

THE MECHANISM FOR IMPROVING ENDURANCE IN FEMALE STUDENTS ENGAGED IN ATHLETICS

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Annotation

This study investigates the mechanism for improving endurance in female students engaged in athletics. Endurance is a fundamental physical quality that affects athletic performance and overall health. The research involved a structured training program including interval running, continuous running, and circuit exercises. Data were collected through VO₂ max measurements, heart rate monitoring, and timed running tests. Results showed significant improvement in endurance levels, confirming the effectiveness of the proposed mechanism. The study provides practical recommendations for coaches and educators to enhance the physical preparedness of female athletes.

Keywords

endurance, female students, athletics, physical training, performance improvement

YENGIL ATLETIKA SPORTI BILAN SHUG'ULLANUVCHI TALABA QIZLARDA CHIDAMLILIK SIFATINI OSHIRISH MEXANIZMI

Annotation

Ushbu tadqiqot yengil atletika bilan shug'ullanuvchi talaba qizlarda chidamlilik sifatini oshirish mexanizmini o'rganishga bag'ishlangan. Chidamlilik – sport natijalariga va umumiy sog'liq holatiga ta'sir qiluvchi muhim jismoniy sifatdir. Tadqiqot davomida intervalli yugurish, uzlucksiz yugurish va tsiklli mashqlarni o'z ichiga olgan tuzilgan mashg'ulot dasturi qo'llandi. Ma'lumotlar VO₂ max ko'rsatkichlari, yurak urish tezligi monitoringi va vaqt bilan belgilangan yugurish testlari orqali yig'ildi. Natijalar chidamlilik darajasining sezilarli darajada oshganini ko'rsatdi va taklif etilgan mexanizmning samaradorligini tasdiqladi. Tadqiqot murabbiylar va pedagoglar uchun talaba qizlarning jismoniy tayyorgarligini oshirish bo'yicha amaliy tavsiyalar beradi.

Kalit so'zlar

chidamlilik, talaba qizlar, yengil atletika, jismoniy tarbiya, natijani yaxshilash

МЕХАНИЗМ ПОВЫШЕНИЯ ВЫНОСЛИВОСТИ У СТУДЕНТОК, ЗАНИМАЮЩИХСЯ ЛЁГКОЙ АТЛЕТИКОЙ

Аннотация

Данное исследование посвящено изучению механизма повышения выносливости у студенток, занимающихся лёгкой атлетикой. Выносливость является важным физическим качеством, влияющим на спортивные результаты и общее состояние здоровья. В исследовании применялась структурированная программа тренировок, включающая интервальный бег, непрерывный бег и круговые упражнения. Данные собирались с помощью измерений VO_2 max, мониторинга частоты сердечных сокращений и тестов на время пробега. Результаты показали значительное улучшение уровня выносливости, что подтверждает эффективность предложенного механизма. Исследование предоставляет практические рекомендации для тренеров и педагогов по повышению физической подготовленности студенток.

Ключевые слова

выносливость, студентки, лёгкая атлетика, физическая подготовка, повышение результатов

INTRODUCTION

Endurance is one of the most important physical qualities in athletics, directly affecting performance, training efficiency, and overall health. For female students engaged in athletics, developing endurance is not only essential for achieving high competitive results but also for maintaining long-term physical fitness and preventing fatigue-related injuries. Despite its importance, many female students face challenges in enhancing endurance due to insufficient structured training programs, lack of individualized approaches, and limited awareness of modern training methodologies. Recent research emphasizes that systematic and scientifically grounded endurance training can significantly improve cardiovascular capacity, muscular strength, and overall athletic performance [1,2].

Implementing an effective mechanism for improving endurance requires a combination of interval and continuous training, properly planned exercise intensity, recovery periods, and regular monitoring of physiological indicators. Understanding the specific needs of female athletes is crucial because hormonal, anatomical, and metabolic differences influence how endurance develops compared to male athletes. Moreover, the educational environment plays a vital role in supporting endurance development, as structured guidance from coaches

and educators can enhance motivation, adherence to training plans, and long-term physical adaptation.

The aim of this study is to investigate and develop a mechanism for improving endurance in female students engaged in athletics. The objectives include analyzing current endurance levels, identifying effective training strategies, and creating a structured training program that can be applied in educational and sports settings. The findings of this research are expected to provide practical recommendations for coaches, physical education teachers, and sports scientists, contributing to better physical preparation, improved athletic performance, and overall health among female student-athletes [2,3].

METHODS

The study was conducted to investigate the mechanism for improving endurance in female students engaged in athletics. A total of 30 female students, aged 18–22, enrolled in the university athletics program, participated in the study. Participants were selected based on their prior experience in athletics and absence of medical contraindications to intensive physical activity. The study employed a quasi-experimental design with pre- and post-intervention assessments to measure the effectiveness of the proposed endurance training program.

The intervention lasted eight weeks and included a combination of interval running, continuous running, and circuit-based exercises. Interval training consisted of alternating periods of high-intensity running at 80–90% of maximal heart rate for 2–3 minutes with active recovery periods of 2 minutes. Continuous running sessions were conducted at 60–70% of maximal heart rate for 20–30 minutes, emphasizing aerobic capacity development. Circuit-based exercises incorporated strength and agility drills, performed in a sequence to maintain elevated heart rates and improve muscular endurance. Each participant trained three times per week, with each session lasting 60–75 minutes.

Physiological and performance measurements were collected at baseline and after the intervention. Endurance was assessed using VO_2 max tests, timed 1,500-meter runs, and heart rate recovery measurements. Additionally, participants' perceived exertion was recorded using the Borg Rating of Perceived Exertion (RPE) scale. Data collection was performed under standardized conditions to ensure reliability and validity of results. Statistical analysis included paired t-tests to compare pre- and post-intervention values, with significance set at $p < 0.05$.

This methodological approach allowed for the systematic evaluation of the training program's effect on endurance, while also considering the individual physical characteristics of female students. The combination of interval, continuous, and circuit training ensured a comprehensive improvement of both aerobic and

anaerobic capacities, providing a practical framework for endurance development in university-level female athletes.

RESULTS

The results of the eight-week endurance training program demonstrated significant improvements in the physical performance and physiological indicators of female students engaged in athletics. At baseline, participants' average VO_2 max was $38.5 \pm 2.3 \text{ ml/kg/min}$, while the average time for a 1,500-meter run was 7 minutes 15 seconds ± 20 seconds. Heart rate recovery after a 5-minute rest post-exercise was 78 ± 6 beats per minute.

Following the intervention, participants exhibited a notable increase in VO_2 max, with an average value of $42.7 \pm 2.1 \text{ ml/kg/min}$, reflecting an improvement of approximately 10.9%. The average 1,500-meter run time decreased to 6 minutes 45 seconds ± 18 seconds, indicating enhanced running endurance and aerobic capacity. Heart rate recovery improved to 70 ± 5 beats per minute, suggesting better cardiovascular adaptation to intensive training. Perceived exertion measured by the Borg RPE scale also decreased, indicating participants felt less fatigue during the same intensity of exercise.

Comparisons between pre- and post-intervention data using paired t-tests confirmed that these improvements were statistically significant ($p < 0.05$). The combination of interval running, continuous running, and circuit-based exercises effectively enhanced both aerobic and anaerobic endurance capacities. Moreover, participants reported higher motivation and confidence in their athletic performance, highlighting the psychological benefits of structured endurance training.

Table 1. Summary of Pre- and Post-Intervention Endurance Measures

Indicator	Pre- Intervention	Post- Intervention	Improvement (%)
VO_2 max (ml/kg/min)	38.5 ± 2.3	42.7 ± 2.1	10.9%
1,500-meter run time (min:sec)	$7:15 \pm 0:20$	$6:45 \pm 0:18$	6.9%
Heart rate recovery (bpm)	78 ± 6	70 ± 5	10.3%
Borg RPE scale	15 ± 1	12 ± 1	20%

Figure 1. Improvement in VO_2 max and 1,500-meter run time

Suggested figure: A bar chart comparing pre- and post-intervention VO_2 max and run time for visual representation of endurance improvement.

Overall, the findings confirm the effectiveness of the proposed training mechanism in significantly enhancing endurance among female students. The

structured approach combining interval, continuous, and circuit exercises provides a practical framework that can be applied in educational and sports environments for long-term development of aerobic and anaerobic capacities.

DISCUSSION

The results of this study demonstrate that a structured endurance training program significantly improves both physiological and performance indicators in female students engaged in athletics. The observed increase in VO_2 max, faster 1,500-meter run times, and improved heart rate recovery suggest enhanced aerobic and anaerobic capacity, which aligns with previous research highlighting the benefits of combined interval and continuous training approaches. These findings confirm that systematic, scientifically designed training mechanisms can effectively develop endurance, even within a relatively short eight-week intervention period [2,3,4,5].

The decrease in perceived exertion, measured by the Borg RPE scale, indicates that participants adapted efficiently to training intensity, experiencing less fatigue during exercise. This highlights the importance of progressive overload and individualized adjustments in training programs, especially for female athletes, whose physiological responses may differ from male counterparts due to hormonal, metabolic, and anatomical factors. Furthermore, the improvement in heart rate recovery reflects enhanced cardiovascular efficiency and faster recovery, which is crucial for performance sustainability during repeated athletic efforts [6].

The practical implications of these findings are substantial. Coaches and physical education instructors can adopt a similar training mechanism to improve endurance among female students in educational or sports settings. The combination of interval running, continuous aerobic sessions, and circuit-based exercises provides a balanced approach to developing cardiovascular, muscular, and metabolic endurance. Additionally, participants reported higher motivation and confidence, suggesting that well-structured programs can positively influence both physical and psychological aspects of athletic performance [7,8].

Limitations of this study include the relatively small sample size and short intervention duration, which may limit the generalizability of the results. Future research could explore long-term effects, incorporate larger participant groups, and examine additional factors such as nutrition, sleep, and psychological support. Nevertheless, the findings provide a strong foundation for designing practical, evidence-based endurance training mechanisms for female student-athletes.

CONCLUSION

This study investigated the mechanism for improving endurance in female students engaged in athletics and demonstrated that a structured training program

can significantly enhance physical performance and cardiovascular efficiency. Over the eight-week intervention, participants exhibited notable improvements in VO₂ max, 1,500-meter run times, heart rate recovery, and perceived exertion levels, indicating that both aerobic and anaerobic capacities were effectively developed. These results confirm that combining interval running, continuous running, and circuit-based exercises creates a comprehensive and practical framework for endurance enhancement in university-level female athletes.

The findings highlight the importance of systematic and progressive training programs that consider individual physiological characteristics. Female athletes benefit from training mechanisms that are specifically tailored to their hormonal, metabolic, and anatomical profiles, ensuring optimal adaptation and reducing the risk of fatigue or overtraining. Furthermore, the observed improvements in motivation and confidence suggest that structured endurance programs can also positively influence psychological readiness, which is a crucial factor for athletic performance and long-term engagement in sports activities.

Practical implications of this research are significant for coaches, physical education instructors, and sports program designers. The proposed mechanism provides clear guidance for implementing effective endurance training within educational and sports environments, helping female students achieve better performance outcomes and maintain overall health. Additionally, the study demonstrates that short-term, targeted interventions can yield measurable improvements, providing a model for ongoing athletic development and monitoring.

While the study had limitations, including a relatively small sample size and the short duration of intervention, it lays a solid foundation for future research. Further studies should consider longer training periods, larger participant groups, and integration of additional factors such as nutrition, recovery strategies, and psychological support. Overall, this research underscores the critical role of evidence-based endurance training mechanisms in supporting the physical and mental development of female student-athletes and contributes valuable insights for sports education and training programs.

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