NUTRACEUTICAL CHARACTERISTICS OF WINE IN HEALTH PROMOTION AND WELLNESS CONTEXT

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Abstract: *The authors present a brief overview of the history of wine in a historical, cultural, religious and medical context. They also attach a description of the results of their own investigation. They provide an overview of the content of polyphenols, particularly resveratrol, in samples of Moldovan wines, along with information about the content of resveratrol in wine in general. They present instruments to ASSESS the organoleptic properties and an example of a simple and inexpensive method to ASSESS the possible positive impact of regular, moderate wine consumption on immunity in humans. It is discussed the influence of the presence of ethanol and resveratrol in wine together on possible nutraceutical effects.*

Keywords: *wine, polyphenols, resveratrol, "French paradox".*

1 Introduction, Nutraceutical characteristics of wine

Wine is not only relevant nutritional and sensory flavour, but also, along with other soft berries fruits, nutraceutical flavour (Proceedings summaries communication, 2002; Peter, Sludge, 2006). Positive impacts of moderate wine consumption and the negative effects of excessive ingestion or consumption of wine are documented from the very beginning of the existence of wine as a product. Health importance of wine has been known since biblical times. The health significance of wine is closely and critically studied since the late eighties and early nineties of the twentieth century. Today winged term "French paradox" is analysed in publications by various authors (e.g. Renaud, De Lorgeril, 1992; Simin, Renaud, 2000;

Curtis, Ellison, 2007). The results of experimental studies indicate that wine can have on human health potentially beneficial effects, especially thanks polyphenols and resveratrol (Renaud, amp; De Lorgeril, 1992; Siemann, Creasy, 1992; Goldberg et al., 1996; Jang et al., 1997; Simin, Renaud, 2000; Sweeney et al., 2002; Wang et al., 2005; Baur, Sinclair, 2006; Lotito, Frei, 2006; Curtis Ellison, 2007; Pack et al., 2008; Willis et al., 2009; Kalt, 2010; Karlsen et al., 2010; Kaplan , 2011; Quideau et al., 2011; Soyollkham et al., 2011; Wood, 2011; Xie et al., 2011; Weingerl, 2012). The authors define the biochemical characteristics of wine with special emphasis on polyphenols and impact on human immunity. It is presented a quite extensive overview of the possible beneficial effect of wine on various areas of human health. In some areas wine share these characteristics with other soft berries (Sludge et al., 2012). There are mainly interesting findings of the potential beneficial effects in cardiovascular diseases (Renaud, amp; De Lorgeril, 1992; Simin, Renaud, 2000; Beattie et al., 2005; Basu et al., 2010). It was discussed the possible involvement of resveratrol on the course of metabolic pathways RISK (Reperfusion Injury Salvage Kinase) and (SAFE Survivor Activating Factor Enhancement) during myocardial ischemia (Hausenloy et al., 2001; Lacerda et al., 2009; Mukhopadhyay et al., 2011; Vang et al., 2011; Somers et al., 2012), in pulmonary hypertension (Chicoine et al., 2009), platelet aggregation (Renaud, amp; De Lorgeril 1992; Simin, Renaud, 2000), in tumor diseases (Carbó et al., 1996; Delmas et al., 2006; Pisano, 2011) and finally a reproductive health (Singh et al., 2011; Chen et al. demonstrate results indicative of the positive effect of polyphenols on bone metabolism (Chen et al., 2010).

Beneficial effects of other soft berries on memory, balance and vision (Greenwell, 2000; Beattie et al., 2005; Han et al., 2006; Bauer, 2011), which can be relatively easily quantified using a diagnostic tool by Tinetti (Tinetti, 2003; Klán, Topinková, 2003; Janečková et al., 2012; 2013) and that can wines due to the presence of polyphenols assume repealing the opposite antagonistic effect of ethanol. In wine ethanol, however, as the enzyme inducer, positively influences the effect of polyphenols on phase I and II in the metabolism of xenobiotics (Ronis et al., 2006). The authors in this context, the special position of Moldovan wines and remind potential impacts of certain peculiarities of the technological process of production of the high content of resveratrol that those wines analysed (Stávek, Šmídová, 2006).

The content of polyphenols, in particular resveratrol, differs between Vitis vinifera and Vitis rotundifolia/Muscadinia (Bouquet, 2004). In addition to differences in the content of resveratrol between species and genera (already mentioned differences between Vitis vinifera

and rotundifolia), there are also differences in geographical conditions. Generally speaking, more difficult conditions for growth vine has, which may be due to greater latitude, the higher content of phytoalexins brings (Siemann, Creasy, 1992; Melzoch et al., 2001; Ratola et al., 2004; Stávek, Šmídová, 2006; Soyollkham et al., 2011). Therefore if in the northern hemisphere wine region is located more in north direction and if in the southern hemisphere is wine region located in more south direction, more wine plants will produce phytoalexins. A special situation is that on the contrary the presence of ultraviolet radiation, which is in turn lower latitudes greater, promotes formation of resveratrol in berries, especially in wine (LeBlanc, 2006).

When assessing the content of polyphenols, especially resveratrol in wine must bear in mind the fact that resveratrol is present in Trans and cis forms, and moreover occurs in the form of glycoside (Goldberg et al., 1996).

In addition health importance of wine depends on resveratrol amount and other polyphenols, particularly flavonoids (flavonols, flavanols, anthocyanin, tannins). Also the other flavonoids are important as flavan/catechins. It is possible to conclude that the total polyphenol content of the food consumed beverages or food for health benefits more important than resveratrol alone (Lotito, Frei, 2006).

2 Objectives and Methods

The main objective of the study was to analyse influence of polyphenols, which are formed in wine, as phytoalexins. The main interest was focused on resveratrol.

The main method to the determination of polyphenols, including resveratrol in wine presents HPLC (LeBlanc, 2006; Weingerl, 2012). In our research, we are using this method to define the content of resveratrol in samples of Moldovan wines, see Table 1.

Table 1 *Biochemical Properties of resveratrol in samples of Moldovan wines*

Business name	**Cépage**	**fortified**	**Resveratrol in mg/l**
Kagor Mereni	CS	yes	10.0
Kagor Cricova	CS	yes	12.0
Kagor CHI	CS	yes	23.0
Cabernet Asconi	CS	no	9.5
Merlot Asconi	M	no	9,9
Vin Sec Virgin Rosu, Cricova Marsovin	ND	no	11.7
Cheval Franc, 2012(Malta)	CF	no	24.9
Magnific, Vin De Rosu Desert	ND	no	28.4
Note: CS = Cabernet Sauvignon, Merlot = M, CF= Caberner Franc, ND = not Declared			

Procedure

All used wine sorties for our research were purchased in public shops network. The top Spanish and Portuguese wines had a content of resveratrol of 15 mg/l. In the renowned Portuguese wine from the region of Alentejo was declared values of 0.13 to 2.47 mg/l (Ratola et al., 2004). By comparison, the findings of the concentration of resveratrol in Moldovan wines are certainly remarkable. Found high resveratrol content in fortified wines of Moldovan port type - Kagor may be contributed of the special technology used in Moldova. The mash is heated to 75 ° C (Šmídová, 2006). This obviously leads to a perfect release of the polyphenols in solution. The content and the effect of polyphenols in berries and products of them do not change at these temperatures (Lyons et al., 2003; Schmidt et al., 2005; Satanina; 2011). Although Moldova is considered the "south", it is necessary to take into account that it is located at the same latitude as Burgundy. Maybe a reason is in influence of prolonged sunshine and therefore exposure to ultraviolet radiation on Moldovan vineyards (LeBlanc, 2006).

As a nutraceutical properties of food are called properties beneficial to health, yet other than nutritional and organoleptic. The term nutraceutical and nutraceuticals overlaps with the concept of "functional food" (Petr, Sludge, 2006). Currently, research activities, but often also polemical activities, present very actual problematic of the nutraceutical potential significance of wine. It was found that, when considering the preferences of consumers in relation to potential nutraceutical effect is the crucial "diet strengthen immunity" - 1st place in public opinion research in Germany, 2nd place in France (Sloan, 2004; Peter, Sludge , 2006). For this reason, we investigated whether moderate consumption of wine will have a positive effect on the absolute lymphocyte count, as surrogate performance of cellular immunity (Verner et al., 2006).

In a simple open configuration, we compared the absolute number of lymphocytes in the sample of students (volunteers) before and after consuming the product Kagor Cricova 16 vol% ethanol, resveratrol in content of 12 mg/l, at 30 days. The duration of administration coincided with a period of testing the summer semester of the academic year 2012/2013, i.e. the period called Academic stress (Marcos et al., 2004). Men enjoyed 1.5 dl daily at bedtime, i.e. ethanol intake 24 g, 1 dl women daily at bedtime, i.e. ethanol intake 16 g. Of the ingested amounts of ethanol does not exceed the ADI (Acceptable Daily Intake) as recommended by the National Public Health Institute in Prague (2014). Compliance with the anticipated consumer behaviour was assessed period Access Drug Accountability Check, i.e. checking accounts returned bottles compared with the original issued / bottles assessed substances.

Evaluated were those who returned at least 75% intact packaging / bottling if it was a woman (3 of 4), and 66% if it was a man (4 of 6).

3. Results

The detailed overview of the investigation results of the 23 persons complied the above conditions 13 persons (i.e. 57%), 6 males and 7 females, are given in the Table 2.

Table 2 *Some nutraceutic properties of wine KAGOR 2013. The effect of moderate regular consumption on absolute lymphocytes´ count, as the surrogate of cellular immunity.*

č.	jméno	M/Ž	Lymfocyty abs. před	Lymfocyty abs. po Drug Accountability delta / %
1	PABR	Ž	2,81	2,35 2/4= 50% N
2	**MIČA**	**Ž**	**2,94**	**3,46 4/4= 100% Y117,7**
3	PEBR	M	2,4	2 3/6=50% N
4	ANDA	Ž	1,9	1,4 2/4=50% N
5	**LUFI**	**M**	**2,36**	**2,6 6/6=100% Y 110,2**
6	PEHO	Ž	2,2	1,9 2/4=50% N
7	MACHA	Ž	2,2	1,8 2/4=50% N
8	MAIV	Ž	2,6	1,9 2/4=50% N
9	**TEKO**	**Ž**	**2,51**	**2,67 4/4=100% Y 106,4**
10	VĚKO	Ž	2,14	2,0 2/4=50% N
11	**PAKR**	**Ž**	**2,7**	**2,7 4/4=100% Y 100,0**
12	**DAKR**	**M**	**2,1**	**2,1 6/6=100% Y 100,0**
13	JAKU	M	2,5	2,1 2/6=33% N
14	**MOLI**	**Ž**	**2,7**	**2,6 3/4= 75%% Y 96,3**
15	**JAMA**	**M**	**2,1**	**2,4 6/6=100% Y 114,3**
16	MAMA	Ž	3,0	2,7 3/4=50% N
17	**JIMU**	**M**	**2,0**	**1,9 4/6=75% Y 95,0**
18	**JAMU**	**M**	**2,0**	**2,2 6/6=100% Y 110,0**
19	**VEMU**	**Ž**	**1,5**	**1,6 4/4=100% Y 106,7**
20	**PENO**	**Ž**	**2,0**	**2,0 4/4=100% Y 100,0**
21	**IVVO**	**Ž**	**2,46**	**2,34 3/4=75% Y 95,12**
22	PAPŘ	Ž	2,57	2,15 2/4=50% N
23	**VLPA**	**M**	**2,7**	**2,9 6/6=100% Y 107,4**

KAGOR 2013

Eligible 13/23 = 56,5%
Per protokol: 13 osob proti 23 : delta% abs. Počtu lymfocytů 104,5 t.j. **Delta = + 4,5%**
Intention to treat: 13 osob proti 13 :delta% abs. počtu lymfocytů 102,5% t.j. **Delta = + 2,5%**
Historická kontrola: v zimním semestru 2007/2008, na souboru 35 studentů,
„ NUTRASTUDENT" prokazuje se pokles abs. počtu lymfocytů o 5%, **Delta = - 5%**
Pozn.: Drug Accountability = % vrácených obalů.
Při dodržení alespoň 75 % dávkování muži 1,5 dcl, ženy 1,0 dcl/den, po dobu zkouškového období v letním semestru akademického roku 2012/2013 se dokumentuje vzestup absolutního počtu lymfocytů, viz výše. Historická kontrola dokumentuje pokles.

Abbreviations Explaining:

- Č.= No.
- Jméno = Name
- M/Ž = M/F (male/female)
- Lymfocyty abs. Před = Lymphocytes´ absolute count before the protocol
  Lymfocyty abs. Po Drug Accountability = Lymphocytes´ absolute count after the protocol has been performed/fulfilled
- Y= Yes, was satisfactory, proband accepted
- N = Not, was not satisfactory, proband not accepted, but rejected
- Delta% = the change in absolute lymphocytes´ count, the number after the protocol has been fulfilled expressed in % of the number of lymphocytes of the same proband before the protocol was started
- Per protocol = 13 probands calculated against 13 probands (the group of all probands successfully performing the protocol against the same identical probands)
- Intention to treat = 13 probands calculated against 23 (the group of all probands successfully performing the protokol against all the probans who have started it).
- Drug accountability check = rate of returned bottles calculated from the number of the bottles acquired.
- For instance 6/6=100% means. Out of 6 bottles acquired all the 6 bottles were returned, which means 100% Drug Accountability recorded"
- 3/4 means, out of 4 bottles acquired only 3 bottles were returned, which means "75% Drug Accountability recorded"

The results showed increase in the absolute number of lymphocytes. The assessment of the "per protocol" can be defined as the average increase in absolute lymphocyte count by 4.5% to 104.5% of baseline. In evaluating of the "intention to treat", i.e. probands fulfilled the conditions "drug accountability", it was found an average increasing in the absolute number of lymphocytes by 2.5% to 102.5% of baseline. Marcos et al. states in her research that the exam period was a decrease in absolute lymphocyte count among students examined, but without intervention, 0.04 × 9log10, which during normal 2.75 represents a decrease of 1.46% (Marcos et al., 2004). Our observed increasing in the absolute number lymphocytes by 2.5 or 4.5% is possible to be considered in relation to the expected projected decline of 1.46%.

4. Discussion

Nouza (2014) in his monograph “Wine and pharmacy” analyses the wine as a medicine in a historical outline from ancient Egypt to the present, including the phenomenon known as the "French paradox". In this context it is worth recalling that even Czechoslovak Pharmacopoeia 1, valid until 1954, states in the amount XXVIII album as Vinum and Vinum rubrum as pharmacopoeia items. Were also listed items Chinaâ Vinum, Vinum Chinaâ ferratum, Vinum Condurango fluid, meridians austerum Vinum, Vinum meridians dulce (CSL 1, 1947). We used Kagor Cricova wine (16 vol% ethanol) would therefore within the meaning of items CSL 1 and PH-4 correspond to the item Vinum meridians austerum (ethanol content of 16 to 20 vol% residual sugar below 50 g). Thus, not only medicinal wines, i.e. in wine as a carrier substance adjusted other, but wine itself as a natural product was even quite recently considered a cure. They were valued properties which have been recommended and prescribed - as roborans, stomachicum, tonicum, but also a sedative and euphoricum/ hilariosum. From the view of our study is important to discuss the issue of wine consumption in context of health and healthcare. Without using attention to the term "French paradox", we must take into account the fact that the open independent sources such in Yearbook FAO OSN (2002) data for the consumer behaviour of the French and Americans, and data of BHF (British Health Foundation, 2012) on cardiovascular mortality in France and the USA, we learn the following, seemingly mutually contradictory facts, namely that the consumption of animal fats in France is a high in contra that coronary death is low. Discusses the positive effect of red wine in the creatively rich scientific work Renaud and amp; De Lorgeril (1992), Ellison (2007). Renaud dealt with the influence of ethanol on platelet aggregation and pointed to an interesting phenomenon which has become an inspiration for further research. Ethanol reduces platelet aggregation similar mechanism such as acetylsalicylic acid (Renaud, De

Lorgeril 1992; Simin, Renaud, 2000), namely by acting on adenosine diphosphate induced aggregation.

While after discontinuation of aspirin the health beneficial effect persists, the influence of ethanol in this regard is not reversible, but it is accompanied by a rebound phenomenon of platelet aggregation after discontinuation of ethanol rises. The brilliant reflection analysed Serge Renaud observation that after carousing chain Britons (binge-drinking) is observed increased incidence of cardiovascular complications, which is not evident in the French wine drinkers (Simin, Renaud, 2000). In wine there must be some positive effect of ethanol supports and maintains, according to Renaud and Curtis Ellison's polyphenols, especially resveratrol.

Recently, researchers interested in turning to the role of vitamin K as a possible factor in attempts to explain the "French paradox" (Geleijnse et al., 2004; Rhéaume-Bleue, 2013). Increased intake of vitamin K, especially directly in the form of K2, apparently protective factor before calcification artery walls. There also arises a minor issue, namely whether Warfarin is a risk factor for cardiovascular calcification apparatus (Price et al., 1998; Schurgers et al., 2007; 2008). It excels need more thorough patient education anticoagulant treatment (Janečková, 2011; 2014).

Notwithstanding the existence or absence of a phenomenon known as the "French paradox" is today directed among professionals of the potential impact of polyphenols and resveratrol in wine in particular on SAFE and RISK pathway in relation to the phenomenon Ischaemic Post Conditioning (Hausenloy et al., 2001; Lacerda et al., 2009; Sommers et al., 2012) . Key role is probably played by the influence of polyphenols on the sphingosine 1-phosphate (Sommers et al., 2012).

Moldova as a wine region is thankful basis for discussion. Since 8 AD, we have documented the enjoyment of wine in the region of present-day Moldova. Famous Ovid says in his dirge (Tristia) that the wine has in his exile, more relegaci, available. Sadly, however, recalls the large temperature differences between summer and winter, when winter fault, “NEC haust meri, sed data Frusta bibunt "- actually a frozen drink wine, served in pieces (Ovid, Tristia, III / X, verse 24). Even this observation may contribute to the high content of phytoalexins in Moldovan wines.

Separate discussion deserve also question how much wine you can drink, so he could make any positive effect in small doses of ethanol and polyphenols, while not on a negative effect of ethanol on human health. In the Czech Republic is keeping the principle that the intake to 16 grams including for women and 24 grams including men can be considered

acceptable daily intake (EAA, 2013). Lachenmeier et al. demonstrating that this boundary could be probably moved up to 25 g/day for women and up to 29 g/day for men. That would content an average of 12%, represented about 20 millilitres of wine per day for women and a quarter litter of wine per day for men - based on an analysis of the NOAEL (No Observed Adverse-Effect-Level) (Lachenmeier et al., 2011). Given that their work selected as being considered a risk factor for determining the safe daily dose incidence of liver cirrhosis, which is certainly the most feared consequence of excessive consumption of ethanol, their work is very inspiring and convincing. The fact that the consumption of moderate wine can be achieved in humans concentrations of resveratrol, already positively affect the cardiovascular system, in particular the production of nitrous oxide, convincingly demonstrated Gresele et al. (2008). Furthermore it cannot avoid discussing whether resveratrol given to itself, that is, not in wine, but in the form of isolated, has health significance. Here we present findings differ to some extent. In 2013 Gliemann et al. show, that resveratrol administered by itself reduces the positive effect of locomotor training on the cardiovascular system in elderly men (Gliemann et al., 2013), while Dolinsky et al. in animal experiments show that resveratrol leads during exercise to improve both muscle strength and cardiac function (Dolinsky et al., 2012).

5. Conclusion

Wine has been recognized for thousands of years and used for alleged health effects. Its use in this sense is obviously limited by the content of ethanol, which is a legal drug. By the current state of knowledge moderate wine consumption may have a beneficial effect especially on the cardiovascular system.

The current recommendations of the National Health Institute for acceptable daily dose of ethanol is 16 grams per day for women and 24 grams per day for men, it will probably be somewhat increased to approximately 25 grams per day for women and 30 grams per day for men. Such consumer behaviour would lead, even while maintaining stringent limit daily intake to 16 or 24 grams per day, for receiving resveratrol to an extent sufficient for the intended beneficial effects, yet would not constitute a health burden ethanol. Special position among analysed wine sorts Moldovan wine occupies. Given the particularities of preparation technology and climatic conditions contain high concentrations of polyphenols, especially resveratrol.

6. References

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