

# Hypertension and related risk factors in type 2 diabetes mellitus (DM) patients in Gaborone City Council (GCC) clinics, Gaborone, Botswana.

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## Abstract

**Introduction:** This cross sectional study was done in Gaborone City Council clinics in Botswana.

**Objective:** The aim of the study was to determine the prevalence of hypertension and related cardiovascular risk factors among DM patients.

**Methods:** A total of 401 patients were included in a cross sectional study during a three-month period between December 1, 2003 and February 28, 2004.

**Results:** During the study it was found out that 61.2% of DM patients had hypertension, 56.4% obesity, 33.5% hypercholesterolemia and 38.9% hypertriglyceridemia. In the study, hypertension was associated with age, sex, type of DM, body mass index (BMI) and hypertriglyceridemia.

**Conclusion:** The study found out that most of DM patients suffer from co-existing hypertension and related cardiovascular risk factors. *African Health Sciences* 2007; 7(1):244-245

## Introduction

Hypertension is a state of elevated blood pressure defined as  $> 140$  mmHg systolic and or  $> 90$  diastolic blood pressure. More than 90% of hypertension is classified as essential hypertension with no obvious cause. Hypertension is associated with bad prognosis when it is associated with DM, male sex, older age, obesity, hypercholesterolemia, black race, smoking and excessive alcohol intake and lack of exercise.<sup>1</sup>

Diabetes mellitus describes several syndromes of abnormal carbohydrate metabolism that are characterized by hyperglycemia. DM is classified as Type 1 diabetes where the pancreas fails to produce insulin due to B-cell destruction, which can be either immune mediated or idiopathic. Type 2 diabetes (90% of all diabetes cases worldwide) which results from the body's inability to respond properly to the action of insulin produced by the pancreas<sup>2,3,4</sup>.

Hypertension among DM patients is associated with increased risk of end stage renal disease and cardiovascular death.<sup>1,4</sup> Aggressive management of hypertension in the presence or absence of DM is associated with more health benefits and less risk of cardiovascular morbidity. In DM mostly

ACE inhibitors are credited in slowing down deterioration of nephropathy.<sup>5,6,7,8</sup>

Hypertension is a common condition which usually coexists with DM and aggravates DM complications and cardiovascular morbidity and mortality. This study aims to determine the prevalence of hypertension among DM patients in GCC clinics and related cardiovascular risk factors.

## Subjects and methods

The study was a cross-sectional study carried out in Gaborone, Botswana. The study subjects were all DM patients who follow diabetic care in Gaborone City Council (GCC) fourteen clinics. There were a total of 401 study subjects, 287(71.9%) were females while 114(28.1%) were males (see table 1). A medical officer examined and administered a questionnaire and patients were sent to have laboratory investigations. Appropriate sized cuff with single digital measuring device was used to measure blood pressure in sitting position. ECG was done for all the study subjects. The study period was between December 1, 2003 and February 28, 2004. All study subjects were asked for consent and only those who consented included in the study. The

**Table 1. Age and sex distribution of DM patients in GCC clinics, June 2004.**

Age in years	Male	Female	Total frequency	Percent
$\leq 30$	0	10	10	2.5%
$> 30-40$	16	30	46	11.5%
$> 40-50$	32	75	107	26.7%
$> 50-60$	33	89	122	30.4%
$> 60-70$	26	58	84	20.9%
$> 70$	7	25	32	8%
Total	114 (28.4%)	287 (71.6%)	401	100%

questionnaire was coded and analyzed using Epi Info 2002. Analysis of variance (ANOVA), t-test, chi-square test, correlation and regression analysis were used. Standard text books, WHO report and Pub Med were used to review for relevant literatures.

## Results

The study found that 61.2% of the DM patients had hypertension. 64.4% of female and 53.1% of male DM patients had hypertension. Female sex was associated with increased risk of hypertension ( $P=0.0001$ ). The percentage of hypertensives among the DM population increased to 70.9% in those who were older than 50 years. Older age was associated with hypertension ( $P=0.00$ ).

Hypertension was present in 41.2% of type 1 and 63.1% of type 2 DM patients. Type 2 DM had significant risk of hypertension (chi-square=6.9, df=2,  $P=0.032$ ).

27.2% of the DM patients were overweight and 56.4% obese. The mean BMI for those who have hypertension was 31.7 (SD=6.2) while for DM patients who are normotensive were 30.8 (SD=6). Although there was no difference in mean BMI in normotensive and hypertensive DM patients ( $P$ -value=0.21), hypertension was strongly associated with overweight ( $P=0.00039$ ) and obesity ( $P=0.0004$ ).

33.5% and 38.9% of the total DM patients have hypercholesterolemia (cholesterol level  $> 5.18$ mmol/L or  $>200$ mg/dl) and hypertriglyceridemia (triglyceride level  $>2.26$  mmol/L or 200mg/dl) respectively. The mean serum cholesterol for hypertensive DM patients was 5mmol/L, while for normotensive DM patients' was 4.8mmol/L. There was no significant difference between the two groups ( $P$ -value=0.29). The mean serum triglyceride for hypertensive DM patients was 1.57mmol/L, while for normotensive DM patients' was 1.5mmol/L. There was a significant difference between the two groups ( $P$ -value=0.013).

Only 18.3% of hypertensive DM patients exercised, while 11.6% normotensive DM patients' exercised, there was no significant difference between the two groups ( $P$ -value=0.06) (Exercise was defined for the study as those exercising at least three times a week for at least for thirty minutes in each session). Only 4% of DM patients admitted to smoking and 3.1% to taking alcohol.

Family history of hypertension among hypertensive and normotensive DM patients were 34.9% and 30.7% respectively. Left ventricular hypertrophy was noticed on 5.2% of electrocardiography traces done on all DM patients.

Nephropathy (diagnosed by proteinuria and azotemia) was detected in DM patients who are hypertensives (9.9%) and normotensive (7.5%), but there was no significant difference ( $P=0.79$ ) between the two-groups. 23% of hypertensive DM patients were treated using ACE inhibitors.

## Discussion

About two thirds of DM patients in the study had hypertension. This may be because both hypertension and DM patients have similar profiles like obesity and physical inactivity. In this study hypertension tended to affect female DM patients more than males, overweight and obese DM patients. This is

similar to findings that DM and HTN common risk factors reported in other studies in other countries. The risk of hypertension increased, as DM patients got older. Type 2 DM patients were affected by hypertension more than type 1 DM patients. Serum triglyceride was associated with hypertension in DM patients unlike cholesterol, which had no significant difference among normotensive or hypertensive DM patients. There was no significant difference in nephropathy among normotensive or hypertensive DM patients. This may suggest that DM nephropathy occurs independent of hypertension.

## Conclusion

The study found out that most of DM patients suffer from co-existing hypertension. So active search for early detection of hypertension and related cardiovascular risk factors should be important part of DM follow up.

Further more the study pointed out that overweight, obesity, physical inactivity and hypertriglyceridemia are associated with hypertension co-existing with DM which may be in tailoring management of hypertension among diabetics.

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