

Plasma Lipid Profile in Type 2 Diabetic Patients with Retinopathy in Khartoum State

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Abstract: Background: Diabetic retinopathy (DR) is a very common complication of diabetes mellitus, leading to visual deficits and blindness around the world. **Aim:** Across-sectional study conducted to measure serum lipid profile in type 2 diabetic patients with retinopathy. **Methodology:** Fifty samples were collected from type 2 diabetic patients with retinopathy in period between July to November 2019, chosen randomly from Alfaisal eye center, and 25 type 2 diabetic patients without retinopathy as control. Sherwood colorimeter 260 was used for measurement lipid profile (total cholesterol, triglycerides, LDL-c and HDL-c) and results were analyzed using statistical of package social science (SPSS) computer program. **Results:** This study found that, in diabetic patients with retinopathy total cholesterol and LDL-c were significantly increased when compared to a control group (mean \pm SD: 174.5 \pm 36.8 mg/dl versus 146.62 \pm 7.0mg/dl p. value = 0.00), (mean \pm SD: 105.6 \pm 33.8 mg/dl versus 81.2 \pm 21.5 mg/dl p. value = 0.00) respectively. There were insignificant difference for HDL-C and triglycerides compared with control group (mean \pm SD: 36.4 \pm 8.4mg/dl versus 33.6 \pm 5.7 mg/dl, p. value =0.146), (mean \pm SD: 120.8 \pm 61.3 mg/dl versus 96.4 \pm 38.4mg/dl, p. value =0.074) respectively. The result showed, there were no correlation between Cholesterol, Triglycerides, LDL-C and duration of the disease (r=0.058, p-value=0.622), (r=-0.010, p-value=0.933), (r=0.045, p-value=0.703) respectively, and there was significant weak negative correlation between HDL- C level and duration of disease (r=-0.235, p-value=0.043). Also there were no correlations between cholesterol, triglycerides, LDL-C and age of diabetic retinopathy (r=0.077, p-value=0.514), (r=0.035, p-value=0.768), (r=0.081, p-value=0.489) respectively and there was significant weak negative correlation between HDL-C level and age of diabetic patients with retinopathy (r=-0.255, p-value=0.027).

Keywords: Diabetic –Retinopathy - Cholesterol- Triglycerides - LDL-C- HDL-C

Introduction:

Diabetes is a chronic disease that appear in two condition, the first condition when the insulin that produced by pancreas does not sufficient, the second condition, the body cannot successfully use the insulin it produces. Blood sugar is regulated by insulin hormone .Hyperglycemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time causes severe damage to many of the body's systems, particularly the nerves and blood vessels [1]. After a while, diabetes can injure the heart, blood vessels, eyes, kidneys, and nerves. The main cause of blindness is diabetic retinopathy , and occurs as a result of long-standing accumulated damage to the small blood vessels in the retina. 2.6% of global blindness can be attributed to diabetes [2].Diabetic eye disease comprises a group of eye conditions that affect people with diabetes. These conditions include diabetic retinopathy, diabetic macular edema (DME), cataract, and glaucoma. All types of diabetic eye disease have the possible to cause severe vision loss and blindness. Diabetic retinopathy involves changes to retinal blood vessels that can cause them to bleed or leak fluid, distorting vision. DME is a consequence of diabetic retinopathy that causes inflammation in the area of the retina called the macula. Because diabetic retinopathy often goes unnoticed until vision loss occurs, people with diabetes should get a comprehensive dilated eye exam at least once a year. Early detection, timely treatment, and appropriate follow-up care of diabetic eye disease can defend beside vision loss [3].

Cholesterol levels must be estimated at least one time every five years in everyone over age 20. Lipid profile is the screening blood test that is usually performed. Men ages 35 and above and women ages 45 and above be more commonly screened for lipid disorders. The lipoprotein profile includes, Total cholesterol, LDL (low density lipoprotein cholesterol, also called "bad" cholesterol), HDL (high density lipoprotein cholesterol, also called "good" cholesterol), Triglycerides (fats carried in the blood from the food we eat. Excess calories, alcohol, or sugar in the body are converted into triglycerides and stored in fat cells throughout the body [4]. Serum lipids play important role in development and progression of DR. Diabetic dyslipidemia characterized by elevated serum total cholesterol (TC), triglycerides (TG), low density lipoproteins cholesterol (LDL-C) and decrease high density lipoproteins cholesterol (HDL-C), and this dyslipidemia has been proposed as potential risk factors for DR [5].

Materials and methods:

This cross-sectional study was approved by the scientific committee of Clinical Chemistry Department at College of Medical

Laboratory Science of Sudan University of Science and Technology. The study was conducted in Khartoum state- Sudan during the period from July to November 2019, chosen randomly from Alfaisal eye center,. A total of 75 individuals (50 diabetic patients with retinopathy and 25 diabetic patients without retinopathy as control) were enrolled in this study , Diabetic patients with hypertension, smoking, renal, liver and heart diseases. were exclude from this study. After obtaining an informed consent from each participant, clinical data was collected by questionnaire. About 2.5 ml of (8-12 hours fasting) venous blood were collected by safe aseptic procedures. In serum sample, blood should be allowed to clot at room temperature. The sample should be centrifuged, and the serum separated. Sherwood colorimeter 260 was used for measurement lipid profile (total cholesterol, triglycerides, LDL-c and HDL-c)

Quality Control: Pathological and normal control sera were measured, to assure the accuracy and precision of result

Statistical Analysis: Data has been analyzed by SPSS version 16

Results:

The result of the biochemical determinant of serum Total cholesterol, triglycerides, HDL –C and LDL-C in type 2 diabetic patients with retinopathy (cases) and type 2 diabetic patients without retinopathy (control) are given in tables and figures:

Table (1): Represent the mean level of serum cholesterol, triglycerides, HDL-C and LDL-C in both of the study groups. The level of cholesterol and LDL-C were significantly increased in diabetic patients with retinopathy compared to control group, and there were insignificant difference between the mean of triglycerides and HDL-C in study groups.

Figure (1): show correlation between cholesterol level and age of type 2 diabetic patients with retinopathy. The scatter showed no correlation between cholesterol level and age of diabetic patients with retinopathy ($r=0.077$, $p\text{-value}=0.514$).

Figure (2): show correlation between triglycerides level and age of diabetic patients with retinopathy. The scatter showed no correlation between triglycerides level and age of diabetic patients with retinopathy ($r=0.035$, $p\text{-value}=0.768$).

Figure (3): show correlation between HDL-C level and age of diabetic patients with retinopathy. The scatter showed significant weak negative correlation between HDL-C level and age of diabetic patients with retinopathy ($r=-0.255$, $p\text{-value}=0.027$).

Figure (4): show correlation between LDL-C level and age of diabetic patients with retinopathy. The scatter showed no correlation between LDL-C level and age of diabetic patients with retinopathy ($r=0.081$, $p\text{-value}=0.489$).

Figure (5): show correlation between cholesterol level and duration of disease. The scatter showed that no correlation between cholesterol level and duration of disease ($r=0.058$, $p\text{-value}=0.622$).

Figure (6): show correlation between triglycerides level and duration of disease. The scatter showed no correlation between triglycerides level and duration of diabetic patients with retinopathy ($r=-0.010$, $p\text{-value}=0.933$).

Figure (7): show correlation between HDL-C level and duration of disease. The scatter showed significant weak negative correlation between HDL-C level and duration of disease ($r=-0.235$, $p\text{-value}=0.043$).

Figure (8): show correlation between LDL-C level and duration of disease. The scatter showed that no correlation ($r=0.045$, $p\text{-value}=0.703$).

Table (1) Comparison of cholesterol, triglycerides, HDL –C and LDL-C levels in type 2 diabetic patients with retinopathy group(case) and type 2 diabetic patients without retinopathy group (control)

variable	Case(n=50) Mean±SD	Control(n=25) Mean±SD	P- value
Cholesterol(mg/dl)	174.54±36.806	146.60±27.009	0.000
Triglycerides(mg/dl)	120.76±61.275	96.40±38.359	0.074
HDL-C (mg/dl)	36.38±8.386	33.64±5.707	0.146
LDL-C (mg/dl)	105.58±33.760	81.24±21.479	0.000

. Results given in mean ± S D.

. P-value ≤ 0.05 consider significant

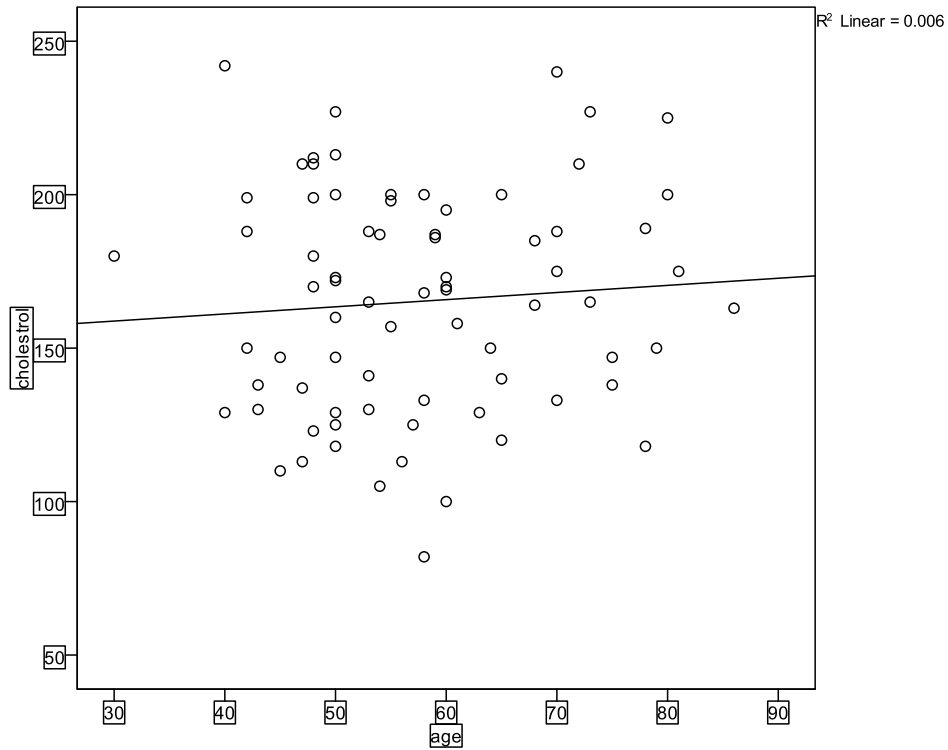


Figure (1) Correlation between cholesterol level and age of diabetic patients with retinopathy ($r=0.077$, $p\text{-value}=0.514$).

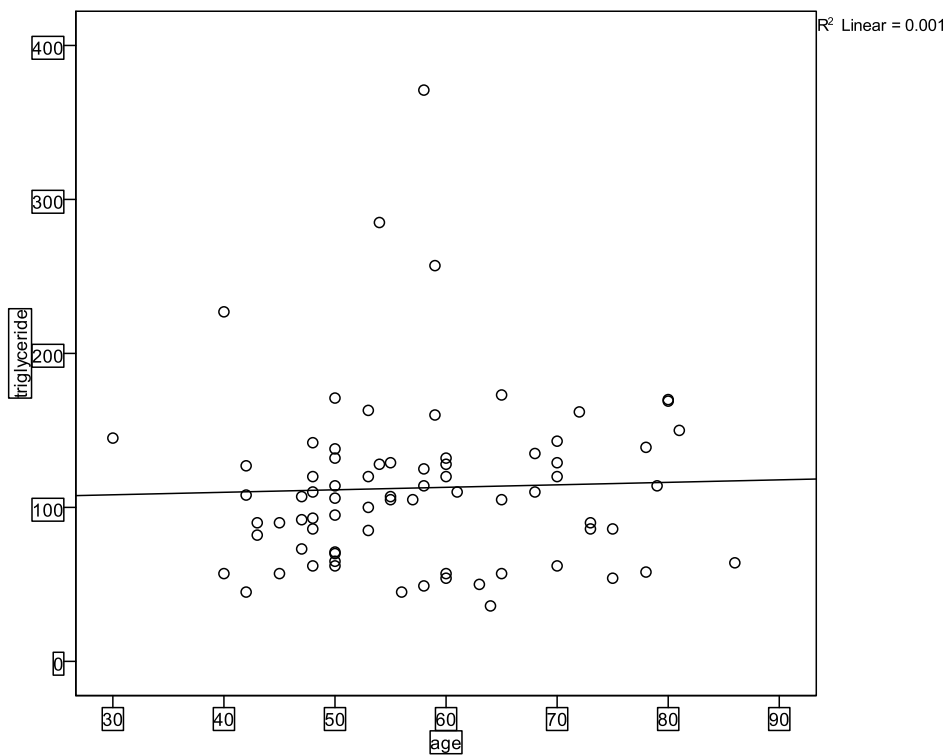


Figure (2) Correlation between triglycerides level and age of diabetic patients with retinopathy ($r=0.035$, $p\text{-value}=0.768$).

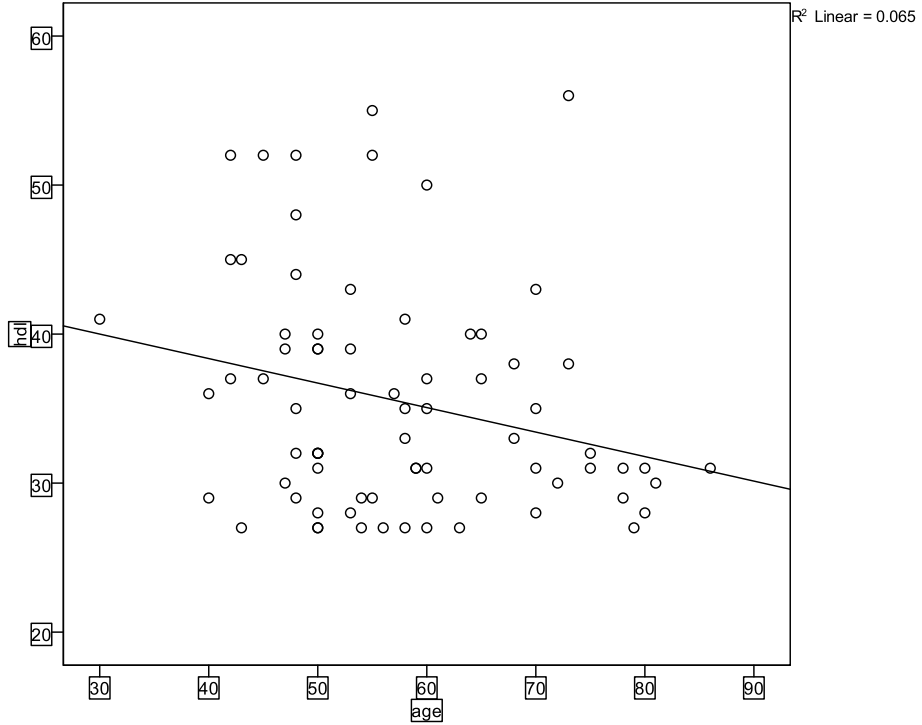


Figure (3) Correlation between HDL-C level and age of diabetic patients with retinopathy ($r = -0.255$, $p\text{-value} = 0.027$).

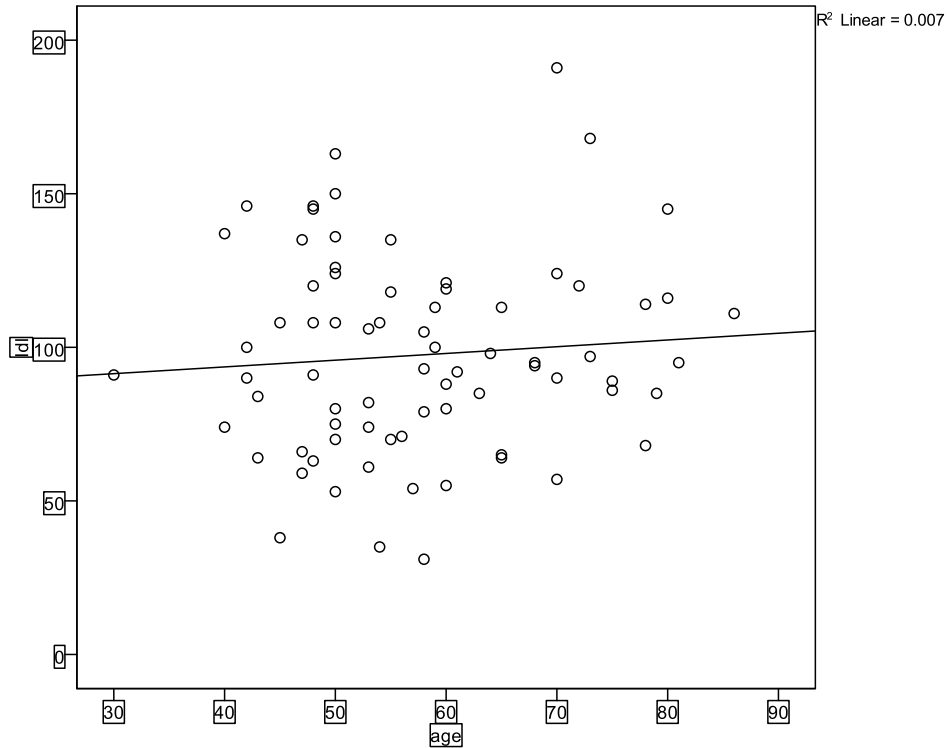


Figure (4) Correlation between LDL-C level and age of diabetic patients with retinopathy ($r = 0.081$, $p\text{-value} = 0.489$).

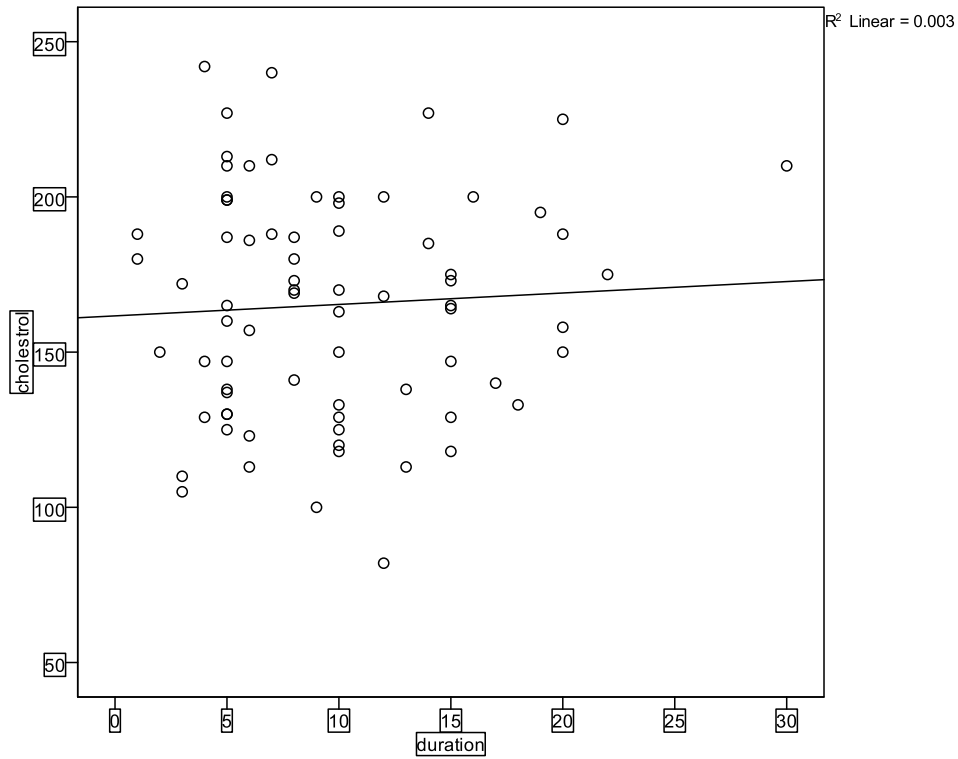


Figure (5) Correlation between cholesterol level and duration of disease ($r=0.058$, $p\text{-value}=0.622$).

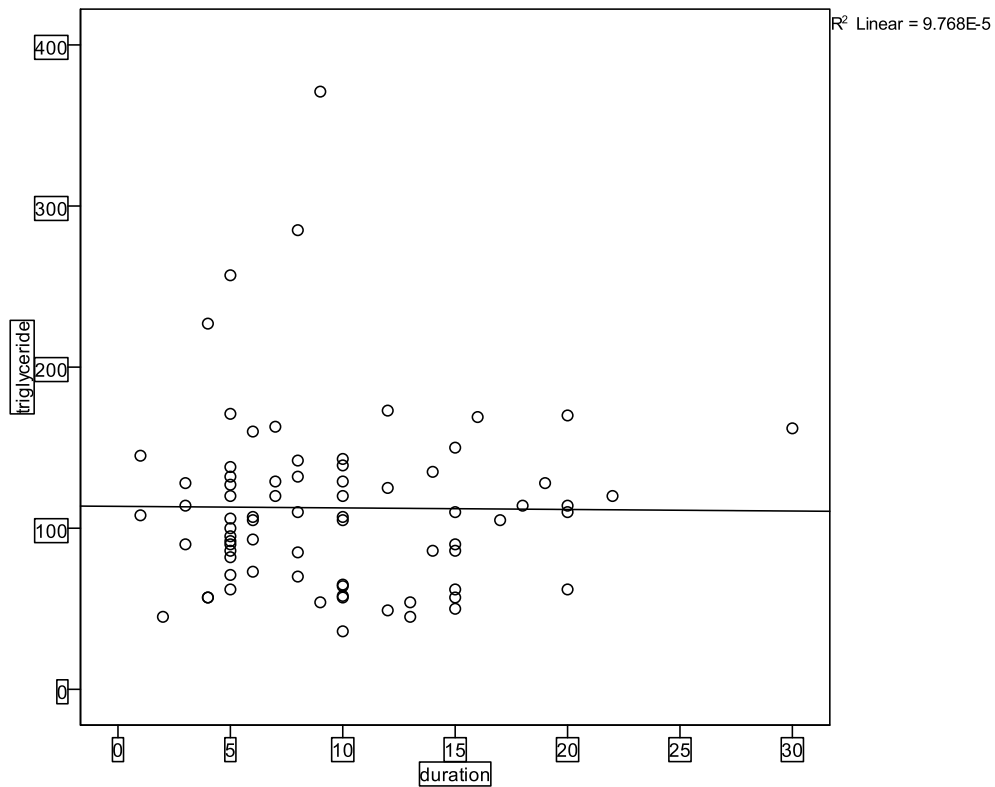


Figure (6) Correlation between triglycerides level and duration of diabetic patients with retinopathy ($r=-0.010$, $p\text{-value}=0.933$).

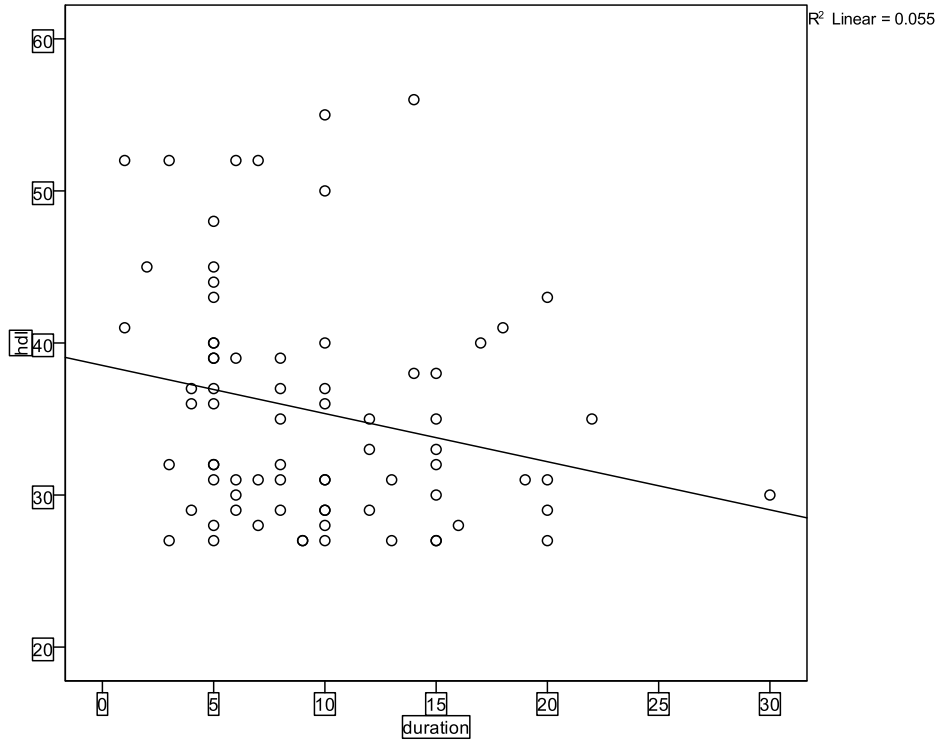


Figure (7) Correlation between HDL-C level and duration of disease ($r=-0.235$, $p\text{-value}=0.043$).

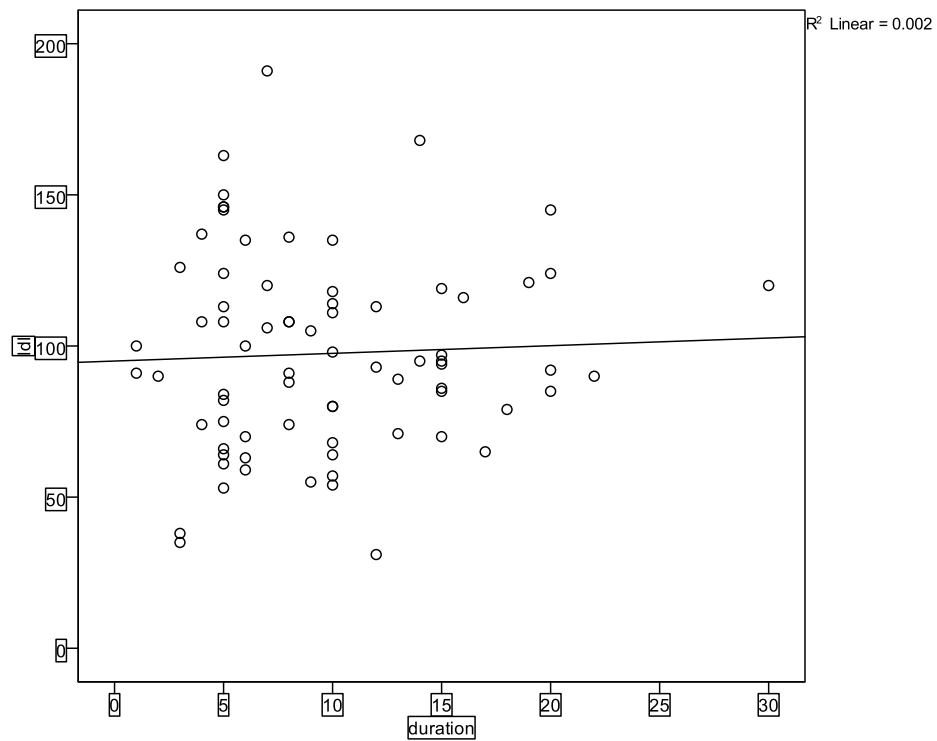


Figure (8) Correlation between LDL-C level and duration of disease ($r=0.045$, $p\text{-value}=0.703$).

Discussion:

Diabetic retinopathy (DR), a very common complication of diabetes mellitus and the leading cause of visual deficits and blindness around the world [6]. This study conducted to estimate lipid profile in type 2 diabetic patients with retinopathy. Preliminary investigated and findings obtained from specially designed questionnaire revealed that, serum level of cholesterol and LDL-C were significantly increased at (P-value=0.000) in the Sudanese diabetic patients with retinopathy versus control subjects. However, the concentrations of triglyceride and HDL-C were insignificantly different at (P-value= 0.074), (P-value= 0.146) respectively. This result agreed with another result of study carried by Chew et al.,1996 [7], which demonstrate that elevated serum lipid levels are associated with an increased risk of retinal hard exudates in persons with diabetic retinopathy, the result showed significantly increased in cholesterol and LDL-C levels in patients with retinopathy group when compared to control group. This result agreed with another result carried by many authors which reported that, there was significant increased in LDL-cholesterol with DR[8] . Also the result is similar to another result which found the serum cholesterol, TG, HDL-C and LDL-C concentrations were significantly deranged in patients with DR as compared to those without DR. [9], This result disagreed with another study which show, there were no significant differences in lipid profile in diabetic patients with retinopathy compared to diabetic patients without retinopathy. [5]

Also the findings of this study showed, there were no correlation between age of diabetic patients with retinopathy and cholesterol, triglycerides and LDL -C ($r=0.077$, $p\text{-value}=0.514$), ($r=0.035$, $p\text{-value}=0.768$), ($r=0.081$, $p\text{-value}=0.489$) respectively and there was significant weak negative correlation between age and HDL ($r=-0.255$, $p\text{-value}=0.027$)..

Also there were no correlation between cholesterol, triglycerides , LDL-C and duration of the disease ($r=0.058$, $p\text{-value}=0.622$), ($r=-0.010$, $p\text{-value}=0.933$), ($r=0.045$, $p\text{-value}=0.703$) respectively. This result agreed with study carried by **Zulfiqar** et al.,2016 which show that Correlation of cholesterol, triglycerides LDL-C and duration of the disease DR was not Statistically significant [9]..

There was significant weak negative correlation between HDL- C level and duration of disease ($r=-0.235$, $p\text{-value}=0.043$).. This result parallel to another result which found , there was significant negative correlation between HDL-C and duration of the DR [10].

Conclusions:

According to the results of this study it is concluded that: Serum total cholesterol and LDL-c levels are increased in diabetic patients with retinopathy .There were weak negative correlation between HDL-C level and study variables (age and duration of disease) .

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