International Journal of Medical Sciences And Clinical Research

VOLUME Vol.05 Issue05 2025
PAGE NO. 51-55
DOI 10.37547/ijmscr/Volume05Issue05-11

The Effectiveness of Improving Endurance Through A Training Program Adapted to The Body Somatotypes Of 17–18-Year-Old Students Studying in Different Higher Education Specialties

Azimova Sayyohat Bobomurodovna

Teacher at the Department of Taekwondo and Sports Activities, Faculty of Taekwondo and Sports Activities, National University of Uzbekistan

Received: 23 March 2025; **Accepted:** 19 April 2025; **Published:** 21 May 2025

Abstract: This study is aimed at developing and evaluating a special training program based on individual somatotypes to improve the endurance of 17–18-year-old university students engaged in combat sports. A total of 90 male students were divided into three groups according to body types: ectomorph, mesomorph, and endomorph. Each group participated in adapted endurance training sessions focused on combat sports over a 10-week period. Pre- and post-study endurance levels were assessed using the Cooper 12-minute run test and heart rate recovery analysis. The results demonstrated statistically significant improvements in endurance across all groups ($p < 0.05$), with mesomorphic students showing the highest rate of progress. The findings suggest that endurance training tailored to body composition is more effective in enhancing athletic performance than generalized programs. This study highlights the importance of individualized physical training in fostering youth participation in sports.

Keywords: Endurance, combat sports, somatotype, training program, university students, physical fitness, sports pedagogy.

Introduction: In modern sports education, organizing training processes based on students' individual physical characteristics plays a crucial role. The ages of 17–18 represent a period of rapid growth in humans, characterized by the active development of muscle strength, cardiovascular and respiratory systems. At this age, key physical performance indicators can be improved directly through scientifically grounded and health-oriented training programs.

Athletes are typically classified by body type into somatotypes such as ectomorph, mesomorph, and endomorph. Each somatotype responds differently to physical loads, and the corresponding exercises should reflect these distinctions. Combat sports—such as boxing, judo, and taekwondo—require a harmonious combination of endurance, speed, strength, and coordination. The increasing popularity of these disciplines among students is noteworthy, not only for their physical benefits but also for their positive effects on immunity.

However, the development and implementation of customized training programs for university students, and their subsequent evaluation, remain an important scientific and practical task.

The aim of this study is to develop a specialized training program adapted to the somatotypes of 17–18-year-old students, focusing on combat sports, and to evaluate its effectiveness in improving performance outcomes.

Objective of the study: To develop and assess the effectiveness of a special physical training program designed according to the somatotype of 17–18-year-old university students engaged in combat sports to enhance endurance.

Tasks of the study:

- To analyze literature related to the research

topic;

- To develop a special training program for combat sports adapted to each somatotype;
- To divide 17–18-year-old university students into ectomorph, mesomorph, and endomorph groups based on body composition;
- To analyze and evaluate the effectiveness of the program by comparing pre- and post-experiment results.

Literature Review. An analysis of sports pedagogy and physical training literature shows the effectiveness of physical exercises. Multiple scientific works suggest that exercise programs tailored to body composition (somatotype) can enhance performance.

S.A. Qodirov (2017), in his study, emphasized the connection between body type and the effectiveness of training programs. He noted that workouts considering somatotype led to better results. According to his findings, ectomorphic athletes benefit from prolonged high-intensity workouts, mesomorphs from strength-speed combinations, and endomorphs from short-duration, high-intensity exercises.

D.S. Ponomarev (2015) studied the implementation of somatotype-based training equipment and concluded that programs tailored to somatotype showed significantly better results than general programs. He stressed the need to consider body composition, particularly in sports like boxing and judo.

A.A. Abdurakhov (2018) developed a study on physical fitness programs adapted to young athletes' somatotypes, which proved to be more effective. The study explored the unique connections between combat sports and specific body parts.

R.M. Ismailov (2016) demonstrated in his research that the development of special training programs tailored to body composition and sport type helps improve athletes' physical qualities. He emphasized not only the need to prepare athletes physically but also strategically, with exercises appropriate for each somatotype.

Foreign literature also extensively studies the relationship between body structure and athletic training. T.L. Allen (2014), in his research, indicated that training programs adapted to somatotype and involving low-intensity physical exercises can increase support and strength in athletes. His study emphasized optimizing tools for ectomorph, mesomorph, and endomorph athletes. According to Allen, ectomorphs benefit from high-temperature, low-intensity exercises, while mesomorphs should engage in strength and speed-integrated workouts.

According to A.S. Tomas and R.K. Johnson (2016), the most effective results were achieved through training programs implemented in a systematic manner according to body composition. Their research explored the influence of somatotype on training outcomes. The study demonstrated that enhancing training programs and applying high-intensity, short-duration exercises were more effective for endomorphic athletes, while ectomorphic athletes showed better performance when subjected to specifically tailored loads. Their findings confirmed that implementing exercises in systemic alignment with body structure and sport type ensures optimal physical condition.

In L.M. Santos's (2018) academic study, a correct approach to training was analyzed in relation to the interaction between body composition and educational programs, particularly in the context of physical development. The research showed that individualized physical preparation based on somatotype and the development of specialized exercises for each type resulted in significantly improved physical performance among athletes.

J.M. Baker (2017) developed training programs for combat sports that were adapted to body types. According to Baker's findings, in order to improve recovery performance in combat athletes, muscle systems need to receive direct power stimulation. His research proved that designing programs specific to each somatotype maximizes athletes' physical capabilities and performance potential.

R.L. Wilkins (2019), in his research, studied the effectiveness of physical preparedness in athletes based on somatotype-specific exercises. Wilkins emphasized the importance of developing diverse strategies depending on somatotype, arguing that each athlete's training should be adapted to their body type, as this directly contributes to improved physical performance indicators.

Thus, in foreign literature, the significance of individualized structuring in improving athletes' physical qualities based on body composition is widely discussed. Training programs tailored to somatotypes are seen as critical for advancing performance in combat sports. It is essential to design training plans that account for the unique characteristics of each somatotype and include specific exercises adapted accordingly.

To fulfill the research objectives, the following methods were used:

- Theoretical analysis and synthesis methods (study and review of scientific-methodological literature, surveys, and interviews with instructors);

- Pedagogical observation of educators' instructional activities and physical training sessions;
- Pedagogical testing methods, including control tests to determine the development level of physical qualities and specialized endurance assessment tests;
- Pedagogical monitoring and analysis methods;
- Mathematical statistical methods;
- Pedagogical and psychological methods, including subjective evaluation techniques.

Analysis and results:

Endurance is the human body's ability to withstand prolonged physical and mental exertion, resist fatigue, and accelerate the recovery process. It is a critical factor for athletic performance, daily life quality, and overall health. These considerations highlight the need to develop a new, specialized system of exercises aimed at increasing endurance.

Somatotype-based grouping of participants:

Of the 90 university students participating in the study, 30 had an ectomorphic body type, 30 were mesomorphic, and 30 were endomorphic. A specific training program was developed for each group. Distinct differences in physical appearance and strength capacity were observed among the groups, depending on body composition.

Training complex to enhance endurance in university students:

We developed a weekly training program tailored to each somatotype. The program is structured as a 6-week cycle, with training sessions held three times per week. Each session lasts between 60 and 80 minutes.

Day	Type of training:	Details:
1.	Circuit training + running	6 exercises (20 seconds each), 3 circuits, 1 km run (interval)
2.	Hurdle running + static exercises	6 hurdles, 3 static exercises
3.	Interval running	4 × 400 m running (at 90% effort) with 2-minute walking intervals

Training program for the mesomorph type (athletic, gains muscle easily, strong build)

Goal: To improve overall endurance and strengthen functional stamina based on the level of endurance.

Day	Type of training	Details
1.	High-Intensity Interval Training (HIIT)	30 seconds work + 30 seconds rest, 6 sets (burpees, squat jumps, mountain climbers)
2.	Continuous running	20–30 minutes
3.	Combined exercises	At 65–75% of maximum heart rate

3. Training program for the endomorph type (rounder build, slow metabolism, prone to fat accumulation)

Day	Type of training	Details
1.	Long-distance walking-running (combined)	10 minutes walking + 15 minutes running + 5 minutes walking
2.	Bodyweight circuit training (no weights)	8 exercises (squats, sharp turns, upward/long/deep jumps, running with arm swings, burpees), 2–3 rounds

3.	High-density intervals	40 seconds of exercise + 20 seconds rest, 5 sets

For the Ectomorph group: The training program for the ectomorph group showed that students in this group easily performed long-distance running and aerobic exercises. In the pre-experiment Cooper test, their average result was 2400 meters. After the experiment, this figure improved to 2700 meters, indicating a high level of aerobic performance.

For the Mesomorph group: The pre-experiment Cooper test results for the mesomorph group averaged 2600 meters. These students performed exercises that combined strength and power. After the experiment, the result improved to 2900 meters. These figures demonstrate the highest level of anaerobic endurance in students with a mesomorphic somatotype.

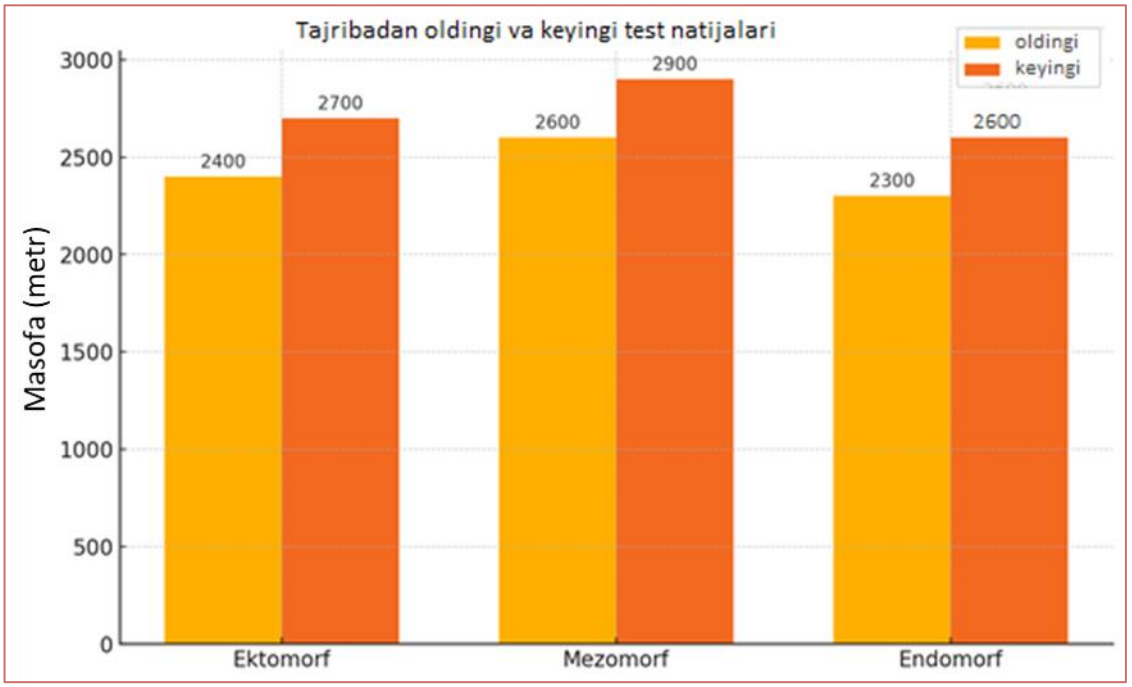
For the Endomorph group: Short-term and high-intensity exercises yielded good results. Their pre-experiment average Cooper test result was around 2300 meters. After the experiment, it improved to 2600 meters, which indicates a high level of anaerobic endurance.

Recovery of heart rate: Positive changes were observed in heart rate recovery time due to the exercises. In the ectomorph group, heart rate returned to normal within 3–4 minutes; in the mesomorph group, recovery was observed within 2–3 minutes. In the endomorph group, heart rate recovery took 4–5 minutes. This system shows different levels of physical recovery based on body composition.

Statistical analysis: According to the results of statistical analysis, the obtained data were analyzed using a T-test to measure differences. The performance of the ectomorph group was evaluated at a moderate level, and a significant difference was found ($p < 0.05$). Differences were also identified in anaerobic levels between the mesomorph and endomorph groups, confirmed statistically.

Conclusion of the analysis: The analysis shows that training programs tailored to body types are effective for evaluating athletes' endurance and strength indicators. Long aerobic exercises were most effective for ectomorph students, strength-building exercises for mesomorphs, and short-term high-intensity workouts for endomorphs.

Figure 1.



CONCLUSION

The results of the study showed that regular training based on exercise programs tailored to the body somatotype of 17–18-year-old university students effectively improves endurance quality. Taking into account the physiological and functional characteristics specific to ectomorph, mesomorph, and endomorph somatotypes, exercise loads designed with an individual approach enhance the adaptability of students' cardiovascular, respiratory, muscular, and energy systems. This positively influences their overall physical fitness and health status.

Recommendations

1. It is recommended to assess university students' body composition (somatotype) and plan training programs individually.

2. Along with increasing endurance, the program should also include educational sessions aimed at promoting a healthy lifestyle.

3. It is advisable to test physical qualities (especially cardiovascular and muscular endurance) every two months to evaluate the effectiveness of the program.

4. The use of modern technologies (such as heart rate monitoring devices and training monitoring applications) is beneficial during training sessions.

5. Students' psychological condition and motivation should be regularly monitored throughout the training process.

REFERENCES

Mirziyoyev.Sh.M Erkin va farovon demokratik O'zbekiston davlatini birgalikda barpo etamiz. T., 2016.

Mirziyoyev.Sh.M Milliy taraqqiyot yo'limizni qat'iyat bilan davom ettirib ,yangi bosqichga ko'yaramiz. - T.:O'zbekiston, 2017, - Б. 145.

O'zbekiston Respublikasining "Ta'lim to'g'risida"gi Qonuni. (1997 yil 29 avgustda qabul qilingan)

O'zbekiston Respublikasining "Kadrlar tayyorlash Milliy dasturi" (1997 yil 29-avgustda qabul qilingan) – Barkamol avlod – O'zbekiston taraqqiyotining poydevori. T. Sharq, 1997 y.

O'zbekistan Respublikasi qonuni «Jismoniy tarbiya va sport to'g'risidagi» 27.06.2000 (yangi taxriri). – T., 2000 y.

O'zbekiston Respublikasi Prezidentining PQ-450 – KURASH milliy sport turini ommalashtirish va rivojlantirishni yangi bosqichga olib chiqish chora tadbirlari to'g'risida" gi qarori 20.12.2024 yil.

Керимоа Ф.А. Спорт кураши назарияси ва усулияти. Т., ЎзДЖТИ, 2005.

8.R.S.Salomov "Jismoniy tarbiya nazariyasi va uslubiyati" Toshkent-2024

9.Azimova.S.B. Boshlang'ich sinf o'quvchilarida me'yorlangan mashqlar orqali darsdan tashqari tezkorlik qobiliyatlarini rivojlantirishning innovatsion vosita va usublari.Maqola, 37-39-bet ,2024-yil.

10. Azimova.S.B. Yakkakurash sport turlariga ixtisoslashgan mashqlar orqali oliy ta'lim muassasasi talabalarining chidamlilik sifatini oshirish samaradoriligi. Maqola, 38-41-bet, 2025-yil.

http://www.ziyonet.uz/

http://www.olympic.uz