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Review article

Moderate alcohol consumption – Blessing or curse?



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ABSTRACT

Alcohol affects organisms in different ways. It is impossible to determine a consumption baseline where adverse effects outweigh benefits. Although the results regarding moderate alcohol consumption during pregnancy are inconsistent, it is not recommended that women consume alcohol throughout pregnancy. The adverse effects of alcohol stand against the positive effects on heart and blood circulation. Depending on dose, the correlation between alcohol consumption and the risk of various tumours has been demonstrated. The daily dose of alcohol for men should not exceed 20 g, for women, 10 g. Moderate alcohol consumption is not recommended in any case, but it can be tolerated.

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Motto: All is poisonous and nothing is without poison, it is only the dose what makes it non-poisonous.

Paracelsus (1493–1541)

History of alcohol and alcoholic drinks

Many historical documents about the production and consumption of alcohol in the middle ages and later periods exist. In particular, wine, beer and spirits have played an important role in human history. As early as the middle ages, alcohol was believed to have healing effects. Abbess Hildegard of Bingen in the convent at Bingen upon Rhine (presently in Switzerland) used its effects for blood circulation and also used e.g. wine in order to heal angina pectoris and heart weakness.

The issue of the origin of alcoholic beverages seemed to have been answered when in 1969 archaeologists found a

wine press, dated approximately 8000 BC, in the hills southwest from Damascus. At the same site, grains of wild vine species were found, which implied that grapes were pressed there with juice which fermented without human involvement. Today we know that the first encounter of man with alcohol dates back well into early history. It is assumed that honey was the first fermentable substance from which, after dilution with water and under the action of expanded yeast, the first product of alcoholic fermentation was developed, but in the early days of mankind, undoubtedly, alcoholic beverages originated by natural fermentation also from other, mainly vegetable, raw materials. Birch and maple sap and other juices of wild berries and plants under the influence of yeast were fermented and therefore supplied drinks, which were, thanks to their sensory properties and intoxicating effect, often preferred to water [1,2].

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The culture of vine and the art of making wine come from the river valleys of Hither Asia, rich in wild vines. The Sumerians, between the Euphrates and the Tigris, are known for producing wine long before 3000 BC. From there, wine wret wandered to the west; the vineyards of the Pharaohs were known as early as the beginning of Egyptian history (approx. 3200 BC). Apparently, by the middle of the 2nd millennium BC at the latest, wineries came to Greece. About 1000 BC, Greek colonists brought wine-making to Italy and southern France. The Romans brought wine-making to Germany, where its tradition was spread throughout Southern-German and the Austrian regions. Thanks to the church and monasteries, wine spread into other areas of Germany, to Silesia and the Baltic Provinces. Pure alcohol, however, began to be produced only in the 11th century AD in Southern Italy under the name “al kuhul”, which in Arabic means “the best of something” [1,2].

Absorption and metabolism

20% of alcohol is absorbed in the stomach; then, its largest portion in the upper part of the small intestine. The rate of absorption is influenced by the following factors:

- A full stomach: milk proteins and fat in particular have a blocking effect.
- Concentration gradient: alcohol concentration in drink and drinking speed.
- Composition and temperature of a beverage: sugar, carbonic acid and high temperatures accelerate absorption.
- Alcohol dehydrogenase: the enzyme of intestinal mucosa partly cleaves alcohol already in the small intestine. Its activity is higher in men than in women.

The maximum alcohol concentration in the blood is already achieved 1–2 h after consumption. Muscles, brain and liver absorb large amounts of alcohol, fat and bones comparatively less efficiently. In order to calculate the maximum concentration in the blood, the bodyweight should be multiplied with the so-called reduction factor. This factor is 0.7 in men, in women, then due to the lower activity of alcohol dehydrogenase, a higher proportion of body fat and thereby a smaller space for hydration 0.6 [3].

The calculation of maximum alcohol concentration in blood:

$$\frac{\text{consumed alcohol in g}}{\text{body weight in kg} \times \text{reduction factor}}$$

2–10% of the consumed alcohol is excreted unaltered in urine, sweat and exhaled air (here as acetaldehyde). The mean elimination of alcohol is 0.1 g/kg in men, and in women 0.08 g/kg per hour. A suitable and safe strategy to increase elimination is not yet known. Alcohol metabolism is accelerated only by high doses of fructose; caffeine has no effect [3].

Alcohol as a food?

Alcohol with its energy of 29.7 kJ/g (7.1 kcal) presents an energy drink, but the body cannot save it. In addition to this, the energy comes from a different carbohydrate content, which is in liquors 10–30 g, in wine 0.1–0.5 g, in port wine 12–25 g and in beer 2–3 g per 100 ml. However, there is no clear correlation between alcohol consumption and body weight

(BMI). The critical issue is whether alcoholic beverages are consumed as a supplement to a normal diet or as a substitute. This applies particularly to persons with a high alcohol consumption (more than 50 g/day), in whom alcoholic beverages may make up a large proportion of food intake. It leads to malnutrition and weight loss [4]. Alcoholic beverages contain besides alcohol and sugar almost no nutrients; the exception is beer, in which is present small amounts of protein, niacin and riboflavin. Some wines contain a relatively high amount of iron (some cheap wine, Cider, Medoc, Malaga). For people who are used to consuming such wines in large quantities, it can lead to hemosiderosis. The alcohol calories should therefore be viewed as “empty calories” [3].

Effects of alcohol on the human body

Alcohol in beer, wine and spirits has different effects. It is impossible to determine a consumption baseline when adverse effects outweigh benefits [5,6]. After careful consideration of the effects of different amounts of alcohol described in the literature, we may consider for healthy men as a wholesome consumption 20 g of alcohol per day (2 dl of wine or 0.5 l of beer or 0.06 l brandy); however, this should not be a daily consumption [7]. According to some epidemiological studies, we may consider this quantity with respect to coronary risk in older men even beneficial for health. For a healthy woman, only 10 g of alcohol per day is considered as beneficial amount, because according to several epidemiological studies the risk of organ damage and breast cancer is increased already at half of the dose in women in comparison with men [7]. Cave: Alcohol is tolerated, but not recommended!

Impact of high alcohol consumption in pregnancy

High alcohol consumption during pregnancy is a major risk factor for the embryo and foetus and is among one of the most common causes of mental and physical developmental disorders with lifelong, irreversible consequences for the damaged child. The most significant form of damage is foetal alcohol syndrome [8] with growth retardation and central nervous system disorders with mental retardation. Foetal alcohol syndrome occurs in approximately 30–45% of children where there is alcohol abuse by the mother during pregnancy. If the development of the child's organs is completed at the time of alcohol consumption by a mother, no or only minor developmental anomalies occur and the child shows no or only slight outward signs. However, damage to the central nervous system (cognitive and behavioural disorders) may occur. The less severe form is known as the foetal alcohol effect [9].

Impact of low alcohol consumption in pregnancy

The baseline alcohol consumption which leads to damage has not been determined yet. In many countries, pregnant women are advised to abstain. The statements are often set out in the form of national guidelines. Recommendations are often complex and thus they imply partial tolerance to consumption of small amount of alcohol. For example, the British guidelines on the treatment of alcohol include the statements saying that pregnant women, who drink alcohol, should not consume more than one to two drinks once or twice a week [10].

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