MODERATE RED WINE CONSUMPTION INFLUENCES THE DEVELOPMENT AND PROGRESSION OF METABOLIC SYNDROME AS A COMPLEX RISK FACTOR FOR CARDIOVASCULAR DISEASE AND DIABETES MELLITUS II

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Abstract: Epidemiological, experimental and clinical investigations have shown that diets supplemented with moderate quantities of alcoholic beverages lead to biochemical changes, that are widely regarded to prevent cardiovascular disease. Red wine contains a naturally rich sources of antioxidants which may protect the body from oxidative stress. We investigated the relationship between red wine intake and lipide profile, glucose, blood pressure and WHR index changes. Participants consumed 200 ml of red wine Lemberger (MASARYK, Slovakia) each day during supper for six weeks and were encouraged to maintain their usual diet and exercise habits. Daily intake of Lemberger during six weeks was associated with lower plasma levels of total cholesterol (5.66±1.12 vs 5.36±1.04), triglycerides (1.68±0.23 vs 1.47±0.66), LDL cholesterol (3.46±0.81 vs 3.26±0.76) and glucose (5.35±0.82 vs 5.26±0.78). On the contrary we recorded higher level of „good" HDL cholesterol (1.42±0.63 vs 1.80±0.58). Systolic and diastolic blood pressure was also decreased. Research results have shown that moderate consumption of red wine have a positive impact on changes waist circumference and ultimately to the Waist to Hip Ratio (WHR). Our study demonstrates a positive association between moderate wine consumption and risk of cardiovascular disease and metabolic syndrome.

Key words: wine, metabolic syndrome, cardiovascular disease, lipide profile, blood pressure

INTRODUCTION

In 1988 Reaven clearly demonstrated that there are different risk factors for the formation and development of cardiovascular disease in many individuals at the same time and this situation called syndrome X. Experts identified the cardiovascular disease as the primary clinical consequence of metabolic syndrome, but a significant majority of individuals with this syndrome have insulin resistance, confirming the increased risk of developing diabetes mellitus type 2. Expert Panel ATP III (2002) identified six symptoms of metabolic syndrome that relate to the development of cardiovascular disease – abdominal obesity, atherogenic dyslipidemia, raised blood pressure, insulin resistance and various forms of glucose intolerance, subclinical inflammation and prothrombotic state. The main risk factors for coronary heart disease are hypertension, elevated LDL and low HDL cholesterol, family history of early-onset coronary heart disease and age. Among other potential risk factors include elevated triglycerides. The beneficial health effects of wine is already known in ancient times, when already ancient and medieval doctors recommend their patients with moderate consumption of wine. The cause of kick-starting the current health research activity of wine was called French paradox that showed about 3-times lower cardiovascular morbidity in French compared to Americans. End of the 20th century, scientists have managed to confirm that the wine is in a reasonable dose a medicine. At present, therefore, is already well known and many studies confirmed that moderate and regular alcohol consumption, particularly wine, has beneficial effects on human health (STAMPFER et al., 2005, Jelski - SZMITKOWSKI 2007). Wine, especially red, is a complex beverage, and is difficult to determine which components are responsible for its beneficial

effects on the human body. Clearly it is certain that the wine owes its properties synergy of alcohol and soft components – polyphenols (BASTIANETTO, 2002).

MATERIALS AND METHODS

For testing we used red wine Lemberger of the Small Carpathian wine region (WINE-MASARYK, Skalica, Slovakia). Research consisted of regular consumption of wine recommended doses according to predetermined conditions during the period of 6 weeks (7 days a week). It was attended by 24 subjects (11 women and 13 men) aged 28-64 years. The consumption of wine has always conducted during dinner after a day abstinence. Dose of alcohol was determined to 200 ml of either gender. Consumed diet did not affect us in any way, the probands ate without changing their eating habits and also without changing their lifestyle. At the beginning, before the start of consumption of wine, we measured subjects blood pressure, anthropometric parameters and collected blood samples. Further blood sampling and blood pressure was carried out after three days and three weeks after the start of consumption. The last blood sampling and measurement of anthropometric parameters was performed immediately after the consumption of wine (after six weeks). First sampling (before the start of consumption of wine) were used as control, and the results were compared with minimum and maximum value benchmarks. Fasting blood were collected in a standard manner (1 EDTA and 2 serum gel tube). We centrifuged obtained blood samples after approximately 30 min., serum gel tube at 3000 rpm for 8 minutes and EDTA at 1600 rpm for 10 min. After separation of blood serum samples are stored at -80 °C until the time of analysis and subsequent thawing, we determined the total cholesterol, triglycerides, LDL cholesterol, HDL cholesterol and glucose using commercial sets available from the company Ecomed. Analysis was performed using biochemical analyzer Lisa 200. Systolic and diastolic blood pressure was measured with a digital pressure gauge in a standard manner before each collection. The statistical analysis was done by algorithms which are located in SAS v.9 (SAS Institute Inc.) and using statistical functions of MS Excel.

RESULTS AND DISCUSSIONS

The most likely cause of sharply rising prevalence of metabolic syndrome is obesity epidemic. MANSON et al. (1995) observed the increase in weight by more than 20 kg increase in cardiovascular mortality more than sevenfold. To assess the clinical severity of obesity is important to identify its type, as android obesity is significantly higher risk of metabolic and cardiovascular complications than gynoid type. As stated KREZE et al. (2004) women with android fat distribution are in eight times greater risk of death for coronary heart disease than women with gynoid fat distribution. To clearly identify of android obesity is used WHR. Ratio higher than 1 for men and greater than 0.85 for women indicates android obesity. Research participants had before start wine consumption the average value of WHR 0.87 ± 0.08. For female had index value of 0.80 ± 0.07, for male 0.93 ± 0.03. After completion of wine consumption we found a slight decrease in the measured values, while all subjects in the WHR value decreased to 0.86 ± 0.08, for female to 0.79 ± 0.07 and male 0.92 ± 0.03. Simple indicator is the waist circumference, which should be in men less than 94 cm and women less than 80 cm. At high risk of developing comorbidities points waist circumference greater than 102 cm in men and greater than 88 cm in women. In women, prior to consumption, we measured the average waist circumference 79.64 ± 11.66, that is after research decreased to 78.55 ± 11.5. For males we found the value of 100.62 ± 6.87 before consumption versus 99.15 ± 6.31 after the wine consumption.

To assess the risk of mainly cardiovascular disease and metabolic syndrome under the

influence of an alcoholic beverage intake was important to us especially, the course level changes of important indicators of lipid profile and glucose. Results are presented in Table 1. We found that levels of monitored parameters in the dynamics of the intake of wine during the six weeks have changed in a positive direction with a declining trend. Compared with the control we reported after six weeks of consumption statistically significant decrease for total cholesterol and LDL cholesterol (p<0.05), while their levels decreased from initial 5.66±1.12 mmol.l^{-1} to 5.36±1.04 mmol.l^{-1} for total cholesterol and 3.46±0.81 mmol.l^{-1} to 3.26±0.76 mmol.l^{-1} for LDL cholesterol. It should also be noted that total cholesterol level in the subjects during the experiment was situated above the upper reference values, but it is important that the six weeks' consumption of red wine resulted in a statistically significant decrease of the mentioned values, which are most critical close to the upper boundary standards. Very important is the fact that the actual decrease in total cholesterol and LDL cholesterol levels confirms the anti-atherogenic effect of wine consumed as a biologically effective product. Confirming this idea is that a parallel increase in levels of "good" HDL cholesterol in the dynamics of the experiment, which operates in the protective storage of cholesterol in the intima of blood vessels. Its level increased after six weeks of drinking Lemberger from initial 1.42±0.63 mmol.l^{-1} to 1.80±0.58 mmol.l^{-1}, the difference was very high significant (p<0.0001). Increase HDL cholesterol by 0.026 mmol.l^{-1} corresponds to the reduction of cardiovascular events by 2% in men and 3% in women (GORDON et al. 1989). These conclusions are also supported by post hoc analysis of primary prevention studies Helsinki Heart Study, in which an increase in HDL cholesterol of 1% corresponded with a reduction in cardiovascular events of 3% (MANNINEN et al. 1998).

Table 1 (a, b):

The average values of parameters before and during long-term consumption of Lemberger

	Before consumption	After 3 days of wine consumption	P-value	Significant koeficient
Total cholesterol (mmol.l^{-1})	5,66 ± 1,12	5,76 ± 1,23	0,493	-
Triglycerides (mmol.l^{-1})	1,68 ± 0,23	1,87 ± 0,49	0,357	-
HDL-cholesterol (mmol.l^{-1})	1,42 ± 0,63	1,66 ± 0,63	0,008	++
LDL-cholesterol (mmol.l^{-1})	3,46 ± 0,81	3,22 ± 0,84	0,003	++
Glucose (mmol.l^{-1})	5,35 ± 0,82	5,57 ± 0,75	0,043	+
Blood pressure systolic (mmHg)	131,8 ± 17	129,9 ± 18,54	0,446	-
Blood pressure diastolic (mmHg)	84,3 ± 11,47	81,9 ± 9,95	0,100	-

	After 3 weeks of wine consumption	P-value	Significant koeficient	After 6 weeks of wine consumption	P-value	Significant koeficient
Total cholesterol (mmol.l^{-1})	5,65 ± 1,13	0,956	-	5,36 ± 1,04	0,041	+
Triglycerides (mmol.l^{-1})	1,73 ± 0,09	0,834	-	1,47 ± 0,66	0,318	-
HDL-cholesterol (mmol.l^{-1})	1,78 ± 0,77	0,001	++	1,8 ± 0,58	< 0,0001	+++
LDL-cholesterol (mmol.l^{-1})	3,19 ± 0,73	0,001	++	3,26 ± 0,76	0,013	+
Glucose (mmol.l^{-1})	5,38 ± 0,75	0,785	-	5,26 ± 0,78	0,434	-
Blood pressure systolic (mmHg)	130 ± 19,77	0,459	-	128 ± 14,22	0,129	-
Blood pressure diastolic (mmHg)	80,1 ± 10,77	0,004	++	80,9 ± 10,37	0,017	+

+ statistically significant
++ statistically high significant
+++ statistically very high significant

Triglycerides was recorded after an initial increase in its levels after three days and three weeks of consumption at the end to fall to 1.47 ± 0.66 mmol.l^{-1}, which was lower than control, although not confirmed statistically. From a health perspective minimum positive changes in levels of substances that threaten the endogenous stability significant and wholesome.

As well as other authors (JOOSTEN et al., 2008) we was monitored a positive decrease of glucose level. Found glucose levels for six weeks consumption of wine did not show any significant differences, although initially we (as with other endpoints in the second sampling, three days after the start of consumption) observed a slight increase with a consequent reduction in blood glucose from an initial 5.35 ± 0.82 mmol.l^{-1} to end 5.26 ± 0.78 mmol.l^{-1}.

However, this biochemical parameter we considered stable in relation to the consumption of red wine, all readings were in the range of benchmarks.

Correlation between the metabolism of all monitored parameters of lipid profile and glucose levels and blood pressure are clear. We found almost parallel decline in systolic pressure (131.8-129.9-130-128 mmHg, respectively) and highly statistically significant reduction in diastolic pressure after three weeks of drinking Lemberger (80.1 ± 10.77 mmHg, $p<0.01$) and statistically significant decrease after six weeks (80.9 ± 10.37 mmHg, $p<0.05$) compared with control (84.3 ± 11.47 mmHg). Increased consumption of alcohol can cause a progressive increase in blood pressure (about 1 mmHg.100 ml^{-1} of ethanol per week). In our case, however, it was confirmed the dependence of J-shaped curve, i.e. low doses of alcohol do not increase pressure, but may act hypotensive. On this basis, we can refute the historically traditional idea of hypertensive effects of wine consumption, particularly red.

CONCLUSIONS

The observed changes in biochemical and physiological parameters show a recovery process as a reflection on moderate consumption of Lemberger. Based on the evaluation results we can conclude that daily intake of a small amount of Lemberger has beneficial effects on risk factors for atherosclerosis. We have experienced not only the expected increase in HDL cholesterol, but in terms of risk of cardiovascular disease a very favorable reduction in total cholesterol, dangerous LDL cholesterol, triglycerides, and in view of risk diabetes mellitus reduction in glucose, too. The favorable effect of six weeks consumption of red wine can be attributed to a decrease in both systolic and diastolic blood pressure. Very surprising was the upward trend in total cholesterol, triglycerides and glucose levels after three days of consumption, which is just over the next six weeks turned into a positive downward. From this perspective, we could in the light of the results after the experimental schedule, in order to stabilize the levels of the parameters needed longer-term consumption of wine, and that short-term intake of small doses of alcoholic beverages has influence on the change in observed indicators undesirable direction. These results say about the benefits of moderate consumption of small amounts of red wine, which is not a problem in terms of harm to health, but in terms of problems associated with drinking culture. In addition to the biochemical changes moderate consumption of wine caused positive encouraging psyche with the induction of pleasurable feelings, and suppressing the release of a bad mood for mental well-being and social communication.

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