Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(3): 693-696
Received: 12-03-2020
Accepted: 16-04-2020

Ashaolu Victoria Oladimeji
Research Scholar, Department of Chemistry, Life, Loyola College, Chennai, Tamil Nadu, India

MF Valan
Assistant Professor, Department of Chemistry, Life, Loyola College, Chennai, Tamil Nadu, India

Corresponding Author:
Ashaolu Victoria Oladimeji
Research Scholar, Department of Chemistry, Life, Loyola College, Chennai, Tamil Nadu, India

Newer plant based drug molecules with theraputic potential to combat alcohol dependency

Ashaolu Victoria Oladimeji and MF Valan

DOI: https://doi.org/10.22271/phyto.2020.v9.i3k.11352

Abstract
Alcohol dependency is one major problem all over the world that have caused increased mortality rate associated with the health risks, psychological, financial, social and economic deterioration. Most synthetic drugs used as treatment for alcohol dependency are reported to have numerous side effects. The development of low-toxicity and high efficiency medicines remains a challenging task for researchers. This current study aims to explore the effects of alcohol dependency and discovering newer plant based compounds to combat the ill effects of alcohol abuse.

Keywords: Alcohol dependency, Phyto-chemical compounds, low toxicity, and high efficacy

1. Introduction
Apart from Salt, Sugar and Tobacco, Alcohol dependency is a serious medical, social and economic problem been recognized as an important cause of mortality. The fastest growth has been in developing countries; especially in the Asian subcontinent where the per capital pure alcohol consumption has increased by over 60%. Globally, 40% of the worlds' populations are alcohol dependents and the numbers of user continues to escalate [1]. The impact of excessive alcohol intake on individual health is rarely emphasized. Therefore, scientific researches to alcohol consumption have significantly increased in the last few years.
Alcohol is no longer viewed as a threat to all, but rather to a small subclass of 'alcoholics' or, in today's technical terms, people who are 'alcohol dependent'. Alcohol is causally related to more than 60 medical conditions [2]. While some recent studies in India have examined patterns of use, and to a limited extent, its impact on health. The health burden attributable to alcohol is notoriously difficult to assess, in a situation where the treatment gap is large and the association between illness and alcohol dependency is rarely made by physicians [3]. Chronic alcohol consumption causes neurotoxicity or toxicity in the brain and nervous tissue. It initiates inflammation and oxidative stress which leads to neuro-degeneration or death of brain cells.
The consumption of alcohol in moderate amount is considered to be beneficial for human health. A good example is the so-called "French paradox", where concurrent consumption of significant amounts of red wine and foods rich in saturated fats results in low incidence of coronary heart disease. However, when alcohol consumption lacks moderation, treatment becomes expedient [4].
In view of the high frequency of drinking in daily life and the increasing consumption of alcohol, the development of low-toxicity and high efficiency medicines remains a challenging task for researchers. This current study is aim to explore the harms from alcohol dependency affecting users as well as non using persons in contact with the user, with a focus on investigating liable natural medicines as new agents to treat both alcohol dependence and the negative consequences of abuse.

2. Alcohol and major concerns
Alcohol related deaths and deaths caused by diseases due to alcoholism are a major cause for concern in the country. 3.3 million Death in India was attributed to alcohol dependency. Alcoholism is one of the leading cause of Liver cirrhosis and failure which means that a large number of people from India lose their lives early due to alcohol dependency and its fallouts. [1] Apart from the health concern, chronic alcoholism is one of the greatest causes for poverty in the country. Although, bans and prohibition have been placed on alcohol dependency, yet the pattern of drinking in India has changed from occasional and ritualistic use to social use. Today, the common purpose of consuming alcohol is to get drunk [5].

These developments have raised concerns about the health and the social consequences of excessive drinking [6]. There is urgent need to generate information which reflects the truth about this phenomenon.

3. Health effects of alcohol consumption

Apart from the social and financial harm caused by alcohol dependence leading to problems in house-work, marriage and relationships, alcoholism as a risk factor mainly through biological and biochemical effects to produce long term health consequences. The table below shows the various health damage caused by alcoholic dependence, an investigation done in India [7]. Statistical studies are relevant to all age groups.

Table 1: Statistical studies are relevant to all age groups

Diseases/ injuries	Percentage value (%)
Malignant neoplasms	
Mouth and oropharynx	19
Oesophageal	29
Liver	25
Breast	7
Neuropsychiatric disorders	
Unipolar depressive	2
Epilepsy	18
Alcohol use: Dependence and harmful use	**100**
Diabetes mellitus	-1
Cardiovascular disorders	
Ischaemic heart disease	2
Haemorrhagic stroke	10
Ischaemic stroke	-1
Cirrhosis of the liver	32
Unintentional injury	
Motor vehicle accidents	20
Drowning	10
Fall	7
Poisoning	18
Intentional injury	
Self-inflicted	11
Homicide	24

Based on this report, alcoholics have a very high tendency of sleep disorder, more heart problem and injuries, greater rates of skin problems, jaundice, burning pain in the stomach, joint pains, chronic cough and fever, suggestive of tuberculosis or chronic lung infections, other gastro-intestinal problems and several other illnesses. Beyond these medical health conditions, alcohol dependency remains a huge medical and psychological condition with which, there has been no emphasis relating to the effects and treatment of this illness.

4. Drug development for alcohol dependency

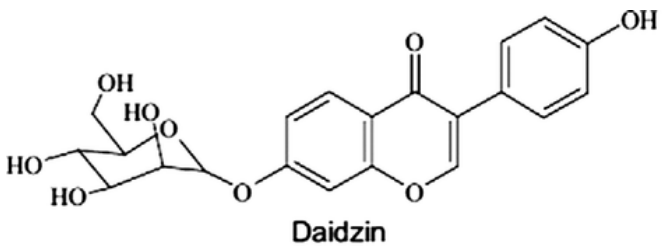
In view of physical health damage, social and financial problems associated with alcoholics, several drugs of chemical constituent rich in benzodiazepines, complex vitamins, cyanamide disulfiram and aldehyde dehydrogenase inhibitors have been administered to alcoholic patients in order to reduce its effects and insatiable appetite of alcohol. After few years, it was reported that these drugs also lead to dependency, misuse resulting to serious adverse effect on patient. These include the development of withdrawal symptoms such as headache, diarrhoea, flatulence and nausea [8-20]. Therefore, the use of pharmaceuticals in the treatment of alcohol dependence syndrome, regardless of chemical composition and mechanism of action, should not be considered the primary therapeutic approach. Natural products from plant origin could be the most effective and safest treatment for alcoholic dependence and the consequences of its abuse.

5. Antidotes to alcoholic dependency

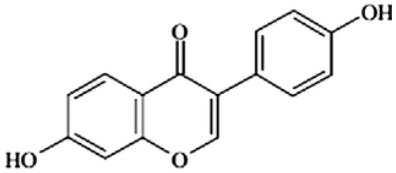
Alcohol dependence is a complex condition that involves neurochemistry, personality traits and even genetics. Social stigma, personal percep6tions and lack of literacy regarding alcohol use and dependence impose treatment barriers. Serotonin, dopamine and GABA (gamma-aminobutyric acid) are few of the neurotransmitters that regulate our mood and choices; dysregulation of these chemicals are observed in alcohol use disorder. Based on research, there is no universal cure for alcoholic dependence. Different approaches have been tested such as rehabilitation of patient, use of synthetic drugs, awareness programme and preventive measure, psycho-therapeutic treatment. Most of which are not very effective for the treatment of alcoholic dependence. With emphasis on Phytochemistry, researchers are interested in the use of natural products from plant origin as a new agent for the treatment of alcoholism and the side effects caused by its abuse.

5.1. Kudzu (*Pueraria lobata*)

P. lobata (Kudzu) is known for its anti-intoxicationg and anti-dipsotropic properties [21]. The iso-flavanone rich extract of Kudzu roots and sometimes flowers are used for the treatment of alcohol dependent patients. This system of treatment originated in China. Studies confirm that these extracts significantly suppress the metabolism of alcohol, which leads to the formation of the toxic products responsible for the troublesome dependence symptoms such as nausea, vomiting, headaches, and excessive perspiration [22]. A concoction of the flowers and tubers is used to treat alcoholism, fever, colds, diarrhoea, dysentery, acute intestinal obstruction etc. [23-26]. Recent research has shown that compounds called "daidzin" and "daidzein", which are contained in the roots and the flowers, are a safe and effective method for treating alcohol abuse.



Daidzin

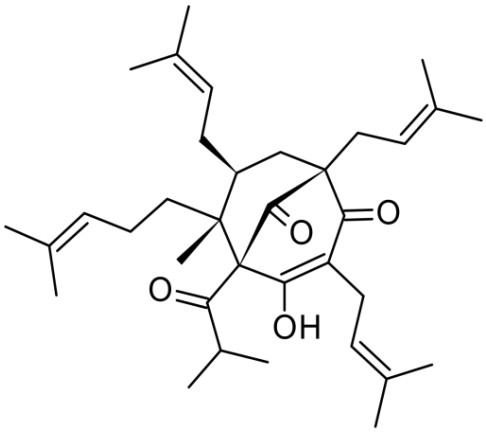


Daidzein

5.2 St. John's wort (*Hypericum perforatum*)

Recent preliminary studies have found that St. John's Wort may also decrease alcohol intake. It regulates brain chemistry

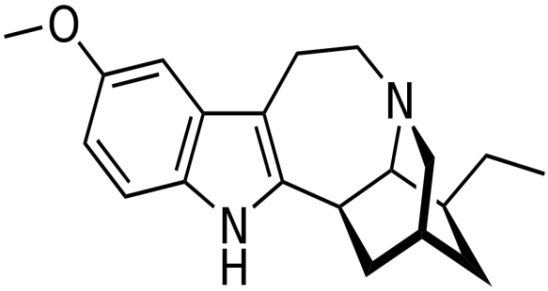
to reduce dependence on alcohol and can help minimize alcohol withdrawal symptoms. It seems to be a potential add-on- therapy for alcohol addiction, but it is yet to be confirmed by human studies [27, 28]. It is said to have anti-inflammatory and neuro-protective properties which may support the regeneration and recovery of the brain from alcohol abuse. It is better used as a supplement. H. perforatum contains a chemical constituent called hyperforin, responsible for its biological action towards the treatment of depression and alcoholism.



Hyperforin

5.3 Ibogaine (*Tabernanthe iboga*)

Ibogaine is one of the major indole alkaloids found in the rootstalk of an African shrub, Tabernanthe iboga. Preliminary research indicates that it may help with drug addiction such as alcoholism [29]. Clinical trials of Ibogaine for the treatment of alcoholism are currently underway in Brazil [30]. The effect was observed only in intraperitoneal and gastric administration, and not in subcutaneous use. Ibogaine is suggested to have an inhibitory effect on voluntary alcohol consumption by interacting with central nervous system (brain) structures. Its primary constituent is the alkaloid known as Ibogaine. It has a compex pharmacological profile and interact with multiple systems of neurotramission.

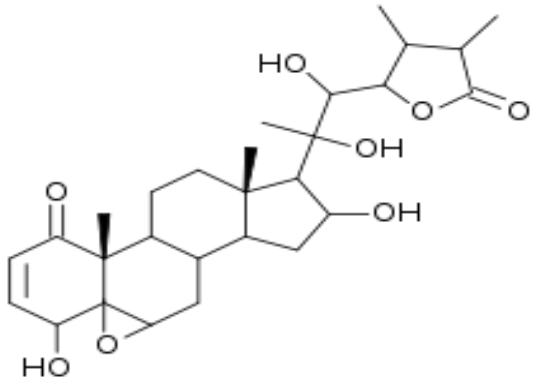


Ibogaine

It is a hallucinogenic compound and, in high doses, a strong stimulant of the central nervous system, which may lead to convulsions, paralysis and even respiratory disorders [31, 32].

5.4 Indian Ginseng (*Withania somnifera*)

Indian Ginseng is one of the most important herbs in Ayurveda, a form of alternative medicine based on Indian principles of natural healing. This herbal supplement is used in traditional Ayurvedic medicine and has been used by some to overcome alcohol withdrawal or cravings. Many claim that it has anxiolytic effects that helps prevent alcohol cravings. It's classified as an "adaptogen," meaning that it can help the body manage stress and hence it is popularly known as Ashwagandha [33]. W. somnifera also provides all sorts of other benefits for the body and brain [34, 35]. Most of the therapeutic properties of W. somnifera are ascribed to bioactive steroidal lactones called withanolides.



Withanolides

There have been several attempts to develop other useful herbal medicinal products for treatment of alcoholism or alcohol dependence disorders. Another research have shown the role of water extracts of thyme (*Thymus vulgaris*, Lamiaceae) and ginger (*Zingiber officinale*, Zingiberaceae) to detoxify the injuries of alcohol abuse on liver and brain [36]. However, further studies are needed to clarify the mechanism of action.

6. Conclusion

The scale of alcohol dependence is growing rapidly. Apart from the social and financial implications of excessive drinking, alcohol consumption is responsible for more than 60 medical conditions in the world. Of utmost importance is the genuine need of educative programmes, especially as the problem affects ever-younger generations. Such programme should focus on presenting the merits of reduced consumption along with the dangers of heavy alcohol in-take and its consequence. In terms of research and development of drugs from plant origin, more hands are required to be on the desk in order to produce safe and, most importantly, effective and clinically proven methods of treatment, including phyto-therapy as an important and promising approach to research treatment of alcoholism. There is thus a strong justification for the health profession to step up its health advocacy with respect to policies to reduce rates of alcohol consumption for the overall benefit of the society.

7. References

1. World Health Organisation, Global status report on alcohol and health, 2014.
2. Room R, Babor T, Rehm J. Alcohol and public health. Lancet. 2005; 365:519–30.
3. Gururaj G, Pratima Murthy, Girish N, Benegal V. Alcohol related harm: Implications for public health and policy in India, NIMHANS, Bangalore, India, 2011, 73.
4. Renaud S, de Lorgeril M. Wine, alcohol, platelets, and the French paradox for coronary heart disease. The Lancet. 1992; 339:1523-1526.
5. Mohan D, Chopra A, Ray R, Sethi H. Alcohol consumption in India: A cross sectional study. In: Demers A, Room R, Bourgault C (eds). Surveys of drinking patterns and problems in seven developing

countries. Geneva: World Health Organization, 2001, 103–14.
6. Saxena S. Country profile on alcohol in India. In: Riley L, Marshall M (eds). Alcohol and public health in eight developing countries. Geneva: World Health Organization, 1999, 37–60.
7. Subir Kumar Das V, Balakrishnan DM. Vasudevan. Alcohol: Its health and social impact in India. The National Medical Journal of India. 2006; 19:2.
8. Froehlich JC, Harts J, Lumeng L *et al*. Naloxone attenuates voluntary ethanol intake in rats selectively bred for high ethanol preference. Pharmacol Biochem Behav. 199; 35:385–90.
9. Froehlich JC, Wand GS. The neurobiology of ethanolopioid interaction in ethanol reinforcement. Alcohol Clin Exp Res. 1997; 20:A181–6.
10. Froehlich JC, Badia-Elder NE, Zink RW *et al*. Contribution of the opioid system to alcohol aversion and alcohol drinking behaviour. J Pharmacol Exp Ther. 1998; 287:284–92.
11. Jones EA, Dekker LR. Florid opioid withdrawal-like reaction precipitately by naltrexone in a patient with chronic cholestasis. Gastroenterology. 2000; 118:431–2.
12. O'Malley SS, Krishnan-Sarin S, Farren C *et al*. Naltrexoneinduced nausea in patients treated for alcohol dependence. Clinical predictors and evidence for opioid-mediated effects. J Clin Psychopharmacol. 2000; 20:69–76.
13. Oncken C, Van Kirk J, Kranzler HR. Adverse effects of oral naltrexone: analysis of data from two clinical trials. Psychopharmacology. 2001; 154:397–402.
14. Food and Drug Administration (FDA). New drug to treat alcoholism. FDA Consum 2004; 38:3.
15. Spanagel R, Mann K. Acamprosate-new preclinical research aspects. MMW Fortschr Med. 2003; 145:61–4.
16. Moak DH. Assessing the efficacy of medical treatments for alcohol use disorders. Expert Opin Pharmacother. 2004; 5:2075–89.
17. Carmen B, Angeles M, Ana M *et al*. Efficacy and safety of naltrexone and acamprosate in the treatment of alcohol dependence: a systematic review. Addiction. 2004; 99:811–28.
18. Feeney GF, Connor JP. Review: acamprosate and naltrexone are safe and effective but have low compliance rates for people with alcohol dependence. Evid Based Ment Health. 2005; 8:14.
19. Mann K. The pharmacological treatment of alcohol dependence: needs and possibilities. Alcohol Alcoholism. 1996; 31(1):55–8.
20. Kiefer F, Wiedemann K. Combined therapy: what does acamprosate and naltrexone combination tell us? Alcohol Alcoholism. 2004; 39:542–7.
21. Bown. D. Encyclopaedia of Herbs and their Uses. Dorling Kindersley, London, 1995.
22. Benlhabib E, Baker JI, Keyler DE, Singh AK. Kudzu root extract suppresses voluntary alcohol intake and alcohol withdrawal symptoms in P rats receiving free access to water and alcohol. Journal of Medicinal Food. 2004: 7:168-179.
23. Kariyone T. Atlas of Medicinal Plants.
24. Yeung. Him-Che. Handbook of Chinese Herbs and Formulas. Institute of Chinese Medicine, Los Angeles, 1985.
25. Duke JA, Ayensu ES. Medicinal Plants of China Reference Publications, Inc, 1985.
26. Foster S, Duke JA. A Field Guide to Medicinal Plants. Eastern and Central N. America. Houghton Mifflin Co, 1990.
27. Rezvani AH, Overstreet D, Yang Y, Clark E. Attenuation of alcohol intake by extract of Hypericum perforatum (St John's wort) in two different strains of alcohol-preferring rats. Alcohol and Alcoholism. 1999; 34(5):699-705.
28. De Vry J, Maurel S, Schreiber R, De Beun R, Jentzsch K. Comparison of hypericum extracts with imipramine and fluoxetine in animal models of depression and alcoholism. European Neuropsychopharmacology. 1999; 9(6):461-468.
29. Koenig X, Hilber K. The anti-addiction drug ibogaine and the heart: a delicate relation. Molecules (Basel, Switzerland). 2005; 20(2):2208–28.
30. Ibogaine in the Treatment of Alcoholism: a Randomized, Double-blind, Placebo-controlled, Escalating-dose, Phase 2 Trial. clinicaltrials.gov.
31. Rezvani AH, Overstreet DH, Perfumi M, Massi M. Plant derivatives in the treatment of alcohol dependency. Pharmacology, Biochemistry and Behavior. 2003; 75:593-606.
32. Xu BJ, Zheng YN, Sung CK. Natural medicines for alcoholism treatment: a review. Drug and Alcohol Review. 2005: 24:525-536.
33. Singh N, Gilca M. Herbal Medicine - Science embraces tradition - a new insight into the ancient Ayurveda. Germany: Lambert Academic Publishing, 2010, 51–67.
34. Ruby B, Benson MK, Kumar EP, Sudha S, Wilking JE. Evaluation of Ashwagandha in alcohol withdrawal syndrome. Asian Pacific Journal of Tropical Disease. 2012; 2:856-860.
35. Mohan L, Rao U, Gopalakrishna H, Nair V. Evaluation of the anxiolytic activity of NR-ANX-C (a polyherbal formulation) in ethanol withdrawal-induced anxiety behavior in rats. Evid Based Complement Alternat Med, 2010-2011.
36. Shati AA, Elsaid FG. Effects of water extracts of thyme (*Thymus vulgaris*) and ginger (*Zingiber officinale* Roscoe) on alcohol abuse. Food and Chemical Toxicology. 2009; 47:1945-1949.