Assessment of the Efficacy of Cardio-Metabolic Pathology Treatment and of the Medical Recommendations Adherence in a Military Population

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Abstract: *Aim:* To assess the efficacy of cardio-metabolic diseases treatment, the compliance to treatment, and to evaluate the obtained results compared to the previous published ones. *Methods:* A screening was conducted in the military population, including male and female with age at least 20 years, with of without: diabetes, impaired fasting glucose, obesity, hypertension, dyslipidemia. The anthropometrics parameters, body fat percent, and blood pressure were evaluated. The following data were collected: glycemia, lipid profile, renal and hepatic function, level of physical activity, smoking status, personal associated diseases. The compliance to treatment was noted in percentages declared by patient in a survey. The IRIS 2 score of insulin resistance and cardiovascular risk using EURO'98 charts, Framingham Score and SCORE system were calculated. The metabolic syndrome diagnosis was performed using the International Diabetes Federation 2005 criteria. *Results:* 338 persons were investigated, the majority were males, 192 with normal glycemia. The objectives of the treatment were reached in < 50% cases for each pathological aspects. A negative correlation was found between anthropometric parameters and the compliance to diet and physical exercise, and positive correlation between bodyweight, high cardiovascular risk and medication. The study showed the same pattern of the treatment as in other studies, with a low compliance to medical nutrition therapy and with low percentage in witch the objective for cardio-metabolic pathology are reached. *Conclusions:* An active and sustained attitude is necessary to promote a healthy lifestyle in the respect of improvement of treatment and prevention of metabolic and cardiovascular morbidity and mortality.

Keywords: Compliance; Medical recommendations; Therapeutic objectives.

Introduction

There is a great interest in the study of cardiometabolic pathology in the last decades due to the risk for cardiovascular mortality. The treatment is multifactorial and need to be structured, sustained and intensive and must be addressed to all of metabolic syndrome and other cardiovascular risk factors in order to improve the prognosis of these diseases [1-3].

EUROASPIRE [4] showed in a 3 consecutive studies a lot of aspects regarding the treatment for cardiovascular diseases, but included also the aspects concerning metabolic disease and the treatment for all cardiovascular risk factors. The strategies for the treatment of cardio-metabolic metabolic syndrome is addressed to obesity, and to the other cardiovascular risk factors such as dyslipidemia, arterial hypertension, hyperglycemia and include lifestyle optimization, psychological treatment, and a lot of drugs [1-3,5-6]. EUROASPIRE study showed that there is a preference for the drugs in detriment of improving lifestyle, a high prevalence of obesity, (38%) and in spite of a variety of available drugs for the main negative cardio-metabolic aspects and in spite of an increase

prescribing of these drugs, the objectives for the glycemia, plasma lipids and arterial blood pressure were reached in a low percentage.[4]

EPIDIAB is a Romanian study concerning epidemics in diabetes, addressed to newly diagnosed diabetes [7]. These studies explained that the low efficacy of treatment could be due not only to the suboptimal prescribing of the drugs, but also due to the low compliance of patient to drug treatment and to the favorable changes in the lifestyle.

The aim of the research was to assess the percentages of reaching the treatment objectives, the compliance to treatment, to compare our results with the results of other studies.

Material and Method

An epidemiological transversal study was conducted as a screening in the military population. There were included into the study 338 person (male and female with age at least 20 years). The study group included people with normal glycemia, impaired fasting glucose, newly diagnosed diabetes and diabetes with more than one year duration, people with obesity, arterial hypertension, dyslipidemia. The anthropometrics parameters, body fat percent (with OMRON BF 312) and blood pressure were measured. Blood was collected for glycemia and lipid profile, renal and hepatic function. The level of physical activity, smoking status, the personal associated diseases were noted. This study is a part of another study about correlation between lifestyle and cardiometabolic pathology, which used a detailed questionnaire including 25 items, but of interest for this study were only that concerning to questions about the type/name of drug treatment for the cardiometabolic diseases and about the adherence (in percentages from 0 to 100%) to medical recommendation concerning diet, physical exercise, schedule to medical visits and medication, filled in questionnaire by the subjects. The subjects were asked what they consider about the etiology of diabetes and other cardio-metabolic diseases (inheritance/stress /unhealthy lifestyle). The presence of hypertensive waist (waist ≥ 94 cm in male and ≥ 80 cm in female and blood pressure ≥ 130/85 mmHg or treatment) was noted.

The IRIS 2 score of insulin resistance [8] including body mass index, glycemia, triglycerides, HDLcholesterol and blood pressure, cardiovascular risk using EURO'98 charts [9], Framingham Score [10] and SCORE system [11] were calculated. The Framingham score estimated the risk for coronary heart diseases for the next decade, based on a number of points given for different cardiovascular risk factors. EURO' 98 risk charts evaluated the risk of a person to develop a cardiovascular disease for the next decade, separately for diabetic/ non diabetic people, including age, sex, smoking status, the level of total cholesterol and systolic blood pressure: low risk < 5%, border risk 5-10%, moderate risk 10-20%, high risk 20-40%, very high risk > 40%. The people who have cardiovascular disease are included in high risk class. SCORE system estimated the risk for fatal cardiovascular events, a high risk being considered at a score ≥ 5%.
The metabolic syndrome diagnosis was performed using the International Diabetes Federation 2005 criteria (waist ≥ 94 cm in male and ≥ 80 cm in female, systolic blood pressure ≥ 130/85 mmHg or treatment, fasting glicemia ≥ 100 mg/dl, HDL cholesterol < 50 mg/dl in female and < 40 mg/dl in male, triglycerides ≥ 150 mg/dl or treatment [12].

The obtained results were compared with the results of other study regarding the compliance to medical recommendations and the targets for cardio-metabolic diseases [4,7,13,14].

The data were analyzed in SPSS. The correlations between clinical and biological parameters and adherence to medical recommendations (we used the nonparametric Spearman rho coefficient) were performed. The comparison between groups were evaluated using the mean rank obtained to formalization of the data (the answer of the people was noted with numbers or with percentages). A significance level of $p=0.05$ was considered.

Results

In the studied group of 338 subjects, 192 person have had normal glycemia (<100 mg/dl), and 146 person have had dysglycemia (impaired fasting glycemia and type 2 diabetes).

The person with cardiovascular and metabolic diseases declared that they followed medical recommendations, except those regarding physical activity, but in spite of medical treatment, the therapeutic objectives were reached in low percentages (Figure 1).

The correlations between declared medical recommendation adherence concerning lifestyle, medication and multiple aspects of cardio-metabolic pathology as followed are presented in Table 1.

The adherence to medical treatment was higher than that regarding the diet in the whole group and the lowest compliance was registered for physical exercises.
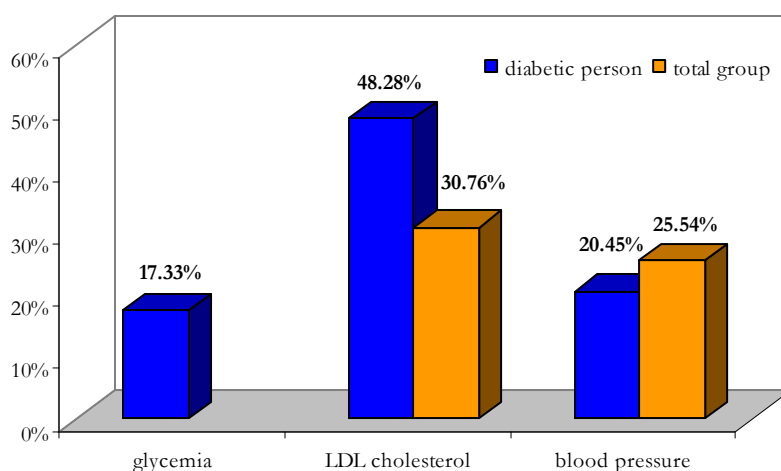

Figure 1. The percentage of person who reached the target for glycemia, blood lipids and arterial blood pressure

Table 1. Correlations of clinical aspects with the medical recommendations adherence

Correlated factors	Spearman rho Coefficient	Significance level
Bodyweight- A. to physical exercise	-0.177	0.01
Body weight -A to diet	-0.180	0.01
Body weight -A to medication	+0.146	0.05
Body mass index -A to physical exercise	-0.204	0.01
Adjusted body mass index -A to physical exercise	-0.181	0.05
Waist-A to physical exercise	-0.194	0.01
Hypertensive waist- A to physical exercise	-0.178	0.01
Insulin resistance score- A to physical exercise	-0.154	0.05
Body fat percent- A to physical exercise	-0.168	0.01
Metabolic syndrome-A to physical exercise	-0.185	0.01
EURO'98 cardiovascular risk- A to medication	+0.133	0.05
Framingham cardiovascular risk- A to medication	+0.129	0.05
SCORE cardiovascular risk- A to medication	+0.145	0.05

A= adherence

The therapeutic structure of the person who reached the target for glycemia was as follows: 34.78% - diet, 34.78% oral mono-therapy, 17.39% combined oral therapy, 4.34% insulin and 8.69% oral therapy plus insulin.

From the person who filled the questionnaire, 26.92% declared personal history of dyslipidemia, from these 64.83% declared that they administered medication (17.58% fibrates and 47.25% statins), and from treated person only 30,76% reached a LDL-cholesterol level < 100 mg/dl,

16.48% a level of LDL-100-130 mg/dl, 18.68% a level of LDL-130-160 mg/dl, 4.39% a level of LDL-160-190 mg/dl, and 12.08% a level of LDL >190 mg/dl; for 17.58% person the level of LDL cholesterol was not known.

From the person with personal history of dyslipidemia, 69.23% have had diabetes, and from these, 48.28% have had a level of LDL cholesterol < 100 mg/dl.

The subjects with metabolic syndrome:
- declared more frequent that they have medical assurance: 49.39 versus 37.95; p = 0.008;
- followed more schedule of the medical visits: 143.88 versus 99.11; p = 0.018;
- are more compliant to recommendations regarding medication: 45.95 versus 39.82; p = 0.001;
- have a lover compliance to physical exercise: 48.92 versus 51.35; p = 0.005;
- received more frequent aspirin, medication for high blood pressure and for high blood lipids, of course.

In the whole group, a level of LDL cholesterol> 100 mg/dl (treated with fibrates in 6.3% cases and with statines in 21.8 cases) was registered in 51.47% person and from these they have had a level of as followed:
- 57.47% - LDL >130 mg /dl (treated with fibrates in 4% cases and with statins in 26% cases);
- 28.73% - LDL > 160 mg/dl (treated with fibrates in 25% cases and with statins in 17.5% cases);
- 13.79% - LDL > 190mg/dl (treated with fibrates in 25% cases and with statins in 8.3%cases).

A personal history of high blood pressure was declared in 40.53% person; from these person only 25.54% (48.57% person being with normal glycemia) presented a level of arterial blood pressure <140/90 mmHg.

From the subjects with arterial hypertension, 64.23% have had type 2 diabetes, and from these only 20.45% reached the targets for blood pressure, according to Europeans guidelines (<130/80 mmHg). The treatment for hypertension was more frequent with ACE inhibitors (52.3%), in mono therapy or in combination with other drugs.

Almost the person with diabetes (90%), correlated the diabetes with familial history and stress (at workplace in men and from house in women).

Only 10% from person considered that the main cause of diabetes or other cardio-metabolic pathology is due to the unhealthy lifestyle (from the lifestyle the physical exercise was rare incriminated).

The results on plasma lipids in comparison, according to the fasting glycemia level are presented in Table 2.

Table 2. The values for triglycerides, triglycerides/ HDL cholesterol and LDL cholesterol in person with normal glycemia and hyperglycemia

VARIABILE	Normal glycemia mean (SD) n=192	Impaired fasting glycemia Mean* (SD) n=13	Newly diagnosed diabetes mean (SD) n=46	Diabetes with >1 year duration mean (SD) n=87
TG- mg/dl	182.98 (140.72)	308.15 (256.95)	233.91 (140.07)	176.82 (102.86)
TG/HDL	4.24 (3.99)	7.40 (7.69)	5.45 (3.88)	5.74 (1.46)
LDL- mg/dl	130.44 (46.10)	155.93 (54.74)	121.01 (41.17)	101.04 (41.26)

n= number of subjects
LDL- LDL cholesterol
TG- triglycerides
TG/HDL- triglyceride/HDL cholesterol
*p<0.05

Discussion

Statistically significant correlations between declared medical recommendation adherence concerning lifestyle, medication and multiple aspects of cardio-metabolic pathology as followed were identified (see Table 1).

- the bodyweight was higher in person with a low compliance to medical recommendation regarding diet and physical exercise and the body weight was higher in person with a high compliance to medication than in the other people;
- the body mass index, adjusted body mass index, the waist, the insulin resistance score, the body fat percent were higher in subjects with a low compliance to medical recommendation to physical exercise;
- the prevalence of metabolic syndrome and hypertensive waist were higher in person who declared a low compliance to medical recommendation regarding physical exercise;
- the subjects included in the high cardiovascular risk classes have had a high compliance to medication.

In Figure 1 are showed the percentages of person who reached the targets for fasting glycemia, LDL-cholesterol and arterial blood pressure in the whole group and in people with type 2 diabetes.

Only 17.33% from all diabetic person reached the targets for fasting glycemia (according to IDF 2007).

In the present study, almost person have had a correct estimation of bodyweight, they have had a low satisfaction level regarding this aspect, but the majority of these people did not followed a medical program to loose body weight.

According to our study, the person with impaired fasting glycemia have had the higher values of plasma lipids (triglycerides and LDL-cholesterol) (see Table 2).

In our study we found a lower adherence to medical recommendations and in special for improving the lifestyle. These fact can lead to a poor management and prognosis of metabolic and cardiovascular diseases. Our study show the same low efficacy in the treatment of cardio-metabolic pathology comparison with EUROASPIRE study, in spite of an increase prescribing of drugs for glycemia, for lipids and for hypertension (in EUROASPIRE the objective for blood pressure was reached in 41% cases, in 53% for LDL-cholesterol, and the glycemic control was also lower than expected). EPIDIAB is a Romanian study concerning epidemics in diabetes and this study showed that the therapeutic objective are reached only in 10-35% cases for glycemia, 5-30% cases for bodyweight, 25-50% for arterial blood pressure and 16-25% cases for lipids. The explanation for this could be not only a suboptimal prescribing of the drugs but also a low compliance of patient to drug treatment and to the favorable changes in the lifestyle. In other studies, the objectives for plasma lipids were reached in 56.1%[13] and for blood pressure in <30%.[14]

Conclusions

1. In our study we found a low compliance to medical recommendations regarding the diet and physical exercise, and high compliance to medication and these kind of compliance was correlated with a high bodyweight, high body mass index, high body fat percent, with hypertensive waist, insulin resistance and metabolic syndrome. In person with high cardiovascular risk level, we found a great compliance to medication.
2. We found a high percentage of untreated person with high blood pressure, high plasma lipids, and from the treated person for these conditions, only a small percentage reached the therapeutic targets according to current guidelines.
3. Our results are according to other studies and show that a sustained and active attitude is necessary from the medical stuff, and a great adherence of people to medical recommendations is mandatory in order to improve these aspects.

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