

Research Articles

Analysis of the Perceptions of Primary Care Physicians in Spain Regarding the Relationship Between Health and wine.

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This study aims to determine the attitudes of primary care physicians in Spain towards the consumption of wine and its effects on health. To this end, 199 surveys were conducted on primary care physicians in Spain. The study concludes that medical professionals associate moderate wine drinking with possible cardiovascular benefits, although there are three groups of physicians with different attitudes toward the consumption of wine and its relationship to health. All of the groups, however, coincide in the view that the amount of wine consumed must be limited. This paper makes an important contribution to research knowledge as it focuses on perceptions of the wine-health relationship among primary care physicians in particular.

1. Introduction

Contemporary societal concerns surrounding the relationship between food and health have led agri-food businesses to become keenly interested in studying and increasing the health benefits of their products. This trend extends to wine, an agricultural product that has numerous beneficial health effects due to its myriad components (Ortuño, 2009). Moderate wine drinking with meals is, for example, one of the main characteristics of the Mediterranean diet (Arós & Estruch, 2013). In combination with foods typical of the Mediterranean diet such as olive oil, vegetables and white meat, consumption of a moderate amount of red wine offers even greater benefits in terms of reducing cardiovascular risk (Mezzano et al., 2001).

The so-called “French paradox” provides another example of the beneficial effects that wine may have on health. It was observed that a diet high in fats, which is typical of the French, did not correlate to the percentage of cardiovascular events that occurred, which was lower in France than in other countries where fatty foods were frequently consumed. It was posited that moderate consumption of wine over an extended period might explain this phenomenon (Renaud & de Lorgeril, 1992). What is known for certain is that as a result of this study, wine consumption rose in the USA and scientists began to further investigate the effects of diet and wine. It seems likely that myriad indeterminate variables may be triggered by the link between alcohol and polyphenols, as alcohol could increase the body’s absorption of other components in wine (Brust, 2010).

In summary, as described by Leighton and Urquiaga (2007), wine and the Mediterranean diet can be said to have synergistic protective effects on cardiovascular risk factors, and some of the protective changes observed in connection with moderate wine consumption only materialize in diets high in fat.

In addition, people generally have a positive view of the beneficial effects of moderate wine consumption (Ortuño, 2009) although consumers lack sufficient, scientifically-supported information to enable them to make safer decisions regarding the consumption of alcoholic drinks (Henley et al., 2011). In fact, consumers find it difficult to comprehend nutritional information and to distinguish between the different levels of scientific evidence behind food claims (Higgins & Llanos, 2015). Against this backdrop, primary care physicians have an important role to play in balancing public health with the benefits of moderate consumption of wine. Given its role in improving the health of a country’s population, primary care is a cornerstone of any health system (Arrazola-Vacas et al., 2015).

This paper aims to shed light on the perceptions of Spanish primary care physicians regarding moderate consumption of wine. By providing information on the attitudes of medical workers in particular, it adds significant value to current research knowledge. The United States, for example, considers moderate alcohol consumption by adults of legal drinking age to be a daily amount of 10 g ethanol (1 drink) for women and 20 g ethanol (2 drinks) for men (Hrelia et al., 2022). This paper also analyses the views of primary care physicians in order to consider this assessment with regard to the specific case of wine. The vast majority of chronic illnesses are largely preventable with hygiene and dietary measures (Arós & Estruch, 2013).

1.1. Literature Review: Wine and Health

Multiple publications describe wine’s possible health benefits (Biasi et al., 2014). As detailed in [Table 1](#), a brief literature review reveals numerous positive effects on health stemming from moderate consumption of wine. Chief among these is its cardioprotective effect, which is owing to multiple factors. On one hand, it is believed that ethanol can increase levels of high-density lipoprotein

Table 1. Literary review of the possible health benefits of moderate wine consumption

Effect on Health	Authors
Reduction of risk factors for cardiovascular disease	Leighton y Urquiaga (2007); Covas et al. (2010); Berciano y Ordovás (2014); Higgins y Llanos (2015); Pérez-Mañá et al. (2015); Artero et al. (2015); Tresserra-Rimbau et al. (2015); De la Torre et al. (2017); Teissedre et al. (2018); Castaldo et al. (2019); Ditano-Vázquez et al. (2019); Choleva et al. (2022); Lucerón-Lucas-Torres et al. (2023)
Diabetes, regulation of blood sugar levels	Leighton y Urquiaga (2007); Rodrigo et al. (2011); Artero et al. (2015); Chikezie et al. (2015); Gepner et al. (2015); Tresserra-Rimbau et al. (2015); Martin et al. (2017); Zhu et al. (2017); Fragopoulou et al. (2018); Golan et al. (2019)
Improvement of neurodegenerative disorders	Brust (2010); Artero et al. (2015); Caruana et al. (2016); Silva & Vauzour (2018); Petrella et al. (2021); Montero et al. (2023)
Lower risk of cancer	Shukla & Singh (2011); García Rodríguez et al. (2015); Sancho y Mach (2015); Klarich et al. (2015)
Lower risk of blindness and macular degeneration	García-Medina et al. (2014); Giaquinta Aranda et al. (2017); Fernández-Araque et al. (2017)
Improvement of IBD	Biasi et al. (2014); Ko et al. (2014); Tsoupras et al. (2023)
Regulation of blood pressure	Gepner et al. (2016); Golan et al. (2019); Roth et al. (2019)
Regulation of haemostasis	De Curtis et al. (2005); Fragopoulou et al. (2018)
Increased longevity	Biasi et al. (2014); Gambini et al. (2021)
Reduced oxidation of LDL cholesterol	Ou et al. (2006)
Lower risk of kidney stones	Fernandez Cabot (2014)

(HDL, or “good cholesterol”) and apolipoproteins A-I and A-II, in addition to reducing platelet aggregation, which in turn triggers changes in blood coagulation and fibrinolysis. On the other hand, phenolic compounds are known to be excellent lipid antioxidants which act by inhibiting the oxidation of low-density lipoprotein (LDL, or “bad cholesterol”) and increasing the synthesis of nitric oxide, which improves arterial vasodilation and reduces monocyte adhesion to the endothelial wall, thereby preventing atherosclerotic plaque formation.

Moderate wine consumption also protects against Type 2 diabetes mellitus by reducing insulin resistance and improving insulin secretion and sensitivity. It can also improve blood sugar levels through a range of mechanisms such as the inhibition of glucose absorption in the intestine or peripheral tissues (Rodrigo et al., 2011).

Another significant protective effect attributed to wine is its impact on neurodegenerative disorders such as Alzheimer’s and Parkinson’s. Multiple studies have shown that wine, more specifically, resveratrol, has a preventive effect against Alzheimer’s disease, improving cognitive function and reducing memory loss. Alzheimer’s patients develop brain lesions due to the accumulation of a monomer called amyloid beta. Several studies have concluded that resveratrol helps to break down these peptides, thereby protecting the brain.

The development of various forms of cancer, a multifactorial disease, has been linked to diet. In combination with the Mediterranean diet, wine has a beneficial and synergistic effect that protects against some types of tumours (Sancho & Mach, 2015). In recent years, several studies have highlighted the protective and preventive effect that polyphenols may have on carcinogenesis (García Rodríguez et al., 2015), demonstrating their ability to inhibit the growth of tumours in animals and cell cultures.

Numerous recent studies have also suggested that diet may have an effect on age-related vision loss (Fernández-Araque et al., 2017). Drinking wine brings the positive effects of antioxidant compounds, specifically polyphenols, into play in ocular processes. These compounds have been reported to have direct and indirect beneficial effects on the progression of glaucoma (Giaquinta Aranda et al., 2017).

Intestinal diseases have also been studied in relation to wine consumption. Polyphenols reach higher concentrations in the intestinal mucosa than in other tissues, which increases their intracellular antioxidant effect. Most phenolics in wine target the redox-sensitive transcription factor NF- κ B, which controls the inflammatory cell signalling cascades that have been implicated in the development of colorectal cancer and the pathogenesis of IBD (Biasi et al., 2014).

Other benefits associated with wine consumption include the regulation of haemostasis and blood pressure and the reduction of LDL cholesterol. Given the numerous effects that wine can have on health, the first research question of this study is “What benefits for human health are associated with drinking different types of wine, in the opinion of primary care physicians?”.

As described above, extensive scientific evidence supports the possible existence of health benefits from moderate wine consumption. The most recent studies confirm the valuable role of moderate wine consumption, especially red wine, in the prevention and treatment of chronic diseases such as cardiovascular disease, metabolic syndrome, cognitive decline, depression, and cancer (Pavlidou et al., 2018). Furthermore, the majority of the reviewed articles indicate that moderate consumption of red wine reduces the risk of developing various diseases, consistent with the findings presented in the literature review by Serio et al. (2023).

It is also, however, important to consider consumers' attitudes toward drinking wine, as a predisposition to view a product or idea in a certain way influences the actions that are taken. Consumers have trouble distinguishing between the different levels of scientific evidence that support food claims, and this may arouse a degree of scepticism when choosing products such as wine (Higgins & Llanos, 2015). Their perceptions and knowledge will divide them into different groups, playing a key role in whether they purchase a particular drink. In marketing, it is often said that what a consumer doesn't perceive, doesn't exist and has no value for them. If consumers view a certain product as healthy, for example, that favourable view will likely cause them to consume it more often, or even to start consuming it for the first time. Attitudes that are formed may even be rooted in incorrect beliefs or associations. Despite all of the knowledge and information available about the potential benefits of moderate wine consumption, if a person views wine as being negatively associated with health, that attitude may cause them to stop consuming it despite the irrationality of this decision.

Authors such as Yoo et al. (2013) and Higgins and Llanos (2015) have employed a scale to measure attitudes towards the relationship between wine consumption and human health. Yoo et al. (2013) assessed attitudes to wine in relation to health and observed that Koreans were more likely than Australians to choose wine based on health criteria. Similarly, Higgins and Llanos (2015) reported that consumers' sociodemographic characteristics had a bearing on whether health benefits were perceived. For example, women were more likely than men to be influenced by the awards a wine might have won or by the opinions of restaurant staff. The respondents in their study had a favourable view of wine, considering it healthier than other alcoholic drinks. However, the study identified various groups of consumers who displayed a greater interest in the health benefits of drinking wine. Both of these studies focused on consumer attitudes, giving no consideration to the views of some of the key players in matters of health: medical workers. Primary care physicians are an important source of information and have been identified by Varela Veiga et al. (2003) as the most suitable health workers to manage alcohol consumption. In view of this, the second research question of this study is "What attitude do primary care physicians have toward alcoholic drinks, in particular wine?". It also aims to determine whether their attitudes differ, as do those of consumers.

2. Materials and methods

The information used in the study was collected via a personal survey of primary care physicians in Spain which is detailed in [Table 2](#). The total number of these professionals is 37,593 (Ministerio de Sanidad, 2024). Stratified random sampling with proportional allocation by region was used, with the number of respondents distributed according to the number of physicians in each region. Different regions of Spain were considered because wine production is more important in some than in others, resulting in a greater wine culture in those where the industry has

a stronger presence. Fieldwork was conducted at a national conference. This choice was made because physicians acknowledge the need to continuously seek information, with attendance at such events serving as a key method for updating their knowledge (Galli et al., 2015). The validity of the survey was assessed based on content, while reliability was evaluated using Cronbach's alpha, obtaining a score of 0.72, which is deemed acceptable (Hair et al., 2006). Finally, it should be noted that the maximum margin of error is $\pm 7\%$ in the worst possible case ($p=q=0.5$).

The questionnaire asked the physicians how much wine consumption per day they would consider to be moderate. In keeping with the study's conceptual framework, the questionnaire also listed the main health benefits of drinking wine and asked respondents whether they were associated with red wine, white wine, no wine consumption at all, or whether they didn't know or were unable to answer. The "no wine" option was included because the alcohol content of wine could cause it to be negatively associated with health, leading to the perception that it lacks any health benefits at all. Another question, based on the scale proposed by Yoo et al. (2013) and Higgins and Llanos (2015), measured attitudes towards the relationship between wine consumption and health. For this purpose, a 5-point Likert scale of agreement or disagreement was used. Finally, information about the primary care physicians surveyed was collected for classification purposes.

Quantitative data processing was performed via simple correspondence factor analysis and cluster analysis. Correspondence analysis is a descriptive technique used to represent contingency tables, i.e., tables that display the frequency with which two or more qualitative variables appear in a set of elements. Cluster analysis, for its part, uses a set of variables for each subject to measure the similarity between them by estimating distances. The program CAR (Lorenzo-Seva et al., 2009) was used to perform the simple correspondence factor analysis, while SPSS was used for the cluster analysis.

3. Results

As regards the characteristics of the study sample (see [Table 3](#)), 63.3% were women, the average age of the doctors surveyed was 49.4 years, and they had worked as primary care physicians for an average of over 20 years. 51.8% of those surveyed said they personally consumed wine at least once per week and almost two out of three of the doctors quantified moderate wine consumption as between half a glass and one glass of wine per day.

The health benefits perceived by the primary care physicians in association with each type of wine are analysed below. [Table 4](#) shows their responses regarding the potential benefits of moderate consumption of red wine, white wine, and no wine, as well as the number of respondents who answered "Don't know" or "No answer". Given the extensive size of this table and to maximize comprehension, the discussion focuses on the correspondence analysis detailed in [Tables 5 and 6](#).

[Table 5](#) shows that the first axis explains almost 91% of the variance between the two data sets analysed. Adequate

Table 2. Details of the survey of primary care physicians in Spain regarding their views on moderate wine consumption

Universe	Primary care physicians in Spain
Sample design	Random stratified by region
Sample size	199 primary care physicians
Sampling error	±7% where $p=q=0.5$, with a confidence level of 95.5%

Table 3. Characteristics of the primary care physician surveyed

	Total sample
Sex of the primary care physician (%)	
Male	36.7
Female	63.3
Age of primary care physician (average)	49.4
Years worked as a primary care physician (average)	20.8
Frequency of wine consumption by the primary care physician (%)	
At least once per week	51.8
At least once per month	26.1
Once every three months	5.5
Less than once every three months / Never	16.6
Moderate wine consumption per day, according to primary care physicians (%)	
None, wine should not be consumed	4.5
Half a glass of wine (75 ml)	21.1
1 glass of wine (150 ml)	40.2
1-2 glasses of wine (151-300 ml) / More than 2 glasses of wine (> 300 ml)	34.2

Table 4. Association of possible beneficial effects of moderate wine consumption (number of answers given)

	Red	White	No wine	Don't know/No answer
Helps the cardiovascular system	173	14	10	7
Promotes regulation of haemostasis by affecting fibrinogen	82	8	29	71
Helps control blood pressure	92	10	54	37
Promotes cholesterol reduction	89	8	49	45
Helps regulate blood sugar levels	19	7	101	63
Improves IBD	34	9	76	68
Promotes better memory	40	9	74	68
Helps against neurodegenerative disorders (Alzheimer's, dementia, etc.)	49	10	66	68
Can lower the risk of kidney stones	24	12	73	81
Improves the skin's elasticity	51	11	55	71
Can lower the risk of age-related blindness and macular degeneration	34	6	67	85
Can prevent some types of cancer	62	12	48	77

interpretation is thus possible as this is well above the variance of 50-60% recommended for social sciences (Hair et al., 2006).

Table 6 shows the coordinates and the inertia explained by the response given (red wine, white wine, no wine or unsure/no answer) and the possible health benefits analysed

for Axis 1. Red wine makes the largest contribution to the first axis, explaining 64.4% of the inertia. The “no wine” option is also well represented, at over 20%. With respect to potential health benefits, the following variables are well represented on this axis, making a significant contribution to its formation: “Helps the cardiovascular system” (58.8%

Table 5. Results of the simple correspondence factor analysis between type of wine, no wine, or unsure/no answer and the possible health benefits analysed

Axis	Principal inertia	Contribution to inertia (%)	Cumulative (%)
1	0.1977	90.9	90.9
2	0.0179	8.2	99.1
3	0.0019	0.9	100.0

Table 6. Coordinates and contributions of red wine, white wine, no wine and unknown/no answer and the potential health benefits analysed

Answer given	Axis 1	
	Coordinates	% of inertia explained
Red	-0.63	64.4
White	-0.10	0.3
No wine	0.36	20.1
Don't know/No answer	0.31	15.2
Potential health benefits		
Helps the cardiovascular system	-1.15	58.8
Promotes regulation of haemostasis by affecting fibrinogen	-0.24	2.3
Helps control blood pressure	-0.33	4.5
Promotes cholesterol reduction	-0.30	3.7
Helps regulate blood sugar levels	0.51	10.9
Improves IBD	0.31	4.0
Promotes better memory	0.26	2.7
Helps against neurodegenerative disorders (Alzheimer's disease, dementia, etc.)	0.15	1.0
Can lower the risk of kidney stones	0.41	7.1
Improves the skin's elasticity	0.10	0.4
Can lower the risk of age-related blindness and macular degeneration	0.33	4.6
Can prevent some types of cancer	0.01	0.0

of inertia) and “Helps regulate blood sugar levels” (10.9%). Consideration of the coordinates of the responses and the different health benefits indicates that primary care physicians associate red wine with aiding the cardiovascular system but don't perceive or associate the consumption of any type of wine with improved blood sugar regulation.

Two different aspects can be distinguished in the physicians' attitudes towards moderate wine consumption and its relationship to health. On one hand, as [Table 7](#) shows, they believe it can lower the risk of certain diseases and that wine is a healthy drink or has more and better health-promoting properties than other alcoholic drinks. In other words, they take a positive view. However, they also take a critical view of patients' knowledge of how much wine it is healthy to consume and of its potentially harmful health effects, or they indicate that the amount of wine consumed must be limited, with the last variable receiving the highest score (4.3). However, in certain cases the coefficients of variation indicate a wide dispersion that may reflect the existence of primary care physicians with differing opinions. A cluster analysis was thus performed, using the variables detailed in [Table 7](#). After reviewing the resulting dendro-

gram, it was determined that the best solution was that of three groups of physicians.

[Table 8](#) details the values by group for each of the variables used to assess the attitudes of primary care physicians towards the relationship between wine consumption and health. Three groups with different characteristics were identified.

Group 1 encompasses 20.1% of all physicians surveyed and displays a favourable attitude toward the relationship between wine and its health-promoting properties. For example, this group agrees quite strongly with the statement “Wine has more or better health-promoting properties than other alcoholic drinks” (4.1). It also views patients as responsible. For example, it gives a score of 3.7, the highest of the three groups, to the statement “Patients know what moderate wine drinking is”. This group could thus be labelled “Favourable” primary care physicians.

Group 2, the smallest of the three, represents slightly more than 14% of the doctors surveyed and disagrees that wine consumption is healthy. It gives the lowest rating, 1.5, to the statement “Wine is a healthy alcoholic drink”. It also distrusts patients' awareness, disagreeing with the statements “Patients display knowledge of how much wine it is

Table 7. Attitude to wine consumption and its relationship to health (1 = strongly disagree; 5 = strongly agree)

	Average	Typical deviation	Coefficient of variation (%)
Wine can reduce the risk of certain diseases	3.8	1.01	27.3
Wine is a healthy alcoholic drink	3.5	1.15	32.9
Wine has more health-promoting properties than other alcoholic drinks	3.9	0.96	24.6
Wine has better health-promoting properties than other alcoholic drinks	3.9	0.86	22.1
Patients display knowledge of how much wine it is healthy to drink	2.0	1.08	54.0
It is important to limit the amount of wine consumed	4.3	0.99	23.0
Patients know what moderate wine drinking is	2.1	1.03	49.0
Patients know why wine is bad for their health	2.3	1.07	46.5

Table 8. Groups of primary care physicians by their attitudes to wine consumption and its relationship to health: average scores (1 = strongly disagree; 5 = strongly agree)

	Group 1	Group 2	Group 3	ANOVA-F
Number (%)	40 (20.1)	28 (14.1)	131 (65.8)	
Attitude				
Wine can reduce the risk of certain diseases	3.9	2.1	4.1	F (2.196) = 90.3 (p = 0.00)
Wine is a healthy alcoholic drink	3.8	1.5	3.8	F (2.196) = 91.3 (p = 0.00)
Wine has more health-promoting properties than other alcoholic drinks	4.1	2.4	4.2	F (2.196) = 68.9 (p = 0.00)
Wine has better health-promoting properties than other alcoholic drinks	4.1	2.9	4.1	F (2.196) = 34.8 (p = 0.00)
Patients display knowledge of how much wine it is healthy to drink	3.3	1.2	1.8	F (2.196) = 61.1 (p = 0.00)
It is important to limit the amount of wine consumed	4.3	4.4	4.3	F (2.196) = 0.2 (p = 0.82)
Patients know what moderate wine drinking is	3.7	1.6	1.7	F (2.196) = 154.3 (p = 0.00)
Patients know why wine is bad for their health	3.6	1.8	2.0	F (2.196) = 52.7 (p = 0.00)

healthy to drink" (1.2) and "Patients know what moderate wine drinking is" (1.6). This group could thus be labelled "Unfavourable".

Finally, Group 3, which is the most numerous and includes nearly two-thirds of the physicians surveyed (65.8%), perceives wine as healthy, as does Group 1. Like Group 2, however, it views patients as irresponsible with respect to how much wine can be consumed, an opinion made clear in its score of 1.7 for the statement that "Patients know what moderate wine drinking is". This group could be labelled "Ambivalent", as it views moderate wine consumption as favourable for health but distrusts patients.

Finally, [Table 9](#) profiles the segments identified based on their views regarding wine consumption and their own personal characteristics.

Group 1, labelled "Favourable", quantifies moderate wine consumption in the highest amount (1-2 glasses or more than 2 glasses per day), and 7 out of 10 of the physi-

cians in the group drink wine at least once a week. This reaffirms the label of "Favourable" assigned to this group, which is the only one to contain more men (53.7%) than women. Finally, with respect to years worked as a primary care physician and age, it has the highest average values.

Group 2, labelled "Unfavourable", quantifies moderate wine consumption as drinking no glasses or half a glass of wine per day (over 46%) and its own wine consumption is very low. Almost 4 in 10 of the primary care physicians in the group never drink wine or do so less than once every three months. Once again, a relationship is seen between consumption patterns and attitudes, which in this group are unfavourable. The group is equally balanced in terms of gender, and with respect to years worked as a primary care physician and average age, its members are generally younger.

Group 3, labelled "Ambivalent", quantifies moderate wine consumption as one glass per day (nearly 46%) and its

Table 9. Characterization of groups of primary care physicians according to their attitudes towards wine consumption and its relationship to health

	Group 1	Group 2	Group 3	Chi-squared
Moderate consumption of wine per day for patients (%)				79.03 (p=0.000)
None, wine shouldn't be consumed / Half a glass of wine (75 ml)	20.0	46.4	22.9	
1 glass of wine (150 ml)	25.0	35.7	45.8	
1-2 glasses of wine (151-300 ml) / More than 2 glasses of wine (> 300 ml)	55.0	17.9	31.3	
Frequency of wine consumption by the physician (%)				24.19 (p=0.002)
At least once per week	70.0	25.0	51.9	
At least once per month	17.5	28.6	28.2	
Once every three months	10.0	7.1	3.8	
Less than once every three months / Never	2.5	39.3	16.0	
Sex of primary care physician (%)				14.38 (p=0.001)
Male	57.5	50.0	27.5	
Female	42.5	50.0	72.5	
	Group 1	Group 2	Group 3	ANOVA/F
Years worked as a primary care physician (average)	25.9	17.0	20.1	F (2.196) = 5.3 (p = 0.006)
Age of physician (average)	53.7	45.3	48.9	F (2.196) = 61.1 (p = 0.03)

own wine consumption is similar to the average of the total sample, i.e., the data show an intermediate level of consumption. The average age of its members and the years they have worked as primary care physicians are also similar to the averages of the total sample. In terms of gender, this group has the most women, who account for over 7 in 10 of its members.

4. Discussion

As seen in [Table 1](#), the literature on wine's cardiovascular benefits is extensive, more so than for studies focusing on other areas. This is in line with this study's findings, which show an evident association of wine, specifically red wine, with heart-healthy effects (Gepner et al., 2015). Similarly, a study by Chang et al. (2016) concludes that the majority view is that red wine is the healthiest alcoholic drink, and that this view is independent of factors such as gender. The antioxidant effect of polyphenols, specifically resveratrol, and the synergy between the alcohol and polyphenols in red wine are largely behind the perception of therapeutic benefits. In addition, Chikezie et al. (2015) have described the irrefutable influence that reactive oxygen and nitrogen species have on the physiopathology of diabetes. The findings, however, do not establish the precise therapeutic effects of antioxidants, which need further clarification. With a view to creating specific therapeutic guidelines in clinical practice, primary care physicians still seem to undervalue the beneficial effects of moderate wine consumption on diabetes. Similarly, a review of various studies reveals no conclusive evidence indicating that light-to-moderate alcohol consumption adversely affects cognition and increases the risk of dementia (Reale et al., 2020).

Finally, it should be noted that moderate consumption of white wine wasn't associated with any potential benefits. One possible explanation for this is that the amount of resveratrol, one of the polyphenols in wine that has received the most attention, can vary from 0 to 2.9 mg/l in red wine but from just 0 to 0.06 mg/l in white wine (Leighton & Urquiaga, 2007).

In cluster analysis, it should be noted that all three groups share the attitude that "It is important to limit the amount of wine consumed". The "Wine in Moderation" campaigns carried out by the wine industry in 2020 to encourage moderate consumption may thus have been rooted in the general consensus among primary care physicians regarding the importance of moderation. Some authors, such as Xiang et al. (2014), have questioned the view that wine's health benefits stem solely from the presence of resveratrol and its role as a powerful antioxidant, arguing that wine's health-promoting effects are more complex in nature and result from the multiplex composition of the drink itself. Moreover, although a growing body of evidence corroborates the health benefits of wine, all of it stresses the importance of moderate consumption in order for them to be realized, and some authors question whether overoptimism may have come into play (Chikezie et al., 2015). From a public health perspective, primary care physicians should implement various measures to address the limitation of wine consumption. Firstly, it is essential to educate patients about moderate wine intake (Hrelia et al., 2022), providing a clear message tailored to their sociocultural backgrounds. Increased knowledge regarding wine allows individuals to make more responsible choices and thus limit their consumption (Jaud et al., 2022). Secondly, physicians should incorporate prevention into their daily prac-

tice through regular assessments (DiMartini et al., 2022). Such intervention ought to be brief and efficient to ensure effectiveness and patient acceptance.

This study's results indicate that Spanish primary care physicians associate beneficial health effects from wine with the specific type of wine consumed. Red wine stands out in particular for its strong association with cardiovascular benefits. White wine, on the other hand, isn't associated with any health benefits in this study.

The doctors also show a generally favourable view regarding alcoholic drinks, in particular wine, although they believe it is vital to limit the amount of wine consumed. With respect to patients' ability to consume wine in moderation, they seem to show doubt or distrust. Furthermore, the segmentation performed based on their attitudes towards wine consumption and its relationship to health identifies three different groups of physicians. For the most part, the physicians perceive moderate consumption as beneficial for health. However, in their attitudes towards their patients they seem to display distrust. It may be that doctors see it as risky to advise patients to drink wine because they fear this might be taken as a licence to consume other alcoholic drinks.

The "Favourable" group consists of older, more experienced physicians, the majority of whom are male, and is the group whose own wine consumption is most frequent. This group likely regularly includes wine in a diet based on a slower, more elaborate style of eating and food preparation. The "Ambivalent" group takes a favourable view of the health benefits of moderate wine consumption and stands out for having the highest share of women and perhaps a more prudent attitude. It is true that information about alcoholic drinks is ambiguous and that clinical trials have been fairly inconsistent. Moreover, it is difficult to form a general view due to the varying nature of patients' characteristics and pathologies, which makes it hard to establish universal prescription guidelines. Finally, the members of the "Unfavourable" group are the youngest and consume the least wine. They may have a different culture, with water and alternative drinks serving as their main beverages, or diets based on faster, more ready-made food.

The results of this study show that the attitudes and perceptions of primary care physicians in Spain regarding the health benefits of wine use are related to their own definition of "moderate" wine intake and their personal wine-drinking behaviours. However, there are two groups of professionals who are misinformed. The "Favourable" segment supports a level of moderate wine consumption that exceeds and may be more harmful than the limits suggested by studies, which recognise health benefits at a consumption level of one glass or less per day for women and two glasses or less per day for men. Indeed, moderate wine consumption, defined as one to two glasses per day as part of the Mediterranean diet, has been positively associated with promoting human health, as well as with the prevention and prognosis of diseases (Pavlidou et al., 2018). The discrepancy regarding what constitutes moderate wine consumption may be influenced by personal factors specific to the physician, such as age or sex. A study conducted among

primary care professionals in Spain found an association between being a male and a consumer of alcohol, and being female and a teetotaller (Rodríguez Fernández et al., 2001). Moreover, physicians' own lifestyles, including their higher frequency of wine consumption, could influence the advice they provide. In any case, excessive consumption poses health, social and economic risks. Therefore, the wine industry should engage with primary care physicians by providing training and educational materials grounded in scientific evidence (González Hidalgo et al., 2015) rather than personal perceptions, for example. Public recognition could also be given to those physicians who advocate for responsible practices. It is important to note that primary care physicians play a pivotal role as leaders in health knowledge.

On the other hand, the "Unfavourable" segment overlooks the benefits of moderate wine consumption. The attitudes and perceptions within this group may lead to patient recommendations that favour a more restrictive intake or complete abstinence. This may stem from the complexity of the risk relationship between alcohol and health, which may confuse physicians when deciding whether to recommend its consumption (Liu et al., 2022). Furthermore, wine analysis clearly indicates that it differs from other alcoholic beverages, with moderate consumption not only failing to elevate the risk of chronic degenerative diseases, but also being linked to health benefits, especially when included as part of a Mediterranean diet. As previously mentioned, it is evident that all educational efforts must be directed towards preventing excessive consumption, particularly among the youth (Hrelia et al., 2022). Therefore, it is crucial to communicate to this demographic that the aim is not to promote red wine consumption for health benefits, but rather to prevent discouraging moderate consumption based on misconceptions or misinterpretations (Wojtowicz, 2023). The wine industry should inform them of the benefits of moderate red wine consumption, which are well-supported by scientific literature (Castaldo et al., 2019). Indeed, Fradera and Hammer (2023) indicate that light-to-moderate wine consumption positively influences cardiovascular mortality. Furthermore, the World Health Organisation (WHO) and the World Cancer Research Fund (WCRF) assert that one third of cancers could be prevented through the adoption of a healthy lifestyle, which includes avoiding smoking, maintaining a normal body weight, engaging in physical activity, avoiding excessive alcohol intake and following a nutritious diet. In short, within the "Unfavourable" segment, perhaps the excessive caution in their advice may stem from a lack of knowledge, which should be grounded in scientific evidence. However, such evidence is often ambiguous, leading to a lack of decisiveness in physicians' recommendations. In addition, as previously noted, it is essential to understand the patient's perception of what constitutes moderate wine consumption. However, on the other hand, eliminating wine consumption altogether could be counterproductive, since this may lead the patient to turn to other, less healthy alcoholic beverages.

Based on this study's findings, the wine industry could claim a relationship between moderate wine consumption

and health, particularly for red wine and the possible prevention of cardiovascular disease. However, the findings would need to be communicated to consumers without detracting from their perception of wine as a fun and festive drink. It could be useful to increase contact between the industry and primary care physicians, who could provide information on relevant new developments. In other words, the sector could work alongside health professionals to convey the importance of moderate, responsible consumption. Furthermore, the physicians' agreement regarding the need to limit wine consumption adds weight to Spanish and European campaigns to raise awareness of consumption patterns that are compatible with a healthy lifestyle that promotes wellbeing. These findings bear out the wine sector's "Wine in Moderation" initiative.

As regards areas for future study, closer consideration is merited by the unfavourable attitude shown by younger physicians toward the health effects of moderate wine consumption. Despite scientific evidence to the contrary, they display a negative attitude which may be rooted in various factors that warrant further study: lack of familiarity with wine, a different type of diet and style of eating, etc. Analy-

sis could also be made of deficiencies in the information on moderate wine consumption available in university programmes, public healthcare systems and health protection bodies for the purpose of explaining to young professionals the subtleties and implications of wine consumption and providing them with support when advising patients. Finally, it should be noted that this study has some weaknesses, such as not taking into account the impact of COVID-19 because fieldwork was carried out before the onset of the pandemic. The survey was also conducted at a scientific conference and despite the randomness of the sample, the physicians surveyed had all attended a medical conference organized by the Spanish Society of General and Family Physicians (SEMG). It should be stressed, however, that attendance of such events is very frequent among the group studied.

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References

- Arós, F., & Estruch, R. (2013). Dieta mediterránea y prevención de la enfermedad cardiovascular. *Revista Española de Cardiología*, 66(10), 771–774. <https://doi.org/10.1016/j.recesp.2013.04.026>
- Arrazola-Vacas, M., Hevia-Payá, J., & Rodríguez-Esteban, L. (2015). ¿Qué factores ayudan a explicar la satisfacción con la Atención Primaria en España? *Revista de Calidad Asistencial*, 30(5), 226–236. <https://doi.org/10.1016/j.cali.2015.04.006>
- Artero, A., Artero, A., Tarín, J. J., & Cano, A. (2015). The impact of moderate wine consumption on health. *Maturitas*, 80(1), 3–13. <https://doi.org/10.1016/j.maturitas.2014.09.007>
- Berciano, S., & Ordovás, J. M. (2014). Nutrición y salud cardiovascular. *Revista Española de Cardiología*, 67(9), 738–747. <https://doi.org/10.1016/j.recesp.2014.05.003>
- Biasi, F., Deiana, M., Guina, T., Gamba, P., Leonarduzzi, G., & Poli, G. (2014). Wine consumption and intestinal redox homeostasis. *Redox Biology*, 2, 795–802. <https://doi.org/10.1016/j.redox.2014.06.008>
- Brust, J. (2010). Ethanol and cognition: indirect effects, neurotoxicity and neuroprotection: a review. *International Journal of Environmental Research and Public Health*, 7(4), 1540–1557. <https://doi.org/10.3390/ijerph7041540>
- Caruana, M., Cauchi, R., & Vassallo, N. (2016). Putative Role of Red Wine Polyphenols against Brain Pathology in Alzheimer's and Parkinson's Disease. *Frontiers in Nutrition*, 3. <https://doi.org/10.3389/fnut.2016.00031>
- Castaldo, L., Narváez, A., Izzo, L., Graziani, G., Gaspari, A., Di Minno, G., & Ritieni, A. (2019). Red Wine Consumption and Cardiovascular Health. *Molecules*, 24(19), 3626. <https://doi.org/10.3390/molecules24193626>
- Chang, K. J., Liz Thach, M., & Olsen, J. (2016). Wine and health perceptions: Exploring the impact of gender, age and ethnicity on consumer perceptions of wine and health. *Wine Economics and Policy*, 5(2), 105–113. <https://doi.org/10.1016/j.wep.2016.09.001>
- Chikezie, P. C., Ojiako, O. A., & Ogbuji, A. C. (2015). Oxidative stress in diabetes mellitus. *International Journal of Biological Chemistry*, 9(3), 92–109. <https://doi.org/10.3923/ijbc.2015.92.109>
- Choleva, M., Argyrou, C., Detopoulou, M., Donta, M.-E., Gerogianni, A., Moustou, E., Papaemmanouil, A., Skitsa, C., Kolovou, G., Kalogeropoulos, P., & Fragopoulou, E. (2022). Effect of Moderate Wine Consumption on Oxidative Stress Markers in Coronary Heart Disease Patients. *Nutrients*, 14(7), 1377. <https://doi.org/10.3390/nu14071377>
- Covas, M. I., Gambert, P., Fitó, M., & de la Torre, R. (2010). Wine and oxidative stress: Up-to-date evidence of the effects of moderate wine consumption on oxidative damage in humans. *Atherosclerosis*, 208(2), 297–304. <https://doi.org/10.1016/j.atherosclerosis.2009.06.031>
- De Curtis, A., Murzilli, S., Di Castelnuovo, A., Rotilio, D., Donati, M. B., De Gaetano, G., & Iacoviello, L. (2005). Alcohol-free red wine prevents arterial thrombosis in dietary-induced hypercholesterolemic rats: experimental support for the 'French paradox.' *Journal of Thrombosis and Haemostasis*, 3(2), 346–350. <https://doi.org/10.1111/j.1538-7836.2005.01126.x>
- De la Torre, R., Corella, D., Castañer, O., Martínez-González, M. A., Salas-Salvador, J., Vila, J., Estruch, R., Sorli, J. V., Arós, F., Fiol, M., Ros, E., Serra-Majem, L., Pintó, X., Gómez-Gracia, E., Lapetra, J., Ruiz-Canela, M., Basora, J., Asensio, E. M., Covas, M. I., & Fitó, M. (2017). Protective effect of homovanillyl alcohol on cardiovascular disease and total mortality: virgin olive oil, wine, and catechol-methylthion. *The American Journal of Clinical Nutrition*, 105(6), 1297–1304. <https://doi.org/10.3945/ajcn.116.145813>
- DiMartini, A. F., Leggio, L., & Singal, A. K. (2022). Barriers to the management of alcohol use disorder and alcohol-associated liver disease: strategies to implement integrated care models. *The Lancet Gastroenterology & Hepatology*, 7(2), 186–195. [https://doi.org/10.1016/s2468-1253\(21\)00191-6](https://doi.org/10.1016/s2468-1253(21)00191-6)
- Ditano-Vázquez, P., Torres-Peña, J. D., Galeano-Valle, F., Pérez-Caballero, A. I., Demelo-Rodríguez, P., Lopez-Miranda, J., Katsiki, N., Delgado-Lista, J., & Alvarez-Sala-Walther, L. A. (2019). The Fluid Aspect of the Mediterranean Diet in the Prevention and Management of Cardiovascular Disease and Diabetes: The Role of Polyphenol Content in Moderate Consumption of Wine and Olive Oil. *Nutrients*, 11(11), 2833. <https://doi.org/10.3390/nu11112833>
- Fernández Cabot, R. A. (2014). *Estudio del estado oxidativo. Niveles en individuos sanos y distintos grupos patológicos* [Tesis Doctoral]. Universitat de les Illes Balears.
- Fernández-Araque, A., Giaquinta Aranda, A., Laudo Pardo, C., & Rojo Aragüés, A. (2017). Los antioxidantes en el proceso de patologías oculares. *Nutrición Hospitalaria*, 34(2), 469. <https://doi.org/10.20960/nh.420>
- Fradera, U., & Hammer, C. (2023). Moderate wine consumption and cancer risk in context. *BIO Web of Conferences*, 56, 04002. <https://doi.org/10.1051/bioconf/20235604002>
- Fragopoulou, E., Choleva, M., Antonopoulou, S., & Demopoulos, C. A. (2018). Wine and its metabolic effects. A comprehensive review of clinical trials. *Metabolism*, 83, 102–119. <https://doi.org/10.1016/j.metabol.2018.01.024>
- Galli, A., Soler, C., Flichtentrei, D., & Mastandueno, R. (2015). Estrategias de educación médica continua. *Revista de La Fundación Educación Médica*, 18(4), 247. <https://doi.org/10.33588/fem.184.788>

- Gambini, J., Gimeno-Mallench, L., Olasso-Gonzalez, G., Mastaloudis, A., Traber, M. G., Monleón, D., Borrás, C., & Viña, J. (2021). Moderate Red Wine Consumption Increases the Expression of Longevity-Associated Genes in Controlled Human Populations and Extends Lifespan in *Drosophila melanogaster*. *Antioxidants*, 10(2), 301. <https://doi.org/10.3390/antiox10020301>
- García Rodríguez, M. del C., Mateos Nava, R. A., & Altamirano Lozano, M. (2015). Efecto in vivo del vino tinto sin diluir, diluido (75%) y sin alcohol sobre el daño genotóxico inducido por metales pesados con potencial cancerígeno: cromo [VI]. *Nutrición Hospitalaria*, 32(4), 1645–1652. <https://doi.org/10.3305/nh.2015.32.4.9520>
- García-Medina, J. J., Vinuesa-Silva, I., Zanón-Moreno, V., Santos-Bueso, E., & Pinazo-Durán, M. D. (2014). What to eat and drink in glaucoma? Evidence from human studies. *Archivos de La Sociedad Española de Oftalmología*, 89(3), 89–91. <https://doi.org/10.1016/j.oftale.2014.06.001>
- Gepner, Y., Golan, R., Harman-Boehm, I., Henkin, Y., Schwarzfuchs, D., Shelef, I., ... Shai, I. (2015). Effects of Initiating Moderate Alcohol Intake on Cardiometabolic Risk in Adults With Type 2 Diabetes. *Annals of Internal Medicine*, 163(8), 569. <https://doi.org/10.7326/m14-1650>
- Gepner, Y., Henkin, Y., Schwarzfuchs, D., Golan, R., Durst, R., Shelef, I., Harman-Boehm, I., Spitz, S., Witkow, S., Novack, L., Friger, M., Tangi-Rosental, O., Sefarty, D., Bril, N., Rein, M., Cohen, N., Chassidim, Y., Sarusi, B., Wolak, T., ... Shai, I. (2016). Differential Effect of Initiating Moderate Red Wine Consumption on 24-h Blood Pressure by Alcohol Dehydrogenase Genotypes: Randomized Trial in Type 2 Diabetes. *American Journal of Hypertension*, 29(4), 476–483. <https://doi.org/10.1093/ajh/hpv126>
- Giaquinta Aranda, A., Fernández Araque, A., Curbelo Rodríguez, R., & Rojo Aragües, A. (2017). Glaucoma y antioxidantes: revisión sistemática. *Revista Mexicana de Oftalmología*, 91(3), 112–121. <https://doi.org/10.1016/j.mexoft.2016.03.007>
- Golan, R., Gepner, Y., & Shai, I. (2019). Wine and Health—New Evidence. *European Journal of Clinical Nutrition*, 72, 55–59. <https://doi.org/10.1038/s41430-018-0309-5>
- González Hidalgo, E., Villena Ferrer, A., & Párraga Martínez, I. (2015). Atención Primaria: la apuesta necesaria. *Revista Clínica de Medicina de Familia*, 8(3), 182–184. <https://doi.org/10.4321/s1699-695x2015000300002>
- Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate data analysis*. Prentice-Hall International.
- Henley, C. D., Fowler, D. C., Yuan, J., Stout, B. L., & Goh, B. K. (2011). Label design: impact on millennials' perceptions of wine. *International Journal of Wine Business Research*, 23(1), 7–20. <https://doi.org/10.1108/17511061111121371>
- Higgins, L. M., & Llanos, E. (2015). A healthy indulgence? Wine consumers and the health benefits of wine. *Wine Economics and Policy*, 4(1), 3–11. <https://doi.org/10.1016/j.wep.2015.01.001>
- Hrelia, S., Di Renzo, L., Bavaresco, L., Bernardi, E., Malaguti, M., & Giacosa, A. (2022). Moderate Wine Consumption and Health: A Narrative Review. *Nutrients*, 15(1), 175. <https://doi.org/10.3390/nu15010175>
- Jaud, D. A., Gergaud, O., & Lunardo, R. (2022). Family and peer communication and wine consumption among young adults: examining the role of responsible drinking practices. *British Food Journal*, 125(6), 2070–2086. <https://doi.org/10.1108/bfj-05-2022-0428>
- Klarich, D. S., Brasser, S. M., & Hong, M. Y. (2015). Moderate Alcohol Consumption and Colorectal Cancer Risk. *Alcoholism: Clinical and Experimental Research*, 39(8), 1280–1291. <https://doi.org/10.1111/acer.12778>
- Ko, E.-A., Jin, B.-J., Namkung, W., Ma, T., Thiagarajah, J. R., & Verkman, A. S. (2014). Chloride channel inhibition by a red wine extract and a synthetic small molecule prevents rotaviral secretory diarrhoea in neonatal mice. *Gut*, 63(7), 1120–1129. <https://doi.org/10.1136/gutjnl-2013-305663>
- Leighton, F., & Urquiaga, I. (2007). Changes in Cardiovascular Risk Factors Associated with Wine Consumption in Intervention Studies in Humans. *Annals of Epidemiology*, 17(5), S32–S36. <https://doi.org/10.1016/j.annepidem.2007.01.007>
- Liu, Y.-T., Lee, J. H., Tsai, M. K., Wei, J. C.-C., & Wen, C.-P. (2022). The effects of modest drinking on life expectancy and mortality risks: a population-based cohort study. *Scientific Reports*, 12(1). <https://doi.org/10.1038/s41598-022-11427-x>
- Lorenzo-Seva, U., Van de Velden, M., & Kiers, H. A. (2009). CAR: A MATLAB package to compute correspondence analysis with rotations. *Journal of Statistical Software*, 31(8), 1–14. <https://doi.org/10.18637/jss.v031.i08>
- Lucerón-Lucas-Torres, M., Saz-Lara, A., Díez-Fernández, A., Martínez-García, I., Martínez-Vizcaíno, V., Cervero-Redondo, I., & Álvarez-Bueno, C. (2023). Association between Wine Consumption with Cardiovascular Disease and Cardiovascular Mortality: A Systematic Review and Meta-Analysis. *Nutrients*, 15(12), 2785. <https://doi.org/10.3390/nu15122785>
- Martin, M. A., Goya, L., & Ramos, S. (2017). Protective effects of tea, red wine and cocoa in diabetes. Evidences from human studies. *Food and Chemical Toxicology*, 109, 302–314. <https://doi.org/10.1016/j.fct.2017.09.015>
- Mezzano, D., Leighton, F., Martínez, C., Marshall, G., Cuevas, A., Castillo, O., ... Pereira, J. (2001). Complementary effects of Mediterranean diet and moderate red wine intake on haemostatic cardiovascular risk factors. *European Journal of Clinical Nutrition*, 55(6), 444–451. <https://doi.org/10.1038/sj.ejcn.1601202>

- Ministerio de Sanidad. (2024). *Número de profesionales de la medicina que trabajan en el Sistema Nacional de Salud (SNS) en Atención Primaria, Atención Hospitalaria, Servicios de urgencias y emergencias (112/061) y Especialistas en formación según comunidad autónoma*. <https://www.sanidad.gob.es/estadEstudios/sanidadDatos/tablas/tabla13.htm>
- Montero, M., Pérez-Matute, P., Yuste, S., Íñiguez, M., Recio-Fernández, E., Motilva, M.-J., Leon-Espinosa, G., Herreras, O., Bartolomé, B., & Moreno-Arribas, M. V. (2023). Investigación de los efectos del consumo moderado de vino en la enfermedad de Alzheimer en modelos de ratones con patología A β y Tau. *BIO Web of Conferences*, 68, 04006. <https://doi.org/10.1051/bioconf/20236804006>
- Ortuño, G. (2009). Salud y consumo moderado de vino. *Enfermería Global*, 15, 1–15.
- Ou, H.-C., Chou, F.-P., Sheen, H.-M., Lin, T.-M., Yang, C.-H., & Huey-Herng Sheu, W. (2006). Resveratrol, a polyphenolic compound in red wine, protects against oxidized LDL-induced cytotoxicity in endothelial cells. *Clinica Chimica Acta*, 364(1–2), 196–204. <https://doi.org/10.1016/j.cccn.2005.06.018>
- Pavlidou, E., Mantzorou, M., Fasoulas, A., Tryfonos, C., Petridis, D., & Giaginis, C. (2018). Wine: An Aspiring Agent in Promoting Longevity and Preventing Chronic Diseases. *Diseases*, 6(3), 73. <https://doi.org/10.3390/diseases6030073>
- Pérez-Mañá, C., Farré, M., Rodríguez-Morató, J., Papaseit, E., Pujadas, M., Fitó, M., Robledo, P., Covas, M.-I., Cheynier, V., Meudec, E., Escudier, J. L., & De la Torre, R. (2015). Moderate consumption of wine, through both its phenolic compounds and alcohol content, promotes hydroxytyrosol endogenous generation in humans. A randomized controlled trial. *Molecular Nutrition & Food Research*, 59(6), 1213–1216. <https://doi.org/10.1002/mnfr.201400842>
- Petrella, C., Di Certo, M. G., Gabanella, F., Barbato, C., Ceci, F. M., Greco, A., Ralli, M., Polimeni, A., Angeloni, A., Severini, C., Vitali, M., Ferraguti, G., Ceccanti, M., Lucarelli, M., Severi, C., & Fiore, M. (2021). Mediterranean Diet, Brain and Muscle: Olive Polyphenols and Resveratrol Protection in Neurodegenerative and Neuromuscular Disorders. *Current Medicinal Chemistry*, 28(37), 7595–7613. <https://doi.org/10.2174/0929867328666210504113445>
- Reale, M., Costantini, E., Jagarlapoodi, S., Khan, H., Belwal, T., & Cichelli, A. (2020). Relationship of Wine Consumption with Alzheimer's Disease. *Nutrients*, 12(1), 206. <https://doi.org/10.3390/nu12010206>
- Renaud, S., & de Lorgeril, M. (1992). Wine, alcohol, platelets, and the French paradox for coronary heart disease. *The Lancet*, 339(8808), 1523–1526. [https://doi.org/10.1016/0140-6736\(92\)91277-f](https://doi.org/10.1016/0140-6736(92)91277-f)
- Rodrigo, R., Miranda, A., & Vergara, L. (2011). Modulation of endogenous antioxidant system by wine polyphenols in human disease. *Clinica Chimica Acta*, 412(5–6), 410–424. <https://doi.org/10.1016/j.cca.2010.11.034>
- Rodríguez Fernández, E., Espí Martínez, F., Canteras Jordana, M., & Gómez Moraga, A. (2001). Consumo de alcohol entre profesionales médicos de atención primaria. *Atención Primaria*, 28(4), 259–262. [https://doi.org/10.1016/s0212-6567\(01\)78944-5](https://doi.org/10.1016/s0212-6567(01)78944-5)
- Roth, I., Casas, R., Ribó-Coll, M., & Estruch, R. (2019). Consumption of Aged White Wine under a Veil of Flor Reduces Blood Pressure-Increasing Plasma Nitric Oxide in Men at High Cardiovascular Risk. *Nutrients*, 11(6), 1266. <https://doi.org/10.3390/nu11061266>
- Sancho, M., & Mach, N. (2015). Efecto de los polifenoles del vino sobre la prevención del cáncer. *Nutrición Hospitalaria*, 31(2), 535–551.
- Serio, F., Imbriani, G., Acito, M., Moretti, M., Fanizzi, F. P., De Donno, A., & Valacchi, G. (2023). Moderate red wine intake and cardiovascular health protection: a literature review. *Food & Function*, 14(14), 6346–6362. <https://doi.org/10.1039/d3fo01004j>
- Shukla, Y., & Singh, R. (2011). Resveratrol and cellular mechanisms of cancer prevention. *Annals of the New York Academy of Sciences*, 1215(1), 1–8. <https://doi.org/10.1111/j.1749-6632.2010.05870.x>
- Silva, P., & Vauzour, D. (2018). Wine Polyphenols and Neurodegenerative Diseases: An Update on the Molecular Mechanisms Underpinning Their Protective Effects. *Beverages*, 4(4), 96. <https://doi.org/10.3390/beverages4040096>
- Teissedre, P.-L., Stockley, C., Boban, M., Ruf, J.-C., Ortiz Alba, M., Gambert, P., & Flesh, M. (2018). The effects of wine consumption on cardiovascular disease and associated risk factors: a narrative review. *OENO One*, 52(1), 67–79. <https://doi.org/10.20870/oeno-one.2018.52.1.2129>
- Tresserra-Rimbau, A., Medina-Remón, A., Lamuela-Raventós, R. M., Bulló, M., Salas-Salvadó, J., Corella, D., Fitó, M., Gea, A., Gómez-Gracia, E., Lapetra, J., Arós, F., Fiol, M., Ros, E., Serra-Majem, L., Pintó, X., Muñoz, M. A., & Estruch, R. (2015). Moderate red wine consumption is associated with a lower prevalence of the metabolic syndrome in the PREDIMED population. *British Journal of Nutrition*, 113(S2), S121–S130. <https://doi.org/10.1017/s0007114514003262>
- Tsoupras, A., Ni, V. L. J., O'Mahony, É., & Karali, M. (2023). Winemaking: “With One Stone, Two Birds”? A Holistic Review of the Bio-Functional Compounds, Applications and Health Benefits of Wine and Wineries' By-Products. *Fermentation*, 9(9), 838. <https://doi.org/10.3390/fermentation9090838>
- Varela Veiga, M., Rodríguez Ledo, M. P., & López Rodríguez, I. (2003). Percepciones y opiniones del médico de atención primaria sobre el consumo de alcohol. *Trastornos Adictivos*, 5(4), 329–334. [https://doi.org/10.1016/s1575-0973\(03\)70130-5](https://doi.org/10.1016/s1575-0973(03)70130-5)
- Wojtowicz, J. S. (2023). Long-Term Health Outcomes of Regular, Moderate Red Wine Consumption. *Cureus*. <https://doi.org/10.7759/cureus.46786>
- Xiang, L., Xiao, L., Wang, Y., Li, H., Huang, Z., & He, X. (2014). Health benefits of wine: Don't expect resveratrol too much. *Food Chemistry*, 156, 258–263. <https://doi.org/10.1016/j.foodchem.2014.01.006>

Yoo, Y. J., Saliba, A. J., MacDonald, J. B., Prenzler, P. D., & Ryan, D. (2013). A cross-cultural study of wine consumers with respect to health benefits of wine. *Food Quality and Preference*, 28(2), 531–538. <https://doi.org/10.1016/j.foodqual.2013.01.001>

Zhu, X., Wu, C., Qiu, S., Yuan, X., & Li, L. (2017). Effects of resveratrol on glucose control and insulin sensitivity in subjects with type 2 diabetes: systematic review and meta-analysis. *Nutrition & Metabolism*, 14(1). <https://doi.org/10.1186/s12986-017-0217-z>