



## Research Article

# Impact of Disease Duration on Lipid Profile in Type 2 Diabetes Mellitus Patients

Authors

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## Abstract

**Aim:** The aim of the study was to study the impact of disease duration on lipid profile in type 2 diabetes mellitus patients.

**Methods:** Total 30 diagnosed type 2 diabetic subjects were taken. The anthropometric parameters were measured by standard methods. The serum samples were used for serum glucose, total cholesterol, triglycerides, HDL-cholesterol was estimated by full automated chemistry analyzer (Siemens-Dimension-RxL Max). The plasma HbA1c estimated by Nyco card reader. VLDL and LDL were calculated by using Friedwald's Formula.

**Results:** There was significantly positive correlation occurs between disease duration with total cholesterol, triglycerides and VLDL-cholesterol having r-value of 0.858, 0.727 and 0.723 respectively at p-value 0.01 levels. There was significantly positive correlation occurs between disease duration with LDL-cholesterol having r-value of 0.849 at p-value 0.05 levels but there was no significant correlation between disease duration and HDL-cholesterol in type 2 diabetes mellitus patients

**Conclusion:** There was more altered lipid metabolism as the duration of diseases increases, indicating that proper management must be taken to prevent the secondary complication which leads to cardiovascular diseases. As the age advances, the degree of dyslipidemia also increases in both genders

**Keywords:** lipid profile, type 2 diabetes mellitus, duration of disease, cholesterol.

## Introduction

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia with alteration in carbohydrates, lipids and protein metabolism. The etiology of disease is mainly insulin deficiency,

altered insulin action or both<sup>[1]</sup>. More than 72,946,400 (8.8% of total population) individuals were suffering from diabetes mellitus in India in 2017<sup>[2]</sup>. One of the major consequences of diabetes is altered lipid metabolism which may leads to

hyperlipidemia and dyslipidemia<sup>[3]</sup>. Dyslipidemia is one of the most important causes of atherosclerosis which may leads to various type of cardiovascular disease. It had been predicted that the fatty tissues was solely related to insulin resistance syndrome and type 2 diabetes mellitus<sup>[4]</sup>. Duration of disease is one of the major consequences which lead to various secondary complications. Wamique M et al., 2016 also proved that the numbers of patients were increased after the age of 35 years<sup>[5]</sup>. Very few studies had been done on diabetes duration and lipid profile in type 2 diabetes mellitus patients of age range of 40-65 years old. The exact mechanism by which altered lipid profile is more deranged with disease duration is not very well understood. Therefore, this study is intended to study the impact of disease duration on lipid profile in type 2 diabetes mellitus patients.

### Materials and Methods

**Study design:** The present case study was carried out in the department of biochemistry clinical laboratory Aarogydham hospital and research center Gwalior & associated laboratory GNV diagnostic centre, Gwalior.

**Study Population:** The study was conducted on 30 patients who were attending the OPD and IPD of Aarogydham hospital. The patients were comes from rural and urban area of Gwalior.

**Study Record:** Documentation of clinical history of patients was compiled in a study record. The written consent was taken prior to the study from all the patients. This study was approved by ethical committee.

**Inclusion Criteria:** Type 2 diabetes mellitus patients of age range of 40-65 years.

**Exclusion Criteria:** Hypothyroid patients, Patients who were taking any medications which are likely to affect lipid metabolism like lipid lowering drugs and thiazides diuretics.

### Measurements of anthropometric parameters

Body weight was calculated in kilograms (kg) by using Digital scale nearest to 0.1 kg. Height was measured by using commercial stadiometer to the nearest 0.1cm. BMI was calculated by using

formula body weight in kg divided by square of height which is in meters. The Waist circumference (in cm) was measuring by using measuring tape midway between lower border of rib cage and the iliac creast and Hip circumference (in cm) was measured by using measuring tape around the point with the maximum circumference over the buttocks. The waist/ hip circumference was measured by dividing waist circumference to hip circumference.

**Sample collection and preparation:** Fasting blood samples (approximately 5 ml) were withdrawn from the antecubital. Blood samples were collected in plain vacutainers and EDTA vacutainers. The plain vacutainers was incubated at 37°C for 30 minutes then clot was removed from plain vacutainers and remaining sample was taken in centrifuged test tube. Samples were centrifuged at 3000 rpm for 10 to 20 minutes. Supernatant collected in clean and dry test tube for analysis of biochemical test.

**Analysis of Sample:** The total cholesterol, triglycerides, HDL- cholesterol, blood glucose were measured in full automated chemistry analyzer (Siemens-Dimension-RxL Max). Glycated hemoglobin (HbA1c) was measured by boronate affinity chromatography using Nyco card reader. VLDL and LDL were calculated by using Friedwald's Formula: VLDL- Cholesterol = TG/5 and LDL-Cholesterol = TG- (HDL-C + VLDL-C).

**Statistical Analysis:** The Data was recorded in Microsoft office excel-13 and analyzed in SPSS statistics- 23. The Graph was plotted in Graph Pad Prism 7.

### Results

The mean and SD of anthropometric and lipid profile of type 2 diabetes mellitus patients was shown in table1. There was significantly positive correlation occurs between disease duration with total cholesterol, triglycerides and VLDL-cholesterol having r-value of 0.858, 0.727 and 0.723 respectively at p-value 0.01 levels shown in table 2. There was significantly positive correlation occurs between disease duration with LDL-cholesterol having r-value of 0.849 at p-value 0.05 levels but there was no significant correlation between disease

duration and HDL-cholesterol in type 2 diabetes mellitus patients shown in table 2. The graphical presentation of correlation of disease duration with

total cholesterol, triglycerides, VLDL-cholesterol and LDL-cholesterol of Type 2 diabetes mellitus patients are shown in figure 1.

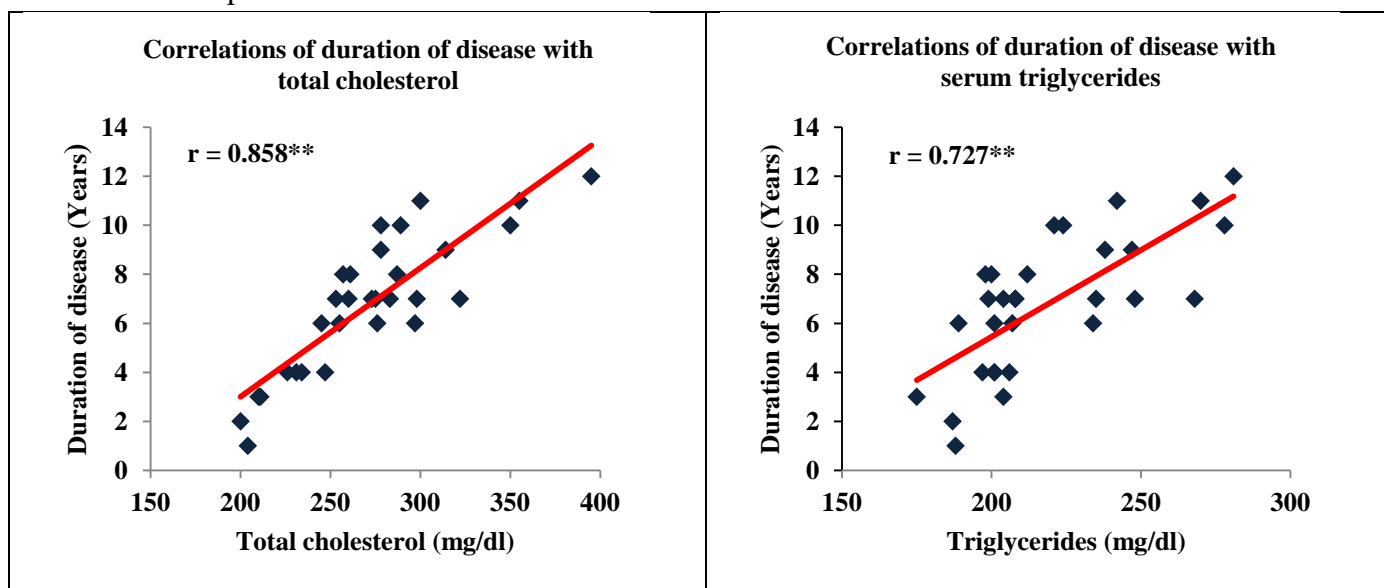
**Table 1:** Showing the anthropometric and lipid profile of type 2 diabetes mellitus patients

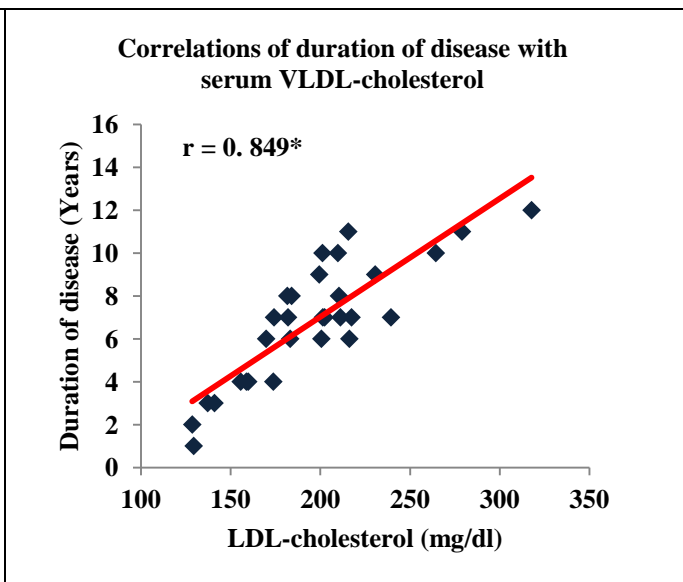
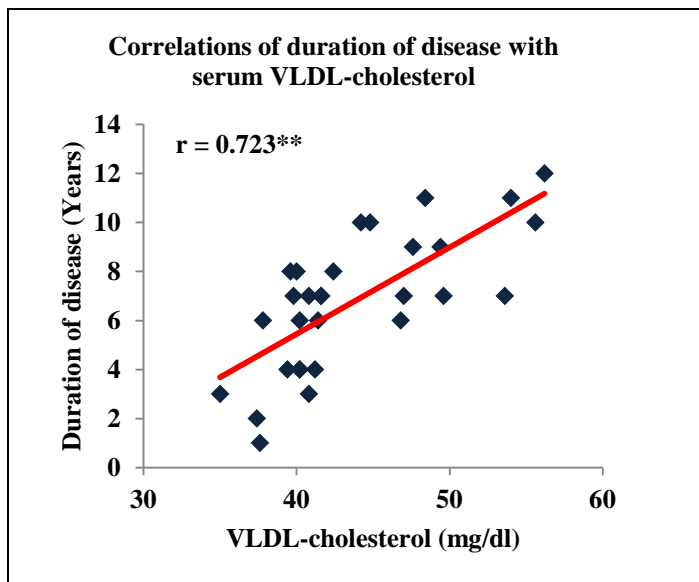
Parameters	Mean	± SD
Weight (Kg)	63.63	4.75
Height (mt)	1.54	0.05
BMI (Kg/m2)	27	2.71
Waist (cm)	86.66	3.92
Hip (cm)	100.11	3.58
W/h ratio	0.87	0.05
Fasting Blood sugar (mg/dl)	203.53	49.93
HbA1c (%)	9.00	1.63
Total cholesterol (mg/dl)	272.13	45.6
Triglyceride (mg/dl)	219.03	28.7
HDL- cholesterol (mg/dl)	32.47	4.04
VLDL- cholesterol (mg/dl)	43.81	5.74
LDL- cholesterol(mg/dl)	195.86	43.01
Duration of disease (years)	6.80	2.80

**Table 2:** Showing the correlation of duration of disease with lipid profile of type 2 diabetes mellitus patients

Correlations of duration of disease with lipid profile	
	Duration of disease (years)
Total cholesterol (mg/dl)	0.858**
Triglycerides (mg/dl)	0.727**
HDL- cholesterol (mg/dl)	-0.379
VLDL- cholesterol (mg/dl)	0.723**
LDL- cholesterol (mg/dl)	0.849*
**Correlation is significant at the 0.01 level (2-tailed)	
*Correlation is significant at the 0.05 level (2-tailed)	

**Figure 1:** graphical presentation of the correlations of duration of disease with lipid profile in type 2 diabetes mellitus patients





### Discussion

The present study indicated the strong positive association of altered lipid profile with duration of disease except not for HDL-cholesterol. Various other studies also supported that the duration of disease is associated with the altered lipid profile with duration of disease in type 2 diabetes mellitus patients<sup>[6,7]</sup>. Numerous studies also indicated very high level of serum total cholesterol, serum triglyceride, LDL-cholesterol and VLDL-cholesterol but no significant increase in HDL-cholesterols<sup>[8-10]</sup>. Otamere H.O., 2011 and Nyasatu et al., 2017 indicated that the duration of disease was not associated with altered lipid profile which is against our study<sup>[11,12]</sup>. Hateren KJJV et al., 2009 also found that the total cholesterol/HDL-cholesterol ratio was increased; total cholesterol and LDL-cholesterol were increased in Type 2 diabetes mellitus and was associated with increased cardiovascular risk<sup>[13]</sup>. Shabana S et al., 2013 found that the degree of dyslipidemia was increased with increased duration of diabetes mellitus in both male and female type 2 diabetes mellitus patients<sup>[14]</sup>.

### Conclusion

There was more altered lipid metabolism as the duration of diseases increases, indicating that proper management must be taken to prevent the secondary complication which leads to cardiovascular diseases.

As the age advances the degree of dyslipidemia also increases in both genders.

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