



## THE BIOLOGICAL EFFECTS OF STILBENES FROM WINE OF *Vitis vinifera L*

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**ABSTRACT:** Wine of *Vitis vinifera L* appear to constitute a large polyphenolic compounds including mainly flavonoids and stilbenes. Stilbenes exhibit potent biological activities in vitro on several targets that might be able to influence favourably several physiological and pathological processes, and to provide a protective effect against cardiovascular diseases and cancer, as suggested by epidemiological studies. Trans-resveratrol, the most studied stilbene, shows great promise in the treatment of leading diseases. Among stilbene monomers, resveratrol(3,5,4'-trihydroxystilbene) has been identified as the major biologically active compound. It acts through multiple pathways on the same pathology such as cancer or cardiovascular diseases. Its absorption appears to be high, but the oral bioavailability of unchanged resveratrol is very low due to rapid and extensive metabolism.

**KEYWORDS:-** Antioxidant activity, Stilbenes, Free radicals

### 1. INTRODUCTION

*Vitis* (grapevines) is a genus of about 60 species of vining plants in the flowering plant family Vitaceae. [1]. *Vitis vinifera L.* is a perennial woody vine belonging to the Vitaceae family. It is a productive plant that is considered to be the world's premier fruit, with nearly 9 million hectares of viticultural land in 1990. It is used for wine, juice, fresh consumption (table grapes), dried fruit and distilled liquor. Polyphenolics are important constituents of grapes in determining the colour, taste and body of wines. Wine is generally an alcoholic beverage made from fermented grapes or other fruits. The natural chemical balance of grapes lets them ferment without the addition of sugars, acids, enzymes, water, or other nutrients.[2] Unlike other alcoholic beverages, red wine, which is obtained after maceration, contains phenolic compounds in high concentrations of up to 4 g/l; relatively low quantities are present in white and rosé wines (i.e. about one-tenth of those in red wines) [3].

Among these compounds, stilbenes constitute an important subclass with respect to the diversity of molecules, and its levels can reach 50 mg/l in red wine. Contrary to other alcoholic

beverages, moderate wine consumption was associated with a decrease (or no increase) in the risk of oral and pharyngeal cancer [4, 5] and breast cancer [6]. Among these phenolic compounds, trans-resveratrol, which belongs to the stilbene family, is a major active ingredient and can prevent or slow the progression of major diseases, as well as extend the lifespan of various organisms from yeast to vertebrates [7].

The inverse association between moderate alcohol consumption and coronary heart disease is well established by several reports, and a portion of this benefit seems to be from the alcohol itself [8]. According to World Health Organization statistics (1995), the reduction in the mortality rate from coronary heart disease in France as compared to the USA was 61 % for men and 69 % for women. As compared to the UK, the reduction was 68 % and 71 %, respectively [8,9]. This finding constitutes the "French paradox" because saturated fat intakes and serum cholesterol concentrations are similar in the three countries. This paradox could be attributable in part to high wine consumption [10].

### 2. BIOLOGICAL EFFECTS

Stilbenes naturally occur in several plant families, such as the Cyperaceae, Dipterocarpaceae,

Gnetaceae and Vitaceae [11, 12]. Grapes (Vitaceae) and products manufactured from grapes are viewed as the most important dietary sources of these substances [13, 14]. Among stilbene monomers, resveratrol(3,5,4'-trihydroxystilbene) has been identified as the major biologically active compound, and most of the studies have focussed on it. In addition this some oligomers have been isolated from *Vitis vinifera*; these are the dimers, trimers and tetramers. These oligomers result from the different oxidative condensations of the resveratrol monomer.[15]

Phenolic compounds like stilbenes have a wide range of pharmacological and biological actions in three major domains: cancer, cardiovascular disease and neurodegeneration.[16] Several studies were performed on the major stilbene resveratrol. From these studies it is very evident that the absorption of resveratrol appears to be very high. However, the oral bioavailability of unchanged resveratrol is very low due to rapid and extensive metabolism. Indeed, in vitro and in vivo studies have demonstrated that resveratrol was metabolised to glucuronide and sulphate conjugates. These metabolites occur in the liver, but the rapid appearance of metabolites in plasma suggests that resveratrol is also partly metabolised in the small intestine [17].

In vitro antioxidant studies with total phenolic compounds from red wine showed that red wine diluted 1000-fold, containing 10  $\mu\text{mol/l}$  phenolics, inhibited human LDL oxidation significantly more than  $\alpha$ -tocopherol [18]. Resveratrol can also prevent the initial events of atherosclerosis in endothelial cells by inhibition of the enzymatic systems producing reactive oxygen species such as NADPH oxidase and hypoxanthine/xanthine oxidase, and by inhibition of both the expression of adhesion molecules and the monocyte adhesion to endothelial cells [19]. Red wine polyphenols are also effective in reducing oxidative damage on normal human red blood cells in vitro [20].

It was also observed that dealcoholized red wine containing total phenolics inhibits platelet aggregation induced by ADP and thrombin human [21]. This report suggested that trans-resveratrol is particularly active by inhibiting the synthesis of certain eicosanoids. Resveratrol promotes anti-

ageing effects in numerous organisms. It modulates pathomechanisms of debilitating neurological disorders, such as ischaemia, Huntington's disease (HD), PD and AD [22]. In rat hippocampal neurons, resveratrol inhibits voltage-activated potassium currents, suggesting that it is useful for treating ischaemic brain injury [23] Some in vivo studies have been carried out in animals and human volunteers in order to show these protective effects after wine or pure compound consumption. It was found that red wine notably reduced coronary atherosclerosis in rabbit [24]. Using a hamster model of atherosclerosis, [25] it was reported that the aortic fatty streak area was significantly reduced (76 %) in the group receiving resveratrol, at a level mimicking a moderate consumption of red wine. Intravenous and intragastric administration of red wine, grape juice and not white wine inhibited in vivo platelet activity and thrombosis in canine coronary arteries [26]. After 2–4 months of beverage consumption, rats exhibited a reduction in platelet aggregation at the same rate by alcohol, red wine and white wine [27]. It was also reported that coronary low-velocity reserve and low-mediated dilatation of the brachial artery increased specifically after the intake of red wine by volunteers, certainly due to the improvement of endothelial function and the vasorelaxant effects of polyphenols [28,29].

It is reported that a diet with red wine solids rich in phenols delayed the onset of tumours in transgenic mice that spontaneously develop externally visible tumors without carcinogen pre-treatment [30]. Red wine polyphenols administered to rats with the diet also inhibited colon carcinogenesis induced by chemical compounds, and a significant decrease in the basal level of DNA oxidative damage to the colon mucosa was observed in rats not treated with carcinogens [31]. The study of tumorigenesis in a two stage mouse skin cancer model showed that topical application of resveratrol reduced the number of skin tumours per mouse by up 98 % and lowered drastically the percentage of mice with tumours [32, 33]. It was also reported that [32], systemic administration of resveratrol has been shown to inhibit the initiation and the development of tumours in about 30 rodent cancer models.

### 3. CONCLUSION

From the above results it is very evident that Stilbenes from wine have a very wide range of pharmacological and biological actions. It has also found that wine drinkers have a healthier diet than people who drink beer or spirits, which may explain why wine has an additional beneficial effect on health. In supermarkets, wine buyers made more purchases of healthy food items such as olives, fruit and vegetables than people who buy other beverages [34]. So it suggests that moderate consumption of wine beneficial to health. There is a greater difference between moderate drinking and immoderate drinking. Excessive drinking of any alcohol based beverage is injurious to health.

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