

## **THE ALTERATION OF LIPID METABOLISM IN PREDIABETES**

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**ABSTRACT:**

*DYSLIPIDEMIA IS ONE OF THE KEY FACTORS OF INITIATION, PROGRESSION AND COMPLICATION OF THE ATHEROSCLEROSIS PROCESS, BEING AN INDEPENDENT RISK FACTOR ASSOCIATED WITH INCREASED CARDIOVASCULAR MORBIDITY AND MORTALITY*

*BEFORE REACHING DIABETES, IT WAS FOUND THAT A MAJORITY OF PATIENTS HAD A PREDIABETIC PHASE. STATISTICS SHOW THAT ABOUT 30% OF ROMANIANS ARE IN THE PREDIABETIC PHASE, WITH OR WITHOUT RISK, THAT IN THE COMING YEARS THEY WILL EVOLVE TO DIABETES ITSELF.*

*THE PURPOSE OF THE STUDY WAS TO DETERMINE THE PREVALENCE OF PREDIABETES, DYSLIPIDEMIA AND TO ESTABLISH CORRELATIONS BETWEEN THE PRESENCE OF DYSLIPIDEMIC RISK FACTORS AND THE PRESENCE OF PREDIABETES.*

*THE STUDY GROUP CONSISTED OF 289 PATIENTS, WITH 141 MEN AND 148 WOMEN PARTICIPATING IN THIS DESCRIPTIVE OBSERVATIONAL STUDY.*

*ALTERATIONS IN LIPID METABOLISM ARE COMMON IN PREDIABETIC PATIENTS. DYSLIPIDEMIA WAS FOUND IN APPROXIMATELY EQUAL PROPORTIONS IN BOTH WOMEN AND MEN.*

*DYSLIPIDEMIA AND PREDIABETES ARE OFTEN PRESENT AT THE SAME TIME IN A PERSON.*

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**KEY WORDS:** DYSLIPIDEMIA, PREDIABETES, DIABETES MELLITUS

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## INTRODUCTION

Dyslipidemia is one of the key factors of initiation, progression and complication of the atherosclerosis process, being an independent risk factor associated with increased cardiovascular morbidity and mortality<sup>5</sup>. Before reaching diabetes, it was found that a majority of patients had a prediabetic phase.

Statistics show that about 30% of Romanians are in the prediabetic phase, with or without risk, that in the coming years they will evolve to diabetes itself. In children, the early presence of prediabetes may increase the risk of developing diabetes mellitus (DM) in adolescence. However, it is accepted that, in children and adolescents, prediabetes can readily return to normal blood sugar.

Statistics show that adolescents aged 12-15 years have a significantly higher prediabetes compared to other ages; in boys, prediabetes is 2.4 times more frequent than in girls. In adults, prediabetes can be aggravating health consequences and associated with retinopathy, neuropathy, high blood pressure, high total cholesterol (TC) and triglycerides (TG), polycystic ovarian syndrome and some cardiovascular diseases<sup>6</sup>.

The purpose of the study was to determine the prevalence of prediabetes, dyslipidemia and to establish correlations between the presence of dyslipidemic risk factors and the presence of prediabetes.

## MATERIAL AND METHODS

The population examined between 2016 and 2017 was from urban area in Dolj county. Our study group was composed by 289 patients. In this descriptive observational study responded 141 men and 148 women.

The mobilization was randomized from the patients who presented themselves to the outpatient clinic without taking into account the family doctor on whose list the patient was enrolled.

We analyzed the following data: demographic data (age, sex, background), anthropometric data (weight, height, body mass index), physiological personal history, pathological personal history and heredocolateral history of diabetes, hypertension, dyslipidemia, myocardial infarction, obesity, autoimmune diseases, etc.).

Venous blood was collected from which the following tests were performed: serum creatinine, total cholesterol, HDL-cholesterol, LDL-cholesterol calculated with Friedwald formula, triglycerides, uric acid, serum hemoglobin.

Preliminary dates on measured clinical parameters were entered into the computer in the database tables in the Microsoft Excel module in the Microsoft Office 2010 Professional and Office 365.

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<sup>5</sup> International Diabetes Federation – IDF Diabetes Atlas; 6th edn. Brussels, Belgium: International Diabetes Federation, 2013. <http://www.idf.org/diabetesatlas>

<sup>6</sup> American Diabetes Association (ADA); *Clinical practice recommendations – Diagnosis and classification of diabetes mellitus*, Diabetes Care. 2014; 37 (Suppl 1), S81-S90

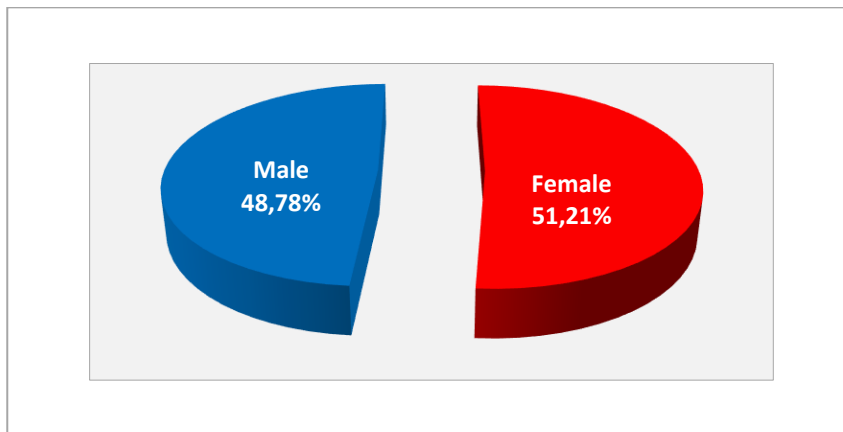
**RESULTS**

The study group consisted of 289 patients, with 141 men and 148 women participating in this descriptive observational study.

The first clinically evaluated parameter was the distribution of patients studied by gender. As can be seen from the data centralized in Table 1, the Male/Female ratio was approximately 1:1.

**Table 1: Distribution of cases by gender**

Gender	No. of cases	%	Male/Female Ratio
<b>Male</b>	141	48,78	<b>0,95</b>
<b>Female</b>	148	51,21	
<b>TOTAL</b>	<b>288</b>	<b>100</b>	



**Figure 1. Distribution by gender of the studied lot**

The patients included in the study group were generally adults and especially the elderly. The dispersion age range was between 40 -87 years (Table 2).

**Table 2. Statistical Age Parameters**

Statistical parameter	Value
<i>The youngest age</i>	40 years
<i>The oldest age</i>	87 years
<i>Average age</i>	<b>65 years</b>
<i>Std. Dev.</i>	10 (55 – 75 years)
<i>Std. Dev. = Standard deviation</i>	

The age group that included the majority of patients (95 patients, almost 33% of cases was between 60 - 69 years).

Using the stratification of patients by age, we found that more than half of them (80%) were over 60 years, making the average age of the patients 65 years and the agglomeration interval in most cases, between 60 - 75 years (Figure 2).

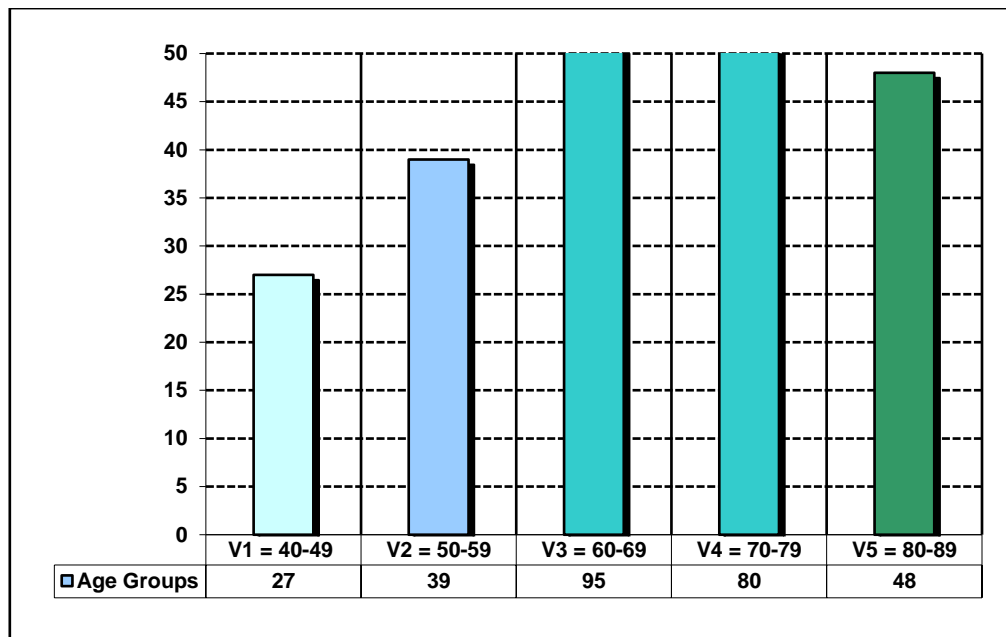


Figure 2. Distribution of patients by age group

The prevalence of dyslipidaemia was 55.70% (Figure 3), insignificantly higher in women than in men 54.72% vs 56.73%) ( $p = 0.228$ ). According to the results of the PREDATORR study, in Romania, the prevalence of dyslipidemia is much higher, 81%.

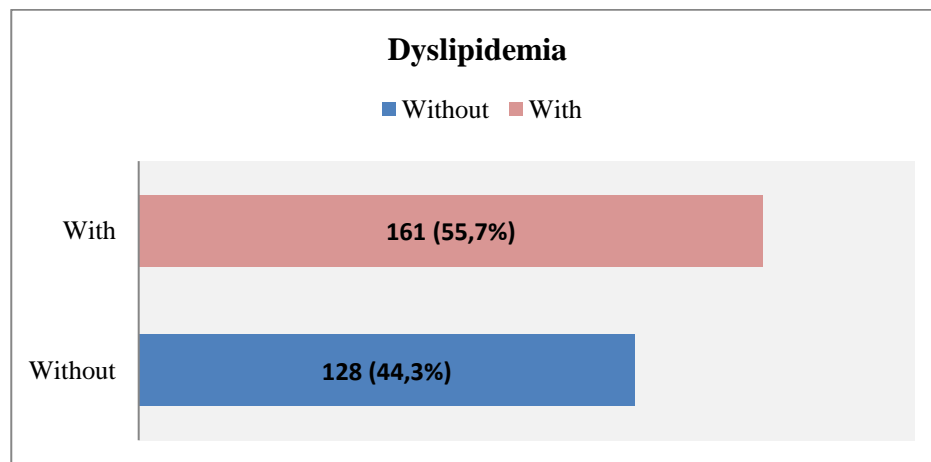
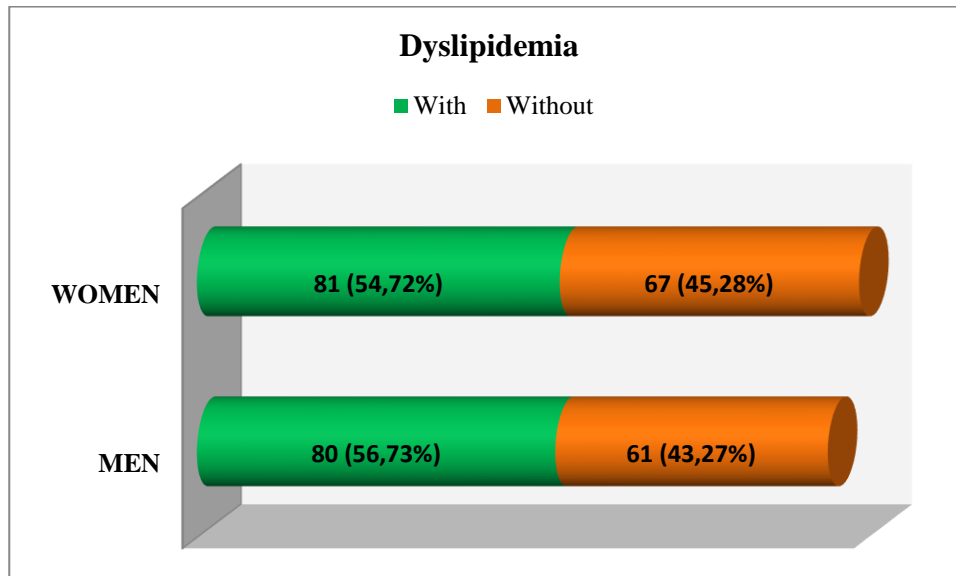


Figure 3. Prevalence of dyslipidemia in the studied group



**Figure 4. Prevalence of dyslipidemia by gender**

In Romania, dyslipidemia is around 30%, and in 2008 according to the study SEPHAR (Study for the Prevalence of Hypertension and Cardiovascular Risk in Romania)<sup>7</sup> there was a prevalence of hypercholesterolemia of 40% in the adult population.

In 2013, according to the PREDATOR study, the prevalence of dyslipidemia involving two or more fatty parameters with pathological values was 60.7%.

Prediabetes had a prevalence of 11.76%, significantly higher among women (19.59% vs 14.7%) ( $p = 0.002$ ).

<sup>7</sup> Cintează M, Pana B, Cochino E, et al; *Prevalence and control of cardiovascular risk factors in Romania: Cardiozone national study. Mædica – A Journal of Clinical Medicine*, 2007, 2(4): 277-288

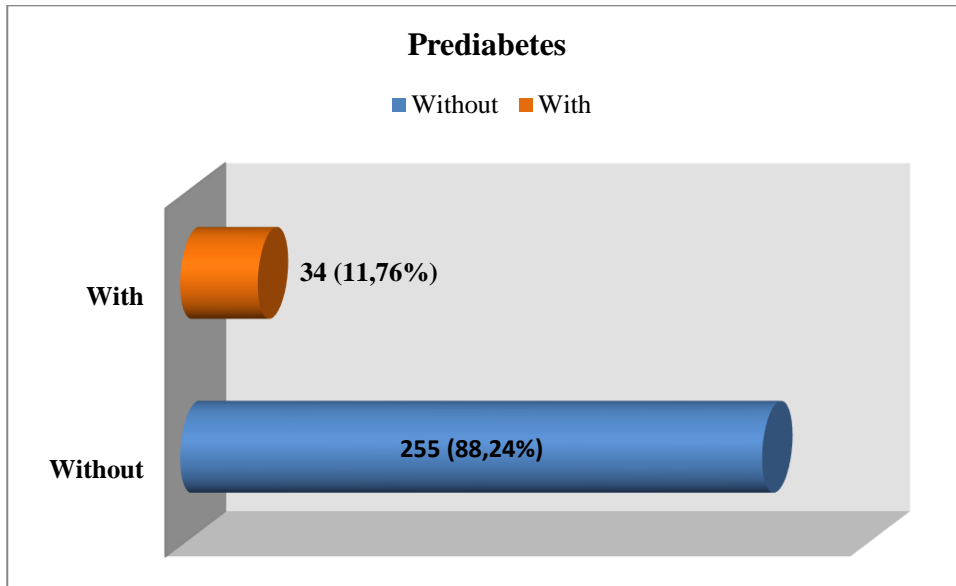


Figure 5. Prevalence of prediabetes in the studied group

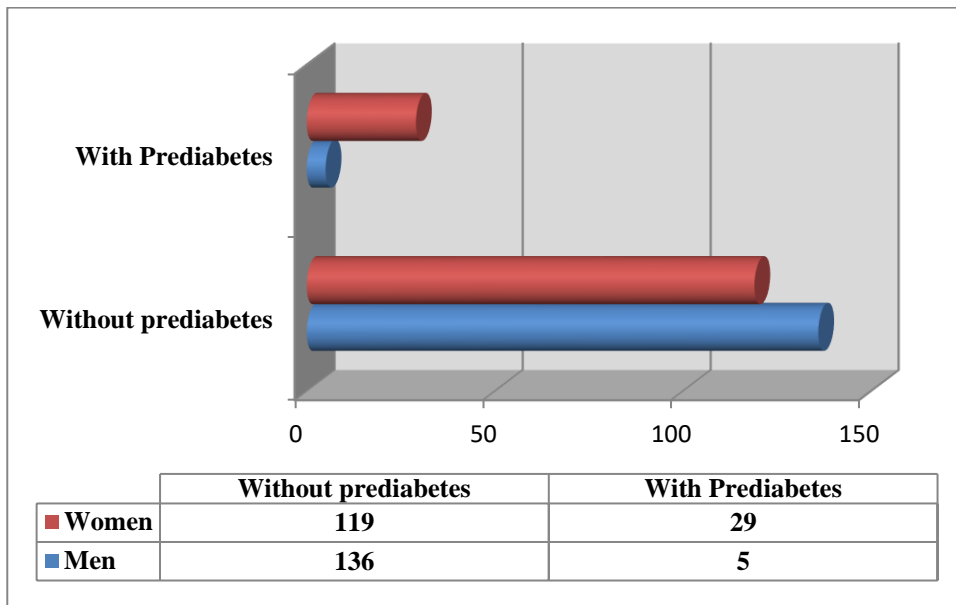
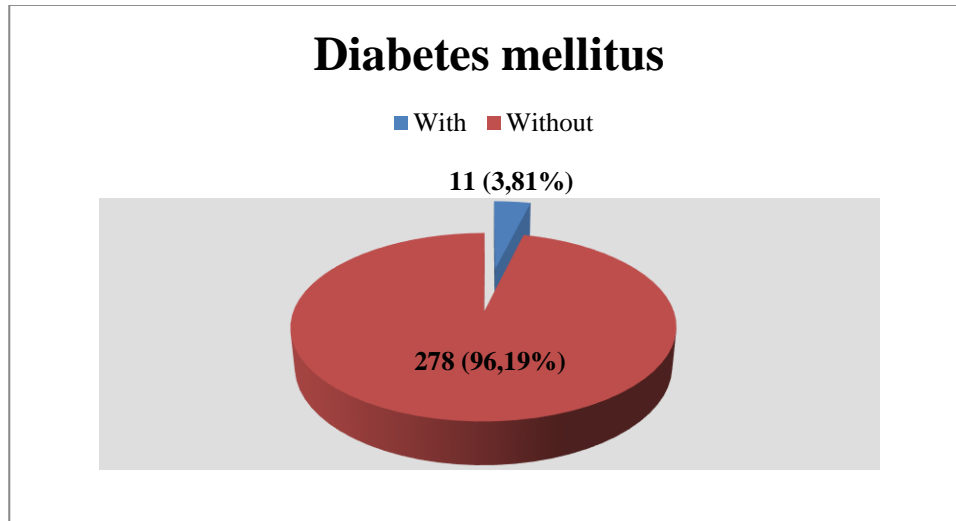


Figure 6. Prevalence of prediabetes by gender

Diabetes was recorded in 3.8% of subjects, significantly higher in males (4.96% vs. 2.70%) ( $p = 0.047$ ).



**Figure 7. Prevalence of diabetes in the studied group**

In 2011, the National Diabetes Register shows a national prevalence of 5.3%, 10.2% for males and 7.4% for women, according to the PREDATORR study.

By comparing the data from the PREDATORR study<sup>9</sup>, completed in 2014, and the results obtained in our study, we have the following results: national prediabetes is found to be 18.4%, in our study 11.76%.

As for diabetes, the national level is 11.67% and in our study it is 3.8%. By detailing gender, prediabetes in women is 19.5% in the PREDATORR study, 19.59% in our study, and 16.9% in males at national level, in our study 14.7%; diabetes is found in the PREDATORR study of female at 7.4%, in our study is 2.7% and in male is 10.2% versus 4.96% in our study.

## CONCLUSIONS

Alterations in lipid metabolism are common in prediabetic patients. Dyslipidemia was found in approximately equal proportions in both women and men. Dyslipidemia and prediabetes are often present at the same time in a person.

**COMPLIANCE WITH ETHICS REQUIREMENTS.** The authors declare no conflict of interest regarding this article.

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