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Review Article

Alcohol as Food or Drug? A Comparative Review of Islamic and Medical Evidence

M. Diaa El-Din H. Farag[1], Ahmed A. Rawwash[2*], Emad Ahmed Fathy Hussein[3], Mohamed F.F Bayomy[4], Emad M. Abdallah[5], Shahira Hassan Negm[6], S.El-Khashab[7]

[1]National Center for Radiation Research and Technology, Egyptian Atomic Energy Authority, Nasr City, Cairo, Egypt.
[2]Department of Botany and Microbiology, College of Science, Al-Azhar University, Assiut Branch, Egypt.
[3]Egyptian MOH, Governmental HIO Zayed OPD, Cairo, Egypt.
[4]The Basic Science Dept, College of Oral and Dental Surgery, Misr Univ. For Science and Technology (MUST), Egypt.
[5]Department of Biology, College of Science, Qassim University, Buraydah, Saudi Arabia; Faculty of Health and Life Sciences, INTI International University, Nilai, Negeri Sembilan, Malaysia.
[6]Egyptian MOH, PHC unit, Al Sheikh Zayed city, Cairo, Egypt.
[7]Kasr Al-Ainy, Cairo University, Egypt.
* Correspondence: dr.ahmad1434@gmail.com; Tel.: 00966539139564

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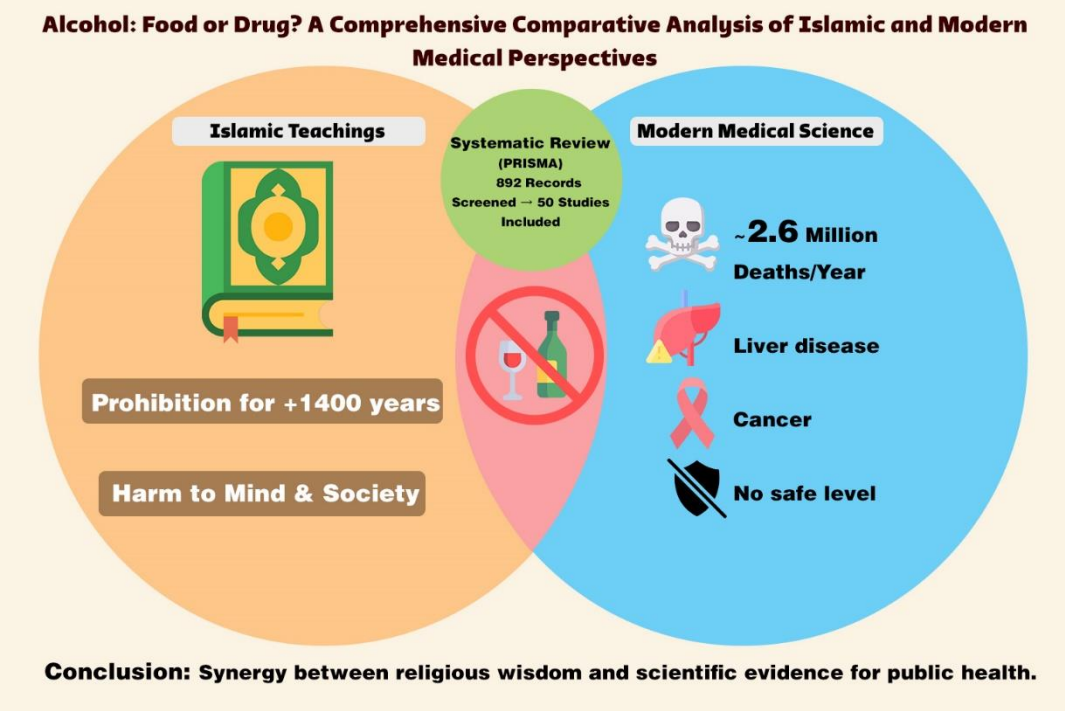
Abstract

Background: This study conducts a comparative analysis of alcohol classification, health effects, and social consequences within Islamic teachings and modern medical science. **Objective:** To conduct a comparative analysis of Islamic teachings and modern medical approaches regarding alcohol classification, health effects, and social consequences. **Methodology:** Using a comparative review following PRISMA guidelines, 50 high-quality sources were selected from an initial 892 records for analysis. **Results:** The findings demonstrate a convergent classification: both paradigms definitively classify alcohol as a harmful substance rather than a food. Islamic law has prohibited alcohol for over 1400 years on the grounds of it impairs cognitive judgment and disrupts social harmony, a position now strongly supported by medical evidence. From an epidemiological perspective, major health bodies conclude that risk increases with any level of consumption, indicating that there is no truly "safe" level from a population health standpoint. Annually, alcohol contributes to approximately 2.6 million global deaths from conditions such as liver disease, cancer, and cardiovascular problems. **Conclusion:** Despite differing foundational perspectives, Islamic doctrine and modern medical science align in identifying the harms of alcohol and in advocating for reduced or eliminated consumption. This synergy highlights how religious wisdom and scientific evidence can jointly inform public health policy.

Keywords: Alcohol, Islamic medicine, public health, comparative analysis, systematic review, substance abuse, religious perspectives and regulations, medical ethics



Graphic abstract

1. Introduction

The classification of alcoholic beverages as food or drug is a persistent theme in human health discourse and has significant consequences for social well-being, public policy and individual behavior. A careful examination of this fundamental question through the two perspectives of Islamic teachings and modern medical science provides a convincing analysis. These two systems of knowledge, which have developed along different paths, are increasingly converging on similar conclusions about the potential harms of alcohol [1,2].

Historically, alcohol's caloric content led to its occasional classification alongside foods, and it was integrated into social and medicinal practices [3]. Ethanol has an energy density of about 7 calories per gram, which puts it between carbohydrates (5 kCal/g) and fats (9 kCal/g) [4].These calories are empty because they have no vitamins, minerals or nutrients that help your health. For this reason, many nutritionists have started to question whether alcohol is a good source of food [5,6]. The International Agency for Research on Cancer (IARC) has designated alcoholic beverages as Group 1 carcinogens, a classification which seriously undermines the image of alcohol as a healthy foodstuff, as recognized by the World Health Organization [7].

Islamic teachings have consistently maintained a clear position for over fourteen centuries, classification of all intoxicating substances (khamr) as haram (abusive) based on rigorous theological, ethical and social criteria [8,9]. The Quranic revelation concerning alcohol was progressive. It first acknowledged that wine and gambling possess certain benefits; nonetheless, their transgressions are deemed more consequential than their merits (The Quran, Al-Baqarah 2:219). In the end, it said that intoxicants are a sin from Satan that believers should stay away from (The Quran, Al-Ma'idah 5:90). Many prophetic traditions (hadith) that broadened the ban to include the manufacture, distribution, and facilitation of alcohol consumption further solidified this prohibition [10].

To understand the reasons behind these teachings, it is important to know what life was like in Arabia before Islam. Archaeological and literary evidence [11] shows that fermented drinks, especially date wine (nabidh) and grape wine, were very important to social and economic life in the Arabian Peninsula. Nasr (1966) Claims that the gradual ban in the Quran reflects Islamic teachings recognizing the ingrained social role of alcohol and enabling a sustainable change in behavior [12]. Historical records demonstrate the effectiveness of this incremental strategy for social reform by showcasing the prompt and extensive

compliance of the early Muslim community with the ultimate prohibition [13].

The understanding of the health effects of alcohol has significantly evolved within contemporary medical science. In the 19th and early 20th centuries, doctors used alcohol a lot as a medicine, an antiseptic, and a beauty product [14]. However, this view has undergone a major change in the face of the growing accumulation of scientific evidence in the latter part of the 20th century. This evidence has led to the current classification of alcohol as a psychoactive substance with serious harm potential. [15].

Recent epidemiological studies show that alcohol is a major risk factor for disease around the world. It causes more than 200 health problems and is responsible for about 5.1% of the global burden of disease and injury [16,17]. The Global Burden of Disease Study 2020 found that alcohol consumption is the leading cause of death that could be prevented worldwide. The best amount of alcohol you should drink for your health is absolutely nothing. [18]. Previous studies indicated possible cardiovascular advantages associated with moderate alcohol intake, a notion that has been significantly contested by more stringent methodological frameworks [19,20]. This discovery represented a substantial deviation from the preceding research.

Because alcohol has social and public health effects, the connection between Islamic teachings and modern medical research is very clear. Islamic jurisprudence has historically recognized the capacity of alcohol to intensify social discord, impair judgement, and destabilize familial structures [21]. This concern is further reinforced by current public health data showing that alcohol-related harm extends beyond the individual health to include domestic violence, road accidents, workplace accidents and the significant economic burden on health care systems. [22,23].

Recent changes in public health messages and alcohol policies show that traditional Islamic beliefs are becoming more and more similar. For example, the US Dietary Guidelines for Americans for 2020-25 removed language suggesting that moderate alcohol consumption could be beneficial to your health in order to minimize the risk [24]. The World Health Organization's 2023 statement that "no level of alcohol consumption is safe for our health" is similar to the strict prohibition that has been a part of Islamic teachings for hundreds of years [25].

This comparative analysis examines the scientific, theological and philosophical bases for the two views on alcohol. Our aim is to find points of agreement and disagreement in the latest evidence from both sides, so that we can better understand the role of alcohol in our societies and in our health. The methodology follows the PRISMA guidelines to ensure that the evidence is clearly and comprehensively presented. It also respects the different ways of knowing that exist in Islamic law and in modern medicine.

2. Methodology

For this comparative analysis, the PRISMA preferred reporting items for systematic reviews and meta-analyses were used for the systematic literature review (Page et al. 2021) In order to ensure a thorough and balanced examination of both paradigms, the methodology was designed to integrate empirical scientific evidence with the scholarly interpretations of Islamic jurisprudence [26].

2.1. Search Strategy and Information Sources

The search was conducted across major electronic databases and information sources, including PubMed, Google Scholar, and the official websites of organizations such as the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The search strategy utilized a combination of keywords and Boolean operators. The primary search string included:

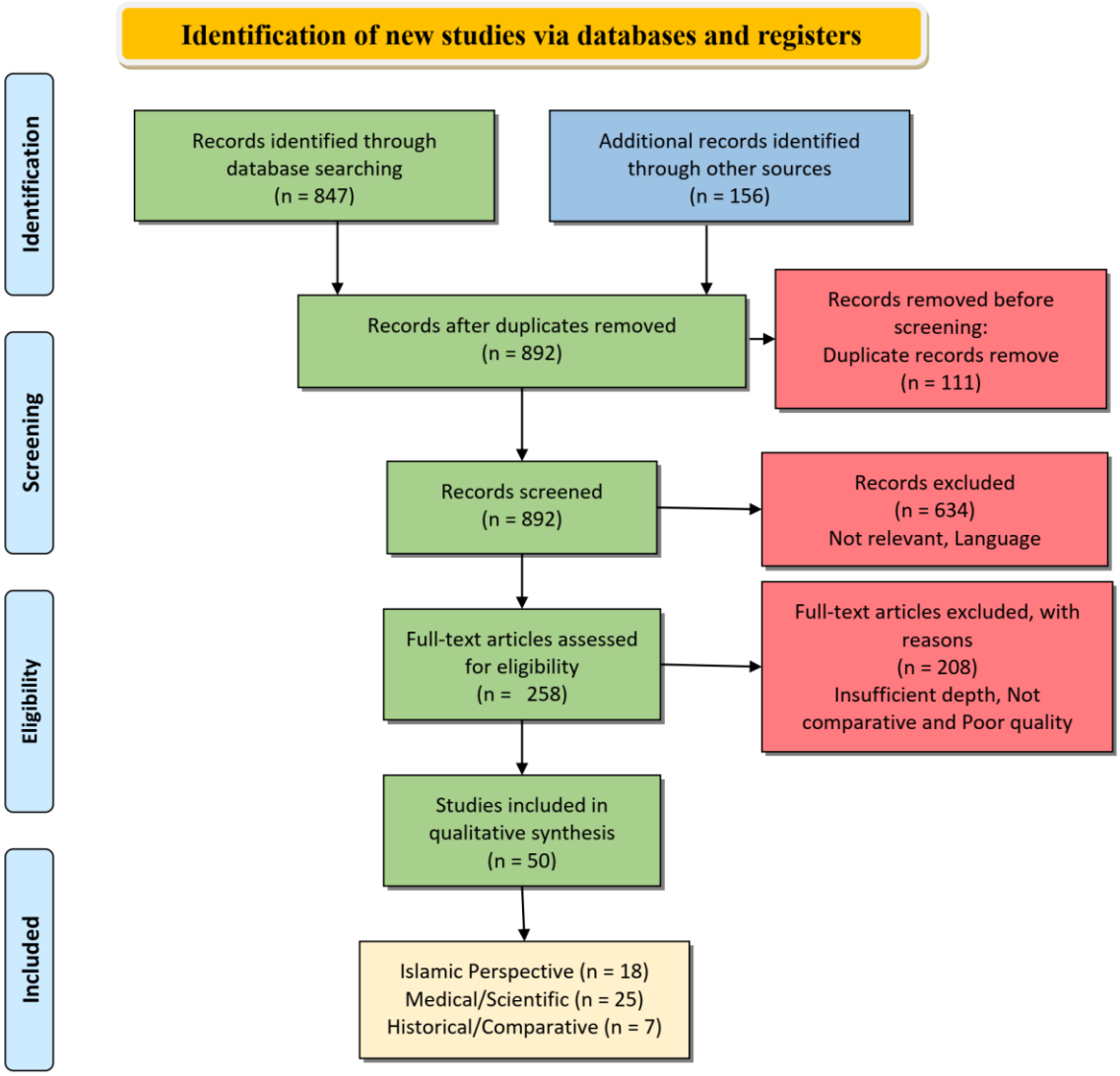
Medical/Scientific: ("alcohol" OR "ethanol") AND ("health effects" OR "carcinogen" OR "liver disease" OR "cardiovascular risk" OR "public health") AND ("systematic review" OR "meta-analysis")

Islamic/Jurisprudence: ("Islamic law" OR "Quran" OR "Hadith") AND ("alcohol" OR "khamr" OR "intoxicant") AND (prohibition)

Comparative: ("alcohol" AND "Islamic" AND "medical" AND "comparison" OR "review")

The search was limited to articles published between January 2000 and October 2025 to ensure the inclusion of contemporary medical evidence.

2.2. Study Selection Process and Criteria



Flow Diagram 1. PRISMA-inspired flow diagram illustrating the literature review and selection process

Flow Diagram 1 The selection process followed the four stages of PRISMA: Identification, Screening, Eligibility, and Inclusion.

Identification: An initial search yielded 847 records from databases and 156 records from other sources (primarily Islamic jurisprudential texts and historical medical treatises), totaling 1003 records. After removing 111 duplicates, 892 unique records remained.

Screening: Titles and abstracts were screened, leading to the exclusion of 634 records that were clearly irrelevant.

Eligibility and Criteria: The remaining 258 full-text articles were assessed for eligibility.

Inclusion Criteria: For modern medical viewpoints, inclusion was restricted to systematic reviews, meta-analyses, peer-reviewed articles, and reports from reputable health organizations that provided high-level evidence on alcohol's health effects. For Islamic perspectives, sources included analyses of primary Islamic texts (Quran and Hadith), scholarly consensus (ijma), and academic articles on Islamic jurisprudence that discussed the rationale for prohibition. The source must have a comparative or directly relevant focus.

Exclusion Criteria: Exclusion was based on a non-comparative focus, insufficient depth, poor methodological quality, or being a primary research article (to prioritize high-level evidence reviews).

Inclusion: A final compilation of 50 sources was included in the qualitative synthesis.

2.3. Data Synthesis and Extraction

We used a standard form to systematically aggregate data from all sources. This form included the design of the study, the main findings and the quality of the methodology. In the context of Islamic sources, the historical context of jurisprudence, the scholarly consensus (ijma) and the authenticity of hadith citations were all given special attention. The synthesis was mainly thematic and narrative in nature. It focused on finding the main themes and looking at where the two sides of the argument agreed and disagreed.

2.4. Ethical Considerations

This study was a literature analysis focused on the public domain and did not require approval by the Institutional Review Board. All sources have been quoted according to academic standards. It was ensured that Islamic teachings were presented in a fair and respectful manner by looking at many reliable sources.

3. Results

3.1. Alcohol classification: Mutual recognition of restrictions

When comparing Islamic law to modern medical science, a major similarity comes to light: both see alcohol as a bad thing, not a good thing. Islamic teachings have consistently deemed alcohol (khamr) as haram (forbidden) for over fourteen centuries, underpinned by a comprehensive framework that prioritizes spiritual well-being and human welfare [8,9]. Al-Bukhari (1997) asserts that this prohibition is all-encompassing, including production, distribution, and any facilitation of its use, alongside consumption. This prohibition signifies a profound understanding of its societal implications [10].

A commonly quoted hadith states that those who drink alcohol will be denied their prayers for 40 days [27]. This period of spiritual consequence can be viewed metaphorically alongside modern biological understanding. Research into gut microbiota indicates that a significant restoration of microbial diversity following the cessation of a disruptive agent often requires a period of approximately 4-6 weeks [28,29]. While not presented as evidence for the hadith, this parallel offers a contemporary lens through which to appreciate the holistic Islamic perspective on well-being, wherein spiritual and physical purification are both considered integral components of health.

Contemporary medical science has reached similar conclusions following extensive epidemiological research. The Global Burden of Disease Study, the first to analyses the health effects of alcohol, concluded that no level of alcohol consumption is safe [18]. This finding is a significant departure from previous medical advice which indicated that moderate intake may have cardiovascular benefits. These claims were largely disproved [19,20]. The IARC classification of alcoholic beverages as carcinogens group 1 [7], placing them in the same group as tobacco and asbestos, supports the scientific consensus that alcohol is not a safe foodstuff.

3.2. Health Effects: A List of Common Concerns

Currently, epidemiological data demonstrate that alcohol constitutes a significant health burden. According to WHO estimates [7] **Figure 1**, alcohol is responsible for 4.7% of all deaths around the world. This means that about 2.6 million people die from alcohol-related causes each year. Alcohol-related deaths are mostly caused by cancer, heart disease, liver disease, and injuries [7,30]. Islamic teachings have long stressed the potential for physical harm associated with alcohol consumption, and these findings are consistent with this view. A nuanced understanding of the health and social consequences of alcohol, which existed well over a thousand years before modern epidemiology, is encapsulated in a prophetic claim attributed to the Prophet Muhammad (may Allah bless him): [31].

3.2.1. The Risk of Cancer

The interface between alcohol and cancer is an important area of convergence. The International Agency for Research on Cancer (IARC) has identified a causal association between alcohol consumption and mouth, pharyngeal, laryngeal, esophageal, liver, colorectal and breast cancer. [32]. Recent studies indicate that even minimal alcohol consumption (fewer than one drink per day) elevates the risk of cancer, with no established safe threshold [33]. This evidence strongly supports the Islamic view that alcohol of any kind is injurious. A preventive approach that is consistent with the current understanding of the carcinogenic properties of alcohol is exemplified by the Hadith principle, which states that any intoxicant is illegal and that anything that causes intoxication in large quantities is (also) illegal.[34].

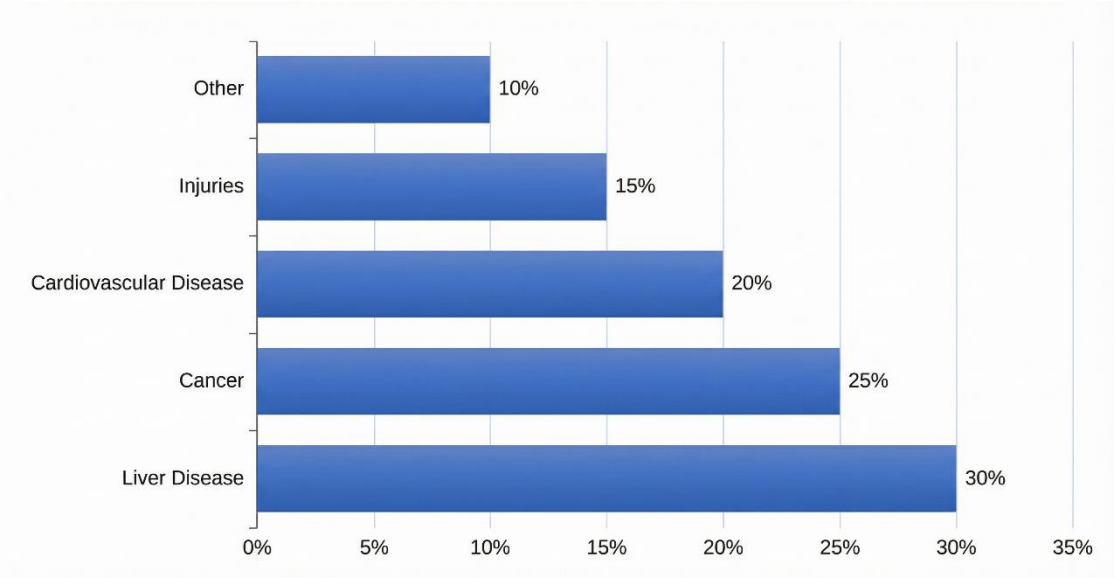


Figure 1. Causes of Alcohol-Related Deaths

3.2.2. Liver Disease

Alcoholic liver disease is one of the most common and direct consequences of alcohol consumption. The progression from fatty liver to alcoholic hepatitis and cirrhosis is predictable and is correlated to the volume and duration of alcohol consumption.[35,36]. The European Association for the Study of the Liver emphasizes that there is no secure limit for alcohol intake concerning liver health [37]. It is significant to recognize that early Islamic medical scholars, including Avicenna (Ibn Sina), recognized the hepatotoxic effects of alcohol over a millennium ago. They elucidated the advancement of liver disease in individuals who habitually consumed wine [38]. This historical insight exemplifies the empirical observation that constituted the basis for the Islamic prohibition.

3.2.3. Cardiovascular Effects

While prior studies indicated that moderate alcohol consumption might confer cardiovascular advantages, subsequent rigorous investigations have predominantly discredited these assertions, attributing the perceived protective effects to confounding variables and methodological deficiencies [19,20]. Recent extensive studies have demonstrated that alcohol consumption increases the risk of hypertension, atrial fibrillation, and alcoholic cardiomyopathy [39]. The Islamic law's focus on protecting life as one of its five core values creates a framework that naturally aligns with evidence-based strategies for preventing cardiovascular disease [40].

3.2.4 Neurocognitive and Mental Health

Alcohol consumption has a significant impact on the central nervous system (CNS), resulting in neuroinflammation, neuronal death, and brain atrophy. These effects result in the impairment of functions such as learning, memory, impulse control, and emotions. Permanent cognitive deficits may result from these adverse effects [41]. Oxidative stress, altered neurotransmitter systems (GABA and glutamate), and a reduction in the growth of grey matter and white matter are the mechanisms by which damage is mediated. These effects are observed in the neurological diseases Wreck Korsakoff syndrome and the increased incidence of stroke and dementia [41]. In middle and late life, alcohol consumption is linked to a variety of structural and functional MRI markers [42]. In individuals with pre-existing vulnerabilities or those who are developing their brains, even low levels of alcohol consumption may contribute to the alteration of brain structure and function [43,44]. Islamic teachings have long recognized this effect on cognition. The word alcohol in the Quran comes from the root word alcohol meaning 'to cover' or 'to cover up'. This refers to the fact that alcohol makes it difficult to think clearly and to make good choices (Quran 5:90). This linguistic insight suggests that humans knew about alcohol's neurological effects long before modern neuroscience.

3.2.5 Fertility and Prenatal Effects

The decline in human fertility has become more concerning in recent decades. Although therapeutic interventions may be beneficial, they are often burdened with high failure rates and costs and are vexing for the couple. Fertility is most effectively addressed through prevention. Male fertility has been demonstrated to be impaired by alcohol [45]. The developing fetus can be adversely affected and the risk of adverse outcomes can be increased by prenatal exposure to alcohol, which is considered a teratogen (Fetal Alcohol Spectrum Disorder). An increasing number of pregnant women may be at risk of prenatal alcohol exposure (PAE) due to global trends in increased alcohol consumption among women of childbearing age. This risk has been further exacerbated by the ongoing COVID-19 pandemic in certain countries [46]. Multiple fetal structural abnormalities, such as renal, cardiac, craniofacial, and other major malformations, are linked to prenatal alcohol exposure. Short palpebral fissures, a smooth phallus, and a narrow vermillion margin on the upper lip are among the characteristic craniofacial abnormalities [47]. It is important to note that while these effects are established, the magnitude of the risk can be influenced by genetic, environmental, and behavioral confounders.

3.2.6. Effects on the Microbiome of Humans

The gut microbiome is significantly disrupted by chronic alcohol consumption, resulting in dysbiosis, which is defined by functional imbalances, altered composition, and reduced microbial diversity. Ethanol exposure directly damages intestinal epithelial cells, compromising tight-junction proteins such as ZO-1 and increasing intestinal permeability a phenomenon known as "leaky gut" [48,49]. This barrier dysfunction enables the translocation of bacterial endotoxins (e.g., lipopolysaccharides or LPS) into the systemic circulation, which in turn induces hepatic inflammation by activating TLR4 in Kupffer cells [50]. The microbiome analysis indicates that alcohol consumption leads to the depletion of beneficial commensals (e.g., *Lactobacillus*, *Bifidobacterium*) and the proliferation of pathogenic taxa such as *Enterobacteriaceae* and *Klebsiella pneumoniae*, which exacerbates mucosal injury [51]. Alcohol reduces the production of short-chain fatty acids (SCFAs), which are essential for colonocyte health and anti-inflammatory signaling. Additionally, it elevates the levels of hepatotoxic metabolites, including acetaldehyde and endotoxins [52].

Sex-specific responses to alcohol are significant, with research suggesting that females may experience more severe dysbiosis as a result of hormonal influences on gut permeability [53]. These modifications have a clinical impact on a variety of conditions, including neuroinflammation and alcoholic hepatitis, as gut-derived toxins activate brain inflammasomes [54]. In animal models, therapeutic strategies that target the microbiome, such as probiotics (e.g., *Levilactobacillus brevis*) and prebiotics like galacto-oligosaccharides, have been shown to be effective in restoring microbial balance and barrier function [55]. Nevertheless, additional validation of optimal interventions for human alcohol-related pathologies is necessary for clinical translation [28].

3.3. Trends and Consumption Around the World

There are big differences in how much alcohol people drink around the world. The ongoing public health issue is highlighted by the rising trend in alcohol-related deaths, notwithstanding certain variations [7,56] **Figure 2**. The Eastern Mediterranean Region, which includes many Muslim-majority countries, has the lowest per capita consumption, while the WHO European Region has the highest [7] **Figure 3**. This geographical variation, which is strongly linked to religious and cultural norms, serves as a natural experiment indicating potential public health benefits related to policies of prohibition or stringent control.

3.4. The Burden on Society and the Economy

Alcohol has a lot of negative effects on society, including a big cost to healthcare systems, domestic violence, traffic accidents, and workplace injuries, as well as harm to people's health [22,57]. According to Sacks et al. (2015), the U.S. economy loses about $249 billion a year because of too much drinking [22]. Islamic jurisprudence has long addressed this greater harm to society by promoting the idea of prohibition, meaning `public interest` [21]. In this context, alcohol is not permitted because it protects the health of the population and maintains stability in families and social harmony.

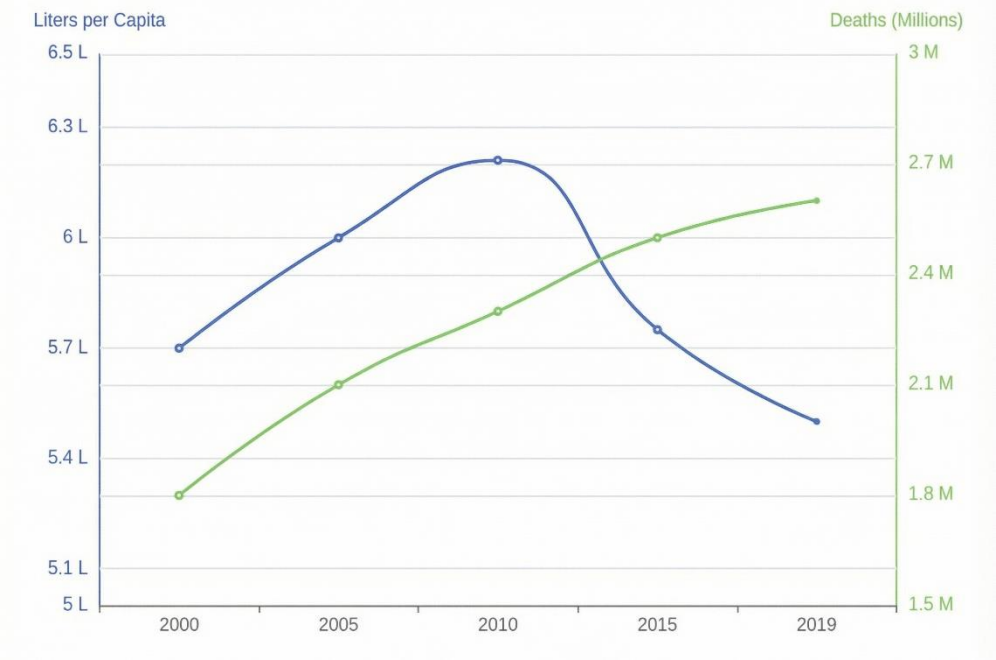


Figure 2. Trends in global alcohol consumption and deaths caused by it (2000–2019).

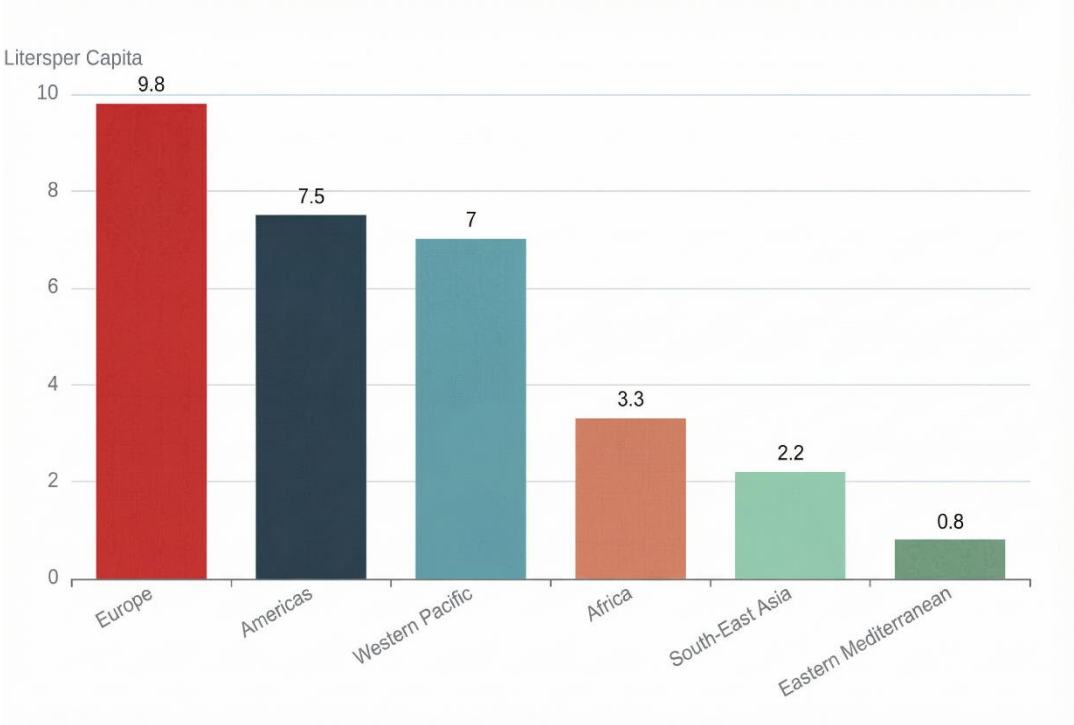


Figure 3. The amount of pure alcohol drunk per person in each WHO region in 2019, for people aged 15 and up.

3.5. The Halal Perspective: Theological Nuance and Modern Complexity

Under Islamic law, the term "Halal" enforces stringent regulations regarding alcohol in food and beverages [58]. Core interpretations classify alcohol within the Halal framework into two categories: the first comprises intoxicating substances from the fermentation of alcoholic beverages alcohol, which are unequivocally prohibited and deemed impure (najis); the second involves ethanol obtained through industrial

synthesis or natural extraction, whose Halal status remains contentious. This duality results in complexity in practical application. For example, processing aids, flavoring agents, or preservatives may include undisclosed alcohol derivatives [59].

The criteria for assessing the permissibility of alcohol primarily hinge on its origin and concentration. A fuzzy logic model suggests that certain Islamic scholars allow the inclusion of industrial alcohol in food when its concentration is under 0.5% and it does not possess intoxicating effects. This threshold lacks universal standardization [60]. A study in Malaysia revealed that 63.7% of food technology students could differentiate between ethanol and alcohol, yet only 29% comprehended the threshold for alcohol as a food additive. This knowledge gap leads to considerable variation in consumer acceptance of products containing "natural alcohol" or "residual fermentation alcohol." An instance is the "Halal Soju" introduced in the Indonesian market, which satisfies demand by eliminating intoxicating elements [61,62].

Technical detection and certification pose significant challenges. contemporary processed foods frequently include undeclared alcohol derivatives (e.g., as flavour carriers or solvents), whereas conventional detection methods fail to identify the origin of the alcohol [59,63]. DNA-based detection technologies, including PCR coupled with lateral flow chromatography, can identify pork components but are inadequate for determining the chemical forms of alcohol. Innovative solutions encompass CRISPR-based rapid nucleic acid testing, capable of concurrently validating meat authenticity and detecting alcohol residues, alongside the creation of a universally standardized Halal certification system [64,65].

Research on consumer behavior uncovers significant contradictions. within Turkish Muslim demographics, Halal certification enhances purchase intention by 67%. Nevertheless, 37% of consumers would still decline a product containing 0.1-0.5% industrial ethanol [66]. This phenomenon arises from the combined necessity of Halal (permissible) and Tayyib (pure, wholesome), indicating that a product must adhere to religious law while also satisfying safety and ethical standards [67,68].

Additionally, there are complications associated with halal practice, as the analytical method is unable to identify specific compounds due to the intricate structure of the interactions between the compounds in the food. In order to guarantee consumer confidence in the integrity of halal products, it is imperative to cultivate an interest in the traceability chain as the halal market expands globally. In the same vein, it is imperative that consumers possess a fundamental comprehension of halal in order to prevent confusion and misinformation.

4. Discussion

The gap between empirical evidence and religious doctrine has narrowed considerably, owing to the growing consensus between Islamic teachings and modern medical science on the classification of alcohol as a harmful substance. Their conclusions are remarkably similar, since they both challenge the notion of alcohol as a food and instead point out its potential for harm, despite their different epistemological bases, one based on divine revelation and the other on empirical observation. This harmonization includes specific health effects of alcohol, such as its effects on the heart and brain, as well as on cancer and liver disease, as presented in **Table 1.** Scientific evidence has increasingly confirmed the precautionary principles enshrined in Islamic jurisprudence for centuries. Both traditions follow the principle of necessity, recognizing that the use of a substance which is otherwise prohibited can be accepted only as a last resort for medicinal purposes, subject to strict conditions and professional supervision. The Islamic phrase that `necessity makes the forbidden permissible' is similar to the medical ethical principle of utility, which says that a treatment is permissible only if the potential benefits outweigh the potential risks. Both perspectives recognize the important social impact of alcohol on individual health and priorities the protection of vulnerable groups, alleviation of the economic burden of the disease and progress towards social justice **Table 2**. The relative effectiveness of alcohol control policies in various Muslim-majority countries is a testament to the integration of harm reduction principles into global public health strategies.

5. Conclusions

By classifying alcohol as a substance of major harm, rather than as a beneficial food or drug, the comparative

Table 1: Organ Systems That Alcohol Harms

Organ Systems	Detrimental effects & Result	Ref.
Brain	Long-term exposure to alcohol causes oxidative stress, neuronal damage and synapse disorders. This may lead to cognitive problems, neurodegeneration and increased risk of developing conditions such as Wernicke-Korsakoff Syndrome. Structural MRI studies confirm the reduction in grey and white matter volume, particularly in the areas responsible for executive function and emotional regulation.	[69,70]
Liver	When the body breaks down alcohol, toxic metabolites like acetaldehyde are formed. This can lead to hepatitis C, alcoholism and cirrhosis. Long-term use depletes glutathione, causing oxidative damage and making it difficult for the body to heal itself. MicroRNA dysregulation compounds the damage.	[71–73]
Heart	Alcohol disrupts calcium signaling and mitochondrial function, which can result in arrhythmias, hypertension and cardiomyopathy. Metabolites of ethanol induce apoptosis and fibrosis in cardiomyocytes, reducing cardiac output. Monotonic associations correlate increased alcohol consumption with reduced aortic elasticity and left ventricular mass.	[70,74,75]
Pancreas	Alcohol causes premature activation of the zymogen, leading to autodigestion, inflammation (pancreatitis) and endocrine system disorders. Long-term exposure is a major risk factor for diabetes and pancreatitis.	[75,76]
Kidneys	Ethanol causes renal tubular acidosis and hepatorenal syndrome by narrowing blood vessels and causing oxidative stress, which makes it harder for the kidneys to filter out waste and balance electrolytes.	[75]

Table 2: The effects of alcohol on communication with other people

Neurobehavioral	Effects on Interpersonal Communication	Ref.
Cognitive Disinhibition	Acute consumption reduces inhibition control, thus increasing aggression and social deviance. Meta-analyses confirm that the effects of expectancy exacerbate risky behaviors and compromise the reciprocity of conversations.	[77]
Emotional Dysregulation	Thwarted interpersonal needs, such as rejection sensitivity, in conjunction with alcohol consumption, exacerbate social anxiety, resulting in maladaptive coping through increased intake. Shame-proneness is linked to alcohol problems, but guilt-proneness has protective effects.	[78,79]
Social Perception Deficits	Heavy drinkers have less empathy and fail to understand social cues, exacerbating the conflict. Partners of alcohol dependent individuals report reduced levels of relationship satisfaction and communication effectiveness.	[80,81]

analysis shows a strong convergence between Islamic theology and modern medicine. This identification supports stringent prohibition and health control measures. However, limitations remain due to reliance on existing literature, possible cultural and methodological biases in the selection of sources and the evolving nature of biomedical research, which may not fully capture the emerging health impacts or nuances of social impact. Future research should explore the longitudinal effects of alcohol policies in different populations, investigate genetic and microbiological factors that affect individual susceptibility, and support collaborative studies that combine religious, medical, and social perspectives. This will ensure that alcohol use and alcohol regulation guidelines are more nuanced and more globally

relevant. In addition, the scientific and ethical rationale for public information campaigns and prevention policies will be strengthened by keeping the evidence base up to date and by developing cross-disciplinary methods.

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DECLARATIONS

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