

FREQUENCY OF IMPAIRED GLUCOSE TOLERANCE IN HYPERTENSIVE PATIENTS

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SUMMARY

OBJECTIVE: To determine the frequency of impaired glucose tolerance (IGT) in hypertensive patients.

DESIGN: Descriptive cross-sectional study

PLACE: Civil Hospital Karachi

SAMPLE SIZE: Eighty patients

DURATION: July 2001 to July 2002

PATIENTS AND METHODS: All the hypertensive patients above 30 years of age of both sexes were included in this study. A detailed relevant history, physical examination including BP was carried out and all the base line investigations and Glucose Tolerance Test (GTT) were performed. Data of each patient were entered on a separate performa.

RESULTS: Eighty hypertensive patients were studied, out of these 46 (57.5%) were females and 34 (42.5%) were males. The ages of patients were between 32-80 years, mean age + SD was 55.725 + 13.364. The maximum patients were in 41-60 years of age (56.25%). Results of this study showing that the frequency of IGT was 46.2%, prevalence of impaired fasting glucose (IFG) was 8.7% and prevalence of diabetes was 5% in these hypertensive patients.

CONCLUSION: It is concluded that impaired glucose tolerance is related to hypertension and other clinical and metabolic abnormalities such as obesity, smoking, hyperlipidemia and family history of DM and positive history of intake of diabetogenic antihypertensive drugs such as diuretics and beta-blockers. Hypertensive patients should be screened for glucose tolerance by OGTT on mass level for the prevention of diabetes. It is an easy and cost effective approach.

KEYWORDS: Hypertension, Impaired Glucose Tolerance, hypertensive diabetic

INTRODUCTION

Impaired glucose tolerance (IGT) is labeled to condition, where blood sugar level lies between normal and diabetes. (definition)

IGT is now considered as a disease¹. It exhibits a more than² fold increase risk for coronary artery disease mortality and increase in the risk for renal disease^{2,3} and retinopathy⁴.

Hypertension and diabetes mellitus are common all over world^{5,6}. Hypertension is considered among the leading non-communicable disease of mankind⁷.

Several clinical and metabolic abnormalities such as hypertension, central obesity, IGT or diabetes and dyslipidemia often cluster together. These abnormalities along with hyperinsulinemia and insulin resistance are termed metabolic syndrome X^{8,9}.

A large population has co-existing problem of hypertension and IGT because of genetic, hormonal and life style factors such as obesity, physical inactivity, smoking, alcohol and certain nutrient excess^{10,11}.

Insulin resistance in hypertensive patients is a well-recognized entity, this is due to a specific resistance to insulin stimulated non-oxidative glucose disposal and not to other metabolic actions of insulin^{5,12,13}.

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Insulin resistance may be playing a part in the development of hypertension as in people with good B-cell reserves insulin-resistance produces a compensatory rise in production of insulin in order to maintain normal fasting blood sugar levels¹⁴. Hypertension may develop due to insulin-induced retention of sodium by kidneys¹⁵ or effect of insulin on the sympathetic nervous system¹⁶ or the handling of sodium by the astral smooth muscle membrane¹⁷. In patients with essential hypertensive, the prevalence of NIDDM is higher than in a normal population. In case-control studies of hypertensive patients either untreated or receiving medicine, the prevalence of glucose intolerance and NIDDM ranges from 20% - 30%¹⁸.

The current study is designed to determine the frequency of IGT, in hypertensive patients.

MATERIAL AND METHODS

This was a descriptive cross-sectional Study of 80 patients, carried out over a period of one year from July 2001 to July 2002 at all medical wards as well as in outpatients department of Civil Hospital Karachi. The patients were more than 30 years of age and diagnosed hypertensive. Patients with systolic BP >135 mmhg and/ or diastolic BP >90 mmhg at three different sittings within two weeks were included in the study. Patients with diabetes mellitus, cushing syndrome, acromegaly, hyperthyroidism, pheochromocytom and those who are pregnant or taking steroids were excluded from the study.

A performa was completed for each patient, it contained a part each for demographics, (containing name, age, sex, occupation and address) medical history (containing a history of smoking, alcohol and drugs and family history of hypertension, diabetes and coronary artery disease in 1st degree relatives) and examined (for pulse, temperature, respiratory rate, blood pressure).

Blood pressure was recorded with mercurial sphygmomanometer, those who were diagnosed hypertensive recently their B.P. recording were repeated twice in 2 weeks. Height and weight of patients were also recorded along with hip and waist ratio) and biochemically patient was evaluated (for

Hb, TLC, ESR, Urine DR for sugar and proteins, urea and electrolytes to see the renal involvement, X-ray chest and ECG done to see the left ventricular hypertrophy and lipid profile to see a risk factor for hypertension and finally an oral glucose tolerance test done.

ORAL GLUCOSE TOLERANCE

Patients were on normal carbohydrate diet for previous three day. They were advised to fast for 14-16 hours before performing OGTT. Patients were not allowed to smoke for at least two hours before and during test.

Fasting blood sample was taken, then 75 gm glucose dissolved in 250 ml of water, taken over about 10 minutes and blood sample (venous) were collected after interval of every half hour for two hours.

Glucose was estimated by GOD-PAP methods with use of glucose oxidase in spectrophotometer (Lab. System). Results were interpreted according the criteria given below.

DIAGNOSTIC CRITERIA FOR IMPAIRED GLUCOSE TOLERANCE

- Fasting whole venous blood Glucose >110 < 126 mg/dl.
- Oral glucose tolerance test 2 hours: whole venous blood glucose 120-179 mg/dl.
- Oral glucose tolerance test ½, 1, 1½ hours: whole venous blood glucose > 180 mg/dl. (Criteria derived from National Diabetes Data Group 1997).

RESULTS

Eighty hypertensive patients were studied, out of these 46 (57.5%) were females and 34 (42.5%) were males. (Fig 1)

The ages of patients were between 32-80 years, mean age + SD was 55.725 + 13.364. The maximum patients were in 41-60 years of age (56.25%). (Fig 2) The frequency of IGT (IGT) was 46.2% (37) [51.35% (19) females and 48.65% (18) males]. (Fig 3) The frequency of impaired fasting glucose (IFG) was 8.7% (7) [10.8% (5) females and 5.8% (2) males].

The frequency of DM was 5% (4) (6.5% (3) females and 2.91% (1) males).

The overall glucose intolerance including IGT, IFG and newly diagnosed DM was 60% (48) in hypertensive patients.(split according to duration of HTN)

The blood sugar values of 2 hrs with mean + SD was 156.70 + 14.03 mg/dl.

Obesity was present in higher frequency in subjects with IGT as compared to subjects with normal glucose tolerance.

The BMI > 30% was higher in subjects with IGT as compared to subjects with normal glucose tolerance in both sexes [42.5% (20) vs 19.7% (6)]. This was statistically significant at (p<0.05).

BMI>30% increase the relative risk 2.24 times for development of IGT.

A positive family history of diabetes was found more in subjects with IGT than in subjects with normal glucose tolerance but statistically not significant.

A positive history of cigarette smoking was more in subjects with IGT as compared to subjects with normal glucose tolerance [16.6% (8) vs 3.11% (1)]. This was statistically significant at P<0.05. (Table 1)

A positive history of antihypertensive drugs (diuretics & beta-blockers) was more in subjects with IGT as to subjects with normal glucose tolerance [39% (19) vs 19.5% (6)]. This was statistically significant at P<0.05.

Abnormal lipid profile was found more in subjects with IGT than in subjects with normal glucose tolerance [46.8% (22) vs 22.6% (7)]. This was statistically significant at P<0.05.

DISCUSSION

Hypertension is considered among one of the leading non-communicable disease of mankind⁷. Hypertension and diabetes are common all over the world^{5,6}.

Various population based studies conducted in

developing countries have shown that the prevalence of hypertension ranges from 9% to 30% among adults age 40-55 years¹⁹.

In the Eastern Mediterranean Region, hypertension is estimated to affect 20 to 20% of population above 35 years of age²⁰.

In US, hypertension in general population was 4% in those aged 18-29 and 65% in those older than 65 years²⁰.

Ten to twenty percent of European men, 15-25% of European women are estimated to have hypertension²¹.

A survey report of urban Indians revealed that more than 16% were hypertensive²².

Prevalence of known hypertension in urbanites of Southern Pakistan was 6.8%²³. Another study from Southern Pakistan, reported prevalence of hypertension 15% and 19% respectively in normoglycemic males and females²⁴. Another study of adult population of Punjab revealing the prevalence of hypertension 17.7 %²⁵.

These studies show that hypertension has high prevalence all over the world.

Hypertension also coexist with diabetes and IGT⁵, so along with hypertension the prevalence of IGT and diabetes is higher.

In South Africa²⁶, the overall prevalence of diabetes and IGT was 11.1% and 6% respectively. In Tanzania²⁷, the overall prevalence of diabetes was 7.1% (4.4% known and 2.7% new) and IGT was 21.5% in Muslim Indians. In Mauritius²⁸ Indian Muslims had a prevalence rate of 13.3% for diabetes and 15.3% for IGT.

A.S. Shera et al has documented the overall prevalence of NIDDM and IGT in both sexes was 11.1% and 9.4% in North West Frontier Province (NWFP) of Pakistan²⁹, in Baluchistan overall prevalence of diabetes and IGT in both sexes was 8.85% and 17.5% respectively³⁰ and in Shikarpur Sindh²⁴ prevalence of diabetes with IGT was 14.1% and 11.2% respectively.

In our study frequency of IGT, IFG & newly diagnosed DM was 46.2%, 8.7% and 5% respectively, overall glucose intolerance in hypertensive patients was 60%, that is higher than the prevalence of IGT in general population which is already mentioned.

Misra A, et al in their study in New Dehli India (1998)³¹ detected the frequency of IGT 80% and 60% in patients with isolated systolic hypertension and both systolic and diastolic hypertensive patients respectively. Another study (1997) of University of Tennessee USA detected 43.2% had IGT and 11.6% had NIDDM³².

Comparing my study to these studies, it is clear that these studies are comparable my study. The results of our study is comparable to the Asian study (Misra A, et al), where as slightly higher western study this may be because of overall higher prevalence of DM in our population.

A positive family history of diabetes, obesity, smoking, lipid profile abnormal and antihypertensive drugs (diuretics and beta-blockers) have been described as related factors in number of studies^{7,33,34}.

In our study positive family history had not statistically significance for IGT in hypertensive patients as compared to hypertensive patients with normal glucose tolerance.

Obesity (BMI>30%) was seen statistically more significant in hypertensive patients with IGT as compared to hypertensive patients with normal glucose tolerance so it is one of the risk factor for IGT both in males and females. This is also supported by study of Usmani R, et al at NIH Islamabad⁷ that also showing BMI>30 among hypertensive patients with IGT.

Cigarette smoking in this study was a significant risk factor for IGT in hypertensive patients as compared to hypertensive patients with normal glucose tolerance. Antihypertensive drugs (Beta-blocker and diuretics) have also significant effect on IGT in hypertensive patients as compared to hypertensive patients with normal glucose tolerance.

Figure - 1
Sex Wise Distribution of Hypertension

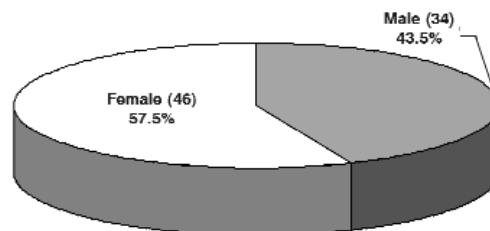


Figure - 2
Prevalence of Hypertension in different Age Groups

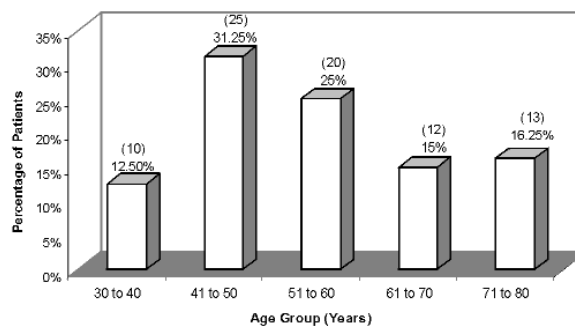
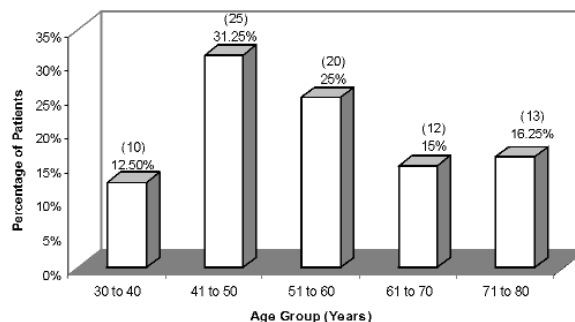


Figure - 3
Prevalence of IGT in Hypertensive Patients



CONCLUSION

IGT is now considered as a disease or separate entity. It is related to hypertension and other clinical and metabolic abnormalities such as obesity, positive family history of diabetes, smoking, hyperlipidemia, and use of antihypertensive drugs such as Beta blocker and diuretics.

Screening of subjects especially with hypertension, IGT is one way of diagnosis and prevention of diabetes. It is an easy and cost effective approach.

Table 1
Variables in Hypertensive Patients with
Abnormal and Normal Glucose Tolerance

	Patients with Abnormal Glucose Tolerance	Patients with Normal Glucose Tolerance
No. of Patients	60% (48)	40% (32)
Positive Family History of DM	14.50% (7)	10.30% (3)
Positive History of Smoking	16.60% (8)	3.11% (1)
BMI > 30%	42.50% (20)	19.70% (6)
Use of Beta-blockers and diuretics	39% (19)	19.50% (6)
*Abnormal Lipid Profile	46.80% (22)	22.60% (7)

*(Serum Cholesterol > 200 mg/dl)

*(Serum Triglyceride > 180 mg/dl)

RECOMMENDATIONS

1. Subject with IGT should be advised to modify their diet, do regular exercise, maintain weight close to their desired weight and avoid smoking.
2. Hypertensive patients should be advised to avoid antihypertensive drugs to some extent which have diabetogenic effect e.g. diuretics, beta blockers.
3. Patients with hypertension should be screened for glucose tolerance through OGTT.
5. The screening for glucose tolerance should be done in hypertensive patients on a larger scale.

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