Moderate levels of alcohol intake have been associated with a reduction in heart attacks and a decrease in total death rate in multiple studies.\(^1\)\(^-\)\(^3\) Higher levels of alcohol intake, on the other hand, have been found to increase cardiac and overall mortality.\(^1\)\(^-\)\(^4\) Since there are no randomized trials of alcohol intake for cardiac and mortality endpoints, these findings are an association rather than cause and effect.

**Moderate levels of alcohol intake**

What constitutes a moderate level of alcohol ingestion in this discussion?

For women less than or equal to 1 drink daily is moderate ingestion. For men less than or equal to 2 drinks daily is moderate ingestion. A drink in scientific studies often represents 5 ounces of wine, a 12 ounce can or bottle of beer or 1.5 ounces of 80 proof distilled spirits, which all have a similar amount of alcohol present.

### Hazards of Alcohol

Before discussing the mortality data and findings favorable to alcohol with moderate alcohol ingestion, it is important to highlight some of the many negative health aspects of alcohol. **There are numerous medical conditions for which complete abstinence from alcohol is advisable- liver disease, GI bleeding, and history of alcoholism to name a few.** The issue of alcohol intake should always be discussed with one’s personal physician in order to determine what is appropriate in regards to alcohol ingestion.

**For younger individuals, risk exists with alcohol intake and there are no significant potential health benefits.** The diseases for which moderate alcohol intake is potentially beneficial are distinctly uncommon until middle age. Even in their 30s, individuals have very little to gain from any possible benefit of alcohol, and have full exposure to the potential negative effects of alcohol.

Alcohol ingestion in younger individuals up into their 30s tends to be episodic and often in a binge related fashion\(^5\) which is always a negative factor for health. The potential for accidental injury with episodic drinking is significant.

**There is an increased risk of breast cancer with alcohol even at moderate levels of ingestion.**\(^6\)-\(^8\) For cancers other than breast cancer, there is an increase in the total number of cancer cases for higher levels of alcohol ingestion. (see Alcohol & Women: [www.nutritionheart.com/women-alcohol/](http://www.nutritionheart.com/women-alcohol/))

**High levels of alcohol intake increase total death rate\(^1\) and the incidence of multiple diseases** including GI bleeding, cirrhosis, pancreatitis, and overall cardiac mortality\(^9\).

In regards to the heart, **heart arrhythmias** can be provoked, particularly during or following heavy drinking. This includes *atrial fibrillation, supraventricular tachycardia,*
and ventricular arrhythmias.\textsuperscript{10-14} Moderate levels of alcohol ingestion may be a precipitant in susceptible individuals with intermittent atrial fibrillation.\textsuperscript{10}

Furthermore, very high intakes of alcohol can cause dilation and severe weakness of the heart muscle called alcoholic cardiomyopathy.\textsuperscript{15} For individuals with this condition, only a complete and continued cessation of alcohol will potentially allow the heart to return to normal size and function.

Alcohol intake increases blood pressure in men and women. \textbf{For alcohol intake above 2 drinks daily, blood pressure rises as alcohol intake increases.}\textsuperscript{16}

Possible Benefits of Alcohol

\textbf{Reduction in Death Rate}

Multiple observational studies have shown an association of moderate alcohol intake with an improvement in overall survival and a decrease in heart attack rate and cardiovascular mortality\textsuperscript{1-3}. The effects on total mortality can be viewed in a sense as a summation of the major positive and negative effects of alcohol ingestion on health.

\textbf{There is a reduction in the overall death rate for moderate alcohol ingestion.}\textsuperscript{1} (In this discussion, one drink is defined as 14g of alcohol per drink.)

Since these studies are not randomized trials, the alcohol can not be said to be the cause of the reduction in death rate. However, even when there is adjustment for other contributing factors, the benefit persists.\textsuperscript{1}

\textbf{MEN}

\textbf{Men & Alcohol Ingestion- Effect on total mortality}\textsuperscript{1} in middle aged and older men

<table>
<thead>
<tr>
<th>Alcohol intake (daily average)</th>
<th>Change in death rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ \frac{1}{4} - 2 drinks/day</td>
<td>~ 10-15% reduction in mortality</td>
</tr>
<tr>
<td>~ 3 drinks/day</td>
<td>no effect</td>
</tr>
<tr>
<td>3 drinks or more/day</td>
<td>increase in mortality</td>
</tr>
</tbody>
</table>

(a drink in this chart is defined as 14g of alcohol/drink)
Alcoholic Drinks & Grams of Alcohol

**Wine:**
5 fluid oz of wine
Alcohol % varies. If alcohol content is 12.0% by volume:
5 x 29.5735 x 0.12 x .789 \(\sim\) 14 grams of alcohol

**Beer:**
Beer 12 fluid ounces
Alcohol % varies. If alcohol content is 5.0% by volume:
12 x 29.5735 x 0.05 x .789 \(\sim\) 14 grams of alcohol

**Liquor:**
1.5 fluid oz of 80 proof
If 80 proof is defined as 40% alcohol by volume:
1.5 x 29.5735 x 0.40 x .789 \(\sim\) 14 grams of alcohol

For men, there is an approximate 10-15% reduction in overall mortality when alcohol is ingested at less than or equal to 2 drinks/per day. Alcohol intake has a neutral effect on mortality at an approximate average of 3 drinks daily (21 drinks/week, 42g of alcohol daily) in men. As alcohol intake further increases, the total death rate progressively worsens.

**WOMEN**

Women & Alcohol Ingestion- Effect on total mortality in middle aged and older women

<table>
<thead>
<tr>
<th>Alcohol Intake (daily average)</th>
<th>Change in death rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 1/4-1 drink/day (1-7 drinks/week)</td>
<td>(~10-15%) reduction in mortality</td>
</tr>
<tr>
<td>~ 1 3/4 drinks/day (12 drinks/week)</td>
<td>no effect</td>
</tr>
<tr>
<td>2 drinks/day (14 drinks/week)</td>
<td>(~3%) increase in mortality</td>
</tr>
<tr>
<td>3 drinks/day (21 drinks/week)</td>
<td>(~20%) increase in mortality</td>
</tr>
<tr>
<td>3 drinks or more (&gt;21 drinks/week) per day</td>
<td>further significant increases</td>
</tr>
</tbody>
</table>

(a drink in this chart is defined as 14g of alcohol/drink)
For women there is an approximate 10-15% reduction in overall mortality for alcohol ingestion at less than or equal to one drink a day.\textsuperscript{1} As alcohol intake increases the benefit disappears and is replaced by a worsening of the death rate. For women, even an average of 2 drinks per day (14 drinks/week, 28g of alcohol/day) results in an increase in total mortality.\textsuperscript{1}

\textbf{Heart Attack and Overall Cardiovascular Mortality}

\textit{In men and women, alcohol ingestion at moderate levels of intake (≤ 1 drink a day in women and ≤2 drinks a day in men) is associated with a lower rate of heart attacks and cardiovascular mortality.}\textsuperscript{2,3} Though a lower frequency of heart attacks is present over a wide range of alcohol intakes, stroke rates and total mortality increase as alcohol intake progresses above moderate levels.\textsuperscript{1,3} There are features of alcohol and the reduction in heart attacks and cardiovascular mortality that are suggestive of a cause and effect relationship.\textsuperscript{3}

\textbf{Possible mechanisms of benefit}

\textit{Alcohol intake increases levels of good cholesterol called high density lipoproteins (HDL). Both HDL1 and HDL2 subfractions increase with alcohol intake.}\textsuperscript{17} Alcohol intake also decreases fibrinogen levels\textsuperscript{18} which reduces excessive blood clotting and may be beneficial in reducing heart attacks.

In addition, alcohol ingestion improves insulin sensitivity.\textsuperscript{19} Observational studies have consistently shown an association of moderate alcohol intake with a lower frequency of diabetes.\textsuperscript{20-21}

\textbf{Summary}

\textit{In summary, moderate level alcohol ingestion (≤1 drink daily in women and ≤ 2 drinks per day in men) correlates with a lower overall mortality and a decrease in the risk of heart attack.}\textsuperscript{1,3} The groups that show the associated benefit are individuals with significant cardiac risk factors and in age groups in which heart attacks occur more commonly, i.e., middle aged and older men and post menopausal women. As levels of intake exceed a moderate level of alcohol ingestion, the associated net benefit resolves and then becomes strongly negative in regards to overall health and mortality.\textsuperscript{1}

\textbf{What about red wine?}

The vast majority of observational studies do not show a difference in the occurrence of benefits and risks between different forms of alcoholic beverage- wine, beer, and hard liquor in equivalent quantities of alcohol. A study in Europe where wine did show an advantage over other alcoholic beverages\textsuperscript{22} may possibly have been the result of chance or that the wine group may have been associated with other beneficial factors that were not identified.
There are substances found in red wine called bioflavonoids, including resveratrol, that have some favorable properties when tested in isolation. However, only 2-17% of the major bioflavonoids in wine are absorbed when ingested, and the body quickly metabolizes them.\textsuperscript{23} The majority of the bioflavonoids that enter the body are converted to conjugate forms which have historically been thought to be inactive. This has not been well studied though and it is of note that there are some conjugates of other substances that are more active than the parent compound.\textsuperscript{24}

The nonalcoholic portion of wine has been shown to be beneficial in some animal studies in inhibiting fat deposition,\textsuperscript{25} but not in others.\textsuperscript{26} There have even been differences in evidence of benefit in other laboratory models between red wines coming from different countries,\textsuperscript{27} so the issue is complex and not entirely straightforward.

And, if there are aspects of wine, such as the tannins in red wine or the tradition of drinking wine with a meal that leads to a more modest intake of alcohol rather than a heavy intake, that may be of potential benefit. In summary, the majority of the observational studies show no difference, though there are some intriguing differences present.

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This information does not constitute medical advice or a recommendation to ingest alcohol. Only a discussion with a personal physician can provide medically appropriate individualized advice.

Eric Roehm, M.D. NutritionHeart.com 2011

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References:


