

A Comparative Role of Oral and Parenteral Anti-Diabetic Agents in Diabetic patients with Acute Myocardial Infarction

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ABSTRACT

According to different studies the diabetic subjects have more risk of myocardial infarction than the non-diabetic subjects. Researchers claimed that anti-diabetic drugs may cause Acute Myocardial Infarction. The current study showed that diabetic patients with myocardial infarction taking oral and parenteral anti-diabetic drugs had significant changes ($P < 0.001$) among all groups. High Mean \pm SD error values (534.0 ± 2.27) were observed in the diabetic patients of Group B, who were taking oral anti-diabetic drugs as compared to control individuals (293.4 ± 2.71) and diabetic patients of Group C, taking parenteral anti-diabetics (532.0 ± 4.33) drugs.

Keywords: Diabetes mellitus, Insulin, Acute Myocardial Infarction, sulfonylurea plus glibenclamide and metformin.

INTRODUCTION

Diabetes mellitus is a metabolic disorder causes due to abnormality in insulin secretion, insulin action, or both. As insulin deficiency results chronic hyperglycemia with disturbances of other metabolisms such as carbohydrate, fats and protein. With the progress of disease, occurrence of tissue or vascular damage observed which become reasons for severe diabetic complications such as retinopathy, neuropathy, nephropathy, cardiovascular complications and ulceration. Therefore, diabetes mellitus covers a wide range of heterogeneous diseases. As Diabetes mellitus has been observed the most common endocrine disorder and it is approximately estimated that about more than 300 million people of the world have diabetes mellitus (Mazzone 2007).

Diabetes mellitus is that special class of metabolic disorders in which changes occurred. Our body use digested food for energy and growth by the process of metabolism. Our food after taking is broken down into an essential biomolecule i.e. glucose. Glucose is a form of sugar in the blood it is the major source of energy for our body. After the digestion of food, this glucose becomes the part of our bloodstream. Cells in our body use the glucose as a fuel for growth and energy. In fact without insulin the glucose cannot enter in our cells. Due to presence of insulin our cells enabled to take in the glucose (Hadaegh, 2009).

Pancreas is responsible to produce Insulin (hormone) automatically. After taking meal the pancreas naturally releases sufficient quantity of insulin which allows the blood glucose to enter into the cells, as glucose moves into the cells with insulin it results to decrease the blood-glucose level. A diabetic patient has elevated quantity of glucose in the blood (hyperglycemia). The reason of this condition shows that the body does not produce insulin or not enough insulin. Therefore, it results in too much glucose deposition in the blood (Bittner 2009). As the excess blood glucose eventually passes out of the body through urine, even then the blood includes plenty of glucose. This excess amount of glucose is not getting by body cells for the essential requirements of energy and growth. This more than enough presence of glucose lead to many complications in the body also known as complications of diabetes mellitus, these complications include eye complications-glaucoma, cataracts, neuropathy, ulcers, diabetic retinopathy, and some others. Foot complications and sometimes gangrene which may require that the foot be amputated.

There are different kinds of anti-diabetic agents, among all these kinds their selection depends on the age and situation of the person, the nature of the diabetes and some other factors also. Usually drugs used in diabetes treat diabetes mellitus by lowering glucose levels in the blood except insulin, exenatide, liraglutide and pramlintide, all are taken orally and are thus also called oral hypoglycemic agents or oral anti-hyperglycemic agents. Diabetes mellitus type 1 or insulin dependent diabetes is a disease caused by the deficiency / lack of insulin. Therefore, insulin must be used in Type 1, which must be injected. Diabetes mellitus type 2 or Non-insulin dependent Diabetes is

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a disease of insulin resistance by cells. Diabetes mellitus Type 2 is an example of the most common type of diabetes. Its treatments include following steps (i)- drugs that naturally increase the amount of insulin secreted by the pancreas, (ii)- drugs that are responsible to increase the sensitivity of target/ specific organs to insulin, and (iii)- drugs that decrease the rate by which glucose absorbance done from the gastrointestinal tract (Grundy, 2007).

There are several groups of oral anti-diabetic drugs often in combination are highly effective in Diabetes mellitus Type 2. In DM Type 2 the therapeutically combination may include insulin or not ; if oral anti-diabetic agents have failed completely then it is required to meet a desired combination of effects. The major advantage of parenteral anti-diabetic drugs in DM Type 2 is that a qualified patient can adjust the dose of it, or even take variations in doses whether less or more, normally when blood glucose levels observed by the patient with a simple meter. In fact diabetic patients need anti-diabetic agents according to stimulation of beta-cells of pancreas to produce more insulin or in other hand diabetic patients require anti-diabetic agents that help insulin to work more better than before. At this stage unluckily, the growth of diabetes reached at an alarming rate. Then ultimately these patients will receive anti-diabetic therapy indefinitely, which results in any unnecessary cardiovascular effects seriously analyzed, from mostly used and well-known oral anti-diabetic agents. It is commonly observed in patients with diabetes mellitus type 2, main cardiovascular events treated with a *sulfonylurea* (*generic*) "*tolbutamide*". After acknowledgement of this issue the detection of harmful influences of sulfonylureas has increased during recent years research, showing results on the ischemic myocardial cell. Similarly, the use of metformin has also been associated with cardiovascular instability / disorder which has been reported during both short and long-term follow-up (Klausen, 2008).

A combination of *sulfonylurea* plus *glibenclamide* and *metformin* considered as most commonly used in clinical trials as anti-hyperglycemic agents. Whether, in long-term treatment the safety of this therapeutic routine is problematic. However, the use of insulin in diabetes mellitus type 2 is also argumentative / controversies in diabetes mellitus type 2. Even so, after some years of disease the majority of patients will receive insulin because oral therapy will be not yet effective. The contrary cardiovascular effects of numerous medications may be stabilizer and disadvantageous for the cardiac patients is of utmost importance and has not yet been specifically addressed in problem oriented studies (Muntner, 2002).

MATERIALS AND METHODS

The whole experimental work was conducted at biochemistry laboratory of CRIMM, The University of Lahore, Department of Cardiology, CCU emergency, diabetic clinic and Pathological laboratory in Allama Iqbal Medical College / Jinnah Hospital Lahore. In this study total 50 individuals were selected. All the individuals were divided into further three groups. 10 normal individuals were placed in Group A. Whereas 20 diabetic patients with myocardial infarction were placed in Group B and 20 diabetic patients with myocardial infarction were placed in Group C. The patients of Group B and Group C were taking oral and parenteral anti-diabetic drugs respectively. 5ml blood drawn from cubital vein of each individual in disposable sterile 10ml syringes (vial) to estimate all parameters i-e: blood glucose level and Troponin-T tests. All research work is conducted in Jinnah Hospital, Lahore and IMBB Department of The University of Lahore. The data was entered and analyzed using SPSS and quantitative variables of the study were expressed as mean ± std.error.

RESULTS

The current study showed that diabetic patients with myocardial infarction taking oral and parenteral anti-diabetic drugs had significant changes ($P < 0.001$) among all groups. High Mean ± SD error values (534.0 ± 2.27) were observed in the diabetic patients of Group B who were taking oral anti-diabetic drugs as compared to control individuals (293.4 ± 2.71) and diabetic patients of Group C, taking parenteral anti-diabetics (532.0 ± 4.33) drugs. The data was entered and analyzed using One way ANOVA for group wise comparison

Table 1: Control Individuals (n=10)

Group A (Variables) Control	Mean ± SD	Sig.
Blood glucose level mg/dl (Random)	293.4 ± 2.71	P < 0.001
Troponin-T level ng/ ml	0.01 ± 0.00	P < 0.001

Table 2: Diabetic patients taking oral anti-diabetic drugs (n=20)

Group B (Variables) Taking Oral Anti-diabetics	Mean ± SD	Sig.
Blood glucose level mg/dl (Random)	534.0 ± 2.27	P < 0.001
Troponin – T level ng/ ml	0.02 ± 0.00	P < 0.001

Table 3: Diabetic patients taking parenteral anti-diabetic drugs (n=20)

Group C (Variables) taking parenteral Anti-diabetics	Mean ± SD.	Sig.
Blood glucose level mg/dl (Random)	532.0 ± 4.33	P < 0.001
Troponin-T level ng/ml	0.02 ± 0.00	P < 0.001

DISCUSSIONS

The current study proved that the diabetic subjects have more risk of myocardial infarction than the non-diabetic subjects. Diabetes mellitus is commonly referred to as diabetes, is a group of metabolic disorder in which high blood sugar levels observed for a long period of life (Razet *al.*, 2009). Diabetes mellitus is caused due to reduced insulin secretion and adjustable degrees of marginal insulin combat which lead to both hyperglycemia or hypoglycemia. Indications of diabetes mellitus include repeated urination, augmented feelings of thirst and hunger. Some other symptoms of high blood sugar levels are blurred vision, polyuria, polydipsia, polyphagia, while nephropathy, vascular diseases, peripheral neuropathy, and susceptibility to infection etc considered as the future complications of it (Wahabet *al.*, 2002).

It has been widely seen that the actual treatment of diabetes is controlled diet, proper exercise, and some medications that reduce glucose levels. Mostly oral and parenteral (injectable) agents are used for the treatment of diabetic patients. Cardiac disorder is a main reason of mortality in diabetes mellitus (Zeller *et al.*, 2005). The previous studies were labeling important/ significant changes in glucose levels and lipid profiles in both male and female regarding different assortments of BMI. Scientists suggested that there is a direct correlation of high BMI with poor control of cholesterol and glucose levels in our population.

Myoglobin and creatine kinase-MB has been replaced by Cardiac troponin-T as the more ideal /preferred marker of heart damage. Troponin is basically a special kind of protein that released from myocytes when irreversible myocardial injury occurs. It is extremely particular to cardiac tissue and diagnoses myocardial infarction perfectly with a history of ECG variations reflecting ischaemia. Troponin-T level in cardiac muscles is reliant on infarct size, thus it is providing a sign for the diagnosis an infarction (Mueller., 2013)

According to Gufstasson *et al.*, 2007 there is high risk of acute myocardial infarction in diabetic patients. Thus patients of diabetes mellitus have more possibilities for acute myocardial infarction (AMI) as compared to that of the patients without diabetes. The relation between cardiovascular disease and diabetes has been well known, and the greater risk for acute coronary syndromes and the lesser result associated to increase blood glucose levels has been noticed in many clinical trials.

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