*ejpmr, 2015,2(4), 71-80.*

**SJIF Impact Factor 2.026**

**EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH**

**www.ejpmr.com**

**Research Article**

**ISSN 3294-3211**

**EJPMR**

# BIOLOGICAL EFFECT OF LIPIDS FACTORS UPON DIABETES IN A CLINIC NEARBY OF M'SILA CITY- ALGERIA

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**Article Received on 07/05/2015** **Article Revised on 30/05/2015** **Article Accepted on 23/06/2015**

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## ABSTRACT

Diabetes mellitus is a common endocrine disorder chronic metabolic affecting the metabolism of carbohydrates, lipids, proteins and enzyme activities. Diabetes mellitus is a disease not without complications, including acute metabolic complications and chronic complications that are the basis of a very high mortality rate. The objective of this study is to estimate the effect of biological factors (CT, HDL, LDL and TG) upon diabetes mellitus. This study is both prospective and retrospective, was held in a nearby clinic, we have followed the development of diabetes in 30 patients (09 men and 21 women) divided into two groups 15 of type I and 15 of type II in period of 12 months where we are interested in a biological assessment (lipid balance sheet).

**KEYWORDS**: Diabetes mellitus, Type I diabetes, Type II diabetes, CT, HDL, LDL, TG.

## INTRODUCTION

In 1946, in the preamble to the constitution of the World Health Organization (WHO) a definition of health is established: "Health is a state of complete physical, mental and social, and not merely the absence of disease or infirmity. » With this definition, prevention and care are not the only means at the health service, there are also the laws, the regulations, the

political orientations of environment, and land development .The population health became a collective responsibility.[1,2, 3]

The term diabetes mellitus etymologically derived from two Greek roots "diabetes" (pass through) and "mellitus" (honey)**.**[4]

Diabetes mellitus is a common chronic metabolic endocrine disorder affecting the metabolism of carbohydrates, lipids, proteins and enzymes**.**[5]

Diabetes mellitus is a disease not without complications, acute metabolic complications and chronic complications that are the basis of a very high mortality rate **[6].** The different types of diabetes are manifested clinically by hyperglycemia all, but will differ in their acute and chronic manifestations, by severity and age of onset. They have recently been classified into four groups, two of which are the principal type I diabetes and type II.**[7]**

Diabetes mellitus (type I and II) is a disease of great frequency and progresses rapidly, it is a major public health problem**.[8]** If formerly, diabetes mellitus contributes to morbidity and mortality observed in developed countries today developing countries are not spared.**[9]**

The objective of this study is to estimate the prevalence of diabetes and the test of pancreatic and renal function and evaluation of the liver function, and the search for the presence or absence of metabolic complications associated with diabetes mellitus. The techniques we have applied are those of the interview, clinical examination, and biological balance sheets

## MATERIALS AND METHODS

From January 2, 2013 until December 31, 2013 we realized an investigation into the endocrinology unit proximity of M'sila town.

Our sample included 30 patients (09 males and 21 females), divided between 15 patients with DT1 and 15 of DT2. All these patients have systematically benefited from a measure of hypertension, weight, ws. Clinical examination was performed for all diabetics who looked completely, systematic and homogeneously for 1 month and then every 3 months, 6 and 12 months.

The study was conducted with an endocrinologist, he established an exhaustive list of patients monitored since January 2013 with diabetes mellitus and has left me free access to the sheets

consultation. We also systematically searched the existence of cardiovascular risk factors such as smoking and dyslipidemia. This study allowed an assessment of the diagnostic level of diabetes and therapeutic care of patients and their biological control. So we have two types of evaluation, one is clinical and the other biological.

**CLINICAL ASSESSMENT INCLUDED**

- Regular weighing of patients to appreciate a possible weight gain.
- Taking blood pressure, looking for one or more metabolic or degenerative complications (Heart failure (HF) , Diabetic nephropathy (DN),Diabetic retinopathy (DR), Cerebrovascular accident (CVA).

**BIOLOGICAL EVALUATION**

Evaluation of lipid metabolism (TC, HDL, LDL, TG) and glucose (Fasting glucose (FG), glycated hemoglobin(HbA1c).

The variables identified during our survey are:

- The sex, height, weight, ws.
- The therapeutic management
- Cardiovascular risk factors associated with diabetes (hypertension, smoking, lipid profile).
- The parameters of glucose monitoring (blood glucose, HbA1c).

From the weight and size, we calculated BMI. We have recovered the quantitative data as the mean and standard error (M ± SE) for paraclinical and biological parameters (WS, BMI, HTA, HbA1C, et CT, HDL, LDL, TG) of each patient during his early consultation at the endocrinology unit within the polyclinique.

These quantitative data was entered in Microsoft Office Word 2007 software and analyzed on software Graph Pad PRISM (Version 5.0).then they were recovered on Microsoft Office Excel 2007 pages through consultation form (Appendix 4) filled by doctor dealing during the consultation but also through the results communicated either by the patients themselves or by nursing assistant surgeon.

The comparison between groups was performed by the Student t test. The value found by calculating t can affirm that people are different with a risk of error p such that:

-p> = 0.05 the difference was not significant;

-0.05> P> 0.01 = the difference is significant;

-0.05> P> 0.001 = the difference is highly significant;

- P <0.001 = the difference is highly significant.

## RESULTS

### 1- Evaluation of lipid metabolism

### 1-1- Cholesterol (CT)

**Table 1: The average rate of the CT of diabetics and normal subjects after 1.3, 6 and 12 months**

| | 1st month | 3rd month | 6th month | 12th month |
|---|---|---|---|---|
| **Control** | 1,86±0,01 | 1,84±0,01 | 1,83±0,01 | 1,82±0,01 |
| **Type I diabetics** | 2,04±0,02 | 1,99±0,03*** | 1,94±0,02*** | 1,92±0,02*** |
| **Type II diabetics** | 2,03±0,02 | 2,01±0,02*** | 2,00±0,02*** | 1,99±0,02*** |

Each value is the mean ± Standard Deviation. (Student test: nsp>0,05, *** p <0.001), groups compared to the Control (non-diabetic), CT expressed in (g / l).

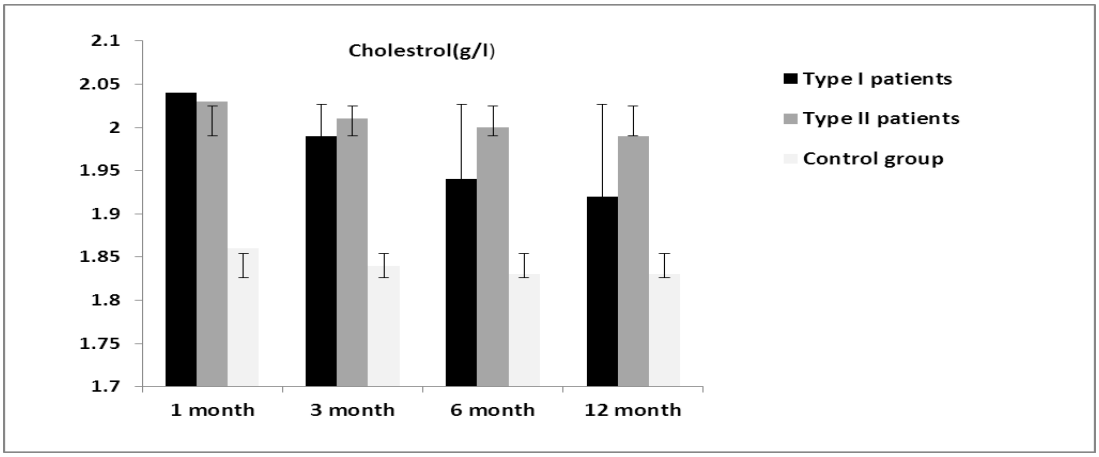


**Figure 1: Average rate of Cholesterol in diabetic and non-diabetic patients.**

At the beginning of the study (1st month) the average rate of CT of diabetic patients remains within the limits of normal. It is noted increasing decline in cholesterolemia, a very highly significant statistically from the 3rd month in groups of diabetic type I and II.

### 1-2- HDL

**Table 2: The average rate of the HDL of diabetics and normal subjects after 1, 3, 6 and 12 months**

| | 1st month | 3rd month | 6th month | 12th month |
|---|---|---|---|---|
| **Control** | 0,51 ± 0,01 | 0,52 ± 0,01 | 0,54 ± 0,01 | 0,57 ± 0,01 |
| **Type I diabetics** | 0,42 ±0,01 | 0,42 ± 0,01 | 0,46 ±0,01* | 0,49±0,01* |
| **Type II diabetics** | 0,42 ± 0.01 | 0,43 ±0,01 | 0,45 ±0,01* | 0,49±0,01* |

Each value corresponds to the mean ± Standard Deviation (Student test: ns p>0, 05,* 0,05 > p > 0,01), groups compared with the Control (non-diabetic), HDL expressed in (g / l).

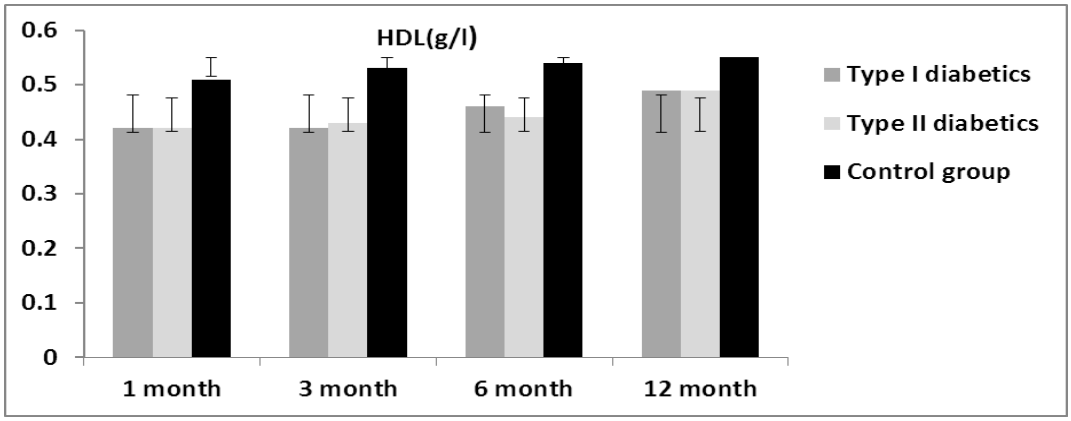


**Figure 2: Average rates of HDL of diabetics and non-diabetic patients**

At the beginning of the study (1st month) average levels of HDL of diabetic patients are relatively low 0.42 ± 0.01 g / l compared to the non-diabetic subjects 0.51 ± 0.01 g / l.

Analysis of the results of the comparison of the average HDL of diabetic patients in group Control at different times, showed a non-significant difference until the 3rd month in which it becomes significant at the 6th and the 12$^{th}$ months.

**1-3- LDL**

**Table 3: The mean LDL levels in diabetic and normal subjects after 1, 3, 6 and 12 months**

| | 1$^{st}$ month | 3$^{rd}$ month | 6$^{th}$ month | 12$^{th}$ month |
|---|---|---|---|---|
| **Control** | 1, 08 ±0,02 | 1,06 ±0,02 | 1,05 ±0,02 | 1,03 ±0,02 |
| **Type I diabetics** | 1,32 ±0,03 | 1,27 ±0,03* | 1,22 ±0,02* | 1,19 ±0,02* |
| **Type II diabetics** | 1,29±0,02 | 1,27 ±0,02* | 1,25 ± 0,02* | 1,23 ± 0,02* |

Each value corresponds Mean ± Standard Deviation (Test de Student: nsp>0,05,*0,05 > p > 0,01), groups compared with the light (non-diabetic), LDL expressed in (g / l), calculated from the formula: LDL = TC (TG / 5 + HDL).

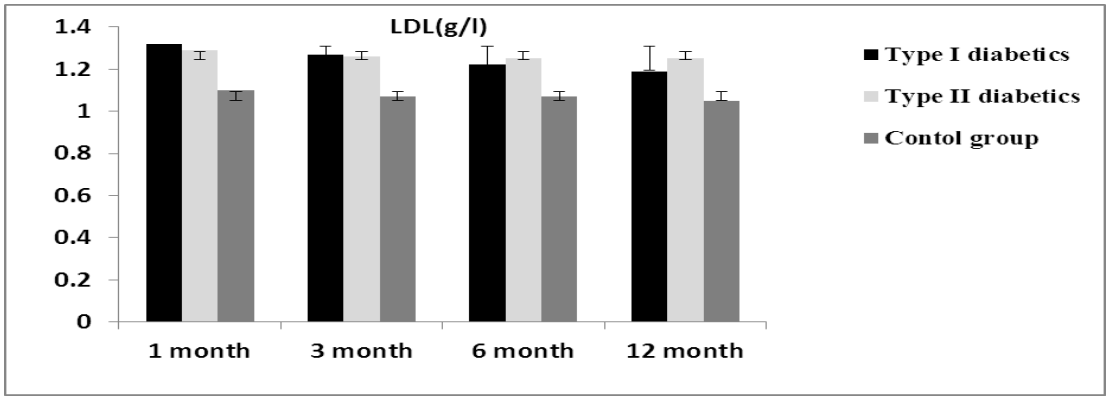


**Figure 3: The means LDL levels in diabetic and non-diabetic**

At first the mean LDL of diabetics and non-diabetic patients it is acceptable. It evolves downward at various times reaching statistical significance from the 3rd month for the groups of diabetics type I and II. The mean of LDL in diabetic patients, are higher than those of non-diabetic patients, this at different times.

**1-4-TG**

**Table 4: The average rate of the TG of diabetics and normal subjects after 1, 3, 6 and 12 months**

| | 1st month | 3rd month | 6th month | 12th month |
|---|---|---|---|---|
| **Control** | 1,27 ±0,04 | 1,26 ±0,04 | 1,24 ±0,03 | 1,22±0,04 |
| **Type I diabetics** | 1,39 ±0,06 | 1,39±0,05* | 1,35±0,06*** | 1,33 ±0,06*** |
| **Type II diabetics** | 1,49±0,02 | 1,48±0,02* | 1,44±0,02*** | 1,43±0,02*** |

Each value corresponds to the mean ± Standard Deviation (Student test: ns p>0,05* 0.05> p> 0.01, ***p <0.001), groups compared to the Control (non-diabetic), TG expressed in (g/l).

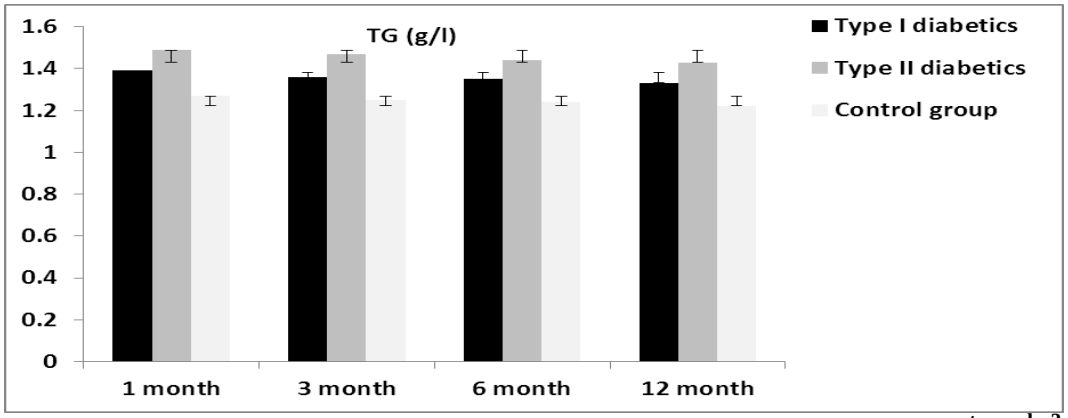


**Figure 4: Evolution of the average rates of TG in the three groups at the 1st, 2nd, 3rd and 12th month**

The average rate of TG at the 1st month is within the normal range in all three groups. TG rate down moderately from the 3rd month in which he reached statistical significance .It becomes very highly significant from the 6th month in both groups of diabetics (type I and II).

## DISCUSSION

To the beginning (1st month) in the three groups, the cholesterol is satisfactory. It is useful to remember that were excluded those patients who the cholesterol level was greater than 2.20g/l. Although cholesterolemia of diabetics is within normal values, it is slightly higher than that of non-diabetics. If we compare our results with those of.[10, 12, 19, 22] They were not observed in patients with high cholesterol, so their results are consistent with our results. Cholesterolemia of diabetics patients significantly decreases in the 3rd months until the end of the monitoring period.

At the beginning of the study, the average of HDL levels in diabetics patients is lower than that of patients in the non-diabetic group, which is in agreement with the data.[11,13,15,19] This average increases significantly at 12 months more clearly in non-diabetics.

These results are also found by the authors raised in studies comparing diabetics and non-diabetics. We found at the end of the monitoring period an increase in the HDL in non diabetics, observed from the third month while in diabetics this increase did not reached the significance level only after 12 months.

At the beginning of our study, the level of LDL in the group of type 1 and 2 diabetes is significantly higher than in the group without diabetes at the end of the 12th month follow-up, LDL levels decreased in all three groups. Which joins the data.[11,13,15,19] The LDL is positively correlated with cardiovascular risk. At the beginning of our study, the rate of triglycerides in the group with diabetes (type I and II is substantially higher than that of non-diabetic subjects, results largely confirmed by the data [16, 18, 19, 20]. We however noted that triglyceridaemia in diabetic patients is at the upper limit of normal; the absence of hypertriglyceridemia is explained by the exclusion criteria. During the entire period of study, triglyceride levels decreased modestly in the three groups although more marked in diabetic patients. Our results confirm those of.[14,17,18,21]

Hypertriglyceridemia is an independent risk factor in diabetes, characterized, firstly by the state of insulin resistance found in diabetes which is accompanied at the hepatocyte by an influx of the substrates needed for their disponibilitédes synthesis, and, secondly, to the decrease in the activity of the TPA with a consequent increase of VLDL and hypertriglyceridemia.

## CONCLUSION

Diabetes mellitus in humans, is a disease whose incidence risk of increasing importantly in the coming years, particularly in obese individuals. It is urgent to make a quantitative assessment of diabetic pandemic. In medical practice, this assessment is based on the identification of risk. This is determined not only by biological markers but by a whole series of clinical parameters known for a long time, especially the interrogation in search of family history, clinical examination and arterial paraclinical examinations; there is currently a very important development of radiological examinations, ultrasound or IRM, to assess arterial status well before the dawn a complication. For any patient with diabetes mellitus, looking for an smoking, blood pressure measurement and waist measurement are necessary elements but often forgotten. Every year, it seems necessary to measure micro albuminuria, total cholesterol, HDL cholesterol and the triglycerides, transaminases and urea and creatinine to detect any complications associated with diabetes.

A highlighted new biochemical and genetic markers is useful for the practitioner who is in front of diabetes, must to determine the risk of an Acute or chronic complication to better understand the pathophysiology of diabetic disease to find the most therapeutic appropriate. Diabetes, by its prevalence in Algeria, must be one of the public health priorities for our country. The primary prevention and early diagnosis through screening in subjects at risk and improving care conditions are essential. Such perspectives merit the continued reflection, better coordination of efforts, and thus an efficient partnership between the public authorities, health authorities, learned societies, parallel organization - such as Social Security (CNAS) - without forgetting the role of civil society through associations with diabetic's patients.

Certainly the prospects for the importance of diabetes in xxi century are quite dark. Under the pressure of globalization, lifestyles are changing throughout the world, which adds to the demographic transition to produce a dramatic increase in the incidence of the disease.

The term epidemic is not usurped in many ethnic and geographic communities where the disease is spreading at an amazing speed, as in the Pacific islands or in certain American Indian communities. The social consequences financial and human of this "epidemic" will depend on the adaptation of resources and the organization of health systems to prevent complications of the disease.

We have already seen the causes of the epidemic. The means (theoretical) prevention cannot just targeting individuals, to encourage them to "lose weight", "eat better" or "get moving", although these initiatives remain essential. The major challenge of prevention must be collectively, Actors , doctors, epidemiologists, administrators, politicians, industry groups, health workers, states, international donors, must put in position for total management of the disease, they must also be aware of the extent of the problem and finally take action against this scourge become a serious public health issue.

This study will be really useful when it is be followed by others, so compared to subsequent data to assess progress through this quest for quality. This would include more patients to increase the sensitivity of our results and evaluate the impact of time on these. It is therefore essential to involve the practice of evaluation in a dynamic of change.

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