

ROLE OF HARD DRUGS AND SOFT DRUGS IN PHARMACEUTICAL SCIENCES

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Article Received on 21/01/2023

Article Revised on 10/02/2023

Article Accepted on 1/03/2023

ABSTRACT

Hard and soft drugs are loose categories of psychoactive drugs. This distinction is used in both official and casual discourse. The term hard drug generally refers to drugs illegal for nonmedical use that lead to profound and severe addiction, as opposed to soft drugs that has weaker or no physical withdrawal symptoms. Some so-called soft drugs are however strongly habit-forming of other reasons than physical withdrawal symptoms; the dividing up between hard and soft drugs is therefore only accepted in the legislation in certain countries. The manager of UNODC for ex. do not accept cannabis as a soft drug. Classification of alcohol and nicotine as hard drugs is also commonly rejected in most countries. A large part of the distinction a subjective, socially conceived notion of the consequences of usage for each. Depending on context, a particular drug can be categorized in many different ways for various reasons.

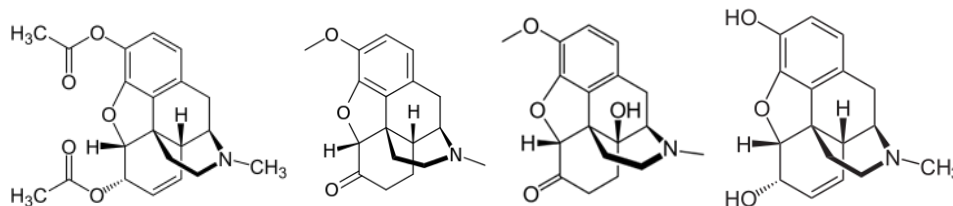
KEYWORDS: Morphine, Heroin, Oxycodon, Hydrocodon, Diazepam, Alprazolam, Clonazepam, Lorazepam, Metamphetamine. Cocaine, Nicotine, Tetrahydrocannabinol, Mescaline, Psilocybin, LSD, Harmine, Methoxyibogamine, DMT, MDMA, Ketamine, Caffeine.

INTRODUCTION

Drugs that act on the nervous system, such as the brain, and impact a person's mental state may be loosely and informally classified into categories. The following categories are not fully agreed upon globally:

- **Hard drugs** are drugs that lead to physical and psychological addiction and potentially death. Making, selling, or using drugs other than for approved medical purposes is illegal in most countries. Hard drugs include opioids like heroin [(5 α ,6 α)-7,8-didehydro-4,5-epoxy-17-methylmorphinan-3,6-diol diacetate], hydrocodone [4,5 α -epoxy-3-methoxy-17-methylmorphinan-6-one], oxycodone ((5R,9R,13S,14S)-4,5 α -Epoxy-14-hydroxy-3-methoxy-17-methylmorphinan-6-one; Oxycontin) and morphine [(4R,4aR,7S,7aR,12bS)-

3-Methyl-2,3,4,4a,7,7a-hexahydro-1H-4,12-methano[1]benzofuro[3,2-e]isoquinoline-7,9-diol]. Benzodiazepines are another class of hard drugs and include diazepam [7-Chloro-1,3-dihydro-1-methyl-5-phenyl-3H-1,4-benzodiazepin-2-one], alprazolam [8-Chloro-1-methyl-6-phenyl-4H-[1,2,4]triazolo[4,3-a][1,4]benzodiazepine], clonazepam [5-(2-Chlorophenyl)-7-nitro-1,3-dihydro-1,4-benzodiazepin-2-one], and lorazepam [7-Chloro-5-(2-chlorophenyl)-3-hydroxy-1,3-dihydro-1,4-benzodiazepin-2-one]. Hard stimulant drugs include methamphetamine (meth), cocaine, and nicotine. Drugs such as alcohol and nicotine are legal to sell in many countries and are often taxed.^[1-3]



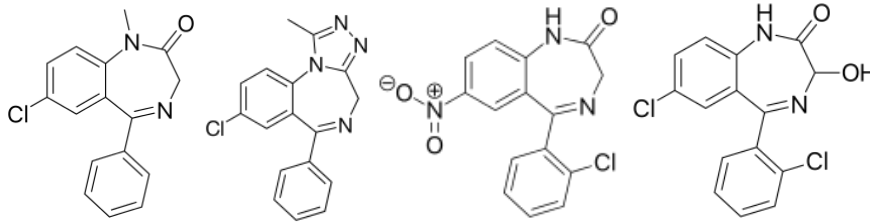


Figure 1: Hard Drugs: Heroin, Hydrocodon, Oxycodone, Morphine, Dizepam, Alprazolam, Clonazepam, Lorazepam.

- **Soft drugs** are not thought to cause physical or psychological addiction or dependence to the extent of hard drugs, however they are still considered unsafe. Examples of soft drugs are hallucinogens like cannabis [tetrahydrocannabinol: (6aR,10aR)-6,6,9-Trimethyl-3-pentyl-6a,7,8,10a-tetrahydro-6H-benzo[c]chromen-1-ol], mescaline [2-(3,4,5-trimethoxyphenyl)ethanamine], psilocybin [3-[2-(Dimethylamino)ethyl]-1H-indol-4-yl dihydrogen phosphate], LSD [(6aR,9R)-N,N-diethyl-7-methyl-

4,6,6a,7,8,9-hexahydroindolo[4,3-fg]quinoline-9-carboxamide], ayahuasca [Harmine: 7-Methoxy-1-methyl-9H-pyrido[3,4-b]indole], iboga [12-Methoxyibogamine], and DMT [2-(1H-Indol-3-yl)-N,N-dimethylethanamine]. While they do not cause physical addiction, some of them may still lead to psychological dependence. There is some evidence suggesting some hallucinogens have therapeutic uses.^[4]

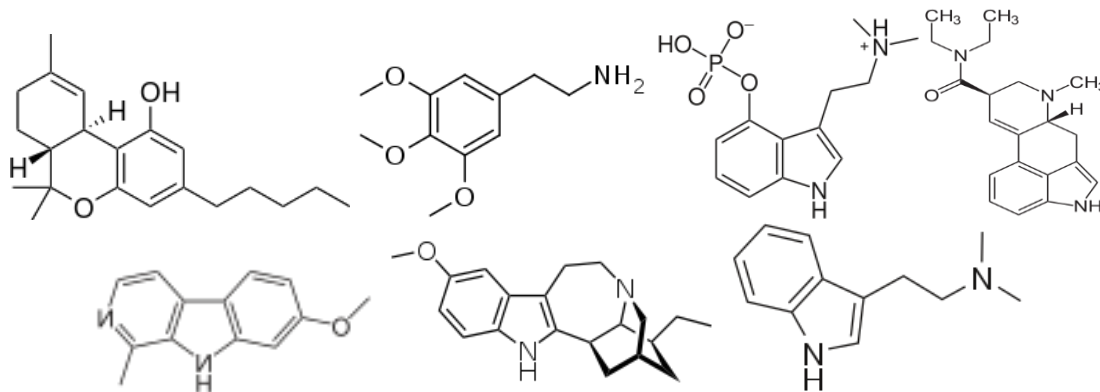


Figure-2: Soft Drugs: Tetrahydrocannabinol, Mescaline, Psilocybin, LSD, Harmine, Methoxyinogamine, DMT.

Effects of drug addiction on the brain

All drugs—nicotine, cocaine, marijuana and others—affect the brain's "reward" circuit, which is part of the limbic system. This area of the brain affects instinct and mood. Drugs target this system, which causes large amounts of

dopamine—a brain chemical that helps regulate emotions and feelings of pleasure—to flood the brain. This flood of dopamine is what causes a "high." It's one of the main causes of drug addiction.^[5]

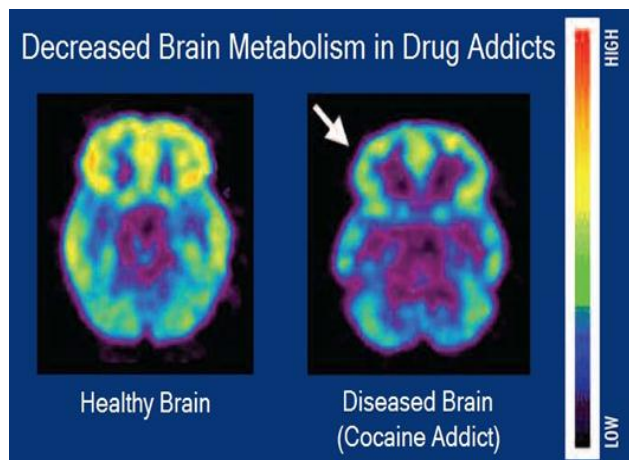


Figure 3: Street drugs.

Although initial drug use may be voluntary, drugs can alter brain chemistry. This can actually change how the brain performs and interfere with a person's ability to make choices. It can lead to intense cravings and compulsive drug use. Over time, this behavior can turn into a substance dependency or drug and alcohol addiction.^[6]

Effects of drugs on health: Drugs can impact almost every organ in the human body.

- A weakened immune system, increasing the risk of illness and infection.^[7]
- Heart conditions ranging from abnormal heart rates to heart attacks and collapsed veins and erectile dysfunction and blood vessel infections from injected drugs.^[8]
- Nausea and abdominal pain, which can also lead to changes in appetite and weight loss.^[9]
- Increased strain on the liver, which puts the person at risk of significant liver damage or liver failure.^[10]
- Seizures, stroke, mental confusion and brain damage.^[11]
- Lung disease.^[12]
- Problems with memory, attention and decision-making, which make daily living more difficult.^[13]
- Global effects of drugs on the body, such as breast development in men and increases in body temperature, which can lead to other health problems.^[14]

Hard Drugs vs Soft Drugs: The line that divides hard and soft drugs is blurred and lacks substantial and clear information to support it. Hard drugs are considered to

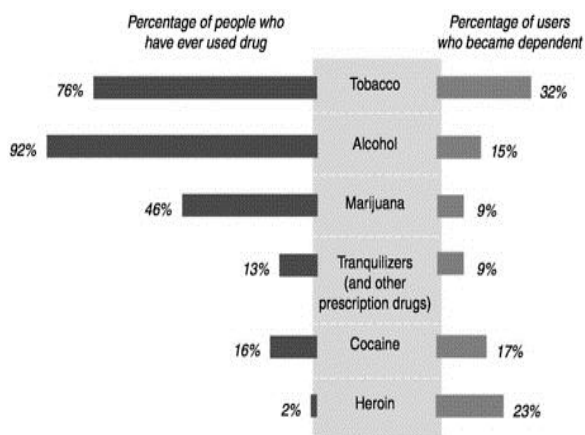


Figure 4: Drug dependence.

In between hard Drugs and Soft drugs: Not all drugs fit under the “hard drug” or “soft drug” label. Examples of these include MDMA [3,4-Methylenedioxy methamphetamine], Ketamine [(RS)-2-(2-Chlorophenyl)-2-(methylamino)cyclohexanone], and caffeine [1,3,7-Trimethyl-3,7-dihydro-1H-purine-2,6-dione]. MDMA shares some features with soft drugs in that it doesn't produce physical addiction. Some studies however say that it might be psychologically addictive, though such a claim is very controversial in the medical

community. It is also easier to overdose on than many soft drugs, though not as much as many hard drugs.^[30-34]

Some examples of soft drugs are marijuana (or cannabis), nicotine, and alcohol. The last two are considered soft drugs because of their legal status for use by adults and because of their wide social acceptability compared to hard drugs. The term “soft drug” is also used interchangeably with the term “gateway drug”, which is often used to describe marijuana and nicotine. Although nicotine, marijuana, and alcohol are considered soft drugs, each of them can cause health issues like liver disease, lung disease, and complications in brain function, and different forms of cancers.^[16]

The concepts of prodrugs and soft drugs are opposite, as follow:

- A prodrug is an inactive compound that requires a metabolic conversion to the active form.^[17]
- A soft drug is pharmacologically active and uses metabolism as a means of promoting excretion.^[18]
- However, it is possible to design a pro-soft drug, a modified soft drug that requires metabolic activation for conversion to the active soft drug.^[19-21]
- It is not possible to prepare soft-pro drug.^[22-29]



though more deaths occur from overdose. Despite this, caffeine is still safer than most hard drugs. Caffeine is the most widely used psychoactive drug in the world.^[35-39]

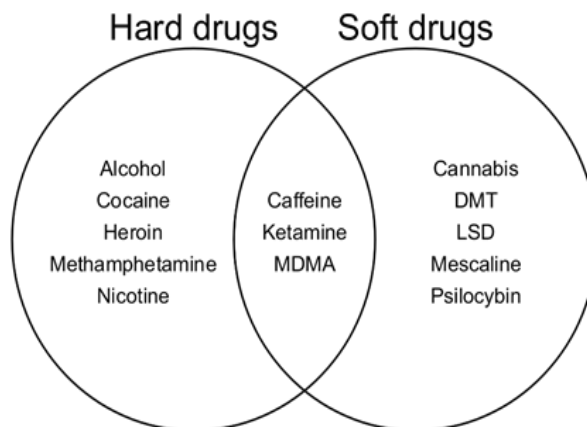
Pharmaceutical sciences: The pharmaceutical sciences combine a broad range of scientific disciplines that are critical to the discovery and development of new drugs and therapies. Pharmaceutical sciences can be broadly classified into the following main categories, with many specialized fields within each category. Drug Action examines how the drug itself actually works in a living system, which is the definition of pharmacology. The action of the drug can be studied at the molecular level, in a cell, an organ, and in animals. Specialty fields within Drug Action include molecular biology, pharmacology, pharmacodynamics, toxicology, and biochemistry.^[40-43]

Advantages

- Elimination of toxic metabolites, thereby increasing the therapeutic index of the drug.^[44]



Figure 5: Hard Drugs & Soft drugs.



Limitations: Our review focused on a quantitative analysis of the terms “hard drugs” and “soft drugs” in the literature. Because only a small number of articles we selected provided reasons for assignment to these categories, we were unable to perform systematic qualitative review. Moreover, with a few exceptions,

individual articles did not directly compare specific substances within the selected categories (“hard” or “soft”) as this was not part of their aims. Our findings should therefore be viewed more as a collection of opinions than a measure of consensus.^[56]

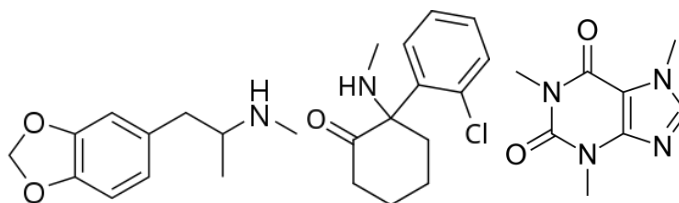


Figure 6: MDMA, Ketamine, Caffeine.

CONCLUSION

The terms “hard” and “soft” drugs have been widely used in the scientific literature over the past five years. Although it initially appears that there is substantial agreement as to which psychoactive substances should be regarded as “hard” and “soft” drugs in the 132 articles

we reviewed, closer inspection shows that the dividing line is often blurred. Authors often used only partial lists of known substances in different categories and did not categorize all of the main substance classes according to ICD or DSM. Authors also gave insufficient information regarding their criteria for deciding whether a drug was

“hard” or “soft,” and citations supporting categorization were missing in 90% of the articles.

Based on our results, the distinction between “hard” and “soft” drugs in the published literature remains unclear for at least three reasons. First, consensus has not yet been reached on the complete range of substances requiring categorization. Second, grouping of substances into specific “hard” or “soft” category within their relation to other drugs is hardly ever considered. Third, thoroughly discussed and precisely defined criteria of “hardness” and “softness” are currently missing.

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