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The health sustainability of herbal wine bioactives towards different chronic diseases

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Abstract
Background: Nowadays, herbal wine is a boon for alcoholic beverage industries as it contains numerous secondary metabolites (bioactives) with many pharmaceutical characteristics.
Aim: The aim of this review is to summarize the current findings about the positive influence of herbal wine consumption on chronic diseases, and the reduction of damage to the cardiovascular system.
Objectives: Chronic diseases become a major health problem in the past decades and are now the second leading cause of death globally. This review aims to outline the benefits of medicinal plants used in herbal wine and plant-derived products and highlight why they should be used as novel anti- chronic diseases agents.
Material and Methods: PubMed, Science Direct, Scopus, Google Scholar are the search engines used for collecting the information for compiling this review paper.
Results: This study emphasizes the alteration of the balance mentioned of total polyphenols and antioxidants present in the herbs and herbal wines which prompts good health and prevention from chronic diseases like cardiovascular disease, diabetes, cancer, arthritis that may affect every human at some point of life. Many reports have been targeted in this review on the health protective properties of herbal wine.
Conclusion: Consumers who didn't like wine were also considered to be uncultured in past, nowadays also get attracted towards herbal wine. It has been concluded that herbal wine is an essential drink which has various polyphenols and antioxidants present in it, which exerts positive impact towards cardiovascular and other chronic diseases and thereby help to prevent them.

Keywords: herbs, herbal wine, chronic diseases, polyphenols, antioxidants, bioactives.

Introduction
Wine's origin traces back to about 8000 to 5000 B.C. in America, Georgia, and Iran; evidence of wine production dates back to the early Bronze Age in the Middle East; and to the third millennium B.C. in Egypt [1]. The fermentation properties of the yeast of the must or juice squeezed out by the grapes, the fruit of the genus Vitis vinifera, which includes up to 5,000 cultivated species used in wine, are included in the wine [2]. After fermentation, wine retains a complex mixture of different compounds that contribute to its quality. Wine contains various amounts of sugar, alcohol, and phenolic compounds, the most studied of which are tannins, resveratrol, and quercetin [3]. Polysaccharides or other trace elements, acids of various forms, and volatile compounds are also present. Flavanols, anthocyanin, and resveratrol are the primary bioactive polyphenols [4]. Flavonoids include catechin, epicatechin, proanthocyanidins, flavones, anthocyanin [5]. Wine has long been used to manage health, and has also been prescribed as medication to relieve symptoms or avoid the most common illnesses. Herbal wine is a necessary beverage that is still in need of improvement [6]. Wine has been used as a medium for herbal preparations mixed with various herbs to cure specific diseases and illnesses since the beginning of the century [7]. Herbal wines are alcoholic beverages made mostly from herbs such as amla, aloe vera, holy basil, lemon grass, peppermint, cinnamon, elder berry, and others. By benefiting from the extract of herbs, regular but restricted use of these herbal wines tends to minimize the need for prescription medications to cure different diseases [8]. Herbal wine and its formulation provide the customer with many health benefits. It performs the role of a functional food. The nutritional value of herbal wine has increased as a result of the yeast's release of amino acids and other nutrients during fermentation. Herbs are often used as flavor enhancers, but it is now well recognized that they have bioactive properties that suggest they may play a role in chronic disease prevention [9].

These herbs were used for their Anticarcinogenic and chemo protective properties. These plants have less toxic anticancer, anti-tumor, and anti-proliferation agents than conventional therapeutics, in addition to these unique properties [10]. For the treatment of cardiovascular disease, chemical and herbal medication are used[11]. Herbal remedies used to treat heart disorders include *Carum carvi* L, *Echium amoenum* Fisch. & *Citrus auranti floria*, *Zataria multiflora* Boiss and *Falcaria vulgaris* Bernh. These are of the most important products affecting cardiovascular disorders [12]. The study of chronic diseases is becoming increasingly common. Internal effects of polyphenols and various wines on the human body have been stated in a variety of studies, owing to their significant role in promoting health. The structure of flavonoids, a major group of polyphenolic compounds linked to the organoleptic and health-promoting effects of red wine, can be influenced by a number of factors. Chronic disorders, also known as non-communicable diseases, are a major health-care challenge. According to the World Health Organization, infectious illnesses account for 71% of all deaths per year [13]. Furthermore, as the (relative and absolute) percentage of people above the age of 65 has taken into account, the number of people with chronic diseases continues to rise. Europe now has the highest number of people aged 60 and over. Many regions of the planet will see accelerated aging, with a quarter of their people aged 60 and over [12]. Since herbal wine produces a variety of phytochemicals, it has been used as a remedy to cure a variety of ailments. Herbal wine is also used to treat a variety of chronic illnesses such as diabetes, kidney disease, cancer, arthritis, and Alzheimer's disease, among many others [13].

Herbs and their constituent's impact on different chronic diseases

Wine includes compounds that have a direct impact on cardiovascular disease and other chronic illnesses [11]. Antioxidants are needed for optimal cardiovascular health. Many seeds and fruits (and their derived products, such as preserves, juices, wine, and so on) and vegetables and their presence in food and drink reduces the risk of cardiovascular diseases, some cancers, and diabetes [11, 16]. Hypertensive patients' blood pressure has been found to be reduced by drinking black grape wine. Wine polyphenols lower the risk of cardiovascular disease and have a beneficial effect on specific human organs [17]. The activity of blue berry fruit polyphenols help in reducing the risk of cardiovascular diseases has been studied by [18]. The results showed the beneficial effects of polyphenols on heart function, reduction of cardiovascular diseases, arteriosclerosis and heart attacks, and reduced risk of hypertension and diabetes [19]. The positive effect of regular consumption of food and drinks rich in polyphenols, such as red wine, tea, chocolate, and vegetables, on endothelial cells and cancer cells [20]. Women that consume more antioxidants (coffee, tea, red wine, blueberries, walnuts, strawberries, cinnamon, and broccoli were significant contributors) have a reduced chance of cardiovascular disease, cardiac arrhythmia, asthma, and diabetes [21]. Flavonoid rhamnetin is another antioxidant used in red wine, as well as tea, assorted fruits, vegetables, and seeds [22]. The effect of rhamnetin on cardiac myocytes under oxidative stress was studied, and it was discovered that rhamnetin can shield cardiomyoblasts from apoptosis by inhibiting free oxygen radicals. Moderate wine drinking has been shown to protect against Alzheimer's disease. Herbal wine made from amla, tulsi, ginger, and aloe-vera is anti-cancer and has been shown to lower cancer risk [23]. Holy basil herbal wine has anti-cancer effects that can be used to treat chronic illnesses such as coughs, colds, and sore throat infections. It's an excellent choice for a pure fermented herbal cocktail. This herbal wine has anti-inflammatory properties [24]. Table one contains different types of herbs used in herbal wine and its health benefits towards chronic diseases.

Table 1: Different types of herbs used in herbal wine and its health benefits towards chronic diseases

Sources	Botanical name	Herb part	Secondary metabolites	Health benefits	Alcohol %	References
Red wine grapes	*Vitis vinifera*	Grape with skin	Antioxidants and Polyphenols like resveratrol.	Positive effect on reduction of cardiovascular diseases and some chronic diseases like cancer.	It has been tested with 15% of ethanol.	[17, 11]
Blue berries	*Cyanococcus*	Berries used	Polyphenols and antioxidant substances such as flavonoids, anthocyanin's	It can helps to reduce the risk of cardiovascular diseases some cancers, and diabetes	It has been tested with 11% of ethanol	[21, 25]
Tea	*Camellia sinensis*	Leaves and tea extract	Tea generally rich in astringent compounds and polyphenols (flavonoid).	Tea lower risk of cardiovascular diseases, heart arrhythmia, chronic illnesses such as cough, cold, fever, cancer and aging diabetes.	it has been tested with 8.82% of ethanol	[21]
Amla	*Phyllanthus emblica*	berry	phytoconstituents like Gallic acid (GA) and Ascorbic acid (AA)	Amla wine contains radical scavengers, it prevent from cardiovascular disease, antiulcer, anticancer, antitumor, type-2 diabetes	It has been tested with 11.4% ethanol.	[26]
Aloe Vera	*Aloe barbadensis miller*	Leaves	Vitamin C, polyphenol, glycoside, phenolic compound.	Aloe-vera has protection against immune system deficiencies, cardiovascular	It has been tested with 8.52 % ethanol.	[27]
Hibiscus	*Hibiscus rosa-sinensis*	Dried crushed flowers petals	antioxidant properties of flavonoids, polyphenolic Compounds and anthocyanins, α-tocopherol, ascorbic acid, carotenoids and flavonoids	Hibiscus contains Low Density Lipoproteins (LDL) which prevents cancer cells.	It has been tested with 11.50% ethanol	[28, 29]
Garlic	*Allium sativum*	Whole garlic by peeling off outer skin	Phenolic compounds (vanillic acid, caffeic acid, ferulic acid, sinapic acid) and anthocyanins.	Garlic wine active against coronary disease and cancer.	It has been tasted with 5.5% of ethanol	[10]

Lemon grass	*Cymbopogon*	Leaves and dry powder	flavonoids, alkaloids, tannins, terpenes, phenolics, anthocyanins, steroids, saponins, isoflavones	Lemon grass improves levels of sugar and cholesterol in the blood	It has been tasted with 6 % of ethanol	[30]
Purple sweet potato	*Dioscorea alata*	Root of purple sweet potato	Anthocyanin pigment, phenolic acids, anthocyanins, tocopherol and b-carotene	Purple sweet potato inhibit cancer cell growth, combating blindness and chronic diseases	It has been tested with 8.61% ethanol.	[31]
Holy basil	*Ocimum tenuiflorum*	Leaves	Phenolic compounds and flavonoids like rosamarinic acid, rutin, gallic acid, quercetin, caffeic acid, chlorogenic acid and kaempferol	Holy basil contains Anti-cancerous, anti-oxidant, anti-diabetic properties.	It has been tested with 5.51% of ethanol.	[32]

Herbs with secondary metabolites

The phytochemical components of medicinal plants are largely responsible for their wide range of pharmacological results. Plant phytochemical constituents are divided into two groups depending on their roles in essential metabolic processes: primary metabolites and secondary metabolites. Plants are an important source for the discovery of new products of medicinal value for drug development and plants secondary metabolites are unique sources for pharmaceuticals food additives, flavors, and other industrial values [33]. Plant secondary metabolites are unique sources for pharmaceuticals, dietary additives, flavors, and other industrial values, and plants are a vital tool for the discovery of new medicinal drugs for drug pharmaceuticals. The medicinal effect of herbals is directed towards secondary plant metabolites during research. Secondary herb metabolites have long been included in herbal medicine and folk medicine to treat a variety of ailments. Secondary plant metabolites are divided into different groups based on their chemical compositions [34]. Secondary metabolites in plants are usually categorized based on their biosynthetic pathways. Flavonoids, steroids, and alkaloids are the four large molecule families. [33]. Polyphenols are secondary metabolites of plants. They comprise several antioxidant compounds and they are generally considered to be involved in the defense against human chronic diseases [35]. While the biological roles of polyphenols are extensive, there is still insufficient evidence to support strong beneficial effects on human chronic diseases. Grape (Vitis vinifera) leaf extracts (GLEs) are known to be rich in phenolic compounds that exert potent antioxidant effects which is avoid different chronic diseases [37].

Mechanism of secondary metabolites in chronic diseases

Polyphenols

Polyphenols are secondary metabolites of plants. They comprise several antioxidant compounds and they are generally considered to be involved in the defense against human chronic diseases [35]. the current evidence defining the position of their dietary intake in the prevention treatment of human chronic diseases, including prostate cancer and other types of cancer, cardiovascular diseases, diabetes mellitus and neurodegenerative diseases such as Alzheimer's disease [35]. There is substantial epidemiological evidence that a diet high in polyphenol-rich fruit, vegetables, cocoa and beverages protects against developing cardiovascular disease and type 2 diabetes [37]. Polyphenols from various food sources such as cocoa, coffee, tea, and apples have been associated with various health-related benefits, including in cardiovascular disease and type 2 diabetes [38] Polyphenols defense against different forms of cancer, Cardiovascular Diseases Prevention, Anti-Obesity Effect/Weight-Reducing Properties, Antidiabetic Activity, and Alzheimer's disease [39]. Figure one shows the importance of polyphenols towards different chronic diseases.

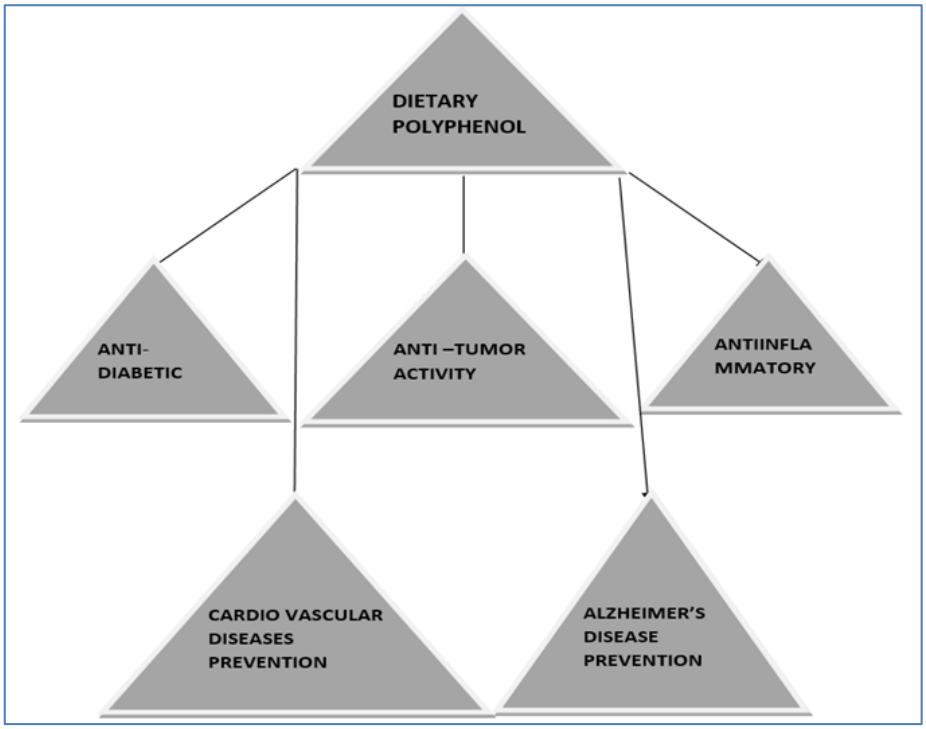

Fig 1: Polyphenols importance towards different chronic diseases prevention

Flavonoids in cardiovascular disorders

Flavonoids are abundant plant-based natural products that have a wide range of medicinal and biological activities. Citrus flavonoids have a variety of biological functions and have shown to be effective treatments for cardiovascular disease. Citrus flavonoids scavenge free radicals, increase glucose tolerance and insulin sensitivity, modulate lipid metabolism and adipocyte differentiation, inhibit inflammation and apoptosis, and improve endothelial dysfunction, among other things [40]. According to their structure, flavonoids could be divided into 6 classes: flavanones, flavones, flavanols, isoflavones, flavonols, and anthocyanidins[41]. Flavonoids are a family of natural compounds that have a polyphenolic composition that are distinguished by two benzene rings in their general structure (two phenyl rings and a heterocyclic ring). The three elements combine to form the flavan nucleus, which is the fundamental structure of flavonoids [42]. Flavonoids are antioxidants present in bananas, vegetables, nuts, beans, coffee, wine, and tea, and have been linked to diseases such as cancer, atherosclerosis, Alzheimer's disease, and many others chronic disease [43]. Polyphenols are the most abundant antioxidants in the diet. Their consumption is ten times that of vitamin C and twenty times that of vitamin E or carotenoids. They are used in a variety of culinary, pharmaceutical, medical, and cosmetic uses due to their antioxidant, anti-inflammatory, anti-carcinogenic, and antimutagenic properties [44]. CVD is the primary cause of death and morbidity worldwide. In recent years, the number of deaths of women with cardiovascular disease has surpassed that of breast cancer deaths [45]. Figure represents the classification of flavonoids.

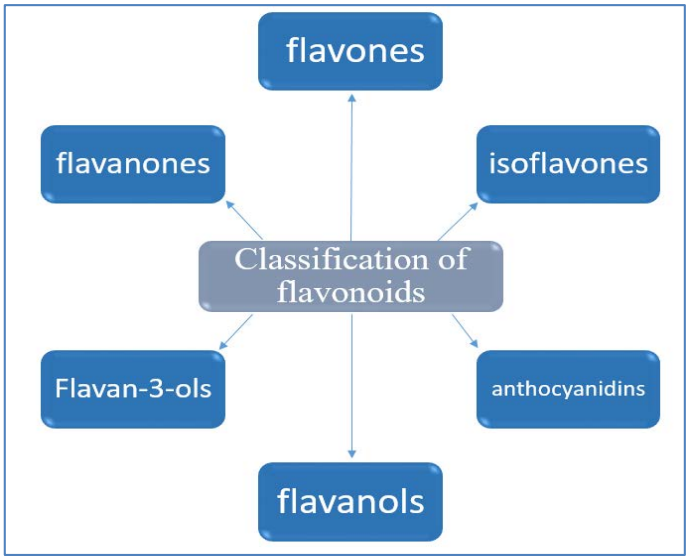

Fig 2: Classification of flavonoids

Conclusion

The leading causes of death and injury are chronic diseases. The biological processes of nutritional herbal wine and nutraceuticals, as well as various natural bioactive compounds from a variety of plant sources, have been thoroughly explored in this study. As a result, antioxidant phytochemicals are one of the most promising treatments for chronic diseases. They have a wide range of biological functions and health effects, including antioxidant and free radical scavenging properties, anti-inflammatory activity, anticancer, anti-aging, and protection against coronary disorders, diabetes, obesity, and neurodegenerative diseases. Herbal wine, are protective against cardiovascular disease, diabetes, and obesity when consumed in moderation Although both in vitro and in vivo studies have reported the anti-carcinogenic properties of herbal wine, protect against carcinogenesis. For cardiovascular diseases, diabetes and obesity, herbal wine is beneficial. It is of note that binge drinking was associated with major cardiovascular accidents, such as myocardial infarction and stroke. For healthy adult drinkers, no more than one drink for females or two drinks for males every day, especially herbal and red wine, is acceptable and relatively safe, and might be protective for the cardiovascular system, and prevention of different chronic diseases.

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