

## THE EFFECT OF LISINOPRIL ON BLOOD GLUCOSE LEVEL

*Khalid Mahmood Qureshi, Raja Zafar Ahmed, Misbahul Islam Khan, Nusrat Pasha*

*The aim of this study was to evaluate the effect of lisinopril on glucose metabolism in mild to moderate hypertensive non-insulin dependent diabetic patients. One hundred and twenty patients were divided into two groups. Group-A was given placebo of lisinopril for two weeks. Group-B was given lisinopril in a fixed dose of 10 mg once daily for two weeks. Comparison of fasting blood glucose levels before and after the treatment showed that the blood glucose level was almost unchanged.*

### INTRODUCTION

It is thought that ACE inhibitors have a unique antihypertensive effect that they do not interfere with glucose homeostasis and some patients may actually have an improvement in glucose tolerance. Most of the currently available antihypertensive drugs produce a number of metabolic effects e.g. beta blockers may be Diabetogenic while angiotensin converting enzyme (ACE) inhibitors appear to improve slightly or not worsen the glucose tolerance<sup>3</sup>. Diabetic patients with hypertension are particularly challenging patients, since many of the agents used to lower blood pressure affect glucose metabolism adversely while ACE inhibitors may be particularly useful in these individuals. They have no known adverse effects on glucose metabolism<sup>2</sup>. There is improved insulin sensitivity with the use of ACE inhibitors in essential hypertension and in type- II diabetic subjects with hypertension<sup>1</sup>. Lisinopril may have an advantage as an antihypertensive agent that it can be given to hypertensive patients without concern that it might alter or impair the glucose tolerance<sup>4</sup>. This study was done to find out the effect of lisinopril on glucose level.

### MATERIALS AND METHODS

One hundred and twenty outdoor patients of both sexes, ages between 35-60 years visiting the diabetic clinic of JPMC Karachi, were included in this study. Patients were selected, having diastolic blood pressure 92-114 mm Hg. Their fasting blood glucose level ranged 140-200 mg/dl.

All the patients were advised to take fixed diet during the study period and avoid over eating. They were also advised to continue their normal activities. Patients having gastrointestinal, hepatic and ischaemic disorders were not included.

The subjects were prepared by withdrawal of all antihypertensive drugs for two weeks.

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From Nishtar Medical College, Multan.

**KHALID MAHMOOD QURESHI**, Assistant Professor Pharmacology.

**Raja Zafar Ahmed**, Assistant Professor Cardiology  
**MISBAHUL ISLAM KHAN**, PRO, PMRC.  
**NUSRAT PASHA**, Assistant Professor Anatomy.

Their fasting blood glucose level on day zero was determined as baseline reading. Patients were divided into two groups.

**Group-A:** Control, consisted of 60 mild to moderate hypertensive non-insulin dependent diabetes mellitus patients. They were given glibenclamide 5 mg once daily with placebo of lisinopril for two weeks.

**Group-B:** Consisted of 60 mild to moderate non-insulin dependent diabetes mellitus hypertensive patients. They were given glibenclamide 5 mg once daily and lisinopril 120 mg once daily for two weeks.

After 14 days fasting blood glucose level was again determined. Blood glucose level was estimated by Hexokinase method. Statistical analysis was performed by means of student's "t" test.

### RESULTS

The results of this study are given in table-1, that shows the blood glucose levels in the two groups at zero week and after two weeks.

**Table-1: Mean Fasting Blood Glucose Levels of the Control and experimental groups**

Drug regimen	0-week mg/dl	2 weeks mg/dl
Placebo	174.0±2.17	172.5 ±2.12
Lisinopril	168.43±1.81	164.63 ± 1.90

### DISCUSSION

In the present study it was found that lisinopril did not produce any significant change in fasting blood glucose level from base line reading to two weeks after the medication. With lisinopril there is decrease of 1.17 mg/dl of glucose, while with placebo of lisinopril there is increase of 3.8 mg/dl of blood glucose level after two weeks of medication. This change in blood glucose level was non-significant.

Lisinopril is a derivative of amino acid proline having specific structure with no sulfhydryl group like captopril, may be a cause of having no blood glucose decreasing affect, like captopril.

were studied. It was found that lisinopril produced significant fall in both systolic and diastolic blood pressure, neither the fasting nor-postprandial blood glucose level were altered in either groups of patients and no patient with normal glucose tolerance developed diabetes mellitus during the study.

Lisinopril may have an advantage as an antihypertensive agent that can be given to hypertensive patients without concern that it might alter or impair the glucose tolerance<sup>4</sup>.

In a study it was found that lisinopril is neutral with regard to insulin sensitivity, plasma insulin and glucose and lipoprotein metabolism in patients with essential hypertension<sup>6</sup>.

In a comparative study of haemodynamic and metabolic effects of low dose hydrochlorothiazide and lisinopril in obese hypertensive patients it was found that there was modest increase in plasma glucose, insulin and triglyceride concentration with hydrochlorothiazide and all the three parameters were unchanged with lisinopril<sup>7</sup>.

In hypertensive non-insulin dependent diabetics, the effect of angiotensin converting enzyme inhibitor lisinopril were compared with those of the calcium antagonist nifedipine and it was found that fasting and post-prandial plasma glucose, glycosylated haemoglobin and plasma lipids appeared to be unaffected by either agent\*

In a study on lisinopril, atenolol, amlodipine and hydrochlorothiazide in hypertensive patients, it was found that hydrochlorothiazide increased the plasma glucose and uric acid concentration, which were unaffected by the other drugs<sup>7</sup>

Angiotensin converting enzyme that converts Angiotensin-I into angiotensin-II is identical with another enzyme kininase-II, which inactivates bradykinin. If ACE inhibitor is given then along with inhibition of ACE, activity of kininase-II is also inhibited thus leading to accumulation of bradykinin. This produces its vasodilator action that may increase the access of insulin and glucose to the active site of the insulin mediated removal of glucose i.e. skeletal muscle tissue'. In addition to central enhancement of sympathetic out flow angiotensin facilitates peripheral sympathetic transmission by whom catecholamines are released leading to increase d blood glucose level.

When ACE inhibitor is given the activity of angiotensin is inhibited leading to decreased sympathetic transmission and decreased release of catecholamine that leads to reduction of blood glucose level, but in this study this effect with lisinopril was not observed.

It is concluded that the use of lisinopril did not produce any marked effect on fasting blood glucose level in the non-insulin dependent diabetic hypertensive patients. Therefore, it is suggested that this drug can be given safely to such type of patients.

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