RAMIAN, Jan, BATOR, Piotr, RAZIK, Michał, ROZWADOWSKA, Patrycja, RYBAK, Jakub, MAGIERA, Barbara, MAGIERA, Karol and RAZIK, Wiktor. Effects of red wine on cardiovascular diseases. Journal of Education, Health and Sport. 2024;61:155-166. eISSN 2391-8306. https://dx.doi.org/10.12775/JEHS.2024.61.010
https://apcz.umk.pl/JEHS/article/view/48435
https://zenodo.org/records/10678505

The journal has had 40 points in Minister of Science and Higher Education of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences); Health Sciences (Field of medical and health sciences).
Punkty Ministerialne 40 punktów. Załącznik do komunikatu Ministra Nauki i Szkolnictwa Wyższego z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).
The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 30.01.2024. Revised: 15.02.2024. Accepted: 19.02.2024. Published: 19.02.2024.

Effects of red wine on cardiovascular diseases

Jan Ramian, Piotr Bator, Michał Razik, Patrycja Rozwadowska, Jakub Rybak, Barbara Magiera, Karol Magiera, Wiktor Razik

Jan Ramian
ramianjann@gmail.com
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0009-0002-1956-241X

Piotr Bator
piotrbator9@icloud.com
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0009-0009-3300-0078

Michał Razik
michrazik@gmail.com
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0009-0005-8930-8961

Patrycja Rozwadowska
patrycja.roz98@gmail.com
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0000-0001-8541-2108

Jakub Rybak
rybakjak@gmail.com
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0009-0005-0481-1569

Barbara Magiera
barbaramgra@gmail.com
Prof. K. Gibiński University Clinical Center of the Medical University of Silesia in Katowice, Medyków 14, 40-752 Katowice
ORCID: 0009-0001-9180-9942

Karol Magiera
magierakarol0@gmail.com
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0009-0004-8621-9755

Wiktor Razik
wiktor.razik@onet.pl
Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
ORCID: 0009-0005-7370-7933

Abstract:

Introduction and purpose: The purpose of this scientific paper is to review the current knowledge of the effects of red wine on human health, particularly with regard to cardiovascular disease.

State of Knowledge: Since the 1990s, red wine has gained its status as a health-promoting alcohol through the French Paradox - when drunk in moderate amounts, it protects against cardiovascular disease. The authors have collected scientific papers on the health effects of alcohol, red wine and resveratrol-a polyphenol that is the main component with health-promoting effects of wine. On their basis, they analyzed the assumptions of the positive effects of wine reaching inconclusive conclusions.

Summary: Despite the fact that both ethanol and resveratrol have a positive effect in in vitro studies, in population studies their effect is much less significant, either because the negative

behavioral-health effects in the case of ethanol are omitted or the actual effective doses of resveratrol are omitted.

Keywords: red wine, alcohol, wine, cardiovascular, resveratrol

Introduction and purpose

Currently, cardiovascular diseases (including atherosclerosis, hypertension, stroke, ischemic heart disease, heart failure, among others) account for about 17.3 million deaths per year with an upward trend [1]. The solution to this growing problem may turn out to be the popular and much-used red wine, and more specifically, the polyphenol resveratrol, found in large quantities in red wine skins, which has been attributed to be responsible for creating the so-called "Frenchman effect," as described in the MONICA study. In that study, it was shown that the French were significantly less likely to develop cardiovascular disease than other Westerners, despite similar saturated fat intake [2]. The explanation for this phenomenon is precisely red wine and, more specifically, its frequent consumption in small to moderate amounts. Despite this, since the knowledge of the effect became widespread (1990s), there have been many research papers exploring this topic in depth, which came to contradictory conclusions. The purpose of this work, therefore, is a systematic review to gain an in-depth knowledge of the effect of red wine on cardiovascular disease, with characteristics of individual health-promoting components.

Materials and Methods

The scientific papers used in this study were obtained from the online databases Pubmed, Google Scholar and Web of Science using the keywords "wine", "red wine", "cardiovascular", "resveratrol", "red wine", "cardiovascular disease", "Frenchman effect". The paper is descriptive in nature and focuses on systematizing the experimental knowledge of the health effects of red wine.

State of Knowledge

The main component of wine is water, accounting for about 75% (90%-60%) of the volume depending on the sugar content, the second most common component is ethyl alcohol ranging from 9-18% depending on the strength of the wine. Mineral components (such as iron, calcium, magnesium, phosphorus, sodium, potassium, among others) are present at 2g/l of wine. In addition, organic components are also present in the must, of which resveratrol (res)-a polyphenolic antioxidant-is the most noteworthy. [3] Resveratrol (3,4′,5-trihydroxy-trans-stilbene) is a polyphenolic derivative of stilbene, which acts as an antioxidant in the body and scavenges free radicals through reactive nitrogen species. [4] it is a rare component of the human diet, the main sources being peanuts, berries and grape skins, from which it enters the finished wine during the manufacturing process [5], because of the manufacturing technology, mainly the time the skins spend in contact with the must red wines contain more resveratrol than white wines.[6] The direct health-promoting effect of resveratrol on the circulatory system is due to two factors, first, it hinders the penetration of low-density lipoproteins into the vessel wall blood vessels, which increases their relaxation of smooth muscle located in the arteries and inhibits platelet aggregation. Secondly, it inhibits lipid peroxidation by inhibiting quinolone reductase 2, whose function is to catalyze adhesin nucleotides, which impairs cellular antioxidant processes [7].

Ethanol in moderate amounts (16-20g of pure alcohol equivalent to about 0.5-1 glass of wine) according to a number of studies [8,9,10,11] has health effects by inducing an insulin-sensitizing effect in the body and increasing the fraction of high-density lipids, and inhibits platelet aggregation, thereby reducing the risk of cardiovascular disease [12,13,14,15].

A U [16,17] or J [18,19,20] shaped curve of the effect of ethanol on cardiovascular disease risk is now postulated, where the risk of disease decreased by about 30-50% in groups consuming up to two drinks per day (moderate alcohol consumption), while the risk of disease increased with consumption from about 50g of pure ethanol per day by about 20% [21]. Additional health-promoting effects manifested in greater reductions in disease risk were observed in individuals additionally burdened with conditions such as diabetes, overweight, nicotinism, metabolic syndrome or its individual components [21,22,23,24] in well-defined groups such as women with type 2 diabetes [25]. Importantly, most of the above-mentioned studies focus only on alcoholic beverages in the broadest sense, and even if the results were adjusted for other health variables such as smoking, age, physical activity, gender, diet [21,25,26], the risk-reducing effect on death or cardiovascular disease was supposed to be ethanol-induced. It should be noted that some researchers attribute the health

effects of the Frenchman effect precisely to other health factors, mainly a healthy diet and physical activity and a good socioeconomic situation, which co-occur with the culture of drinking small amounts of wine with dinner [27,28], thus negating or significantly downplaying the benefits of drinking alcohol in moderation.

Focusing on the title liquor, it should be carefully examined whether it is not ethanol alone that is the source of health-promoting changes in the body and the other components of red wine do not cause significant changes. One can look at this issue in 3 ways: first, whether the risk of death from cardiovascular disease depends on the type of alcoholic beverage, second, what is the difference in the effect of non-alcoholic and traditional wine on the human body, and third, whether the wine components themselves other than alcohol, mainly resveratrol, have a positive effect on the human body. The first question was addressed in a study comparing wine with beer and liquor [29]. The study was first conducted as a cohort of nearly 25,000 participants, taking into account disruptive factors such as BMI, lifestyle, physical activity, education and smoking the risk of death from cardiovascular disease and cancer was assessed. The results indicated a more than 20% lower relative risk for death from the stated causes in wine drinkers than beer or liquor drinkers. Regarding the second issue, two studies show the effects of wine components other than ethanol on lipid metabolism [30,31] and glucose metabolism [31], respectively. Naissidens, using 45 women as an example, proved that drinking 400 ml of non-alcoholic wine, as opposed to standard wine, does not affect plasma LDL and HDL lipid levels, which improve by 8% and 17%, respectively [30]. Chiva-Blanch, on the other hand, in a study on 67 men at high cardiovascular risk, proved that the HDL to LDL ratio changed by 7% for red wine and 5% for gin, in favor of HDL, but after using non-alcoholic red wine. In the case of glucose metabolism, neither drink lowered it, but plasma insulin concentrations fell by 21% for red wine, 20% for non-alcoholic red wine and 13% for gin, citing the polyphenols in wine as the culprit for this result [31].

Touching on the issue of resveratrol, its content in red wines ranges from 0.1-14.3mg/l, and white wines from 0.1-1.2mg/l, in other foods it is as follows: currant juice 2mg/l, grape juice 5mg/l- red, 0.5mg/l white, grapes- 5-10mg/100g, cranberries 1.9mg/100g, peanuts 0.15mg/100g. In studies using supplementation of synthetic resveratrol, its health-promoting effect was demonstrated by example: 62 patients with type 2 diabetes, in whom 250mg of resveratrol per day led to a drop in LDL lipids [32], while Timmers led to a drop in systolic blood pressure from 130 to 124 mmHg in 11 obese men using 150mg of resveratrol per day [33]. A study on 75 people at high cardiovascular risk divided into placebo, synthetic

resveratrol (350mg) and enriched grapes (8mg) groups showed a decrease in serum LDL lipoprotein levels of 4.5% and 2.9%, respectively, relative to the placebo group [34]. Meta-analyses yielded inconclusive results; Amirhossein Sahebkar, based on 7 studies combining a total of 282 subjects, found no significant effect of resveratrol supplementation on both LDL, triglycerides and HDL regardless of the dose used, the duration of supplementation or the health status of individual patients [35]. Weaver el al. studying resveratrol and red wine in relation to blood pressure inferred from 37 studies a 2.6 mmHg decrease in systolic blood pressure with wine and a 3.7 mmHg decrease with resveratrol alone [36]. Subsequently, Lin and Szafranek, analyzing 7 studies focusing on 105,000 people, showed a 20% decrease in the risk of death from cardiovascular disease due to the high intake of flavonoids contained in red wine [37].

Discussion

In light of the presented studies, a clear assessment remains impossible to make, although they have shown positive effects of both ethanol and resveratrol on the human body in relation to the prevention of cardiovascular disease with the indication of specific metabolic pathways, however, their gains are diminishing in clinical trials, especially in the case of resveratrol where the best results were obtained in people at risk of cardiovascular disease or with other diseases, and at doses many times higher than can be obtained from moderate drinking (one serving of wine with the highest concentration of resveratrol contains about 2mg of it), this is shown in the cited meta-analyses in which studies with wine achieved worse results than resveratrol supplementation. Long-term consumption of alcohol in any amount increases the risk for damage or loss of liver or pancreatic function whether from inflammatory diseases and cirrhosis as well as a number of cancers. It is important to remember that alcohol contributes to 10% of all deaths in people aged 15-49 worldwide, with a particular focus on cancer, a relationship that increases with the amount of alcohol consumed from the smallest doses [38]. Moreover, pads citing average alcohol consumption do not take into account differences from drinking patterns, and binge drinking, even irregular drinking, is associated with an increased chance of death [39]. Another issue that may discredit the health effects of wine is its cultural position, especially in the Mediterranean, where it is associated as a beverage consumed in small quantities on special occasions, this is reflected in the fact that in countries without a wine-drinking culture, its consumption correlates with significantly higher consumption of fruits and vegetables, lower caloric intake, while beer drinkers were more likely to reach for sodas, margarines and sweet snacks [40,41,42].

Summary

The data presented here present inconclusive results, and there is a lack of research addressing important issues such as scientific papers using wine made from currants. In the current state of knowledge, the authors tend to believe that red wine has only minor positive effects on health and should only be consumed in the Mediterranean diet model-as one glass with dinner with plenty of vegetables and fruits, polyunsaturated fats, as part of a balanced diet and maintained physical activity.

Conceptualization: JR, PR; methodology, PB; software: WR; check: MR, PB, PR; formal analysis: BM; investigation: JR, MR; resources: JR; data curation: KM; writing - rough preparation: JR; writing - review and editing: BM; visualization: JR; supervision, JR; project administration: JR

All authors have read and agreed with the published version of the manuscript.

Funding statement: The study did not receive any external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflict of Interest Statement: The authors declare that they have no conflict of interest.

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