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A Training Program for Special Endurance and Its Impact on Blood Measurements, Blood Proteins, Immune Activity and 800 M Achievement

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Abstract

Objectives. The objective of this research was to identify the effect of a training program, designed by the researcher and structured using special endurance exercises, on certain immune system variables, physical variables, and achievement performance in the 800-meter race among the study participants.

Materials and Methods. The study utilized the experimental method with a one-group pre-test and post-test design. A specialized endurance training program was prepared and applied over a specific training period during 2024–2025. Pre-measurements were taken to assess the immune variables, physical variables, and 800-meter race times before the intervention. Following the implementation of the training program, post-measurements were conducted under the same conditions to evaluate the impact of the program. All procedures ensured the control of external variables and standardized testing conditions to maintain the validity of the results.

Results. The results indicated that the special endurance training program led to a noticeable improvement in the efficiency of the immune system among the runners. Additionally, the program contributed significantly to enhancing athletic performance, as evidenced by a reduction in the time needed to complete the 800-meter race after the training intervention.

Conclusion. Based on the findings, it was concluded that the specialized endurance exercises effectively improved both the immune system efficiency and the athletic achievement of the 800-meter runners. The training program developed by the researcher proved to be a successful approach for promoting both physiological health and performance outcomes in middle-distance running.

Keywords : Special Endurance, Blood Measurements, Blood Proteins, Immune Activity, 800 m Run.

Introduction

The practice of sports activity plays a significant role in disease prevention by strengthening the immune system through changes in metabolic and inflammatory pathways, which can affect the human body from time to time (Christiani et al., 2021). Moderate and regular exercises, whether qualitative or quantitative, particularly those characterized by strength and intensity, have a positive impact on white blood cells and overall immune

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function. Physical activity has also been shown to prevent atherosclerosis and other serious diseases by enhancing metabolic processes that combat inflammation, thereby reducing disease risks (Borges et al., 2022). As scientific interest in sports immunology has increased, researchers have begun to explore how the athlete's body protects itself from illness during training and competition, focusing on immune cells such as white blood cells and their components. This area of study is particularly relevant during the pre-competition stage—a critical training period aimed at achieving peak performance—which requires a balance between high training loads and adequate preparation (Fil'o & Janoušek, 2022).

Managing this phase is essential for maintaining an athlete's physical form and avoiding overtraining, which is often associated with weakened immunity and a higher risk of disease or injury (Jabbar et al., 2025). Physical exertion increases the body's need for oxygen, which is met by enhancing cardiac output and boosting blood flow to active muscles. This process stimulates the release of catecholamines and glucocorticoids, which mobilize white blood cells from various reservoirs, increasing their count in the bloodstream. These changes positively influence immune function by raising levels of lymphocytes and granulocytes and improving conditions like VDR deficiency (Fikret & Leyla, 2020). Additionally, exercise helps combat chronic inflammation, improves mood, and has a direct impact on circulatory and respiratory systems, particularly through special endurance exercises that activate hormones, enzymes, and essential immune and muscle cells (Hortobágyi et al., 2022). Exercise also alters cardiovascular disease risk by modifying fat and glucose metabolism and reducing inflammation, thereby increasing the secretion of beneficial proteins that sustain muscle function during physical activity (Van der Woude et al., 2022). While many physiological studies have focused on the effects of exertion on the circulatory, respiratory, and musculoskeletal systems, research into its impact on the immune system remains limited. To date, few have explored how physical exertion during the pre-competition phase affects immune blood components.

Thus, the present study aims to fill this gap by investigating the effect of special endurance training on immune activity, blood proteins, and athletic performance during this critical period. The study focuses on six 800-meter runners from Zubair Club, with research activities conducted at Zubair Club Stadium, Al-Bayan Laboratory, and Zubair General Hospital from October 1, 2024, to January 5, 2025. The research aims to develop specialized endurance exercises, assess changes in blood measurements, immune proteins, immune system function, and performance, and compare pre- and post-test results. The researcher hypothesizes that special endurance training will positively impact the physiological systems

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of athletes, with expected improvements in immune function and athletic achievement. Blood is defined here as a connective tissue responsible for nutrient transport and waste removal (Musallam, 2001), while white blood cells are immune components that protect the body from germs, including various types such as neutrophils and lymphocytes (Musallam, 2001). Immunoglobulins are antibodies that combat foreign substances, including types like IgM, IgG, and IgA (Breaux et al., 2021), while cellular immunity involves immune responses driven by specialized cells such as macrophages (2022), and humoral immunity refers to antibody-mediated responses targeting bacterial infections (Borges et al., 2022).

Materials and Methods

Study Participants.

The research sample consisted of six (6) advanced-category athletes specializing in the 800-meter run, deliberately selected from Al-Zubair Sports Club and officially registered with the Iraqi Central Athletics Federation for the 2024–2025 season. The selection criteria included similarity in training age, biological age, and performance level to ensure homogeneity. Table 1 presents the morphological characteristics of the participants, showing consistency in data distribution, as evidenced by torsion coefficient values within ±3.

Table 1. Morphological measurements of the research sample

Variables	Measurement Unit	Mean	Median	Standard Deviation	Torsion Coefficient
Age	Year	21	21	0.894	0.000
Height	cm	180.33	180	2.2422	1.825
Training Age	Year	4.33	4	0.516	0.968
Achievement (800 m)	Min	1.59	1.795	0.2264	-0.001

These values indicate that the research sample is homogeneous in terms of age, physical characteristics, and prior performance.

Pre-intervention blood and immune-related variables were also assessed to determine baseline levels and ensure participant readiness. Table 2 summarizes these measurements, where all torsion coefficients remained within the acceptable ±3 range, indicating data normality and sample consistency.

Table 2. Blood and immune system variables of the research sample (pre-test)

Variables	Measurement Unit	Mean	Median	Standard Deviation	Torsion Coefficient
White Blood Cells	Ml	4.67	5.00	0.516	-0.968
Red Blood Cells	Ml	4.273	4.150	0.307	2.022
Hemoglobin	di/g	11.17	11.00	0.753	-0.313
Platelets	Ml	219.67	220.00	0.516	-0.968
Lymphocytes	%	21.33	21.00	0.516	0.968

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Neutrophils	%	30.50	30.50	0.548	0.000
Eosinophils	%	5.67	5.50	0.816	0.857
IgG	di/mg	1127.5	1127.5	7.583	0.774
IgE	m/kiu	11.33	11.00	0.516	0.968
IgA	di/mg	171.67	171.50	1.862	1.281

Study organization.

An exploratory study was conducted on September 25, 2024, using two athletes outside the research sample at Al-Zubair Sports Stadium in Basra. The objective was to identify potential implementation issues, train assistants, test devices, and introduce procedures to the athletes. Following the pilot, pre-tests were carried out on September 28, 2024, involving blood withdrawal for lab analysis and physical performance assessments including a 300-meter run (speed endurance), 10 squat jumps (strength endurance), and a 600-meter run (performance endurance). Blood was drawn again after the 800-meter race test to monitor immune response.

The training program, designed by the researcher, was implemented over 12 weeks (October 4, 2024 – January 6, 2025), totaling 36 training sessions (3 per week). It was divided into three phases: general preparation (4 weeks), special preparation (4 weeks), and pre-competition (4 weeks). Each training unit lasted between 60 to 90 minutes. Training methods included high-intensity interval training (HIIT), repetitive training, and Fartlek, with a 3:1 load-to-recovery structure. The post-tests, conducted on January 7, 2025, followed the exact protocol as the pre-tests for consistency and comparison.

Statistical analysis.

To analyze the data and determine the effect of the training program, the researcher employed several statistical methods. These included:

1. Arithmetic Mean
2. Median
3. Standard Deviation
4. Torsion Coefficient
5. T-Test (calculated and tabular)

The mean, median, and standard deviation were used to summarize the data, while the torsion coefficient helped confirm the normal distribution and homogeneity of the sample. The

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paired t-test was applied to compare pre-test and post-test results and to determine statistically significant differences in performance, blood parameters, and immune function.

Results

Table .3 represents the means, standard deviation and value (T) calculated and tabular for the pre- and post-tests before and after the implementation of the training program in the variables of performance endurance, speed endurance, force endurance and completion of (800) .

Variables	Test		Mean	Median	standard deviation	(T) calculated value	(T) tabular value	Sig. level
Physical tests	800 m run	Pre	1.59min	2	1.17	6.892	2.776	Sig.
		Post	1.56min	1.925	0.0225			
	200 m jumping run	Pre	52.0sec	2	0.632	2.201		Sig.
		Post	41.0sec	1.925	0.632			
	400m run	Pre	60.7sec	60	1.387	34.785		Sig.
		Post	54.8sec	53	0.516			

It is clear from Table (3) that the significant differences between physical measurements and achievement under research before and after the implementation of the training program, as the standard deviations after the implementation of the training program are less than they were before the implementation of the program, and this is a preliminary indicator that there is an impact of the program on the development of physical qualities under research and achievement (200 m ran jumping 400 m running 800 m achievement) and to test the statistical significance test was used test (T) as shown in the table above.

Table 4. shows the value of arithmetic media, standard deviations, tabular and calculated T-values The results of blood measurements, blood proteins, and pre- and post-immunity for the research sample.

Variables	Measurement	Pre-program	St.d	Post-	St.d	Sig.	Calculated t	Tabular	Sig.

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	unit	mean		program mean		value		t	level
white blood cells	Ml	4.67	.516	5.67	.632	.012	-3.873	2.776	Sig.
Red blood cells	Ml	4.298	0.176	5.285	1.751	.012-	-3 .876	2.776	Sig.
Hemoglobin	di/g	11.17	.753	13.83	1.179	.014	-3 .037	2.776	Sig.
Platelets	Ml	219.67	.516	255.00	5.477	.000	-15. 732	2.776	Sig.
Limo Fusite	%	21.33	.516	31.17	0.983	.000	-16 .364	2.776	Sig.
Nitrophil	%	30.50	.548	51.33	1.966	.000	-27 .812	2.776	Sig.
Isophil	%	5.67	.816	9.67	.516	.000	-10 .954	2.776	Sig.
IgG	di/mg	1127.50	7.583	1453.33	4.082	.000	-82 .247	2.776	Sig.
IGE	m/kiu	11.33	.516	21.83	2.229	.000	-11 .864	2.776	Sig.
IGA	di/mg	171.67	1.862	255.83	3.764	.000	-43 .020	2.776	Sig.

Discussion

It is clear from Table (4) the differences in the mean, standard deviation and testing the p-value of the above variables (under research) before and after the training program that the value of (T) by comparing it with (sig) with the moral level (0.05) and since the level of significance is greater than the value of (sig), this confirms the existence of statistically significant differences for variables (blood, blood proteins and immune system) in favor of dimensional measurements.(Miguel et al., 2021)

The researcher believes that the positive results shown by the previous tables are due to the impact of the training program prepared by the researcher and because of his modest experience being one of the former Iraqi champions in athletics, coach of the Egyptian Smouha Club, University of Basra and coach of the national team, and the selection of sound and correct training methods, especially those that help develop the stretch (aerobic lactic and anaerobic).(Liao et al., 2021)

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The researcher also took into account the ripples of the training load in terms of intensity, size and comfort, which gave a clear indication of the role of the training program in raising physiological and physical competencies, and the researcher also took into account the principle of individual differences and ripples of training load and the efficiency of athletes where the more the trend towards improving performance and achieving the best achievement, which had a positive impact on the development of the above variables, which brought about the process of functional adaptation and thus the development of achievement.(Hortobágyi et al., 2022)

Therefore, the use of appropriate and purposeful training achieves advanced results when it is fully specialized, The goal of the sports training process is to reach the individual athlete to the highest level of athletic achievement in the event or activity in which the player specialized.(Schneider et al., 2018)

As for the role of endurance, especially speed endurance, it is an important and basic physical requirement for 400-meter runners, considering that the race distance requires this physical ability and its development helps to achieve the required achievement, and for this reason the player who has the characteristic of stretching can perform races with technical abilities and efficiency without falling the level or without showing signs of fatigue that affect the continuation of performance as required.(Sonchan et al., 2017)

Conclusions.

In light of the research objectives and hypotheses, and based on the findings obtained through the research procedures, tests, statistical analyses, and subsequent discussions, the researcher arrived at several important conclusions. First, special endurance training designed on sound scientific foundations was found to significantly enhance the efficiency of the immune system in athletes competing in the 800-meter event.

Furthermore, the study demonstrated that the preparation and application of well-structured exercises, incorporating aerobic, lactic, and anaerobic energy systems, contributed to improvements in the morphology and function of neutrophil cells. This adaptation indicates a strengthened immune response as a result of the specialized training regimen.

Additionally, the training program developed by the researcher proved effective in enhancing athletic performance. This was evidenced by measurable improvements in the time taken by the runners to complete the 800-meter race, confirming the positive impact of structured endurance exercises on competitive achievement.

Recommendations

Informed by these conclusions, the researcher puts forward several recommendations to optimize the benefits of endurance training and its effects on athlete health and performance. First, there is a clear need for continuous and periodic medical monitoring to ensure the proper functioning of the body's vital organs, safeguarding athlete health over time.

Moreover, regular physical exercise should be emphasized as a key strategy in improving overall health, particularly the efficiency of various bodily systems, with special attention to the immune system. The study also highlights the importance of applying similar endurance training principles across different fields of physical activity to achieve broader health and performance benefits.

A further recommendation is to promote stronger collaboration between medical and sports professionals to elevate the level of athletic performance nationally, particularly within Iraq. Additionally, greater reliance on medical analyses as a standard tool for evaluating general health status and for the selection of athletes is strongly advised.

Finally, the researcher encourages future investigations into the relationship between immune system function and performance development across various sports disciplines. Such studies would provide valuable insights into optimizing training programs and enhancing athlete health and competitive success.

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Conflict of interest

Have no conflict of interest to declare.

References

Borges, L., Dermargos, A., Gorjão, R., Cury-Boaventura, M. F., Hirabara, S. M., Abad, C. C., Pithon-Curi, T. C., Curi, R., Barros, M. P., & Hatanaka, E. (2022). Updating futsal physiology, immune system, and performance. *Research in Sports Medicine*, *30*(6), 659–676.

Breaux, R., Dvorsky, M. R., Marsh, N. P., Green, C. D., Cash, A. R., Shroff, D. M., Buchen, N., Langberg, J. M., & Becker, S. P. (2021). Prospective impact of COVID-19 on mental health functioning in adolescents with and without ADHD: protective role of emotion regulation abilities. *Journal of Child Psychology and Psychiatry*, *62*(9), 1132–1139. https://doi.org/10.1111/jcpp.13382

Christiani, M., Grosicki, G. J., & Flatt, A. A. (2021). Cardiac-autonomic and hemodynamic responses to a hypertonic, sugar-sweetened sports beverage in physically active men. *Applied Physiology, Nutrition, and Metabolism*, *46*(10), 1189–1195.

Fikret, A., & Leyla, S. (2020). Physical activity and physical fitness levels of convicts/detainees remaining in closed penalty execution institutions. *Pamukkale Journal of Sport Sciences*, *3*, 28–41.

Fiľo, P., & Janoušek, O. (2022). The relation between physical and mental load, and the course of physiological functions and cognitive performance. *Theoretical Issues in Ergonomics Science*, *23*(1), 38–59. https://doi.org/10.1080/1463922X.2021.1913535

Hortobágyi, T., Vetrovsky, T., Balbim, G. M., Sorte Silva, N. C. B., Manca, A., Deriu, F., Kolmos, M., Kruuse, C., Liu-Ambrose, T., Radák, Z., Váczi, M., Johansson, H., dos Santos, P. C. R., Franzén, E., & Granacher, U. (2022). The impact of aerobic and resistance training intensity on markers of neuroplasticity in health and disease. *Ageing Research Reviews*, *80*. https://doi.org/10.1016/j.arr.2022.101698

Jabbar, A. K., Faraj, A. S., & Khazaal Jabbar, A. (2025). Effect of phosphorous training according to pulse intensity to develop speed endurance and Achievement of 400-meter run for women Introduction Scientific creativity made researchers in the search and investigation of scientific facts. *Musamus Journal of Physical Education and Sport (MJPES)Physical*, *7*(1), 308–316. https://doi.org/10.35724/mjpes.v7i1.6743

Liao, B., Zhao, Y., Wang, D., Zhang, X., Hao, X., & Hu, M. (2021). Nicotinamide mononucleotide supplementation enhances aerobic capacity in amateur runners: a randomized, double-blind study. *Journal of the International Society of Sports Nutrition*, *18*(1), 54. https://doi.org/10.1186/s12970-021-00442-4

Miguel, M., Oliveira, R., Loureiro, N., García-Rubio, J., & Ibáñez, S. J. (2021). Load measures in training/match monitoring in soccer: A systematic review. In *International Journal of Environmental Research and Public Health* (Vol. 18, Issue 5, pp. 1–26). MDPI AG. https://doi.org/10.3390/ijerph18052721

Musallam, A. J. (2001). *The Impact of Physical Pregnancy on Some Physiological Variables of The Blood Circulation System and Blood Electrolytes and Their Relationship to Myocardial Measurements*. Basra.

Schneider, C., Hanakam, F., Wiewelhove, T., Döweling, A., Kellmann, M., Meyer, T., Pfeiffer, M., & Ferrauti, A. (2018). Heart rate monitoring in team sports-A conceptual framework for contextualizing heart rate measures for training and recovery prescription. *Frontiers in Physiology*, *9*(MAY). https://doi.org/10.3389/fphys.2018.00639

http://ejournal.unmus.ac.id/index.php/physical
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DOI: 10.35724/mjpes.v7i2.6988

Sonchan, W., Moungmee, P., & Sootmongkol, A. (2017). The effects of a circuit training program on muscle strength, agility, anaerobic performance and cardiovascular endurance. *International Journal of Sport and Health Sciences*, *11*(4), 176–179.

Van der Woude, D. R., Ruyten, T., & Bartels, B. (2022). Reliability of muscle strength and muscle power assessments using isokinetic dynamometry in neuromuscular diseases: a systematic review. *Physical Therapy*, *102*(10), pzac099.

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