

Designing a Training Program According to Borg Rating of Intensity and its Effect on Some of the Physical and Functional Capabilities and Achievement in Individual Time Trial For Cyclist's Juniors

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((Abstract))

The research aims to Designed Training program according to Borg rating of intensity fit with abilities research sample for cyclist's individual time trial juniors. And identify the effect of the training program in some of the physical and functional capacities and achievement for cyclist's individual time trial juniors. The experimental method for suitability in solving the problem of the research on a sample of Juniors in the road race cyclist's season (2018-2017) representing the age group (17-18 years) and totaling (20) cyclists who make up the percentage (71.42%) of the Finding the original community. Chosen way intentional been randomly assigned to two groups officer and pilot of (10) cyclist's for each group. It was the use of statistical Pouch (SPSS) to extract the results. It was reached The intensity Zones, which was an enhancement factor to develop of the physical and functional abilities and achievement of cyclist's individual time trial juniors. And Training according to intensity Zones contributes to raising the level of adaptation to the body's functional equipment and recovery through the training unit and between the training units and avoid injury which is enhancement of physical performance. And determining the lactic threshold heart rate of cyclist's contributes to the codification of training programs and reaching the goals to be achieved.

Introduction and the Importance of Research: -

The Borg rating of perceived exertion of intensity is one of the modern classifications used to standardize training programs and helps to identify the appropriate intensity to make the training more logical by collecting daily and weekly workload as an indicator of how difficult the small training department compared to the previous training courses to avoid stress, instead of the progress in the workload in the form of A straight line follows a pattern that allows the body to gradually adjust and upgrade its capabilities and this will be fruitful in races .

The Borg rating scale (RPE scale) is a simple method of rating perceived exertion (RPE) and can be used by coaches to gauge an athlete's level of intensity in training and competition. Perceived exertion is an individual's rating of exercise intensity, formed by assessing their body's physical signs such as heart rate, breathing rate and perspiration/sweating. This measure was created in 1960 by Dr. Gunnar Borg, a Swedish psychiatrist. (Abdulkarim, 51ص,2013)

This assessment should take place at the beginning of the training season as well as throughout the training process to assess progress. This gives me a better picture of the athletes' abilities, both physically and mentally, and thus allows for training by the trainer, which is critical to the development of any athlete.

The load is measurable using the Borg evaluation of the measurement of effort and is often used by scientists to determine at which level the athlete works. The trainer can easily identify the athlete's access to the lactic threshold through the Borg rating to assess the difficulty of exercise. (Earlen, 2011)

Dr. Borg has established two types of measurements for intensity as follows :- (Abdulkarim, 2013,52ص)

1. Scale (6-20) Grade: The scale is based on 6-20, the grade 6 represents the lowest voltage / pain level and 20 is the highest level: -

- (6-9) degree in the training recovery.
- (10-12) degree in aerobic endurance training.
- (13 - 14) degree when the cadence development exercises to bear strength and speed.
- (15 - 16) degree when drills without threshold slightly.
- (17) degree when the threshold exercises .
- (18 - 20) degree when training maximum aerobic capacity and anaerobic capacity .

2. (CR10) Grade: The CR10 is similar to the 6 -20 scale. However, it is between 0-10 and 0 is no voltage and 10 is the maximum voltage.

- (0) degree No recuperation from training.
- (1) the degree of training exercises and feet.
- (2) Degree of very light rotary drills .
- (3) Degree of endurance exercises.
- (4) The degree of long-term performance exercises is somewhat difficult .
- (5) Degree exercises that require concentration, increased breathing rate .
- (6) The degree of short end exercises and breathing becomes heavy .
- (7) Degree of mountain highlands and road racing exercises .
- (8) Degree exercises are very hard .
- (9) Degree drills that reach the death limit feeling and win the races .
- (10) Degree of maximum voltage training.

The importance of research is through the adoption of modern scientific methods and the application of training according to the classification of Borg rating of intensity as well as areas (Lactic threshold heart rate) despite the existence of several classifications of areas of intensity that varied through the actual need of the athlete and the type of sports effectiveness and practice and age and training of the athlete to upgrade In the level of training for cyclists and to be training more stable, especially during the long period to achieve outstanding achievement, and adopt modern scientific methods that increase the capabilities of the athlete and provides unique advantages of the cyclist through the monitoring of the intensity of training, or racing As well as the ease of application of the program without the need for multiple devices expensive physically for the cyclist or trainer.

Research problems:-

The achievement of sports achievements requires the use of modern training methods and means, which are a necessary requirement for trainers to upgrade the physical and functional capabilities and achievement of riders

through the codification of training programs that help to carry loads of training and high demands that require high levels of performance in the race.

The problem of research is to depart from the traditional formulas of rider training programs and to adopt a modern classification of intensity and to use the areas of intensity in this classification to put the training doses in a training program that is radically different from what was previously applied and to know the effect on the physical and functional riders' abilities and their performance in the individual time trial.

Research goals:-

- 1- Design a training program according to the classification of Borg areas of intensity to suit the capabilities of the sample of the Individual Time Trial for Cyclist's juniors.
- 2 - To recognize the impact of the training program in some physical and functional abilities and achievement of the Individual Time Trial for Cyclist's juniors.

Research assumes:-

- 1- There are statistically significant differences between the results of the tests of the physical abilities of the members of the research sample of the control and experimental groups.
- 2 - There are statistically significant differences between the results of the dimension of the functional abilities of the members of the research sample of the control and experimental groups.
- 3 - There are statistically significant differences between the results of the remote tests in the completion of the research sample of the control groups.

Research fields:

The human field: - Road race trainees Youth class (ages 17-18) Participants in the Iraqi league (2017 - 2018) .

Time domain: - The period from 1/1/2018 until 1/6/2018, including the duration of implementation of the main experiment from 31/1/2018 to 6/5/2018.

Baghdad - Al-Diwaniyah, Diwaniyah - Baghdad, as well as the Laboratory physiology in the college of Physical Education and Sports Sciences - Al-Qadisiya University .

Research Methodology and Field Procedures :

Research Methodology: -

The experimental approach was used in the design of the control and experimental groups, for its suitability and the nature of the research problem.

The research sample was chosen in a deliberate manner and consisted of the riders of the clubs (Najda, beaa, Muhannawiya, san Raji) for the sports season (2017-2018). The number of 20 riders was considered homogeneity in the variables that affect the results of the experiment. The homogeneity of the sample and equivalence between the two groups was calculated by measurements and tests. As shown in table (1).

Table (1)**Sample homogeneity in (height, weight, age, raining age)**

Statistical processes variables	measuring unit	Arithmetic mean	Mediator	standard deviation	Torsion coefficient
Length	cm	171.30	171.50	4.450	- 0.082
Weight	Kg	67.60	67.50	3.691	0.249
Age	month	212.75	211.00	5.964	0.296
Training age	month	33.75	31.00	10.804	0.234

The equivalence of the two research groups in the tests in question was verified to ensure a single line of initiation between the two groups, as shown in Table (2):

Table (2)**Shows the equality of sample in the previous tests for the control and experimental groups**

Variables	measuring unit	experimental group		Control group		T. test	Sig	Significance of differences
		standard deviation	Arithmetic Mean	standard deviation	Arithmetic Mean			
power	Cycle / second	1.958	21.50	1.494	21.30	- 0.257	0.800	No significant
Aerobic endurance	rate / minute	36.567	688.00	26.137	702.50	1.020	0.321	No significant
Anaerobic endurance	Minute	0.869	3.02	0.765	3.46	1.198	0.246	No significant
Strength Endurance	Meter	168.655	2320	221.826	2323	0.034	0.973	No significant
Speed endurance	Meter	88.976	1375	102.875	1415	0.930	0.365	No significant
Vo2 max	ml / kg / min	7.578	53.743	6.877	56.737	0.925	0.367	No significant
Heart rate	rate / minute	3.921	179.60	3.020	177.70	- 1.214	0.240	No significant
Stroke Volume	Millimeter	4.551	90.40	4.962	86.20	- 1.973	0.064	No significant

Cardiac output	L / min	0.854	16.118	1.110	15.364	- 1.702	0.106	No significant
Achievement	Km / h	1.632	35.97	1.278	34.86	- 1.689	0.109	No significant

The following tests were adopted :

- 1 - Maximum power test . (3:39)
- 2 - Ramp test. (4:44)
- 3 - Graded Exercise test. (5:58)
- 4 - Three minutes test by gear (53 x 13). (6:196)
5. Two-minutes test by gear (53 x 19). (6:194)
6. Vo2 max test. (7:0)
- 7 - Physio Flow tests. (7:0)
8. Achievement test. (3:41)
9. Determining the lactic threshold Heart rate test (LTHR). (5:40)

The scientific weight of the tests has also been verified with honesty, consistency and objectivity. A sample medical examination was conducted at the Center for Sports Medicine in Baghdad prior to the start of the tests.

The tests of the tribal groups (control and experimental) in the stadiums and laboratory physiology in the College of Physical Education and Sports Sciences / University of Qadisiyah and the international highway between Diwaniyah and Baghdad, on Tuesday, Wednesday, Thursday, 31/1 - 2/2/2018 and proved the conditions related To perform tests of sequence, distance, time and air pressure in bike tires and others, for the purpose of the implementation of remote tests.

The training program has been initiated., 6/2/2018, and ended (30/4/2018). The training program included the following :

- 1 - A training program was built for a period of (12) weeks by (3) intermediate training courses and (6) training modules in the small training course to be the total number of training units (72) training modules.
- 2 - The pregnancy is in the middle cycle (1: 3) and according to the severity of the maximum work.
- 3 - Base period (general preparation) were used in the first intermediate session, and in the second and third intermediate sessions, the Build period (special preparation).
- 4 - The duration of the training unit ranged from (35) minutes to (142) minutes and the principle of gradual pregnancy. The total time of the training program was (5555.52) minutes.
- 5 - The distance of the training unit ranged from (15) km to (67) km and the principle of gradual pregnancy and the total distance of the training program (2296) km.

- 6 - The principle of individual differences was adopted as a key factor in training after determining the lactic threshold of the heart rate of each cyclist within the experimental group.
- 7 - The method of continuous training and (interval) low and high intensity and repetition in the application of the program within the main section.
- 8 - The work interval – to – recovery ratio (0.5), (1.1), (1.2), (1.3), (1.5) and (1.10) .
- 9 - The training methods used in the training program varied, including bike training and non-bike training, which were implemented in an indoor training room.
- 10 - The strength exercises were adopted in the training program by dividing them into four stages, including the first stage (exercises for the purpose of anatomical adaptation), the second stage (exercises for maximum transition), the third stage (exercises for maximum strength) and the fourth stage (exercises for the strength maintenance) .
11. The appropriate weights were determined in the strength training for each cyclist through the one-time maximum strength test (1-RM).
12. For the nature of the sample and the objective of the research, the intensity of each cyclist was determined from low intensity to extreme intensity, with a severity ranging from (106-65%) of the maximum intensity of the lactic threshold to the heart rate of the cyclists .
13. The effort and burden on the cyclist was assessed during the training modules and intermediate courses through the adoption of the Borg classification of intensity. And take into account the spikes in pregnancy to avoid fatigue and overload.
14. The daily workload of the training module was calculated by multiplying the average rating of the Borg $\times$ time of the module.
15. The average workload of the training module ranged from 245 to 1967.25 and the principle of gradual pregnancy. The overall workload of the training program (63942.01)
16. Recent exercises have been adopted in the training modules in the field of bicycles, and these exercises are used in developed countries.
- 17 - Exercise flexibility and stretch in the warm up to prepare the muscles and avoid injury and the process of calm after training to relax the muscles and relaxation.

The tests were carried out on Thursday, Friday and Saturday for the period (4-6 / 5/2017) in the stadiums and the physiotherapy laboratory at the College of Physical Education and Sports Sciences / Al Qadisiya University and the international highway between Diwaniyah and Baghdad.

The statistical pouch system was used to extract the torsion coefficient, the simple correlation (Pearson), the computational circles and the standard deviations, as well as the tit test of the interrelated and independent samples .

Display, Analyze and Discuss the Results:-**Table (3)****Significance differences between the post tests for the two research groups**

Variables	measuring unit	experimental group		Control group		T. test	Sig	Differences Significance
		standard deviation	Arithmetic Mean	standard deviation	Arithmetic Mean			
power	Cycle / second	2.025	22.90	1.751	22.20	- 0.827	0.419	No significant
Aerobic endurance	rate / minute	20.806	630.00	21.275	667.80	4.017	0.001	Moral significant
Anaerobic endurance	Minute	0.388	4.175	0.605	3.229	- 4.157	0.001	Moral significant
Strength endurance	Meter	182.57	2650	90.676	2460	- 2.947	0.009	Moral significant
Speed endurance	Meter	88.349	1565	110.68	1465	- 2.233	0.038	Moral significant
Vo2max	ml / kg / min	3.469	47.115	4.369	53.043	3.360	0.003	Moral significant
Heart rate	rate / minute	7.987	158.70	4.990	166.70	2.686	0.015	Moral significant
Stroke Volume	Millimeter	6.255	99.30	5.116	92.80	- 2.544	0.020	Moral significant
Cardiac output	L / min	0.962	15.730	0.731	15.470	- 0.680	0.505	No significant
Achievement	Km / h	1.507	32.195	1.082	34.176	3.375	0.003	Moral significant

The researchers attributed these differences in favor of the experimental group in physical abilities (aerobic endurance, anaerobic endurance, strength endurance, speed endurance) to all abilities developed through the use of exercises that were based on the Lactic threshold heart rate and areas of distress according to the rating of Borg , Development of abilities and achievement of moral differences as well as muscle strength exercises used in the training program bicycle and bicycle was integral to the main body parts, and the use of high-intensity exercises to develop an aerobic endurance effect in increasing the amount of lactic acid in the Blood and muscle, which led to adaptations that help the cyclist continue to perform with the high proportion of lactic acid and this is important for the cyclist, which helps to continue and achieve the achievement in critical times of competition, and this (Tom Danielson and Allison Westfahl) that "anaerobic endurance is Muscle work without the use of oxygen and reliance

on stored energy and the inability to get rid of carbon dioxide directly through the lungs Lactic acid is formed in the muscle and then called the system of anaerobic .(8:13)

As for the non-significant differences in the ability of the (power) speed, researchers are encouraged to develop in the results of the remote tests of both control and experimental groups as a result of rapid repetition exercises using heavy gears, which helped to develop the power of speed, which came after the speed and strength training that helped in the development and stability of these The two characteristics of the riders and then the use of exercises similar to the performance in the competition that led to the link between the two capacities.

The significant differences in the distance tests for the Stroke Volume and for the benefit of the experimental group are attributed to endurance exercises (aerobic and anaerobic) in the second intensity zone (endurance), the sixth intensity zone (aerobic capacity) and the seventh intensity zone (anaerobic capacity) One of them is related to the other to balance the amount of cardiac output, and scientific studies and sources have shown that Stroke Volume increases in the athlete endurance as a result of the increase in the improvement of heart mobilization and systolic state of the heart and blood volume and low resistance in blood vessels, The birth of the Stroke Volume is linked to the maximum limit consumption of oxygen (Vo2Max) and that the Stroke Volume up to the summit when it is equal to (Vo2Max) (40 - 50%) . (9:24)

The non-significant results of cardiac output were attributed to lower heart rate of athletes in both groups due to continuing training.

As for the moral difference in achievement and for the benefit of the experimental group, it refers to the training of zones of distress focused on the development of physical and functional capabilities identified by adaptations in the internal functional organs of the body, as the design of the training program and suitability to the research sample of the most important things to make the impact , The most modern and useful training is the one that emphasizes the change at an appropriate rate in the intensity of the training within the zones of emphasis for the purpose of developing special abilities and performance and achieving the best achievement. "(10:45) The building of the program according to the correct scientific foundations has an impact on the development of performance and Achievement, as well as following the determination of average workload according to the Borg rating for the intensity that contributed to functional adaptations and speed of hospitalization as well as avoid injuries, and that the goal of the stage is consistent with the goal of the exercises achieved by these zones , " the organization of training must be on a basis adapted to the goal The training phase within the preparation phase and that the continuation of this type of training will achieve the best performance in the competitions , which leads to achieving the best levels of riders achievement " .(11:55)

• Conclusions:-

1. The exercises of the first zone (recovery) contributed to increase the speed of hospitalization and adaptation during and between training units.
2. The second intensity zone (endurance) exercises have contributed to the development of aerobic endurance by adapting to the body's internal organs and influencing the development of functional physical abilities.
3. The exercises of the third zone (tembo) contributed to increase the speed of the pace of the man to bear speed and bear power.
4. The fourth intensity (sub - lactic threshold) and the fifth intensity training (super lactic threshold) contributed to the development of bearing speed , endurance strength, anaerobic endurance and functional abilities .
5. The sixth zone (aerobic capacity) exercises have contributed to the development of aerobic endurance, increased maximum oxygen consumption, stroke size and lower heart rate, which has been positively reflected on cardiac output.
6. The seventh intensity (anaerobic capacity) exercises have contributed to the development of anaerobic and aerobic endurance, speed , strength and functional improvement .

7. The evaluation of the average workload according to Borg rating of intensity contributed to the development of physical and functional abilities, which was reflected in the development of achievement for the individual time trial cyclists for the sample of the research.

8. Training in accordance with areas of distress contributes to raising the level of adaptation to the body's functional equipment and the recovery through the training unit and between training units and avoid injuries, which reflected positively on the level of physical performance.

9. Determining the lactic threshold heart rate of cyclists contributes to the codification of training programs and reaches the goals to be achieved.

• **Recommendations:-**

1- To adopt the training program prepared according to the rating of Borg for intensity in the training of cyclists.

2 - Emphasize the need to use specific training zones for each cyclist during the training stages to maintain physical fitness and avoid excessive training.

3 - Utilizing the training in the training program prepared in a scientific and thoughtful way to develop the physical and functional abilities and achievement of individual time trial cyclists.

4 - Emphasize the need to focus on exercises areas of distress that achieve the objective of the training program during the training stages.

5 - Emphasize the need for training in all zones of distress during the training stages to achieve appropriate adaptation as each region has a specific purpose and the body will have specific physiological reactions to training.

References:-

1. Ali Hameed Abdul Karim : The Determination Of The Anthropometric Measurements And Physical Abilities For The Selection Of Junior Cyclists Racers , University of Mustansiriyah - College of Basic Education , 2013 .
2. Dimer Earlen : **Training Means and effort parameter in performance weight lifters Training** , Romania , Bucharest , 2011 .
3. Fagard, Rebert : **Athlete's Heart** , Heart Publishing Group and British Cardiac Society , 2003 .
4. J.H.J. Tacx & P.A. Tacx : **ASTRAND TEST 130 watt Tacx B.V** , Rijkssstraatweg , BW Wassenaar , 2017 , info@tacx.nl .
5. Joe Friel : **CompuTrainer workout Manuel** , racer mate incorporated , 2004 .
6. Joe Friel: **The Cyclist's Training Bible** , 3rd Ed ,United State , Colorado , Velo Press , 2003 .
7. Robert and Linda R. Sands : **The Anthropology of sport and Human movement** , USA , Rout , Ledge , 2010.
8. Samir Rajie Aubes: Effect of Specialist Training of time Trial Race According Force Moments and Electrical Activity of leg Muscles in some physical characteristics , effort distribution and achievement for Iraqi national team of bicycle , Al-Qadisiya University , College of Physical Education , 2012 .
9. Shannon Sovndol: **Fitness Cycling** , Human Kinetics , United States , 2013 .
10. Simon Jobson , James Hopker : **Performance Cycling** , First Edition , ISBN print , 2012 .
11. Tom Danielson and Allison Westfahl : **Simple Core-Training radsporter** , Velopress , USA , 2015 .