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Comparison of left ventricular structure in young Qazvin's elite male basketball players and non-athletes

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ABSTRACT

Performance of heart has substantial role in breaking records of sports. Achieving to optimal performance of endurance Training builds upon the consistency in several parts of body specially heart. Type, intensity, term training programs is determining components of providing structural consistency and performance of heart especially in left ventricular. Aim of this research was comparing structure of left ventricular of young Qazvin's elite male basketball players and non-athletes. Sample of research included 15 athletes were selected randomly with mean age 21.87 years old and 15 non-athletes with mean of 25 year old. We used Echocardiography with two-dimensional and M-mode and measuring Simpson in order to investigate structure of left ventricular. Findings of the research were analyzed by independent samples t test. Results show that in all of variables include (LVPWS, LVPWD, LVM, LVESV, LVEDV, IVS, and IVSD) as indictors of left ventricular is significantly more than non-athletes and it might be due to effect of combined Sports. Thus, we recommend to instructors do echocardiography each year before heavy training programs in order to ensure about healthy heart of athletes and non-pathological heart and combined exercise more aerobic for improving capacity of ventricular, rapid recovery and following Cardio respiratory fitness in basketball training program.

Keywords: Structure indicators of left ventricular, Basketball players, non-athletes

INTRODUCTION

Muscles of heart totally called Myocardium or Myocardium's muscles and heart muscle thickness in different parts of the heart vary based on pressure. Left ventricular cavity of the heart is the strongest muscles, it needs significant amounts of power for pumping blood to the general circulation, and it leads to more thickness of its muscular wall in comparison with other heart chambers. Consequence of the increased muscle mass of the left ventricle during rest or exercise pressure on natural light activities. Intensify exercise especially intense aerobic activity needs blood for active muscles. In response to both intensify aerobic and resistance leads to Hypertrophy in left ventricular. In contrast, positive adaptations resulting from exercise, heart muscle because of diseases such as heart valve disease and high blood pressure also impose hypertension, which is called Hypotrophy Patalogic and it has similar visual Physiological hypertrophy. In response to exercise or disease, left ventricular imposes adaption with

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increase size and capacity of blood pumping; similarly, adaption occurs as results of physical exercise in skeletal muscle (Vilmor et al, 2009). Meanwhile, mechanisms of adaption and heart performance in disease are different from adoptions of aerobic exercise. We used Echocardiography and Magnetic Resonance Image (MRI) in order to reduce danger of sudden death in competitive sports (Pelliccia et al, 2012). In order to achieve optimal performance of adoption in various parts of body especially heart depends on type, intensity and period of exercise schedule and these are determining components in emerging adoption structure and heart performance especially in left ventricular. It seems that exercise activities are located at one end of a continuum that one side is endurance activities and on other side is resistance activity (Koshki, 1998) (Pela et al, 2004). In distance between two sides of continuum usually are sports that athletes based on theses exercises need use combined exercises. With these exercises, cardiovascular adaptations are different. Most of researches about heart adoption is investigating effect of resistance and endurance activities and less studies investigate effect of combined exercises (Hosseini et al, 2009)(Jurg et al, 2003).Furthermore, combined exercises leads to increase thickness of left ventricular wall thickness and left ventricular mass. There have been numerous articles and research about effect of exercises activities on structure of left ventricle and results of research indicates that increase capacity and size of left ventricle. Thus, Sandip et al (2012), investigated effect of 16 weeks of exercise on left ventricle, injection fraction and aerobic capacity of 85 students in physical education (43 men with mean of 20.11 years old and 42 women with mean of 19.81) and results indicated that there was not significant relationship between in structure and ejection fraction after 16 weeks, however, aerobic capacity increased (Sandip et al , 2012). Arco et al, (2009), investigated Size and left ventricular posterior wall and the wall deformation strain rate of 120 endurance athletes (62% men and 38% women) 62 controller group (58% Men) and significant relationship exists mass of left ventricular in two groups of men and women in comparing with controller group. Whilst, there was not significant relationship with diastolic size of the groups of athletes and controller groups. Vasiliaukasa et al (2006), investigated structure of heart structure of 93 basketball players in three range of teenagers, young and adults and found significant relationship thickness of the posterior wall of the left ventricle and left ventricular mass in each age group compared to the control group. Cardiac adaptations in athletes with intensity, duration and type of exercise, the results are different, which raises several questions. In addition, there are still a lot of loose issues show related to sport endurance, strength and composition with left ventricular hypertrophy (Aaron et al, 2008). Furthermore, a comparison of left ventricular structure combined sports such as basketball (where endurance and speed are different exercises) with non-athletes and very little research. Thus, the question posed to realize that the structure of the left ventricle with non-athletes, basketball players are different and structure of left ventricular athletes and non-athletes from type of structure. In other words, Left ventricular posterior wall thickness at end diastole (LVPWD), Left ventricular posterior wall thickness at end Systole (LVPWS), Ventricular septum thickness at end diastole (IVSD), Ventricular septum thickness at end systole (IVSS), Left ventricular end-diastolic volume (LVEDV), left ventricular end-systolic volume (LVESV), Left ventricular mass (LVM) are difference between in basketball players and non- athletes? Previous research shows that combination exercise leads to increase relative wall thickness and left ventricular volumes. The exercises with little increase in left ventricular internal diameter and wall thickness is associated with greater increases Shawn et al (2004) and Hosseini (2008).

MATERIALS AND METHODS

This study is causal research - a comparative research regarding the dependent variable or the events that it pays to investigate possible causes. The study was retrospective, and the researcher is trying to raise its handicapped. This study aimed to compare the two groups and left ventricular structure in young elite basketball players and non-athlete. The population of the study selected 30 elite athletes Qazvin basketball team regularly at least 6 years of activity in the field and 15 non-athletes aged 18-32 years comprised. In according to content and aim 15 people considered as test athletes in the sample study who was at least 3 year in selected teams randomly as statistical sample. Number of samples selected by Med

calculator mean and standard deviation of previous studies and selected two groups of 15 persons. After ensuring the health of athletes and non-athletes who took the questionnaire and medical examination then we measured health of athletes and non-athletes and weight and height with a height gauge and scale. The effect of confounding variables and the troublesome age, weight, history of exercise, medication, time and place of measurement in this study was controlled. In order to further reliability, an examiner and expert performed the measurements in similar way and avoiding the effect of the time factor measurements in all of tests in simultaneous period between 18-22 hours in Rahiian Alborz hospital of Qazvin. In order to evaluate indicators of LVPWS ،IVSD ،IVSS،LVEDV ،LVESV ،LVM, LVPWD by echocardiography of Kontron model of 2010 made in French. Echocardiography is the basis of high frequency sound waves are directed to the heart and its echo can be used by a specific receptor. In other words, any radiation or waves dangerous to persons and does not transmit sound waves are used for imaging the simple. In the present study using two-dimensional and M-mode echocardiography machines and measuring Simpson was used to assess left ventricular structure. The two-dimensional echo a more accurate picture of the anatomy of the heart and further details may be found in one view. This type of echocardiography for measurement of cardiac size and components was used and their effectiveness. Assessment of a subject sitting in a chair for 15-20 minutes and were conducted by a researcher under the supervision of a physician. We used two test of Levine's test and Kolmogorov-smirnov test in inferential statistics to ensure the normal distribution of data and in order to test of hypotheses of t test especially Independent Samples t Test.

RESULTS

The subjects of this study included the basketball athletes and non-athletes were selected randomly. Table 1 Mean and standard deviation of the respondents' demographic characteristics including age, weight and height.

Table 1. Comparing three variables of ages, heights and weights

Group	Variables	ages	Weight	Height
Basketball players	**Mean**	21.87	77.87	186.27
	Standard Deviation	4	8.72	5.54
	Least records	18	60	177
	Highest records	30	89	195
	Numbers	15	15	15
Non-Basketball players	**Mean**	25	73.33	176.53
	Standard Deviation	4.77	8.07	3.81
	Least records	18	18	170
	Highest records	32	32	183
	Numbers	15	15	15

In among variables of the study, mean age of basketball players is 21.87 and mean of variables of non-basketball players is 25. Standard deviation of basketball players is minimal less than non-basketball players. Mean variable of weight of basketball players is 77.87, while, non-basketball players is mean weight of 73.33. The standard difference between the two groups is not significantly different weight ranges. Mean variables age of basketball players. Mean variable of height in sample of basketball players is 186.27, while, this index is 176.53 for non-basketball players and there is 10cm difference in two groups. Standard deviation of height of basketball players is 5.54 and non-basketball players 3.81.

Table 2 .Comparing indicators of Posterior wall of the left ventricle in Diastole

Groups	LVPWD (mm)	Indicators
Basketball players	**Mean**	**10.06mm**
	Standard Deviation	**1.19**
Non-basketball players	**Mean**	**8.07mm**
	Standard Deviation	**0.82**

Table 3. Comparing indicators of Posterior wall of the left ventricle in the end of Diastole

Groups	LVPWS (mm)	Indicators
Basketball players	**Mean**	**15.30**
	Standard Deviation	**2.73**
Non-basketball players	**Mean**	**9.70**
	Standard Deviation	**1.15**

Table 4. Comparing indicators of thickness of the ventricular septum (IVSD) in the end of Diastole

Groups	LVPWS (mm)	Indicators
Basketball players	**Mean**	**10.64**
	Standard Deviation	**1.85**
Non-basketball players	**Mean**	**7.98**
	Standard Deviation	**0.78**

Table 5. Comparing indicators of thickness of the ventricular septum (IVSS) in the end of Systolic

Groups	LVPWS (mm)	Indicators
Basketball players	**Mean**	**14.18**
	Standard Deviation	**2.35**
Non-basketball players	**Mean**	**10.85**
	Standard Deviation	**1.06**

Table 6. Comparing indicators of Left ventricular end-diastolic volume (LVEDV)

Groups	LVPWS (mm)	Indicators
Basketball players	**Mean**	**97.17**
	Standard Deviation	**22.92**
Non-basketball players	**Mean**	**82.35**
	Standard Deviation	**5.65**

Table 7. Comparing indicators of left ventricular end-systolic volume (LVESV)

Groups	LVPWS (mm)	Indicators
Basketball players	**Mean**	**39.69**
	Standard Deviation	**5.63**
Non-basketball players	**Mean**	**33.10**
	Standard Deviation	**4.10**

Table 8. comparing indicators of thickness of left ventricular (LVM)

Groups	LVPWS (mm)	Indicators
Basketball players	**Mean**	**185.09**
	Standard Deviation	**41.94**
Non-basketball players	**Mean**	**127**
	Standard Deviation	**15.27**

Analytical results

Table 9: t student test

Variable	t	df	Sig	Results
LVPWD	5.354	28	0.000	P<%1

In comparing index of LVPWD between two groups of studying, t value independent group is 5.354 calculates and sig is p<%1 and results of indicate that significant relationship exists between left ventricular posterior wall thickness in end of Diastole (LVPWD)

Table 10. t student test

Variable	t	df	Sig	Results
LVPWD	7.309	28	0.000	P<%1

In comparing two groups of variables LVPWS, amount of t is 7.309. Findings of research indicated that there is a significant difference between left ventricular posterior wall thicknesses in the two group's end of Systolic (LVPWS).

Table 11. t student test

Variable	t	df	Sig	Results
IVSD	5.127	28	0.000	P<%1

In according to the table above mentioned in comparing two groups of in Variable ventricular septum (IVSD), t vale of independent group is 5.127. Results of findings indicated that significant relationship exists between ventricular septum thickness at end-diastole in both groups (IVSD).

Table 12. t student test

Variable	t	df	Sig	Results
IVSD	5.002	28	0.000	P<%1

In comparing two groups of variables in end-systolic ventricular septum (IVSS), t value is 5.002 and sig is p<%1 and findings show that ventricular septum thickness at end systole in both groups (IVSS).

Table 13: t student test

Variable	t	df	Sig	Results
IVSD	2.431	28	0.022	P<%5

In comparing two groups of research, two variables of left ventricular end-diastolic volume (LVEDV, t in independent group is 2.431 and sig is 0.022 and it shows that difference between two groups is P<%5. Therefore, significant relationship exists between left ventricular end-diastolic volumes in the two study groups (LVEDV).

Table 14. t student test

Variable	t	df	Sig	Results
IVSD	3.669	28	0.001	P<%1

In according data of the table, from comparing two groups of variable left ventricular end-systolic volume (LVESV); t value of independent group is 3.669 and significant relationship exists and sig is p<%1. Findings of research show that significant relationship exists between left ventricular volumes in both groups at the end of systole (LVESV).

Table 15. t student test

Variable	t	df	Sig	Results
LVM	5.040	28	0.001	P<%1

T value of independent groups is calculated based on two groups of athlete and non-athlete in variables of left ventricular mass (LVM) is 5.040 and sig is p<%1 and finding of the research shows that there is significant difference between Left ventricular mass (LVM).

DISCUSSION

Results of research indicated that significant relationship exists between Left ventricular posterior wall thickness at end diastole (LVPWD), Systolic (LVPWS) Basketball players, and non-basketball players. Therefore, Haji Ghasemi (2010) structure and some indicators of heart performance three groups of runners' half strength, taekwondo and non-athletes by using echocardiography with two dimensional, M-mode. Results indicated that end-systolic diameter and left ventricular posterior wall thickness in the three groups, however, end-diastolic diameter, thickness of the ventricular septum and no significant difference between stroke volume and taekwondo endurance runners half and the control group. Furthermore, significant relationship exists between ventricular septum thickness and left ventricular end-diastolic volume increase endurance runners Haji Ghasemi Alireza(2010). Furthermore, Asbern et al (2007), investigated effect of two methods of static and dynamic exercise on left ventricular structure of 41 elite tennis players. Static exercises like bodybuilding athletes used more concentric hypertrophy, and eccentric hypertrophy of athletes who were more used than dynamic exercises (Osborn, 2007). Richard et al (2003) also investigated research based on dimension, left ventricular mass and endurance-trained women, resistance and combination, and found that between ventricular posterior wall thickness and left ventricular mass and strength was more than other groups Richard and Bloomer (2003). Results of research is consistent with research of Haji Ghasemi (2010) and Osburn (2007) and it might be due to similarity of previous research such as type and intensity of exercises. Richard (2003) was not consistent with result of the research and it might be due to difference measuring of echocardiography, age and period of exercises. Significant relationship exists between indicators in end-diastolic intraventricular septum thickness (IVSD) and systolic (IVSS) in among basketball players and non-basketball players. Some athletes improve their physiological condition and show two ventricular septal hypertrophy. Most cases occur in endurance athletes and increase workout progress. Wall between the two ventricles of larger amounts of the normal range in 60% of basketball players and swimmers are seen more. Although the two ventricular septal hypertrophy in athletes may be inappropriate for posterior wall, but the actual size, often within or close to the normal range. Based on research results significant relationship exists between Left ventricular end-diastolic and systolic volume index (LVESV and LVEDV). Thus, Sandip et al (2012), investigated effect of 16 weeks of exercise on left ventricular injection fraction and aerobic capacity of 85 students in physical education (43 men with mean 20.11 years old and 42 women with mean of 19.81. and results indicated that there was not significant relationship between in structure and ejection fraction after 16 weeks, however, aerobic capacity increased (Sandip et al , 2012). Scharf et al (2010) investigated Ventricular structure and corridors 26 triathletes (with mean of 27.3 and scale age of

18-35) and comparing 27 non athlete (mean age of 27.3 and scale age of 20-34 years old) by using Magnetic resonance (MR) and they found that there was significant increase between the groups and controller group left ventricular mass and left and right ventricular end-systolic volumes. Left and right ventricular end diastolic volume was larger than normal, but there was no significant difference between the control groups (Scharf et al, 2005). Hojat (1997) investigated size of 40 hearts of athletes of wrestling, karate and 10 healthy people without sport experience as controller group by echocardiography by measuring end of systole, diastole, posterior and septal wall thickness show significant relationship between athletes and controlling group. Comparisons between sports groups suggests that the size of the end diastolic and systolic heart cavity wrestlers were no significant differences with other sports groups. The size of the end diastole, systole, ventricular wall thickness, posterior wall thickness between karate groups in comparison with other sporting groups no significant differences were observed (Shahla, 1997). Venkusas et al (2008) did a research about.

CONCLUSION

Results of research indicated that significant relationship exists between all indices of left ventricular non-athletes with basketball and it can be due to type of Basketball player's activities. It seems that basketball players' activity is combination and provides significant difference in structure of left ventricular. Therefore, in field of combined activities as if basketball was limited and real opinion about structure of heart especially left ventricular is based on research and several research of this field. In according to findings of research propose left ventricular cavity athletes and non-athletic sports programs combine to add in their daily life. Moreover, we investigated basketball coaches for athletes aerobic exercise capacity, left ventricular rapid recovery and subsequent increase in cardiorespiratory fitness in their training program to include every year of your heart in order to aware about non-pathologic of your heart.

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