to execute the technical and tactical elements of the game effectively.

Handball is taught in physical education classes for both boys and girls, but it can also be integrated into other forms of organized physical activity, such as extracurricular sports programs, optional lessons, or specialized training sessions for school sports teams.

Due to its complex and dynamic nature, handball makes a significant contribution to achieving the broader objectives of physical education and sports, fostering physical, cognitive, and social development. The sport not only enhances motor skills, coordination, and tactical thinking but also supports the overall development of students' personalities, preparing them for effective social integration and teamwork.

Additionally, structured handball training at the middle school level can serve as a foundation for talent identification and selection. Skilled students demonstrating exceptional ability may be encouraged to pursue handball at a competitive level within specialized sports institutions.

Conclusion

The COVID-19 pandemic has significantly disrupted the lives of handball players, leading to major psychological repercussions due to confinement and lifestyle modifications. Athletes faced unprecedented challenges, as they had no prior reference for adapting to this new reality (Tayech et al., 2020).

To maintain optimal performance and well-being, athletes must adhere to a balanced lifestyle, which includes proper nutrition, structured exercise, and sufficient sleep (Puta et al., 2017). These factors are essential for sustaining physical and mental resilience, particularly in times of reduced training opportunities.

In handball training, it is crucial to select the most effective

exercises and structured drills that facilitate the correct acquisition of fundamental technical skills. Moreover, training should focus on the integration of these skills into more complex technical structures, allowing players to develop game-specific abilities that improve overall performance.

A key methodological approach is the inclusion of thematic games in every training session, regardless of the age of the students or the specific phase of skill development. These games provide a dynamic and engaging learning environment, fostering technical refinement and tactical awareness in a game-like setting.

The organization of school competitions, such as the "Olympiad of School Sports", can play a pivotal role in promoting handball participation among students. These events serve as a platform for skill application, motivation, and competitive engagement, significantly enhancing the learning process and fostering a deeper appreciation for the sport.

By incorporating structured training methodologies and fostering competitive opportunities, handball education can continue to develop effectively, even in challenging circumstances.

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