The effect of exercises in the third intensity zone of the strength characteristic of speed for the legs on some physiological and biochemical indicators for handball players

Efecto de los ejercicios en la tercera zona de intensidad de la característica de fuerza de velocidad de las piernas sobre algunos indicadores fisiológicos y bioquímicos de jugadores de balonmano

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Abstract

Objective: preparing exercises for the third intensity zone for strength and speed for the legs, and identifying their effect on some physiological and biochemical indicators for (the level of lactic acid concentration, the concentration of sodium bicarbonate, the concentration level of (potassium K+) and (sodium Na+) in the blood, and the number of breathing times (RF)
Research methodology: the experimental research method was adopted by designing the experimental and control groups on a sample of Army Sports Club players amounting to (16) players, deliberately selected (100%) from their community using a comprehensive enumeration method, and then divided into two groups of equal number, After determining the tests for physiological and biochemical indicators, these exercises were experimented with, adopting the use of different training tools, by regulating the training load for each player at an intensity of (85%) to (95%), repetitions of (5-10), groups of (3-5), and the duration of the rest periods.
Result: ha applying the third intensity zone exercises for strength and speed in the legs helps reduce the level of lactic acid concentration and increase the concentration of sodium bicarbonate in a balanced manner and helps improve the concentration level of (potassium K+) and (sodium Na+) in the blood in Blood in handball players helps reduce the number of respirations (RF) after exertion,
Conclusions: Applying exercises in the third intensity zone for strength and speed in the legs helps reduce the level of lactic acid concentration and increase the concentration of sodium bicarbonate in a balanced manner in the blood of handball players.

Keywords

Third intensity zone exercises; strength characteristic of speed for the legs; physiological and biochemical indicators; handball.

Resumen

Objetivo: preparar ejercicios para la tercera zona de intensidad para la fuerza y la velocidad de las piernas, e identificar su efecto sobre algunos indicadores fisiológicos y bioquímicos para (el nivel de concentración de ácido láctico, la concentración de bicarbonato de sodio, el nivel de concentración de (potasio K+) y (sodio Na+) en la sangre, y el número de tiempos de respiración (RF)
Metodología de investigación: se adoptó el método de investigación experimental mediante el diseño de los grupos experimentales y de control en una muestra de jugadores del Army Sports Club que ascendió a (16) jugadores, seleccionados deliberadamente (100%) de su comunidad utilizando un método de enumeración integral, y luego divididos en dos grupos de igual número. Después de determinar las pruebas para los indicadores fisiológicos y bioquímicos, se experimentaron estos ejercicios, adoptando el uso de diferentes herramientas de entrenamiento, regulando la carga de entrenamiento para cada jugador a una intensidad de (85%) a (95%), repeticiones de (5-10), grupos de (3-5) y la duración de los períodos de descanso.
Resultado: ha aplicar ejercicios de la tercera zona de intensidad para fuerza y velocidad en las piernas ayuda a reducir el nivel de concentración de ácido láctico y aumentar la concentración de bicarbonato sódico de forma equilibrada y ayuda a mejorar el nivel de concentración de (potasio K+) y (sodio Na+) en sangre en jugadores de balonmano ayuda a reducir el número de respiraciones (RF) tras el esfuerzo,
Conclusiones: Aplicar ejercicios de la tercera zona de intensidad para fuerza y velocidad en las piernas ayuda a reducir el nivel de concentración de ácido láctico y aumentar la concentración de bicarbonato sódico de forma equilibrada en sangre de los jugadores de balonmano.

Palabras clave

Ejercicios de tercera zona de intensidad; fuerza característica de velocidad para las piernas; indicadores fisiológicos y bioquímicos; balonmano.

Introduction

Modern sports training has adopted an organizational structure consistent with the state of new development by using modern scientific methods in the sports training process away from those previously relied upon traditional methods and adopting new means and methods according to a codified method that leads to knowing the effect of sports training in developing many physical, skill and physiological indicators." (Al-Nasiri & Al-Rikabi, 2020) Considering that the physiology of sports training is not limited to monitoring the development of players, but it can extend to monitoring the quality of training methods and methods and their reflection on the biological condition of the players in a way that ensures their safety and health and avoids the risks of chemical injuries to the muscles resulting from the burdens of training with high loads, and for those seeking to go out. It is a given in the field of training and sports physiology that by getting rid of imitation, it is necessary to find other ways or methods that are less restrictive and take into account the privacy of handball players and the nature and importance of their movements on the court. In addition, "the most important thing that distinguishes sports training is its connection to the theories and foundations of other sciences on which it relies mainly in forming its of achieving the principle of gradual progress." (Al-Qot, 2020). It is also believed that muscular exercises with mobile contraction improve coordination of muscle fibers and utilize the energy storage and release mechanisms in the muscles, leading to increased explosive capacity of the muscles. (Larkin, et al., 2017) Thus, "exercises that focus on mobile contraction and the exchange of muscle work work to develop fast-twitch muscle fibers and improve coordination between the nervous system and muscles.

They contribute to increasing the ability to jump, run fast, and explosive power in different types of sports." (Hasan & Shbeeb, 2021). "There must be regulation in the components of loads, such as intensity, volume, and rest, so as not to cause any health, physical, or technical harm to the athlete." (Al-Ali & Shaghati, 2006). "When exercises are varied between muscle contraction and static, a variety of muscles in the arms are stimulated, including the biceps and triceps. This helps balance muscle development and avoid overlooking the strengthening of certain muscles at the expense of others." (Al-Amin, 2018). Also, "it is difficult for trainers to devise means of isolating the muscles participating in the technical performance of skills by making them work individually, which results in them resorting to diversity and exchange to cover most of the muscles with the influence of resistances, provided that each resistance is proportional to the size of each muscle, its type, and the direction of its work in that skill" (Salman & Abdul-Ameer, 2021). "No matter how diverse the methods and methods for developing muscle strength are, the required improvements fall within the determinants of good planning for the application of these methods and methods, which often focus on plyometric and ballistic exercises in cycles of lengthening and shortening the muscle for rapid, high-production contraction in the effect of the force resulting from it." (Abdel Zaher, 2014). "Thus, third intensity zone exercises are a concept often used in physical exercise programs, and they mean exercises that target strength characterized by speed. These exercises include many fast and powerful movements that aim to improve rapid muscle strength and the ability to perform sudden and powerful movements efficiently." (Abu Al-Roumi, 2018). It is also worth noting that the diversity of exercises and the inclusion of different components of physical fitness in the training program can have a greater positive impact on the results.

These exercises may include strength, flexibility, aerobic capacity and endurance, along with the third intensity zone of strength characterized by speed. Also, third intensity zone exercises that target strength characterized by speed can help develop rapid muscle strength and can increase the efficiency of the circulatory system, and this means increasing the ability of the muscles to repeat fast and powerful movements with greater efficiency, and this contributes to improving the performance of basketball skills that... It requires quick explosions such as jumping, launching, and dodging better and stronger, and enhances the efficiency of the respiratory system, as the respiratory system needs to supply the muscles with oxygen and remove carbon dioxide effectively during high-intensity exercises. Among the distinctive exercises in the intensity zone, the third includes:

- High jumps according to the player's ability and horizontal jumps in various directions.
- Exercises that require explosive ability, such as pushing from the ground and plyometric jumps.
- Lifting free weights at high speed and repeatedly.
- Exercises that combine strength and speed, such as throwing and tossing.

Thus, the burdens of exercises in the third intensity zone for strength and speed for the legs can cause internal reactions at the biological level of the body represented by biochemical changes and the required balance of these changes mediated by physiological indicators and vital organizations in the body, as "the lack of processing of the energy currency in the body represented by the compound (ATP) (It may be considered the main cause of fatigue, and the weak ability to produce this compound is determined by the biochemical mechanisms of accumulated metabolites and biological control within the cell system that cannot be isolated or placed in isolation from this) (Al-Nedawy & Saeed Al-Mousawi, 2022) and "damage to local homeostasis responses (Local Homeostatic Responses) which is another group of responses other than reflexive actions in addition to the seconds (8-10) with the phosphagen system and "the phosphate buffer system is a mixture of phosphate (HPO4) and phosphoric acid (H2PO4) and it works like the bicarbonate system. If a strong acid such as hydrochloric acid (HCL) is added, it is replaced by weak phosphoric acid and the pH changes toward normal." (14:10) ...and when the lactic acid threshold (4 mmol) is exceeded, the pH of the blood decreases, which can become dangerous when the vital organs are unable to neutralize the blood and the internal systems and organs are unable to get rid of lactic acid." (Kaabi, 2007) In addition, "The importance of the availability of the elements potassium and sodium lies in that they are responsible for the absorption of sugars in the intestine, responsible for muscle contraction, support the amount of water within the body's cells, and regulate the pH of the blood and various body fluids." (Al-Nasiri & Al-Rikabi, 2020) As "Potassium, sodium, and magnesium work to regulate the acid-base balance within the muscle cell and require compensation to maintain this during high physical activity, which results in chemical reactions that increase the acid-base balance, in addition to their role in regulating osmotic pressure. "The Law of Mass Action states that when the final products of a chemical reaction accumulate in the reaction medium, the speed of the reaction stops almost completely." (Arthur & John, 2006) Likewise, "Biological organizations represent the line of defense." The first is in the blood for any change in the pH value, and it works within a very short period of time (a fraction of a second) to reduce the pH value.

The second line of defense is the respiratory system, which works to remove (Co2) within several minutes and then remove the carbonic acid. (H2Co2) from the body, and there is an inverse relationship between the concentration of lactic acid and the level of bicarbonate." (Saeed et al., 2019) Thus, "the process of releasing energy in the event of increased blood acidity finds difficulty temporarily due to the decrease in the activity of the enzymes responsible for energy production." (Ali & Sajit, 2017) As for "repeating the respiratory rate, the period of return to the normal state (the recovery period) depends on the physical and training state of the individual." (Antathar et al., 2023) In addition, because of the complexity and interconnectedness of this matter between training and physiology, it requires taking into account the physiological state of handball players when they receive methods. Targeted training takes the physical factor as an independent variable with specialized exercises characterized by high intensity. This is what was not emphasized by the coaches when the researcher observed the training of the Army Sports Club in Baghdad, and then this neglect may cause a decline in the level or training status of the handball players, as Improvements or reactions to the effects of these exercises were followed up.

Research aimed to

-Prepare exercises for the third intensity zone for strength and speed of the legs for handball players, and to identify the effect of exercises for the third intensity zone for strength and speed for the legs on some physiological and biochemical indicators for handball players.

Researcher hypothesizes

- There are statistically significant differences between the results of the pre- and post-tests for the experimental and control research groups for the level of lactic acid concentration, the percentage of sodium bicarbonate concentration, the concentration level of (potassium K+) and (sodium Na+) in the blood, and the number of respirations (RF) after exertion
- There are statistically significant differences between the results of the posttests of the experimental and control research groups for the level of lactic acid concentration, the percentage of sodium bicarbonate concentration, the concentration level of (potassium K+) and (sodium Na+) in the blood, and the number of respirations (RF) after exertion.

Method

Research methodology

The experimental research approach was adopted, which is defined as "controlling a specific variable within the conditions of an experiment that enjoys safety conditions to determine its effect on another variable or variables by fixing the rest of the influencing factors." (Abdel Fattah, 2022). The researcher also adopted an experimental design with tightly controlled experimental and control groups in the pre- and post-tests. The experimental group trains with exercises in the third intensity zone for strength and speed for the legs, and the control group trains using the methods used with them as they are. The limits of the research community are represented by handball players. Applicants in the Army Sports Club participating in the sports season (2021-2022) who were officially registered in the Central Iraqi Handball Federation, numbering (16) players, were all deliberately selected using a comprehensive enumeration method of (100%) because they are the population of the phenomenon investigated in the research problem, and they were dealt with. As a single sample without excluding any of them, this sample was then divided according to the parameters of the experimental design into two experimental and control groups with equal numbers for each group (8) players, who were distributed into those groups procedurally in the manner of symmetrical pairs.

Measurement and procedures

Laboratory examination of blood was adopted in the pre- and post-measurements for the players of the experimental and control research groups. The level of lactic acid concentration, the concentration of sodium bicarbonate in the blood, and the concentration level of (potassium K+) and (sodium Na+) were measured after the laboratory performed a physical effort test on The stationary bike at full speed for (90) seconds, and the number of respirations (RF) is measured immediately after the effort, and then the tester sits without performing any effort for (5) consecutive minutes, and after (5) minutes of complete rest, (5cc) is drawn. from the blood directly after the completion of this effort and is preserved in tubes for transfer to laboratory analysis to measure these four biochemical indicators. As for the content of the exercises in the third intensity zone for strength and speed for the legs, the researcher prepared them according to the method of high-intensity interval training, adopting the use of different training tools represented by each of the boxes. Wood at different heights, free weights, and rubber ropes tied to the legs, with the movement of muscle contractions similar to playing, especially when running or jumping to shoot the handball.

The intensity and times required to perform the repetitions were determined by measuring each player's abilities by the strength and speed of the legs, and taking into account the principle of gradation. With the training load for these exercises and the principle of undulation in planning them in units and weeks and over the length of the special preparation period, in addition to taking into account the individual differences of each player according to his maximum intensity, and the training load for each player began to be rationed with an intensity of (85%) to (95%) and repetitions of (5-10), and with sets (3-5), and the duration of the rest periods between repetitions, and the number of sets, and with a transitional rest period between one exercise and another (2-5) minutes according to the training specifications for the anaerobic phosphagenine energy system, as these exercises were applied at the beginning of the main section of The training unit is (120) minutes long for (10) consecutive training weeks, at a rate of (2) two units per training week, applied on the days (Monday and Wednesday) thereof, with a total of training units for these exercises (20) units, and the training session in the main section of the training unit was (14-21) minutes, so the total time for implementing the exercises in minutes amounted to (280-420) minutes, as after completing the implementation of the pre-test, the application of the intensity zone exercises began.

The third was for strength characterized by speed for the legs for the players of the experimental research group. This application began from Monday, corresponding to the date (11/9/2023) until Wednesday, corresponding to the date (15/11/2023). As for the players of the control group, they were satisfied with the method of the coach followed with them, and after completion From this experiment in the post-tests on Thursday (16/11/2023), the automated data processing using the SPSS system was verified to extract the values of the percentage, the arithmetic mean, the standard deviation, Levene's

test for homogeneity of variance, and the t-test for samples. Correlated, and t-test for uncorrelated samples.

Findings

The (table 1) shows the results of the pre-test for the arithmetic mean, standard deviation and calculated (T) value, which is greater than the tabular (T) at a significance level of (0.05).

Table 1. Shows the results of the pre-tests between the two groups on the dependent variables

Test and unit of measurement	Group	Number	Arithmetic mean	Standard deviation	Leven Homogeneity Variance	(sig)	(T)	(sig)	Type sig
Lactic aside in blood mmol/l	Experimental	8	13.38	0.744	0.025	0.876	0.632	0.537	Non sig
	Control	8	13.13	0.835					
Nahco3 in blood mmol/l	Experimental	8	12	2.138	2.739	0.120	0.564	0.582	Non sig
	Control	8	12.5	1.309					
(potassium k+) mmol/l	Experimental	8	135.5	2.563	0.019	0.891	0.408	0.689	Non sig
	Control	8	136	2.33					
(sodium na+) mmol/l	Experimental	8	3.775	0.292	0.19	0.669	0.2	0.844	Non sig
	Control	8	3.8	0.2					
(RF) every minute	Experimental	8	52.63	2.504	0.223	0.644	0.541	0.597	Non sig
	Control	8	53.38	3.021					

Not significant if (Sig) < (0.05) at the degree of freedom (total n) - (2) and the level of significance (0.05).

The (table 2) shows the results of the pre-test for the arithmetic mean, standard deviation and calculated (T) value, which is greater than the tabular (T) at a significance level of (0.05).

Table 2. Shows the results of the pre- and post-tests for the two groups on the dependent variables

Test and unit of measurement	Group and its number	Comparison	Arithmetic mean	Standard deviation	Arithmetic mean of difference	Standard deviation of differences	(T)	(sig)	Type sig
Lactic acid in blood Mmol/l	Experimental (8)	Pre	13.38	0.744	3.13	0.641	13.792	0.000	Sig
		Post	10.25	0.463					
	Control (8)	Pre	13.13	0.835	1.25	0.707	5	0.002	Sig
		Post	11.88	0.641					
Nahco3 in blood Mmol/l	Experimental(8)	Pre	12	2.138	3.38	2.264	4.217	0.004	Sig
		Post	15.38	0.518					
	Control (8)	Pre	12.5	1.309	0.88	0.641	3.862	0.006	Sig
		Post	13.38	1.061					
(potassium k+) mmol/l	Experimental(8)	Pre	135.5	2.563	7.25	2.435	8.422	0.000	Sig
		Post	142.75	0.707					
	Control (8)	Pre	136	2.33	1.13	0.641	4.965	0.002	Sig
		Post	137.13	2.357					
(Sodium Na+) mmol/L	Experimental (8)	Pre	3.775	0.292	0.763	0.325	6.639	0.000	Sig
		Post	4.538	0.052					
	Control (8)	Pre	3.8	0.2	0.138	0.074	5.227	0.001	Sig
		Post	3.938	0.177					
(RF) every minute	Experimental(8)	Pre	52.63	2.504	11	3.024	10.29	0.000	Sig
		Post	41.63	0.744					
	Control (8)	Pre	53.38	3.021	3.75	2.435	4.356	0.003	Sig
		Post	49.63	2.446					

Significance of the difference (Sig) > (0.05), degree of freedom (n)-(1) for each group, significance level (0.05).

The (table .3) shows the results of the pre-test for the arithmetic mean, standard deviation and calculated (T) value, which is greater than the tabular (T) at a significance level of (0.05).

Table 3. Shows the results of the posttests between the two groups on the dependent variables

Test and unit of measurement	Group	Number	Arithmetic mean	Standard deviation	)t(	(sig)	Type sig
Lactic aside in blood mmol/l	Experimental	8	10.25	0.463	5.814	0.000	Non sig
	Control	8	11.88	0.641			
Nahco3 in blood mmol/l	Experimental	8	15.38	0.518	4.793	0.000	Non sig
	Control	8	13.38	1.061			
(potassium k+) mmol/l	Experimental	8	142.75	0.707	6.466	0.000	Non sig

(sodium na+) mmol/l	Control	8	137.13	2.357	9.213	0.000	Non sig
	Experimental	8	4.538	0.052			
(RF) every minute	Control	8	3.938	0.177	8.851	0.000	Non sig
	Experimental	8	41.63	0.744			
	Control	8	49.63	2.446			

Significance of the difference (Sig) > (0.05) at the degree of freedom (total n) - (2) and the significance level (0.05).

Discussion

It is clear from the results that the application of the third intensity zone exercises for strength and speed for the legs in the training units for training handball players is a departure from the usual and fixed determinants in taking into account the cellular recovery time necessary to create balances through biological control over the system of biochemical reactions of metabolic products and mineral elements necessary for the efficiency of muscle cell contractions. In addition, this is what was clear because of the positive effect in improving the internal organization of the without their loss as a result of stress. Which the players receive, and thus, giving the appropriate rest period for each training intensity and its repetitions allows the cells to regain their ability to regulate energy-producing biochemical reactions during high-intensity efforts or what are called violent efforts, meaning that increasing the load by applying exercises in the third intensity zone for strength characterized by speed for the legs requires

An increase in the production of this vital energy. In addition, the processes of depolarization in the electricity of the cellular membrane for the union and separation of cellular proteins require an appropriate flow in their ionic cycles in accordance with what is appropriate for the arrival of the electrical signal and the release of acetylcholine, which was helped by the application of the exercises in the third intensity zone for the distinctive force. The results of the role of the physiological indicator represented by the number of respirations (RF) after effort among handball players was of great importance in ridding the body of metabolic products and restoring the oxidation of vital energy materials, in addition to being one of the most important indicators for expressing the physiological state of the players in physiology (Abdullah Mohsen2025), A. Training, and thus maintaining the cellular environment is a necessity for each of the handball players, which coaches must pay attention to when planning and implementing the high-intensity exercises that are the subject of the research, as "the gradual increase in the training load is the basis for any player training planning and must be followed by all players." "Those who care about their level of achievement." (Al-Abdullah, 2018) Likewise, "the ability of the muscles to resist fatigue for a relatively long period of time, and from their point of view this means the ability of the individual to continue to exert successive effort while putting resistance on the muscle groups," (Ozmen, et al., 2017) as the enzyme helps Dehydrogenase (LDH) helps in getting rid of lactic acid, and increasing the concentration of this enzyme is accompanied by an increase in getting rid of lactic acid, as it is a dehydrogenase, and then converts lactic acid into pyruvic acid, and beta-endorphins (blood morphine) work.

As a chemical carrier, it is involved in many physiological processes, and helps increase the secretion of some hormones such as glucagon and insulin." (Hussein et al., 2025) as training leads to the athlete leads to the occurrence of physiological changes that include the body's systems, and the level of athletic performance advances whenever these changes are positive in order to achieve physiological adaptation of the body's systems and then to the physical load. "Exercises that target the third intensity zone, which focuses on strength characterized by speed, contribute to strengthening muscles, tendons, and ligaments, and thus reducing the risk of injuries during sports activities and daily life." (Abdel Zaher, 2014) Also, "sodium has a role in helping to maintain blood pressure at normal levels, supports neuromuscular function, and regulates fluid balance in the body. The normal level of blood sodium ranges between (135-145) milliequivalents per liter, and sodium deficiency occurs." Blood when the level of sodium in the blood falls below (135) mEq/L (RAA - Renin Angiotensin Aldosteron System) Sodium consumption and potassium secretion from the kidneys, so an increase in the secretion of one of these substances (renin, angiotensin and aldosterone) causes the secretion of potassium in excessive amounts from The kidneys, which then leads to a lack of potassium in the blood, causing weakness, muscle aches and weakness in the muscles, and in the most difficult cases, respiratory tract failure can occur due to weak breathing muscles, and ventricular rhythm disturbances in the heart." (Rand &Suhad, 2022) In addition, "The third intensity zone works to develop a variety of physical abilities, including rapid muscular strength, and exercises that focus on the third intensity help in developing rapid muscular strength,

which is the ability to produce great force in a short time. This Useful in various sporting activities. (Abu Al-Roumi, 2018) In addition, "to increase the possibility of chemical changes in the muscle fibers, the exercises should be at a high intensity, and in this type of rapid training you will be very active." (Morad & Shbeeb, 2023) The regularity of the sample's exercise training led to the accumulation of fat, which led to weight loss Physical training produces changes as a temporary response to performing physical activity (38). the specificity of the exercises, which are designed by using more parts of the body and involving more muscles (such as double-wave exercise instead of single-arm use) and lower body participation, which leads to greater metabolic rate and thus more fat burning (Saeed et al., 2019).

Because of the specificity of the exercises, which are designed by using more parts of the body and involving more muscles (Almusawi DS, 2019) heavily on research and scientific studies through proper planning and a comprehensive scientific and practical vision in the process of preparation and training. It has proven that the use of training means and equipment has a role Positive in sports training By using a group of muscles in the body, which in turn leads to the development of strength, because these muscles have a major role in performing skills (Ali & Qassim, 2022) The stages of skill preparation are among the important stages that play a fundamental role in preparing offensive and defensive plans, and failure to implement these duties leads to poor performance (Mohammed & Saeed , 2021). Thus, modern methods for developing the physical and motor qualities that enable them to master the exercises are a development of the aspect Physical activity is separate from the skill aspects. The exercises that were prepared were intended to develop the muscle groups working in the game, and most importantly, to ensure and prepare groups with motor skills similar to performance. (Qassim, 2020) The nature and characteristics of the strategies used, as their degree is linked to sudden, rapid decline. To load the training in terms of the cool-down period or its time, and therefore did not achieve the retention of training adaptations and physical training gains (Badawi , et al., 2023)

That exercises with high-intensity loads (maximum) play an important and fundamental role in raising the level of performance of players as an individual and a team (37) .The training intensities are different, as they were controlled through a progression of intensity, as was the repetition and rest period given when applying the exercises. Significant differences in variables (36). If the player wants to reach the ideal performance, which leads to this performance being under the control of his feeling, "the speed of departure increases the greater the momentum that can be obtained while adopting the appropriate position" (35) the mechanism of action and application of training exercises has been developed scientifically by forming their types according to the goal of training, which is to reach a distinct level of physical fitness for this group and enjoy physical health appropriate to the biological age of the sample. xercises were appropriate to the level of the research participants(Shahab Ahmed,2025) R, were built on correct scientific foundations, and were implemented properly by the training coaches and the players. In addition to this, these exercises included more than one physical attribute at one time during the performance (Al-Nedawy & Saeed Al-Mousawi, 2022), confirms that scientific training standardized in physical abilities leads to changes in most muscle components that develop kinetic energy and then skills related to performance, This process is closely related to the intensity and duration of the physical effort, and these changes appear in the form of physiological adaptation, so we call it physical training (Badwi Shbeeb et al. 2023), the researcher paved the way for the preparation of physical exercises. Preventatively, then incorporate physical exercise Explosive forcewith defensive movements during the special preparation period or through exercises related to game skills (Al-Moussawi et al., 2009) .

Conclusions

- Applying exercises in the third intensity zone for strength and speed in the legs helps reduce the level of lactic acid concentration and increase the concentration of sodium bicarbonate in a balanced manner in the blood of handball players, and they excel with this basal balance over the players who train without it.
- Applying the third intensity zone exercises for strength and speed in the legs helps improve the concentration level of (potassium K+) and (sodium Na+) in the blood of handball players and they outperform players who train without them.

- Applying the exercises in the third intensity zone for strength and speed in the legs helps reduce the number of breathing times (RF) after exertion in handball players, and they outperform players who train without them.

Recommendations

- It is necessary to pay attention to planning the application of exercises in the third intensity zone for the strength and speed of the legs, taking into account the physiological state of the players and the specificity of the game of handball.
- It is necessary to pay attention to the handball players' need for physiological and biochemical improvements by maintaining their health condition.
- Scientific foundations must be adopted in planning the application of the third intensity zone exercises for strength characterized by speed of the legs, its waves and appropriate training methods, and the number of training units and weeks appropriate to the level of handball players.

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