

Coexistence of Hypertension in Type 2 Diabetes Mellitus Patients (Co-tension-D2 study)

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ABSTRACT

Background: The co-existence of hypertension and type 2 diabetes mellitus is very common. Hypertension remarkably increases the cardiovascular risk in diabetic patients.

Aim: To see the prevalence of hypertension in already known Type 2 diabetic patients.

Methods: This cross-sectional survey was comprised 556 patients and conducted in Endocrine & Diabetes Clinic, Department of Medicine, Shaikh Zayed Hospital Lahore from 4th Feb 2014 to 3rd Nov 2014. Patients of either sex, aged 35- 55 and above, with different body mass indices (BMIs) were included. Patients who were smokers, type 1 diabetes mellitus, congestive cardiac failure (CCF), arrhythmias, chronic kidney disease (CKD) were excluded.

Results: There were 212(38.2%) males and 344(61.8%) females with mean age of the gender 51.84±8.59 years. Two hundred and twelve (32.2%) patients had diabetes for <10 years and 344 patients (51.8%) had diabetes >10 years duration. 54 (31.8%) males and 116(62.2%) females were having 'diabetes alone' whereas out of remaining 386,158 (41%) males and 228(59%) females had "co-existent hypertension". By analyzing Group B subgroups i.e. aware Group B-(a), and unaware Group B-(u), almost 50% were unaware of their coexistent hypertension.

Conclusion: Coexistence of hypertension in diabetics is often undiagnosed and is associated with increased markers of vascular disease that may be a link to the important macro and micro vascular risk seen.

Key words: Hypertension, Type 2 diabetes mellitus, Risk factors, Body mass index,

INTRODUCTION

Type 2 diabetes mellitus is one of the greatest public health threats of the 21st century. Changes in human behavior and lifestyle associated with globalization have resulted in a dramatic increase in its prevalence worldwide. Type 2 diabetes mellitus is also associated with an increased risk of premature death from cardiovascular disease (CVD), stroke and end-stage renal disease.¹ Type 2 diabetes mellitus and hypertension coexist 2-3 times more commonly than predicted by chance.^{2,3}

The co-existence of both diseases is associated with increased stiffness of large arteries leading to macro and micro vascular complications e.g. increase cardiovascular and cerebrovascular risk particularly if missed and remain un-treated.^{4,5} Diabetic individuals with coexisting hypertension have a much greater prevalence of stroke and transient ischemic episodes than do normotensive diabetics. Peripheral vascular disease is also increased in the presence of high blood pressure in the diabetic patients.⁶ In other words both hypertension and diabetes mellitus are major independent risk factors for accelerated atherosclerosis and ischemic heart disease.^{7,8,9}

Coexistence of hypertension and diabetes is also associated with increased microvascular complications like diabetic retinopathy and nephropathy. A relation between both systolic and diastolic blood pressure and both background and proliferative retinopathy has been reported.^{10,11} Arterial hypertension and type 2 diabetes appear to be associated clinically as a syndrome that also include other conditions such as dyslipidemia, central obesity, hyper uricemia and accelerated atherosclerosis.^{12,13} This syndrome has been described as insulin resistance syndrome, metabolic syndrome or "syndrome X".¹⁴

A lot of factors including lifestyle and genetic factors are said to be culprits the genesis of both conditions. Also both share common factors such as insulin resistance, aging, obesity, use of thiazide diuretics in subjects initially with hypertension and development of nephropathy in those initially with diabetes, especially type 1.^{15,16} Diabetes may also be associated with systolic hypertension secondary to atherosclerosis. In addition both conditions are familial, which is likely to be polygenic in origin, although the underlying mechanism is still unclear.¹⁷

In untreated patients with essential hypertension, fasting and post prandial insulin levels are higher than in normotensive controls, regardless of the body mass index, with a direct correlation between plasma insulin concentrations and blood pressure level¹⁸. A genetic predisposition to insulin

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resistance and hypertension is present in patients with type 2 diabetes mellitus¹⁹.

In addition to the genetic predisposition, insulin resistance/hyperinsulinemia is incriminated in the development of hypertension through abnormalities in insulin signaling and associated cardiovascular and metabolic derangements²⁰.

PATIENTS AND METHODS

This cross-sectional survey was conducted in Endocrine & Diabetic Clinic Department of Medicine, Shaikh Zayed Hospital, Lahore from 4th February 2014 to 3rd November 2014. Obese type 2 diabetic patients aged more than 35 years were scrutinized for the study protocol. Those having history of CCF, CKD, arrhythmias, diabetes mellitus type 1 and smokers were excluded from the study. After informed written consent, total of 556 patients included in the study. 212 were males and 344 were females. A structured proforma was used to gather information on socio-demographic variables (gender, age, physical activity status, duration of diabetes and awareness about hypertension). Anthropometric measurements including weight and height were measured by trained staff. Body mass index (BMI) was obtained by dividing the weight in kilograms by height in meters² (kg/m²). BMI was categorized as, overweight if BMI = 25-29.9 kg/m² and obese if BMI = 30 kg/m².²¹ Blood pressure was measured using standardized sphygmomanometers, from the left arm in sitting position with the arm at the level of heart and repeated after 5 minutes rest. The patient was labelled as having hypertension if mean of the systolic blood pressure = 140 mmHg or diastolic blood pressure = 90 mmHg, according to JNC 7 guidelines or if the patient was on antihypertensive medications.²² Blood pressure readings were taken from each patient and the average BP of both sexes was calculated and recorded. Those who were aware of their HTN or were already on anti HTN Rx were categorized as-Group B-(a) "Aware Hypertensives", and the ones not aware about co-existent HTN were categorized as group B-(u) "Unaware Hypertensives". Those diabetics not fulfilling the criteria of having hypertension were categorized as Group A (diabetics alone group). Data interpreted in tables with statistical analysis by using SPSS. Frequency distributions and chi-square statistics were used for categorical variables.

RESULTS

There were 212 (38.2%) males and 344 (61.8%) females. The results show that maximum participants were of more than 55 years with age mean±SD of 51.84±8.59 years, male were early to seek medical advice than females and 38.2% of the participants were having their diabetes within past 10 years time, as compared to 61.8% who had diabetes for more than 10 years duration with mean±SD 10.67±4.47

years. Mean BMI of participants were 29.23±2.26 wt/m², systolic BP 165.17±13.21 mmHg and diastolic BP 87.86±5.50 mmHg, 38% were having diabetes diagnosed in less than 10 years time and on average 79.4% were having no physical activity and only 6% were having adequate physical activity per week (Table 1).

Table 1: Demographics of studied groups (n = 556)

Demographics	No.	%
Gender		
Male	212	38.2
Female	344	61.8
Age (years)		
35 – 44	124	22.3
45 – 54	166	29.9
> 55	266	47.8
Mean±SD	51.84±8.59	
Mean BMI (Wt/m ²)	29.23±2.26	
Mean systolic BP (mmHg)	165.17±13.21	
Mean diastolic BP (mmHg)	87.86±5.50	
Physical activity		
> 3 times/week	46	8.3
1-2 times/week	68	12.3
No physical activity	442	79.4
Duration of diabetes (years)		
< 10	212	38.2
> 10	344	61.8
Mean±SD	10.67±4.47	

Table 2: Age wise comparison of both genders of Group A- (diabetes alone group) [n=170]

Age (years)	Male (n = 54)		Female (n = 116)	
	No.	%	No.	%
35 – 44	23	42.6	32	27.6
45 – 55	14	25.9	43	37.0
> 55	17	31.5	41	35.4
Mean±SD	49.04±9.33		46.61±5.17	
P value	0.020			

Table 3: Age wise comparison of both genders of Group B- (diabetes & HTN combined group) [n=386]

Age (years)	Male (n = 158)		Female (n = 228)	
	No.	%	No.	%
35 – 44	28	17.7	41	17.9
45 – 55	41	25.9	68	29.9
> 55	89	56.4	119	52.2
Mean±SD	54.74±8.90		53.91±8.84	
P value	0.327			

When compared the diabetes alone in genders, 54 (31.8%) were males and 116 (62.2%) were females. When compared the age, 49.04±9.33 years in males and 46.61±5.17 years in females. Statistically the difference was significant (P<0.05) [Table 2]. When compared diabetes and HTN combined group, out of 386, 158(41%) were males and 228(59%) were females. Male participants were have mean ages 54.74±8.90 years and females has 53.91±8.84 years. Statistically the difference was not significant (P>0.05) [Table 3]. By analyzing Group B subgroups, i.e. aware Group B-(a), and unaware Group B-(u), it was shown that almost 50% of both sexes were unaware of their coexistent hypertension. Also, awareness prevalence decreased in both sexes with increased age (Table 4).

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Table 4: Comparison of group B-(a) with group B-(u) according to age in genders

Awareness	Male age group (years)				Female age group (years)			
	35-44(n=28)	45-55(n=41)	> 55(n=89)	Total	35-44(n=41)	45-55(n=68)	>55(n=119)	Total
Group B-(a)	17(60.7%)	24(58.5%)	39(43.8%)	80(50.6%)	24(56.2%)	40(58.8%)	57(47.8%)	121(53.1%)
Group B-(u)	11(39.3%)	17(41.5%)	50(56.2%)	78(49.4%)	17(43.8%)	28(41.2%)	62(52.2%)	107(46.9%)

DISCUSSION

The coexistence of diabetes and hypertension in the clinical setting has been extensively reported and described as “double edged sword” or a “toxic combination” that increases risks of cardiovascular diseases, renal complications, and retinopathy.^{21,22} Elevated intra-arterial pressure is one of the most important risk factors for cardiovascular disease. Diabetics have a substantial cardiovascular risk, and a subject with noninsulin-dependent diabetes is probably at a similar risk with a non diabetic that has sustained a myocardial infarction.²³

The study has further confirmed the high prevalence of HTN in diabetics appeared to be linked with increasing age and BMI. This finding is comparable to the ones referred in international literature within strata of age or BMI, the magnitude of the risk of HTN in diabetics were higher than that for diabetes alone. Brown et al²⁶ conducted National Health and Nutrition Examination Survey III 1988-1994 in US adults and Must et al²⁵ published their studies in JAMA. They included measurement of height, weight, BP and confirmed that prevalence of high BP and Diabetes increased as BMI increased.

Also, in our study, it was found that the female participants had mean BMI 29.3 kg/m², more than that of men mean BMI 27.2 kg/m², this is in concordant to the study published by Brown et al²⁴ and Must et al.²⁵ This may be a reflection that physical inactivity index was more in female gender may be because of our social demographics and involvement of female gender in the house hold activities rather than getting sufficient time and company to go for out-door activities.

Hypertension is a common problem for people with diabetes. Our study comprised a larger group (69.4%) of those having co-existence of both diabetes and HTN at the same point of time, that those having diabetes alone (30.6%); This data very much simulates as quoted earlier in the literature. Choukem et al²⁶ reported that 66.7% of diabetic patients had co-existent hypertension.

Almost same prevalence of both of these morbidities were observed in Arab countries. The prevalence rate of co-existence hypertension was (70.4%) in study done by Mohamed Berraho et al²⁷ among patients with type 2 diabetes, 64.5% rate reported in Qatari diabetics²⁸ and 72.4% rate Jordanian diabetics.²⁹ And also similar results 74.4% and 73% rates of coexistent hypertension reported in UK Caucasians³⁰, Italian³¹ and Spanish.³² But in contrast to all studies mentioned above, it is

wonderful that the prevalence of co-existent hypertension in Saudi diabetics is only 53%³³, 44% in Omani diabetics³⁴ and 38% in Bahraini diabetics, the demographics and social factors of these Arab countries need to be studied.

Our study has revealed the co-occurrence of hypertension and diabetes to be at least double as diabetes alone. The study also revealed that 46-53 % of participants with diabetes were aware of co-existent HTN with equal awareness status between both genders also revealed in our study that unawareness about co-existent HTN increased in both genders as the age increased. This finding is comparable to the one quoted by Mohamed Berraho et al.²⁷ They concluded In his study the frequency of unknown hypertension in studied diabetics were 38.8%. The results are different that that published by Katte et al in 2014.³⁵ They conducted a detailed study on more than 1700 Cameroonian diabetics and found that 75% of participants with diabetes and HTN were aware of their condition, while only about 1/3rd of those with diabetes alone and less than ¼ of those with hypertension alone were aware of their condition.

This difference of awareness of co-existent HTN in diabetics in developing world like us may be because of low socioeconomic status, lack of health educational programs or malpractice of medicine and finally lack of any symptoms specific for HTN in diabetics. This data points towards importance of frequent monitoring of blood pressure in diabetics and the importance of good community health services.^{36,37} Our data also indicated that hypertension is associated with the duration of diabetes. So all the diabetics should be screened repeatedly to see the co-existent hypertension.³⁸ This is comparable to studies done by Libby et al³⁹ in 2005, Fong⁴⁰ DS in 2004 and Sowers et al in 2000.⁴¹ They also proved that duration of diabetes is directly associated with the severity of macro- and micro-vascular complications, both of which contribute to the development of renal and/or atherosclerotic hypertension. Therefore early detection and control of the coexisting of both diseases is primordial and key to the reduction of related morbidity and mortality and therefore emphasize the need for a more pro-active approach to hypertension and diabetes prevention, detection, treatment and control in this setting³⁸.

CONCLUSION

High prevalence rates of hypertension were observed in diabetics in the population studied. This may be a reflection of overall prevalence in community. Increased age and BMI were found to be important

risk factors for both of these paired disorders. Integrated programs for prevention, detection and control of both conditions: especially repeated counselling of the diabetics for regular screening of co-existent silent HTN and other vascular risk factors can potentially help to prevent morbidity and mortality related to these paired disorders. Definitely, effective and efficient community health programs would play a key role with the help of media is yet to be established. Also publicity of mockery should be banned as the component of National Health Policy.

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