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Study of LDH adaptations associated with the development of Speed endurance in basketball players U19

Berria Mohammed[1 *], Kasmi Bachir[2], Seghir Nour Eddine[3], Belkadi Adel[4]

*[1] * PhD Student in Sports Physiology, Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (USTOMB) ALGÉRIE, E-mail:mohammed.berria@univ-usto.dz,[2] Senior Lecturer Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (USTOMB) ALGÉRIE, E-mail:Kasmi.ustoieps@yahoo.fr, [3]Senior Lecturer Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (USTOMB) ALGÉRIE, E-mail:nsegheir@yahoo.fr. [4]Senior Lecturer Institut d'education physique et sportive Université Mostaganem ALGÉRIE. E-mail:adel.belkadi@univ-mosta.dz)*

ABSTRACT:

Purpose: The aim of this study was to investigate the effects of 8 weeks regular exercise on (LDH) level enzymes adaptation associated with the specific endurance training program. Methods: Research group consists of total basket players16 males; between 17-18 age range with (0,99±6,27). The participants were divided equally into two groups as Control Group (CG) and Experimental Group (EG). From the beginning of the study to the end of 10-weeks (90min/3day/week) of progressive speed endurance training fitness exercise, the participants were confronted to 2 tests(Test 8*25m,LDH Test) after resting plasma blood samples were done to LDH enzyme test in order to determine the (LDH) levels as biochemical markers. Results: There were no significant difference between pre and post tests in control group, however there were significant difference in (LDH) values in Experimental group between pre and post tests after 10 weeks exercise program ($p<0,05$). Conclusions: Our findings shows that, 10 weeks of regular speed endurance training application increase the level of (LDH) for basketball players.

KEY WORDS : LDH, Speed; Endurance, Basketball.

INTRODUCTION

It has commonly been assumed that changes in aerobic and anaerobic metabolism produced by a newly devised short training program[1–3], According to [4] periodized training program evoked changes in (LDH) in elite female basketball players, which appeared to influence their recovery-stress state. [5] holds the view that the components of physical preparedness (strength, speed and endurance) are in inverse interrelations. Enzymes, immune system, anabolic, and catabolic hormones and energy stores have been used to follow the physiological responses during chronic physical stress [6], A strong relationship between (CK) and (LDH) has been included in the functional assessment. These relationships may partly be explained by an indication of the degree of a physical training adaptation. Over half of those surveyed reported that, the muscle metabolism involves both of the enzymes. Further analysis showed that there is an increasing concentration of the two enzymes after the intensive physical exercise[7,8]. There is evidence that (CK) and (LDH) plays a crucial role in recovery, On the other hand, in spite of these recent findings about the role of other variables such as blood lactate (Bla), oxygen consumption (VO2) and heart rate (HR) [9–13]. A significant analysis and discussion on the subject was presented [14](LDH) works on the prevention of muscular failure in different ways.

In the recent decades, (LDH) has been one of the major interesting research subjects in sports medicine due effectiveness of obtaining information on the muscle's state. [14]. More than that, Numerous studies have attempted to explain uses of (LDH) in evaluating athlete's physical fitness[15]. It is also useful to produce energy during the Blood lactate (Bla) metabolism with an increase of heavy anaerobic dependence [16]. Data from several sources have identified the increased (LDH) and (CK) may release glucose during recovery and allows the enhanced subsequent performance. This is supported by a decrease in blood lactate (BLa), Recent cases reported by (Losnegard et al)[17] also support the hypothesis that Serum activity of muscle enzymes witnessed some changes.

Prior studies that have noted serum lactate was dramatically increased immediately post exercise, More recent attention has focused on the provision of evaluating muscle enzyme levels after exercise[18–20]. This raises questions about (LDH) which will be discussed in the next chapter. To determine the effects of (LDH), Clarkson [21] compared muscle biopsy findings have evidenced different activity of total (LDH) and (LDH) isozymes in endurance and strength athletes. The results of this study shows a higher total LDH and prevalence of LDHs activity whereas the former had lower total LDH with a prevalence of LDH isoenzymes activity. In addition, general propositions are usually supported with real examples, (LDH) and (C.K) activity measured by needle biopsy showed different behaviors and changes before and after training. These differences were also the results of different protocols, load, and level of training. [22–24]

METHODS

PARTICIPANTS

Sixteen healthy male basketball players took part in this study (mean ±SD; age: 17,37±0,51years; height: 178,00±8,28 cm; and weight: 70.62 ± 8.66 kg) participated in the study after receiving a comprehensive explanation of the procedure. The participants were also selected based on their mean period of practicing Basketball was 6,27 ± 0,99 years. Based on the results of a self-reported questionnaire, no subject had been treated with any experienced acute illness from infection during the first three months. Subjects reported no sleep disorder and did not consume any alcoholic beverages and none of them was taking any medication.

EXPERIMENTAL DESIGNS

The players were divided into two groups based on their performance (EG,CG) were of the same sex (males) This study protocol was in accordance with the Helsinki Declaration for human experimentation[25] and was approved by the scientific Institute of sports ethics committee. Blood samples were collected from an antecubital vein tow times (T1) resting baseline, (T2) immediately 48H post training period, Many Studies comparing capillary and venous blood parameters have shown contrasting results [26]. Samples collected using EDTA as an anti-coagulant were analyzed in a five-part differential hematological analyzer (Beckman Coulter, NSW, Australia) immediately after collection, for the determination of LDH levels. The (EG) was affronted to an intensive program containing speed endurance exercises From the beginning of the study to the end for 10-weeks (90min/3day/week), while the control sample was exercised for its normal program. The same tests were carried out All subjects were instructed to fast for at least 8 hours and to refrain from strenuous physical exercise for at least 48 hours before sampling and were arrived at the testing center at 8:30 AM to eliminate any possible stress effect

Table 1 :

Characteristics of study participants

Characteristic	Experimental group	Control group	sig	Differences of significance
N	8	8		
Age (years)	17,37±0,51	17,62 ±0,51	1,00	Non significant
Weight (kg)	70,62±8,66	75,62 ±7,42	0,62	Non significant
Height (cm)	178,00±8,28	179,75±9,91	0,47	Non significant
Experience (years)	6,27±0,99	5,56 ±0,58	0,91	Non significant
LDH enzyme level	156,5±68,99	175,12±74,47	0,92	Non significant
Test 8*25 m (s)	1,69±46,40	46,53±2,27	0,42	Non significant

DATA ANALYSIS

The Levene test was used to check the homocedasticity, and the Shapiro-Wilk test was used to test the normality of data, and given these assumptions were confirmed parametric statistics were used. Data are reported as mean ± SD, and 95% confidence intervals (95%CI) of the difference. performance of RSTA, and LDH Level test were tested by a paired Student's T-test. The level of statistical significance was set at 5%. Cohen's d was calculated as post LDH mean minus baseline mean divided by baseline standard deviation and classified according to Rhea (2004) for highly trained athletes (trivial < 0.25; small = 0.25 to 0.50; moderate = > 0.50 to 1.0; large = > 1.0)

THE REPEATED SPRINT TEST (RST):

The (RST) was performed outdoors on an artificial grass surface. Each test comprised 8× 25m sprints separated by 25 s active recovery during which the subjects jogged back to the starting line. Prior to the sprint tests, a standardized warm-up was led by the coach. All participants were familiarized with both performance tests. The tests were conducted on separate days with at least 48 h between each test to allow sufficient recovery. Pre- and post-training tests were performed at the same time of the day and led by the same person. Participants were advised to eat a standardized meal 2 hours prior to testing in order to be fully hydrated and to avoid consuming alcohol the day before testing and items containing caffeine on the day of testing itself.

Results:

Table 02

Biochemical test of the LDH Level before and after the experimentation.

Statistical measures	Sample size	Pre-test	Post-test	sig
Experimental Group	08	156,±568,99	245,37±84,95	0,007
Control Group	08	175,12±74,47	189,00±77,90	0,63

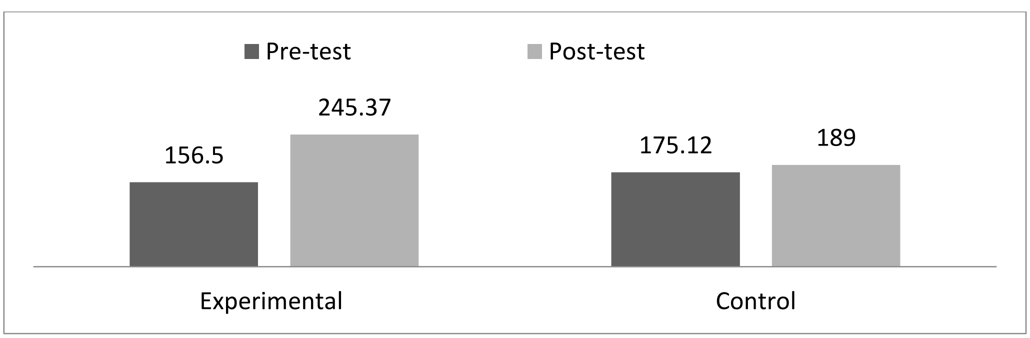

Figure 1. LDH levels before and after the interventions

It has been proved from the above results shown in figure n°1: that the pre-test average value of the sample is the experimental group applied in the program of training, proposed to the development of speed endurance has reached 156,5±68,99, whereas for the post-test, the average for the same sample has reached lots of 245,37±84,95, whereas for the control group, the average pre-test has reached 175,12±74,47, whereas for the post-test , it has reached 189,00±77,90.

Table 03

RST Test Before and After the experimentation.

Statistical measures	Sample size	Pre-test	Post-test	sig
Experimental group	08	46,40±1,69	44,41±1,95	0,002
Control group	08	46,53±2,27	45,88±1,96	0,090

It has been proved from the above results shown in Table n°2: that the pre-test average value of the sample is the experimental sample applied in the program of training, proposed to the development of speed endurance has reached 156,5±68,99, whereas for the post-test, the average for the same sample has reached lots of 245,37±84,95, whereas for the Officer sample , the average pre-test has reached 175,12±74,47, whereas for the post-test , it has reached 189,00±77,90.

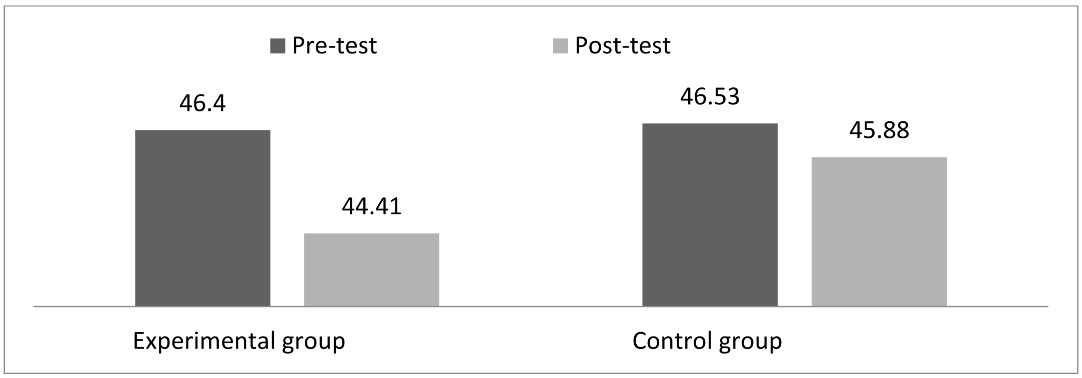

Figure 2. RAST levels before and after the interventions

It has been shown also that the moral demonstration value (Sig) of the experimental Sample has been estimated at 0,007 and which shows that there are considerable Statistics differences that exists between both Pre-test and Post-test in favor to the Post-test , Starting from the big average test . While the Officer Sample Moral Demonstration has been estimated at 0,632 and which shows to no-existing differences of considerable statistics between both pre-test and post-test.

DISCUSSION

As illustrated in table 01 there were no significant differences between the pre-test and the post-test for the control sample. However, our resulat also show that significant differences do exist, albeit findings are somewhat contradictory in pre-test and the post-test for the (EG) .These The differences between CG and EG are highlighted in Table 1. It is recommended that further research be undertaken in the following areas: Further experimental investigations are needed to estimate the LDH for 30 seconds as a primary timing of its repetitions. And after being sure of the functional adaptation of the body's organs, the timing of each physical effort repetition will be 24 second; and then ١٦ seconds which were conducted to develop the anaerobic power in main phase. This procedure explains the increasing activity of the enzyme (LDH) after a Physical efforts, The finding is consistent with findings of past studies by Author, which this goes with what has been brought by [27] who claimed that utilizing exercise may have little effect on glucose metabolism. As a result of this effort, the level of the catabolism and the anabolism of is increased, This is supported by [28] study which reveal that a catabolic dysregulation is at the core of the mechanism leading to muscle strength decline with aging .

These results were similar with the experiments of [29] who considered Such changes to the global exercise stimulus exert regulatory effects on key enzymes and transport proteins via both hormonal control and local allosteric regulation , However, it was later shown by [30] as results to his study may provide insight into the age and sex bias in musculoskeletal studies, such as those on fall risks. and found similar results to those obtained by [30–33]. Furthermore, [34,35]showed that this enzyme is affected by the increasing of the training and the physical load. In addition to work of [36,37], [34]provides That the (LDH) increases its activity with sport exercise practice of High Intensity or using resistant exercises., however, all the previous studies of [9,18,20,22,27,31,36,38]that are reported in the open literature on Changes in serum enzymes, lactate, and haptoglobin following acute physical stress in international-class athletes To the best of author knowledge, the case of[22] has not been given great attention by the researchers in the past and this motivated the present study. that the physical effort has an impact on LDH adaptations associated with the development of Speed endurance.

However, there have been no controlled studies which compare differences in biochemical adaptation of the muscle to the training process of athletes [31,39]. In fact, LDH catalyzes the conversion of pyruvate lactate and the conversion of lactate to pyruvate, the reverse reaction [40,41]. There is a difference between the activity of total LDH and its enzymes in muscle cells[42,43]. Furthermore, it is combined with the endurance and strength is consistent with literature [42,44,45]. Therefore, another motivation for this study is that the enzyme activity is related to the Physical Effort which leads to many Chemical Reactions during the Metabolism in order to produce energy[45]. Similarly, Authors like[44,46,47] founded the enzyme LDH reflects the degree of the Glycogine's decomposition in muscles effort which leads to the increasing of the enzyme "LDH" activity in Blood; this is why it is considered as an indication to the Long power anaerobic since it helps in metabolism like Lactic Acid. For this reason, any enzyme increasing activity is used to get rid of the Lactic Acid[45].Prolonged physical effort and training lead to many functional and metabolic changes in the system. It also leads to an increased physical efficiency and tolerance exertion [48,49], Thus, it is possible that the immunological and hormonal changes can occur because of an increase in training volume and intensity that are in association with stress tension in aerobic a resistance [50].

This paper reviews the literature concerning the usefulness of using physical aspect, and when we refer to the Figure 2, The present study, however, makes several noteworthy contributions to how to provide a new method in speed endurance test. According to the researchers, these differences are due to the conducted training program which contains similar exercises as the ones of the competition.

According to an investigation by Mohr et al[51] , speeds endurance training improved fatigue resistance during a great sprint ability and an intense exercise. Author added that the responses of an exercise performance are highly dependent on the type of high intensity [51]. More than that, it may a very high and constant exercise during speed endurance and concomitant long recovery interval may be a stimulus for a large range of adaptations in muscular systems which are important for improving fatigue resistance during intense exercise. On the other hand, a lower exercise intensity combined with short recovery intervals during speed endurance training[52]. However, endurance speed should be considered as a component of endurance and not of the speed[52–54]. Studies show some beneficial effects aerobic exercise and resistance training among adults. [51,53,55]stated that anaerobic speed is divided into two subcategories. First-speed endurance production which is conducted at very high intensities during 30s exercise intervals interspersed with 2-3 min rest period to ensure sufficient recovery prior to undertaking the next exercise [56]. More than that, endurance production training to distance runners found greater improvement in running economy compared to traditional endurance training .The second is called speed endurance maintenance training [57]. Further investigation and experimentation into Speed endurance Training is strongly recommended. A number of possible future studies using the same experimental set up are apparent. It would be interesting to assess the effects of Another biochemical markers to explore whether adaptations in oxygen uptake Kinetics and running economy may have contributed to the differences between the speed endurance production and speed endurance maintenance groups[56,57]. In summary, our results suggest that 8 weeks regular exercise endurance training increases expression of LDH enzyme in blood after 48h of resting.

CONCLUSION:

The present study was designed to determine the effects of 8 weeks regular exercise on (LDH) level enzymes adaptation associated with the specific endurance training program, and it was demonstrated by the levels of this enzyme in the blood.

Thus, we can consider That LDH enzyme as biochemical indicator of the anaerobic system's adaptation and his efficiency for evaluation the recovery performance of basketball players.

It is recommended that further research be undertaken in the following areas: Further experimental investigations are needed to estimate LDH During a special period of the season. However, well controlled studies are still required to be done because the lack of similar evidences and the considerable methodological limitations in this study.

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