Review Article

Kratom Use and Health Literacy of Kratom for User: A Narrative Review

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Abstract

Kratom is a tropical plant native to Southeast Asia. The delisting of kratom as a narcotic in many countries has significantly increased its accessibility, leading to greater experimentation with its usage. The kratom has the potential for pain relief, euphoria, and addiction to opioids. However, misuse, especially through potent mixtures like 4×100, can lead to adverse effects such as nausea, vomiting, and dizziness. Responsible use and health literacy are crucial for addressing concerns and preventing misuse, emphasizing the need for accurate information on kratom's traditional and modern applications. This review aims to provide a comprehensive perspective on the effects of kratom use, usage patterns, clinical care guidelines for kratom users, and health literacy related to kratom use. A searched Pubmed, ScienceDirect, Google scholar, Scopus, and Thailand journal citation index center databases using appropriate search strategies for each database. After the screening, all relevant studies were included. Improper usage of kratom can detrimentally impact users' health, manifesting side effects akin to both stimulant and opioid consumption, such as tachycardia, blushing, anxiety, agitation, loss of appetite, and polyuria. Therefore, promoting health literacy is essential for individuals using kratom responsibly to ensure a better understanding of its potential risks and benefits.

Keywords: kratom, kratom use, health literacy of kratom

Kratom is a plant in the Rubiaceae family, and its scientific name is *Mitragyna speciose Korth.*[1] Kratom has been discovered to have many chemical substances, such as alkaloids, flavonoids, triterpenes, and phenolic compounds. The most common alkaloids (66%) contain two main active ingredients: Mitragynine and 7-hydroxy Mitragynine. Mitragynine, which has a central nervous system inhibitory effect on opioid receptors.[2] It has similar effects to opioid drugs such as morphine, heroin, or fentanyl. The effects of Mitragynine and 7-hydroxy Mitragynine are sedative, euphoric, and analgesic.[3] Potential effects of using kratom include increased energy, decreased pain, increased focus, improved mood, decreased anxiety, reduced or discontinued use of opiates, and reduction in symptoms of posttraumatic stress disorder. Possible additional benefits include anti-inflammatory and immune stimulatory effects.[4, 5]

Kratom is a plant native to Southeast Asia whose leaves have been used as traditional medicine in Thailand and Malaysia for hundreds of years.[6] Currently, the legal status of kratom in many countries has been removed from controlled substances, such as Thailand, Malaysia, Indonesia, Vietnam, Denmark, Finland, Germany, Poland, and Sweden. Most kratom users take kratom by chewing fresh leaves, bringing fresh leaves to boil, and drinking them as tea. Fresh leaves are dried and ground into powder, brewed, mixed with honey, and formed into a ball for portability. Currently, there are reports of kratom being used by boiling kratom with other ingredients called 4x100, which is popular among teenagers in southern Thailand. It consists of three basic

ingredients: Coca-Cola and tea from boiled kratom leaves, and codeine or cough medicine that contains diphenhydramine.[7,8] The effects of kratom include euphoria, increased energy, decreased pain, improved mood, decreased anxiety, and decreased use of opiates.[5,9] The common side effects of kratom overdose are tachycardia, blushing, anxiety, agitation, loss of appetite, and polyuria. The opioid-like side effects include itching, nausea, constipation, dizziness, hypotension, dry mouth, and sweating. Serious toxicity has been reported, including agitation, tachycardia, torsades de pointes, seizures, psychosis, coma, and death.[9] Indeed, it is evident that kratom can exhibit both negative consequences and potential benefits when utilized appropriately. Health literacy is crucial for managing daily life. Searching for health information, understanding, and utilizing health services are integral to maintaining well-being. Health literacy is connected to general literacy and encompasses people's knowledge, motivation, and competencies to access, understand, appraise, and apply health information. It empowers individuals to make informed judgments and decisions regarding healthcare, disease prevention, and health promotion, aiming to maintain or improve the quality of life throughout the life course. To this end, the present work is the first to detail health literacy for kratom users. In this, we aim to provide a comprehensive perspective on the effects of kratom use, usage patterns, clinical care guidelines for kratom users, and health literacy related to kratom use.

Method

We conducted a literature search that addresses health literacy related to kratom use. An electronic search was conducted to identify all research articles published from 2003 to 2023 using the major research databases, such as Pubmed, ScienceDirect, Google Scholar, Scopus, and Thailand Journal Citation Index Center databases using appropriate search strategies for each database. We chose search keywords that health literacy, limited health literacy, poor health literacy, inadequate health literacy, health information, comprehend, Mitragynine, kratom use pattern, kratoms, and effects of kratom. We then analyzed the literature's discussion of comprehensive perspective on the effects of kratom use, usage patterns, clinical care guidelines for kratom users, and health literacy related to kratom use.

Result

Phytochemical of Kratom

Most of the substances found in kratom leaves are alkaloids, divided into two large categories: Heteroyohimbines and Oxindoles. The amount of alkaloids found in kratom is according to the growth area, season, humidity, soil conditions, and storage time.[10] In a a study comparing the amount of Mitragynine in kratom leaves from Thailand and Malaysia, it was found that the Mitragynine content in Thailand was approximately five times higher than that in Malaysia.[11]

Patterns of Kratom use

Kratom use pattern in the United States and Europe

Kratom was first reported to be imported into the United States in the 1980s. The United States has seen an increase in kratom by using natural remedies to improve mood and quality of life, substituting prescription, illicit opioids to reduce pain, and opioid withdrawal by those seeking to quit opiates.[5,12] Kratom use has become widespread in Europe and America. Kratom is being sold at cigarette shops, herbal shops, and "head" shops, where it is primarily marketed as an herbal medicine/supplement to treat a variety of ailments (pain, mental health, opioid withdrawal symptoms). The use of kratom is predominantly by liquids, but the use of powders added to food, beverages, or processed kratom capsules is also found. Kratom dry is cooked and drank, similar to tea or coffee; however, the taste is bitter and astringent, so sugar, honey, or sweeteners are usually added to beverages.[12-14] Kratom products are becoming increasingly available in both content and marketing. Survey research indicates that kratom is used primarily in the United States to self-treat anxiety, depression, pain, fatigue, and substance use disorder (SUD) symptoms. Kratom is also well known for use as a short- or long-term, full-length opioid agonist replacement. Therefore, their use may be greater in regions particularly affected by prescription opioid addiction.[15] The United States federal drug laws do not regulate kratom and mitragynine as controlled substances; only a few states have regulations in place.

However, some states classify kratom as a narcotic, with provisions that prohibit its production, distribution, and funding. These regulations either promote or prohibit the possession of kratom leaves. On August 30, 2016, the US drug agency Drug Enforcement Administration (DEA), which oversees the regulation of addictive drugs, including kratom, issued a notice containing alkaloids from kratom: Mitragynine and 7-Hydroxymitragynine are temporarily listed on Schedule 1 of the Controlled Substances Act. The reasons cited in the DEA's announcement are to prevent an imminent hazard and ensure public safety.[16,17] The legal status of kratom varies in Europe, and it is an illegal drug/substance in Denmark, Finland, Ireland, Latvia, Lithuania, Poland, Romania, and Sweden. Countries with liberal kratom policies include Austria, Belgium, Canada, France, Greece, Hungary, Netherlands, and the United Kingdom.[5, 18, 19]

Kratom use pattern in Southeast Asia

Kratom use data is available for six countries in Southeast Asia: Thailand, Malaysia, Indonesia, Myanmar, Philippines, and Cambodia. Each country uses kratom in distinct ways, influenced by the medical or chemical effects of kratom within that country. This diversity results in variations in societal status, legal standing, impact on crime, and influence on the economy in each country.[18] In Malaysia and Thailand, kratom has primarily been used for two applications: as a stimulant to increase work efficiency, and to build tolerance to heat and humid climate conditions for manual laborers.

However, kratom is also used as a medical remedy for a range of symptoms, including analgesic, relaxation, anti-diarrhea, antipyretic, anti-diabetic, intestinal infections, and to reduce coughing.[5,10] In addition, kratom is also used for other purposes, including social meet-ups, helping with sleeping, reducing withdrawal symptoms and recreational needs, as well as improving sexual performance.[20] Each country has different usage characteristics. In Malaysia, kratom is commonly consumed in local coffee shops and is used as tea. However, it was found that the chewing of fresh kratom leaves is less prevalent than in Thailand. There were also reports of users smoking dried leaves for a relaxing effect.[10] The most common pattern of kratom use in Malaysia involves boiling kratom leaves in a mixture to create a syrup known as 4x100. Approximately 90% of kratom users are concentrated in the northern part of the country. The primary purposes for taking it include seeking entertainment, increasing working power, and enhancing sexual performance. [20] In Thailand, kratom has been consumed for a long time, either in the form of fresh or dried leaves that are chewed, smoked, or brewed into tea. It has also been found that kratom boiled water is the mixture boiled to create a syrup referred to as 4×100. It is used for recreational purposes and consists of 3 ingredients as follows: Coca-Cola, tea made from kratom leaves, and codeine or diphenhydramine-containing cough syrup.[8,21] The trend of kratom use in Thailand is on the rise. In 2019, The prevalence of kratom use indicates that 1,605,040 people, accounting for 31.91 per thousand of the population, have used kratom leaves. In the past year, the prevalence of kratom use was reported to be 9.76 per thousand of the population who have used kratom leaves. The prevalence of people who had consumed kratom boiled water was reported to be 10.19 per thousand of the population. In the past year, the prevalence of people who consumed kratom-boiled water was reported to be 4.40 per thousand of the population.[22-24] In 2021, Thailand passed the updated Narcotics Act, removing kratom from the list of prohibited substances. This decision was based on the recognition that kratom consumption is a part of traditional Thai cultural norms, allowing for its possession and consumption. On August 23, 2022, Thailand published the Kratom Plant Act B.E. 2565 (2022) in the Government Gazette, and the law came into effect the following day.[25]

Adverse effects of kratom use

Addiction potential: The two most common alkaloids, mitragynine, and 7-hydroxy mitragynine are blinding with μ-opioid receptor agonists. Moreover, the addictive mechanism of kratom is similar to opioids.[26] Kratom's addictive potential is comparable to caffeine but less than that of cocaine or heroin.[4] There is still little research on the impact of kratom addiction, but they are related to the amount and duration of kratom use. Studies have found that people who use kratom in quantities of more than 5 grams of kratom three times per day for at least 6 months may experience addiction problems. Withdrawal effects are likely to occur when users stop using kratom.[27-29] The common withdrawal symptoms reported include insomnia, mood disorder, nervousness, and seizure in severe withdrawal cases. The recommended average daily intake is less than 276.5 milligrams per day. Regular consumption of kratom water for users of below 3 glasses per day or below 600 milliliter means there is a high chance of being unable to control kratom cravings. A severe addiction to kratom develops, and withdrawal symptoms occur kratom is not used.[28]

Withdrawal effects

The withdrawal of kratom effects occur within 12 – 48 hours after stopping kratom.[5] Common withdrawal symptoms are myalgias, tremors, jerks, twitches, diarrhea, rhinorrhea, lacrimation, hot flashes, fever, and cravings correlated with the quantity, duration, and frequency of kratom use.[28,30,31] In addition, short-term withdrawal symptoms were found, including insomnia, restlessness, irritability, anger, hostility, fatigue, anxiety, sadness, mood swings, and sometimes hallucinations. While longer-term effects, specifically anxiety and depression.[4, 29, 32, 33]

Adverse effects of kratom use

Southeast Asia has relatively few studies on the negative effects of kratom use. Reported side effects of kratom use are similar to the use of opioids. The opioid-like side effects include itching, nausea, constipation, dizziness, hypotension, dry mouth, and sweating. Serious toxicity has been reported, including agitation, tachycardia, torsades de pointes, seizures, psychosis, coma, and death.[9] A study was conducted on a group that used kratom in high doses, and chronic kratom consumption over 3 glasses of decoction per day was found to be associated with a decline in learning and visual episodic memory.[34]

Currently, kratom users are modifying kratom for easier consumption, which is called 4x100. The formula is becoming abused by youth addicts, leading to a significant social problem in Thailand. The issue is particularly prevalent among young Muslims in Bangkok and people in the three southernmost provinces of Thailand. Kratom may be mixed with four major ingredients: boiled kratom leaves, cola soft drink, codeine-containing cough syrup, and the fourth ingredient depends on the producer's choice or is whatever makes them inebriated i.e. mosquito coils, anxiolytic drugs or antidepressants (alprazolam, diazepam, amitriptyline, or nortriptyline), analgesic (paracetamol, or tramadol), some of drug abuse (methadone, marijuana, or methamphetamine), herbicide, or even the powder peeled from the inside of fluorescent light bulbs. This mixture can have adverse effects on consumers' health. In this case, the cause of death might be attributed to multidrug intoxication, with additive adverse effects, especially to the central nervous system (CNS) and respiratory depression. Often consumed by young Muslims in southern Thailand, this drink is said to have effects similar to alcohol intoxication.[35, 36]

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A Guide for healthcare providers

1. Laboratory tests cannot identify mitragynine in the urine of patients using kratom. However, detection of mitragynine in urine is possible through gas chromatography-mass spectrometry (GC/MS), a method that generally eliminates the need for further laboratory testing. Evaluation can be based on symptoms such as nausea, vomiting, and severe diarrhea. Electrolytes can be checked in the event of abdominal pain or jaundice in the patient. For those using high doses of kratom, additional examination and monitoring of neurological and respiratory symptoms should be considered.[37]

2. Patient care[37]

2.1 Emergency and supportive measures.

- If the patient is restless or agitated, consider administering medication. Intravenous Diazepam is a common practice in such cases.
- In the case of a patient who is agitated, severely agitated, in a coma, or experiencing seizures, consider performing intubation.

2.2 Decontamination in cases where the patient consumes large amounts of kratom or consumes kratom together with other substances, consider giving 50 grams of activated charcoal powder (1 gram/kilogram in children) not more than 4 hours before arriving at the hospital. Do not administer activated charcoal powder if the patient is unconscious. However, if the patient is intubated first, activated charcoal can be given to prevent aspiration into the lungs.

2.3 The symptoms of kratom overdose are similar to opioid overdose; however, there is no specific antidote. Treatment guidelines may consider giving a Naloxone injection. The starting dose is 40 micrograms per session, slow IV push, then gradually titrate to 400 micrograms, 2 - 3 minutes apart from each dose. If respiratory depression is still present, the dose can be increased to 2 milligrams to reduce the risk of opioid toxicity.[38] There is no effective method to enhance elimination for individuals toxic from kratom.

Health literacy

Health literacy refers to the ability of individuals to understand and use information that promotes and maintains good health for themselves.[39] Moreover, the public health service system must be more cohesive and less challenging to access and comprehend. Making informed decisions about the information one believes requires skills in accessing and evaluating information. Therefore, comprehending and utilizing information for making healthcare decisions is crucial. However, suppose an individual needs to gain health knowledge. In that case, it leads to a need for more skills for protecting and caring for one's health, hindering the ability to make informed decisions about correctly using health information.

Health literacy is crucial for managing daily life. Searching for health information, understanding, and utilizing health services are integral to maintaining well-being. Taking care of health goes beyond merely visiting a doctor, clinic, or a hospital; it is a vital component of daily living. Health literacy is essential for preventing health problems and plays a crucial role in effectively managing health issues when they arise in daily life. Health literacy is connected to general literacy and encompasses people's knowledge, motivation, and competencies to access, understand, appraise, and apply health information. It empowers individuals to make informed judgments and decisions regarding healthcare, disease prevention, and health promotion, aiming to maintain or improve the quality of life throughout the life course.[40]

Health literacy of the kratom user

Health literacy regarding kratom use refers to the ability to access accurate information about kratom, knowledge, understanding, evaluation, or data analysis. This includes the application of information to make decisions about the correct use of kratom. The specific details are as follows:

Accessing information about kratom

This is the ability to find information about kratom from reliable sources or health services that provide information about kratom. A study was conducted on the communication patterns of online communities with content about kratom juice, along with an examination of the identity display related to kratom juice drinking behavior that appeared on online media. The study revealed that the communication pattern typically starts with the page creator attempting to position themselves as an influencer, sharing their experiences as someone who has consumed kratom water. It was found that communication involves using messages, images, and video clips that align with the given situation. The content is categorized into positive energy content and trend-building content. These contents can attract the audience to participate as group members and disseminate the information within the community. This process contributes to the expansion of the kratom water drinker network. As for the identity associated with kratom water-drinking behavior, it was crafted by collecting and selecting the identities of both page owners and members. These identities are categorized into two forms: 1.) personal identities derived from the benefits of drinking kratom water and 2.) social identities arising from the advantages of social signals.[41]

Understanding kratom use

The ability to understand the correct meaning and usage of kratom, as well as the benefits and harms associated with its use, is crucial when considering the use of kratom in a community context. A study of the creation of participatory campaign media to enhance understanding and address the issue of kratom tea use among youth in the at-risk areas of Songkhla Province was conducted. The research underscored the significance of collaborative efforts among regional stakeholders for effective media creation. Through brainstorming sessions, key issues were identified for communication in the

campaign media, focusing on two main points: preventing kratom addiction among young people and assisting friends who have become addicted to kratom water in reintegrating into society. The presented content aimed to shift the receivers' attitudes and cultivate a correct understanding of the personal identity of kratom drinkers, aligning with their actual situations. Emphasis was placed on revealing drawbacks and dispelling false social identities that perceive kratom juice as more beneficial than harmful.[42]

Appraise

The ability to analyze the situation of kratom use in the community, assess problems arising from its use, evaluate information presented in the media, and compare information about kratom use from various sources is crucial. A study demonstrated the tracking of the movement of narcotic drugs on the internet, where illegal or strictly regulated substances face severe punishment. The study found that online communication channels are less likely to be used for substances with severe penalties, such as illegal narcotics. In contrast, substances with milder consequences, like addictive plants (e.g., marijuana, kratom) and incorrectly used medications (e.g., sleeping pills, tranquilizers, painkillers, antihistamines), tend to have a higher presence.[43,44]

Apply information about kratom use

The ability to plan and set goals involves observing one's behavior, analyzing it, and adjusting kratom use behavior accordingly. It allows for informed decision-making in the use of kratom, employing reason to analyze both positive and negative outcomes and choosing methods that have beneficial effects on health.

Discussion

This is the first narrative review of kratom use and health literacy of kratom use. These findings include the consumption of kratom in the United States as liquids, and the use of powers added to food, beverages, and capsules is growing in popularity. The patterns of kratom use in Southeast Asia are diverse, encompassing methods such as chewing fresh kratom leaves, brewing them into tea, smoking, and combining them with coffee or sweet beverages for consumption.[5] Nevertheless, there is a concerning trend where kratom is combined with other substances to enhance its effects and duration. This mixture, known as the 4x100 formula, is increasingly being abused by young individuals struggling with addiction. In this context, the 4x100 cocktail has gained popularity as a substance abuse formula, as its consumption induces sensations akin to drinking alcohol. In this case, the cause of death might be due to multidrug intoxication of the additive adverse effects especially CNS and respiratory depression.[36] Given that kratom product may vary greatly in potency, there is no standard dosing system. At relatively low doses, typically ranging from 1 to 5 grams of raw leaves, where stimulant effects predominate, side effects may include contracted pupils and blushing. Stimulation-related adverse effects may manifest as anxiety and agitation, while opioid-associated effects, such as itching, nausea, loss of appetite, and increased urination. At moderate to high doses, typically ranging from 5 to 15 grams of raw leaves, where opioid effects typically emerge, there are additional adverse effects including tachycardia, along with opioid-related side effects such as constipation, dizziness, hypotension, dry mouth, and sweating.[29] To summarize, the side effects of kratom use bear similarities to opioid consumption. Opioid-like side effects encompass itching, nausea, constipation, dizziness, hypotension, dry mouth, and sweating. Serious toxicity incidents have been reported, including agitation, tachycardia, torsades de pointes, seizures, psychosis, coma, and, in extreme cases, death.[9] Long-term use of high doses of kratom carries the risk of developing tolerance, dependence, and withdrawal symptoms. These symptoms may include loss of appetite, weight loss, decreased sexual drive, trouble sleeping, muscle spasms, muscle and bone pain, myoclonus, watery eyes, hot flushes, fever, diarrhea, restlessness, as well as emotional effects like anger and sadness.[45]

Kratom is a legal substance and is easier to access than opiods. Kratom affects the health of users who use it inappropriately. Therefore, health literacy is important for health kratom users, to ensure the empowerment of individuals who use kratom to make informed decisions regarding kratom consumption and to reduce the likelihood of adverse health effects. Responsible use and health literacy are key to navigating the growing popularity of kratom and ensuring the well-being of those who choose to incorporate it into their lifestyles.

Conclusion

The article emphasizes the importance of health literacy in managing daily life, particularly in the context of using kratom. It acknowledges that kratom can have both negative consequences and potential benefits when used appropriately. Health literacy, encompassing knowledge, motivation, and competencies in accessing, understanding, appraising, and applying health information, is highlighted as crucial. The article is the first to address the health literacy of kratom users, empowering individuals to make informed decisions about healthcare, disease prevention, and health promotion to maintain and/or improve their quality of life. As well as the determinants examined, participants with low health literacy reported having poorer quality of life, higher psychological distress, and poorer mental health, which is consistent with previous findings that associate lower health literacy with poor health outcomes.[46]

Conflict of interest

The authors declare no conflict of interest.

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