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PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.809418>Available online at: <http://www.iajps.com>**Research Article****EVALUATION CARDIAC DYSFUNCTION AND LEFT  
VENTRICLE HYPERTROPHY PREVALENCE AMONG  
METABOLIC SYNDROME PATIENT REFERRED TO AMIR-  
AL-MOMENIN HOSPITAL, ZABOL, 2014****Zohreh Mahmoodi<sup>1</sup>, Mohamad Reza Havasian<sup>2</sup>, Morteza Salarzaei<sup>3\*</sup>**<sup>1</sup>Department of Cardiology, Faculty of Medicine, Zabol University of Medical Sciences, Zabol, Iran.<sup>2</sup>Department of Periodontics, School of Dentistry, Ilam University of Medical Sciences, Ilam, Iran.<sup>3</sup>Student of Medicine, Students Research Committee, Zabol University of Medical Sciences, Zabol, Iran.**Abstract:**

*Metabolic syndrome is including collection of metabolic disorders that increase the risk of cardiovascular disease. This study examined the association of metabolic syndrome with left ventricular hypertrophy, diastolic dysfunction and systolic dysfunction.*

*Materials and Methods: this cross sectional study has done on 165 patients that by the non-probabilistic sampling were chosen from the patients in the local and national clinic in Amir Al-Momenin hospital of Zabol, 1393. The complete histories of the patients were asked, including age, sex, occupation, drugs and cigarettes. Then a physical examination was done, including measurement of waist circumference, height, weight, blood pressure. To perform the test, blood samples were taken in the fasting state finally, then put them in echocardiographic. Data obtained were analyzed by SPSS version 18. This study shows that 165 participants in the research, 56 persons (33.9%) were eligible for the metabolic syndrome. From 56 individuals who meet the metabolic syndrome in 12 patients (21.4%) had ventricular hypertrophy and 45 patients (80.35%) had diastolic dysfunction and 10 cases (17.85%) had impaired systolic performance. Statistical analysis of the data showed that in this study there is no significant relationship between metabolic syndrome and ventricular hypertrophy ( $p=0.074$ ) and systolic dysfunction ( $P=0.156$ ) but there is significant relationship between metabolic syndrome and diastolic dysfunction ( $P<0.00$ ). This study shows that the prevalence of metabolic syndrome in referred patients to Imam-Ali hospital, Zabol, relatively is high and there is relationship between the metabolic syndrome and ventricular diastolic. This study did not confirm the association of metabolic syndrome with ventricular hypertrophy.*

**Key Words:** *Metabolic Syndrome, Ventricular Hypertrophy, Echocardiography.*

**Corresponding author:****Morteza Salarzaei,***Student of Medicine,**Students Research Committee,**Zabol University of Medical Sciences,**Zabol, Iran. Email: [havasian1991@gmail.com](mailto:havasian1991@gmail.com),*

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**INTRODUCTION:**

Metabolic syndrome includes a variety of metabolic disorders that expose the patient with the risk of coronary cardiovascular diseases (CVD) and Diabetes Mellitus [1]. Metabolic syndrome can increase the incidence rate of cardiovascular diseases including coronary artery diseases, sudden death, and congestive heart failure, and it is associated with increased mortality as well as the disability arising from heart diseases. One of the hypotheses of the increased cardiac events in the metabolic syndrome suggests that the disorder created in the function of the left ventricle brings about an increased risk of cardiovascular disease in the patients suffering from this syndrome. This disorder can in turn originate from the left ventricular hypertrophy, diastolic dysfunction, and systolic dysfunction of the left ventricle (3, 4, and 5). The main symptoms of metabolic syndrome include central obesity, hypertriglyceridemia, reduced HDL, hyperglycemia, and hypertension [2]. For diagnosing left ventricular hypertrophy, echocardiography is much more sensitive than ECG. In fact, echocardiography is considered as a valid and safe diagnostic tool in evaluating the cardiac structural and functional disorders; echocardiographic indices are used to study the prevalence of cardiac structural and functional disorders [3]. According to the studies conducted so far, metabolic syndrome is a strong risk factor of the myocardial dysfunction even in patients with no apparent cardiovascular disorder [4]. The studies have also indicated that this syndrome can bring about the cardiac diastolic and systolic dysfunction [5]. Metabolic syndrome is generally without any symptoms. The comorbid diseases of this syndrome include the cardiovascular diseases that increase suffering from strokes and peripheral vascular diseases. Hypertrophy is referred to enlargement of cardiac muscular cells and the cardiac size in response to the additional load arising from pressure of volume, or the trophic messages such as hyperthyroidism [6]. The prevalence of metabolic syndrome is different in different countries. This is partly related to the age and race of different populations and the diagnostic criteria. The prevalence of metabolic syndrome increases with the increase of age; the prevalence of this syndrome is %24 in the United States, %40 in Canada, and %23.1 in Iran [7, 8 and 9]. Moreover, obese children and parent are %80 more likely to be exposed to the risk of obesity, and this is created as a result of a combination of genetic effects and peripheral factors [10]. The previous studies conducted have suggested different findings on the effect of metabolic syndrome on creating cardiac functional and structural disorders. However, some other studies have not confirmed this effect. Moreover, some studies have indicated that metabolic syndrome can

cause cardiac diastolic and systolic dysfunction even in individuals that are not suffering from left ventricular hypertrophy. A study has claimed that high BMI higher than 25 is the prognostic of the diastolic dysfunction, and it is the main prognostic factor of systolic and diastolic dysfunction [11]. Given the different findings as well as the ecological and demographic features, it seems necessary to conduct more studies and researches. The present study aims determining the prevalence rate of left ventricular hypertrophy and cardiac dysfunction according to the echocardiographic indices in metabolic syndrome patients referring to Amir-Al-Momenin Hospital of Zabol.

**MATERIALS AND METHODS:**

The present study is a descriptive-analytical one conducted on the patients staying in the internal section as well as those who had referred to the cardiac clinic of Amir-al-Momenin Hospital of Zabol in 2015. The inclusion criteria of the present study were all the patients staying in the internal section as those who had referred to the cardiac clinic of Amir-al-Momenin Hospital of Zabol in 2015. The exclusion criteria include suffering from different kinds of cardiomyopathy, congenital heart defect, acute myocarditis, pericarditis, and pericardial involvement, and other recognized diseases of those suffering from acute coronary syndrome. Given  $p=0.3$  and  $d=0.07$ , the sample size was estimated to be 165 participants. The samples were selected and studied through using non-probability sampling. The information needed was collected through applying researcher-made questionnaire. For this purpose, the patients' medical history was received including information such as age, gender, and etc. The patients then underwent complete physical examination including measuring waist, height, weight, and blood pressure. For performing blood test, the blood samples were acquired in the fasting status, and then the patients underwent echocardiography. The data collected were analyzed through using SPSS version 18 and chi-squared test ( $\chi^2$  statistical test) [12-14]. Moreover,  $p \leq 0.05$  was considered as the significance level.

**FINDINGS:**

From the 165 patients studied, 73 patients (%44.2) were male and 92 patients (%55.7) were female. The patients' average age was  $53.7 \pm 1.47$ . The youngest patient participated in this study was 16 years old, and the oldest participant was 74 years old. With respect to age, the patients' frequency was as follows: under 30 years old, 2 patients (%1.2); 30-40 years old, 7 patients (%4.2); 40-50 years old, 36 patients (%21.9); 50-60 years old, 91 patients (%55.2); and in the group of over 60 years old, 29 patients (%17.5). With regard to the

patients' age, the prevalence of metabolic syndrome was as follows: 40-50 years old, 5 patients (%8.9); 50-60 years old, 38 patients (%67.8); and in the group of over 60 years old, 13 patients (%23.3). Age groups of fewer than 30 years old and 30-40 years old did not have any metabolic syndrome patients. The prevalence of metabolic syndrome increased in both genders with the increase of age ( $P<0.005$ ). Moreover, the findings acquired from the left ventricular hypertrophy studies in patients suffering from metabolic syndrome as well as patients without metabolic syndrome have indicated that 12 patients (%21.42) of the metabolic syndrome patients suffer from left ventricular hypertrophy, and 11 patients (%10.09) of the patients without metabolic syndrome suffer from left ventricular hypertrophy (Table 1). In fact, most of the individuals suffering from metabolic syndromes as well as those without metabolic syndrome do not suffer from left ventricular hypertrophy (LVH); given the findings of the chi-square test, metabolic syndrome does not

have a significant relationship with left ventricular hypertrophy ( $P>0.005$ ). Among those suffering from metabolic syndrome, 10 patients (%17.8) suffer from systolic dysfunction, and among the patients without metabolic syndrome, 11 patients (%10.1) suffer from systolic dysfunction. Moreover, among those suffering from metabolic syndrome, 45 patients (%80.4) suffer from diastolic dysfunction, and among the patients without metabolic syndrome, 39 patients (%35.8) suffer from diastolic dysfunction (Table 2). The prevalence of systolic dysfunction in both groups (those suffering from metabolic syndrome and those without metabolic syndrome) was not significantly different. However, the diastolic dysfunction was significantly different in the two groups. Given the findings of chi-square test, metabolic syndrome has no relationship with systolic dysfunction ( $P>0.005$ ). However, it is significantly related with diastolic dysfunction ( $P<0.005$ ).

**Table 1: The frequency distribution of left ventricular hypertrophy in patients suffering from metabolic syndrome and those without metabolic syndrome**

LVH Metabolic Syndrome	Suffering from LVH		Without LVH	
	Number	Percent	Number	Percent
<b>Suffering Metabolic Syndrome</b>	12	21.42	44	78.58
<b>Without Metabolic Syndrome</b>	11	10.09	98	89.91

**Table 2: The frequency distribution of systolic and diastolic dysfunctions in patients suffering from metabolic syndrome and those without metabolic syndrome**

Metabolic syndrome	Systolic dysfunction				Diastolic dysfunction			
	Yes		NO		Yes		No	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>With Metabolic Syndrome</b>	10	17.8	46	82.2	45	80.4	11	19.6
<b>Without Metabolic Syndrome</b>	10	10.1	98	89.9	39	35.8	70	64.2
	Sig: 0.156, Df: 1				Sig: 0.000, Df:1			

**DISCUSSION:**

Given the increasing prevalence of metabolic syndrome, the probable relationship of this syndrome with cardiovascular diseases, and the increased incidence of cardiovascular diseases (being the most common reason of morbidity and mortality until 2020), it is deemed necessary to conduct accurate studies on this syndrome. Different studies have provided different findings about the effect of metabolic syndrome on creating cardiac functional and structural disorders. In the present research, it was attempted to study the prevalence of left ventricular hypertrophy based on the echocardiographic index in metabolic syndrome patients referring to Amir-al-Momenin Hospital of Zabol in 2015. The findings of the present study indicate that the prevalence of metabolic syndrome in the patients referring to Amir-al-Momenin Hospital of Zabol in 2015 was %33.9. This syndrome has a high level of prevalence in different countries: %24 in the United States, %40 in Canada, and %23.1 in Iran. The findings of the present study indicate that according to the ATP III criteria, %33.9 (standardized based one age) of the population studied suffer from metabolic syndrome. The prevalence of metabolic syndrome in this study was higher than that of the previous studies. This is partly due to the age and race of the different populations as well as different diagnostic criteria. The prevalence of metabolic syndrome increases with the increase of age. Other studies have also reported the effect of age on the prevalence of this syndrome [15]. According to the findings acquired, metabolic syndrome is significantly related to age and femaleness ( $P < 0.005$ ). However, in the study conducted by Ivanovic et al, 2011, it has been stated that there is no significant relationship between age and metabolic syndrome [16]. This increasing trend can be attributed to a similar trend that has to do with age in each part of the metabolic syndrome. Moreover, age increase in insulin resistance has been also observed in healthy young adults, middle aged individuals, and the elderly people with normal weight [17]. It seems that the difference of age affects the accumulation of risk factors [18]. This trend was not observed in all age groups though. The present study did not confirm the significant relationship that metabolic syndrome results in increased LVH and systolic dysfunction. However, the present study indicated that there is a significant relationship between metabolic syndrome and diastolic dysfunction. The study conducted by Sarrafzadegan et al, 2011 indicated that metabolic syndrome has no significant relationship with ventricular hypertrophy as well as systolic and diastolic dysfunction [3]. Moreover, the study conducted by Hamdy-Sliem et al, 2011, [19] indicated that metabolic syndrome has no effect on LVH but affected diastolic dysfunction.

The study conducted by Lars et al, 1995 suggested the relationship between ventricular hypertrophy and metabolic syndrome [20]. The present study indicated that there is a significant relationship between metabolic syndrome and diastolic dysfunction. However, there is no relationship between metabolic syndrome and systolic dysfunction. The studies conducted by Hamdy-Sliem [19] and Fuentes [21] have confirmed the effect of metabolic syndrome on the diastolic dysfunction. However, the study conducted by Gong et al, 2009 has indicated the effect of metabolic syndrome on both systolic and diastolic dysfunctions [5].

**CONCLUSION:**

The findings of the present study indicated that the prevalence of metabolic syndrome in the participants studied was relatively high. Moreover, there is a significant relationship between metabolic syndrome and cardiac diastolic dysfunction. Given the relationship of this syndrome with the cardiovascular diseases, it is deemed necessary to conduct early diagnosis and treatment for this syndrome. However, further attempts have to be made toward changing lifestyle especially promoting the diet for preventing obesity, increasing physical activities (especially from childhood), and controlling blood pressure.

**REFERENCES:**

1. Longo D, Fauci A, Kasper D, Hauser S, Jameson J, Loscalzo J. *Harrison's principles of internal medicine*. 18<sup>th</sup>.ed. New York; McGraw Hill, 2012.
2. MR Havasian, J Panahi, MA Ruzegar. Research Article Ilam Lipid and Glucose Study: A cross-sectional epidemiologic study. *Nova Journal of Medical and Biological Sciences* 2014; 2(5): 1-6.
3. Sarrafzadegan N, Sadegh M, Paidarei N, Abadi E, Forouzani A, Hashemi M. Metabolic Syndrome and Structural and Functional Echocardiographic characteristics: A Case Control Study in Isfahan Cohort Study . *Iranian Journal of Endocrinology and Metabolism* 2011; 13(6): 658-65.
4. Wong C, O'Moore-Sullivan T, Fang Z, Haluska B, Leano R, Marwick, Leano R. The myocardial and vascular dysfunction and exercise capacity in the metabolic syndrome. *Am J Cardiol* 2005; 96(12): 1686-96.
5. Gong HP, Tan HW, Fang NN, Song T, Li SH, Zhong M, et al. Impaired left ventricular systolic and diastolic function in patients with metabolic syndrome as assessed by strain and strain rate imaging. *Diabetes Res Clin Pract* 2009; 83(3): 300-07.
6. Rubin R, Strayer D. *Rubins Pathology*. 16<sup>th</sup> ed. North American Edition, 2012.
7. Malik S, Wong ND, Franklin SS, Kamath TV, Gilbert JL, Pio JR, Williams GR. Impact of the metabolic syndrome on mortality from coronary

heart disease, cardiovascular disease, and all causes in United States adults. *Circulation* 2004; 110(10): 1245-50.

8. Isomaa BO, Almgren P, Tuomi T, Forsén B, Lahti K, Nissén M, Taskinen MR, Groop L. Cardiovascular morbidity and mortality associated with the metabolic syndrome. *Diabetes care* 2001; 24(4): 683-89.

9. Lakka HM, Laaksonen DE, Lakka TA, Niskanen LK, Kumpusalo E, Tuomilehto J, Salonen JT. The metabolic syndrome and total and cardiovascular disease mortality in middle-aged men. *JAMA* 2002; 288(21): 2709-16.

10. Longo D, Fauci A, Kasper D, Hauser S, Jameson J, Loscalzo J. *Harrison's principles of internal medicine*. 18<sup>th</sup>.ed. New York; McGraw Hill, 2012.

11. Havasian MR, Panahi J, Khosravi A. Correlation between the lipid and cytokine profiles in patients with coronary heart disease (CHD)(Review article). *Life Science Journal* 2012; 9(4): 5772-77.

12. Mohamadi J, Motaghi M, panahi J, Havasian MR, Delpisheh A, Azizian M, Pakzad I. Anti-fungal resistance in candida isolated from oral and diaper rash candidiasis in neonates. *Bioinformation* 2014; 10(11): 667-70.

13. Havasian MR, Panahi J, Pakzad I, Davoudian A, Jalilian A, Zamanian Azodi M. Study of Inhibitory effect of alcoholic and aqueous extract of *Scrophularia striata* (tashne dari) on candida albicans in vitro. *J of Pejouhesh* 2013; 36(5): 19-23.

14. Somi MH, Fatahi E, Panahi J, Havasian MR, Judaki A. Data from a randomized and controlled trial of LCarnitine prescription for the treatment for

Non- Alcoholic Fatty Liver Disease. *Bioinformation* 2014; 10(9): 575-79.

15. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. *JAMA* 2002; 287(3): 356-59.

16. Ivanovic BA, Tadic MV, Simic DV. Predictors of global left ventricular function in metabolic syndrome. *Arq Bras Cardiol* 2011; 96(5): 377-85.

17. DeFronzo A, Ferrannini E. Insulin resistance: a multifaceted syndrome responsible for NIDDM, obesity, hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. *Diabetes care* 1991; 14(3): 173-94.

18. Chen, Wei, Weihang Bao, Shahana Begum, Abdalla Elkasabany, Sathanur R. Srinivasan, and Gerald S. Berenson. Age-related patterns of the clustering of cardiovascular risk variables of syndrome X from childhood to young adulthood in a population made up of black and white subjects: the Bogalusa Heart Study. *Diabetes* 2000; 49(6): 1042-48.

19. Hamdy S, Gamela N. Left ventricular structure and function in prediabetic adults: Relationship with insulin resistance. *Cardiovasc Dis Res* 2011; 2(1): 23-8.

20. Lind L, Andersson PE, Andrént B, Hänni A, Lithell HO. Left ventricular hypertrophy in hypertension is associated with the insulin resistance metabolic syndrome. *Journal of hypertension* 1995; 13(4): 433-38.

21. Fuentes LD, Brown AL, Mathews SJ, Waggoner AD, Soto PF, Gropler RJ, Dávila-Román VG. Metabolic syndrome is associated with abnormal left ventricular diastolic function independent of left ventricular mass. *European heart journal* 2007; 28(5): 553-59.