

## FISH DIET INFLUENCE ON BLOOD BIOCHEMICAL MARKERS RELATED TO LIPID METABOLISM IN DANUBE DELTA POPULATION

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**Abstract.** It is known that fish meat contains a high quality protein that helps keeping low values of total lipids levels. Our main objective was to determine blood biochemical parameters which emphasize the correlations between a fish based diet and health conditions. We analyzed the blood of 176 patients, residents of Danube Delta, diagnosed clinically healthy. Tested blood biochemical parameters belong or relate to the lipid metabolism (e.g. total serum lipid levels, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, glucose, total serum proteins). Blood was processed in the Routine Med Sulina laboratory. Differentiation criteria were based on geographical region affiliation, sex, age and diet. Our results showed that patients with a diet based on fish are healthier than those with a diet in which fish meat is scarce, the former having blood biochemical parameters values closer to normal. The values of total cholesterol, HDL cholesterol ("good" cholesterol), LDL cholesterol ("bad" cholesterol), triglycerides are positive correlated with total serum lipids values. The overall results were within normal limits. The presence of fish meat and fish secondary products in people's diet is beneficial in preventing lipid metabolism disorders.

**Key words:** lipids metabolism, fish, Danube Delta, health

### Introduction

Fish diet is rich in high quality protein, is an important source of omega 3, vitamins and minerals, it helps to lower blood pressure and decrease levels of triglycerides, total cholesterol, HDL („good" cholesterol) and LDL cholesterol value, serum total lipids.

Dominant fish species in the Danube Delta that people eat are: rapacious, perch, crucian carp, bream, rudd, perch, catfish, pike, anchovy, herring, turbot, sturgeon etc.

Based on literature data, normal values of biochemical parameters vary by sex, age, diet and geographical region and we want to determine if the fish diet

really help us maintain normal levels of lipids and other analytes at the biochemical level (Wallach, 2001).

In this report we will present lipids metabolism, biochemical statistical analysis of patients who are consumers of fish in the Danube Delta, Sulina.

Lipids in the human body are dual: exogenous origin from food diet and endogenous origin (Roşoiu, 2005).

The liver is the most important seat of degradation and synthesis of lipids metabolism but the main role of liver in glucose metabolism (Roşoiu, 2008).

The nutrition and endocrine diseases or the screening of healthy people are made trough sets of laboratory analyses such as: glucose, triglycerides, lipoproteins, ionogram, total calcium, cholesterol, transaminases, proteins, phosphorus, magnesium, hemoglobin, iron (Roşoiu, 2010).

The lipids are stored in adipous cells with 50-70000 kcal energy and are used between 20-40 days (Ghid pentru alimentație sănătoasă, 2006).

### Material and Methods

A total of 176 patients, residents of Danube Delta, diagnosed clinically healthy were included. Patients are involving at least once a week fish diet. Blood was collected and analyzed at medical analysis laboratory Routine Med Sulina during September 2014 - September 2015.

For serum biochemistry were used following measuring instruments: automatic biochemistry unit SAPPHERE 350, centrifuges Rotofix 32 A and reagents Audit Diagnostics.

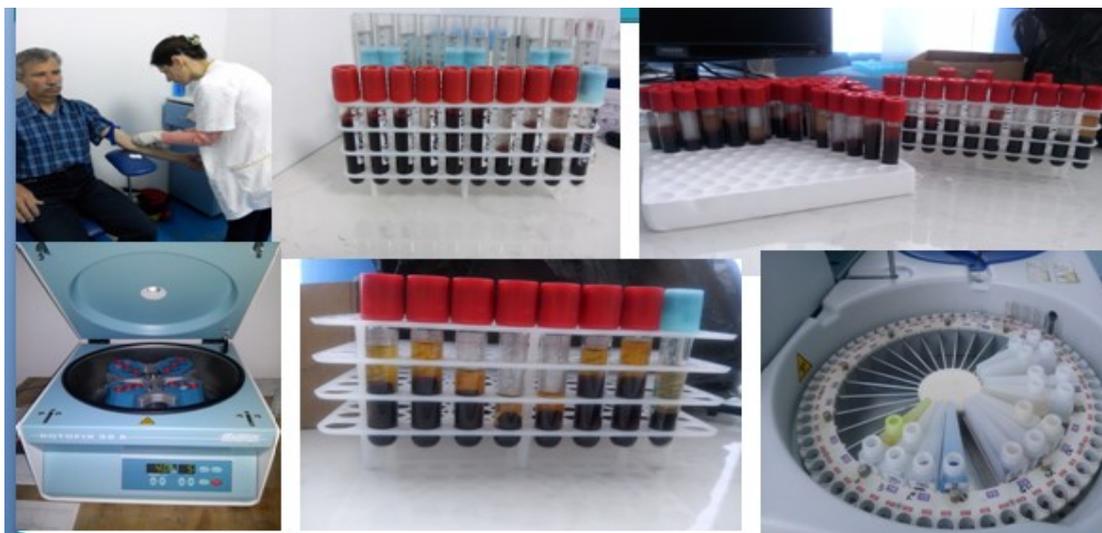


Figure 1: harvesting , centrifugation , preparing,analyzing blood samples

Biochemical results have been introduced in Microsoft Office Excel software, 86 women and 90 men; both women and men were grouped by age range: 20-40 years, 40-60 years, 60 years; we took into account the values of total lipids, total cholesterol, HDL - cholesterol, LDL - cholesterol, triglycerides, glucose, total protein; data were processed in Excel and Sigma Plot program.

**Table 1:** Patients grouped by age range

Age interval	Men	Women	Total
20-40 years	19	25	44
40-60 years	26	31	57
>60 years	45	30	75

### Results and Discussion

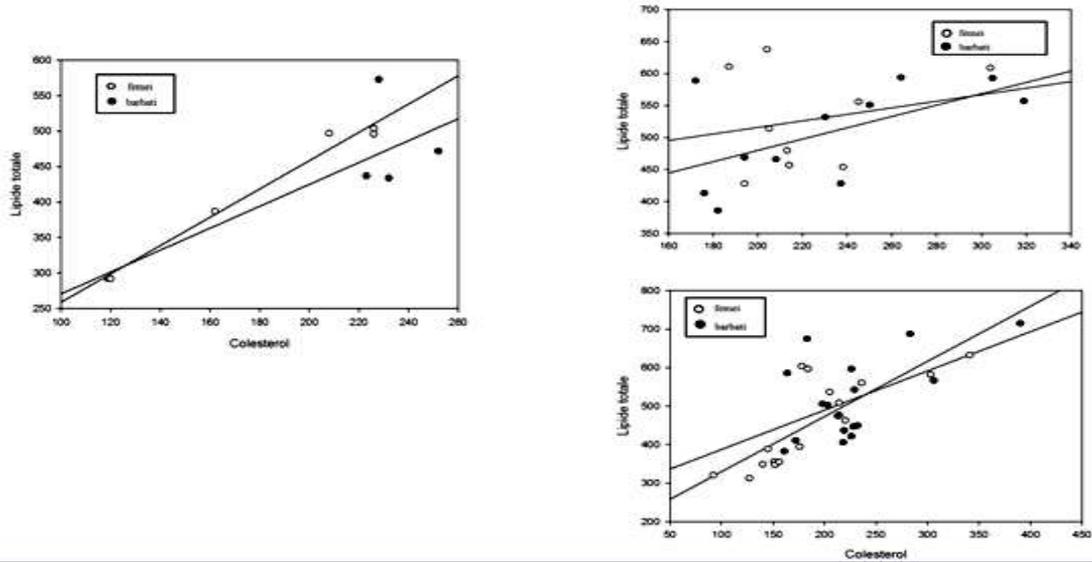
Based on the testimony of patients that they included in the diet fish and fish products at least once a week; based on their results and data from the literature, results in the following test values of patients in the Danube Delta, Sulina are:

- Total cholesterol values are relatively higher at women than men, slightly exceeding the value of 200 mg/dl both women and men:
  - The total lipid values are within normal limits imposed by laboratory 400-800mg/dl
  - HDL -cholesterol levels are normal 35-100mg/dl
  - LDL- cholesterol levels are within the normal range of 50-180 mg/dl
  - The total protein values are within the limits of 6,4-8.3 g/dl
  - Triglyceride levels are normal , only 10 patients having values slightly above 200 mg/dl
    - Glucose levels are higher at men than at women

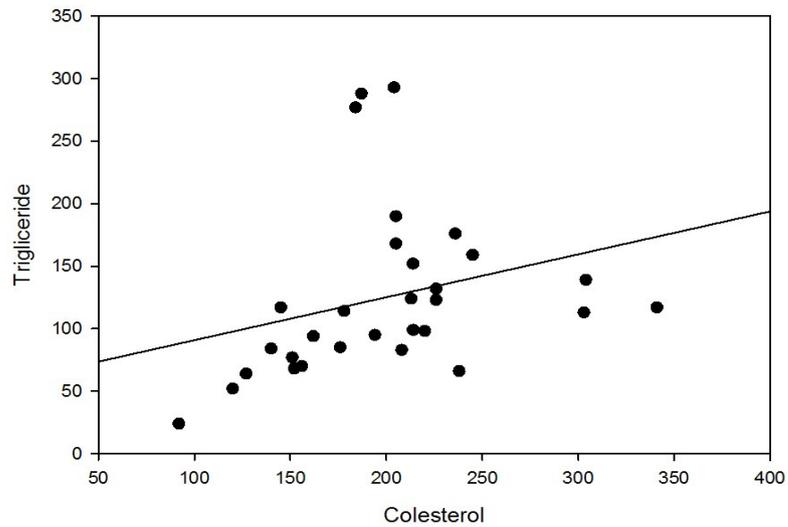
Among the biochemical markers analyzed:

- There is a positive correlation between total cholesterol and lipid levels in both women and men figure (2,3,4);
- There is a positive correlation between cholesterol and triglyceride levels (figure 50);
- There is a positive correlation between HDL and the values Ldl both women and men (figure 6);
- There is a negative correlation between cholesterol and glucose, both women and men (figure 7).

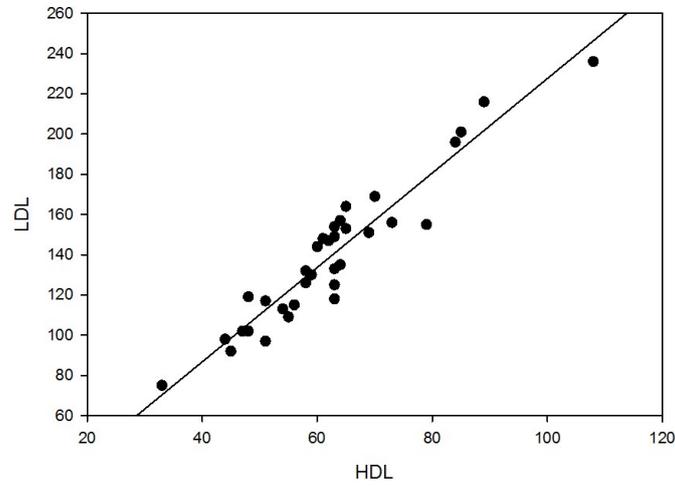
Fish Diet Influence On Blood Biochemical Markers Related To Lipid Metabolism  
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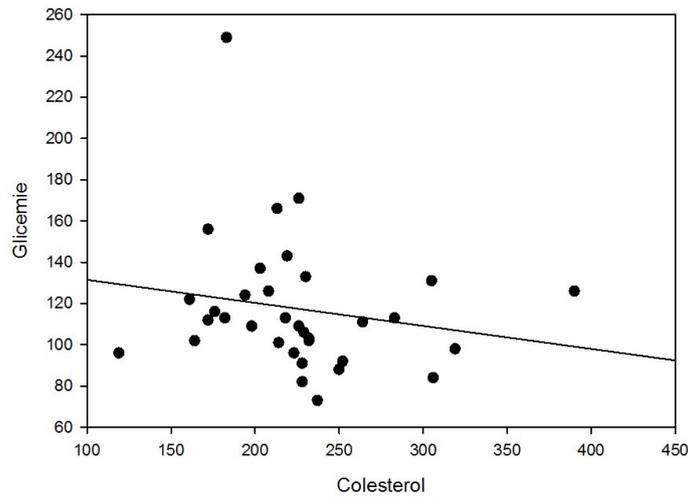
**Figure 2,3,4** . A positive correlation between total cholesterol and total lipids at women and men aged 20-40 years top left , between 40-60 years top right ,bottom right 60 years



**Figure 5.** There is a positive correlation between cholesterol and triglyceride levels at men



**Figure 6.** There is a strong positive correlation between HDL and LDL at women



**Figure 7.** There is a negative correlation between cholesterol and glucose at women

### Conclusions

1. From this statistical analysis, fish and fish products really helps us maintain the normal level of triglyceride, total cholesterol, HDL and LDL cholesterol, total lipids, if, we include in the diet these products more frequently than normal. The consequences of inadequate lipids: increased risk of atherosclerotic cardiovascular disease; favoring excess weight / obesity.

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2. Sulina's patients studied indicate that they are very healthy due fish diet and their results are in limits of 3 medical laboratories of our country and 3 different region.

**Table 2:** Limits of the normal studied biochemical markers at 3 medical laboratories in Sulina, Bucharest and Braila

Name	RoutineMed Sulina	Synevo Bucuresti	Medcenter Braila
Total lipids	400-800 mg/dl	400-900mg/dl	500-900 mg/dl
Total cholesterol	>200 mg/dl	200-240mg/dl	>200 mg/dl
HDL-cholesterol	35-100 mg/dl	40-60mg/dl	40.0-60.0 mg/dL
LDL-cholesterol	50-180 mg/dl	<100 mg/dl	<100 mg/dL
Triglyceride	>200 mg/ dl	>150mg/dl	<150 mg/dL
Total proteins	6,4-8,3 g/dl	6,6-8,7g/dl	6.6-8.3 g/dL
Glucose	70-115 g/dl	60-99 mg/dl	74-106 mg/dL.

3. Because of the geographical area, people that live in Sulina, Danube Delta, are isolated, are constrained to eat more fish than other type of meat, Sulina being surrounded by water.

4. People are more active than those from land, they are moving only with boats and they maximizes the energy provided by total lipids the final result is a good health.



**Figure 8:** Tulcea's map



**Figure 9:** Sulina's map

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