

# MEASUREMENT OF SERUM CHOLESTEROL AND TRIGLYCERIDE; EVALUATION IN PATIENTS WITH DIABETES; HYPERTENSION & CEREBROVASCULAR ACCIDENT IN SOUTH PUNJAB

**DR. ABRAR AHMAD,**  
Registrar  
Nishtar Hospital, Multan

**DR. ARIF RAHIM KHAN, FCPS-I**  
Registrar, Medical Unit-IV,  
Nishtar Hospital, Multan.

**DR. ZAFAR AHMAD RAJA**  
Associate Professor of Cardiology,  
Nishtar Medical College, Multan.

**Dr. Ghulam Mustafa, FCPS.**  
Assistant Professor of Medicine,  
Nishtar Medical College/Hospital, Multan

## SUMMARY

Lipid disorders occur in patients with hypertension, cerebrovascular accident (CVA) and NIDDM. However their detection and subsequent intervention remains under-estimated throughout the world due to one or another reason. The aim of this study was to evaluate the status of lipids in our diabetic, hypertensive and stroke patients regardless of their hypertensive and glycemic control, age and sex. This study was carried out on 300 cases of diabetes mellitus, hypertension and cerebrovascular accident at Medical Unit-11 of Nishtar Hospital, Multan. Out of 300 patients, 93 (31%) patients showed isolated stroke, 114 (38%) patients showed isolated diabetes mellitus. Isolated hypertension was found among 21 (7%), six (2%) patients out of 300 showed combined, hypertension, CVA and diabetes mellitus. 18 (6%) patients exhibited combined hypertension and stroke. 20 (6.7%) patients were having combined diabetes mellitus and hypertension. 7 (2.3%) patients out of 300 exhibited combined diabetes mellitus and stroke.

**KEYWORDS:** Hypertension, Diabetes mellitus, Cerebrovascular accident, Hypertriglyceridemia, Hypercholesteremia.

## INTRODUCTION

Cholesterol is a fatty material, which over the years thickens and narrows the arterioles. It is manufactured in the liver and is an essential element of blood. It is present abundantly in egg-yolk, butter, cream, animal fat, and milk. Excessive intake of these products, can elevate the cholesterol level in the blood, called hypercholesterolemia<sup>1</sup>.

Pakistan is a developing country and during the last three decades its economic condition has been improved. Heart diseases, levels of lipoprotein and cholesterol are somewhat related to the living conditions of the people. As a result, average cholesterol level and coronary heart disease has been affected<sup>1</sup>.

Atherosclerosis accounts for approximately 78% of all mortality caused by diabetes. Overall individuals with diabetes have a 2 to 3 fold increased risk of cardiovascular disease compared with that in individuals

without diabetes. The major risk factors contributing to the excess of cardiovascular disease caused by diabetes includes hyperglycemia, insulin resistance, dyslipidemia, hypertension and smoking. Although the low-density lipoprotein (LDL) and total cholesterol levels of patients with diabetes are similar to those of non-diabetic population, triglyceride levels are usually higher in those with diabetes<sup>2</sup>.

In hypertensive patients, many of risk factors for coronary disease are known to be present, the most important being hyperlipidemia. It has been studied that with increasing severity of hypertension, the prevalence of elevated cholesterol, LDL cholesterol and low HDL cholesterol was higher, whereas triglycerides level were less affected. This indicates that an abnormal total cholesterol HDL ratio is the most common variety of dyslipidemia in uncomplicated hypertension<sup>3</sup>.

Increased serum cholesterol levels have been observed in individuals who suffer from non-hemorrhagic stroke, but not in those who suffer intra cranial or subarachnoid haemorrhage<sup>4</sup>. Serum lipids are thought to interact with the pathogenesis of non-hemorrhagic stroke through a atherosclerosis mechanism<sup>5</sup>.

Lipid abnormalities are common in patients with diabetes mellitus. There are difference in the lipid profile between diabetic and non-diabetic individuals, which may contribute to increased atherosclerosis and an associated increased risk of coronary heart disease in addition to promoting systemic atherosclerosis. Elevation in lipid levels may also contribute to the development of glomerulosclerosis and chronic renal failure. There are some recent studies in the field of islet B-cell dysfunction caused by hyperlipidemia (lipotoxicity), which result in perturbed insulin secretory capacity and hyperglycemia<sup>6</sup>.

Conventionally blood cholesterol levels have been measured by samples obtained by venepuncture in clinical setting. As lipid abnormalities are observed in different medical diseases, a simple method for screening of cholesterol and triglycerides is described. Recently, portable blood cholesterol analyzers, which

use finger stick blood samples, have been developed. These devices lend convenience to cholesterol screening because they can be used in a variety of settings, are relatively painless and inexpensive, do not require highly skilled technicians to operate and allow rapid feed back of results<sup>7</sup>.

## **PURPOSE OF STUDY**

My purpose of this study was:-

1. The results of this study can be applied to prevent increased intake of fatty diets and to reduce the risk factors for cardiovascular events in the population.
2. To determine the percentage of hypertensive, diabetic and stroke patients having increased level of cholesterol and triglyceride.

## **PATIENTS & METHODS**

The prospective study on "Measurement of serum cholesterol and triglycerides in patients with diabetes mellitus, hypertension and cerebrovascular accident" was conducted at 40 bed medical unit-IV of Nishtar Hospital, Multan. This Hospital is a teaching hospital attached with Ishtar Medical College and serves as tertiary health care centre. It has a large catchment area including South Punjab and adjoining area of Baluchistan, North West Frontier province and Sindh province.

All the patients with diabetes mellitus, hypertension, and cerebrovascular disease above 12 years age were included. They were admitted through outpatient department and emergency department and selected randomly. However, the following groups of patients were excluded from this study:-

- Patients taking antihyperlipidemic drugs.

## MEASUREMENT OF SERUM CHOLESTEROL & TRIGLYCERIDE

- Patients with serious condition (hypotension).
- Patients with acute myocardial infarction and ventricular failure.
- Patients taking diuretics, beta blockers.
- Patients with nephrotic syndrome and hypothyroidism

All the patients were admitted in ward and a uniform system of history taking, clinical examination and laboratory investigations was adopted. Entries were made in pre-designed proforma. Descriptive statistics was applied because this is descriptive study design. No P value or inferential tests are required. Descriptive statistics will be calculated through SPSS.

When the patient was admitted, he/she was interviewed in detail under the headings of name, age, sex, weight, address, occupation, family history, smoking or any other associated disease. History was also taken about previous intake or current therapy regarding the use of antihyperlipidemic drugs.

General physical examination included nutritional status, weight, blood pressure measurement on standing and lying position, examination of arterial pulses and signs of vascular insufficiency in legs. Patients were also checked for peripheral neuropathy. Skin was checked for skin manifestations, eruptive xanthoma, tendon xanthoma and xanthelasma. Eyes were checked for cataract and fundoscopy (pupils dilated with Mydracyl drops).

All the routine investigations were done as follows;

- Complete examination of blood.
- Differential leukocyte count.
- Complete examination of urine.
- Serum creatinine and blood urea.
- Serum electrolytes.
- Ultrasonography.
- Hasting blood sugar.

Blood Samples for lipids were taken under the following standard conditions.

- All the samples were taken early in the morning after 12 hour fasting for total cholesterol and triglyceride estimation by using kits (Accutrend Cholesterol, Accutrend Triglycerides, Roche).
- Blood samples were not heparinized.
- Patients were advised to have their usual normal or routine diet until their lipid profile was completed.
- Patients under stress or having critical conditions like acute myocardial infarction and hypotension were excluded from the study.
- Cholesterol values less than 200 mg/dl (5.2 mmol/L) was considered normal.
- Fasting triglycerides below 150 mg/dl (1.73 mmol/L) was considered normal.

Electrocardiography and skiagram of chest were carried out in every patient in order to rule out concomitant diseases like myocardial infarction, pulmonary tuberculosis, heart failure and pneumonia. Such patients were excluded from the study. CT scan of patient with cerebro-vascular accident was carried out for proper diagnosis.

## RESULTS

During the study period 300 patients were selected randomly for the estimation of serum cholesterol and triglycerides regardless of glycemic control and hypertension. Male to female ratio was as follows and maximum age was 85 years with mean age 61 years.

Sex	No. of Pts.	%age
Male	153	51.0
Female	147	49.0

Age(yrs)	Male	Female	Male	Female
<40	09	09	145.0	238.0

**MEASUREMENT OF SERUM CHOLESTEROL & TRIGLYCERIDE**

51-50	09	09	144.0	188.0
51-60	24	15	171.2	140.0
61-70	06	09	151.0	140.0
>70	03	-	115.0	-
Total	51	42		

Age(yrs)	Male	Female	Male	Female
<40	09	09	161.6	182.0
41-50	09	09	178.3	208.0
51-60	24	15	190.0	133.8
61-70	06	09	169.0	178.0
>70	03	-	165.0	-
Total	51	42		

	No. Of Pts	Male	Female
Hypertriglyceridemia	39(41.9%)	18(46%)	21(54%)
Hypercholesterolemia	15(16.2%)	09(60%)	06(40%)

Age(yrs)	Male	Female	Male	Female
<40	09	03	142.6	165.0
41-50	-	-	-	-
51-60	09	06	145.0	205.0
61-70	03	09	135.0	150.0
>70	03	-	140.0	-
Total	24	18		

Age(yrs)	Male	Female	Male	Female
<40	09	03	191.6	187.0
41-50	-	-	-	-
51-60	09	06	195.0	190.0
61-70	03	09	180.0	172.6
Total	24	18		

	No. Of Pts	Male	Female
Hypertriglyceridemia	18(43.0%)	12(67%)	6(33%)
Hypercholesterolemia	09(21.4%)	6(67%)	3(33%)

Age(yrs)	Male	Female	Male	Female
<40	03	15	105.0	122.4
41-50	09	09	230.0	145.33
51-60	33	27	185.2	211.55
61-70	09	09	106.3	148.0
>70	-	-	-	-
Total	54	60		

Age(yrs)	Male	Female	Male	Female
<40	03	15	135.0	123.0
41-50	09	09	230.0	180.0
51-60	33	27	163.0	171.9
61-70	09	09	121.0	160.0

>70	-	-	-	-
Total	54	600		

**Table-XI. Dyslipidemia in Diabetes Patients (n=300 with diabetes = 114)**

	No. Of Pts	Male	Female
Hypertriglyceridemia	39(34.2%)	15(38%)	24(62%)
Hypercholesterolemia	24(21.0%)	12(50%)	12(50%)

**DISCUSSION**

This study was done in Medical Unit-IV, Nishtar Hospital, Multan with the name “Measurement of serum cholesterol and triglyceride in patients with diabetes mellitus, hypertension and cerebrovascular accident”.

Total 300 patients were included in this study. These patients were selected randomly through emergency and outpatient department, with diabetes mellitus, hypertension and cerebrovascular accident. In this study some patients were having isolated diabetes mellitus, isolated hypertension and isolated CVA. Some patients show the combination of diabetes mellitus and hypertension. Some patients were having combination of hypertension and cerebrovascular disease and some were having combined diabetes mellitus, hypertension and cerebrovascular accident.

In the present study 114 (38%) patients of the total 300 patients with mean age of 54 years were suffering from isolated diabetes mellitus. Of these 114 patients 45% were male while 55% were female. In this study 21% of the patients were having increased level of serum cholesterol and 34.2% patients having increased level of triglyceride (more than 150 mg/dl). When we compare this study with a study at Multan<sup>8</sup> with the name of “pattern of dyslipidemia in controlled and uncontrolled type-II diabetes mellitus, it was found that 24% of the population was smoker and 64% of the patients were having sedentary life style. In patients with controlled diabetes mellitus, the total cholesterol was raised in 82%

while total triglyceride was raised in 75% of the patients. While in patients with uncontrolled diabetes mellitus, the total cholesterol was raised in 77% of the patients while total triglyceride was raised in 85% of the patients. When we compare the results of two studies, we see although smoking rate has been raised in the present study but the total cholesterol and triglycerides level are less as compared to the above cited study. The reason behind it that over the time, the dietary habits are quietly changed, the people are now more aware of their dietary habits, body weight and physique. Second possibility is of increasing poverty in our country. The fatty diets are too costly to be available tathe people. The third possibility is of increased literacy rate and sedentary life style has totally changed.

Another study conducted on diabetes dyslipidemia in Pakistani diabetics<sup>9</sup>. In above-mentioned study the effect of flavastatin HMG CoA reductase inhibitor was assessed in 50 patients with dyslipidemia in diabetic belonged to the city of Lahore. In this study the total cholesterol and triglyceride were very high i.e. total cholesterol level above 300 mg/dl and triglyceride level above 293.3 mg/dl in each patient. When we compare this study with the present one, total cholesterol and triglycerides are quite low in present study. The reason is financial status, difference between people belonging to Lahore and our area.

Hypertriglyceridemia is most common lipid abnormality in NIDDM, particularly in diabetics with poor glycemic control<sup>10</sup>. The above observation was also seen in present study. Triglyceride levels were above the desired level in 34.2% patients out of 114 patients, with mean triglyceride level of (desired level) below 150 mg/dl. Hypertriglyceridemia is a potent risk factor for macrovascular disease due to reduced synthesis of insulin dependent lipoprotein lipase in liver, resulting in impaired clearance of IDL, chylomicron and VLDL remnants<sup>11</sup>. High triglyceride levels are associated with hypercoagulopathy and decreased fibrinolysis both contributing to coronary heart disease<sup>12</sup>, in addition to metabolic relation to LDL cholesterol modifying its particle into more dense, small and hence more

atherogenic form<sup>13</sup>.

In the present study 42 patients (14%) with mean age of 63 years were suffering from isolated hypertension. Of these 57% were male while 43% had increased level of triglycerides while 22% were having increased serum cholesterol. In these patients 64% were smoker. The similar study "Dyslipidemia in hypertension" at Pakistan Institute of Medical Sciences, Islamabad in 1997<sup>14</sup> showed that 32% of the patients were having hyperglyceridemia and 10% of patients were having both raised triglyceride and cholesterol.

In our study more patients had increased level of cholesterol and triglyceride. The exact cause of increased cholesterol and triglyceride in present study is not known. Another study carried out in 1991<sup>15</sup> reveals that 48% of patients were having hypercholesterolemia. Another study carried out in non-obese, non-diabetics hypertensive patients, showed that 50% of the patients had dyslipidemia and 39% had hypertriglyceridemia<sup>16</sup>. Hypercholesterolemia was found in 1% of the patients and combined hypertriglyceridemia in 10% of patients. When we compare the results of present study, our study population has comparatively lower level of cholesterol and triglyceride as compared to above cited study. The logical difference between the results may be due to regional difference, and another difference may be due to dietary habits and high socio-economic status in that area.

A study from UTAH<sup>17</sup> showed the frequent occurrence of high serum lipids in hypertensives which has been termed as "Familial dyslipidemic hypertensive".

Khan et al (1994)<sup>18</sup> studied the patterns of dyslipoproteinemia in Karachi from 1989 to 1993. Hypertriglyceridemia was the most prevalent of all the lipid abnormalities. Studies have shown that antihypertensive drugs like thiazide diuretics and beta blockers do themselves alter the blood lipid profile. So careful choice of antihypertensive therapy is very important.

To reduce the risk, involved with hypertension, primary prevention of hypertension through non-pharmacological measures is recommended. Efforts are required to prevent high blood pressure through planning a population strategy to achieve effective blood pressure.

Hypertension has long been recognized as an important risk factor for both ischemic stroke and primary intracerebral haemorrhage. Multiple Risk Factor Intervention Trial (MRFIT) shows that major risk factor for stroke is high blood pressure. Another way of expression is that 40% of strokes can be attributed to systolic blood pressure of more than 160 mmHg<sup>19</sup> Several studies have indicated that diabetics are at increased risk of ischemic stroke and multiple lacunar infarct<sup>20</sup>.

A prospective epidemiologic study<sup>21</sup> evaluated 2710 Japanese, American men (below age 55-65). The result indicated that 602 (22.7%) men were having increased level of serum cholesterol and triglyceride. In our study 41% were suffering from hypertriglyceridemia and 16% patients were having hypercholesterolemia. So the results of our study highlights the public health implication, concerning the establishment of programmes to lower serum cholesterol in order to reduce stroke incidence.

## CONCLUSION

- Diabetics are prone to die 10-15 years earlier than general population from premature cardiovascular disease and risk factors from the day of the diagnosis or even earlier.
- Diabetic dyslipidemia is most common association/complication of NIDDM, affecting more than half of the patients and disposes to premature atherosclerosis and macrovascular complications.
- First step is to control dyslipidemia is good glycemic control which will help in reverting most but not all lipid abnormalities. Good glycemic control is essential but usually insufficient to

correct lipid disorders in diabetes mellitus.

- In our setup, patients with diabetes mellitus, hypertension and cerebrovascular accidents are seldom screened for management are less satisfactory due to one or another reason.
- Related risk factors other than dyslipidemia and smoking should be corrected as these operate in vicious cycle and worsening of single factor will adversely affect the rest, while correcting a single risk factor will have favourable effects on others.
- Hypertension is more common in NIDDM and needs special attention. It should be controlled with drugs, which do not disturb glycemic control or lipid profile.  $\beta$ -blockers and diuretics are usually less favoured as compared to ACE inhibitors and calcium channel blockers.
- If dyslipidemia persists even after a six month trial of non-pharmacological measure and good metabolic control, one should seriously consider the lipid lowering drugs. Nicotinic acid group should be avoided as it worsens the glycemic control. Fibrate and statins are good choice.
- There is need for large scale trials of lipid lowering agents in diabetic dyslipidemia, hypertensive dyslipidemia and in patients of CVA showing increased level of serum lipids. There is need for addressing about primary prevention.

## REFERENCES

1. Khan JA, Khan SP, Ahmad Z, Shah SH, Khaliq MA. Level of hypercholesterolemia in patients admitted for heart diseases, a pilot study. *Pak J Med* 2001; 40: 18-19.
2. Goldberg RB. Hyperlipidemia and cardiovascular risk factors in patients with type-2 diabetes. *Am J Manag Care* 2000; 6(Suppl-13): 692-96.
3. Thakur AK, Achari V. A study of lipid levels in uncomplicated hypertension. *Indian Heart J* 2000; 52: 173-77.
4. Cooper GR, Myers GL, Smith J, Schlant RE. Blood lipid measurement. *JAMA* 1992; 267; 1652-60.
5. Alburcher JF, Ferrierer J, Rudidavest JB. Serum lipids in young patients with ischemic stroke. *J Neurol Neurosurg Pschy* 2000; 69: 29-33.
6. Rejmohan L, Deepa R, Mosan A, Mohan V. Association between isolated hypercholesterolemia, isolated hypertriglyceridemia and coronary artery disease in South Indian type-2 diabetic patients. *Indian Heart J* 2000; 52; 400-6.
7. Naughtom MJ, Luepkr Rv, Strickland D. The accuracy of portable cholesterol analysis in public screening programmes: *JAMA* 1990; 263; 263:1213-14.
8. Iqbal Z. Pattern of dyslipidemias in controlled and uncontrolled type-II diabetes mellitus. Dissertation FCPS 1999.
9. Afzal N, Raza SN, Nadeem MA, Khan JA, Israr M, Malik M\*. Effect of fluvastatin on dyslipidemia associated with type-II diabetes mellitus. *Pak J Med Sci* 1999; 15(3): 241-48.
10. Zimman B. Metabolic control and prevention of long term complications of NIDDM. *Medicographia* 1995; 17(2): 39-42.
11. Garber AJ, Vinik A, Crespian SR. Detection and management of lipid disorder in diabetic patients. *Diabetes Digest* 1994; 7(7): 11-17.
12. Loyd J, Reckless JPD. Lipid abnormalities in diabetes. *Postgraduate Doctor* 1993; 16(2): 66-72.
13. Syvanne m, Taskin MR. Lipids and lipoproteins as coronary risk factor in NIDDM. *Lancet* 1997 (Suppl 1): 20-23.
14. Ahmad KI. Prevalence of dyslipidemia in hypertension. *Pak Inst Med Sci Islamabad* 1997.
15. Gulzar A, Rehman KU, Tayyab M, Saleem M, Janjua MI, Haider Z. Blood lipids in non-obese, non-diabetic patients with untreated essential hypertension, *P J M R* 1991;30:147-50.
16. Haider Z, Usman S, Jabeen M, Bano KA, Obaidullah S, Fayyaz A. Profile of hyperlipidemia in various patient

- groups and control. Pak J Med Res 1991; 30:147-50.
17. William RR, Hunt SC, Hopkins PN et al. Familial dyslipidemic hypertension. Evidence from 58 UTAH families. JAMA 1988; 256: 3579-86.
18. Khan F, Molla A, Kayanni N, Khurshid M. Pattern of dyslipiproteinemia in selected population of Karachi. J Pak Med Assoc 1994; 44:165-66.
19. ISOH, Jacobs DR, Wentworth D, Neatam JD. Serum cholesterol in 350,977 men screen for MRIFT. N Eng J Med 1989; 320:904-10.
20. Mast H, Thomas JL, Lee ST, Mohr JP, Sacco RL. Diabetes and hypertension as determinant in multiple lacunae infarct. Stroke 1995; 26(1): 30-33.
21. Goldberg RJ, Burchfield CM, Banfant R, Chiu D, Reed. Diabetes mellitus factors associated with atherosclerosis disease in middle age men. Arch International Med 1995; 155(7): 686-94.

**Monopoly is business at the end  
of its journey**

**Shuja Tahir**