Sarcouncil journal of Medical sciences

ISSN(Online): 2945-3526

Volume- 03| Issue- 10| 2024

Research Article

Received: 20-08-2024 | Accepted: 01-09-2024 | Published: 30-10-2024

# Effect of High-Intensity Interval Training on Speed Endurance and Some Functional Indicators of Young Fencing

***Dr. Mustafa Ghasib Abdulzahra and Dr. Muthana layth Hatem***

*Asst. Prof. University of Misan, College of Physical Education and Sports Science*

**Abstract:** The research study aimed to identify the high-intensity interval training stations according to the circuit training method in speed endurance and some functional indicators of the kidneys for young fencers. The researchers used the experimental method and defined their research community as players of the Maysan Governorate teams in fencing and for the three weapons in the youth category (epee, foil, and sabre), with (4) players for each weapon, out of a total of (12) players. Some procedures were adopted to achieve the objectives of the study. The study came out with the following conclusions: The high-intensity interval training stations according to the circuit training method had a positive effect on the development of speed endurance for the arm carrying the weapon and the legs. The study showed that the measurement of the functional indicators of the kidneys fell within the normal limits. The training method used achieved positive results in adapting the functional indicators of the kidneys to the research variables.

**Keywords:** High intensity interval training stations, speed load, functional indicators.

## 1INRODUCTION

### 1.1 Introduction and Importance of the Research:

The philosophy of studies on the science of modern sports training was not reduced to presenting it as an intensity, repetition and comfort, but rather expanded to the multiplicity and diversity of means and methods and integrated with training doses in order to return meaningful benefits, by identifying the effects of external load in the various body systems and providing the most accurate information that contributes to the required changes in order to achieve the best achievement.

Given the importance of diversity in training methods and means and their application in the doses of training curricula, therefore, high-intensity interval training stations according to the circuit training method are effective methods for implementing training doses, for the purpose of achieving the desired goals that were set for functional adaptation, and according to these functional changes, an improvement in the level of physical performance results.

Training doses cause various functional changes resulting from increasing the efficiency of the body's vital organs and systems in facing the training load requirements of the specialized type of sports activity. Physiological studies of sports training have not left any research phenomenon untouched, but they need to conduct more research and provide the most accurate information, including the functional responses of the kidneys accompanying the physical effort implemented during high-intensity interval training stations, which we see as worthy of attention to study as an important aspect of the body and which play a prominent and vital role in the homogeneous stability of the internal environment, to ward off the risk of metabolic waste products that cause serious damage to the cells of the body's systems. In order to maintain this, it has become important to provide the most accurate information that contributes to making the required changes with the aim of achieving the optimal achievement for fencing players.

The importance of the research lies in presenting a training vision in the high-intensity interval training stations according to the circular training method, as it is suitable for developing the speed endurance of the arm carrying the weapon and the legs, which is positively reflected in the level of skill performance, in addition to knowing its internal effects in measuring some functional indicators of the kidneys, hoping that this research will contribute scientifically to solving the field problems of fencing players.

### 1.2 Research Problem:

Believing that raising the efficiency of fencers and understanding the correct relationship of pregnancy, comfort and peculiarities of training cannot be done without identifying the internal load and the changes that occur in the functional body systems as a result of the use of exercises, which therefore aim to ration the functional external loads used, and given the lack of information available to our knowledge or lack of modernity, which serves in its outcome to raise the level of achievement, so we decided to delve into this phenomenon as a fertile field for study and research By answering the following question:

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License



***Corresponding Author:** Suhair Sadai Mahmood

DOI-https://doi.org/10.5281/zenodo.14026713

- What is the level of changes that can occur in measuring some functional indicators of the kidneys, due to the effect of high-intensity interval training stations according to the circuit training method, and does this training vision contribute to developing speed endurance for fencers.

**1.3 Research Objective:**
1- Identifying the stations of high-intensity interval training according to the circuit training method in speed endurance and some functional indicators of the kidneys of young fencers.

**1.4 Imposition of the Search**:
1- High-intensity interval training stations according to the circuit training method affect speed endurance and some kidney functional indicators in young fencers.

## 2- RESEARCH METHODOLOGY AND FIELD PROCEDURES:

**2.1 Research Methodology:**
The researchers used the experimental method with one group in achieving the research objective.

**2.2 Research Community:**
The researchers identified the research community, which are the players of Maysan governorate teams in fencing and for the three weapons (fencing sword, shish weapon, Arab sword weapon), Youth category under the age of (20 years) and registered with the lists of the Fencing Sub-Federation for the season 2021-2022, and by (4) players for each weapon, out of which their number reached (12) players and their percentage was (100%), as clinical examinations were conducted by a specialized medical staff at Al-Zahrawi General Hospital in the governorate to ensure their safety and freedom from diseases that may affect On the results of the research, homogeneity has been done in (height, body mass, chronological age, training age) as well as the equivalence of the study variables in muscular ability and some functional indicators of the kidneys (creatinine, urea), and it was found that there is clear homogeneity and equivalence in those variables for members of the research community.

**2.3 Tools, Devices and Means used in Research:**
(Tests and measurement, Arab and foreign references and sources, fencing weapons, sign, medical scale, medical tubes).

**2.4 Functional Tests and Measurements used in Research**:

**2.4.1 Muscle ability test for extending and bending the arm-bearing arm (10s): (Mustafa Jaseb, 2016)**
**2-4-2 Performance test (physical - skill) for the lower limbs (14 m): (Mustafa Jaseb, 2020)**
**2.4.3 Measurement of functional examinations:**
In order to conduct laboratory tests of the biological process variables of the study, samples were taken from the adrenaline of individuals society Search At break time By the staff of medical Specialized in the laboratory of Al-Zahrawi General Hospital in Maysan Governorate by means of medical tubes for the examination of diuresis used once, so that laboratory can examine some functional indicators of the kidneys (creatinine, urea).

**2.5 Pre-Tests:**
The researchers tested the muscular ability of the arm-bearing arm and legs on Individuals society Research in the Fencing Hall of the Faculty of Physical Education and Sports Sciences / Maysan University at ten in the morning on Thursday, 3/3/2022.

**2.6 Main Experience:**
After obtaining all the necessary approvals from the sub-fencing federation and the research community members learned about the importance of the study and the extent of its benefit, they expressed their approval to cooperate with the researchers and implement their research procedures. After completing all the preliminary procedures, starting with the results of the clinical examination and laboratory analysis, which resulted in the safety of the community and their enjoyment of complete health, the researchers began conducting their research, starting with the players' commitment to health prevention measures in light of the Corona pandemic, according to the directives of the Supreme Committee for National Health and Safety, where the players were exposed to doses of high-intensity interval training station loads according to the circular training method in the special preparation stage, as the researchers prepared the station exercises and continued to apply them within the coach's curriculum for a period of (10) weeks and at a rate of (30) training units, as the first training unit was applied on Monday 3/7/2022 and the last training unit was on Friday, corresponding to 5/13/2022, at a rate of (3) training units per week on the days (Monday, Wednesday, Friday), and the partial intensities of the special exercises were calculated by the maximum repetition of each exercise × the required intensity /100.

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

**2.7 Post-Tests:**
The post-tests of the research sample for the aforementioned variables were conducted on Tuesday, 10/5/2022.

**2.8 Statistical Methods:** The researchers used the statistical bag (SPSS) version (23).

## 3- PRESENTATION AND DISCUSSION OF RESULTS

**3.1 Presentation of Results:**

**Table 1:** shows the arithmetic means, standard deviations, (T) and (Sig) values in the speed endurance test and some of the overall functional indicators (pre-post) for the research community.

| Statistical Treatments | Unit of measurement | M | SD | T | Sig |
|---|---|---|---|---|---|
| **Weapon arm speed endurance test** | | | | | |
| southern | Number/Time | 40.38 | 1.92 | 7.855 | 0.000 |
| Go away | | 70.16 | 0.371 | | |
| **Speed endurance test for men** | | | | | |
| southern | Time | 68.63 | 1.40 | 8.20 | 0.009 |
| Go away | | 65.88 | 1.45 | | |
| **Creatinine measurement in the administration** | | | | | |
| southern | µ. Mol/L | 71.8 | 2.58 | 11.27 | 0.000 |
| Go away | | 84.7 | 2.46 | | |
| **Measurement of urea in the administration** | | | | | |
| southern | M. Mol/L | 4.4 | 1.29 | 12.82 | 0.000 |
| Go away | | 6.8 | 1.52 | | |

## 3.2 DISCUSSION:

**3.2.1 Discussion of the Results of the Weapon-Carrying Arm and Leg Speed Endurance Tests:**
The researchers attribute this development in the ability of the working and opposing muscles to endure the performance speed of the weapon-carrying arm and leg, which occurred positively among the members of the experimental group, to the high-intensity interval training stations according to the circular training method and the nature of the muscle work rhythm of the compound exercises and their formation, as it meant mixing the physical and skill aspects, as it gives the possibility of influencing muscle groups of different performance (working and auxiliary) in the training stations that resembled the skill performance in fencing, and that implementing the performance of the stations is an effective and influential means of increasing the intensity of training, which formed continuous resistance to the work of those muscles for the fencers, and with the increase in the speed of endurance, the resistance of the range of motion increases during implementation, so the stations of the training method followed are characterized by suspense and excitement to avoid boredom and the routine of the exercise in the entire training process, to motivate fencers by changing the stimuli and putting them in front of constantly renewed challenges without causing muscle stress, which resulted in developing efficiency The muscle functionally improves its speed endurance and gives it the ability to endure the skill performance of the weapon-bearing arm and legs. This interpretation is consistent with all previous studies that confirmed that "when adopting high-intensity circuit training stations, the effect is clear in developing some qualities, including the muscle's ability to endure speed". (Souhail Hermassi, 2020 & Rizki Yuliandra, 2020 & Maniazhagu, S.Malar, 2019 & Heinrich, K.M., 2014,) and "The effectiveness of circuit training stations has been proven to reflect positive changes in the adaptation of physical and functional fitness". (Bellar D, 2015 & Butcher SJ, 2015 & Gina Sobrero, 2017 & Alcaraz, P.E., 2011) and "The process of combining the physical and skill aspects contributes to the development of special physical abilities that are trained according to the motor paths of the required performance by using different types of resistance to train this muscle". (Mustafa, 2019) Also, shaping the load in it in the style of circuit training stations ensures the development of speed endurance and achieving this, as these exercises included great intensity and volume on the arm and legs during implementation. This is consistent with what was indicated by (Amira Hassan & Maher Hassan, 2008) “The principle of increasing intensity contributes to accelerating the development of physical qualities such as muscle strength and its components and special endurance for speed and strength'. In addition, exercises were adopted that resembled the skill performance of fencing during

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

the implementation period of the stations. This is consistent with what was indicated by (Al-Bishtawi & Al-Khawaja, 2005) “Special exercises that are the same or similar to the required skills aim to raise the physical ability and physiological potential of the athlete to endure strength and speed".

**3.2.2 Discussion of Creatinine Results in Diuresis:**

The researchers attribute these indications to the high-intensity interval training stations according to the circuit training method and the nature of the formation of the implemented load that increases the repeated contraction of muscle cells and in turn increases metabolic rates leaving behind waste and toxins, including creatinine, which is excreted with urine by the glomerular filtration process that works to get rid of it after it rises in the blood. This reflects the adaptation of the kidney function to its vital regulatory role to maintain the necessary stability of cells and their performance of their various vital activities. This interpretation is consistent with all previous studies that confirmed "creatinine is a chemical compound formed in the metabolism resulting from the breakdown of creatine and is filtered through the kidneys, and it was noted that there is an increase in creatinine residues in the urine due to the increasing intensity of physical activity". (Bekos C, 2016 & Jeffrey S. Forsse, 2023 & Howden, E. 2013) and "creatinine levels increase with the training dose load phase and rise in the urine and decrease in the blood as a result of functional adaptations in the kidneys". (Matthew Hall, 2013 & E. Bakońska-Pacoń, 2006) and that "the amount of glomerular filtration of creatinine residues depends on the intensity and type of exercise and increases significantly in the urine". (Arakawa K, 2016 & ZBIGNIEW, 2016)

The researchers also believe that physical effort leads to changes in blood circulation, as the rate of filtration of the renal glomerulus doubles its work despite the amount of blood received by the kidneys compared to the amount ofmuscles in the implementation of physical effort, but the glomerular filtration process works in the excretion of larger amounts of metabolic waste and other substances. The explanation was consistent with all studies that indicated that "during reduced renal blood flow, the glomerular filtration rate increases when physical exertion reaches high intensity". (Katarzyna, 2019 & Macdougall, I. 2015) and "High-intensity exercise affects protein excretion in the urine by increasing glomeruli permeability and decreasing blood return". (Lamoon S., 2009 & Pattyn, N., 2014)

**3.2.3 Discussion of the Results of Urea in Diuresis:**

The researchers explain that the increase in urea concentrations in urine is due to protein metabolism as a result of high-intensity interval training stations according to the circuit training method and the nature of the physical load formation. This in turn leads to an increase in amino acid metabolism processes, thus increasing their metabolic waste to produce urea concentrations, which are the most important wastes in the blood and constitute a burden on the various organs and systems of the body. Therefore, it limits the efficiency of the muscular system during training stations. In this case, it reflects the response and adaptation of the kidneys’ function by filtering the blood and getting rid of its toxins regularly and excreting them through the urine to maintain the body’s balance to improve performance and delay the onset of fatigue. This explanation is consistent with all previous studies in succession. (Masato Suzuki, 2015 & Guido Bellinghieri, 2008 & Jacques R, 1994) "The kidneys play an important role in keeping the body's homeostasis from excreting metabolic and harmful waste products from them. The glomerular filtration rate increases with increased metabolic rate under physical exertion" and "The excretion of urea in the urine increases in response to high amino acid metabolism and remains elevated for some time. later in proportion to the intensity and duration of the exercise". "Knowing the rates of low urea in the blood and its high urine gives good indications about the function of the kidneys".

## 4. CONCLUSIONS AND RECOMMENDATIONS:

**4.1 Conclusions:**

1- High intensity interval training stations had a positive effect on the development of speed endurance of the weapon-bearing arm and legs.

2- The study showed that the measurement of the functional indicators of the kidneys was within the normal limits.

3- The training method followed achieved positive results in adapting the functional indicators of the kidneys to the research variables.

**4.2 Recommendations:**

1- Adopting the circular training method due to its distinct positive results.

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

2- The necessity of adopting physical tests and functional measurements in determining the training and physiological status of athletes.
3- Conducting similar studies on different age groups and sports activities and for other functional variables.
4- The necessity of using modern and innovative training methods in developing the training status of fencing and other sports.

## REFERENCES

1. Alcaraz, P. E., Perez-Gomez, J., Chavarrias, M. & Blazevich, A. J. "Similarity in adaptations to high-resistance circuit vs. traditional strength training in resistance-trained men." *Journal of Strength and Conditioning Research* 25.9 (2011): 2519–2527.
2. Mahmoud, A. H. & Mahmoud, M. H. "Modern trends in sports training science." *Alexandria: Dar Al-Wafa for Dunya Printing and Publishing*, (2008).
3. Arakawa, K. "Changes in blood biochemical markers before, during, and after a 2-day ultramarathon." *Open Access Journal of Sports Medicine* 7 (2016): 43–50.
4. Makki, A. N. F. "The effect of anaerobic endurance training at different times in developing endurance (speed and strength of performance) among female fencers." Unpublished master's thesis, College of Physical Education and Sports Sciences for Girls, University of Baghdad, 2010: 59–60.
5. Bekos, C. "Non-professional marathon running: RAGE axis and ST2 family changes in relation to open-window effect, inflammation and renal function." *Scientific Reports* 6 (2016): 1–12.
6. Bellar, D., Hatchett, A., Judge, L. W., Breaux, M. E. & Marcus, L. B. "The relationship of aerobic capacity, anaerobic peak power and experience to performance in CrossFit exercise." *Biol Sport* 32.4 (2015): 315–320.
7. Butcher, S. J. "Do physiological measures predict selected CrossFit benchmark performance?" *J Sports Med* 6 (2015): 241–247.
8. Bakońska-Pacoń, E. "Creatinine clearance and 24-hour creatinine excretion profile in the urine of people after physical exercises." *Biology of Sport* 23.2 (2006): 157–170.
9. Al-Maliki, F. A. M. "The effect of training on sand in developing endurance (speed and strength of performance) among Basra youth fencing team players." *Basra Magazine* 43 (2009): 88.
10. Sobrero, G. "A comparison of high intensity functional training and circuit training on health and performance variables in women: A pilot study." *Women in Sport and Physical Activity* 25.1 (2017): 1–10.
11. Bellinghieri, G, *et al*. "Renal alterations during exercise." *Journal of Renal Nutrition* 18.1 (2008): 159.
12. Heinrich, K. M., Patel, P. M., O'Neal, J. L. & Heinrich, B. S. "High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study." *BMC Public Health* 14 (2014): 789.
13. Howden, E. J., Leano, R., Petchey, W., Coombes, J. S., Isbel, N. M. & Marwick, T. H. "Effects of exercise and lifestyle intervention on cardiovascular function in CKD." *Clinical Journal of the American Society of Nephrology* 8.9 (2013): 1494–1501.
14. Poortmans, J. R. & Vanderstraeten, J. "Kidney function during exercise in healthy and diseased humans: An update." *Sports Med* 18.6 (1994): 423.
15. Forsse, J. S. "The effect of acute aerobic exercise on biomarkers of renal health and filtration in moderate-CKD." *Research Quarterly for Exercise and Sport* (2023): 1–9.
16. Żołądkiewicz, K. "The effects of long-lasting physical exercise and training on kidney functions." *Quality in Sport* 1.5 (2019): 25.
17. Lamon, S., Martin, L., Robinson, N., Saugy, M., de Ceaurritz, J. & Lasne, F. "Effects of exercise on the isoelectric patterns of erythropoietin." *Clin J Sport Med* 19 (2009): 311–315.
18. Macdougall, I. C. & Cairns, H. S. "Effect of exercise training on estimated GFR, vascular health, and cardiorespiratory fitness in patients with CKD: A pilot randomized controlled trial." *American Journal of Kidney Diseases* 65.3 (2015): 425–434.
19. Maniazhagu, S. & Manogari, M. "Effects of circuit training and battle rope training on speed of school girls." *Asian Journal of Applied Science and Technology (AJAST)* 3.3 (2019): 66–72.
20. Suzuki, M. "Physical exercise and renal function." *J Phys Fitness Sports Med* 4.1 (2015): 17–29.
21. Hall, M. & Trojian, T. H. "Creatine supplementation." *American College of Sports Medicine* 12.4 (2013): 241.

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

**Publisher: SARC Publisher**

22. Al-Bishtawi, M. H. & Al-Khawaja, A. I. *Principles of sports training.* Amman: Wael Publishing House, 2005.
23. Abdul Zahra, M. C. "The effect of (green tea) on the oxidation level and its enzymatic antioxidants." *International Journal of Advanced Mathematical Research* 6.4 (2019): 719.
24. Pattyn, N., Coeckelberghs, E., Buys, R., Cornelissen, V. A. & Vanhees, L. "Aerobic interval training vs. moderate continuous training in coronary artery disease patients: A systematic review and meta-analysis." *Sports Medicine* 44.5 (2014): 687–700.
25. Yuliandra, R., Nugroho, R. A. & Gumantan, A. "The effect of circuit training method on leg muscle explosive power." *Journal of Physical Education, Sport, Health and Recreations* 9.3 (2020): 157–161.
26. Hermassi, S., Laudner, K. & Schwesig, R. "The effects of circuit strength training on the development of physical fitness and performance-related variables in handball players." *Journal of Human Kinetics* 71 (2020): 200.
27. Wochyński, Z. & Sobiech, K. "Post-exercise proteinuria in the cadets trained on special aerial gymnastics instruments." *International Journal of Occupational Medicine and Environmental Health* 28.5 (2015): 863–873.

**Source of support:** Nil; **Conflict of interest:** Nil.

**Cite this article as:**
Abdulzahra, M.G. and Hatem, M.L. "Effect of High-Intensity Interval Training on Speed Endurance and Some Functional Indicators of Young Fencing." *Sarcouncil journal of Medical sciences* 3.10 (2024): pp 7-12.

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License



**Publisher: SARC Publisher**