Proportion of Total Lipid Profile Levels among Diabetic Patients with Type II in Reference Laboratory – Emsallatah

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الخلاصـة

خلفيـة الدراسـة: أجريت هذه الدراسة في الفترة من سبتمبر 2021 إلى ديسمبر 2021 وهدفت إلى التغيرات المرضية لفرط الدهون الثلاثية وفرط الكوليسترول والدهون البروتينية المنخفضة والمرتفعة الكثافة لمرضى السكري من النوع الثاني في (المختبر المرجعي - مسلاتة) وتحديد بعض عوامل الخطر لمرضى السكري من النوع الثاني.

المواد والطرق المستخدمة: شملت الدراسة 203 ،حيث جمّعت عينات الدم عن طريق بزل الوريد وتم قياس مستويات الكوليسترول الكلي في الدم (TC) والبروتين الدهني عالي الكثافة (HDL) والبروتين الدهني منخفض الكثافة (LDL) والدهون الثلاثية (TG) باستخدام الأساليب الكيميائية الحيوية القياسية وتم تحليل البيانات بواسطة (Microsoft Excel, 2010) وبرنامج (SPSS, 20). وقد أجريت الدراسة على 108 إناث و 95 من الذكور والمشاركين في الدراسة تتراوح أعمارهم (20-90 سنة). وجمعت المعلومات الأساسية بما في ذلك العمر والجنس والتدخين والإقامة وضغط الدم بواسطة استمارة الإستبيان.

النتـــائج: حسب العمر، لوحظ ارتفاع مستويات الكوليسترول بنسبة (10.3٪ من إجمالي المرضى) كما لوحظ ارتفاع مستويات البروتين الدهني منخفض الكثافة (LDL) بنسبة (13.8٪ من إجمالي المرضى) ، بينما لوحظت خطورة مستويات البروتين الدهني عالي الكثافة (HDL) بنسبة (61.1٪ من إجمالي المرضى حسب العمر) ، (72.2٪ إناث ، 48.4٪ ذكور) و (71.13٪ من إجمالي المرضى المصابين بارتفاع ضغط الدم). في المقابل لم يلاحظ أي فروق بين مستويات الدهون الثلاثية (TG) ومتغيرات الدراسة.

الإستنتـــاج: كان تكرار ارتفاع الكوليسترول ومستويات LDL عالية طبقاً لمتغير العمر، بمستويات HDL عالية حسب متغير العمر والجنس وضغط الدم ، في حين أن مستويات TG لم تكن لها علاقة مرتبطة بعوامل خطر الدراسة.

الكلمات المفتاحية: فرط دهون الدم ، الكوليسترول الكلي ، صورة الدهون ، زيادة شحوم الدم ، داء السكري.

Abstract

Background: This study was conducted in the period from September 2021 to December 2021 and aimed to present the pathological changes of hypertriglyceridemia, hyper cholesteremia, and hyper lipedema for patients with diabetes mellitus with type II in the (Reference Laboratory – Emsallatah) and determine some of the risk factors in patients with diabetes mellitus type II.

Materials and Methods: A total of 203 patients participated in this study. Blood samples were collected by venipuncture. The levels of serum total cholesterol (TC), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglyceride (TG) were measured using standard biochemical methods, and the data was analyzed using Microsoft Excel version 2010 and the SPSS program (SPSS version 22). The study was done among 108 females and 95 males, and the participants of the study were aged 20–90 years. The basic information, including age, gender, smoking, residency, and hypertension, was collected by a questionnaire.

Results: High cholesterol levels were noted in 10.3% of total patients and elevated low-density lipoprotein (LDL) levels were noted in 13.8% of total patients, while the levels of high-density lipoprotein (HDL) were noted at risk in 61.1% of total patients (according to age), (72.2% of females and 48.4% of males) and (71.13% of total patients who have hypertension). In contrast, no differences were observed between triglyceride (TG) levels and any of the study variables.

Conclusion: The frequencies of cholesterol and LDL levels were higher according to age, and levels of HDL were higher according to age, gender, and hypertension, while the frequencies of TG levels weren't related to any of the risk factors in the study.

Key Words: hyperlipidemia, total cholesterol, lipid profile, hypertriglyceridemia, and diabetes mellitus.

Introduction:

Diabetes mellitus (DM) in Africa usually takes a severe course and shows high rates of acute and chronic complications and a poor outcome. A study conducted in Nigeria in two hundred patients with type II DM and a hundred sex and age-matched healthy controls aged between thirty-two and eighty-six years was to see the frequency of prevalence of elevated macromolecule levels within the study subjects and compare clinical and organic chemistry variables between type II diabetic patients and non-diabetic patients. Clinical and organic chemistry parameters were conjointly compared between subjects with style II DM. The World Health Organization has elevated the traditional and elevated platter levels. Long-term glycaemic management exploitation of glycosylated Hb was determined and compared within the study subjects. Type II diabetic patients and controls had considerably different plate concentrations. The mean levels of the lipid profile parameters (TCHOL, LDL-C, TG, LDL/HDL) and CRP were considerably higher in DM patients than in control subjects (Ogbera A.O. & Azenabor A.O., 2010).

Cardiovascular diseases (CVD) have been identified as the first leading disease affecting the Chinese population (Liu S. *et al*., 2019). It is widely known that serum hyperlipidemia, particularly elevated levels of total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C), is strongly related to the development of CVD (Stary HC, *et al*., 1994). So, management of serum cholesterol levels has been a central objective in preventing cardiovascular events (Erin D. Michos *et al*., 2019). Over the past three decades, the prevalence of dyslipidemia has increased remarkably in China (Yang F. *et al*., 2021). The results of a 2012 national survey showed that the prevalence of hyperglyceridemia and hypercholesterolemia in adults was 13.1% and 4.9%, respectively (National Center for Disease Control and Prevention, *et al*., 2015). Projected trends in serum TC and other factors would induce an increase of approximately 21.3 million cardiovascular events and 7.7 million cardiovascular deaths over 2010 to 2030 (Moran A, *et al*., 2010).

Lipoprotein abnormalities disagree between type I and type II diabetes. Type I diabetes results from a cellular-mediated response to destruction of the beta cells of the exocrine gland. Subjects with type II diabetes have internal secretion resistance and sometimes have relative (rather than absolute) internal secretion deficiency. In patients with type II diabetes, lipoid abnormalities are doubly as common as those in the non-diabetic population and a lot more complicated than those in patients with type I diabetes, attributable to the interactions among fat,

internal secretion resistance, and hyperinsulinemia, factors ordinarily seen with this condition. The most common lipoid abnormalities related to type II diabetes are hyper triglyceridemia and reduced HDL-C levels. (Lopes-Vlrella MF, *et al*., 1977; Falko JM, *et al*., 1987).

LDLC levels are typically not accumulated, although LDL metabolism is abnormal, as proved by accumulated LDL synthesis and removal seen in kinetic studies. However, with higher glycemic management standardization, however, doesn't occur (Falko JM, *et al*., 1987). (Klssebah AH, *et al*., 1983; Stern MP, *et al*., 1992). Therefore, various qualitative abnormalities of lipoproteins occur in patients with DM, which can increase the atherogenic potential in these patients (Wltztum JL, *et al*., 1982) (Sato V, *et al*., 1979;Ginsberg HN., 1991).Treating patients with coronary heart disease (CHD) with 3-hydroxy-3-methyl glutaryl coenzyme A enzyme inhibitors (statins) prevents coronary events and extends survival (Scandinavian Simvastatin, 1994; Sacks FM, *et al*., 1996). Relative risk reductions have been consistent across all groups of patients studied and throughout the population ranges of total cholesterol, HDL-C, and triglycerides. In a combined analysis of two secondary prevention trials with pravastatin, Cholesterol and Recurrent Events (CARE) and Long-term Intervention with Pravastatin in Ischemic Disease (LIPID), only patients with low pretreatment LDL-C (125 mg/dl) did not show significant risk reduction (Sacks F.M. *et al*., 2000).

The two studies included 2607 such participants (20% of the two cohorts). The other large statin trials that have been reported had very few if any participants with pretreatment LDL-C in this range (Downs J.R. *et al*., 1998). It is possible that polygenic disease makes patients more vulnerable to the adverse effects of beta-lipoprotein; that LDL is more atherogenic in diabetic patients than in non-diabetics; or that statin effects on atherogenic lipoproteins that were not measured or on tube-shaped structure inflammation can be stronger or more necessary in diabetic patients. These observations are also pertinent to the initial report of the advantage of lipid-lowering medication in reducing CHD events in diabetics and other insecure patients with low baseline LDL-C within the massive Heart Protection. Study Current tips for CHD interference for individuals with polygenic disorder advocate reducing LDL-C to a hundred mg/dl despite the beginning level. professional Panel on Detection, Evaluation, and Treatment of high blood cholesterol (American Diabetes Association Scientific Sessions, 2001).

Rationale: Diabetes mellitus could be a chronic health problem that needs continuous medical care; Diabetic patients are at a high risk of complications of accumulated blood serum cholesterol and triglycerides because of abnormalities in one of the diabetes dysfunctions. It unremarkably happens in type II, so analysis of lipid profile has become a very important health management tool for diabetic patients. The accumulated risk of coronary artery sickness in subjects with DM will be partially explained by the lipoprotein abnormalities related to DM. Hypertriglyceridemia and low levels of lipoprotein are the most common lipid abnormalities. In distinction, in type II diabetes, though lipid values improve, abnormalities unremarkably persist even once optimum glycemic management has been achieved. Screening for dyslipidemia is suggested in subjects with diabetes.

Aim of the study: This study aimed to evaluate the prevalence of total lipid profile that determined complications in diabetic patients with type II.

Objectives: Our study presents the pathological changes of total lipid profile among diabetic patients with type II in the reference laboratory-Emsallatah.

General Objective:

-To estimate the proportion of total lipid profile among diabetic patients with type II.

Specific Objectives:

-To detect disturbances of hypercholesterolemia, hyperlipidemia, and hypertriglyceridemia among diabetic patients.

-To know the relation between diabetic patients who have an increase in total lipid profile with risk factors (age, sex, smoking, residency, and hypertension).

-To find out the relation between diabetic disease and the duration of injury.

Materials and Methods: This study depends on estimating the proportions of triglycerides, total cholesterol, and lipid profile among diabetic patients with type II.

Type of study: An analytical cross-sectional study.

Area of study: Emsallatah-Libya. (Reference laboratory: Emsallatah).

Duration of study: This study started from (15-9-2021) to (15-12-2021).

Study variables:

Dependent variables: Total lipid profile.

Independent variables: Duration of injury, hypertension, residency, smoking, gender, and age.

Population target and sample size: 203 patients with diabetes mellitus type II.

Study criteria:

Inclusion criteria: Patients were previously diagnosed with diabetes mellitus with type II.

Exclusion Criteria: No diabetic patients and diabetic patients with type I.

Data collection and analysis: Interview and questionnaire: Interviews with patients were done to obtain the clinical data, and also a questionnaire sheet was recorded by the investigators.

Study population: The study population consisted of men and women aged 20 to 90. Blood samples were collected from about 203 patients.

Sample collection: Blood samples were obtained from men and women. The blood should be collected by venipuncture under aseptic conditions at a temperature of 23–24C and controlled humidity of 40–50%, and the samples should be processed after 1 hour of collection at room temperature.

Material required for the study: syringe, alcohol, cotton, tourniquet, plane tubes, reagents for (cholesterol-triglycerides-HDL-LDL) cuvettes, centrifuge, and spectrophotometer.

Collection of blood samples:

Laboratory assays:

The subjects were advised to come after overnight fasting of 12–14 hours, and blood samples were drawn from an antecubital vein using a sterile disposal syringe. The samples were collected in one clean, dry bottle. There was a 5ml plain blood sample in the bottle, and the samples were allowed to clot for 30 minutes and then centrifuged for lipid profile estimation. The procedure was done by using the kit provided by (Bio Maghreb company, France). Total cholesterol, HDL cholesterol, and triglyceride estimations were done using a commercially available kit (Bio Maghreb company, France) by an Enzymatic Colorimetric test. Estimation of HDL was done by the method of Burstein and LDL cholesterol was calculated using the Freidewald Equation. LDLc = total cholesterol – HDLc – (TG/5)

Results were reported:

- T. cholesterol as gm/dl, compared to the international standard level of up to 200 mg/dl in males and females.
- Triglyceride as gm/dl, compared to an international standard level of up to 150 mg/dl in males and females.
- LDL as gm/dl, compared to an international standard level of less than 100 mg/dl in males and females.

- HDL as gm /dl, compared to the international standard level of above or equal to 60 mg/dl in males and females.

Collection of blood samples:

Methods: biochemical methods

Determination of total cholesterol (by enzymatic colorimetric test "CHOD-PAP"):

Principle: The determination of cholesterol after enzymatic hydrolysis and oxidation. The colorimetric indicator is quinonimine, which is generated from 4-aminoantipyrine and phenol by hydrogen peroxide under the catalytic action of peroxidase (Tinder's reaction).

•Cholesterol ester + H2O $\xrightarrow{\text{CHE}}$ Cholesterol + fatty acid

•Cholesterol +O2 $\xrightarrow{\text{CHO}}$ Cholesterol-4en-3-one + H2O2

• 2H2O2+ 4-aminoantipyrine + Phenol $\xrightarrow{\text{POD}}$ Quinonimine +4H2O

Reagents:

Reagent 1: Buffer solution.

Reagent 2: Vial of enzyme.

Reagent 3: Standard.

Normal range- less than 200mg/dl.

Procedure: Three test tubes were labeled as blank, standard, and test. 10 microliters of standard solution were added to the standard tube, and 10 microliters of the sample were added to the test tube. Then 1.0ml of reagent A was added to all tubes. Thereafter, the tubes were mixed well and left at room temperature for 10 minutes. Then 1.0ml of reagent B was added to all tubes, and after that, the tubes were mixed and left to incubate for five minutes at 37^0C before reading. Then the absorbance of the standard was measured and the test was read at 505 nm against a reagent blank using a spectrophotometer. The colour is stable for at least 30 minutes.

Determination of LDL: The serum LDL is calculated by using Friedewald formula:

LDL-C is measured by:

1 – Direct LDL-C (by using a method that measures it directly).

Normal range of LDL _ less than 120mg/dl.

Normal range of LDL-less than 100 mg/dl is optimal.

From 100 to 129 mg/dl, near optimal.

From 130 to 159 mg/dl is borderline.
From 160 to 169 mg/dl is high.
Determination of HDL cholesterol: (by HDL cholesterol precipitating reagent " HDLc- P"):
Principle: in the presence of magnesium ions, the very low density (VLDL) and low density (LDL) lipoproteins from serum or plasma are precipitated by phosphotungstate. After centrifugation, the supernatant contains high density lipoprotein (HDL). The HDL cholesterol fraction is determined using the total cholesterol enzymatic reagent (Grove T.H., 1979; Kannel, W.B.*et al*., 1979).
Reagents:
Reagent 1: Magnesium chloride $mgcl_2$.
Reagent 2: precipitating reagent (Phosphotungstic acid (PH6.2).
Normal range: 60 mg/dl or higher preferred.
Men who have less than 40 mg/dl are at risk.
Women who have less than 50 mg/dl are at risk.
Procedure: three test tubes were labeled as blank, standard, and test. 10 microliters of standard solution were added to the standard tube, and 10 microliters of the sample were added to the test tube. Then 1.0 ml of reagent was added to all tubes. Thereafter, the tubes were mixed well and left at room temperature for 10 minutes. Then 1.0ml of reagent 2 was added to all tubes. After that, the tubes were mixed and left to incubate for 5 minutes at 37^0C before being read. Then the absorbance of the standard was measured and the test was read at 505nm against a reagent blank using a spectrophotometer (Evilioion 2000, Italy). The colour is stable for at least 30 minutes.
Determination of triglycerides: (by Enzymatic Colorimetric test " GPO- PAP"):
Principle: the triglycerides are determined after enzymatic hydrolysis with lipoprotein lipase. The indicator is a coloured phenazone formed from hydrogen peroxide, 4-aminoantipyrine, and 4-chlorophenol under the catalytic influence of peroxidase.

- Triglycerides + 3 H_2O $\xrightarrow{LPL}$ Glycerol+ 3RCOOH

- Glycerol + ATP $\xrightarrow{GK/Mg^{2+}}$ Glycerol-3-phosphate + ADP

- Glycerol-3-phosphate + O_2 $\xrightarrow{GPO}$ Dihydroxyacetone-phosphate + H_2O_2

•2H2O2 +4-aminoantipyine + 4chlorophenol $\xrightarrow{POD}$ 4-(p-Benzoquinone-monoimino)-phenazone + $2H_2O$ + HCL

Reagents:

Reagent 1: Solution tampon.

Reagent 2: Enzyme lipoprotein lipase.

Reagent 3: Standard glycerol.

Normal range:

It is preferable to have a level of less than 150 mg/dl.

From 150 to 199 mg/dl is borderline.

From 200 to 499 mg/dl is high.

Procedure: three test tubes were labeled as blank, standard, and test. 10 microliters of standard solution were added to the standard tube, and 10 microliters of the sample were added to the test tube. Then 1 mL of reagent A was added to all the tubes. Thereafter, the tubes were mixed well and left at room temperature for 10 minutes. Then 1 ml of reagent B was added to all tubes, and after that, the tubes were mixed and left to incubate for five minutes at 37^0C before reading. Then the absorbance of the standard was measured and the test was read at 505nm against a reagent blank using a spectrophotometer. The colour is stable for at least 30 minutes.

Interview and questionnaire: Interviews with the patient were done to obtain the clinical data and also a questionnaire sheet was recorded by the investigators.

Statistical analysis: The data were analyzed and stored in the Microsoft Word 2010 computer program. The data were collected randomly and inserted by hand.

Ethical consideration: Patients were informed about the objective of the research and asked to sign an agreement to be involved in this research. Any patient who refused to be involved was excluded from the study.

Results:

Presentation and analysis of data: The questionnaire form is adopted as the main tool for collecting data and information related to study variables. The questionnaire includes general information and demographic characteristics of the target individuals of the study.

presentation and analyzing patient data. To identify some characteristics of the study participants, such as age, gender, duration of injury, residency, smoking, and hypertension, were analyzed, and the following is a detailed presentation of these properties:

Demographic characteristics:

1- distribution of sample individuals according to age.

Table 1: The Repetitive distributions and percentages of the sample individuals on the basis of age

Age	Frequency	Percentage%
20 to less than 30 years	2	1
30 to less than 40	46	22.7
40 to less than 50	44	21.7
50 to less than 60	48	23.6
60 to less than 70	35	17.2
70 year and more	28	13.8
total	203	100

The data set out in the table (1) relating to the distribution of the sample individuals on the basis of age indicated that (1%) of the sample their age were from 20 to less than 30 years, and (22.7%) of the sample were aged 30 to less than 40 years, also (21.7%) of the sample were aged 40 to less than 50 years, and (23.6%) of the sample were aged 50 to less than 60 years, and (17.2%) of the sample were aged 60 to less than 70 years, and (13.8%) of the sample ranged in age from 70 years and more.

2-Distribution of sample individuals on the basis of gender:

Table 2: Repetitive distribution and percentage of the sample individuals on the basis of gender

gender	Number	Percentage
male	95	46.8
female	108	53.2
Total	203	100

The data set out in the table (2), regarding the distribution of the sample individuals on the basis of gender, showed that 46.8% of the patients were female, while 53.2% of the patients were male.

1-distribution of sample individuals according to the duration of injury:

Table 3: Repetitive distribution and percentage of the sampled individuals on the basis of duration of injury.

duration of injury	Number	Percentage
less than 10 years	108	53.2
10 to less than 20 years	70	34.5
20 to less than 30 years	19	9.4
30 to less than 40 years	5	2.5
40 to less than 50 years	1	.5
Total	203	100

Table (3) revealed that 53.2% of patients had a duration of injury of less than 10 years, 34.5% had a duration of injury of 10 to less than 20 years, 10% had a duration of injury of 30 to less than 40 years, 9.4% had a duration of injury of 20 to less than 30 years, 2.5% had a duration of injury of 30 to less than 40 years, and 0.5% had a duration of injury of 40 to less than 50 years.

4-distribution of sample individuals according to the residency.

Table 4: Repetitive distribution and percentage of the sample individuals on the basis of residency

Residency	Number	Percentage
Emsallatah	118	58.1
Tarhuna	53	26.1
Gumadha	17	8.4
Qasr Alakhiar	15	7.4
Total	203	100.0

from table (4) showed that 58.1% of patients live in Emsallatah, while 26.1% of patients live in Tarhuna, 8.4% of patients live in Gumadha, and 7.4% of patients live in Qaser Alakhiar.

5- distribution of sample individuals according to smoking:

Table 5: Repetitive distribution and percentage of the sampled individuals on the basis of smoking:

smoking	Number	Percentage
No	132	65
Yes	71	35
Total	203	100.0

Table (5) shows that 65% of patients do not smoke, while 35% of patients do smoke.

6-distribution of sample individuals according to hypertension:

Table 6: Repetitive distribution and percentage of the sampled individuals on the basis of hypertension.

Hypertension	Number	Percentage
No	109	53.7
Yes	94	46.3
Total	203	100.0

Table (6) shows that 11% of patients don't have hypertension while 46.3% of patients have hypertension.

The relationships between cholesterol and the study variables

1. The relationship between age and cholesterol level:

Table (7) shows the results of the Chi^2 distribution test for the relationship between age and cholesterol.

			Total cholesterol			Total	P-Value
			desirable	borderline	high		
Age	20 to less than 30 year	Number	2	0	0	2	0.021
		Percentage %	100.0%	0.0%	0.0%	100.0%	

	30 to less than 40	Number	30	14	2	46	
		Percentage %	65.2%	30.4%	4.3%	100.0%	
	40 to less than 50	Number	29	11	4	44	
		Percentage %	65.9%	25.0%	9.1%	100.0%	
	50 to less than 60	Number	34	10	4	48	
		Percentage %	70.8%	20.8%	8.3%	100.0%	
	60 to less than 70	Number	19	7	9	35	
		Percentage %	54.3%	20.0%	25.7%	100.0%	
	70 years and more	Number	12	14	2	28	
		Percentage %	42.9%	50.0%	7.1%	100.0%	
Total		Number	126	56	21	203	
		Percentage %	62.1%	27.6%	10.3%	100.0%	
Calculated Ch2 Value=20.989			df= 10		Tabulated Ch2 Value = 18.31		

The results in table (7) show that the P-value equals 0.021, which was less than 0.05 and indicates that there were differences in the level of cholesterol according to age. This was confirmed by the calculated chi value of 20.989, which was greater than its tabulated value of 18.31, so the cholesterol level was related to age.

2. The relationship between gender and cholesterol level:

Table 8 shows the results of the Chi^2 distribution test for the relationship between gender and cholesterol.

			total cholesterol			Total	P-Value
			desirable	borderline	high		
Gender	male	Number	60	22	13	95	0.199
		Percentage %	63.2%	23.2%	13.7%	100.0%	
	female	Number	66	34	8	108	
		Percentage %	61.1%	31.5%	7.4%	100.0%	
Total		Number	126	56	21	203	
		Percentage %	62.1%	27.6%	10.3%	100.0%	
Calculated Ch2 Value=3.228			df= 2		Tabulated Ch2 Value = 5.99		

Data recorded in Table (8) showed that the P-value equals 0.199, which was more than 0.05 and indicates that there weren't differences in the level of cholesterol according to gender. This was confirmed by the calculated chi value of 3.228, which was less than its tabulated value of 5.99, so the cholesterol level wasn't related to gender.

3. The relationship between injury duration and cholesterol level:

Table (9) shows the results of the Chi^2 distribution test for the relationship between the duration of injury and cholesterol.

			total cholesterol			Total	P-Value
			desirable	borderline	high		
duration of injury	less than 10 years	Number	70	30	8	108	0.365
		Percentage %	64.8%	27.8%	7.4%	100.0%	
	10 to less than 20 years	Number	44	17	9	70	
		Percentage %	62.9%	24.3%	12.9%	100.0%	
	20 to less than 30 years	Number	7	8	4	19	
		Percentage %	36.8%	42.1%	21.1%	100.0%	
	30 to less than 40 years	Number	4	1	0	5	
		Percentage %	80.0%	20.0%	0.0%	100.0%	
	40 to less than 50 years	Number	1	0	0	1	
		Percentage %	100.0%	0.0%	0.0%	100.0%	
Total		Number	126	56	21	203	
		Percentage %	62.1%	27.6%	10.3%	100.0%	
Calculated Ch2 Value=0.365			df= 8		Tabulated Ch2 Value = 15.51		

The data mentioned above showed that the P-value equaled 0.365, which was more than 0.05 and indicates that there weren't differences in the level of cholesterol according to the duration of injury. This was confirmed by the calculated chi value of 0.365, which was less than its tabulated value of 15.51, so the cholesterol level wasn't related to the duration of injury.

4. The relationship between residency and cholesterol level:

Table (10) shows the results of the Chi^2 distribution test for the relationship between residency and cholesterol.

			total cholesterol			Total	P-Value
			desirable	borderline	high		
Residency	Emsallatah	Number	77	32	9	118	0.166
		Percentage %	65.3%	27.1%	7.6%	100.0%	
	Tarhuna	Number	29	16	8	53	
		Percentage %	54.7%	30.2%	15.1%	100.0%	
	Gumadha	Number	12	5	0	17	
		Percentage %	70.6%	29.4%	0.0%	100.0%	

	Qasr Alakhiar	Number	8	3	4	15	
		Percentage %	53.3%	20.0%	26.7%	100.0%	
Total		Number	126	56	21	203	
		Percentage %	62.1%	27.6%	10.3%	100.0%	
Calculated Ch2 Value= 9.13 df= 6 Tabulated Ch2 Value = 12.59							

The results in Table (10) showed that the P-value equaled 0.166, which was more than 0.05 and indicates that there weren't differences in the level of cholesterol according to place of living. This was confirmed by the calculated chi value of 9.13, which was less than its tabulated value of 12.59, so the cholesterol level wasn't related to place of living.

5. The relationship between Smoking and cholesterol level:

Table (11) shows the results of the Chi^2 distribution test for the relationship between smoking and cholesterol.

			total cholesterol			Total	P-Value
			desirable	borderline	high		
Smoking or not	No	Number	78	43	11	132	0.066
		Percentage %	59.1%	32.6%	8.3%	100.0%	
	Yes	Number	48	13	10	71	
		Percentage %	67.6%	18.3%	14.1%	100.0%	
Total		Number	126	56	21	203	
		Percentage %	62.1%	27.6%	10.3%	100.0%	
Calculated Ch2 Value= 5.421 df= 2 Tabulated Ch2 Value = 5.99							

Data recorded in Table (11) showed that the P-value equaled 0.066, which was more than 0.05 and indicates that there weren't differences in the level of cholesterol according to smoking. This was confirmed by the calculated chi value of 5.421, which was less than its tabulated value of 5.99, so the cholesterol level wasn't related to smoking.

6. The relationship between hypertension and cholesterol levels:

Table (12) shows the results of the Chi^2 distribution test for the relationship between hypertension and cholesterol.

			total cholesterol			Total	P-Value
			desirable	borderline	high		
Hypertension	No	Number	62	33	14	109	0.217
		Percentage %	56.9%	30.3%	12.8%	100.0%	
	Yes	Number	64	23	7	94	
		Percentage %	68.1%	24.5%	7.4%	100.0%	
Total		Number	126	56	21	203	

	Percentage %	62.1%	27.6%	10.3%	100.0%	
Calculated Ch2 Value= 3.059		df= 2		Tabulated Ch2 Value = 5.99		

The data mentioned above showed that the P-value equaled 0.217, which was more than 0.05, and indicates that there weren't differences in the level of cholesterol according to hypertension. This was confirmed by the calculated chi value of 3.059, which was less than its tabulated value of 5.99, so the cholesterol level wasn't related to hypertension.

The relationships between LDL and the study variables

1.The relationship between age and LDL level:

Table 13 shows the results of the Chi^2 distribution test for the relationship between age and LDL.

			LDL				Total	P-Value
			Optimal	near optimal	border line	high		
Age	20 to less than 30 year	Number	1	1	0	0	2	0.008
		Percentage %	50.0%	50.0%	0.0%	0.0%	100.0%	
	30 to less than 40	Number	16	15	9	6	46	
		Percentage %	34.8%	32.6%	19.6%	13.0%	100.0%	
	40 to less than 50	Number	14	19	7	4	44	
		Percentage %	31.8%	43.2%	15.9%	9.1%	100.0%	
	50 to less than 60	Number	13	25	6	4	48	
		Percentage %	27.1%	52.1%	12.5%	8.3%	100.0%	
	60 to less than 70	Number	9	6	7	13	35	
		Percentage %	25.7%	17.1%	20.0%	37.1%	100.0%	
	70 years and more	Number	6	12	9	1	28	
		Percentage %	21.4%	42.9%	32.1%	3.6%	100.0%	
Total		Number	59	78	38	28	203	
		Percentage %	29.1%	38.4%	18.7%	13.8%	100.0%	
Calculated Ch2 Value=31.317			df= 15		Tabulated Ch2 Value = 25			

Data recorded in table (13) showed that the P-value equaled 0.008, which was less than 0.05 and indicates that there were differences in the level of LDL according to age. This was confirmed by the calculated chi value of 31.317,

which was greater than its tabulated value of 25, so the LDL level was related to age.

2. The relationship between gender and LDL level:

Table 14 reveals the results of the Chi^2 distribution test for the relationship between gender and LDL.

			LDL				Total	P-Value
			Optimal	near optimal	border line	high		
gender	male	Number	27	36	18	14	95	0.984
		Percentage %	28.4%	37.9%	18.9%	14.7%	100.0%	
	female	Number	32	42	20	14	108	
		Percentage %	29.6%	38.9%	18.5%	13.0%	100.0%	
Total		Number	59	78	38	28	203	
		Percentage %	29.1%	38.4%	18.7%	13.8%	100.0%	
Calculated Ch2 Value = 0.159 df= 3 Tabulated Ch2 Value = 7.81								

The results in table (14) showed that the P-value equaled 0.984, which was more than 0.05 and indicates that there weren't differences in the level of LDL according to gender. This was confirmed by the calculated chi value of 0.159, which was less than its tabulated value of 7.81, so the LDL level wasn't related to gender.

3. The relationship between injury duration and LDL level:

Table 15 shows the results of the Chi^2 distribution test for the relationship between the duration of injury and LDL.

			LDL				Total	P-Value
			Optimal	near optimal	border line	high		
Duration of injury	less than 10 day	Number	38	38	19	13	108	0.133
		Percentage %	35.2%	35.2%	17.6%	12.0%	100.0%	
	10 to less than 20 day	Number	15	34	11	10	70	
		Percentage %	21.4%	48.6%	15.7%	14.3%	100.0%	
	20 to less than 30 day	Number	3	6	7	3	19	
		Percentage %	15.8%	31.6%	36.8%	15.8%	100.0%	
	30 to less than 40 day	Number	2	0	1	2	5	
		Percentage %	40.0%	0.0%	20.0%	40.0%	100.0%	
	40 to less than 50day	Number	1	0	0	0	1	
		Percentage %	100.0%	0.0%	0.0%	0.0%	100.0%	
Total		Number	59	78	38	28	203	

	Percentage %	29.1%	38.4%	18.7%	13.8%	100.0%	
Calculated Ch2 Value = 0.133		df= 12		Tabulated Ch2 Value = 21.03			

The tabulated results in table (15) showed that the P-value equaled 0.133, which was more than 0.05 and indicates that there weren't differences in the level of LDL according to duration of injury. This was confirmed by the calculated chi value of 0.133, which was less than its tabulated value of 21.03, so the LDL level wasn't related to the duration of injury.

4. The relationship between residence and LDL level:

Table (16) shows the results of the Chi^2 distribution test for the relationship between place of living and LDL.

			LDL				Total	P-Value
			Optimal	near optimal	border line	high		
Residency	Emsallatah	Number	42	40	22	14	118	0.139
		Percentage %	35.6%	33.9%	18.6%	11.9%	100.0%	
	Tarhuna	Number	11	22	8	12	53	
		Percentage %	20.8%	41.5%	15.1%	22.6%	100.0%	
	Gumadha	Number	3	10	4	0	17	
		Percentage %	17.6%	58.8%	23.5%	0.0%	100.0%	
	Qasr Alakhiar	Number	3	6	4	2	15	
		Percentage %	20.0%	40.0%	26.7%	13.3%	100.0%	
Total		Number	59	78	38	28	203	
		Percentage %	29.1%	38.4%	18.7%	13.8%	100.0%	
Calculated Ch2 Value= 0.139			df= 9		Tabulated Ch2 Value = 16.92			

The results in table (16) showed that the P-value equaled 0.139, which was more than 0.05 and indicates that there weren't differences in the level of LDL according to place of living. This was confirmed by the calculated chi value of 0.139, which was less than its tabulated value of 16.92, so the LDL level wasn't related to residence.

5. The relationship between Smoking and LDL level:

Table (17) shows the results of the Chi^2 distribution test for the relationship between smoking and LDL.

			LDL				Total	P-Value
			Optimal	near optimal	border line	high		
Smoking	No	Number	39	50	25	18	132	0.995
		Percentage %	29.5%	37.9%	18.9%	13.6%	100.0%	

	Yes	Number	20	28	13	10	71	
		Percentage %	28.2%	39.4%	18.3%	14.1%	100.0%	
Total		Number	59	78	38	28	203	
		Percentage %	29.1%	38.4%	18.7%	13.8%	100.0%	
Calculated Ch2 Value= 0.076 df= 3 Tabulated Ch2 Value = 7.81								

The results in table (17) showed that the P-value equaled 0.995, which was more than 0.05 and indicates that there weren't differences in the level of LDL according to smoking. This was confirmed by the calculated chi value of 0.076, which was less than its tabulated value of 7.81, so the LDL level wasn't related to smoking.

6. The relationship between Hypertension and LDL level:

Table 18 shows the results of the Chi^{2}distribution test for the relationship between hypertension and LDL.

			LDL				Total	P-Value
			Optimal	near optimal	border line	high		
Hypertension	No	Number	31	40	22	16	109	0.892
		Percentage %	28.4%	36.7%	20.2%	14.7%	100.0%	
	Yes	Number	28	38	16	12	94	
		Percentage %	29.8%	40.4%	17.0%	12.8%	100.0%	
Total		Number	59	78	38	28	203	
		Percentage %	29.1%	38.4%	18.7%	13.8%	100.0%	
Calculated Ch2 Value= 0.618 df= 3 Tabulated Ch2 Value = 7.81								

The data in table (18) showed that the P-value equaled 0.892, which was more than 0.05 and indicates that there weren't differences in the level of LDL according to hypertension. This was confirmed by the calculated chi value of 0.618, which was less than its tabulated value of 7.81, so the LDL level wasn't related to hypertension.

The relationships between HDL and the study variables

1.The relationship between age and HDL level

Table 19 shows the results of the Chi^2 distribution test for the relationship between age and HDL.

			HDL		Total	P-Value
			desirable	at risk		
age	20 to less than 30	Number	0	2	2	0.009

	year	Percentage %	0.0%	100.0%	100.0%	
	30 ti less than 40	Number	13	33	46	
		Percentage %	28.3%	71.7%	100.0%	
	40 to less than 50	Number	17	27	44	
		Percentage %	38.6%	61.4%	100.0%	
	50 to less than 60	Number	13	35	48	
		Percentage %	27.1%	72.9%	100.0%	
	60 to less than 70	Number	19	16	35	
		Percentage %	54.3%	45.7%	100.0%	
	70 years and more	Number	17	11	28	
		Percentage %	60.7%	39.3%	100.0%	
Total		Number	79	124	203	
		Percentage %	38.9%	61.1%	100.0%	
Calculated Ch2 Value=15.375 df= 5 Tabulated Ch2 Value = 11.07						

The records in table (19) show that the P-value equals 0.009, which was less than 0.05 and indicates that there were differences in the level of HDL according to age. This was confirmed by the calculated chi value of 15.375, which was greater than its tabulated value of 11.07, so the HDL level was related to age.

2. The relation between gender and HDL level:

Table (20) shows the results of the Chi^2 distribution test for the relationship between gender and HDL.

			HDL		Total	P-Value
			desirable	at risk		
gender	male	Number	49	46	95	0.000
		Percentage %	51.6%	48.4%	100.0%	
	female	Number	30	78	108	
		Percentage %	27.8%	72.2%	100.0%	
Total		Number	79	124	203	
		Percentage %	38.9%	61.1%	100.0%	
Calculated Ch2 Value = 12.045 df= 1 Tabulated Ch2 Value = 3.841						

The results in table (20) showed that the P-value equaled 0.000, which was less than 0.05 and indicates that there were differences in the level of HDL according to gender. This was confirmed by the calculated chi value of 12.045, which was greater than its tabulated value of 3.841, so the HDL level was related to gender.

3. The relationship between injury duration and HDL level:

Table 21 shows the results of the Chi^2 distribution test for the relationship between the duration of injury and HDL.

			HDL		Total	P-Value
			desirable	at risk		
duration of injury	less than 10 day	Number	38	70	108	0.493
		Percentage %	35.2%	64.8%	100.0%	
	10 to less than 20 day	Number	29	41	70	
		Percentage %	41.4%	58.6%	100.0%	
	20 to less than 30 day	Number	8	11	19	
		Percentage %	42.1%	57.9%	100.0%	
	30 to less than 40 day	Number	3	2	5	
		Percentage %	60.0%	40.0%	100.0%	
	40 to less than 50day	Number	1	0	1	
		Percentage %	100.0%	0.0%	100.0%	
Total		Number	79	124	203	
		Percentage %	38.9%	61.1%	100.0%	
Calculated Ch2 Value = 3.404 df= 4 Tabulated Ch2 Value = 9.49						

The findings in Table (21) showed that the P-value equaled 0.493, which was more than 0.05 and indicates that there weren't differences in the level of HDL according to duration of injury. This was confirmed by the calculated chi value of 3.404, which was less than its tabulated value of 9.49, so the HDL level wasn't related to the duration of injury.

4. The association between residency and HDL level:

Table 22 shows the results of the Chi^2 distribution test for the relationship between residence and HDL.

			HDL		Total	P-Value
			desirable	at risk		
Residency	Emsallatah	Number	54	64	118	0.132
		Percentage %	45.8%	54.2%	100.0%	
	Tarhuna	Number	16	37	53	
		Percentage %	30.2%	69.8%	100.0%	
	Gumadha	Number	5	12	17	
		Percentage %	29.4%	70.6%	100.0%	
	Qasr Alakhiar	Number	4	11	15	
		Percentage %	26.7%	73.3%	100.0%	
Total		Number	79	124	203	
		Percentage %	38.9%	61.1%	100.0%	
Calculated Ch2 Value= 5.618 df= 3 Tabulated Ch2 Value = 7.81						

The outcomes in Table (22) showed that the P-value equaled 0.132, which was more than 0.05 and indicates that there weren't differences in the level of HDL

according to place of living. This was confirmed by the calculated chi value of 5.618, which was less than its tabulated value of 7.81, so the HDL level wasn't related to place of living..

5. The relationship between smoking and HDL levels:

Table (23) shows the results of the Chi^2 distribution test for the relationship between smoking and HDL.

			HDL		Total	P-Value
			desirable	at risk		
Smoking	No	Number	47	85	132	0.122
		Percentage %	35.6%	64.4%	100.0%	
	Yes	Number	32	39	71	
		Percentage %	45.1%	54.9%	100.0%	
Total		Number	79	124	203	
		Percentage %	38.9%	61.1%	100.0%	
Calculated Ch2 Value= 1.74 df= 1 Tabulated Ch2 Value = 3.841						

The findings in Table (23) showed that the P-value equaled 0.122, which was more than 0.05 and indicates that there weren't differences in the level of HDL according to smoking. This was confirmed by the calculated chi value of 1.74, which was less than its tabulated value of 3.841, so the HDL level wasn't related to smoking.

6. The relationship between hypertension and HDL level:

Table 24 reveals the results of the Chi^2 distribution test for the relationship between hypertension and HDL.

			HDL		Total	P-Value
			desirable	at risk		
Hypertension	No	Number	52	57	109	0.004
		Percentage %	47.7%	52.3%	100.0%	
	Yes	Number	27	67	94	
		Percentage %	28.7%	71.3%	100.0%	
Total		Number	79	124	203	
		Percentage %	38.9%	61.1%	100.0%	
Calculated Ch2 Value = 7.651 df= 1 Tabulated Ch2 Value = 3.841						

The data mentioned above showed that the P-value equaled 0.004, which was less than 0.05 and indicates that there were differences in the level of HDL

according to hypertension. This was confirmed by the calculated chi value of 7.651, which was greater than its tabulated value of 3.841, so the HDL level was related to hypertension.

The relationships between triglyceride and the study variables:

1. The relationship between age and TG level:

Table 25 reveals the results of the Chi2 distribution test for the relationship between age and TG.

			TG			Total	
			desirable	borderline high	high		
age	20 to less than 30 year	Number	1	0	1	2	0.53
		Percentage %	50.0%	0.0%	50.0%	100.0%	
	30 ti less than 40	Number	22	10	13	45	
		Percentage %	48.9%	22.2%	28.9%	100.0%	
	40 to less than 50	Number	21	6	17	44	
		Percentage %	47.7%	13.6%	38.6%	100.0%	
	50 to less than 60	Number	21	17	10	48	
		Percentage %	43.8%	35.4%	20.8%	100.0%	
	60 to less than 70	Number	18	7	10	35	
		Percentage %	51.4%	20.0%	28.6%	100.0%	
	70 years and more	Number	15	6	7	28	
		Percentage %	53.6%	21.4%	25.0%	100.0%	
Total		Number	98	46	58	202	
		Percentage %	48.5%	22.8%	28.7%	100.0%	
Calculated Ch2 Value=9.023			df= 10		Tabulated Ch2 Value = 18.31		

The results in Table (25) showed that the P-value equaled 0.53, which was more than 0.05 and indicates that there weren't differences in the level of TG according to age. This was confirmed by the calculated chi value of 9.023, which was less than its tabulated value of 18.31, so the TG level was related to age.

2. The relationship between gender and TG level:

Table 26 shows the results of the Chi2 distribution test for the relationship between gender and TG.

			TG			Total	P-Value
			desirable	borderline high	high		
gender	male	Number	39	26	29	94	0.141

		Percentage %	41.5%	27.7%	30.9%	100.0%	
	female	Number	59	20	29	108	
		Percentage %	54.6%	18.5%	26.9%	100.0%	
Total		Number	98	46	58	202	
		Percentage %	48.5%	22.8%	28.7%	100.0%	
Calculated Ch2 Value = 3.913 df= 2 Tabulated Ch2 Value = 5.99							

The results in Table (26) show that the P-value equaled 0.141, which was more than 0.05 and indicates that there weren't differences in the level of TG according to gender. This was confirmed by the calculated chi value of 3.913, which was less than its tabulated value of 5.99, so the TG level wasn't related to gender.

3. The relationship between the duration of injury and TG level:

Table (27) shows the results of the Chi^2 distribution test for the relationship between duration of injury and TG.

			TG			Total	P-Value
			desirable	borderline	high		
duration of injury	less than 10 day	Number	55	20	32	107	0.803
		Percentage %	51.4%	18.7%	29.9%	100.0%	
	10 to less than 20 day	Number	31	21	18	70	
		Percentage %	44.3%	30.0%	25.7%	100.0%	
	20 to less than 30 day	Number	9	4	6	19	
		Percentage %	47.4%	21.1%	31.6%	100.0%	
	30 to less than 40 day	Number	2	1	2	5	
		Percentage %	40.0%	20.0%	40.0%	100.0%	
	40 to less than 50day	Number	1	0	0	1	
		Percentage %	100.0%	0.0%	0.0%	100.0%	
Total		Number	98	46	58	202	
		Percentage %	48.5%	22.8%	28.7%	100.0%	
Calculated Ch2 Value = 4.561 df= 8 Tabulated Ch2 Value = 15.51							

The data in table (27) showed that the P-value equaled 0.803, which was more than 0.05, and indicates that there weren't differences in the level of TG according to duration of injury. This was confirmed by the calculated chi value

of 4.561, which was less than its tabulated value of 15.51, so the TG level wasn't related to the duration of injury.

4. The relationship between residence and TG level:

Table 28 shows the results of the Chi^2 distribution test for the relationship between place of living and TG.

			TG			Total	P-Value
			desirable	borderline	high		
Residency	Emsallatah	Number	57	27	34	118	0.993
		Percentage %	48.3%	22.9%	28.8%	100.0%	
	Tarhuna	Number	26	11	15	52	
		Percentage %	50.0%	21.2%	28.8%	100.0%	
	Gumadha	Number	8	5	4	17	
		Percentage %	47.1%	29.4%	23.5%	100.0%	
	Qasr Alakhiar	Number	7	3	5	15	
		Percentage %	46.7%	20.0%	33.3%	100.0%	
Total		Number	98	46	58	202	
		Percentage %	48.5%	22.8%	28.7%	100.0%	
Calculated Ch2 Value= 0.754 df= 6 Tabulated Ch2 Value = 12.59							

The results in table (28) show that the P-value equaled 0.993, which was more than 0.05 and indicates that there weren't differences in the level of TG according to place of living. This was confirmed by the calculated chi value of 0.754, which was less than its tabulated value of 1259, so the TG level wasn't related to place of living.

5. The relationship between smoking and TG level.

Table 29 illustrates the results of the Chi^2 distribution test for the relationship between smoking and TG.

			TG			Total	P-Value
			desirable	borderline	high		
Smoking	No	Number	66	27	39	132	0.599
		Percentage %	50.0%	20.5%	29.5%	100.0%	
	Yes	Number	32	19	19	70	

		Percentage %	45.7%	27.1%	27.1%	100.0%	
Total		Number	98	46	58	202	
		Percentage %	48.5%	22.8%	28.7%	100.0%	
Calculated Ch2 Value= 1.164 df= 2 Tabulated Ch2 Value = 12.59							

The results in table (29) show that the P-value equaled 0.559, which was more than 0.05 and indicates that there weren't differences in the level of TG according to smoking. This was confirmed by the calculated chi value of 1.164, which was less than its tabulated value of 12.59, so the TG level wasn't related to smoking.

6. The relationship between Hypertension and TG level:

Table 30 shows the results of the Chi^2 distribution test for the relationship between hypertension and TG.

			TG			Total	P-Value
			desirable	borderline	high		
Hypertension	No	Number	50	24	35	109	0.509
		Percentage %	45.9%	22.0%	32.1%	100.0%	
	Yes	Number	48	22	23	93	
		Percentage %	51.6%	23.7%	24.7%	100.0%	
Total		Number	98	46	58	202	
		Percentage %	48.5%	22.8%	28.7%	100.0%	
Calculated Ch2 Value = 1.352 df= 2 Tabulated Ch2 Value = 5.99							

The results in Table (30) showed that the P-value equaled 0.509, which was more than 0.05 and indicates that there weren't differences in the level of TG according to hypertension. This was confirmed by the calculated chi value of 1.352, which was less than its tabulated value of 5.99, so the TG level wasn't related to hypertension.

Discussion: The aim of this study was to estimate the proportions of lipid profile levels among diabetic patients and compare them with study variables that are present (age, gender, hypertension, smoking, and duration of injury). Lipid abnormalities are common in diabetics. Dyslipidaemias make diabetics prone to

developing CHD and other complications of atherosclerosis. There were 203 patients in this study, out of which 46.8% of the patients were male and 53.2% were female. In this study, the number of females was higher compared with male patients, and this may be referred to the fact that women were more careful about their health than males by making checkups or could be due to a lack of exercise and a high caloric diet. And these results agree with previous studies in Libya (W. T. Friedewald *et al*., 1972; International Diabetes Federation, 2011). Data from our study also showed that the age of the patients varied from less than 30 years to more than 70 years. The highest percentage prevalence of the disease was found in the age group (50 to less than 60) years for both genders. These results agree with many studies in different Arabic regions (I. S. B. Arcol, 1989). In the current study, 53.2% of total male and female patients developed this disease within the last ten years, which may be related to Libya's political and economic situation. The prevalence of diabetes mellitus tends to be higher among hypertension patients, but in this study, we found that hypertension's relationship to diabetes mellitus is insignificant. This finding is inconsistent with that of (El-Hazmi M.A. & Warsy A.S., 2001).This might be explained by our method of taking blood pressure measurements; taking one reading in one setting is usually not conclusive of blood pressure status (James P.A *et al.*, 2014). A study conducted in Nishtar Hospital, Multan by Ahmad A *et al*. (2003) showed that 21% of patients with type II diabetes had raised serum cholesterol (> 200 mg/dl) and 34.2% of patients had raised triglycerides in serum (> 150 mg/dl). In our study, 10.3 percent of diabetics had serum cholesterol levels greater than 200 mg/dL, and 28.7 percent had serum TG levels greater than 200 mg/dL. The values of serum TG and cholesterol in our study disagree with the abovementioned study. The reason for the difference in serum cholesterol values may be due to a difference in the dietary habits of the people of Multan. "Frequency of dyslipidaemia in type II diabetes mellitus in patients of the hazara division" showed that serum triglyceride was raised in 59% (Ahmed N *et al*., 2008).

The most probable reason behind this is that people are now more aware of their physical well-being and are changing their dietary habits. The increasing use of cooking oils in place of vanaspati ghee has also contributed to the change in the lipid profile. Another reason is the increasing literacy rate and lifestyle modification by most people. In the present study, 61.1% of diabetics had HDL-C of more than 35 mg/dl. Elevated serum TG, serum cholesterol, and LDL-C

levels were frequently associated with low HDL-C levels, the findings of (Kannel W.B *et al*., 1979; Jarrett R.J *et al*., 1982 ; Barette *et al.*,1982) were also consistent with our study. Changes occur in lipid and lipoprotein concentrations with age that increase the risk of developing atherosclerotic disease. In our study, where the mean age was 52 years, the total cholesterol among diabetic patients between the ages of 60 and 70 increased progressively, such that (25.7%) of patients are at risk of total cholesterol level. This is consistent with some previously published observations that suggested plasma total cholesterol concentration increases progressively and in women reaches its peak value between ages 60-70 and in men between ages 50-60 (Robert A. & Kaisim, 1987).

The most probable reason behind this can be that individuals are currently a lot of tuned in to their physical well-being and are dynamical their dietary habits. The increasing use of cooking oils in place of vanaspati clarified butter has additionally contributed to the change within the lipid profile. another excuse is that the increasing attainment rate and life-style modification by most of the people. within the present study, 61.1% of diabetics had HDL-C of over thirty five mg/dl. Elevated blood serum TG, body fluid cholesterol, and LDL-C levels were often related to low HDL-C levels. The findings of (Kannel W.B *et al*., 1979), (Jarrett R.J *et al*., 1982) and (Barette *et al*.,1982) were additionally in step with our study. Changes occur in lipid and lipoprotein concentrations with age that increase the danger of developing coronary-artery {disease} disease. In our study, wherever the mean age was fifty two years, the whole cholesterol among diabetic patients between the ages of sixty and seventy raised more and more, such (25.7%) of patients are in danger of total cholesterol level. this can be in step with some previously revealed observations that advised plasma total cholesterol concentration will increase increasingly and in girls reaches its peak price between ages 60-70 and in men between ages 50-60 (Robert A. & S Kaisim, 1987). Hyperlipidemia in females may be due to the effects of estrogen on body fat distribution, which results in differences in altered lipoproteins (Moyad J *et al.*, 2019). This demonstrates the higher atherogenic risk in females than in males, which could be due to the persistence of a less favorable lipid profile (Pandya H *et al.*, 2012). The relationship between reduced HDL cholesterol levels and an increased risk of coronary heart disease (CHD) is well documented in the literature (Wysocka-Mincewicz M *et al.*, 2016). A number of functions of HDL particles may lead to direct cardio protective effects, including

promotion of cellular cholesterol efflux and direct ant oxidative and anti-inflammatory properties (Krauss RM., 2004).Other risk factors have been included in our study, such as hypertension. Hypertension is associated with higher cardiovascular risk factors. In our study, all lipid profile tests were not related to hypertension in diabetic patients except HDL, whose P value was 0.05, which meant it was related to hypertension. Other studies were designed to determine the relationship between the levels of lipid profile in diabetes mellitus type II and the level of cholesterol, which was significantly increased in diabetic patients with hypertension. (Hashim, D.A., 2018) As for smoking, which is considered to be one of the major risk factors for heart disease, our results show that there were no differences in TC, LDL, HDL, and TG according to smoking, while in other observations, it was concluded that the levels of lipid indices were higher in smokers than in non-smokers and that cardio metabolic disorders were reflected by high lipid indices (Wakabatashi, 2014). The results of our study show that there are no differences in high levels of TC, TG, LDL, and low levels of HDL in patients with DM according to duration of injury. These results agree with those of (Otamere H. *et al.*, 2011) that found duration of disease did not affect the lipid profile, while (Sultana, 2010), (Uttra *et al.*, 2011), and (Jain *et al.*, 2016) observed significant increases in TC, TG, VLDL, LDL, and HDL in patients with DM with time progressing, and the study of (Talat *et al.*, 2003) observed that duration of diabetes was associated with a higher incidence of dyslipidemia. And these observations disagree with the results of our study.

Conclusion: On the basis of the results of this research, we concluded that the level of cholesterol and LDL is higher in elderly diabetic patients compared to those who are younger, meaning that the level of TC and LDL is influenced by age, and we did not find any differences in TC and LDL levels according to gender, hypertension, duration of injury, or smoking. We also found that HDL levels are affected by gender (female 108 "72.2%" of them at risk) and place of living (male 95 "48.4%" of them at risk). It's also affected by hypertension (94 {71.3%} of them at risk), but it's not affected by other factors such as smoking, duration of injury, and place of living. As for TG level, we found, according to our study, that it's not affected by any of the study variables.

Recommendations: Based on the results of a current study, we tend to suggest the following:

1-All patients littered with DM ought to be tested often for HbA1C, lipid profile, and triglycerides.

2-The primary dietary fat goals in individuals with diabetes are to limit saturated fat and dietary cholesterol intake. Saturated fat is that the principal dietary determinant of plasma LDL cholesterol. what is more, individuals with diabetes seem to be additional sensitive to dietary cholesterol than the overall public.

3-Maintaining quality life and dominant controlling and blood pressure As a rule, patients with diabetes and hyperlipemia ought to keep their blood pressure as traditional as attainable.

5-Improve health through healthy food selections and physical activity.

6-Aims of evidence-based recommendations are to enhance diabetes care by increasing the attention of clinicians and patients with useful nutritionary therapies.

7-Programs of education and complications concerning DM ought to be provided by the native authorities and connected organizations.

8-Establish protocols and systems in hospitals for the management and follow-up of diabetic patients.

9-Authorities ought to offer smart and appropriate facilities to attenuate the value of management and treatment for diabetic patients to scale back diabetes complications.

10-For diabetic individuals in danger for hyperlipaemia, to decrease risk by encouraging physical activity and promoting food decisions that facilitate moderate weight loss or a minimum of stop weight gain.

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