

## THE EFFECT OF A TRAINING METHOD WITH DISTANCES SHORTER & LONGER THAN RACE DISTANCE TO DEVELOP SPEED ENDURANCE, ANAEROBIC CAPACITY & ITS EFFECT ON 400 M DASH ACHIEVEMENT FOR YOUNG FEMALES

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### Abstract

The study aimed on preparing two training courses by using for the distance less or more than the race distance for developing long aerobic capacity and bearing speed for ran 400 m for young women and to identify his impact of these two approaches for developing long aerobic capacity and bearing speed for run completion 400m m for and to identify the best distance which was used in the research for distance for developing long aerobic capacity and bearing speed for ran 400 m for young women , The researchers used experimental method for two months and by three days a week and a research sample composed of young women players ran 400 meters in Sulaymani city ,toll of their number was 8 player , divided into two experimental groups , One of them Applied training course spaces less than a race distance of 400 m and Second applied or distances of more than race distance The researchers used a smart table for Energy Systems for Fox and Matthews to extract distances in training courses and the way of training And the percentage of extraction intensity And the percentage of rest to work between the duplicates and between groups Depending on certain ratios of the second and third distances of the two regions For suitability with the energy system to run 400 meters The researchers found the results that distances less is more worked on the development of variables research And developed its achievement also ran the 400 meters, but the distances over the race distance has worked to develop endurance speed and achievement was better than less of the race distance they are close together a little bit, the researchers recommend using use-distance approach or similar to the actual performance of the event itself is very comparable to the privacy of the effectiveness of 400m doing and conduct similar research on other distances in other game in track and field , especially barriers and middle distance Researchers to unload the statistical data and the results on the electronic system to extract spss research and the conclusions adopted The researchers adopted to unload the statistical data and the results on the electronic system spss for finding and concluding research

**Key Words:** Training method, shorter and longer distances than race distance, speed endurance, long anaerobic capacity, 400 m dash sprinting for young females.

### 1. INTRODUCTION

Sport education various sciences contributed effectively to raise sport performance in many different games. Sport training plays an important role in developing sport achievement and pushing it towards the highest sport levels. Bastawesi Ahmed says that: "sport training is a purposeful educational process with scientific planning for preparing players with their different levels physically, skillfully and psychologically to reach the highest possible level" (24: 3). The game of the 400 m dash race is one of the tough and quick events in athletics in which speed endurance plays an important and decisive role in achievement and achieving records. This game needs levels of speed, endurance and the rest of physical abilities to reach the hoped goal. Speed endurance is one of the most important aspects in achievement in the 400 m dash sprinting. It should be considered through setting training methods. Speed endurance is one of the complex physical capacities that consist of speed and endurance. It also means an athlete's ability to maintain his speed and the length of his/her performance duration period of the effort exerted. Athletes will resist the fatigue that emerges as a result of lack of consumed oxygen, accumulation of lactic acid in muscles and the distances used in developing these various capacities between shorter or longer than the distance of the race itself (148: 24). On the other hand, the long anaerobic capacity, with its consistency duration falls within this game and performance consistency period between (30 – 60 seconds) using nutritional fuel is called the Glycogen. Aboelela Abdelfattah, 1997 referred that this substance is originally resulted from the carbohydrate substances consumed by humans and transform in digestion into glucose sugar, but n the form of a longer complex substance, the glycogen. It splits into energy, transforms into glucose sugar, and then into lactic acid helping in rebuilding ATP to produce necessary energy (1: 32). There are a lot of trainers who prefer using shorter distances and

others prefer using longer distances based on personal experience. Hence, the importance of this study emerges in determining the priority in using shorter or longer distances than the race distance to develop speed endurance, long anaerobic capacity and achievement of the 400 m dash sprinting for young females.

**Problem of the Study**

All training methods aim to develop physical, functional aspects and achievement. Literature of training and athletics, especially in sprinting games, refer that the distances used in training methods are whether shorter or longer than distances of races themselves. After scholars’ review in addition to exploration of opinions of many trainers and specialists about priority of using distances in training, it was found that there is a difference in views in 400 meter dash sprinting. Some support adoption of shorter distances and other support adoption of longer distances. This issue makes a problem facing trainers in choosing the best method to be used, so researchers conducted this study to determine the effect of using shorter or longer distances than the race’s distance to develop speed endurance, long anaerobic capacity and the achievement in the 400 m dash sprinting race for young females.

**Goals of the Study**

1. Preparing the two training methods using shorter and longer distances than the race’s distance to develop speed endurance, long anaerobic capacity and the achievement in the 400 m dash sprinting race for young females.
2. Determine the effect of both methods using shorter and longer distances than the race’s distance to develop speed endurance, long anaerobic capacity and the achievement in the 400 m dash sprinting race for young females.
3. Determine the best distances used under study to develop speed endurance, long anaerobic capacity and the achievement in the 400 m dash sprinting race for young females.

**Hypotheses of the Study**

1. There are statistically significant differences between pre and post tests as a result of using shorter distance training in 400 m distance to develop speed endurance, long anaerobic capacity and the achievement in the 400 m dash sprinting race for young females.
2. There are statistically significant differences between pre and post tests as a result of using longer distance training in 400 m distance to develop speed endurance, long anaerobic capacity and the achievement in the 400 m dash sprinting race for young females.
3. There are statistically significant differences in post tests between both groups that used shorter and longer distances than 400 m distance to develop speed endurance, long anaerobic capacity, and the achievement in the 400 m dash sprinting race for young females.

**2. METHODOLOGY OF THE STUDY:**

The researchers used the empirical method as it is proper to procedures of the study.

**Sample of the Study:**

The sample of the study was chosen from outcomes of young females in Al Sulaimanya Governorate’s clubs in the 400 m dash sprinting in athletics (8 female runners in the original population chosen all by the researchers). Therefore, the percentage of the sample was 100% of original population of the study. The sample was divided randomly into two equal empirical groups (4 female runners each). Both groups conducted the two training methods prepared by the researchers unified in terms of intensity, size, repetition and breaks depending on high intense interval training.

**Homogeneity:**

In order to ensure homogeneity of the sample, the researchers adopted skewness coefficient to explore homogeneity in length, weight, time age and training age for the sample of the study. Results of the test are shown in table (1):

**Table (1) Homogeneity of the sample in length, weight, time age and training age**

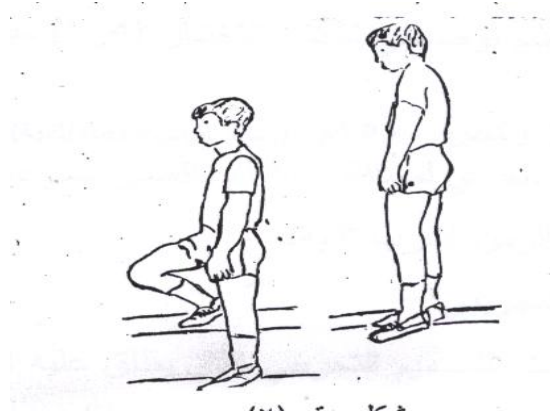
Serial	Statistics variables	Measure Unit	Arithmetic Mean	S.D	Median	Skewness
1	Mass	Kg	57.50	1.69	58.00	0.82
2	Length	M	1.63	0.02	1.63	0.21
3	Age	Year	18.62	0.51	19.00	0.64
4	Training age	Year	3.43	0.41	3.50	0.27

Table (1) shows skewness value less than ±1 for all variables in homogeneity of the sample (length, mass, age, training age).

## Field Procedures

**Tests:** the researchers adopted the following tests:

- **Speed endurance test 300 m** (316:13)
- **400 m Dash Achievement test**
- **Sprint test for the non-oxygenic capacity** (157:17) (measure unit = watt)



**Figure (1) positions of the body and legs when performing the anaerobic capacity sprint**

## Pre-Tests

The researchers conducted pre-tests for groups of the study at the same day, times and conditions to give equal opportunity to both groups to record results. Pre-tests were applied on variables of the study as follows:

First: Friday 10/07/2015

- Speed endurance test (300 m dash)
- Long anaerobic capacity test

Second: on Saturday 11/07/2015, the 400 m dash sprinting achievement test was conducted after a one-day break to reach the needed achievement. Rest between both tests of speed endurance for the 300 m dash was 45 m as a measuring rate for speed endurance in terms of intensity and break after complete recovery. The test was conducted at five in the pitch of Al Solimanya sporting club.

## 3. TRAINING METHOD

The researchers prepared two training methods for the 400 m dash for both empirical groups; one of them used distances less than the distance in 400 m dash and the other used the high intense interval training method (see annexes 1, 2). This was done depending on their field training experience and trials, opinions of some specialists in sport training and building method of interval training based on distances set by Fox & Mathews (266: 25) at table (2). This method was applied on both empirical groups on Sunday 12/07/2015 in 8 weeks (3 days a week average: Sunday, Tuesday and Thursday) considering a set of notes in methods. Note also that the female players went through their training program on other days of the week.

### Notes on the Training Method

- 1- It depends on the second and third energy system areas from two tables of (Fox & Mathews) based on distances (see table 8) to set the training program with taking a percentage from a certain sample (quarter) from the whole area alone with integration in a training unit to be proportionate with the 400 m dash event and considering the sample's category and homogeneity. This is because the energy system for any physical activity is determined in the light of effort time and energy consumption rate in this activity. One of the basic principles to build any training method is the necessity to determine the used energy system through which body loads are distributed (244: 9).
1. Intensity was determined through maximum achievement for each distance and player of the sample.
2. Breaks between repetitions were determined according to the ratio of working to breaks in the table.
3. Break within groups were set based on the table of forming training load's components to develop the lactic anaerobic abilities (197: 1).
4. The high intense interval training was used (80% to 95%).
5. The training term is the period of special preparation and the training load was done with two medium rounds.

**Type of Interval Training Used in the Study:**

The researchers adopted high intense interval training as well as the training which is based on the smart table based on time or distance (25: 266). It is divided into four areas: ATP-CP, ATP-CP-LA, ATP-O2-LA and O2. In this table, the researchers set intensity, size, breaks and method of breaks noting that this table was used in all fields of sport education for all individual, team games and teaching methods' exercises. It is possible to use the full area, parts of it or 3/2 of the training method for male young men and applicants as in table (2):

**Table (2) Smart Table to build the program in interval training based on distances**

Area	Energy system	Sprint distance	Repetitions in training units	No. of groups in one unit	No. of repetitions in one group	Ratio of work to rest	Type of rest
1	ATP – PC	50	50	5	10	3:1	Passive rest
		100	24	3	8		
2	ATP – PC LA	200	16	4	4	3:1	Positive rest
		400	8	2	4	2:1	
3	LA – O <sub>2</sub>	600	5	1	5	2:1	Passive rest
		800	4	2	2	1:1	
4	O <sub>2</sub>	1000	3	1	3	2/1:1	Passive rest
		1200	3	1	3	2/1:1	

**Post-Tests**

The working team under the researchers' supervision conducted post-tests for groups of the study at the same day, times and conditions to give equal opportunity to both groups to record results. Post-tests were applied on variables of the study in two days as follows:

First: Friday 04/09/2015

- Speed endurance test (300 m dash)
- Second: Saturday 05/09/2015
- The 400 m dash sprinting achievement test

Post-tests were conducted at the same day, times and conditions and procedures used in pre-tests.

**Discussing and Analyzing Results of Pre & Post Tests of the 1<sup>st</sup> Empirical Group, Distances Shorter than 400 m**

**Table (3) Statistical features of Pre & Post Tests of the 1<sup>st</sup> Empirical Group, Distances Shorter than 400 m:**

Serial	Test / measure unit	Pre-test		Post-test		T Counted	Significance Level	Differences
		Mean -	S.D ±	Mean -	S.D ±			
1	Speed endurance / sec	49.39	0.65	47.21	1.02	8.94	0.003	Significant
2	Long anaerobic capacity / watt	222.25	15.174	240.75	13.12	12.33	0.001	Significant
3	400 m / sec achievement	65.91	0.64	64.00	0.28	7.73	0.004	Significant

Table (3) shows that the counted T value for pre and post tests of speed endurance was (8.94) which refers that there is a significant difference, and it was (12.33) in long anaerobic capacity. This means that there is a significant difference. As for the 400 m sprinting achievement, its value was (7.73) with a significant difference.

Results show that all variables of the study developed notably as researchers found that this is due to effectiveness of the used exercises in terms of intensity, size and breaks appropriate to speed endurance requirements. This was evidence that the positive effect of the training method applied on members of the sample. This is done through preparing training in terms of setting the training place and distance. This shows that achieving and approving skills will be as a result of organizing the available tools and

materials, investing and utilizing them properly, so it was necessary to organize training due to correct rules which include optimal development (15: 76). Therefore, components of the training load of the method were used properly as a result of the training method used during the training method shown in the interval training. Since legal training loads have a great effect, they achieve a good level as asserted by (Allawy Aboelela). He found that training loads are the main method to achieve physiological effects to the body to enhance the response of body systems and raise level. It is one of the most important and successful factors and of the training programs and then improving levels (20: 22). In addition, the duration of implementing the training methods are sufficient to change for the better as any change or adaptation needs a duration to make the training effective in functions of the body that affect performance level which was asserted by (Wilmor and Castle) from (Aboelela) regarding that most changes resulting from training happened through the first period of the program within 6: 8 weeks (2: 32). Upon reviewing the training's duration, we find that it is suitable and close to program period with developing the program to be proper with the duration. Further, the training method performed by the group resulted in the hoped results as being concerned with physiological aspect and energy systems that are related to the 400 m dash represented in the long anaerobic capacity. Goals of the training unit cannot be achieved if they are far from applications of energy production system (1: 30) and the physiological aspect has a direct and effective relation with the recording level of runners in athletics and achieving physiological adaptation between muscular effort and functions of body systems. Physiological changes through organized training in body systems' functions result in adaptation of these systems through muscular effort and persistence of performing this effort (22 : 72). Results of 400 m dash achievement refer that there is also a development in results of the post-test which are better than the pre-test. Researchers found that this was due to development of speed endurance which is a physical capacity composed of endurance and speed. It means one's ability to perform physical endurance with high speed and in a specific duration. Trainers think that this is one of the most important physical capacities in training 400 m dash sprinting. The level improvement in 400 m dash sprinting is related to this capacity as asserted by (Kais Nagy) as speed endurance training is one of the most important basic elements needed in the 400 m dash training (13: 167).

**Discussing and Analyzing Results of Pre & Post Tests of the 2<sup>nd</sup> Empirical Group, Distances Longer than 400 m**

**Table (4) Statistical features of Pre & Post Tests of the 2<sup>nd</sup> Empirical Group, Distances Longer than 400 m:**

Serial	Test / measure unit	Pre-test		Post-test		T Counted	Significance Level	Differences
		Mean -	S.D ±	Mean -	S.D ±			
1	Speed endurance / sec	46.91	1.43	43.86	1.03	7.82	0.004	Significant
2	Long anaerobic capacity / watt	246.75	23.94	265.25	19.75	5.32	0.013	Significant
3	400 m / sec achievement	65.69	1.38	62.64	1.46	8.70	0.003	Significant

Table (4) shows that the counted T value for pre and post tests of speed endurance was (7.82) which refers that there is a significant difference, and it was (5.32) in long anaerobic capacity. This means that there is a significant difference. As for the 400 m sprinting achievement, its value was (8.70) with a significant difference.

Results of tests for the group which used training with longer distances than 400 m showed that there is a development as post-tests' results referred that there is a significant difference than in results of pre-tests which refers to a change in the players' likelihood towards change to better. Researchers found that this was due to effectiveness of the training method which is the used means in organizing exercises used in a scientific way to have effect as well as testing suitable close distances to develop speed endurance and suitable intensity to develop achievement speed endurance in 400 m dash. It also showed that loads are an important factor in the success and failure to achieve its goal. Organization of components in terms of intensity, size and rest in the training method to be proportionate with the level and goal of training is a very important factor in successful training. This was referred to by (Hamdy & Mohamed) as importance of intensity and load is given to be proportionate with the level of the trainee. In case of training aiming to develop and enhance speed endurance, it is good to use incomplete rest (67: 5). This was applied when designing and applying the training method to make such an improvement. The used high intensity ranges between (80 – 90%) with suitable training size distributed along 2 months. This was a sufficient period to make such effects and suitable training amount. These generate fatigue which is one of the signs of good training load to a percentage till the athlete reaches fatigue and not adapting. This was asserted by (Holman) from (Hamdy) ad “the use of training load leads to fatigue appropriate to the level of this load (5: 66). In addition, stresses and difficulties that affect functional systems related to physiological development are also effective. Legalizing these components has an effect on improving player's level, so researchers found that the training load, which is one of the most important means to affect quick response to training's requirements, enhances levels of players and makes them endure burdens of their trainings in order to make enhancement towards development of their levels and reach achievements as well as the physiological aspect represented in the long none-oxygenic capacity. This was asserted by (Allawy & Aboelela) as they found that training loads are the main method to make body physiological effects, enhance responses and adaptation of the body systems and raising levels. Yet, using proper physical loads is the important thing as physical load should not be less than the player's level, not leading to advancing the athlete's level nor more than his capacity which lead to disorder in the health

condition, fatigue and injuries. Therefore, regulation of training loads is one of the most important factors of successful training program and then performance improvement (22: 20). Finally, results of post tests of both groups of the study using shorter and longer distances than the race's distance showed that there are significant differences in tests. Results also refer that the prepared training method by the researchers with the choice of close or similar distances to actual performance of the same event, so selected distances in speed endurance training are close to distances in 400 m dash. From a training perspective, it becomes 300 meters. Distances less than actual distance use very high intensity in performance or maximum intensity due to distance length. This stimulates functional systems, muscular and nervous systems operate with maximum abilities despite severe lack in consumed oxygen which does not respond the body's need as a result of high intensity which is not appropriate with the percentage of available oxygen. This causes high accumulation of lactic acid in muscles resulting in fatigue. Training on such type of distances is very close to specifications of performing the 400 m dash as asserted by (Ralph Setpis) as he found that "it is one of the most difficult types of non-oxygenic capacities and it is repeated with less repeated times and achieved using shorter distance than the race's distance and quicker (14: 26). Moreover, (Shaker Mahmoud) asserted that training in these distances is done with high intensity and is important for the 400 m dash and at special preparation stage (8: 33). As for distances used in longer than 400 m, the used intensity will be less than in longer distances. In addition, the consumed oxygen percentage will be less, so players adapted in performance but players of short distances will not continue in shorter distances with high intensity for longer distances than training. Therefore, the group using longer distances was better and this agrees with what was found by (Bomba): "by choosing shorter distances than the race's distance, it gives higher speed than the race's in addition to application of the technique with slower distance than the race's (23: 148), so while training it is preferable to use both distances to develop speed endurance and non-oxygenic capacities included in this capacity of speed endurance which was asserted by (Crowman) from (Mohamed Reda) as it is better to develop speed endurance with high intense training with shorter time period to develop speed followed by training with average intensity training loads to develop endurance (21: 6). Finally, researchers found that both distances will lead to develop speed endurance, long the anaerobic capacity and achievement in 400 m dash sprinting for young females in a close way.

#### 4. CONCLUSIONS:

Using longer and shorter distance training than race's distance develops speed in the 400 m dash sprinting event for young females in a close way and the most used is longer distance training.

1. Using shorter and longer distance training than the race's distance developed the long anaerobic capacity in an equal way in both methods.
2. Using longer and shorter distance training than race's distance develops achievement in the 400 m dash sprinting and longer distance training developed it better than shorter one.

#### 5. RECOMMENDATIONS:

1. Asserting that using longer and shorter distance training than race's distance develops speed endurance and long anaerobic capacity in the 400 m dash sprinting.
2. Using other training method is recommended such as repeated training with high intensity.
3. Using close or similar distances to performance of actual event is very close to achievement and specifications of the 400 m dash sprinting event.
4. Conducting similar researches on other distances of athletics' races especially hurdles and average distance races.

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**Annex (1): A model for a training method for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> weeks for shorter distances than in the 400 m race:**

Week	No. of training Unit	Intensity %	Date	Method items	Repetition time (sec)	Break within repetitions (mins)	Break within groups (mins)	Weekly training size
1	1	80	Saturday	200 m x 3 250 m x 3	31 39	3 – 4 mins	6 – 8 mins	4300 m
	2		Monday	300 m x 3 350 m x 2	51 63			
	3		Wednesday	250 m x 3 300 m x 2	39 51			
2	4	80	Saturday	(200 m x 3x) <sup>2</sup>	30	3 – 4 mins	6 – 8 mins	41500 m
	5		Monday	250 m x 3 350 m x 2	38 62			
	6		Wednesday	250 m x 3) x2	38			
3	7	85	Saturday	300 x 3 250 x 2	49 37	4 – 5 mins	6 – 8 mins	4000 m
	8		Monday	350 x 2 200 x 2	60 28			
	9		Wednesday	(250 m x 3) x2	37			
4	10	80	Saturday	200 m x 2 250 m x 3	31 39	3 – 4 mins	6 – 8 mins	4400 m
	11		Monday	300 m x 3	51			

				350 m x 2	63		
	12		Wednesday	250 m x 3	39	3 – 4 mins	6 – 8 mins
				350 m x 2	62		

**Note:**

The training method lasts in the second month with the same pattern but with higher intensity in the 5<sup>th</sup> and 6<sup>th</sup> weeks to 85%, in the 7<sup>th</sup> to 90% and then reduces to 85% in the final week.

**Annex (2): A model for a training method for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> weeks for longer distances than in the 400 m race:**

Week	No. of training Unit	Intensity %	Date	Method items	Repetition time (sec)	Break within repetitions (mins)	Break within groups (mins)	Weekly training size
1	1	80	Saturday	500 m x 2 600 m x 2	1.35 1.50	4 – 5 mins	6 – 8 mins	6550 m
	2		Monday	550 m x 2 600 m x 2	1.45 1.50	4 – 5 mins	6 – 8 mins	
	3		Wednesday	450 m x 3 700 m x 1	1.15 2.15	4 – 5 mins	6 – 8 mins	
2	4	80	Saturday	(500 m x 2x) <sup>2</sup>	1.35	4 – 5 mins	6 – 8 mins	7100 m
	5		Monday	650 m x 2 700 m x 1	1.55 2.15	4 – 5 mins	6 – 8 mins	
	6		Wednesday	600 m x 2) x2	1.50	4 – 5 mins	6 – 8 mins	
3	7	85	Saturday	450 x 2 500 x 2	1.12 1.30	5 – 6 mins	6 – 10 mins	5600 m
	8		Monday	600 x 2 700 m x 1	1.46 2.10	5 – 6 mins	6 – 10 mins	
	9		Wednesday	(450 m x 2) x2	1.12	5 – 6 mins	6 – 10 mins	
4	10	80	Saturday	500 m x 2 700 m x 2	1.50 2.15	4 – 5 mins	6 – 8 mins	6600 m
	11		Monday	500 m x 2 600 m x 2	1.35 1.50	4 – 5 mins	6 – 8 mins	
	12		Wednesday	550 m x 2 450 m x 2	1.45 1.15	4 – 5 mins	6 – 8 mins	

**Note:**

The training method lasts in the second month with the same pattern but with higher intensity in the 5<sup>th</sup> and 6<sup>th</sup> weeks to 85%, in the 7<sup>th</sup> to 90% and then reduces to 85% in the final week.