

## Effect of the Contrast Training on Some Biological Variables and Special Physical Abilities of Basket Ball Players

<sup>1</sup>Asaad Ali El Kiki and <sup>2</sup>Mohamed Masoud Ibrahim

<sup>1</sup>Department of Training, Faculty of Physical Education, Alexandria University, Egypt

<sup>2</sup>Department of Biological Science and Sport Health, Faculty of Physical Education, Alexandria University, Egypt  
[msh292005@yahoo.com](mailto:msh292005@yahoo.com)

**Abstract:** The aim of this study is to assess the effect of the contrast training on some biological variables and special physical abilities of basket ball players of Saint Marc College Club. The researchers used the experimental method of a pre-post measurements of one group composed of 15 basket ball players. The execution of the proposed training program of the contrast training and its effect on some biological variables was through the period of 15/8/2014 to 15/10/2014, it included 24 training units, 3 training units weekly for 8 weeks. The proposed training program revealed an improvement in post measurements of all biological variables and special physical abilities of the basket ball players of Saint Marc Club. The researchers recommend the following: Taking the results of the biological variables and special physical abilities into account in rationing the loads and training programs and take benefits of the biological results of the basket ball players in training the players on rational scientific basis and to be directed to the contrast training.

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### 1. Introduction

So as to reach the highest level in sport, it depend on the soundness and the limit of the biological state of the different systems of the body, as this may indicate the efficiency of the systems, and the up date directions of the scientific studies of physical education progress in through the biological responses of the training programs, as the aim of the training program is to reach high standard of the players, and many scientific theories in this field led to explain some truth and help to found the best solutions and higher sport level of the players, hence it can put the physical levels and efficiencies which are suitable to the biological responses and the different sport programs are built on the experiments and assessments of the biological systems.

**Kamal Darwish and others, (1998)** states that the level of performance is effected by different biological, physiological and morphological variables as the physiological parameters are in front, in the effect of the physical performance, also efficiency and graphic are all affected by the training loads, and adaptation of the body, and its ability to retard fatigue, also the ability of the player to send the neural signals suitable to the kind of muscle contraction for performance (physical, efficiency, graphic). Due to mutation in performance and the increase in training loads (intensity and volume), it is important that the trainer be aware of the physiological effects and can in this case, put the rationing loads to induce the positive effects on the players and reach the highest performance levels (15:

17).

Adaptation and responses are achieved through the hormonal and nervous systems, as they affect the chemical levels on the body cells and systems, and the nervous system is quicker in response than endocrine system to reach homeostasis of cells as a result of the change in the outside environment or the change in the emotional activities (45).

**Ali El Beck et al., (2009)** showed that the seasonal sports timing is as preceeded shapes of biological biochemical and morphological ones, which occurred in the internal body systems of players under the effect of training and other factors (11: 64-65).

**Abu El Ella, (2003)** stated that the regular exercises can lead to biological and anabolics changes in muscle fibers as an increase in anaerobic enzymes as phosphofructokinase and the increase in ATP is (18%), PC (22%) glycogen (66%) and also affect mitochondria density and volume (1: 232-233).

**Emad Aboseid, (2005)** stated that the physical act of each sport is linked with special physical abilities that positively affect the performance. As every motion of the player needs different movement of a part or more of the body, which need muscle work by using a peculiar strength, also it need a special speed and perform the movement for a specific time and the basic physical power help the player to do different movement effectiveness of the sport in a suitable manner. As this is very important to reach higher performance activities as it is an important ability for every sport (12: 82).

It is well known, that each sport has its physical specific identity which differ from other sports, and each sport is different through its specific movements, as speed and endurance run, jump and reverse move which are important to motion ability and graphic and each kind of sport consist of many examples of movement, so it is the task of the trainer to recognize the most important physical characteristics of the sport which may help the player to perform good in efficient and graphic act (13: 33).

The basketball is a sport of different activities in defence and offence that are used due to the circumstance of play and the location of players and the space of the play ground, which led the basket ball player to do his abilities in speed, strength in accurate manner (20).

The researchers seek to know the efficiency of the up to date training methods on biological parameters and physical abilities of the basket ball players to reach the development occurring in competitive sports and to know the best method of training so as to prepare the players for improving their biological abilities and special physical abilities to reach the great mutation of physical training science.

**Brad Mc Gregor, (2006)** stated the assumption that is continuous toward the sport performance led the scientists to search methods of positive training on athletic performance and contrast training is one of these methods that attract trainers nowadays (25: 27).

**Duthie et al., (2002)** classified the types of training according to weight exercises and plyometric to:

1. Traditional training: Plyometric training is used followed by weight training.
2. Complex training: Weight training is used followed by plyometric one in the same training course.
3. Contrast training: Weight training and plyometric one in alternation (31: 530-538).

**Smilios et al., (2005)** stated that the contrast training between light and moderate intensity that affect positively the speed strength, in the case, weight training precede the plyometric one in the same session with rest period between 3-4 minutes (41: 23).

**Sharky (1991), Pouletto (1991, Wilmore and Costelle (1994)** are in accordance in development of physical abilities of players by using different types of training inside and outside the play ground, as adaptation of physical abilities did not stop by ball training but by the use of development strength muscle training that develop the muscle strength involved in skill performance, that form the main goal of the special preparation due to its sharing in skill performance (40: 72), (38: 64), (35: 154).

**Mohamed Ismail, (2010)** reported that muscle strength is an important part of the special physical abilities due to the need of leg muscles for different skill motion, skillness and strategy, as the leg muscles

might increase jumping several inches, and help skill performance as most players need muscle strength for peak performance (19).

**Aboeilla, (2003)** stated that the correlation of strength training to many physiological parameters linked to muscle or nerve nourishment of muscle and this is associated with physiological changes as hypertrophy of muscle occurred due to weight training and the increase muscle transverse section. Hypertrophy may be temporally due to pump of liquids in muscle cells, from the blood and stay for a short time, then the muscle return to its original volume in hours after training or may be permanent due to regular continuous exercises. Hypertrophy may be due to increase muscle fibrils, or contractile muscle increase in myosin and actin, increase strength in tendons and ligaments, increase capillaries density of each myofibril, also testosterone play an important role in males compared to females of the same training program as the increase percentage of testosterone over estrogen may induce increase muscle mass (1: 231-232).

The researches proved that there is a relationship between creatine kinase and testosterone, kriegel and University USA have done experiments on muscle tissues under the effect of testosterone, they found that they produce creatine more than usual of (3-5%) for 12 unit of testosterone, this was a revolution in sport training related to muscle strength stimulating the hormone as this proved that the increase in creatine may increase testosterone but this need some prove, and creatine provide ATP energy to the skeletal muscles only, but not to other tissues (46). It is accepted that some measures as sex, age, race, environment and physical activity indicate the level of creatine kinase in the body, that was linked to exercise as an insult to the muscle lead to increase in creatine kinase due to training (47).

Most researches were concentrated on the effect of training on Rbcs, Hb, but not on Wbcs, which may be due to their effect on physical fitness for O<sub>2</sub> transport to skeletal muscles, except that Wbcs is also important for athletes due to its resistance to disease in competition seasons which led to decrease fitness (48).

This study is important for the search of new training methods and its effects on biological parameters and physical abilities of basketball player during training, and these methods must be submitted to experiment, to elevate the athletes level by increasing the efficiencies of the biological changes during training and its positive effect on athletes.

#### **The importance of the study are:**

1. Help the development of training method in basketball player.
2. To know the effect of the contrast training on the biological parameters and physical abilities of training in elevation of basketball standard level.

3. To introduce the new method in training field and training programs to help elevation of basketball standard.

#### Aim of the study

Is to identify the effect of contrast training on some biological variables and special physiological abilities of the basketball players.

#### Study Hypothesis:

- There are significant changes between pre-post measurements in some biological parameters of basketball players.
- There are significant changes between pre-post measurements in some special abilities of basketball players.

Contrast training is a training shape in which weight training in high intensity is followed by plyometric training with different intensities to the active muscles and the motion passway of the performance are similar for both plyometric and weight

training (25: 125).

#### Study Procedures:

Research method: The researcher used the experimental method of pre-post measurements of one group that fit with the nature of the research.

Pre measurements of the biological parameters were from 10-11/8/2014. Blood sample was drawn and special physical abilities measurements were from 12-13/8/2014.

Basic study was done using training program from 15/8/2014 to 15/10/2014,

Post measurements was executed from 16-20/10/2014. The experiment was performed in Saint Marc College, sample used consisted of 15 Basketball players.

#### Measurements:

1. Age.
2. Height.
3. Weight.
4. Practice years.

**Table (1): Basic measurements before the experiment**

Basic Measurements	N = 15			
	Mean	SD	Skewness	Differentiating index
Age (year)	23.40	3.40	0.28	-0.20
Height (cm)	182.00	9.09	-0.12	-1.72
Weight (Kgm)	78.67	12.02	-0.13	-0.23
Practice (year)	8.47	1.70	0.79	-0.71
BMI (kgm/m <sup>2</sup> )	23.64	2.22	-0.59	0.9 9

Skewness (-0.59 – 0.79), and differentiating index (-1.72 – 0.99), they were between ( $\pm 3$ ), meaning that the sample was free of default of distribution before the experiment.

#### Laboratory measurements:

##### 1. Biological measurements:

Siemens device Ameulaat for hormones and enzymes by using radioactive materials in liquid scintillation counter.

Blood sample was drawn in special tubes containing heparin, then put in ice pack to the laboratory and using special kits.

##### Complete blood count:

Using centrifuge for separation of blood cells in special tubes containing EDTA and the device used in coulter counter for measurement of Wbcs, HB, platelets. All blood drawn by vein puncture was put in special tubes containing EDTA than to the Ice pack to the laboratory.

##### 2. Measurements of special physical abilities:

All physical abilities measurements were after references<sup>(18,19,49,50)</sup>.

##### The equipments used:

- Siemens (device Ameulaat).
- Coulter counter.
- Gym, stop watch, camera, measure scale.
- Ice pack, different weights.
- Club of basketball, whistle, cones.

##### Steps of performing the essential study:

- Period of training program (60 days).
- No. of weeks 8 weeks.
- No. of training units per week (3).
- Time of training unit (90) min.
- Method of training contrast training.

##### Principles of training program:

- Identification of the goal and aim of the different period of training.
- Identify the individual differences and responses of each player.
- Identification of the main work of training and its graduation.
- Suitability of the training program to the age period and growth development.
- Distribution and adjustment of training.
- Equilibration of special and general training.
- Flexibility of the program and practical application.
- Suitability of the load in training as intensity, volume density.
- Degradation in increasing loads and suitable progress and shape and direction of specific training loads.
- Load training dynamics.

- Taking care of the rules of warming up and cooling down.
- Adaptation.

10-11/8/2014 by the help of a Medical personal for blood drawing.

The pre-measurements of the special physical abilities from 12 to 13/8/2014.

#### Pre-measurement

It was operated for biological variables from

**Table (2): Statistical analysis of biological variables before training program**

Variables	N = 15			
	Mean	SD	Skewness	Differentiating index
CPK (UL)	121.40	32.06	0.48	-0.83
E2 (UL)	50.87	11.42	2.19	2.65
Testosterone (UL)	610.67	233.38	0.31	-1.45
L.A (mg/L)	13.67	3.31	0.24	-0.83
W.B.C (UL)	7.91	2.80	-1.67	2.86
R.B.C (UL)	5.50	0.58	0.42	-1.41
H.G.B (g/dl)	13.91	0.98	-0.25	-0.84
PLt (UL)	227.27	62.91	-0.75	1.89

Skewness (-1.67 – 2.19), and differentiating index (-1.45 – 2.86), they were between ( $\pm 3$ ), meaning that the sample was free of default of distribution before the experiment.

**Table (3): Statistical analysis of special physical abilities before training program**

Variables	N = 15			
	Mean	SD	Skewness	Differentiating index
Speed endurance (s)	44.03	2.41	0.17	0.81
Coordination (s)	8.88	0.85	-0.30	-0.58
Strength speed (m)	43.79	6.16	-0.03	-0.94
Flexibility (cm)	8.60	1.40	0.18	-0.75
Blowing strength (m)	2.24	0.12	-0.33	-0.65
Transient speed (s)	4.59	0.17	0.25	0.83
Endurance of arms (No.)	11.07	2.14	0.56	-0.29
Muscle endurance (No.)	25.27	4.74	0.10	-1.15
Agility (s)	11.03	0.62	0.22	-1.26

Skewness (-0.33 – 0.56), and differentiating index (-1.26 – 0.83), they were between ( $\pm 3$ ), meaning that the sample was free of default of distribution before the experiment.

#### Essential Study:

The researchers conducted the training program in 15/8/2014 it was applied on 24 training units, 3 units weekly for 8 weeks.

#### Training unit was composed of :

1. Preparatory part: (10 min) of warming up, stretching,
2. Main part: (75 min) of contrast training of weight and plyometric training.
3. End part: (5 min) cooling down post measurements.

After the program the following biological special ability variables were measured 16 to 20/10/2014).

#### Statistical Analysis

The researchers used (SPSS. 20) by the following manipulations:

- Mean.
- SD.
- Skewness.
- Differentiation index.
- T Test.
- Percent improvement.
- Kohen influence volume.
- ITA factor.

#### Results and Discussion

##### 1. Biological variables

**Table (4): Significant differences of biological values before and after training basketball players N = 15**

Variables	Pre meas.		Post meas.		Mean Dif.	Deviat.	T	Improvement %
	M.	SD.	M.	SD.				
CPK (UL)	121.40	32.06	162.27	31.95	40.87	10.27	15.41	33.67
E2 (UL)	50.87	29.42	35.00	17.93	15.87	12.87	4.77	31.20
Testo-sterone (UL)	610.67	233.38	771.27	202.54	160.60	62.83	9.90	26.30
L.A (mg/L)	13.67	3.31	10.46	2.20	3.21	1.50	8.29	23.48

\*  $P < 0.05$  Tcal. (4,77 – 15,41) % improvement (23,48% - 33,6%)

**Table (5): Significant differences between pre-post training of biological values of basketball players N = 15**

Variables	T	(Ita) <sup>2</sup>	Cohen inf. V.
CPK (UL)	15.41	0.94	1.28
E2 (UL)	4.77	0.62	0.31
Testosterone (UL)	9.90	0.88	0.65
L.A (UL)	8.29	0.83	0.80

\* Cohen influence volume, 0.2 low (E2), 0.5 Moderate Test, 0.8 High LA, CPK

**Table (6): Blood picture before and after training of basketball players N = 15**

Variables	Pre meas.		Post meas.		Mean Dif.	Deviat.	T	Improvement %
	M.	SD.	M.	SD.				
W.B.C (UL)	7.91	2.80	10.02	1.17	2.10	2.43	3.35	26.55
R.B.C (UL)	5.50	0.58	6.14	0.48	0.633	0.24	10.22	11.51
H.G.B (g/dL)	13.91	0.98	14.75	0.55	0.85	0.47	6.91	6.11
PLt (UL)	227.27	62.91	254.87	61.07	27.60	6.85	15.60	12.14

\* P < 0.05 Tcal (3,35 – 15,60) % improvement (6,11 – 26,55%)

**Table (7): Blood picture before and after training of basket ball players N = 15**

Variables	T	(Ita) <sup>2</sup>	Shen inf. V.
W.B.C (UL)	3.35	0.44	0.86
R.B.C (UL)	10.22	0.88	1.10
H.G.B (g/dl)	6.91	0.77	0.50
P.L.T (UL)	15.60	0.95	0.44

\* Cohen influence volume, 0.2 low (E2), 0.5 Moderate Test, 0.8 High LA, CPK

## (2) Special physical abilities:

**Table (8): Special physical abilities before and after training program of basketball players N = 15**

Variables	Pre meas.		Post meas.		Mean Dif.	Deviat.	T	Improvement %
	M.	SD.	M.	SD.				
Speed endurance (s)	44.03	2.41	39.98	2.39	4.05	1.70	9.24	9.20
Coordination (s)	8.88	0.85	8.36	0.70	0.52	0.37	5.45	5.86
Strength speed (m)	43.79	6.16	57.63	6.04	13.85	2.63	20.43	31.63
Flexibility (cm)	8.60	4.40	11.20	3.71	2.60	1.64	6.145	30.23
Blowing strength (m)	2.24	0.12	2.52	0.14	0.283	0.04	27.31	12.63
Transient speed (s)	4.59	0.17	3.98	0.15	0.61	0.09	25.26	13.29
Endurance of arms (No.)	11.07	4.64	30.53	5.96	19.74	2.56	29.45	175.88
Muscle endurance (No.)	25.27	4.74	32.33	4.78	7.07	1.03	26.50	27.98
Agility (s)	11.03	0.62	10.61	0.48	0.41	0.22	7.12	3.72

\* P < 0.05 = 2.145

**Table (9): Special physical abilities before and after training of basketball players N = 15**

Variables	T	(Ita) <sup>2</sup>	Cohen inf. V.
Speed endurance (s)	9.24	0.86	1.68
Coordination (s)	5.45	0.68	0.61
Strength speed (m)	20.43	0.97	2.26
Flexibility (cm)	6.145	0.73	0.58
Blowing strength (m)	27.31	0.98	1.87
Transient speed (s)	25.26	0.98	3.71
Endurance of arms (No.)	29.45	0.98	3.17
Muscle endurance (No.)	26.50	0.98	1.50
Agility (s)	7.12	0.78	0.59

\* Cohen influence volume, 0.2 low (E2), 0.5 Moderate Test (Agility), 0.8 High (Muscle endurance)

## Discussion

### 1. Biological variables:

Table (4, 5, 6, 7) indicated the significance

between pre and post measurements in biological variables of basketball players, there was significant changes, (P < 0.05) in all variables for the sake of post

measurement "Tcal" (4,77 – 15,71) (3,57 – 10,6) improvement percent (23,48% - 33,6%) (6,11 – 26,55%).

The improvement of testosterone was due to the effect of the proposed program, this was in accordance with Int. Association for track and field (regional center) (2010), it stated that testosterone increased after resistant training of high intensity with long rest period (Max. strength training) and significant increase in testosterone and IGF, after (Mixed exercise) (2: 12-13). **Bahaa Salama (1999)**, **Heshmat, Salah (2009)** agree that training increased energy for the sake of the demand of skeletal muscles, and Nervous system and stress hormones (5: 109) (6: 79-80). Also agree with **Crewther et al., (2013)** (27) that testosterone increased significantly in training session after the triumph match not the defeated one.

**Heshmat & Mohamed Salah (2009)** stated that there are 3 responses hormones due to physical activity:

1. Fast responses as for catecholamine, cortisol at the beginning of muscle effort.
2. Moderate responses as for thyroxine and growth and ADH.
3. Delayed responses as for aldosterone, testosterone (6: 79).

The researchers opinion is that there are some changes in Endocrine system due to physical activity, and there responses. Also the physical activity may affect anabolic hormones (Testosterone) of elite athletes.

The improvement in creatine kinase of post measurements may be due to the effect of the training program. **Risan Kherebat (2000)** reported that the training of some events like weight lift and disc throw do not increase mitochondria, some researchers found an increase in activity of some enzymes involved in metabolism and energy production, the enzymatic activity increase with training of muscles (9: 6), **Sabri Ghanem, (2002)** reported that CK plays an important role in physical activity, as its elevation increase the requirements of muscle with energy during short time in high intensity activities (10: 54).

**Alves et al., (2013) (23)** agree that strength training increase CK in serum was due to its response to frequent dose of high intensity training (34: 1065).

**Viru, (2000)** stated that the quick response of muscle due to need of the phosphoric system as energy which increase CK in muscle (42: 77) cohen agree with **Magda El Taher (2007)** who stated that anaerobic training increased CJ in the blood.

Also, **Amal El Sherif (2012) (3)** stated that there is a relation between numerical score of short distance runners and CK, Foss and **Keteyian (1998)**, **Paul et al., (1996)** reported that CK plays an important role for building PCR in muscle in rest period and recovery to increase ATP level (33: 43) (37: 234). **Rodrigues et**

**al., (2010) (39)** showed that competition training increase CK after 48 hours.

The researchers showed that CK play an important role in physical activity, as its high level increase energy of muscles from quick energy for short times in case of high intensity activities.

**As garret et al., (2000)** indicated that the quick muscle activity needs the phosphoric system as Energy source which increase CK activity in muscle (43: 77).

Many researchers indicated that lactate increased in the blood after increasing the intensities of performance as stated by: (14, 8, 21, 36, 26, 3) they added that the increase in lactate in due to the effect of the physical training, that was also noticed by **Alawy and Abou El Ella (2000)**, **Heshmat and Shalaby (2003)**, they stated that lactate is the end product of glycolysis was at rest (15 mg, 100 ml) (1mmol/L.) and increased after increased physical activity (17: 171) (7: 47-50).

**Hasaa, (2005)** showed that glycolysis in muscle result in pyruvic acid which is changed to lactic acid in anaerobic exercise, this oxygen short may lead to lactic acid accumulation (22: 4-5), he also added that high intensity exercise may help the athlete to train with high level of lactic acid specially in moderate run paces, they can tolerate high level of lactic acid (18 m mol/L.) or more during high exertion, it is well known that 2-3 m mol/L. Lactic acid accumulation is a low level after training to lactate threshold, here lactate begin to elevate (22: 10). This was noted by **Alves et al., (2013) (23)**, which indicated a decreased lactate concentration after 48 hours after the end of training.

Blood cells increased after the training program. This was also reported by (4, 24, 29). This result is also in agreement with (51) that exercise led to changes in blood which may be temporally or permanent leading to adaptation, of these increase blood volume, Hb, R bec. The variables increase in trained athletes compared to untrained, the decreased in Hb may decrease oxygen uptake, also wbcs is important as it affect immunity.

This indicate that the first hypothesis has been realized.

## 2. Discussion of special physical abilities:

Table (8, 9) indicated an improvement percent after the program (3,72% to 175,88%) in all tests of special physical abilities, this improvement was induced due to the positive effect of the training program. **Ebben et al., (2000) (32)** stated that the contrast training induced an increased  $Ca^{2+}$  levels which in turn increased ATP affecting speed strength and improve skillness performance. This was also indicated by **Duke, (2002)** which revealed an improvement of (11%) in muscle power due to weight and plyometric training and 3% only for weight training. **Ebben (2002) (44)** noticed that weight and

plyometric training with an intensity 70% might help packing fast muscle fibers which increase the profit of weight and plyometric training together.

The researchers agree with the results of **Donald Chu (1996) (28)** who mix weight and plyometric training for better results, and the combination of weight and plyometric training in the same training unit is called complex training.

This indicate that the second hypothesis has been realized. So, it may he said that the contrast training program affect positively the biological and physical and efficiency of performance, the content of the program and degrees together with the rationing of contrast physical training with rest periods and individual differences of players all these have a positive effect in elevation of the biological and physical level of the basketball players.

### Conclusion

#### It may be concluded that :

1. The contrast training affects positively and significantly and with high improvement percent the biological variables of the basket ball players.
2. The contrast training affects positively and significantly and with high improvement percent the special physical abilities of the basket ball players.
3. There was significantly differences before and after the training program on biological and special physical abilities of the basket ball players for the favour of post measurements.

### Recommendations

#### It may be recommended to:

1. Benefit of the results of the study in rationing loads and training program.
2. Benefit of the results in training players on scientific basis rationing and directing the contrast training.
3. Using the contrast training in other sports activities by making it more available for the principles of privacy and ambitious and difference and miscellaneous.
4. Direct the results of the study on a scientific basis for researcher in training program of biological and physical measurements of the basket ball players.

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