

## The study of cardiac arrhythmias in asthmatic patients referring to Amir-al-Momenin Hospital of Zabol, 2013

Zohreh Mahmoodi<sup>1</sup>, Mohamad Reza Havasian<sup>2</sup>, Morteza Salarzai<sup>3,\*</sup>

<sup>1</sup>Cardiologist, Dept. of Cardiology, Zabol University of Medical Sciences, Zabol, Iran, <sup>2</sup>Dentistry, Dept. of Periodontics, Ilam University of Medical Sciences, Ilam, Iran, <sup>3</sup>Physician, Student of Medicine, Students Research Committee, Zabol University of Medical Sciences, Zabol, Iran

**\*Corresponding Author:**

Email: mr.mortezasalar@gmail.com

### Abstract

Asthma is one of the most common diseases, and it is one of the main factors behind physical disabilities as well as high economic costs. The present research aims at studying the prevalence of cardiac arrhythmias in asthmatic patients of Amir-al-Momenin Hospital of Zabol in 2013. In this cross-sectional, descriptive study, as many as 200 asthmatic patients were studied; the participants' minimum age was 15, maximum was 80, and they had no history of heart diseases. The information and data related to the participants of the present study were collected through using standard questionnaires. Spirometry and electrocardiogram was taken from the patients, and the arterial blood oxygen was measured through using pulse oximetry. The data were analyzed through using SPSS 18. The present study indicated that from among the 200 asthmatic patients studied, 19 patients suffered from cardiac arrhythmia. Among these 19 patients, seven patients had sinus tachycardia, 8 patients had PVC, 1 patient had MAT, and 3 patients had Rbbb. With respect to the drugs taken, cardiac arrhythmia was more common among patients who used beta-agonists together with anticholinergic, glucocorticoids, and theophylline's. The findings of the present study indicated that the prevalence of cardiac arrhythmia was relatively high among the asthmatic patients. The present study indicated that due consideration must be given to asthma and the attempts toward early cardiac arrhythmias diagnosis through taking electrocardiogram in periodic examinations and giving the patients awareness about the symptoms of arrhythmia so that early diagnosis of arrhythmia in asthmatic patients is made.

**Keywords:** Cardiac Arrhythmias, Asthmatic Patients, Zabol, Iran.

### Introduction

Asthma is a chronic respiratory clinical syndrome that leads to inflammation, irritability, and spasm of lung airways.<sup>(1)</sup> People suffering from this disease will suffer from severe periodic attacks resulting from allergic reaction and reversible bronchospasm.<sup>(2)</sup> This spasm leads to clinical symptoms such as wheezing, shortness of breath, and coughing. This disease can be seen in all age groups. However, its prevalence is more common among people over 60 years old as well as children.<sup>(3)</sup> According to the epidemiological studies, the prevalence of asthma has increased over the last two decades.<sup>(4)</sup> Based on the WHO estimates, 235 million suffer from asthma, and it accounts for more than 80 percent of mortality in countries where people have low or average incomes. It is estimated that about 25 thousand children lose their lives yearly due to asthma.<sup>(5)</sup> According to the meta-analysis of the national studies, the average prevalence of asthma among the Iranian children is 13.14%, and in fact, the annual increase rate of asthma prevalence is higher than that of the international average.<sup>(6)</sup> Cardiac arrhythmias take place with different qualities in patients without heart diseases and those suffering from heart diseases of whatever cause.<sup>(7)</sup> In fact arrhythmia of whatever kind is associated with disorder of speed, order, creation place or conducting the electric impulse in one's heart. Not all arrhythmias are dangerous, but some of them can be dangerous and call for urgent treatment so that sudden death is prevented.

Unfortunately, most of the arrhythmias are not taken into serious account by patients, and they are accidentally diagnosed during a common physical examination or through taking electrocardiogram. More than 40 million people in the United States suffer from different kinds of heart diseases, and more than 1 million people die from these diseases each year, 700 thousand of whom die from acute myocardial infarction.<sup>(8)</sup> Since they have quick effects on the treatment process, B-agonists just like salbutamol, are the first treatment drugs taken by asthmatic patients. High and long-term consumption of such drugs can bring about various complication in asthmatic patients.<sup>(9)</sup> These complications include increased cardiovascular diseases and the incidence of multifocal atrial tachycardia, atrial fibrillation, atrial tachycardia, and premature ventricular contractions(PVC).<sup>(10)</sup> Most of the cardiac complications in asthmatic patients are attributed to taking beta-agonists. This group of drugs increases the heartbeat and reduces the density of potassium. Moreover, they can accelerate ischemia, and bring about heart failures, arrhythmia, and sudden death. Moreover, these drugs can bring about disorders in the cardiovascular system through creating electrolyte abnormalities such as hypocalcaemia, hypomagnesemia, and hypokalemia, and they will thus bring about the incidence of arrhythmia and ECG changes.<sup>(11)</sup> The present research aims at studying the prevalence of cardiac arrhythmias

in asthmatic patients referring to Amir-al-Momenin Hospital of Zabol in 2013.

### Materials and Method

The present study is a descriptive-analytical one conducted on all asthmatic patients referring to Amir-al-Momenin Hospital of Zabol in 2013. The inclusion criteria of the present study were the patients diagnosed to suffer from asthma through using spirometry, having passed at least 6 months of the patients' treatment. The exclusion criteria were not having a history of heart disease and acute asthma. The patients were selected through using non-probability sampling from the patients staying in the Lung Subspecialty Ward and Internal Medicine Ward of Amir-al-Momenin Hospital of Zabol; they were taken spirometry, pulse oximetry, and ECG. The information was collected through using a researcher-made questionnaire whose validity and reliability were previously confirmed by the specialists and scholars of this field. The data collected were analyzed by SPSS version 18 through using descriptive-analytical statistics and chi-squared statistical test ( $X^2$  test).<sup>(12-14)</sup> Moreover,  $p < 0.05$  was considered as the significance level.

### Results and Discussion

From among the 200 asthmatic patients studied, 90 patients (45%) were male and 110 patients (55%) were female. The patients' average age was  $46.87 \pm 1.098$ . The prevalence of arrhythmia was 96 from every 1000 asthmatic patients referring to Amir-al-Momenin Hospital of Zabol (Table 1). In fact, from every 200 asthmatic patients studied, 19 patients (9.5%) had arrhythmia. Moreover, with respect to the treatment conducted, the frequency of arrhythmia in asthmatic patients was as follows: 3 patients (15.7%) used beta-agonists; 3 patients (15.7%) used anticholinergics and beta-agonists; 4 patients (21%) used beta-agonists, anticholinergics, and glucocorticoids; and 9 patients (47.3%) used beta-agonists, anticholinergics, glucocorticoids, and theophylline's to treat their disease (Table 2) ( $P < 0.005$ ). With respect to the diagnosis duration of the disease, the frequency distribution of arrhythmia in asthmatic patients was as follows: 2 patients in 1-5 years; 3 patients in 5-10 years, 5 patients in 5-15 years; and 9 patients in more than 15 years (Table 3) ( $P > 0.005$ ). With respect to the disease severity, the frequency distribution of arrhythmia in asthmatic patients was as follows: 2 patients (5.12%) minor; 2 patients (4.34%) moderate; 6 patients (9.215%) severe; and 9 patients (18%) very severe (Table 4) ( $P < 0.005$ ). Asthma is one of the most common chronic diseases all over the world. At present, more than 300 million people suffer from this disease. This disease is commonly described with increased airway responsiveness to allergens, increased mucus secretion, and eosinophilic inflammation. In fact, the inflammation pattern in asthma is the main characteristic of allergic diseases that

involves many mediators.<sup>(15,16)</sup> However, there are numerous evidences indicating the increased prevalence of asthma as well as other atopic diseases in the world. Although the existence of asthma has been recorded many times during the last 30 years, different methods and lack of similar diagnostic criteria have made it difficult to compare the findings.<sup>(17)</sup> The present research aimed to study the prevalence of cardiac arrhythmia in asthmatic patients referring to Amir-al-Momenin Hospital of Zabol in 2013. The findings of this study indicated that, from among the 200 asthmatic patients, 19 patients (9.5%) suffered from arrhythmia; among these 19 patients, the highest level of prevalence was related to PVC and sinus tachycardia with 42.1% and 36.7% respectively. In the present study, from among the 30 asthmatic patients undergoing pharmaceutical treatment with beta2-agonist, 15.7 percent of the patients (10.5% sinus tachycardia and 5.2% PVC) suffered from arrhythmia. In a study conducted by Warnier et al, 158 asthmatic patients were studied.<sup>(18)</sup> The findings of the aforementioned study indicated that PVC and tachycardia are the most common arrhythmias with 30% and 40% respectively. In the aforementioned study, these symptoms were more common among 42 patients undergoing the treatment with beta-agonist. The findings of the aforementioned study are consistent with those of the present study. From among the 45 asthmatic patients undergoing the treatment with anticholinergic and beta-agonist, one patient suffered from sinus tachycardia, and two patients suffered from PVC. Moreover, from among 106 asthmatic patients undergoing the treatment with beta-agonist, anticholinergic, and glucocorticoid, two patients suffered from sinus tachycardia, one patient suffered from mat, and 1 patient suffered from Rbbb. From among 19 asthmatic patients undergoing the treatment with beta-agonist, anticholinergic, glucocorticoid, and theophylline, two patients suffered from sinus tachycardia, five patients suffered from PVC, and two patients suffered from Rbbb. In the present study, taking drugs was closely related with suffering from arrhythmia, and this is consistent with the findings of the study conducted by Salpeter et al.<sup>(19)</sup> Using beta2-agonist in asthmatic patients is associated with risk of cardio-vascular complications. Starting the treatment with these drugs brings about increased heartbeat, and using beta-adrenergics and beta-agonists is likely to bring about ischemia, congestive heart failure, arrhythmia, and sudden death. In some patients suffering from acute severe asthma, using drugs increases suffering from potentially fatal arrhythmia and cardiac ischemia death. Numerous studies have indicated that increase heartbeat is closely related with increased mortality. Beta2-mimetics are the most commonly used drugs for treating asthma. They increase the activities of the sympathetic system, and as a result, they will bring about increased heartbeat and cardiac arrhythmia. In the present study, the prevalence of cardiac arrhythmia was higher among the elderly; from among the patients older

than 50, 11 patients suffered from arrhythmia. This is consistent with the findings of the study conducted by Enright et al.<sup>(20)</sup>

**Table 1: The prevalence of cardiac arrhythmia in asthmatic patients studied**

Asthmatic patients	Number	Percent
With arrhythmia	19	9.5
Without arrhythmia	181	91.5
Total	200	100

**Table 2: The frequency distribution of asthmatic patients with respect to the treatment conducted**

Drug used	Kind of Arrhythmia	Number	Percent
Beta-agonist	Sinustachycardl	2	10.5
	PVC	1	5.2
	Total	3	15.7
Beta-agonist+ Anticholinergic	Sinustachycardl	1	5.2
	PVC	2	10.5
	Total	3	15.7
Beta-agonist+ Anticholinergic+ Glucocorticoid	Sinustachycardl	2	10.5
	Mat	1	5.2
	Rbbb	1	5.2
	Total	4	21
Beta-agonist+ Anticholinergic+ Glucocorticoid+ Theophylline	Sinustachycardl	2	10.5
	PVC	5	26.3
	Rbbb	2	10.5
	Total	9	47.3

**Table 3: The frequency distribution of arrhythmia in asthmatic patients with respect to the diagnosis duration of the disease**

Diagnosis Duration	Kind of Arrhythmia	Number	Percent
1-5 years	Sinus tachycardia	1	1.26
	PVC	1	1.26
5-10 years	Sinus tachycardia	1	1.26
	PVC	2	2.32
10-15 years	Sinus tachycardia	2	8.3
	Mat	2	8.3
	PVC	1	4.15
More than 15 years	Sinus tachycardia	3	27.3
	PVC	3	27.3
	mat	1	9.01
	Rbbb	2	18.02

**Table 4: The frequency distribution of arrhythmia in asthmatic patients with respect to the disease severity**

Disease Severity	Number	Percent
Mild	2	5.12
Moderate	2	4.34
Severe	6	9.21
Very Severe	9	18

## Conclusion

The findings of the present study indicated that the prevalence of cardiac arrhythmia in asthmatic patients was relatively high. Moreover, the prevalence of cardiac arrhythmia is closely related with using drugs to treat asthma in asthmatic patients. The present study indicated that due consideration must be given to asthma and the attempts toward early cardiac arrhythmias diagnosis through taking electrocardiogram in periodic examinations and giving the patients awareness about the symptoms of arrhythmia so that early diagnosis of arrhythmia in asthmatic patients is made.

## Ethical Considerations

This research project was approved by the ethics committee of Zabol, University of Medical sciences and name and Specification of patients were kept confidential.

**Source of Funding:** Zabol University of Medical Sciences.

**Conflict of Interest:** None.

## References

1. Ferreira MA, Matheson MC, Tang CS, Granell R, Ang W, Hui J, et al. Genome-wide association analysis identifies 11 risk variants associated with the asthma with hay fever phenotype. *Journal of Allergy and Clinical Immunology*. 2014; 133(6): 1564-71.
2. Honkoop PJ, Loijmans RJ, Termeer EH, Snoeck-Stroband JB, van den Hout WB, Bakker MJ, et al. Symptom-and fraction of exhaled nitric oxide-driven strategies for asthma control: A cluster-randomized trial in primary care. *Journal of Allergy and Clinical Immunology*. 2015; 135(3): 682-8.
3. Hanania NA, Trzaskoma B, Rosen K, Manga V, Omachi TA. Exploring Omalizumab In Allergic Asthma: An Analysis Of Efficacy By Asthma Severity And Eosinophilic Status Using Pivotal Trial Studies. *Am Thoracic Soc*. 2015; 20(3): 4150-59.
4. Pağan K, Bartuzi Z. The role of flavonoids in asthma. *Postep Derm Alergol*. 2011; 28(5): 396-401.
5. Haidari F, Mohammadshahi M, Malgard SH, Borsi SH, Chitsaz P, Rahemi M. Comparison of Intake of Food Consumption Pattern in Asthmatic and Healthy Adults. *Journal of Sabzevar University of Medical Sciences*. 2016; 23(2): 222-32.
6. Heydarnia MA, Entezari A, Mehrabi Y, Pourpak Z, Moin M. The prevalence of asthma symptoms in a metaanalysis of country. *Research in Medicine*. 2007; 31(3): 217-25.

7. Maurice S, Malcolm B, Mellroy Merline D. Clinical cardiology. 4th. Cheitlin: Publishing Divisiion of Prentice Hall, 1990.
8. Salavati M, Rahimi MH, Felegari GH, Borzou SR. Effect of Relaxation Program on the Rate of Ventricular Arrhythmia in Patients with Myocardial Infarction. *Armaghane danesh*. 2005;9(4):9-16.
9. Wenzel S, Ford L, Pearlman D, Spector S, Sher L, Skobieranda F, et al. Dupilumab in persistent asthma with elevated eosinophil levels. *New England Journal of Medicine*. 2013;368(26):2455-66.
10. O'Gara PT, Kushner FG, Ascheim DD, Casey DE, Chung MK, De Lemos JA, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction. *Circulation*. 2013;127(4):362-425.
11. Finkle WD, Greenland S, Ridgeway GK, Adams JL, Frasco MA, Cook MB, et al. Increased risk of non-fatal myocardial infarction following testosterone therapy prescription in men. *PloS one*. 2014;9(1):85805-13.
12. 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.
13. 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.
14. Panahi J , Havasiyan MR, Gheitasi S, Pakzad I, Jaliliyan A, Hoshmandfar R, Havasiyan M. The in Vitro Inhibitory Effects of the Aqueous Extracts of Summer Onion on Candida Albicans. *J of Ilam Uni Med Sci*. 2013;21(1):54-9.
15. Buss, WW, Lemanski RF. Asthma. *Engl J Med*. 2001; 344(21):350-62.
16. Mosmann TR, Coffman RL. Th1 and Th2 cells: different pat terns of lymphokine secretion lead to different functional properties. *Annu Rev Immunol*. 1989;7(1):145-73.
17. Abbasi-Ranjbar Z. Prevalence of Asthma Symptoms in Children. *J of GUILAN Uni of Med Scie*. 2006;14(56):1-9.
18. Warnier MJ, Rutten FH, Kors JA, Lammers JWJ, de Boer A, Hoes AW, et al. Cardiac arrhythmias in adult patients with asthma. *Journal of Asthma*. 2012;49(9):942-46.
19. Salpeter SR, Ormiston TM, Salpeter EE. Cardiovascular effects of  $\beta$ -agonists in patients with asthma and COPD: a meta-analysis. *CHEST Journal*. 2004;125(6):2309-21.
20. Enright PL, Ward BJ, Tracy RP, Lasser EC. Asthma and its association with cardiovascular disease in the elderly. *Journal of Asthma*. 1996;33(1):45-53.