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IPMAIRED GTT IN UNCONTROLLED HYPERTENSIVE NON DIABETIC PATIENTS AND EFFECT OF ANTIHYPERTENSIVE DRUGS ON ABNORMAL GTT

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ABSTRACT

Object: To determine frequency of impaired GTT in uncontrolled hypertensive non diabetic patients and to see the effect of antihypertensive drugs on result of GTT
Background: Hypertension is awell recognized complication of type 2 diabetes. On the other hand hypertensive patients can develop diabetes or abnormal glucose metabolism. There is a delay in recognition of diabetes in hypertensive patients due to use of fasting blood sugar as a screening method. The alternative method is screening by GTT in general population and especially in hypertensive non diabetic patients. The antihypertensive drugs like diuretics and beta blocker may cause impaired GTT.
Study design: It is a cross sectional study
Material and Method: The study was done at tertiary care Hospital for period of one year.All diagnosed hypertensive patients,according to JNC 7 criteria,above age of 35 years were included in the study. Those with known diabetes or on steroids were excluded. Total 248 patients without gender difference went through glucose tolerance test according to WHO criteria.
Results: In total 248 patients, 50% were male and 50% were females. The mean age was 52.4+10.834 years. The GTT was abnormal in 45.2% (n=112) of patients in which 41.9% (n=104) were impaired and 3.2% (n=8) were found to be diabetic. The FBS was impaired in 6% (n=15) and in range of diabetic in 3.2% (n=8). The 41.9% patients with normal FBS had abnormal GTT. The abnormal GTT was associated with smoking, lack of exercise andobesity. The multiple regression analysis revealed no significant effect of antihypertensive drugs on result of GTT.
Conclusion: The abnormal glucose metabolism may increase the risk of atherosclerotic vascular abnormalities leading to myocardial infarction or stroke in hypertensive patients. The use of FBS as screening test for abnormal glucose metabolism is unreliable and there is need to do GTT in all hypertensive non diabetic patients.

Key words: Hypertensive diabetic patients, antihypertensive drugs effect, abnormal glucose metabolism

INTRODUCTION

The presence of hypertension in diabetic patients is well known as reported in UKPDS that 39% of diabetic patient develop hypertension.[1]The general population having undiagnosed diabetes or abnormal glucose metabolism was reported with different frequencies in different places.[2,3]The incidence of undiagnosed diabetes was found 2.5% in males and 3.4% in females while impaired GTT was 7.7% in males and 8.9% in females,[4]which reveals that abnormal glucose metabolism is more prevalent than diagnosed diabetes mellitus. Another study for GTT also revealed diabetes in 4.5% while Impaired GTT in16.7%.[5]
The abnormal glucose metabolism has risk for development of myocardial infarction and ischemic stroke and there is more chance of atherosclerotic vascular abnormalities leading to

myocardial or cerebral infarction in hypertensive patients with abnormal glucose metabolism.[6]The Framingham study explained that more prevalence of diabetes in hypertensive patients than normotensive patients.[7]

The fasting blood sugar is taken as screening for diabetes or abnormal glucose metabolism and GTT is advised when result exceed 109mg/d (6 mmol/l), 8 but as the other studies[1,9,10] revealed that GTT is more reliable test to know abnormal glucose metabolism. The diagnosis of diabetes or abnormal glucose metabolism in hypertensive patients would change the management and outcome especially in patients with risk factors for ischemic heart disease and stroke.

There are several studies showing abnormal GTT in hypertensive patients worldwide but not a there is an local study done in Pakistan showing frequency of IGT 46.2 % on smaller population.[11] There was a need to see the effect of hypertension on GTT and to determine the effect of antihypertensive on GTT. Therefore study was designed to know the frequency of impaired GTT in patient who were known hypertensive but not known diabetic.

MATERIAL AND MATHOD

This crosssectional study was done from May 2011 till April 2012 for a period of one year in Sindh Govt. Lyari General Hospital Karachi.All the patients above 35 years of age attended medical OPD during this period with uncontrolled hypertension were included in the study. The known diabetic patients, patients on steroids and patients below the age of 35 were excluded.All the patients after informed consent went through detailed history taking, demographical data, family history of diabetes and hypertension, habits of smoking and alcoholism, exercise, diet and history of antihypertensive drugs. The detailed examination and biochemical laboratory tests were done and recorded in preformed performa.

The blood pressure was taken by mercury sphygmomanometer while patients were relaxed for five minutes in sitting position. The first reading was discarded and average of three reading was taken as according to UKPDS study.[12] The hypertension was labeled as systolic BP more than 140mm Hg and diastolic BP more than 90mm Hg according to JNC 7.[13] Uncontrolled hypertension was labeled to those who were taking two or more antihypertensive with systolic blood pressure more than 140 mm Hg and diastolic blood pressure more than 90 mm Hg. All patients went through GTT according to WHO criteria. (14ref med channel 9) In GTT after taking fasting sample for blood sugar, 75 g glucose was given orally and blood samples for sugar were taken at 60 min and 120 min interval. The GTT results were classified according to WHO criteria. Diabetes was considered when fasting blood sugar more than 126 mg/dl and 2 hours level more than 200 mg/dl, the impaired fasting glucose (IFG) was considered when fasting glucose was more than 110mg/dl but less than 126 mg/dl and impaired glucose tolerance (IGT) when fasting glucose level less than 126 mg/dl and 2 hours blood sugar more than 140 mg/dl.[14]Age was divided into two groups and BMI classification was done according to NIH.[15]The statistical analysis was done on SPSS version 17 using t test for comparison of mean for age, BMI, FBS, systolic and diastolic blood pressure while chi square was applied to prove significant difference between normal and abnormal GTT. The multiple logistic regression test was applied to find relation between antihypertensive drugs and abnormal GTT.

RESULTS

The total 248 patients were included in the study in which 50% (n=124) were males and 50% (n=124) were females. The ratio of male to female was 1:1.The GTT was abnormal in 45.2% (n=112) of patients in which 41.9% (n=104) were impaired and 3.2% (n=8) were found to be diabetic.The age ranges from 35 years as minimum and 80 years as maximum with mean age 52.4+10.834. The age was divided into two groups less than 55 years of age and more than 55 years of age and there was no significant difference regarding abnormal GTT between the two groups.The increase in BMI was related with abnormal GTT as there was a significant difference in normal and obese patients.Mean systolic blood pressure was 178.56+13.918 mm Hg and mean diastolic blood pressure was 103.62+6.9 mm Hg.The mean fasting blood sugar was 96.94+11.06 mg/dl with minimum 69mg/dl and maximum was 134 mg/dl.The fasting blood sugar was more than 126 mg/dl only in 3.2% (n=8) patients. The 41.9% (n=104) patients having normal FBS had abnormal GTT.The abnormal GTT was associated with smoking, lack of exercise, and family history of diabetes mellitus. (p value <0.05).There was no significant association of abnormal GTT in patients with alcoholism, dyslipidemia, compliant to healthy diet and raised uric acid level.There was no significant effect of antihypertensive drugs on GTT as the multiple regression analysis revealed no significant difference between normal and abnormal GTT regarding antihypertensive especially diuretics and beta blockers.

DISCUSSION:

In our study the frequency of abnormal GTT in hypertensive non diabetic patients was 45.2% which is slightlylower than the international studies[2,3] but almost same as local study.[11]In our study the age limit was 35 to 80 years with mean age 52.4+10.8. Study done by Yi and Hanaug[3]showsthe prevalence of abnormal GTT was more than 50% where the age limit was 40-79 years. Another study by Salmasi[2] revealed 58% prevalence of abnormal GTT in hypertensive population where age limit as 35 to 82 years. Therefore the middle aged and old aged population is more prone to develop abnormal GTT.The male to female ratio for IGT was 51:53 and for diabetic was 3:5 which coincidesto the study by Salmasi[2] where male to female ratio was 16:18 for IGT and 5:19 for diabetes. This indicates that more chances of abnormal GTT in women. The same observation was seen in local

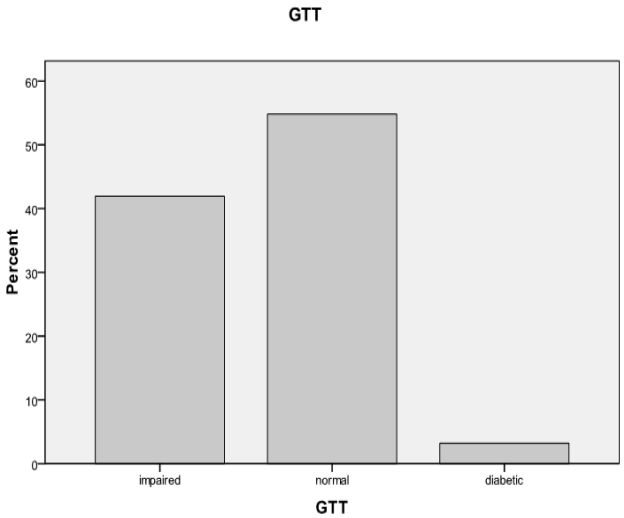


Chart 1: percentage of normal, impaired and diabetic GTT results

TABLE 1 CHI SQUARE ANALYSIS OF VARIABLES WITH NORMAL AND ABNORMAL GTT RESULTS

VARIABLES		GTT RESULTS		total	df	ODratio	p -value
		abnormal	normal				
age	less than 55 years	73	83	156			
	55 years or more	39	53	92	1		0.295
BMI	Normal	8	24	32			
	over weight	32	28	60			
	class I obesity	39	35	74			
	class II obesity	20	34	54			
	class III obesity	13	15	28	4		0.04
GENDER	Male	54	70	124			
	Female	58	66	124	1		0.351
smoking	Yes	41	33	74			
	no	71	103	174	1	2.2	0.024
ALCOHLISM	Yes	7	3	10			
	no	105	133	238	1	3.3	0.099
FAMILY HISTORY OF							
DIABETES	Yes	4	16	20			
	No	108	120	228	1	0.28	0.015
duration of hypertension	less than 5 years	93	105	198			
	5-10 years	14	22	36			
	more than 10 years	5	9	14	3		0.512
EXERCISE	Yes	53	39	92	1		
	No	59	97	156			0.002
DIET	Yes	46	54	100	1		
	No	66	82	148			0.465
DYSLIPIDEMIA	Yes	69	76	145			
	No	43	60	103	1	1.3	0.218
INCREASE URIC ACID	Yes	75	103	178			
	No	37	33	70	1	4	0.083
BETA BLOCKER		36	48	84			
		76	88	164	1	0.86	0.35
ALPHA BLOCKER		7	7	14			
		105	129	234	1		0.458
CALCIUM CHANNEL							
BLOCKERS		54	58	112			
		58	78	136	1		0.442
ACE INHIBITORS		64	82	146			
		48	54	102	1	0.87	0.355
ARBs		46	50	96			
		66	86	152	1	1.2	0.287
VASODILATORS		3	3	6			
		109	133	242	1	0.9	0.563
DIURETICS		34	34	68			
		78	102	180	1	1.3	0.212
OTHER							
ANTIHYPERTENSIVE		7	5	12	1		
		105	131	236			0.259
FBS	LESS THAN 110mg/dl	104	121	225			
	110-126 mg/dl	0	15	15			
	MORE THAN 126mg/dl	8	0	8	2		<0.001

TABLE 2 MULTIPLE REGRESSION ANALYSIS OF ANTIHYPERTENSIVE DRUGS ON ABNORMAL GTT

Variables	-2 log likelihood of reduced model	Chi-square	Df	Sig.
Beta Blocker	261,757	0.172	1	0.678
Alpha Blocker	261.757	0.304	1	0.581
Ca Channel Blockers	262.747	1.162	1	0.281
Other Anti hypertensive drugs	261.685	0.100	1	0.752
Vasodilators	261.921	0.336	1	0.562
ARBs	262.457	0.872	1	0.351
ACE inhibitors	263.515	1.930	1	0.165

The dyslipidemia was associated with abnormal GTT, but in our study the dyslipidemia was found more in the group with abnormal GTT but there was no significant difference statistically.Salmasi[2] also reported high cholesterol and triglyceridemia in patients with abnormal GTT.The abnormal GTT was seen in obese patients as there was significant difference in normal and obese patients regarding GTT (p value=0.04), the same finding are reported by Yi and Hanaug.[3]

Another important finding in our study was normal FBS in 41.9% of patients with abnormal GTT. This again is supported by study by Salmasi[2] in which 40% of the patient had normal FBS with abnormal GTT.The local study done in Pakistan also revealed that 16.7% patients had IGT in which 2.2% of patients had IFG.[10]Another local study revealed IGT was 46.2% in females and 48.6% in males. In which IFG was 8.7% in females and 5.8% in males.[11]These studies raised the question that, is the screening of diabetes by FBS is adequate or not. Study done by Nakagami T et al[8]on a large population reported that IFG more than 5.8 mmol/L (105 mg/dl) is sensitive but not specific for diagnosis of abnormal glucose metabolism.This can be seen in special population like patients with hypertension, stroke and tuberculosis that FBS is not specific for abnormal glucose metabolism.The other study also reported that abnormal GTT level more than 11 mol/L in patients with fasting glucose less than 7 mmol.[16]This confirmed that FBS was classify euglycemia with abnormal GTT.[17]The presence of abnormal glucose metabolismespecially in hypertensive patients increases the risk of cardiovascular disorders. Another study reported greater risk of cardiovascular death with abnormal GTT than impaired fasting glucose.[18]One of the study revealed subclinical coronary atherosclerosis in patients with abnormal GTT.[19]

Therefore identification of abnormal glucose metabolism is important in general population and especially among hypertensive patients, so a preventive strategy can be established. There is significant decrease in mortality and morbidity is diabetic patient when hypertension is controlled.[12]The same efforts can be done in hypertensive patients with abnormal glucose metabolism to reduce mortality and morbidity.The another important finding in our study was thatnone of the patient with impaired fasting glucose had diabetes after 2 hours glucose challenge which also coincides to Salmasi.[2]

The significant finding in our study is that, there was no significant effect of antihypertensivedrugs on result of GTT. This is in contrast with the studies which are showing impaired GTT in patient on diuretics and beta blockers, [20,21]but the same result was seen in the study by Salmasi.[2]

The implication of our study is that all patients with hypertension screened for abnormal glucose metabolism can go through the prevention program including life style modification, control of other risk factors like dyslipidemia. The control of hypertension should be done by the drugs which also prevent angina and stroke, as the reduction of coronary and cerebral artery events seen after use of ACE inhibitors in hypertensive diabetic patients.[22]

CONCLUSION

The study concluded that the entire hypertensive patient should be screened for abnormal glucose metabolism not only by FBS but also by GTT as fasting blood sugar may be normal in patients with impaired glucose tolerance test.The IGT should be addressed in this population because the risk of arthrosclerosis increases with abnormal glucose metabolism with other risk like hypertension. The patient should receive the antihypertensive drugs which are not only controlling the blood pressure but reduced the risk of stroke and angina. The antihypertensive drugs not having any significant effect on GTT result.

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