

THE KAVA PLANT (*Piper methysticum*): A REVIEW

Running Title: Kava Plant: A Review

POOJA LODHI¹, NEELKANT PRASAD^{1*}, SAURABH¹, SANDEEP KUMAR YADAV¹,
LOKESH KUMAR², SAKSHI¹

SGT College of Pharmacy, Shree Guru Gobind Singh Tricentenary University, SGT University,
Gurugram, Haryana, India- 122505

Department of Kaya Chikitsa, Faculty of Indian Medical System, Shree Guru Gobind Singh
Tricentenary University, SGT University, Gurugram, Haryana, India- 122505

***Corresponding Author**

Dr. Neelkant Prasad

Professor

SGT College of Pharmacy, Shree Guru Gobind Singh Tricentenary University, SGT University,
Gurugram, Haryana, India- 122505

DOI: <https://doi.org/10.63001/tbs.2026.v21.i04.pp91-105>

KEYWORDS

Piper methysticum,
Kava, Anxiety,
Depression, Insomniac,
Hepatotoxicity, Lung cancer

Article Info

Received: 16.09.2026

Accepted: 02.10.2026

Published: 10.10.2026

Abstract

Kava (*Piper methysticum*) is a medicinal plant indigenous to the Pacific Island region, where beverages prepared from its roots have been consumed traditionally for ceremonial, social, and therapeutic purposes. For centuries, kava has been recognized for its anxiolytic, calming, and mood-enhancing properties, which are largely attributed to its ability to modulate neurotransmitter activity, including dopaminergic pathways. Although kava possesses several pharmacological benefits, excessive or inappropriate use may result in adverse health consequences. This review discusses the paradox surrounding kava safety, particularly the controversy regarding hepatotoxicity associated with its consumption, and examines the available scientific evidence related to this issue.

In addition to its well-established role in the management of anxiety and stress, research indicates that kava may offer therapeutic benefits in other clinical conditions, including depression, premenstrual syndrome, and certain sleep-related disorders. The review also evaluates the potential of kava as a natural sleep-promoting agent while highlighting the limitations, precautions, and possible risks associated with its use. Particular emphasis is placed on the safety concerns related to long-term or excessive consumption, especially the potential for liver toxicity. Furthermore, the article describes the recommended methods of kava consumption, its commercially available formulations, and considerations regarding appropriate dosage. It also addresses concerns associated with smoking kava-containing products, which may increase the risk of respiratory complications, including lung cancer. Although kava demonstrates considerable therapeutic potential, its use should always be guided by a qualified healthcare professional to maximize clinical benefits while minimizing the risk of adverse effects.

Introduction

The plant kingdom has played a vital role in the evolution of human healthcare, providing numerous natural remedies that have been used for centuries to prevent and treat a wide range of diseases. Scientific investigations of medicinal plants have significantly

contributed to the discovery of bioactive compounds with therapeutic value. Among these medicinal plants, *Piper methysticum*, commonly known as kava, has gained considerable attention because of its diverse pharmacological properties and longstanding

traditional use (Fragoulis, 2017). Although often overlooked in modern medicine, kava remains an important herbal remedy in many parts of the world for promoting relaxation, improving sleep quality, and alleviating symptoms of anxiety and stress. Clinical and experimental studies have demonstrated that kava extracts possess anxiolytic and mild euphoric effects, making them a popular natural alternative to alcohol and certain conventional anxiolytic agents.

Kava (*Piper methysticum*) is a perennial shrub native to the islands of the South Pacific, where it has been cultivated and consumed for centuries as part of cultural, ceremonial, and medicinal practices (Pollastri, 2009). The therapeutic preparation is traditionally obtained from the plant's roots and rhizomes. These are harvested, dried, finely ground into powder, and mixed with water to prepare a beverage that is consumed for its calming and relaxing effects. This traditional preparation continues to play an important role in the social and cultural heritage of many Pacific Island communities.

The pharmacological activity of kava is primarily attributed to a group of bioactive constituents known as kavalactones, which exert their effects on the central nervous system. Consumption of kava has been associated with enhanced relaxation, reduced mental tension, improved mood, and a general sense of well-being. These effects are believed to result from modulation of several neurotransmitter systems, including dopaminergic and γ -aminobutyric acid (GABA)-mediated pathways. In addition to its anxiolytic properties, kava has demonstrated analgesic, muscle-relaxant, and anticonvulsant activities in various experimental and clinical studies (Teschke, 2011). Consequently, it has been widely investigated as a complementary therapeutic option for the management of anxiety

disorders, particularly generalized anxiety disorder, which has become increasingly prevalent among younger populations.

Beyond its neurological and psychological benefits, kava has also attracted interest for its potential role in women's health. Premenstrual syndrome (PMS) is characterized by a combination of physical, emotional, and behavioral symptoms that occur during the luteal phase of the menstrual cycle and can substantially affect quality of life (Teschke, 2021). Women with PMS commonly experience mood disturbances, anxiety, irritability, fatigue, and physical discomfort before the onset of menstruation. Owing to its anxiolytic, sedative, and muscle-relaxant properties, kava has been explored as a natural therapeutic option for reducing the emotional and physical symptoms associated with PMS. Although further well-designed clinical studies are needed to establish its long-term efficacy and safety, current evidence suggests that kava may provide symptomatic relief and improve overall well-being in women affected by premenstrual syndrome.

Neurobehavioral effects of Kava

Kava (*Piper methysticum*) has been traditionally consumed throughout the South Pacific islands and northern regions of Australia, where it has long been valued for its medicinal and cultural significance. Owing to its broad range of therapeutic properties, kava has gained increasing attention in the global pharmaceutical and nutraceutical industries and is now widely marketed in many Western countries as a herbal medicine or dietary supplement (Teschke, 2012). Experimental studies in animal models have demonstrated that the pharmacological activity of kava is primarily mediated by kavalactones, which influence neuronal excitability through interactions with voltage-gated ion channels. These

interactions are believed to contribute to the characteristic muscle-relaxant effects of kava while also supporting its anesthetic, anticonvulsant, and anxiolytic activities (Peterson, 2019). Based on these findings, further investigations have examined isolated cases involving psychotic and dystonic disorders, suggesting that kava possesses psychoactive properties. Nevertheless, current evidence indicates that, when consumed at recommended doses, kava does not significantly impair higher cognitive functions such as reasoning, judgment, or normal thought processes.

Numerous clinical and experimental studies have consistently demonstrated the effectiveness of kava in alleviating stress, anxiety, and nervous tension, establishing it as one of the most extensively investigated herbal anxiolytic agents (Tengfei, 2020). Its beneficial effects on emotional well-being have stimulated considerable interest in understanding its psychoactive mechanisms and therapeutic potential. Despite the growing body of evidence supporting its clinical utility, the precise mechanisms by which kavalactones modulate neuronal signaling and central nervous system activity remain incompletely understood. Consequently, further mechanistic and clinical investigations are warranted to fully elucidate the neuropharmacological actions of kava and to optimize its safe and effective therapeutic application.

Anti-anxiety effects of Kava

Traditionally, kava supplements have been widely consumed to promote relaxation and improve sleep quality. More recently, scientific investigations have explored their potential therapeutic role in the management of anxiety disorders. In a clinical study published in 2013, 75 individuals diagnosed with anxiety disorders were randomly assigned to receive either a standardized kava

extract or a placebo over a treatment period of six weeks (Christl, 2009; Sarris, 2013). Throughout the study, participants were closely monitored to evaluate changes in anxiety symptoms and treatment safety. At the end of the intervention, individuals receiving kava extract demonstrated a significant reduction in symptoms of anxiety and psychological stress compared with those receiving the placebo. Although a few participants experienced mild and transient adverse effects, such as headache, no evidence of liver toxicity was observed during the study period (Foo, 1997). Furthermore, the commonly reported adverse effects associated with kava consumption were not evident among patients undergoing treatment for anxiety disorders (Sarris, 2012). Overall, findings from studies supported by the National Institutes of Health (NIH) suggest that, despite some variability in clinical outcomes, kava exhibits considerable potential as a complementary therapeutic option for the management of anxiety disorders.

Sleep-promoting effects of Kava

Kava (*Piper methysticum*) has been used for centuries as a traditional herbal remedy to promote relaxation and improve sleep quality. The sedative and anxiolytic properties of kava extracts have led to their widespread use as complementary agents for managing sleep disturbances. Although kava has long been considered a natural alternative for individuals experiencing sleep-related problems, its effectiveness as a definitive treatment for sleep disorders has not been conclusively established (Wang, 2018). One of the advantages frequently attributed to kava is that, unlike many conventional hypnotic medications, it appears to have minimal influence on rapid eye movement (REM) sleep, thereby preserving normal sleep architecture (Herberg, 2013). Nevertheless, healthcare professionals

generally advise against the concurrent use of kava with prescription sedatives or other central nervous system depressants because of the potential for adverse drug interactions and increased toxicity (Berry, 2019).

The principal bioactive constituents of kava are kavalactones, which are responsible for its sedative, anxiolytic, and muscle-relaxant effects. These compounds have demonstrated sleep-promoting activity in both experimental animals and humans. Animal studies have shown that kava facilitates the onset of sleep rather than altering the overall sleep cycle. For example, research published in *Psychopharmacology* in 2005 reported that kava administration enabled rats to fall asleep more rapidly, although it did not significantly modify normal sleep patterns (Clouatre, 2004). These findings suggest that kava primarily reduces sleep latency instead of directly regulating circadian sleep rhythms.

Evidence from clinical investigations also supports the beneficial effects of kava on sleep quality, particularly in individuals whose sleep disturbances are associated with anxiety or stress. In a randomized clinical trial conducted in 2005, sixty-one participants experiencing sleep disturbances accompanied by anxiety or psychological stress received either kava extract or a placebo for four weeks. Participants treated with kava exhibited significant improvements in sleep quality compared with those receiving placebo. Earlier clinical research had similarly demonstrated the anxiolytic effects of kava. In a six-week study involving twenty-four patients with stress-related insomnia, kava supplementation reduced perceived stress levels and was associated with improved sleep quality (Tarbah, 2003; Shaik, 2009). These findings indicate that the sleep-promoting effects of kava are likely mediated through its ability to alleviate anxiety and

induce relaxation rather than through direct hypnotic action.

Despite these encouraging observations, the role of kava in the treatment of chronic insomnia remains uncertain. While kava may facilitate relaxation and improve sleep quality in individuals experiencing anxiety-related sleep disturbances, current evidence does not support its use as a reliable standalone therapy for primary insomnia (Johnson, 2011). Comparative clinical studies evaluating kava, valerian, and placebo have reported inconsistent findings, with some investigations showing no significant advantage of kava over placebo in the management of insomnia. Consequently, additional well-designed clinical trials are required to establish its efficacy for this indication.

Safety concerns have also limited the widespread therapeutic use of kava. Several countries have introduced regulatory restrictions on kava-containing products because of reports linking prolonged or excessive consumption to hepatotoxicity. The National Institutes of Health has also highlighted the potential risk of liver injury associated with kava use (Narayanpillai, 2014). Severe hepatic damage has been reported in rare cases, particularly following long-term or high-dose consumption. Other adverse effects associated with regular kava use include jaundice, fatigue, dark-colored urine, gastrointestinal discomfort, headache, dizziness, and drowsiness. Therefore, although kava possesses promising anxiolytic and sleep-promoting properties, its use should be approached cautiously, particularly in individuals with pre-existing liver disease or those receiving medications that may interact with hepatic metabolism. Further research is needed to establish its long-term safety profile and define appropriate therapeutic guidelines.

Kava and hepatotoxicity

The widespread use of kava has been significantly influenced by concerns regarding its potential hepatotoxicity, giving rise to what has often been described as the "kava paradox." This controversy resulted in restrictions or regulatory limitations on the use of this traditional Pacific herbal medicine in several countries, despite its long history of safe cultural use for various medicinal and ceremonial purposes. However, hepatotoxic reactions associated with kava consumption are considered uncommon (Connor, 2021). Evaluations presented to the World Health Organization suggested that the reported cases of liver toxicity were not necessarily attributable to kava itself. Instead, evidence indicated that factors such as poor-quality raw materials, inappropriate plant parts, contamination, adulteration, or inadequate manufacturing practices were more likely responsible for the observed hepatotoxic effects. Consequently, stringent quality control measures, including comprehensive testing and standardization of kava raw materials, have been recommended to ensure product safety and minimize the risk of adverse hepatic events.

Traditional use of Kava plant

For centuries, communities inhabiting the Pacific Islands and northern regions of Australia have traditionally used the kava (*Piper methysticum*) plant for its calming properties, primarily to promote relaxation, improve sleep, and relieve muscular tension (Ulbricht, 2005). Although these remain its best-known traditional applications, scientific investigations conducted over the past several decades have suggested that kava may possess a broader range of therapeutic benefits beyond its conventional uses.

Today, kava-derived products are commercially available in many countries,

including the United States, where they are marketed as herbal supplements in a variety of formulations. Despite restrictions or bans imposed in countries such as France, Canada, the United Kingdom, and Germany because of safety concerns, kava continues to be recognized for its potential medicinal value (Carmella, 2019). Traditionally, the roots of the plant were harvested, dried, and ground into a fine paste or powder before being mixed with water to prepare a ceremonial beverage. In several Pacific communities and parts of northern Australia, kava is also commonly consumed as an herbal tea, and commercially prepared kava beverages are widely available through local retailers.

Kava supplements are marketed in several dosage forms, including liquid extracts, powders, capsules, and tablets. Among these, liquid preparations remain particularly popular and are often diluted with fruit juice or other beverages before consumption to improve palatability (McElroy, 2019). Powdered root extracts are also extensively used for the manufacture of oral capsules and tablets. Although kava is available as an over-the-counter herbal supplement in some regions, healthcare professionals generally recommend that its use should be undertaken under appropriate medical supervision because excessive or prolonged intake may increase the risk of adverse effects. Clinical recommendations commonly suggest limiting the daily intake of kava extracts to approximately 250 mg, while avoiding higher doses unless specifically advised by a qualified healthcare provider.

Consumption of Kava

As there are many forms in which you can consume Kava, here are the forms in which they are mostly available on the market:

Kava tea

Kava tea is among the most widely used traditional preparations for consuming *Piper methysticum*, particularly for individuals seeking relief from anxiety and stress. It remains a popular herbal beverage worldwide because of its perceived calming and relaxing effects. In addition to its anxiolytic properties, kava tea is commonly consumed to promote relaxation and improve overall well-being. Commercial formulations are often blended with other medicinal herbs to enhance their therapeutic benefits. The beverage is typically prepared by steeping the powdered kava root or tea formulation in hot water before consumption (Toll, 2007).

Consumers are advised to exercise caution when selecting commercially available kava tea products. Many formulations are marketed as "proprietary blends," making it difficult to determine the exact quantity of kava present in each serving. For this reason, experts recommend choosing products that clearly specify the amount of kava extract and the concentration of kavalactones on the product label. Transparent labeling enables consumers and healthcare professionals to estimate the daily intake more accurately and promotes the safe use of kava-containing products.

Kava tincture or liquid

In addition to herbal tea, kava is available in several other formulations, with liquid extracts or tinctures being among the most commonly marketed alternatives. These products are typically supplied in bottles of varying volumes, generally ranging from approximately 59 mL to 177 mL (Moulds, 2003). Because of their strong taste, liquid kava extracts are often diluted with fruit juice or other non-alcoholic beverages before consumption to improve palatability. Although the flavor of some preparations has been compared to that of whiskey, they should never be consumed in combination

with alcoholic beverages because such combinations may increase the risk of adverse effects, particularly hepatotoxicity and central nervous system depression. Since liquid formulations contain highly concentrated levels of kavalactones, they should be taken only in the recommended doses and in small quantities to minimize the risk of toxicity.

Kava capsules

Kava is also commercially available as oral capsules, which are generally prepared using powdered or standardized extracts obtained from the roots of the *Piper methysticum* plant (Stickel, 2003). Similar to other kava formulations, consumers should carefully examine the product label to determine the concentration of kavalactones, as this information is essential for appropriate dose selection and safe use. Although kava capsules are widely marketed as herbal supplements, their use should preferably be guided by a qualified healthcare professional. Medical supervision is particularly important to ensure appropriate dosing, minimize the risk of adverse effects, and avoid potential interactions with other medications.

Safety issues related to Kava

For centuries, the kava (*Piper methysticum*) plant has played an important role in the traditional healthcare practices of Pacific Island communities. Owing to its anxiolytic and calming properties, kava has gained recognition worldwide and has been recommended by healthcare practitioners as a complementary herbal remedy for the management of anxiety and stress-related conditions (Olsen, 2011). Nevertheless, both clinical evidence and medical experts emphasize that kava should be used cautiously and preferably under professional supervision. In general, treatment is recommended at the lowest effective dose and for limited durations, typically not

exceeding three months, to minimize the risk of adverse effects (Chou, 2013). Concurrent consumption of kava with alcohol should be avoided because this combination may increase the likelihood of toxicity and undesirable pharmacological effects. Excessive or prolonged intake of kava may result in adverse reactions such as headache, dizziness, fatigue, depression, diarrhea, and dermatological abnormalities.

Among the commonly reported adverse effects, headache is frequently associated with doses exceeding the recommended therapeutic range. Dizziness may occur because of the muscle relaxant and central nervous system depressant effects of kavalactones (Fasinu, 2012). Fatigue is another commonly observed complaint, particularly when kava is used for its anxiolytic or muscle-relaxing properties. Chronic or excessive consumption has also been linked to characteristic skin changes, including dryness, scaling, and yellowish discoloration.

One of the most significant safety concerns associated with kava has been the occurrence of reports describing liver injury following the use of kava-containing products (Kong, 2018). These reports associated kava consumption with hepatic disorders such as hepatitis, liver cirrhosis, and, in rare cases, liver failure. Although these concerns led several countries, including France and Canada, to restrict or prohibit the sale of kava products, subsequent investigations have suggested that the available evidence does not conclusively establish kava itself as the direct cause of hepatotoxicity (Lebot, 1997). Instead, later studies indicated that many reported adverse events were more likely related to poor-quality raw materials, the use of inappropriate plant parts, contamination, or unsuitable manufacturing practices rather than the traditional aqueous preparations of

kava. These findings highlight the importance of standardized raw materials, rigorous quality control, and appropriate manufacturing procedures to ensure the safe use of kava-based products.

Problems that Kava can cause if used for long term

Kava tea has become a widely consumed herbal preparation, particularly among individuals seeking natural approaches for the management of anxiety and stress. Many users rely on kava as a complementary therapeutic option because of its calming and anxiolytic properties (Weiss, 2005). Although available evidence suggests that discontinuation of kava is associated with a relatively low risk of withdrawal symptoms, prolonged or excessive use may lead to significant long-term health concerns (Peterson, 2020; Schmidt, 2003). Chronic consumption has been associated with a range of adverse effects involving multiple organ systems, including respiratory complications and other serious chronic disorders. Therefore, understanding the potential long-term consequences of regular kava use is essential for its safe and appropriate clinical application.

- **Long-term adverse effects of kava use:** Although kava is generally regarded as a well-tolerated herbal remedy when used appropriately, prolonged or excessive consumption has been associated with several potential health concerns.
- **Respiratory complications:** Individuals who consume kava over extended periods have occasionally reported breathing difficulties. Although such events are uncommon, they may arise from multiple contributing factors and warrant further clinical investigation.
- **Photosensitivity:** Long-term kava users have, in some cases, experienced increased sensitivity to light, resulting in

discomfort or intolerance when exposed to bright light.

- **Hematological alterations:** Chronic use of certain herbal or pharmaceutical agents may influence blood cell function or composition. Similar hematological changes have also been reported in individuals with prolonged kava consumption (Bachhuber, 2016).
- **Weight loss and nutritional deficiencies:** Continuous intake of kava has been associated with reduced appetite, which may subsequently contribute to weight loss, poor nutritional status, and malnutrition in susceptible individuals.
- **Exacerbation of psychiatric disorders:** Prolonged kava use may aggravate pre-existing psychiatric illnesses in vulnerable individuals. In particular, patients with schizophrenia or related psychotic disorders may experience worsening of their symptoms, emphasizing the need for careful medical supervision.
- **Immunological effects:** Extended consumption of kava has also been suggested to influence immune function. Although the underlying mechanisms remain unclear, some evidence indicates that kava may contribute to immune suppression or alter normal immune responses in certain individuals (Kessler, 2005).
- **Dermatological manifestations:** Chronic kava consumption has been linked to characteristic skin abnormalities, collectively referred to as kava dermopathy. Clinical manifestations may include dry, rough, flaky, or scaly skin accompanied by yellowish discoloration, particularly following long-term or heavy use.

Why it is important to use Doctor's advice before using Kava

Kava (*Piper methysticum*) has been valued for centuries as a traditional herbal remedy and beverage because of its calming, anxiolytic, and muscle-relaxant properties. Its therapeutic potential has been supported by several experimental and clinical studies, making it a popular complementary treatment for stress, anxiety, and sleep-related disorders (Dai, 2015). Nevertheless, despite its potential health benefits, kava is not free from adverse effects, and inappropriate or prolonged use may result in serious health complications. Although short-term use is generally associated with relatively few adverse reactions, medical supervision is recommended, particularly for individuals with underlying health conditions or those taking concomitant medications. Kava is frequently consumed to improve sleep quality because of its sedative properties; however, routine use as a sleep aid is not generally recommended. This caution is related not only to the pharmacological effects of kava but also to the possibility of dependence associated with certain kava-containing preparations, even though the plant itself is not considered inherently addictive (Jhoo, 2006).

Beyond its role in promoting relaxation and sleep, kava has attracted considerable attention for the management of anxiety disorders, which continue to represent a major global mental health concern. Owing to its anxiolytic activity, kava has demonstrated encouraging outcomes in individuals experiencing mild to moderate anxiety and stress-related conditions (Ketola, 2015). However, like any therapeutic agent, its benefits should be carefully weighed against its potential risks. Users should remain vigilant for adverse reactions and seek prompt medical evaluation if any concerning symptoms develop (Li, 2014).

Several adverse effects have been associated with kava consumption, particularly following excessive or prolonged use:

- **Loss of appetite:** Reduced appetite is a commonly reported adverse effect of kava consumption and may subsequently result in unintended weight loss and nutritional deficiencies. Persistent appetite suppression should be evaluated by a healthcare professional.
- **Fatigue:** Individuals using kava may experience excessive tiredness or lethargy, which is likely related to its sedative and muscle-relaxant effects.
- **Elevated body temperature:** Although uncommon, an unexplained increase in body temperature has been reported in some users. Because body temperature regulation is essential for normal physiological function, individuals experiencing persistent fever or temperature elevation should seek medical attention (Pan, 2020).
- **Nausea and vomiting:** Gastrointestinal disturbances, including nausea and vomiting, may occur, particularly after excessive intake or when kava is consumed with alcohol or other interacting substances. These symptoms should not be ignored, especially if they are persistent or severe (Zhongbo, 2017).
- **Dark or brown-colored urine:** A noticeable change in urine color may indicate underlying hepatic or renal dysfunction. Since dark urine is considered a warning sign of possible organ injury, prompt medical evaluation is recommended.
- **Abdominal pain:** Mild gastrointestinal discomfort may occasionally occur during kava use; however, severe or persistent abdominal pain could indicate a more serious underlying condition and requires immediate clinical assessment.

- **Jaundice:** Yellow discoloration of the skin or sclera is a significant clinical sign suggestive of liver dysfunction. Cases of jaundice associated with kava use have raised concerns regarding potential hepatotoxicity, and individuals developing these symptoms should discontinue kava immediately and seek urgent medical care (Wruck, 2008).
- **Unusual bruising or bleeding:** Although infrequently reported, spontaneous bruising or abnormal bleeding may indicate serious systemic abnormalities, including impaired liver function or coagulation disorders. Such manifestations warrant immediate medical investigation.

Overall, while kava offers potential therapeutic benefits for anxiety, stress, and sleep disturbances, its use should be approached with caution. Appropriate dosing, avoidance of prolonged unsupervised consumption, and timely recognition of adverse effects are essential to maximize therapeutic benefits while minimizing potential health risks.

Although kava is widely available in various formulations, including teas, capsules, tablets, and liquid extracts, its use should preferably be guided by a qualified healthcare professional because of the potential for adverse effects and drug-related complications. Careful medical supervision is particularly important to ensure appropriate dosing, as the concentration of active constituents may vary considerably among commercially available products. Variability in product quality and dosage may increase the risk of toxicity or therapeutic failure if kava preparations are consumed without proper guidance. In addition, kava produces central nervous system depressant effects that may resemble those of alcohol; however, concurrent

consumption of kava with alcoholic beverages should be strictly avoided because the combination may potentiate adverse reactions and increase the risk of serious toxicity.

Even when recommended precautions are followed, factors such as an individual's medical history, pre-existing liver disease, concurrent medication use, or underlying psychiatric disorders may increase susceptibility to adverse outcomes associated with kava. Particular caution is warranted in individuals with mental health disorders, as prolonged or excessive kava consumption has been reported to worsen depressive symptoms and may aggravate existing psychiatric conditions. Therefore, comprehensive medical evaluation and appropriate patient counseling are essential before initiating kava therapy to ensure its safe and effective use.

Conclusion

Kava (*Piper methysticum*) is a medicinal plant native to the South Pacific islands and parts of northern Australia and is commercially available in several formulations, including teas, capsules, tablets, and dietary supplements. The physiological effects of kava may vary among individuals depending on factors such as body weight, age, metabolic status, immune function, and overall health. Traditionally, Pacific Islanders have used kava as a ceremonial beverage and herbal remedy to promote relaxation, relieve muscle tension, reduce stress, and induce a sense of calm. Owing to these pharmacological properties, kava has gained considerable attention as a complementary therapy for conditions such as anxiety, stress, and sleep disturbances.

The long-standing traditional use and reported therapeutic benefits of kava have

contributed to its worldwide popularity as a herbal medicine. Nevertheless, despite its potential clinical value, kava is associated with adverse effects that may become serious, particularly when consumed in excessive amounts, for prolonged periods, or without appropriate medical supervision. Consequently, consultation with a healthcare professional before initiating kava therapy is strongly recommended. Although several countries have imposed restrictions or bans on kava products because of safety concerns, available evidence suggests that standardized, high-quality kava preparations may provide therapeutic benefits when used responsibly, at recommended doses, and under appropriate clinical guidance.

References

- Bachhuber, M. A., Hennessy, S., Cunningham, C. O., & Starrels, J. L. (2016). Increasing Benzodiazepine Prescriptions and Overdose Mortality in the United States, 1996–2013. *American Journal of Public Health*, 106(4), 686–688. <https://doi.org/10.2105/ajph.2016.303061>
- Berry, J., Gilbert, A., & Grodnitzky, J. (2019). Cases of Kava Impairment in Iowa Drivers. *Journal of Forensic Sciences*, 64(6), 1943–1949. <https://doi.org/10.1111/1556-4029.14130>
- Carmella, S. G., Heskin, A. K., Tang, M. K., Jensen, J., Luo, X., Le, C. T., Murphy, S. E., Benowitz, N. L., McClernon, F. J., Vandrey, R., Allen, S. S., Denlinger-Apte, R., Cinciripini, P. M., Strasser, A. A., al'Absi, M., Robinson, J. D., Donny, E. C., Hatsukami, D. K., & Hecht, S. S. (2019). Longitudinal stability in cigarette smokers of urinary eicosanoid biomarkers of oxidative damage and inflammation. *PLOS ONE*, 14(4), e0215853.

- <https://doi.org/10.1371/journal.pone.0215853>
- Chou, T.-W., Feng, J.-H., Huang, C.-C., Cheng, Y.-W., Chien, S.-C., Wang, S.-Y., & Shyur, L.-F. (2013). A Plant Kavalactone Desmethoxyyangonin Prevents Inflammation and Fulminant Hepatitis in Mice. *PLoS ONE*, 8(10).
- Christl, S. U., Seifert, A., & Seeler, D. (2009). Toxic Hepatitis After Consumption of Traditional Kava Preparation. *Journal of Travel Medicine*, 16(1), 55–56. <https://doi.org/10.1111/j.1708-8305.2008.00259.x>
- Clouatre, D. L. (2004). Kava kava: examining new reports of toxicity. *Toxicology Letters*, 150(1), 85–96. <https://doi.org/10.1016/j.toxlet.2003.07.005>
- Dai, J.-Q., Huang, Y.-G., & He, A.-N. (2015). Dihydromethysticin kavalactone induces apoptosis in osteosarcoma cells through modulation of PI3K/Akt pathway, disruption of mitochondrial membrane potential and inducing cell cycle arrest. *International Journal of Clinical and Experimental Pathology*, 8(5), 4356–4366. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4502999/>
- Dai, J.-Q., Huang, Y.-G., & He, A.-N. (2015). Dihydromethysticin kavalactone induces apoptosis in osteosarcoma cells through modulation of PI3K/Akt pathway, disruption of mitochondrial membrane potential and inducing cell cycle arrest. *International Journal of Clinical and Experimental Pathology*, 8(5), 4356–4366.
- Fasinu, P. S., Bouic, P. J., & Rosenkranz, B. (2012). An Overview of the Evidence and Mechanisms of Herb-Drug Interactions. *Frontiers in Pharmacology*, 3.
- Fluyau, D., Revadigar, N., & Manobianco, B. E. (2018). Challenges of the pharmacological management of benzodiazepine withdrawal, dependence, and discontinuation. *Therapeutic Advances in Psychopharmacology*, 8(5), 147–168. <https://doi.org/10.1177/2045125317753340>
- Foo, H., & LEMON, J. (1997). Acute effects of Kava, alone or in combination with alcohol, on subjective measures of impairment and intoxication and on cognitive performance. *Drug and Alcohol Review*, 16(2), 147–155. <https://doi.org/10.1080/09595239700186441>
- Fragoulis, A., Siegl, S., Fendt, M., Jansen, S., Soppa, U., Brandenburg, L.-O., Pufe, T., Weis, J., & Wruck, C. J. (2017). Oral administration of Methysticin improves cognitive deficits in a mouse model of Alzheimer's disease. *Redox Biology*, 12, 843–853.
- G. Petersen, Yijin Tang, & Fields, C. (2019). *Chemical and in vitro toxicity analysis of a supercritical fluid extract of Kava kava (Piper methysticum)*.
- Herberg KW. (2013). [Effect of Kava-Special Extract WS 1490 combined with ethyl alcohol on safety-relevant performance parameters]. *Blutalkohol*, 30(2). <https://doi.org/>
- Jhoo, J.-W., Freeman, J. P., Heinze, T. M., Moody, J. D., Schnackenberg, L. K., Beger, R. D., Dragull, K., Tang, C.-S., & Ang, C. Y. W. (2006). In Vitro Cytotoxicity of Nonpolar Constituents from Different Parts of Kava Plant (*Piper methysticum*). *Journal of Agricultural and Food Chemistry*, 54(8), 3157–3162. <https://doi.org/10.1021/jf051853j>

- Johnson, T. E., Hermanson, D., Wang, L., Kassie, F., Upadhyaya, P., O'Sullivan, M. G., Hecht, S. S., Lu, J., & Xing, C. (2011). Lung Tumorigenesis Suppressing Effects of a Commercial Kava Extract and Its Selected Compounds in A/J Mice. *The American Journal of Chinese Medicine*, 39(04), 727–742. <https://doi.org/10.1142/s0192415x11009202>
- K. Connor, J. Davidson, & L. Churchill. (2021). *Adverse-Effect Profile of Kava. Kava - Better Health Channel*. (n.d.). www.betterhealth.vic.gov.au. Retrieved August 6, 2021, from <https://www.betterhealth.vic.gov.au/health/healthyliving/kava#medicinal-uses-of-kava>
- Kava | Michigan Medicine*. (n.d.). www.uofmhealth.org. <https://www.uofmhealth.org/health-library/tn7356spe>
- Kava Can Promote Healthy Sleep by Reducing Stress*. (n.d.). Verywell Health. Retrieved August 6, 2021, from <https://www.verywellhealth.com/kava-for-insomnia-relief-89337>
- Kava Hepatotoxicity: Are we any Closer to the Truth? (2004). *Planta Medica*, 70(3), 193–196. <https://doi.org/10.1055/s-2004-815533>
- Kava Kava: Benefits, Side Effects and Dosage*. (2018, February 10). Healthline.
- Kava*. (n.d.). Gaia Herbs. Retrieved August 6, 2021, from <https://www.gaiaherbs.com/blogs/herbs/kava>
- Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, Severity, and Comorbidity of 12-Month DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 617. <https://doi.org/10.1001/archpsyc.62.6.617>
- Ketola, R. A., Viinamäki, J., Rasanen, I., Pelander, A., & Goebeler, S. (2015). Fatal kavalactone intoxication by suicidal intravenous injection. *Forensic Science International*, 249, e7–e11. <https://doi.org/10.1016/j.forsciint.2015.01.032>
- Kong, Y., Gao, X., Wang, C., Ning, C., Liu, K., Liu, Z., Sun, H., Ma, X., Sun, P., & Meng, Q. (2018). Protective effects of yangonin from an edible botanical Kava against lithocholic acid-induced cholestasis and Hepatotoxicity. *European Journal of Pharmacology*, 824, 64–71.
- Lebot, V., Merlin, M., & Lindstrom, L. (1997). Kava: The Pacific Elixir: The Definitive Guide to Its Ethnobotany, History, and Chemistry.
- Li, X., Xu, X., Ji, T., Liu, Z., Gu, M., Hoang, B. H., & Zi, X. (2014). Dietary feeding of flavokawain A, a Kava chalcone, exhibits a satisfactory safety profile and its association with enhancement of phase II enzymes in mice. *Toxicology Reports*, 1, 2–11. <https://doi.org/10.1016/j.toxrep.2014.02.002>
- McElroy, J. P., Carmella, S. G., Heskin, A. K., Tang, M. K., Murphy, S. E., Reisinger, S. A., Jensen, J. A., Hatsukami, D. K., Hecht, S. S., & Shields, P. G. (2019). Effects of cessation of cigarette smoking on eicosanoid biomarkers of inflammation and oxidative damage. *PLOS ONE*, 14(6), e0218386. <https://doi.org/10.1371/journal.pone.0218386>
- Moulds, R. F. W., & Malani, J. (2003). Kava: herbal panacea or liver poison? *Medical Journal of Australia*, 178(9), 451–453.

- <https://doi.org/10.5694/j.1326-5377.2003.tb05289.x>
- Narayanapillai, S. C., Leitzman, P., O'Sullivan, M. G., & Xing, C. (2014). Flavokawains A and B in Kava, Not Dihydromethysticin, Potentiate Acetaminophen-Induced Hepatotoxicity in C57BL/6 Mice. *Chemical Research in Toxicology*, 27(10), 1871–1876. <https://doi.org/10.1021/tx5003194>
- Olsen, L. R., M. Grillo, & Skonberg, C. (2011). *Constituents in kava extracts potentially involved in Hepatotoxicity: a review*.
- Pan, H., Liu, F., Wang, J., Zhao, M., Wang, D., Jia, C., Wang, T., Chen, Z., Fan, Y., Liang, D., & Meng, Q. (2020). Dihydromethysticin, a natural molecule from Kava, suppresses the growth of colorectal cancer via the NLRC3/PI3K pathway. *Molecular Carcinogenesis*, 59(6), 575–589.
- Petersen, G. E., Tang, Y., & Fields, C. (2019). Chemical and in vitro toxicity analysis of a supercritical fluid extract of Kava kava (*Piper methysticum*). *Journal of Ethnopharmacology*, 235, 301–308.
- Peterson, L. A., Balbo, S., Fujioka, N., Hatsukami, D. K., Hecht, S. S., Murphy, S. E., Stepanov, I., Tretyakova, N. Y., Turesky, R. J., & Villalta, P. W. (2020). Applying Tobacco, Environmental, and Dietary-Related Biomarkers to Understand Cancer Etiology and Evaluate Prevention Strategies. *Cancer Epidemiology Biomarkers & Prevention*, 29(10), 1904–1919. <https://doi.org/10.1158/1055-9965.epi-19-1356>
- Pollastri, M. P., Whitty, A., Merrill, J. C., Tang, X., Ashton, T. D., & Amar, S. (2009). Identification and Characterization of Kava-derived Compounds Mediating TNF- α Suppression. *Chemical Biology & Drug Design*, 74(2), 121–128.
- R. Teschke, A. Genthner, & A. Wolff. (2021). *Kava hepatotoxicity: comparison of aqueous, ethanolic, acetonic kava extracts and kava-herbs mixtures*.
- R. Teschke, J. Sarris, & I. Schweitzer. (2012). *Kava hepatotoxicity in traditional and modern use: the presumed Pacific kava paradox hypothesis revisited*.
- R. Teschke. (2012). *Kava hepatotoxicity--a clinical review*.
- Sarris, J., LaPorte, E., Scholey, A., King, R., Pipingas, A., Schweitzer, I., & Stough, C. (2013). Does a Medicinal Dose of Kava Impair Driving? A Randomized, Placebo-Controlled, Double-Blind Study. *Traffic Injury Prevention*, 14(1), 13–17. <https://doi.org/10.1080/15389588.2012.682233>
- Sarris, J., Scholey, A., Schweitzer, I., Bousman, C., LaPorte, E., Ng, C., Murray, G., & Stough, C. (2012). The acute effects of Kava and oxazepam on anxiety, mood, neurocognition; and genetic correlates: a randomized, placebo-controlled, double-blind study. *Human Psychopharmacology: Clinical and Experimental*, 27(3), 262–269. <https://doi.org/10.1002/hup.2216>
- Schmidt, M. (2003). Are Kavalactones the Hepatotoxic Principle of Kava Extracts? The Pitfalls of the Glutathione Theory. *The Journal of Alternative and Complementary Medicine*, 9(2), 183–187. <https://doi.org/10.1089/10755530360623284>
- Shaik, A. A., Hermanson, D. L., & Xing, C. (2009). Identification of Methysticin as a potent and non-toxic NF- κ B inhibitor from Kava, potentially responsible for

- Kava's chemopreventive activity. *Bioorganic & Medicinal Chemistry Letters*, 19(19), 5732–5736. <https://doi.org/10.1016/j.bmcl.2009.08.003>
- Stickel, F., Baumüller, H.-M., Seitz, K., Vasilakis, D., Seitz, G., Seitz, H. K., & Schuppan, D. (2003). Hepatitis induced by Kava (*Piper methysticum* rhizoma). *Journal of Hepatology*, 39(1), 62–67. [https://doi.org/10.1016/s0168-8278\(03\)00175-2](https://doi.org/10.1016/s0168-8278(03)00175-2)
- TARBAH, F., MAHLER, H., KARDEL, B., WEINMANN, W., HAFNER, D., & DALDRUP, T. (2003). Kinetics of kavain and its metabolites after oral application. *Journal of Chromatography B*, 789(1), 115–130.
- Tengfei Bian, Corral, P., Yuzhi Wang, Botello, J. F., Kingston, R., Daniels, T., R. Salloum, E. Johnston, Z. Huo, Lu, J., Liu, A. C., & C. Xing. (2020). Kava as a Clinical Nutrient: Promises and Challenges.
- Teschke, R., Sarris, J., & Schweitzer, I. (2012). Kava hepatotoxicity in traditional and modern use: the presumed Pacific kava paradox hypothesis revisited. *British Journal of Clinical Pharmacology*, 73(2), 170–174.
- Teschke, R., Sarris, J., Glass, X., & Schulze, J. (2011). Kava, the anxiolytic herb: back to basics to prevent liver injury? *British Journal of Clinical Pharmacology*, 71(3), 445–448.
- Toll, B. A., O'Malley, S. S., McKee, S. A., Salovey, P., & Krishnan-Sarin, S. (2007). Confirmatory factor analysis of the Minnesota Nicotine Withdrawal Scale. *Psychology of Addictive Behaviors*, 21(2), 216–225. <https://doi.org/10.1037/0893-164x.21.2.216>
- Toxicology and carcinogenesis studies of kava kava extract (CAS No. 9000-38-8) in F344/N rats and B6C3F1 mice (Gavage Studies). (2012). *National Toxicology Program Technical Report Series*, 571. <https://doi.org/>
- Ulbricht, C., Basch, E., Boon, H., Ernst, E., Hammerness, P., Sollars, D., Tsourounis, C., Woods, J., & Bent, S. (2005). Safety review of Kava (*Piper methysticum*) by the Natural Standard Research Collaboration. *Expert Opinion on Drug Safety*, 4(4), 779–794.
- Wang, Y., Eans, S. O., Stacy, H. M., Narayanapillai, S. C., Sharma, A., Fujioka, N., Haddad, L., McLaughlin, J., Avery, B. A., & Xing, C. (2018). A stable isotope dilution tandem mass spectrometry method of major kavalactones and its applications. *PLOS ONE*, 13(5), e0197940. <https://doi.org/10.1371/journal.pone.0197940>
- Weiss, J., Sauer, A., Frank, A., & Unger, M. (2005). Extracts and kavalactones of *Piper methysticum* g. Forst (kava-kava) inhibit p-glycoprotein in vitro. *Drug Metabolism and Disposition*, 33(11), 1580–1583.
- Wruck, C. J., Götz, M. E., Herdegen, T., Varoga, D., Brandenburg, L.-O., & Pufe, T. (2008). Kavalactones protect neural cells against amyloid beta peptide-induced neurotoxicity via extracellular signal-regulated kinase 1/2-dependent nuclear factor erythroid 2-related factor 2 activation. *Molecular Pharmacology*, 73(6), 1785–1795.
- Zhongbo, L., U-Syn, H., Ke, Y., Chunli, W., Noriko, Y., & Xiaolin, Z. (2017). Kavalactone yangonin induces autophagy and sensitizes bladder cancer cells to flavokawain A and docetaxel via inhibition of the mTOR

pathway. *The Journal of Biomedical Research*, 31(5), 408.