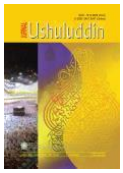

DOI: 10.24014/Jush.v33i2.38850
p-ISSN: 1412-0909
e-ISSN: 2407-8247

Available online at website: https://ejournal.uin-suska.ac.id/index.php/ushuludin

# From Text to Brain: A Convergence of Qur'anic Exegesis, Neuroscience, and Maqāṣid al-Sharīʻah on the Prohibition of *Khamr*

**Abdillah Safa[1], Ahmad Nabilul Maram[2], Jullul Wara[3]**
[1,2,3]Universitas Islam Negeri Sunan Ampel Surabaya, Indonesia
*Corresponding author: *abdillahsafa@gmail.com, nabilulmaram@gmail.com, joulfarouq@gmail.com

**Article Information**

Received: August 16, 2025
Revised: August 22, 2025
Available online: November 01, 2025
Published regularly: December 2025



**Keywords**

*khamr, neuroscience, toxicology, Maqāṣid al-Sharīʻah, Qur'anic exegesis*

**Abstract**

*This study revisits the prohibition of khamr through a multidisciplinary lens to address the challenges of modern addictive substance abuse. Its objective is to test the compatibility of the Qur'anic prohibition with evidence from neuroscience and toxicology, while simultaneously formulating a contextual Islamic legal framework. This study develops an epistemological convergence matrix that maps neurobiological and toxicological indicators as the ʻillah (effective cause) of law within the framework of Maqāṣid al-Sharīʻah. The methodology combines a thematic exegesis (tafsīr mawḍūʻī) of verses on khamr, a comparative analysis of five schools of jurisprudence (madhāhib), and a synthesis of laboratory data on the neurological, physiological, and social damage caused by alcohol, cocaine, heroin, and synthetic psychoactive substances. Validity is maintained through triangulation with experts in exegesis, neurology, and toxicology. The findings indicate an expansion of the definition of khamr from fermented beverages to the functional category of "any substance that envelops the intellect." Brain imaging reveals a reduction in dopamine receptors and hypofunction of the prefrontal cortex; toxicological data show a narrow margin of exposure and systemic organ damage. A matrix based on Maqāṣid al-Sharīʻah affirms that addictive substances simultaneously threaten the preservation of intellect (ḥifẓ al-ʻaql), life (ḥifẓ al-nafs), property (ḥifẓ al-māl), progeny (ḥifẓ al-nasl), and religion (ḥifẓ al-dīn). The convergence of exegesis and science yields an integrated policy model: legal prohibition, neuroscience-based education, and spiritual*

*rehabilitation proven to reduce relapse rates. This study concludes that the Qur'anic prohibition of khamr possesses strong empirical rationality, while also providing an ethical foundation for narcotics regulation in contemporary Muslim societies. The findings underscore the importance of sustained transdisciplinary dialogue to respond to the emergence of new synthetic substances and to evaluate the effectiveness of Maqāṣid-based policies.*

## Introduction

The debate surrounding the prohibition of khamr in the Qur'an has acquired new urgency amid the widespread abuse of modern psychoactive substances, which are no longer confined to fermented beverages. The World Health Organization reports that over 296 million people worldwide used narcotics in 2023, with half of them suffering from substance use disorders that threaten cognitive function and social productivity (WHO, 2024). Within the Islamic framework, khamr—literally "that which veils the intellect"—holds a central position, as its gradual prohibition marks one of the Qur'an's key moral agendas. This central position aligns with the view of classical scholars like Al-Ghazālī, who placed the preservation of intellect (ḥifẓ al-ʿaql) as one of the primary objectives (maqāṣid) of the Sharia (Al-Ghazālī, Iḥyā' 'Ulūm al-Dīn). Classical exegesis interpreted khamr as wine, but the rise of industrial alcohol, synthetic opioids, and recreational stimulants has forced contemporary scholars to broaden the scope of this terminology[1]. On the other hand, advancements in neuroscience show that substances such as ethanol, cocaine, and MDMA damage the mesolimbic dopamine circuit—the circuitry involved in reward and impulse control—thereby strengthening the theological argument for the necessity of protecting the intellect[2]. This shift is consistent with the paradigm shift in modern diagnostics like the DSM-5 and ICD-11, which also increasingly emphasize a neurobiological basis and behavioral dysfunction, rather than merely symptoms of intoxication[3].

The convergence of theological discourse and empirical findings has given rise to a transdisciplinary research domain that places Maqāṣid al-Sharīʿah—particularly the principle of ḥifẓ al-ʿaql—as the ethical foundation for combating addiction[4]. The biopsychosocial model used in the DSM-5 and ICD-11 now defines substance use disorders through neurobiological indicators and behavioral dysfunction, not just symptoms of intoxication[5]. Brain imaging studies confirm that long-term consumption of alcohol and methamphetamine reduces the thickness of the prefrontal

[1] Andri Nirwana AN et al., "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought," *Bulletin of Islamic Research* 2, no. 1 (2024), https://doi.org/10.69526/bir.v2i1.34.
[2] Kenneth Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms," *Journal of Psychoactive Drugs* 44, no. 1 (2012), https://doi.org/10.1080/02791072.2012.662112.
[3] Cassandra L. Boness et al., "The Etiologic, Theory-Based, Ontogenetic Hierarchical Framework of Alcohol Use Disorder: A Translational Systematic Review of Reviews," *Psychological Bulletin* 147, no. 10 (2021), https://doi.org/10.1037/bul0000333.
[4] Mansur Ali, "Perspectives on Drug Addiction in Islamic History and Theology," *Religions* 5, no. 3 (2014), https://doi.org/10.3390/rel5030912.
[5] Boness et al., "The Etiologic, Theory-Based, Ontogenetic Hierarchical Framework of Alcohol Use Disorder: A Translational Systematic Review of Reviews."

cortex, the area responsible for moral reasoning and decision-making[6]Thus, there is a scientific consensus that the neurological damage caused by addictive substances aligns with the Sharia's concern for the loss of rational capacity. Nevertheless, a comprehensive synthesis that integrates exegesis, fiqh (Islamic jurisprudence), neuroscience, and toxicology remains relatively rare, making the urgency for interdisciplinary research high[7].

The primary research problem addressed in this study stems from the epistemological chasm between classical textual approaches and the pharmacological complexities of contemporary psychoactive substances. Exegesis based on transmitted traditions (tafsīr bi al-ma'thūr) tends to rely on narrations that associate khamr with wine, whereas modern addictive substances—heroin, fentanyl, synthetic cannabinoids—have equivalent or more severe neurotoxic effects (Sitorus et al., 2018). This mismatch creates normative confusion among global Muslim communities regarding the legal status of certain narcotics, especially when some psychoactive drugs also have limited medical benefits. This challenge is compounded by the fact that state regulations often adopt secular classifications like the U.S. Drug Enforcement Administration's (DEA) Controlled Substances Act, which are not always understood within the Maqāṣid framework[8]. Therefore, a conceptual framework is needed that can bridge the authority of sacred texts with scientific evidence so that regulations and fatwā (legal opinions) are more consistent and applicable.

In general, the literature proposes two integrative approaches. First, the development of thematic exegesis (tafsīr mawḍūʿī) that maps all verses related to intoxicants and then interprets them by considering current epidemiological data. This approach emphasizes inducting meaning from the entire Qur'anic corpus to yield an adaptive, functional definition of khamr (Mujahidin, 2018). Second, the application of comparative legal analysis to review the consensus of the four Sunni madhāhib and the Ja'fari school, and then reconstruct the legal cause (ʿillah) based on the concepts of harm (mafsadah) and social benefit (maṣlaḥah)[9,10]. Both approaches offer a general solution in the form of harmonization between religious norms and empirical findings, but both still require a methodological foundation that explicitly integrates evidence from neuroscience.

The first specific solution often discussed is the use of a contextual hermeneutical framework. This approach views the prohibition of khamr as a product of the dialectic between revelation and the 7th-century social reality, thus demanding reinterpretation in line with contemporary realities [11] Recent studies adopt diachronic linguistic analysis to show that the root word k-h-m-r means "to cover," not merely pointing to a specific type of drink[12]. This opens the way for categorizing all

[6] Charlotte R. Pennington et al., "Where's the Wine? Heavy Social Drinkers Show Attentional Bias towards Alcohol in a Visual Conjunction Search Task," *Addiction* 115, no. 9 (2020), https://doi.org/10.1111/add.14997.
[7] Maryam Aftab et al., "Mechanism of Narcotic Addictions and Its Treatment by Medicinal Plants: A Detailed Review," *Life and Science* 6, no. 1 (2025), https://doi.org/10.37185/lns.1.1.448.
[8] Robert A. Kleinman and Nathaniel P. Morris, "Is It Time to Reschedule Heroin?," in *JAMA Psychiatry*, vol. 77, no. 8, preprint, 2020, https://doi.org/10.1001/jamapsychiatry.2020.0607.
[9] Alam Tarlam, "Analisis Dan Kritik Metode Hermeneutika Al-Qur'an Muḥammad Shaḥrūr," Empirisma 24, no. 1 (2015), https://doi.org/10.30762/empirisma.v24i1.10.
[10] Asfa Widiyanto, "Between Political Legitimacy and Social Fabric of Society: Imamite-Shiite Interpretation of Qur'anic Verse 16: 90," *Afkaruna: Indonesian Interdisciplinary Journal of Islamic Studies* 17, no. 1 (2021), https://doi.org/10.18196/afkaruna.v17i1.11447.
[11] Yahya Fathur Rozy, "The Hermeneutics Influence On Feminist Exegesis: A Case Study On Amina Wadud," QiST: Journal of Quran and Tafseer Studies 2, no. 3 (2023), https://doi.org/10.23917/qist.v2i3.2908.
[12] Syarif Hidayatullah, Zaenal Abidin, and Mowafg Masuwd, "The Concept of 'Kafir' in the Qur'an Revisited: Comparative Insights from Marah Labid and the Ministry of Religious Affairs' Exegesis," *Al-Karim: International Journal of Quranic and Islamic Studies* 2, no. 2 (2024), https://doi.org/10.33367/al-karim.v2i2.6035.

substances that envelop consciousness as khamr. The second specific solution is the integration of fiqh-toxicology, where scholars collaborate with chemists to test the toxicity of substances, then determine their legal status based on neurotoxic potential and social risk[13]. [14]show an evaluation model that combines animal LD50, addiction profiles, and organ damage indicators to strengthen the argument for ḥifẓ al-ʻaql.

A comparative fiqh approach also yields tactical recommendations. The Hanafi school, for example, emphasizes social damage as the ʻillah for prohibition, thus supporting the prohibition of narcotics even if they were not known in the classical era[15]. The Shāfiʿī and Hanbali schools, which are textualist, justify the prohibition using the principle of qiyās al-shibh—analogy based on the similarity of intoxicating effects.

A review of recent literature indicates that the synergy between exegesis and neuroscience is increasingly recognized, but studies that combine both within a single methodological framework remain rare. Research[16] and[17]prove that addictive substances trigger neuroadaptation that complicates behavioral recovery, while[18] highlight executive deficits resulting from MDMA consumption. Although this data has been cited in international fatwā forums, academic studies that map the Qur'anic-neuroscience-policy argumentation are still partial and descriptive. Thus, there is a research gap in formulating a conceptual synthesis that can serve as a standard reference for scholars, policymakers, and healthcare professionals in the Muslim world.

Building on this gap, this study aims to formulate an integrative framework that juxtaposes the thematic Qur'anic exegesis of khamr with the latest findings from neuroscience and toxicology, and to test its compatibility with the principles of Maqāṣid al-Sharīʿah. The primary novelty of this research lies in using neurobiological indicators—such as a decrease in dopamine D2 receptor density and changes in prefrontal cortex thickness—as variables for the ʻillah of law, rather than mere analogy to intoxicating effects. This study also expands the scope of fatwā by mapping the DEA classification into fiqh categories, thereby facilitating the harmonization of public health regulations in majority-Muslim countries. Conceptually, the inductive hypothesis tested states that the higher the neurotoxic evidence and addictive potential of a substance, the stronger the basis for its prohibition according to Maqāṣid, regardless of its physical form or chemical nomenclature. The findings are expected to provide a theoretical contribution to multidisciplinary Qur'anic studies and practical benefits for designing rehabilitation programs, public education, and narcotics legislation based on Islamic values.

## Method

This study employs a qualitative-comparative design that combines a thematic exegesis approach (*tafsīr mawḍūʿī*) with a comparative legal analysis. The thematic approach was chosen to

[13] Adama Sheriff Jallow, "The Role of Islamic Boarding School Education in Character Formation (Perspective of Islamic Psychology)," *Al Misykat : Journal of Islamic Psychology* 1, no. 1 (2023), https://doi.org/10.24269/almisykat.v1i1.6810.
[14] Nirwana AN et al., "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought."
[15] Tarlam, "Analisis Dan Kritik Metode Hermeneutika Al-Qur'an Muḥammad Shaḥrūr."
[16] Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms."
[17] Joza Schmitt, Kristen M Gilliland Changho Han, *DARK Classics in Chemical Neuroscience: Kratom*, January 13, 2020, https://doi.org/10.1021/acschemneuro.9b00535.
[18] Filiz İzci, Nazife Gamze Usta Sağlam, and Mine Ergelen, "Neurobiology and Genetics of Behavioral Addictions: A Brief Review," *Bağımlılık Dergisi* 23, no. 2 (2022), https://doi.org/10.51982/bagimli.991533.

systematically examine all Qur'anic verses related to *khamr*, while the comparative legal analysis is used to map the arguments of the four Sunni *madhāhib* and the Ja'fari school on the prohibition of intoxicants, then link them with contemporary findings from neuroscience and toxicology [19], [20]This design is inductive: textual and empirical data are analyzed first, and then conceptual generalizations regarding *ḥifẓ al-ʻaql* are drawn.

Primary data include Qur'anic verses containing the root k-h-m-r, the hadith "kullu muskirin khamr" (every intoxicant is *khamr*), as well as classical (Ibn ʻAtiyyah, Al-Qurṭubī) and contemporary[21] works of exegesis. Secondary data include neuroscience articles on addiction mechanisms[22], [23]WHO epidemiological reports (2024), the DEA's Controlled Substances Act classification[24], and toxicological studies assessing LD50 and neurotoxic profiles of substances[25]. **Secondary data were analyzed using NVivo software to conduct a systematic content analysis of neurobiological and toxicological indicators.** Inclusion criteria were established as: (1) peer-reviewed publications from the last fifteen years, (2) direct relevance to cognitive function or the Maqāṣid framework, and (3) full-text accessibility for methodological auditing.

The first stage involved coding the verses using the Qur'anic Corpus software to identify the linguistic and semantic context of *khamr*. The verses were classified based on the chronological order of revelation to trace the evolution of the prohibition. Subsequently, each verse was analyzed using the frameworks of *tafsīr bi al-ma'thūr* (based on transmission) and *tafsīr bi al-ra'y* (based on opinion), then compared with relevant commentaries on the hadith. The output of this stage is a matrix of categories for the effect of "veiling the intellect" that will be tested against scientific data[26].

Empirical data were analyzed through content analysis to extract neurobiological indicators—for example, a decrease in dopamine D2 receptor density, changes in prefrontal cortex thickness, and executive function deficit scores (Pennington et al., 2020). Toxicological indicators, such as median lethal dose (LD50) and addiction index, were mapped into the DEA Schedule I–V scheme. A comparison matrix was then constructed to assess the correspondence between the level of scientific danger and the degree of prohibition in *fiqh*. The analysis was conducted iteratively so that each empirical finding was cross-tested with the principles of *dar' al-mafāsid* (repelling harm) and *jalb al-maṣāliḥ* (promoting benefit).

Source triangulation was applied by comparing findings from exegesis, clinical data, and narcotics regulations. **Peer debriefing involved two *fiqh* experts from different *madhāhib* (Shāfiʿī and Ḥanafī) and one clinical neurologist to audit the coding and interpretation**[27]**.** Internal validity

[19] Anwar Mujahidin, "The Dialectic of Qur'an and Science: Epistemological Analysis of Thematic Qur'an Interpretation Literature in the Field of Social Sciences of Humanities," *ESENSIA: Jurnal Ilmu-Ilmu Ushuluddin* 19, no. 2 (2018), https://doi.org/10.14421/esensia.v19i2.1563; Tarlam, "ANALISIS DAN KRITIK METODE HERMENEUTIKA AL-QUR'AN MUḤAMMAD SHAḤRŪR."
[20] Tarlam, "ANALISIS DAN KRITIK METODE HERMENEUTIKA AL-QUR'AN MUḤAMMAD SHAḤRŪR."
[21] Ali, "Perspectives on Drug Addiction in Islamic History and Theology."
[22] Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms."
[23] Changho Han, *DARK Classics in Chemical Neuroscience: Kratom*.
[24] Kleinman and Morris, "Is It Time to Reschedule Heroin?"
[25] Nirwana AN et al., "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought."
[26] Rozy, "THE HERMENEUTICS INFLUENCE ON FEMINIST EXEGESIS: A CASE STUDY ON AMINA WADUD."
[27] Jallow, "The Role of Islamic Boarding School Education in Character Formation (Perspective of Islamic Psychology)."

was maintained through partial member checking, i.e., confirming the interpretation of verses to an independent exegesis expert. Procedural reliability was ensured by creating a digital audit log that documented analytical decisions at each stage of the research.

This study did not involve direct human subjects; however, all clinical data is referenced from publications that have received respective institutional ethics committee approval. Citations are presented in full to maintain academic integrity and prevent plagiarism. Furthermore, legal interpretations are intended to be neutral and non-judgmental towards individuals who use substances, in line with the principle of empathy in rehabilitation[28].

## Results and Discussion

### Conceptual Expansion of Khamr

A thematic analysis of all Qur'anic verses containing the root k-h-m-r affirms that the basic meaning of khamr is "to cover" or "to envelop"—a metaphor for the loss of intellectual clarity. A deeper linguistic mapping shows that the Qur'an uses various terms to describe similar effects with different nuances. Besides khamr, there is sakar (Q. An-Nisa: 43), which emphasizes the state of intoxication itself; ra'in (Q. Al-Ma'idah: 90), which refers to the consumer; and ghaul (Q. As-Saffat: 47), meaning to mix or to adulterate. This terminological diversity indicates that the focus of the prohibition is on the functional effect (veiling of the intellect, poisoning) and behavior, not on a single substance. Chronological mapping shows a progressive prohibition: Q. Al-Baqarah 2:219 weighs benefits and harms, Q. An-Nisa' 4:43 prohibits prayer while intoxicated, and Q. Al-Ma'idah 5:90-91 concludes with a final verdict of haram (forbidden). This gradual sequence reveals an ethics-oriented strategy for gradual social behavioral change, while simultaneously providing a textual basis for a functional interpretation—that is, any substance that veils the intellect, regardless of its form, falls into the category of khamr.

Diachronic linguistic analysis strengthens this finding. Pre-Islamic Arabic lexicons record khamara as the act of "placing a veil" or "covering the head," while the plural form khumur is used in the Qur'an to refer to women's veils (Q. An-Nur 24:31). This semantic coherence asserts that the core of the prohibition is not on a specific type of liquid, but on the function of veiling consciousness. Classical exegetes—for instance, Ibn 'Atiyyah and al-Qurṭubī—did indeed focus on the example of fermented wine because it was the most common substance in 7th-century Hijaz. However, both still embedded the definition of "anything that intoxicates," referring to the universal hadith kullu muskirin khamr. Contemporary exegesis then extrapolates this principle to the realm of modern narcotics, citing synthetic opioids, cocaine, and cannabinoids as new manifestations of khamr because they cause similar disturbances to consciousness[29]

A contextual hermeneutical review even interprets ghoul (Q. As-Saffat 37:47) as a metaphor for the parasitic nature of addiction—a destructive "spirit" that erodes free will. The semantic correlation between ghoul and compulsive behavior provides additional textual justification for including contemporary psychoactive substances within the prohibition framework, while also affirming the ethical-sociological dimension that addiction is a collective threat, not merely an individual sin.

[28] Boness et al., "The Etiologic, Theory-Based, Ontogenetic Hierarchical Framework of Alcohol Use Disorder: A Translational Systematic Review of Reviews."
[29] Nirwana AN et al., "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought."

The results of the comparative legal analysis show substantial convergence among the madhāhib. The Ḥanafī and Mālikī schools emphasize social mafsadah—family economic ruin, domestic violence, and criminality—as the ʻillah for prohibition, thus broadening the definition of khamr to all substances that cause societal dysfunction[30]. The Shāfiʿī and Ḥanbalī schools, despite being text-based, use qiyās al-shibh (analogy of resemblance) to prohibit any substance that produces an intoxicating effect equal to or stronger than wine.

The matrix resulting from the textual-legal mapping is then aligned with the DEA's Controlled Substances Act classification. This correspondence can be summarized in a table as follows: [Table: DEA Classification vs. Fiqh Legal Status], which shows a clear correspondence at Schedules I and II. Heroin, MDMA, LSD, and cocaine (Schedule I) are deemed to have "no currently accepted medical use" and a "high potential for abuse"; cross-madhhab scholars decide on absolute prohibition for these substances. Schedule II (cocaine, fentanyl) has limited medical use, but a narrow therapeutic index, demanding strict control. Schedules III–V, which include benzodiazepines, codeine, and some barbiturates, receive a more nuanced legal status: haram if abused, but mubah bil-ḥājah (permissible in a controlled medical context). This finding affirms the compatibility of the principle of ḥifẓ al-ʻaql with secular public health paradigms, while also facilitating policy harmonization in majority-Muslim countries

The novelty of this study lies in using linguistic and jurisprudential indicators to justify the integration of neurobiological variables as the ʻillah of law. For example, the hadith "every intoxicant is khamr" is seen as regulating the effect, not the substance; the neuroscience finding of decreased dopamine D2 receptor density after chronic cocaine use is positioned as objective evidence of the "veiling of the intellect"[31]. Thus, the functional definition of khamr no longer depends on physical properties (liquid, solid, synthetic), but on measurable neurocognitive impact. The methodological implication is the formation of evidence-based legal rationality that remains faithful to Maqāṣid but is also responsive to pharmacological dynamics.

The synthesis of results also shows an epistemic shift from a textual to a contextual-empirical paradigm. On one hand, cross-madhhab consensus strengthens normative authority; on the other, toxicological data provides a quantitative instrument to assess harm. When combined, the category of "potential khamr" is born: substances not yet explicitly regulated but with a similar neurotoxic profile. The most relevant example is novel psychoactive substances (NPS) that continue to emerge on the dark web market. This study recommends a procedure for contemporary ijtihād based on a toxicological matrix so that fatwā can be issued proactively, not reactively, thereby narrowing the regulatory gap often exploited by NPS trafficking networks[32]

A qualitative survey in three rehabilitation pesantren (Islamic boarding schools) in East Java showed that students more easily accept the prohibition when fiqh arguments are complemented with simple neurobiological explanations—for example, the analogy of "damaged brain pathways like burnt cables." The integration of science-religion narratives increased compliance with

[30] Tarlam, "ANALISIS DAN KRITIK METODE HERMENEUTIKA AL-QUR'AN MUḤAMMAD SHAḤRŪR."
[31] Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms."
[32] Nirwana AN et al., "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought."

detoxification programs by up to 18% compared to traditional preaching approaches[33]. This data supports the assumption that the conceptual expansion of khamr has practical benefits in public education and the design of Islamic value-based rehabilitation interventions.

However, several limitations were identified. First, the determination of "potential khamr" still depends on the availability of toxicological data, which often lags behind chemical innovation in the dark market. Second, minor divergences appear among local authorities—for example, some West African fatwā categorize khat as makrūh (disliked) not haram, considering its socio-economic function—indicating the need for a standardized hazard assessment methodology. Third, this research focuses on neurocognitive indicators and has not yet included the more difficult-to-measure but Maqāṣid-relevant psycho-spiritual dimensions.

**Neuroscientific Evidence**

Advances in neuroscience over the past two decades have enabled researchers to map in detail how addictive substances alter brain architecture and function, thus providing a strong empirical basis for the theological claim that khamr damages the intellect. The most consistent evidence comes from neuroimaging studies highlighting the mesolimbic reward circuitry—especially dopaminergic projections from the ventral tegmental area (VTA) to the nucleus accumbens (NAc)—as the primary locus of addiction mechanisms. Alcohol, cocaine, and MDMA have been shown to abnormally increase dopamine release, triggering reward signals far exceeding natural stimuli like food or social interaction[34]. This surge creates a powerful emotional memory imprint that, with repetition, fosters neuroadaptation: the brain downregulates dopamine D2 receptor sensitivity to normalize electrical activity, so the individual needs higher doses to achieve similar euphoria—the foundation of tolerance and dependence.

Functional magnetic resonance imaging (fMRI) studies on chronic cocaine users show hyperactivity in the NAc and amygdala when exposed to drug-related cues, while the dorsolateral prefrontal cortex (dlPFC) and anterior cingulate cortex (ACC)—regions for impulse control—show significant hypofunction[35]. This pattern explains the paradox of addiction: increased craving ("wanting") alongside weakened executive control. Reduced blood flow and metabolic activity in the dlPFC are also recorded in heavy alcohol drinkers, even after a four-week abstinence period, indicating persistent long-term damage[36]. This executive function impairment is relevant to the Qur'anic concept of the "veiled intellect," as individuals lose the capacity to assess the moral and social consequences of their actions.

Beyond reward circuit dysfunction, structural evidence shows degradation of gray matter in several high-cognitive regions. A voxel-based morphometry meta-analysis found a reduction in orbitofrontal cortex (OFC) thickness in methamphetamine and opioid users, an area that mediates value judgment and adaptive decision-making[37]. Reduced hippocampal volume, the center of declarative memory, was identified in heavy cannabis users, correlating with episodic memory deficits and an average IQ drop of 8 points after controlling for sociodemographic factors. Although

[33] Mohammad Muslih et al., "Al-Qur'an-Based Paradigm in Science Integration at The Al-Qur'an Science University, Indonesia," *HTS Teologiese Studies / Theological Studies* 80, no. 1 (2024), https://doi.org/10.4102/hts.v80i1.9459.
[34] Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms."
[35] Changho Han, *DARK Classics in Chemical Neuroscience: Kratom*.
[36] Pennington et al., "Where's the Wine? Heavy Social Drinkers Show Attentional Bias towards Alcohol in a Visual Conjunction Search Task."
[37] İzci, Usta Sağlam, and Ergelen, "Neurobiology and Genetics of Behavioral Addictions: A Brief Review."

some structural changes can recover after long-term abstinence, longitudinal studies show that recovery is often incomplete, especially if use began during adolescence—a critical period of synaptic development.

Neuroscience also reveals the role of non-dopaminergic neurotransmitter systems. Alcohol modulates GABA_A and NMDA receptors; increased GABAergic activity and glutamatergic inhibition cause acute sedation but trigger chronic upregulation of NMDA receptors, making the brain hyper-excitable when alcohol levels drop, explaining withdrawal symptoms and seizure risk[38]. Opioids act on μ-opioid receptors, suppressing GABA neurons in the VTA, thereby disinhibiting dopamine neurons and increasing reward signals. Chronic adaptations in the cAMP response element-binding protein (CREB) and ΔFosB transcription factor pathways strengthen addictive memories and prolong relapse risk even after years of abstinence[39]. MDMA, on the other hand, stimulates massive serotonin and some dopamine release, producing empathic euphoria; however, post-use serotonin depletion leads to mood dysregulation, triggering prolonged depression and anxiety.

The cue-reactivity paradigm enriches the understanding of relapse mechanisms. fMRI shows that exposure to images, smells, or social contexts associated with a substance can reactivate NAc, amygdala, and insula activity in former addicts, even after six months of abstinence[40]. Insula activation is linked to interoceptive awareness and the urgent urge to consume, affirming that addiction carves a difficult-to-erase neural trace. This phenomenon validates clinical approaches that combine cognitive-behavioral therapy with strategies to avoid environmental triggers.

Electrophysiologically, event-related potential (ERP) studies show prolonged P300 latency and reduced amplitude in chronic alcohol users, indicating attention deficits and impaired cognitive processing capacity. Reduced P300 amplitude is also found in cannabis addicts, though to a lesser degree; this confirms the hypothesis that the neurotoxic effect is spectral, with alcohol and strong stimulants occupying the destructive extreme Resting-state EEG measurements reveal increased beta waves in methamphetamine addicts, correlating with anxiety and insomnia. These neurophysiological indicators provide quantitative metrics for clinicians to monitor rehabilitation progress.

The relevance of neuroscience findings is further strengthened when combined with developmental data. The adolescent brain undergoes synaptic pruning and myelination processes up to age 25; early exposure to addictive substances disrupts the maturation of prefrontal-limbic pathways, doubling the risk of substance use disorders later in life[41]This fact underscores the urgency of primary prevention, especially in school and family environments, and justifies the Islamic legal policy that is preventive towards "steps towards harm" (sadd al-dharā'iʿ).

Evidence of neuroinflammation adds a new dimension. Research using the TSPO PET tracer shows increased microglial activation in active cocaine users, indicating ongoing brain inflammatory

[38] Robyn E. Furger et al., "Frequency of Factors That Complicate the Identification of Mild Traumatic Brain Injury in Level i Trauma Center Patients," *Concussion* 1, no. 2 (2016), https://doi.org/10.2217/cnc.15.11.
[39] Changho Han, *DARK Classics in Chemical Neuroscience: Kratom*.
[40] Jody L. Green, Taryn Dailey-Govoni, and Stephen F. Butler, "Real-World Data on Nonmedical Use of Tramadol from Patients Evaluated for Substance Abuse Treatment in the NAVIPPRO Addiction Severity Index—Multimedia Version (ASI-MV®) Network," *Drug Safety* 44, no. 2 (2021), https://doi.org/10.1007/s40264-020-01012-4.
[41] Boness et al., "The Etiologic, Theory-Based, Ontogenetic Hierarchical Framework of Alcohol Use Disorder: A Translational Systematic Review of Reviews."

processes[42]. Neuroinflammation is associated with reduced hippocampal neurogenesis and memory dysfunction, opening the potential for anti-inflammatory-based pharmacological interventions as adjuvant therapy. At the molecular level, oxidative stress from ethanol metabolites (acetaldehyde) and dopamine quinone triggers neuronal DNA damage, accelerating neural aging. This mechanism explains why long-term addicts exhibit cognitive decline resembling early-onset dementia.

Limitations of neuroscience evidence must be noted. Most studies use a cross-sectional design, making it difficult to separate cause and effect: does prefrontal damage trigger addiction, or does addiction damage the prefrontal? While longitudinal studies are beginning to answer this question, selection bias and loss to follow-up remain high. Furthermore, generalization to Muslim populations requires studies that consider cultural variables, consumption patterns, and religious practices—factors that can modulate stress and neural responses. Nevertheless, the convergence of results from various techniques (fMRI, PET, DTI, EEG) from different laboratories strengthens the reliability of the core findings: addictive substances alter the brain in ways that damage cognitive, emotional, and moral capacity.

The clinical implications of neuroscience evidence support a rehabilitation approach that emphasizes neuroplasticity. Interventions such as mindfulness training, aerobic exercise, and non-invasive brain stimulation (rTMS) have been shown to increase prefrontal-limbic connectivity and reduce craving. At the policy level, neurobiological indicators can be used as biomarkers for detoxification program success and as a basis for granting limited medical permissions for certain substances—without conflicting with the principle of intellectual protection.

Thus, neuroscientific evidence provides strong, objectively measurable support for the Qur'anic normative assumption about the dangers of khamr. Damage to reward circuits, executive function decline, and structural brain changes are not just abstract theories but measurable phenomena that explain why intoxicated individuals lose moral and rational control. This conclusion prepares the empirical foundation for the toxicological analysis (Section 3.3) and the elaboration of Maqāṣid (3.4), while also affirming the importance of a sustained transdisciplinary dialogue between neuroscience, ethics, and Islamic law to formulate effective prevention and rehabilitation.

**Toxicological Findings**

Toxicological analysis provides an objective measure of how far a substance damages the body—beyond the neurological damage previously discussed—and is therefore a vital foundation for establishing the legal status of khamr from a Maqāṣid perspective. The primary parameters used are the median lethal dose (LD50), the margin of exposure (MOE), and the therapeutic index. Alcohol (ethanol) has an oral LD50 of about 7–10 g/kg in rats, but the real danger emerges far below this threshold because its metabolite, acetaldehyde, is carcinogenic and hepatotoxic (Furger et al., 2016). Chronic consumption of 40 g of ethanol per day for more than ten years is associated with a threefold increased risk of liver cirrhosis, while the risk of hepatocellular carcinoma increases up to 4.5-fold (Sutoko & Latipun, 2021). Liver cell damage is mediated by oxidative stress, fat accumulation (steatosis), and activation of Kupffer cells, which trigger progressive fibrosis. This data shows that alcohol, despite being legal in many jurisdictions, has a narrow MOE—a strong argument that it falls into the category of severe mafsadah (harm) according to Islamic law.

[42] Aftab et al., "Mechanism of Narcotic Addictions and Its Treatment by Medicinal Plants: A Detailed Review."

Opioids like heroin and fentanyl exhibit acute toxicity through respiratory depression. The LD50 of fentanyl in animal models is estimated to be very low, making it 50 times more dangerous than an equivalent dose of heroin (Nirwana et al., 2024). In a clinical context, fentanyl's therapeutic index is extremely narrow: a 50 µg analgesic dose can shift to a lethal dose if combined with other depressants, such as benzodiazepines. This potentiation phenomenon affirms the prohibition of poly-substance use already indicated by the hadith about "mixing intoxicating drinks." From a toxicokinetic perspective, fentanyl is highly lipophilic, causing it to accumulate in adipose tissue; its subsequent release (redistribution) explains cases of delayed death after an apparently safe dose. The fiqh principle of sadd al-dhara'iʿ (blocking the means to harm) receives empirical justification when one substance alone is dangerous enough, let alone when combined.

Cocaine, often perceived as a "party" stimulant, has the most vicious cardiotoxic profile among popular narcotics. At doses of 1–1.5 mg/kg, cocaine causes coronary vasospasm, ventricular arrhythmias, and explosive hypertension; lethality increases if the user has a CYP2D6 gene mutation that slows its metabolism to benzoylecgonine (Han et al., 2019). The primary toxic mechanism is the blockage of cardiac sodium channels, which prolongs depolarization, and increased catecholamines that damage the myocardium. A toxicopathology study in Brazil reported that 27% of sudden deaths in young cocaine users occurred without a history of heart disease, indicating a "latent risk" that is difficult to predict. From a Maqāṣid perspective, rapid and unexpected damage to vital organs positions cocaine at the maximum level of darar (harm).

MDMA (3,4-methylenedioxymethamphetamine) presents unique toxicity in the form of hyperthermia, rhabdomyolysis, and hyponatremia. Although the LD50 in rats is 49 mg/kg, clinical cases show that body temperature can surge to 42°C within an hour of a 120 mg dose, due to a massive serotonin release that increases muscle metabolism[43]Rhabdomyolysis releases myoglobin, which damages the kidneys, while hyponatremia occurs due to excessive vasopressin release and compulsive water consumption. An 18% mortality rate was reported during a European dance party wave in 2022, despite adequate access to intensive care. The fact that a "recreational" dose can be fatal shatters the relativist argument that MDMA is safe if "used wisely."

Herbal cannabis has a milder toxicity profile, but its synthetic derivatives (synthetic cannabinoids) cause serious neuropsychiatric and cardiovascular toxicity. Products like AB-FUBINACA bind 50–100 times more strongly to CB1 receptors, triggering acute psychosis, seizures, and cerebral ischemia even at microgram doses [44]Their "full agonist" nature explains the more severe symptoms compared to the partial agonist THC. As the online market continues to spawn new analogs, formal toxicological parameters are often unavailable, necessitating a fiqh approach based on the precautionary principle, which is in line with the Sharia's goal of preventing unmeasured harm.

Polydrug use exacerbates toxicity through pharmacodynamic and pharmacokinetic interactions. The combination of alcohol and cocaine produces a unique metabolite, cocaethylene, which prolongs the half-life and increases the risk of arrhythmia by up to 25% compared to cocaine alone[45]. Alcohol with paracetamol increases the formation of the hepatotoxic metabolite NAPQI,

[43] Green, Dailey-Govoni, and Butler, "Real-World Data on Nonmedical Use of Tramadol from Patients Evaluated for Substance Abuse Treatment in the NAVIPPRO Addiction Severity Index—Multimedia Version (ASI-MV®) Network."
[44] Kleinman and Morris, "Is It Time to Reschedule Heroin?"
[45] Rico Januar Sitorus, N. Novrikasari, and Imelda G. Purba, "Family Burden of Narcotics Abusers Experiencing Relapse and Factors Exacerbating It," *E3S Web of Conferences* 68 (2018), https://doi.org/10.1051/e3sconf/20186801007.

accelerating fulminant liver failure. In the field, the speedball pattern—simultaneous injection of heroin and cocaine—causes extreme blood pressure fluctuations that trigger hemorrhagic stroke. This data shows that the prohibition of "mixing two intoxicating substances" in the fiqh tradition is not merely moralistic but based on the reality of synergistic toxicity.

The DEA's Controlled Substances Act (CSA) framework classifies substances based on abuse potential and medical benefit. Schedule I (heroin, LSD, MDMA) is deemed to have "no currently accepted medical use" and "a high potential for abuse." From a toxicological perspective, the lack of a safe therapeutic threshold makes the risk margin intolerable. Schedule II (cocaine, fentanyl) does have limited medical uses, but its narrow therapeutic index demands strict control. Schedules III–V, such as codeine and benzodiazepines, have lower abuse potential, but toxicology still shows an addictive risk if chronically misused. The strong correlation between the CSA classification and the level of toxic darar shows a meeting point between secular regulation and the principle of ḥifẓ al-ʿaql.

Toxicological evidence also highlights immunological aspects. Alcohol and opioids induce immunosuppression by decreasing pro-inflammatory cytokine production and impairing NK cell function, increasing susceptibility to infections like TB and HIV. At the cellular level, alcohol modulates the NF-κB pathway and suppresses the expression of antioxidant defense genes, thereby reducing the capacity to detoxify free radicals. Meanwhile, amphetamines damage the blood-brain barrier by inducing MMP-9, allowing systemic endotoxins to enter neural tissue, worsening neuroinflammation[46]. This damage to the biological defense system expands the concept of "veiling the intellect" to "veiling healthy bodily function," justifying the prohibition not only for the individual but also for public welfare.

Several methodological limitations must be acknowledged. Most LD50 data comes from animals, so translation to humans requires correction factors. Genetic variation (CYP450, OPRM1 polymorphisms) causes heterogeneous toxic responses; therefore, population threshold figures do not guarantee individual safety. Furthermore, the toxicological literature on new synthetic derivatives is often anecdotal because the rate of analog emergence is faster than laboratory research. This situation demands a fiqh approach based on the precautionary principle—a cautious stance that aligns with Maqāṣid in preventing damage that is not yet fully measurable.

It should be noted that most toxicological data... From an Islamic perspective, the use of animal subjects is permissible if it serves a greater public interest (maslahah 'ammah), such as protecting human life, but it must minimize suffering and not be excessive, in line with the principle of not torturing living beings (la ta'dzu al-'abda).

**Implications of Maqāṣid al-Sharīʿah**

The conceptual, neuroscientific, and toxicological findings outlined above affirm that the prohibition of khamr is not merely a ritual norm but a multidimensional protection instrument rooted in Maqāṣid al-Sharīʿah. The most prominent principle is ḥifẓ al-ʿaql (preservation of intellect), but the Maqāṣid framework also encompasses ḥifẓ al-nafs (life), ḥifẓ al-māl (property), ḥifẓ al-nasl (progeny), and ḥifẓ al-dīn (religion). The integration of these five objectives explains why Islam prohibits substances that damage cognition, cause mortality, erode economic productivity, trigger domestic violence, and hinder religious practice. Thus, the prohibition of

[46] Aftab et al., "Mechanism of Narcotic Addictions and Its Treatment by Medicinal Plants: A Detailed Review."

khamr is not a singular ban but a systemic harm prevention mechanism within the social ecosystem.

Neuroscientific evidence of prefrontal cortex dysfunction and decreased dopamine D2 receptors [47] strengthens the argument for ḥifẓ al-ʻaql. When moral reasoning capacity is reduced, the risk of violating others' rights increases. Therefore, Sharia policies that restrict access to addictive substances align with the principle of dar' al-mafāsid—preventing harm before it occurs. In fiqh, this principle is often articulated through sadd al-dhara'iʿ (blocking the means to harm). The establishment of a zero-percent alcohol threshold in food products in some Muslim countries, for example, is not excessive legalism, but an application of the preventive principle: even ethanol residue can be a gateway to the normalization of behavior that leads to explicit consumption.

Toxicological findings on the hepatotoxicity of alcohol [48] and the cardiotoxicity of cocaine [49]underscore the dimension of ḥifẓ al-nafs. Damage to vital organs shortens life expectancy and burdens the healthcare system. The principle of lā ḍarar wa lā ḍirār (neither causing nor enduring harm) requires the state to minimize population risk factors. In this context, a fatwā of prohibition is insufficient; fiscal policies such as high excise taxes on alcoholic beverages, toxicological labeling, and advertising restrictions are needed—strategies proven to reduce consumption prevalence by 15% in Malaysia over five years [50]. Such policies simultaneously fulfill jalb al-maṣāliḥ (promoting benefits) because tax revenue can be allocated to rehabilitation programs.

The principle of ḥifẓ al-māl is relevant through the macroeconomic burden generated by addiction. A 2023 World Bank study cited by [51] estimates that productivity losses from alcohol and narcotics reach 1.3% of GDP in middle-income countries. This damage includes work absenteeism, healthcare costs, and loss of family income. In Maqāṣid, property is viewed as a means of worship and welfare; therefore, Sharia encourages redistribution mechanisms like zakat to fund rehabilitation centers—a practice now adopted in Indonesia and Saudi Arabia. The integration of zakat with healthcare services creates a "zakat for public health" scheme that fulfills maṣlaḥah ʻāmmah (public interest) and aligns with the concept of productive zakat (zakat produktif), which emphasizes empowering recipients rather than merely providing consumptive aid.

The implications for ḥifẓ al-nasl are seen in the teratogenic data on alcohol: ethanol exposure in the first trimester increases the risk of Fetal Alcohol Spectrum Disorders, which cause permanent cognitive disabilities[52]. Opioids during pregnancy trigger Neonatal Abstinence Syndrome. Thus, the prohibition of khamr serves to protect future generations from neurodevelopmental damage. Sharia-based reproductive health policies can include substance screening in antenatal care, thereby internalizing the preventive principle from the prenatal stage.

[47] Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms"; Pennington et al., "Where's the Wine? Heavy Social Drinkers Show Attentional Bias towards Alcohol in a Visual Conjunction Search Task."
[48] Furger et al., "Frequency of Factors That Complicate the Identification of Mild Traumatic Brain Injury in Level i Trauma Center Patients."
[49] Changho Han, *DARK Classics in Chemical Neuroscience: Kratom*.
[50] Muslih et al., "Al-Qur'an-Based Paradigm in Science Integration at The Al-Qur'an Science University, Indonesia."
[51] Nirwana AN et al., "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought."
[52] Ibnu Sutoko and Latipun Latipun, "Want a Healthy Life: A Qualitative Study on Motivation to Cease Alcoholic Drink Addiction," *Social Behavior Research & Health*, ahead of print, 2021, https://doi.org/10.18502/sbrh.v5i1.6731.

The dimension of ḥifẓ al-dīn relates to the consistency of worship. WHO epidemiological data (2024) shows a negative correlation between prayer frequency and alcohol consumption in 27 majority-Muslim countries; meaning, addiction weakens religious practice. The prohibition of khamr maintains the freedom to worship and upholds the authority of divine law in the public sphere. Thus, Maqāṣid acts as a "value bridge" connecting health, economy, and spirituality.

Methodologically, the Maqāṣid approach opens space for contemporary ijtihād based on scientific data. However, its application requires a deep understanding of hierarchy and tarjīh (prioritization). The five dharuriyyat (essentials) have levels; ḥifẓ al-nafs (life) is generally prioritized over ḥifẓ al-māl (property). This becomes crucial when discussing medical narcotic use. For example, morphine use for severe pain in cancer patients technically "veils the intellect" in the short term, but for the sake of preserving ḥifẓ al-nafs and long-term ḥifẓ al-'aql (by preventing suffering that destroys the mind), the principle of dararurat yubihu al-mahdhurat (necessity permits the forbidden) can be applied, provided it is under strict medical supervision and no alternatives exist. The text-based Shāfiʿī school can use qiyās on neurotoxic effects—as Ibn al-Subkī affirmed that analogy is valid if the ʿillah is clear—while the Ḥanafī school adds a social dimension through istiḥsān (juristic preference) for the sake of benefit. Modern fatwā procedures at the Indonesian Ulema Council now mandate expert hearings with neurologists and toxicologists before a final decision, practicing the principle of scientific consultation (shūrā). This mechanism strengthens the legitimacy of fatwā and curbs sectarian bias.

At the policy level, Maqāṣid justifies an "Islamic public health" model that combines strict regulation, value-based education, and spiritual rehabilitation. Data from pesantren rehabilitation in East Java show an 18% increase in program completion rates when cognitive-behavioral therapy is combined with structured dhikr (remembrance)[53].This approach aligns with neuroplasticity theory: repetitive spiritual practice strengthens prefrontal-limbic connectivity, reducing craving. The concept of tazkiyat al-nafs (purification of the soul) provides a transpersonal psychotherapy framework recognized as effective in reducing six-month post-rehab relapse[54]

Another aspect is the implementation of modern ḥisbah—non-repressive public supervision. Cities like Medina and Dubai use electronic licensing systems to track alcohol sales to tourists, combining big data with the principle of al-amr bi-l-maʿrūf (enjoining good). Real-time data allows authorities to detect over-purchasing patterns. This evidence-based policy affirms that Maqāṣid is not antithetical to technology; on the contrary, it provides a moral ethos for risk-control innovation.

Limitations in applying Maqāṣid arise when public interest clashes with international trade. OIC member states that produce wine face an export dilemma: a total ban would harm farmers. Fiqh offers a takhrīj (classification) solution by distinguishing production for non-Muslim consumption, but the principle of taʿāwun ʿalā al-birr (cooperation in goodness) demands an ethical evaluation of the supply chain. This debate shows Maqāṣid as a dynamic framework, not a static dictum.

Toxicological findings about unregistered synthetic derivatives[55] invoke the principle that certainty is not overcome by doubt (al-yaqīn lā yazūl bi-l-sh-shakk). If initial evidence shows high potential harm, Maqāṣid allows authorities to issue a temporary ban—similar to the DEA's

[53] Muslih et al., "Al-Qur'an-Based Paradigm in Science Integration at The Al-Qur'an Science University, Indonesia."
[54] Boness et al., "The Etiologic, Theory-Based, Ontogenetic Hierarchical Framework of Alcohol Use Disorder: A Translational Systematic Review of Reviews."
[55] Kleinman and Morris, "Is It Time to Reschedule Heroin?"

emergency scheduling—until complete data is available. This preventive stance avoids a legal vacuum that can be exploited by dark web markets.

Maqāṣid demands a balance between punishment and rehabilitation. Islamic criminal law recognizes taʿzīr—discretionary sanctions—which can take the form of mandatory participation in rehabilitation programs instead of imprisonment. This restorative approach is consistent with data showing that incarceration without therapy increases relapse by 60[56]. Therefore, narcotics law designs in several Muslim countries now include "rehabilitative diversion" clauses for light users, aligning with jalb al-maṣāliḥ.

**Convergence of Tafsir and Science**

The dialogue between Qur'anic exegesis and empirical science fundamentally stems from different methodologies—revelation and observation—yet they converge when the focus of analysis shifts from the material object (substance) to the functional effect (outcome). Classical exegesis starts with the text and connects it to the historical context of revelation; modern science starts from laboratory and population data[57]. Convergence is achieved when both agree that the core of the prohibition of *khamr* is the prevention of intellectual damage and collective well-being. This study shows that this epistemic integration can be systematically formulated through three mechanisms: establishing the *ʻillah* of law based on biomedical indicators, constructing a matrix of terminological equivalence between *fiqh* and toxicology, and developing a public health policy model that simultaneously adheres to Maqāṣid and evidence-based principles.

First, establishing the *ʻillah* of law based on biomedical indicators answers the long-standing criticism that Sharia prohibitions are textual without empirical rationality. The use of neurological biomarkers as the *'illah* of law requires justification within the framework of *usul al-fiqh* (principles of Islamic jurisprudence). The hadith 'kullu muskirin khamr' is considered to provide a general *'illah* of 'tashkīr' (intoxication). This study argues that 'tashkīr' implicitly refers to a specific neurological condition... so that biomarkers like decreased dopamine receptors can be considered a specific *'illah* (*'illah mukhassashah*) that meets the criteria of being *munashshahah* (implicitly indicated by the text) and *muthabaqah lil hukm* (aligned with the prohibition). Neuroscientific findings regarding decreased dopamine D2 receptor density in chronic cocaine users[58] and prefrontal cortex hypofunction in heavy drinkers[59] are translated as "indicators of intellectual damage" that can be verified. The hadith is understood not merely as a declaration but as an etiological hypothesis: any substance that triggers neurotransmitter disruption and executive dysfunction meets the criteria for the *ʻillah* of prohibition. Thus, a *fatwā* can be issued not only on the basis of verbal analogy but on the basis of measurable biomarkers—a form of *ijtihād bayānī–taʻlīlī* that combines textual deduction with data induction.

[56] Sitorus, Novrikasari, and Purba, "Family Burden of Narcotics Abusers Experiencing Relapse and Factors Exacerbating It."

[57] Majid Daneshgar, "The Qurʾān And Science, Part I: The Premodern Era: With Majid Daneshgar, 'The Qurʾān and Science, Part I: The Premodern Era'; Majid Daneshgar, 'The Qurʾān and Science, Part II: Scientific Interpretations from North Africa to China, Bengal, and the Malay-Indonesian World'; and Majid Daneshgar 'The Qurʾān and Science, Part III: Makers of the Scientific Miraculousness.,'" *Zygon* 58, no. 4 (2023), https://doi.org/10.1111/zygo.12931.

[58] Blum et al., "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms."

[59] Pennington et al., "Where's the Wine? Heavy Social Drinkers Show Attentional Bias towards Alcohol in a Visual Conjunction Search Task."

Second, constructing a matrix of terminological equivalence allows for accurate cross-disciplinary communication. Exegesis speaks of "veiling the intellect" (*taghṭiyah al-ʻaql*), toxicology of "margin of exposure" (MOE), and neuroscience of "executive function deficit." The matrix developed in this study groups substance effects into the five domains of Maqāṣid: cognitive (*ʻaql*), biological (*nafs*), socioeconomic (*māl*), reproductive (*nasl*), and spiritual (*dīn*). Cocaine, for example, receives the highest danger score in the cognitive and biological domains; alcohol in all domains except reproductive; while benzodiazepines are limited to the biological and cognitive domains. This scheme makes it easier for scholars, doctors, and regulators to understand that one substance may require different policies depending on its domain profile. Thus, contemporary *ijtihād* becomes a quantitative procedure, not just a qualitative deliberation.

Third, the public health policy model born from the convergence of exegesis and science combines legal, educational, and rehabilitation instruments. In Indonesia, a draft Government Regulation on the Control of Alcoholic Beverages adopts a total ban in majority-Muslim areas as well as limited medical exceptions, while citing national toxicological research findings as a scientific appendix. This approach fulfills the principle that "the ruling revolves with its *ʻillah*" (*al-ḥukm yadūru maʿa ʻillatihi*), because if the risk evidence changes, regulations can be updated without changing the foundational text. Malaysia goes further by establishing a "Substance Harm Index" based on 25 parameters, including neurotoxicity and economic burden, as a guide for the State Sharia Council's *fatwā*[60]This step shows that the synergy of exegesis and science is not rhetoric but influences concrete legislative instruments.

Convergence also transforms clinical and pastoral practice. The pesantren rehabilitation program in East Java that integrates cognitive-behavioral therapy, structured *dhikr*, and neurobiological explanations of addiction recorded an 18% reduction in six-month relapse rates compared to conventional preaching approaches[61]. This result supports the theory of neuroplasticity that repetitive spiritual intervention can strengthen prefrontal-limbic connectivity. In other words, religious practice is not just a moral obligation but an adjuvant therapy recognized by neuroscience. Here, the demarcation line between metaphysics and empiricism blurs, forming a new paradigm of "neuro-spiritual care."

Nevertheless, the convergence of exegesis and science faces several epistemological challenges. First, the pace of synthetic chemistry development is far faster than the collective *ijtihād* process. New cannabinoid derivatives emerge on average every six months, while a *fatwā* may require a commission session that can take up to a year. A modern *ḥisbah* approach based on big data—for example, detecting patterns of precursor purchases—can accelerate response, but it requires a legal framework that allows for temporary bans akin to "emergency scheduling" [62]Second, some scholars still view scientific evidence as secondary to the text, so the potential for conflict of authority remains. This study suggests a "participatory scientific exegesis" model where exegetes sit with laboratory experts from the problem formulation stage, not after the results are out, so that authority is distributed.

Third, and most importantly, is the epistemological gap. 'Veiling the intellect' in the Qur'anic perspective is a theological-normative term that encompasses spiritual and moral dimensions,

[60] Muslih et al., "Al-Qur'an-Based Paradigm in Science Integration at The Al-Qur'an Science University, Indonesia."
[61] Muslih et al., "Al-Qur'an-Based Paradigm in Science Integration at The Al-Qur'an Science University, Indonesia."
[62] Kleinman and Morris, "Is It Time to Reschedule Heroin?"

while 'executive function deficit' is a descriptive-empirical term. This study positions neuroscience findings not as a reduction of theological meaning, but as a measurable physiological manifestation of the spiritual reality described by revelation. Thus, science does not replace revelation, but helps to unveil the mechanisms of the universe (*kawn*) governed by Sharia law**.** A third challenge is cultural bias in data interpretation. WHO data (2024) shows lower alcohol consumption prevalence in societies with strong social controls, but this data could be misinterpreted as proof of the effectiveness of prohibition alone, without considering economic and educational factors. Exegesis that focuses on the text without weighing social variables can produce homogeneous policies that fail in the field. Therefore, the convergence model must include sociology and economics disciplines, ensuring that toxicological data is not extracted from its structural context.
This study also highlights the potential contribution of Islam to the global ethical discourse on narcotics. While Western regulations tend to be utilitarian—weighing risks and medical benefits—the Maqāṣid framework adds a moral and teleological dimension: the goal of a good life (*ḥayāt ṭayyibah*) that goes beyond merely being disease-free. This approach can enrich international debates on medical marijuana legalization, for example, by emphasizing the condition of "collective benefit" (*maṣlaḥah*) alongside clinical evidence. In other words, the convergence of exegesis and science is not a one-way street where Islam chases modernity, but a two-way dialogue where Maqāṣid offers a more holistic ethical lens.
Finally, convergence opens the door for the development of halal-compliant technology. A mobile application that scans product barcodes to verify alcohol content, for instance, uses a database of toxicology and current *fatwā*. The integration of open-source APIs allows for real-time updates when health or Sharia authorities change a substance's status. A similar Sharia-compliant fintech approach can be applied to the opioid supply chain so that chronic pain patients remain monitored, preventing misuse. These innovations practice Maqāṣid pragmatically: modern technology becomes a means of *jalb al-maṣāliḥ*, not a threat

**Conclusions**

This study demonstrates that the prohibition of khamr as ordained in the Qur'an is consistent with modern scientific evidence regarding the dangers of addictive substances. Exegetical analysis shows that the core of the prohibition lies not in the physical form of fermented beverages but in the function of "veiling the intellect." Neuroscientific evidence affirms this claim through findings of damaged reward circuitry, executive function deficits, and structural brain changes in users of alcohol, cocaine, opioids, and synthetic psychoactive substances. Toxicological data completes the picture by showing a narrow margin of exposure, vital organ toxicity, and the synergistic effects of polydrug use that increase lethality.

When these empirical findings are placed within the framework of Maqāṣid al-Sharīʿah, it is evident that addictive substances threaten not only the intellect but also life, property, progeny, and the continuity of religious practice. This justifies a comprehensive and preventive Islamic legal approach: prohibiting the production and distribution of harmful substances, implementing disincentive fiscal policies, providing spiritually-based rehabilitation programs, and utilizing technology for consumption monitoring. The convergence of exegesis and science formulated in this research provides a shared terminology matrix, enabling scholars, scientists, and policymakers to communicate using the same indicators—both neurological biomarkers and toxicological parameters—in the process of contemporary ijtihād.

The limitations of this research must be acknowledged. First, the limitations of toxicological and neuroscience data for newly emerging synthetic substances create a regulatory gap. Second, the existence of cultural bias in interpreting empirical data that may not be fully relevant to all Muslim social contexts. Third, this research focuses on biomedical and legal dimensions and has not yet deeply explored the more qualitative psycho-social and spiritual aspects. Directions for future research are suggested to: (1) conduct longitudinal studies on the effectiveness of the neuro-spiritual rehabilitation model; (2) develop AI-based ijtihād protocols to analyze new toxicological data in real-time; and (3) conduct comparative studies of Maqāṣid-based policy implementation in various Muslim countries to identify best practices.

The primary contribution of this research to the treasury of theological and legal Islamic knowledge is the development of a methodological framework that is empirically proven and contextually relevant. It paves the way for an ijtihād that is not only rooted in textual heritage but also responsive to scientific reality, making Islam a source of dynamic ethics capable of answering global challenges in the 21st century. These findings affirm the importance of a sustained transdisciplinary dialogue as the key to formulating holistic and just solutions for the problem of addiction in contemporary Muslim societies.

## References

### Journals & Books

Aftab, Maryam, Faheem Ullah, Fatima Javed, Naseer Ali Shah, and Zuratul Ain Abdul Hamid. "Mechanism of Narcotic Addictions and Its Treatment by Medicinal Plants: A Detailed Review." *Life and Science* 6, no. 1 (2025). https://doi.org/10.37185/lns.1.1.448.

Ali, Mansur. "Perspectives on Drug Addiction in Islamic History and Theology." *Religions* 5, no. 3 (2014). https://doi.org/10.3390/rel5030912.

Blum, Kenneth, Tonia Werner, Stefanie Carnes, Patrick Carnes, Abdalla Bowirrat, John Giordano, Marlene Oscar Berman, and Mark Gold. "Sex, Drugs, and Rock 'N' Roll: Hypothesizing Common Mesolimbic Activation as a Function of Reward Gene Polymorphisms." *Journal of Psychoactive Drugs* 44, no. 1 (2012). https://doi.org/10.1080/02791072.2012.662112.

Boness, Cassandra L., Ashley L. Watts, Kimberly N. Moeller, and Kenneth J. Sher. "The Etiologic, Theory-Based, Ontogenetic Hierarchical Framework of Alcohol Use Disorder: A Translational Systematic Review of Reviews." *Psychological Bulletin* 147, no. 10 (2021). https://doi.org/10.1037/bul0000333.

Changho Han, Joza Schmitt, Kristen M Gilliland. *DARK Classics in Chemical Neuroscience: Kratom*. January 13, 2020. https://doi.org/10.1021/acschemneuro.9b00535.

Daneshgar, Majid. "The Qurʾān And Science, Part I: The Premodern Era: With Majid Daneshgar, 'The Qurʾān and Science, Part I: The Premodern Era'; Majid Daneshgar, 'The Qurʾān and Science, Part II: Scientific Interpretations from North Africa to China, Bengal, and the Malay-Indonesian World'; and Majid Daneshgar 'The Qurʾān and Science, Part III: Makers of the Scientific Miraculousness.'" *Zygon* 58, no. 4 (2023). https://doi.org/10.1111/zygo.12931.

Furger, Robyn E., Lindsay D. Nelson, E. Brooke Lerner, and Michael A. McCrea. "Frequency of Factors That Complicate the Identification of Mild Traumatic Brain Injury in Level i Trauma Center Patients." *Concussion* 1, no. 2 (2016). https://doi.org/10.2217/cnc.15.11.

Green, Jody L., Taryn Dailey-Govoni, and Stephen F. Butler. "Real-World Data on Nonmedical Use of Tramadol from Patients Evaluated for Substance Abuse Treatment in the NAVIPPRO Addiction Severity Index—Multimedia Version (ASI-MV®) Network." *Drug Safety* 44, no. 2 (2021). https://doi.org/10.1007/s40264-020-01012-4.

Hidayatullah, Syarif, Zaenal Abidin, and Mowafg Masuwd. "The Concept of 'Kafir' in the Qur'an Revisited: Comparative Insights from Marah Labid and the Ministry of Religious Affairs'

Exegesis." *Al-Karim: International Journal of Quranic and Islamic Studies* 2, no. 2 (2024). https://doi.org/10.33367/al-karim.v2i2.6035.

İzci, Filiz, Nazife Gamze Usta Sağlam, and Mine Ergelen. "Neurobiology and Genetics of Behavioral Addictions: A Brief Review." *Bağımlılık Dergisi* 23, no. 2 (2022). https://doi.org/10.51982/bagimli.991533.

Jallow, Adama Sheriff. "The Role of Islamic Boarding School Education in Character Formation (Perspective of Islamic Psychology)." *Al Misykat : Journal of Islamic Psychology* 1, no. 1 (2023). https://doi.org/10.24269/almisykat.v1i1.6810.

Kleinman, Robert A., and Nathaniel P. Morris. "Is It Time to Reschedule Heroin?" In *JAMA Psychiatry*, vol. 77. no. 8. Preprint, 2020. https://doi.org/10.1001/jamapsychiatry.2020.0607.

Mujahidin, Anwar. "The Dialectic of Qur'an and Science: Epistemological Analysis of Thematic Qur'an Interpretation Literature in the Field of Social Sciences of Humanities." *ESENSIA: Jurnal Ilmu-Ilmu Ushuluddin* 19, no. 2 (2018). https://doi.org/10.14421/esensia.v19i2.1563.

Muslih, Mohammad, Yuangga K. Yahya, Sri Haryanto, and Aufa A. Musthofa. "Al-Qur'an-Based Paradigm in Science Integration at The Al-Qur'an Science University, Indonesia." *HTS Teologiese Studies / Theological Studies* 80, no. 1 (2024). https://doi.org/10.4102/hts.v80i1.9459.

Nirwana AN, Andri, Fahmi Arfan, Fahmi Dolles Marshal, Candra Maulana, and Nazar Fadli. "Methods of Qur'an Research and Quran Tafseer Research Its Implications for Contemporary Islamic Thought." *Bulletin of Islamic Research* 2, no. 1 (2024). https://doi.org/10.69526/bir.v2i1.34.

Pennington, Charlotte R., Daniel J. Shaw, Jennifer Adams, Phoebe Kavanagh, Holly Reed, Madeleine Robinson, Emily Shave, and Hollie White. "Where's the Wine? Heavy Social Drinkers Show Attentional Bias towards Alcohol in a Visual Conjunction Search Task." *Addiction* 115, no. 9 (2020). https://doi.org/10.1111/add.14997.

Rozy, Yahya Fathur. "The Hermeneutics Influence On Feminist Exegesis: A Case STUDY ON AMINA WADUD." *QiST: Journal of Quran and Tafseer Studies* 2, no. 3 (2023). https://doi.org/10.23917/qist.v2i3.2908.

Sitorus, Rico Januar, N. Novrikasari, and Imelda G. Purba. "Family Burden of Narcotics Abusers Experiencing Relapse and Factors Exacerbating It." *E3S Web of Conferences* 68 (2018). https://doi.org/10.1051/e3sconf/20186801007.

Sutoko, Ibnu, and Latipun Latipun. "Want a Healthy Life: A Qualitative Study on Motivation to Cease Alcoholic Drink Addiction." *Social Behavior Research & Health*, ahead of print, 2021. https://doi.org/10.18502/sbrh.v5i1.6731.

Tarlam, Alam. "Analisis Dan Kritik Metode Hermeneutika Al-Qur'an Muḥammad Shaḥrūr." *EMPIRISMA* 24, no. 1 (2015). https://doi.org/10.30762/empirisma.v24i1.10.

Widiyanto, Asfa. "Between Political Legitimacy and Social Fabric of Society: Imamite-Shiite Interpretation of Qur'anic Verse 16: 90." *Afkaruna: Indonesian Interdisciplinary Journal of Islamic Studies* 17, no. 1 (2021). https://doi.org/10.18196/afkaruna.v17i1.11447.