Differences in physical fitness and some pulmonary functions level for soccer youngsters

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Abstract: The aim of the study was to determine the differences in physical fitness and some pulmonary functions level for soccer youngsters, the researcher used the descriptive method due to its suitability to the nature of the study, the study sample was chosen intentionally, two groups, the first group (10) youngsters from Port Fouad club under (15) years, the second group (10) youngsters from private learning center under (15) years, physical fitness was assessed by estimating pulse rate and VO_2 max using cooper test, respiratory rate was measured also some pulmonary functions was assessed using Pony spirometer represented in FVC, FEV_1, PEF , MEF_{25}, MEF_{50}, the results revealed that the first group using rationing training were improved in comparison with the second one in all determined variables, it may be concluded that the physical training must be performed in rationing basis due to its positive effect on physical fitness and health of soccer youngsters.
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1. Introduction and research problem

Guyton and Hall (2006) states that the respiratory system transport O_2 from environment to the cells and tissues inside the body, and trans port of CO_2 from the cells and tissues to outside the body, the respiration process passes to the phases transport of air from outside the body to the respirator system, stage of transport of O_2 from the respiratory system to the blood, stage of transport of O_2 through the blood to tissues, stage of metabolism of food and energy production in the presence of O_2 by phosphorylation process. (19: 514)

Barrett et al. (2010) clarify that the stages are executed through the lungs and the bodies tissues, The lungs are positioned in the chest, the right one composed of three parts, he left one composed of two, each part is divided to (200) sub partition and many alveoli attached to bronchi the lungs is sponge in shape, the lower part is composed of dom shape muscle called diaphragm, also between the ribs located inter costal muscles, these respiratory muscles increases the long axis and the transverses axis of the lung leading to negative pressure permit the air to enter from outside the body to the lung, the oxygen is transported to the hemoglobin through the membrane of alveoli, then oxygen is transported to the tissues. (6: 587)

Heshmat et al. (2013) added that physical effort affect the respiratory system by increasing respiratory rate (13–15) count per minute and sometimes to more than double, also increase the respiratory tract and enable the oxygen to reach the tissues through hemoglobin, also increased ventilation and strengthen respiratory muscles (intercostal) and diaphragm which improve their functions. (22: 98)

Blair et al. (2004) indicated that central nervous system affect respiration by the action of nervous signals from respiratory center to muscles and other signal go from muscles and joint to respiratory center, which stimulate ventilation, to protect O_2 & CO_2 in the blood, meaning a relation between nervous system and respiratory system and active muscles to increase gases in the blood during physical activity. (10: 913)

Malina (2006) showed that physical activity is a behavior related to many factors including energy output, stresses, physical fitness, skillness, type of exercise and work also the place of training, in the school or home, clubs or relaxation places, also the decrease physical activity is a behavior related to other components, such as culture learning, music, art, TV seeing and video play also transportation maybe a shape of decreased physical activity which in fluency the health and fitness negatively, growth occur between birth and puberty, growth is the increase in the body size and components, maturity happen due to biological development and the cognition, behavior and motor changes and the relation between growth, maturity and development is changing during enfanty and maturation and between individuals and groups and between different cultures, and this relation affects on behavior which is active or non-active between persons. (24: 133)

Heshmat et al. (2013) indicated the different factors affecting VO_2 max, centrally or peripherally,

centrally is affected by CNS, cardiovascular, which enable skeletal muscles to use oxygen during training such as alertness, heart action, blood volume and its O_2 transport, peripherally due to skeletal muscles that affect the ability of cells to use O_2 transport, peripherally due to skeletal muscles that affect the ability of cells to use O_2 during training, such as blood capillaries of the muscles also muscle membrane and fibers and its ability to absorb O_2 and its uses by the mitochondria. (22: 341)

Heshmat and Mohamed salah (2009) reported that researches revealed the action of sports training:

- Increase pulmonary ventilation.
- Increase respiratory efficiency.
- Increase athlete lungs.
- Increase O_2 ability to spread during rest and exercise of athletes.
- Increase endurance of athletes due to Increase number and size of mitochondria which increase endurance and lactate accumulation and retard muscle fatigue. (21: 153)

According to the precede and due to different shapes and aims of the physical activates, the researcher tried to determine the differences in physical fitness and health due to the type of the physical activity of the soccer youngster from the view of regularity of rationing of training programs and physical activity.

Aim of the research

The aim of the study was to investigate the differences in physical fitness and some pulmonary functions level for soccer youngsters.

Research hypothesis

1- There are significant differences between the first and second group of youngsters in physical fitness for the first one.

2- There are significant differences between the first and second group of youngsters in some pulmonary functions for the first one.

2. Research procedures

Research method:

The researcher used the descriptive method due to its suitability to the nature of the study.

Research sample:

The participants were selected randomly and were divided to two equal groups, the first group of (10) youngsters from port Fouad club for soccer under 15 years, the second group of (10) youngsters of special education center of soccer under (15) years also (3) Youngsters for the pilot study.

Table (1): Research sample

The club	Main study	Pilot Study
Port Fouad under (15) years	(10) youngsters	(3) youngsters
Special education center (15) years	(10) youngsters	

Sample homogeneity:

Table (2) reported that skewness were between (+3) indicating homogeneity of the sample.

Table (2): Arithmatic mean, median, standard deviation, skewness in variables of age, height, weight, training experience and BMI N=20

Variables	U of M	A. Mean	Median	S.D.	skewness
Age	Year	15.5	15.5	0.28	-0.87
Height	Cm	171	171	0.19	0.34
Weight	Kg	64.5	64.5	2.52	0.18
Training experience	Years	4.5	4	0.71	2.13
BMI	Kg/m^2	22	22	0.68	0.07

Data collection tools:

- **Height**: by using… Restameter.
- **Weight**: by using… Medical scale.
- **Body Mass Index**: by using formula… BMI = weight / $height^2$.
- **Pulse rate:** by using… Pulse meter.
- **Respiratory rate:** by using… Counting no of respiration per minute.
- **VO_2 max**: by using… Cooper test.
- **Lung functions:** by using… Pony spirometer.

Automatic measuring of variables:

- Forced vital capacity... FVC.

- Forced expiratory volume in one second... FEV_1.
- Peak expiratory flow... PEF.
- Maximum expiratory flow at 25% of vital capacity… MEF_{25}.
- Maximum expiratory flow at 50% of vital capacity… MEF_{50}.

Pilot study:

Executed at 27/9/2016 before (2) days of main study, using (3) youngsters of the sample community out of the main sample and that for…

- Investigate the soundness of the equipment and tools.
- To know the problems that might face the study.
- Determine the best ways to perform measurements and record data.

Main study:

Executed 30/9/2016, beginning by assessment of... Pulse rate, Respiratory rate at rest, Cooper test for VO_2 max, at last lung functions using pony spirometer for the two groups of the study.

Statistical data analysis:

Using (SPSS) including…

- arithmetic mean.
- Median.
- Standard deviation.
- Skewness.
- Mann-Whitney U test.

3. Results

Table (3) indicated statistical significant difference between group (1) & group (2) in the variables of the research and for the group (1), that the (U) calculated value less than the (U) tabular value.

Table (3): Significance of differences of the two groups of youngsters in the research variables $N_1 = N_2 = 10$

Variables	U of M	S. Ranks		Ranks V.		(U) value		sig
		G (1)	G (2)	G (1)	G (2)	Table	Calcu.	
Pulse rate	No/Min	60	150	95	5	23	5	S
VO_2 max	Ml/Kg/Min	139.5	70.5	15.5	84.5	23	15.5	S
Respiratory rate	No/Min	67.5	142.5	87.5	12.5	23	12.5	S
FVC	L	143	67	12	88	23	12	S
FEV_1	L	136.5	73.5	18.5	81.5	23	18.5	S
PEF	L/S	142	68	13	87	23	13	S
MEF_{25}	L/S	148	62	7	93	23	7	S
MEF_{50}	L/S	136	74	19	81	23	19	S

4. Discussion

Table (3) indicated significant statistical differences between group (1) and group (2) in the pulse rate, VO_2 max for the group (1).

The expiation of this may be due to the regular training they proceed, based up on scientific basic and rationing in load training, from the point of Intensity and volume and frequencies which induce a positive action upon pulse rate and VO_2 max.

This is in accordance with Bastawisi, A. (1999), Mohamed, A. and Abou El-Ella, A. (2000), Rafea, S. (2009), Hazaa. E. (2010) The rationing program is suitable to the requirements of different age stages, male or female, and the executed sport activity, which enable the response of the body to improve and induce adaptation and recovery with the loads, this is verify by pulse rate and VO_2 max. (7: 26), (27: 162), (29: 174), (20: 157)

Gray (1990) and fox (1979) indicated that O_2 utilization at rest (250) ml/min and increased in case of maximal training to (3600) ml/min for non-athletes, reach (4000) ml/min for athletes and higher in elite athletes. (18: 35), (17: 241)

Schnerman (2002), Tanaka and seals (2003) added that the increased VO_2 max depending on the number of training sessions weekly and on the sport performed as it increased in case of soccer and long distance run compared with short distance and in non-athlete and that the genes play an important role in determining VO_2 max in addition to chest size compared with body volume and the strength of respiratory muscles. (33: 283), (34: 2152)

From the preceded discussion the first hypotheses is realized.

Table (3) indicated a significant difference between the group (1) and group (2) in the variables respiratory rate, FVC, FEV_1, PEF, MEF_{25}, MEF_{50} and for the group (1).

The researcher opinion that group (1) improvement of the respiratory variables indicated adaptation soccer youngsters due to rationing exercises and the regulatory of training which led to

positive results such as the enlargement of respiratory tract and bronchi with alveoli and the exchange of gases and the action of respiratory muscles.

These results are in accordance with bertholon et al. (1986), clanton et al. (1987), Holmen et al. (2002), cheng et al. (2003) as they resorted that respiratory muscles are subjected to training such as the skeletal muscles, which make it constricted in higher strength to improve pulmonary are important in indication of the components which improve ventilation in normal standard and the decrease of the forced ventilation that prove the increase pressure of the chest on the lungs due to decrease plasticity of lungs and led to decrease air pushing and induce a decreased MEF_{25}, MEF_{50}, so it is very important to assess vital capacity and the forced expiration and expiration. (9: 80), (13: 39), (23: 8) (12: 521)

Robergs and Roberts (2000), adegoke and arogundad (2002), carter et al. (2004), basu et al. (2004) reported that rationing training, depending on scientific bases may enhance the positive effect of respiratory system of the player will improve the state of the respiratory tract and the alveoli and increased strength of respiratory muscles. (30: 15), (3: 9), (11: 24), (8: 887)

Saad, T. (1992), Farouk, A. (1995), Abou El-Ella, A. and Sobhy, H. (1997), Abou El-Ella, A. (1998), Bahaa, S. (1998) clarify that the factors that affects on vital capacity are… Flexibility of lung tissues, the state of the chest without abnormalities and the respiratory passages with any contractions and the strength of the diaphragm and respiratory muscles, posture, age, sex and sport performance. (32: 96), (15: 116), (2: 123), (1: 96), (4: 224)

Doherty and Dimitriou (1997), Adegoke and Arogundad (2002) added that sport training affect some variables of the lug functions by increasing development of respiratory muscles. (14: 337), (3: 9)

Mc connel and romer (2004), Rodrigo et al. (2004) assure the importance clinically assessment of the respiratory system, normally the assessment of FVC, FEV_1 elevated 80%, indicate closure of the respiratory passages due to disease. (26: 117), (31: 1081)

Fishman (2008), Barnes (2000) indicated that the movement of diaphragm and respiratory muscles, as the movement of the diaphragm is (75%) of the volume inside the chest during the normal inspiration and during contraction the diaphragm downward and the movement of diaphragm change from (1.5) cm during normal inspiration to (7) cm during deep inspiration and the intercostal muscle affect respiration and this increase horizontal axis and the transverse one of the chest leading to decreasing the internal pressure of the chest which permit inspiration than expiration and exercise strengthen the respiratory muscles and increase the volume of air that enter and exit, and decrease respiratory rate and depth of respiration which increase size of lungs and vital capacity. (16: 130), (5: 269)

From the preceded discussion the second hypothesis is realized.

Conclusion

In light of the results and the study sample, the researcher reached the following:

1- The rationing physical training affect positively the level of physical fitness by a reduced pulse rate and high VO_2 max of soccer youngsters.

2- The rationing physical training affect positively the level of some lung functions such as FVC, FEV_1, PEF, MEF_{25}, MEF_{50}.

Recommendation

In light of the results and the study sample the researcher recommends:

1- Attention of rationing of the physical training as it affect positively the level of physical fitness and health of soccer youngsters.

2- Attention of assessing pulmonary of unction due to its importance in investing the physical and health soccer youngsters.

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