

ORIGINAL RESEARCH ARTICLE

Can Orthostatic Hypotension be Used as a Prognostic Marker for the Development of Early Adverse Outcomes in Patients with Coronary Artery Disease?**B.R. Kartheek*¹, S. Venkateswaraiah², Y.Gopi³**¹*Faculty of Medicine, Asia Metropolitan University, PasirGudang Campus, Jalan Lembah-6, Bandar Seri Alam-81750, Masai, Johor, Malaysia*²*Assistant Prof of Pharmacology, NRI Medical College, Guntur, India*³*Physician, Waltair Healthcare, D.No.17-1-29, Opp. K.G.H Clock Tower, Maharanipeta, Visakhapatnam-02, Andhra Pradesh, India.*

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ABSTRACT**Objective:** To assess the role of the orthostatic hypotension in the development of the early cardiovascular complications in the ischemic heart disease patients.**Patients and methods:** 200 patients with ischemic heart diseases were included in this prospective observational follow up study. Blood pressure was measured with the standard mercury sphygmomanometer, the measurement in supine position was taken after at least 15 minutes of rest and the measurement in standing position was taken at the third minutes of standing, the orthostatic hypotension is said to be present when there was a sustained drop in systolic (≤ 20 mmHg) or diastolic (≥ 10 mmHg) blood pressure at the third minute of standing up.**Results:** Fifty one patients developed cardiovascular complications out of seventy two patients with orthostatic hypotension and out of one twenty eight patients without orthostatic hypotension, sixteen patients developed cardiovascular complications, this association is statistically significant (p – value ≤ 0.05). The symptoms of head ache, blurred vision, falling and light headedness were independent of OH in all aged groups. Based on the nutritional status, Body Mass Index was measured in these subjects and identified as 78% well nourished; 2% under-nourished and 47% overweight. Past history of Hypertension and usage of medications were the common underlying conditions.**Conclusion:** Orthostatic hypotension can be used as a prognostic marker for the development of early adverse complications in ischemic heart disease patients, thus it can be useful tool to screen the high risk patients in the coronary care unit. Symptoms were independent of physical recording of OH.**Keywords:** Ischemic heart disease, orthostatic hypotension, Symptoms, Mortality, Ageing.**INTRODUCTION**

Blood pressure is regulated by activity in autonomic nervous system. With aging, the ability to regulate blood pressure is decreased. 200 patients with ischemic heart diseases were included. The diagnosis of ischemic heart diseases was based on clinical and electrocardiographic findings. Blood pressure was measured with mercury sphygmomanometer, the measurement in supine position and then at the third minutes of standing was taken. Orthostatic hypotension is said to be present when there was a sustained drop in systolic (≥ 20 mmHg) or diastolic (≥ 10 mmHg) blood pressure at the third minute of standing up [1,2].

Hemodynamic homeostasis becomes less effective with aging and is associated with a decreased ability to regulate blood pressure. Postural hypotension is a common clinical disorder among the older population, incidence of which increases with increase in age [3]. In a study done on elderly residential population of Malaysia by Kartheek, B.R., *et al* [4], OH was recorded in 8 out of 60 healthy subjects. Many times it is asymptomatic unless diagnosed by physical examination. Some conditions like hypertension, diabetes mellitus, low blood volume, and use of medications may even further impair the ability of the elderly to cope with orthostatic stress. The mechanism by

which the orthostatic hypotension and cardiac autonomic neuropathy increase cardiovascular morbidity and mortality remain to be settled. One hypothesis involves impaired central control of respiration in patients with cardiac autonomic neuropathy [5]. Some studies found exercise intolerance in patients with cardiac autonomic neuropathy with a reduced response in heart rate and blood pressure and decreased cardiac output during exercise [6,7,8]. All cause mortality in middle aged adults was higher among those with (13.7%) than without (4.2%) OH [9]

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Aim of the study:

To assess the role of the orthostatic hypotension in the development of the early cardiovascular complications in the ischemic heart disease patients.

MATERIALS AND METHODS

Blood pressure was measured with the standard mercury sphygmomanometer, the measurement in supine position is taken after at least 15 minutes of rest and the measurement in standing position is taken at the third minutes of standing.

In standing posture, the accurate BP was measured by keeping the person's hand in extended position with support at heart level. Orthostatic hypotension is said to be present when there was a sustained drop in systolic (≥ 20 mmHg) or diastolic (≥ 10 mmHg) blood pressure at the third minute of standing up. Variables noted were systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse rate(HR) in supine position and at third minute of standing. Height, weight and body mass index (BMI) are recorded. On standing, participants were asked whether they were feeling any dizziness, faintness, or light-headedness and the procedure aborted for safety

reasons if necessary, this was infrequent. All patients were reviewed for smoking, antihypertensive drugs (β – blockers, ACE – I or ARB.s ... etc) and for signs of peripheral neuropathy (by pin prick test, light touch and position sense bilaterally) as a possible association with autonomic neuropathy. Observation and follow up was done for ten days on the subjects in the hospital. Data on subjects who developed cardiovascular complications like extension of infarction-mechanical complications, rhythm disorders, cardiac failure, shock and death is recorded during follow up period and analysis done to find out relation between the orthostatic hypotension and cardiovascular complications and mortality. Heart rate (HR) was recorded by counting the pulse rate by palpation of the radial artery for one minute.

Sample:

Sample was obtained from coronary care units of tertiary hospitals and regional primary, secondary care hospitals after getting ethical approval.

The data regarding their identity, life style, Past History of related diseases, height, weight, reason for admission, diagnosis and list of main drugs used and Blood pressure indices were collected in a proforma.

Data Analysis:

The statistical analyses are based on Chi – square and *t* – tests with a *p*– value of 0.05 or less considered statistically significant. Analysis was done to test whether any relation exists between presence of orthostatic hypotension in coronary care patients and development of early cardiovascular complications and death.

RESULTS

Two hundred patients with ischemic heart diseases aged between (26 – 88) years (mean 58 ± 13.4), (117) patients (58.5 %) were males and (83) patients (41.5 %) were females, out of those (200) patients, (75) patients (37.5 %) were diabetics, (72) patients (36 %) had orthostatic hypotension (mean age 63 ± 13.6) and (128) patients (64 %) had no orthostatic hypotension (mean age 55 ± 11.7) (**Table 1**).

Out of the (72) patients with orthostatic hypotension, (51) patients (70.83%) developed different cardiovascular complications and twenty one patients (29.17%) passed in uneventful course during their admission in coronary care unit, while out of (128) patients without orthostatic hypotension, sixteen patients (12.5%) developed different cardiovascular complications

and (112) patients (87.5%) passed in uneventful course during their admission in coronary care unit , statistically there was a significant effect of orthostatic hypotension on the development of the complication ($p < 0.05$) (Table 2).

When we studied the combined effects of the orthostatic hypotension and diabetes mellitus on the development of the cardiovascular complications, statistically there was extra risk of diabetes and orthostatic hypotension over the orthostatic hypotension alone on the development of the cardiovascular complications (p – value < 0.05) (Table 3) between the cardiovascular complications and orthostatic hypotension. Cardiovascular complications , rhythm disorders , heart failure , shock , extension of preexisting ischemia , death and others (mitral regurgitation , ventricular septal defect , thromboembolism and pericarditis) were more frequent in patients with orthostatic hypotension than those without orthostatic hypotension (51 vs. 16) and statistically significant (p – value < 0.05) (Table 4).

The occurrence of different symptoms in relation to orthostatic hypotension headache, blurred vision, falling, light headedness were found to be independent of physical recording of orthostatic hypotension. Symptoms are similar in all age groups(<45 vs>45) (Table 5 & 6).

Table 1: factors which are affecting the orthostatic hypotension

Characteristics		Patients without OH N = 128 (64%)	Patients with OH N = 72(36%)
Age	<45	29	23
	>45	99	49
Sex	male	72	34
	female	56	38
Peripheral neuropathy		17	11
Smoking		63	53
Antihypertensive Drugs	B- blocker	53	33
	ACE – I ARB.s	27	12

Table 2: the relation between the orthostatic hypotension and the cardiovascular complications

Patients	Complicated patients	Uncomplicated patients
Patients with orthostatic hypotension ; N=72	51 (70.83%)	21 (29.17%)
Patients without orthostatic hypotension; N=128	16 (12.5%)	112 (87.5%)

P – Value < 0.05

Table 3: the effects of orthostatic hypotension and diabetes mellitus on the complications

Patients	Complicated patients	Uncomplicated patients
Diabetic patients with orthostatic hypotension; N= 52	31 (59.61%)	21 (40.38%)
Diabetic patients without orthostatic hypotension; N= 23	8 (34.78%)	15 (65.22%)

P – Value < 0.05

Table 4: Occurrence of different complications in relation to orthostatic hypotension

Complication	Patients with orthostatic hypotension	Patients without orthostatic hypotension
Rhythm disorders	41	2
Heart failure	38	8
Shock	10	6
Extension of ischemia	11	2
Others *	13	10
Death	20	5
Total	72	128

P – Value < 0.05

* mitral regurgitation , ventricular septal defect , thromboembolism and pericarditis

Table 5: occurrence of different symptoms in relation to orthostatic hypotension

Symptoms	< 45 YRS N=100	> 45 YRS N=100	Patients with orthostatic hypotension	Patients without orthostatic hypotension
Headache	32	23	27	28
Blurred Vision	22	13	21	14
Falling	28	39	34	33
Light Headedness	23	37	28	32

Table 6: Number Of Symptomatic Subjects VS Orthostatic Hypotensive Subjects

Age Group years	Symptomatic	OH Recorded
<45	37	26
>45	39	46

DISCUSSION

Orthostatic hypotension was an important and common problem in the coronary care unit patients (44%) especially in elderly (34%) and diabetic patients (28 %). Age is one of the most important factors in the etiology of orthostatic hypotension, next common factors are the antihypertensive drugs and diabetic autonomic neuropathy while sex had limited role. Some authors claimed smoking, but found no significant effect on orthostatic hypotension^[12].

In this study , the presence of the orthostatic hypotension increased with the age , we did not find significant effect of age and antihypertensive drugs probably due to small number of patients and that all patients were in complete bed rest. In the present study, we found significant relation between orthostatic hypotension and appearance of cardiovascular complications and death, during the follow up period of (10 days) in the coronary care unit.

Many researchers studied the relationship between the orthostatic hypotension and the morbidity and mortality both in elderly and young patients and in diabetics and non – diabetics and all found significant effect of orthostatic hypotension.

Heikki L and K.E.Juhani (2004) concluded that diabetics with orthostatic hypotension carry a high risk vascular death^[12].

In our study we observed the interaction between the orthostatic hypotension and diabetes mellitus for the increment of the morbidity and mortality suggesting that diabetes mellitus increased the mortality through the orthostatic hypotension and associated autonomic neuropathy.

The mechanism by which the orthostatic hypotension increases the cardiovascular morbidity and mortality is probably related to the associated autonomic dysfunction that leads to reduced response in heart rate and blood pressure and decrease in the cardiac output during exercise. Another factor is the association between the cardiac autonomic neuropathy and prolongation of QT interval, which lead to adverse cardiac events [10,11].

The limitations of our study were: short time of follow up, the small number of the patients, and the need for other tests to detect signs of autonomic dysfunction and this may be due to the short time of the study and serious state of the patient.

CONCLUSION

Orthostatic hypotension can be used as a prognostic marker for the development of early adverse outcomes in ischemic heart disease patients with acute coronary syndrome, thus it can be useful tool to screen the high risk patients in the coronary care unit.

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