

# Prevalence of Hypertension among Diabetic Patients Attending Diabetic Clinic at Teaching Hospital, Batticaloa

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**Abstract:** Diabetes Mellitus (DM), Hypertension are most common disorders in world population. Both are chronic medical conditions that frequently co-exist. It is a cross sectional descriptive study involving simple random sample of hundred diabetic patients who are attending to Diabetic clinics at Teaching Hospital, Batticaloa. Prevalence of hypertension among diabetic patients was 59%. Type of DM, family history of hypertension, lipid disorders had influence on development of Hypertension among DM patients ( $p < 0.05$ ).

Prevalence of Hypertension among DM patients was moderately high. Awareness about complication of Hypertension and DM was inadequate in the sample studied.

**Keywords:** Diabetes Mellitus (DM), Hypertension, Prevention

## Introduction

Diabetes Mellitus (DM), Hypertension are most common disorders in world population. DM is a most common metabolic disorder affecting a large number of populations in developed countries as well as developing countries including Sri Lanka. Hypertension also is an important health concern of world population and these diseases can occur separately or together (Katulanda *et al*, 2008).

Globally, as of 2010, an estimated 285 million people had DM. Its incidence is increasing rapidly, and by 2030, this number is estimated to almost double. DM occurs throughout the world, but is more

common (especially type 2) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030. The increase in incidence in developing countries follows the trend of urbanization and lifestyle changes, “Western-style” diet and also predisposed genetically and has influence of family history (Wild *et al*, 2004).

Hypertension is a disease of vascular regulation in which the mechanisms that control arterial pressure within the normal range are altered. The basic explanation is blood pressure that is elevated when there is increased peripheral vascular resistance. Hypertension may be Essential Hypertension or Secondary Hypertension (Weber, 2012).

DM and Hypertension are chronic medical conditions that frequently co-exist. Data from several studies have suggested that the prevalence of hypertension in patient with DM is greater than non-diabetic people and hypertension is frequent in diabetic people (Donald & Simonson, 1998).

The incidence of hypertension is related to degree of identified risk factors such as obesity, advanced age, family history, extensive atherosclerosis, glucose intolerance, insulin resistance, hyperinsulinaemia, lipid disorders, diabetic nephropathy, and genetics in diabetic patients. Combination of both diseases gives more chances to occurrence of very severe major, minor complications. Modified pharmacological and non-pharmacological treatments are available to control Hypertension among Diabetic people (Marre *et al*, 1993).

There is a significant number of diabetic patients attending to Teaching Hospital Batticaloa with Hypertension. The proposed study aimed to determine the prevalence of hypertension and identify the risk factors for developing hypertension among diabetic patient attending diabetic clinic, Teaching Hospital, Batticaloa.

### **General objective**

To determine prevalence of hypertension among diabetic patients attending diabetic clinic at Teaching Hospital Batticaloa

### **Specific objectives**

To identify the characteristics of diabetic patients prone to develop hypertension

To identify risk factors for developing hypertension among diabetic patients

To assess awareness regarding complication of hypertension among diabetic patients

To assess the extent of life style modification among diabetic patients with hypertension

### **Literature Review**

DM is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced. DM affects large number of people in developed countries as well as developing countries (American Diabetes Association). One of five adults in Sri Lanka has either diabetes or pre diabetes and one third of those with diabetes are undiagnosed (Katulanda *et al*, 2008). Hypertension is a chronic medical condition in which the blood pressure in arteries is elevated more than 140/90 mmHg. It affects large number of people (Battegay *et al*, 2005).

The prevalence of hypertension in patients with DM is two times greater than in an appropriately matched non-diabetic population. In patients with Insulin Dependent Diabetes Mellitus (IDDM), hypertension is generally not present at the time of

diagnosis. In Non-Insulin Dependent Diabetes Mellitus (NIDDM), many patients are hypertensive at the time of diagnosis. The incidence of hypertension in NIDDM is related to the degree of obesity, advanced age, and extensive atherosclerosis that is typically present, and it probably includes many patients with essential hypertension (Donald & Simonson, 1998).

A study done on Prevalence of hypertension in a black African diabetic population found that the difference between normotensive diabetes and hypertensive diabetics was significant such a prevalence rate of 66.4% in diabetic population appears to be high, particularly in patients with NIDDM. There was no statistical difference for prevalence between male and female. But the difference was strongly significant between IDDM and NIDDM (Ducorps *et al*, 1996).

The common association between DM and hypertension may be promoted by several mechanisms. Patients with IDDM and prone to develop nephropathy often have a familial predisposition for essential hypertension, whereas normotensive healthy offspring of non-diabetic essential hypertensive parents tend to have a reduced insulin sensitivity and increased plasma insulin levels (Weidmann & Ferrari, 1991).

A study on Hypertension and DM found that association of arterial hypertension and DM is frequent in one third of patients attending a diabetic clinic. Excess hypertension frequency is marked in type II DM, a condition often associated with other vascular risk factors such as obesity and lipid disorders. There is a genetic basis for diabetic nephropathy, which may share a common background with familial hypertension. Apart from possible genetic predispositions to hypertension diabetes association, chronic hyperglycemia can lead to alteration in functional and structural properties of blood and vessels, which both contribute to elevated vascular resistance and blood pressure (Marre *et al*, 1993).

The Blood pressure is generally normal in IDDM patients in the absence of nephropathy. Blood pressure rises with the development of incipient nephropathy, and hypertension is common in patients with overt nephropathy. There is an increased prevalence of

hypertension among patients with NIDDM. Also an increased prevalence of raised blood pressure among the siblings of NIDDM patients. Insulin resistance and compensatory hyperinsulinaemia might lead to an increase in blood pressure by a number of putative mechanisms (Ferriss, 1991).

In the United States, it is estimated that 10 million persons suffer from DM, 60 million from hypertension, and 3 million from the combination of the two. There may be a causal relationship between hypertension and DM. Obesity may be a precipitating factor for both hypertension and NIDDM (Hamilton, 1990). Hypertension leads to potential complications such as left ventricular hypertrophy, myocardial infarction, heart failure, transient ischemic attack, cerebrovascular attack, renal failure and retinal haemorrhage. DM leads to complications such as macrovascular complications and microvascular complications. Macrovascular complications include coronary artery diseases, cerebrovascular diseases and peripheral vascular diseases. Microvascular diseases include retinopathy, neuropathy and nephropathy (Smeltzer & Bare, 2004).

Mortality and morbidity from macrovascular disease, hyperlipidemia, and retinopathy are high in Sri Lankan diabetic patients especially in elderly (Weerasuriya *et al.*, 1998). Simple life style modifications, such as a healthy diet that include reducing sugar intake, physical activity are considered to be essential for the preventions and control of incident Diabetes Mellitus (Alshafae *et al.*, 2008).

The Working Group on Hypertension in Diabetes has outlined a flexible modified version of the stepped-care approach to the treatment of hypertension in diabetes. Management is complex because diabetes is associated with autonomic neuropathy, sexual dysfunction, hyperlipidemia, and fluid and electrolyte disorders (Battegay *et al.*, 2005).

Treatment of Hypertension among Diabetic people has two goals. They are decrease risk of cardiovascular disease morbidity and mortality and delay or preferably prevent progression of diabetic nephropathy and retinopathy (Sierra & Ruilope, 2000). Pharmacological and non- Pharmacological methods are carried to manage Hypertension among Diabetic

people. Main Non-pharmacologic measure is life style modification such as weight reduction, sodium restriction, cessation of smoking, reduce alcohol intake (Kaplan & Victor, 1998).

## Methodology

The cross sectional descriptive study involving all the diabetic patients who were attending to diabetic clinics at Teaching Hospital, Batticaloa. hundred diabetic patients were enrolled in this study by using simple random sampling. Patients who did not give consent to participate in this study and patients unable to speak or having pain at the time of interview were excluded from study. Study was carried out from April 2012 to December 2012. Data was collected by using a pre designed structured interviewer administered questionnaire.

## Data analysis

Questionnaires was coded and statistical analysis was done using SPSS (version 16) analytical package

## Results

### Demographical data

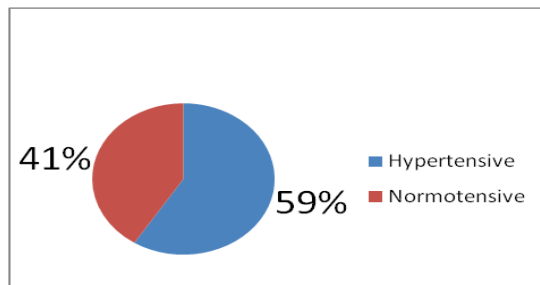
Out of 100 subjects the majority was males (n=58, p=58%) and twenty nine percentage (n=29) patients were between 51-60 years (Mean=54.41, SD=11.49). Majority of subjects (n=92, p=92%) had type-11 DM. Fifty nine (59%) had diagnosis of hypertension. Fifty three subjects had family history of DM (53%). Majority people have history of parents had DM (n=28, p=53 %).

Thirty nine (39%) had family history of hypertension. Among them, majority people had history of both single parent and siblings had hypertension (n=15, p=30%).

**Table 1- Demographic characteristics**

Characteristics	Response	Subjects (n=100) Percentage (%)
Gender	Male	58%
	Female	42%
Age group	31 – 40 years	14%
	41 – 50 years	26%
	51 – 60 years	29%
	61 – 70 years	26%
	71 – 80 years	05%
Type of DM	Type I	59%
	Type II	41%
Diagnosis of Hypertension	Yes	53%
	No	47%
Family history of DM	Yes	39%
	No	61%
BMI	Underweight	65%
	Normal	26%
	Overweight	06%
	Obesity	03%
Diagnosis of Lipid disorders	Yes	47%
	No	53%

**Prevalence of Hypertension among diabetic patients**



**Fig. 1 - Prevalence of Hypertension**

Prevalence of hypertension among diabetic patients was fifty nine percentage (n=59). Among them fifty six percentage patients were males (n=33) and most of them were 51-60 years old (n=22, p=38%). Majority of hypertensive patients were with Type-11 DM patients (n=56, p=95%).

**Risk factors for developing hypertension among diabetic patient**

There is significant association between Type of DM, family history of hypertension, history of lipid disorders and development of Hypertension in DM patients (p<0.05). Body Mass Index has no influence (p>0.05) on development of Hypertension in DM patients

**Table 2: Risk factors for developing hypertension**

Risk factor	P value
Type of DM	.042
Family history of Hypertension	.003
Body Mass Index (BMI)	.145
Presence of Lipid disorder	.031

**Complications**

Patients' awareness on complication of hypertension and DM also were assessed among whole population in this study (n=100).

*Complications of Hypertension*

**Table 3: Awareness of hypertensive complications**

Complications	Aware	
	Number	Percentage
Cardiac complications	44	73%
Renal complications	40	67%
Eye complications	37	61%
Cerebral complications	40	67%

Only sixty Patients (60%) aware that hypertension can causes complication. Among them forty four patients (73%) mentioned cardiac complications. Only thirty seven patients (37%) mentioned eye complications.

### Complications of DM

**Table 4; Awareness of DM complications**

Complications	Aware	
	Number	Percentage
Cerebrovascular complications	20	37%
Coronary artery disease	21	39%
Peripheral vascular disease	47	87%
Retinopathy	21	39%
Neuropathy	34	63%
Nephropathy	16	30%

Only fifty four Patients (54%) aware that DM can cause complications. Among them, Peripheral vascular disease was mentioned by most of patients (47%). Most of patients (70%) had not aware on nephropathy complications of DM.

### Diagnosed complications of patients

Among all the patients, seventeen patients (17%) were diagnosed as Ischemic Heart Disease patients and five patients (5%) were diagnosed as acute renal failure at the time of interview.

### Life style modification

Life style modifications were assessed among hypertensive patients with DM in this study (n=59). The following were assessed such as diet, exercise, changes in smoking habit, and changes in use of alcohol.

#### Diet

Diet modifications of patients showed following actions

**Table 5: Diet modification**

Modification	Action	Number	(%)
Amount of meal	Decrease	56	96%
Amount of rice	Decrease	53	90%
Amount of vegetables	Increase	56	96%
Amount of green leaf	Increase	59	100%
Use of coconut milk	Decrease	32	54%
Use of oil	Decrease	30	51%
Use of red rice	Increase	51	87%
Use of sugar free foods	Not at all	48	81%
Use of salt (marmite, dry fish, cream cracker)	Decrease	41	70%

All the hypertensive subjects with DM (100%) stated that they increased intake amount of green leafs in their meals. Also most of patients decreased the amount of meals and rice in their daily intake. Half of patients (51%) reduced use of oil in their meals. Most patients (81%) use vegetables oil for their meal preparation. Most patients (99%) avoid High cholesterol foods such as mutton, prawn.

Among hypertensive patients, forty one subjects (70%) engaged with regular exercises. Among them, thirty subjects (73%) follow their exercise every day and others doing exercise less frequently.

### Changes in Smoking

**Table 6: Changes in smoking habits**

Action	Number	Percentage
Withdrawal	08	30%
Reduce	15	58%
No modification	03	12%

Among hypertensive patients, Twenty six subjects (51%) had habit of Smoking. Twelve percentages of subjects had no any modification on the habit of smoking after diagnosis of hypertension.

### Changes in Alcohol

**Table 7: Changes in alcohol habits**

Action	Number	Percentage
Withdrawal	18	58%
Reduce	08	25%
No modification	05	16%

Among hypertensive subjects, Thirty one (53%) had history of alcoholism. Among them, sixteen percentages had no any modification on alcoholism after diagnosis of hypertension.

## Discussion

In the present study, Prevalence rate of hypertension was 59% (n=59) among diabetic patients. Similarly in the study done by Ducorps *et al*, 1996 in a black African diabetic population found that Prevalence of hypertension rate was 66.4% (n=365).

There was significant association between type of DM and disease progress ( $p < 0.05$ ). Study conducted on Etiology and Prevalence of Hypertension in Diabetic Patients found that, patients with Non-Insulin Dependent Diabetes Mellitus (NIDDM), many patients are hypertensive at the time of diagnosis (Donald & Simonson, 1998).

In the present study, Family history of hypertension had influence on development of hypertension among diabetic patient. Study on Hypertension and DM done by Marre *et al* 1993, found that there is association of hypertension and DM which may share a common background with familial hypertension.

In the present study, there is significant association between presence of lipid disorder and the development of hypertension. Study conducted on Etiology and Prevalence of Hypertension in Diabetic Patients found that, the incidence of hypertension is related to degree of identified risk factors such as obesity, advanced age, family history, extensive atherosclerosis, glucose intolerance, insulin resistance, hyperinsulinaemia, lipid disorders, diabetic nephropathy, and genetics in diabetic patients (Donald & Simonson, 1998).

Knowledge of Diabetes Mellitus as a serious condition which can produce lifelong complications was adequate among the present study sample. Only 54% subjects knew that Diabetes Mellitus cause complications. The study by Mohan *et al* 2005, in Chennai (India) found that only 40.6% (n = 1529) of self-reported diabetic subjects knew that Diabetes Mellitus can cause complications. It shows that the subjects have better knowledge on complications of Diabetes mellitus.

Most (87%) subjects in the present study identified peripheral vascular diseases as a complication of Diabetes Mellitus. Majority (92%) of

the sample in Moodley *et al* 2007, study has identified blindness/Retinopathy as main complication of Diabetes Mellitus. This may be due to the patients undergo foot sensations test every month, and eye checkup done on every 3 months.

In the present study, knowledge about lifestyle modification among hypertensive subjects with DM was optimal. Almost all subjects stated that hypertension can be controlled by modifying dietary habits, 30% of subjects stated that they withdrawn from smoking and 58% subjects withdrawn from alcohol consumption for better management of hypertension with DM.

## Conclusion

Prevalence of Hypertension among diabetic patients was fifty nine percentage (n=59, p=59%). Type II diabetic patients are more prone to get hypertension. Type of DM, family history of Hypertension, presence of Lipid disorders had influence on development of Hypertension among diabetic patients. Awareness about complication of hypertension, DM was inadequate. Lifestyle modification among hypertensive subjects with DM was optimal in diet modification.

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