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Changing trends in the use of kratom (*Mitragyna speciosa*) in Southeast Asia

Darshan Singh[1] | **Suresh Narayanan**[2] | **Balasingam Vicknasingam**[1] | **Ornella Corazza**[3] | **Rita Santacroce**[4] | **Andres Roman-Urrestarazu**[5]

[1] Centre for Drug Research, Universiti Sains Malaysia, Gelugor, Penang, Malaysia

[2] School of Social Sciences, Universiti Sains Malaysia, Gelugor, Penang, Malaysia

[3] Centre for Clinical & Health Research Services, School of Life and Medical Sciences, University of Hertfordshire, College Lane Campus, Hatfield, UK

[4] Department of Neuroscience, Imaging and Clinical Sciences, Gabriele D'Annunzio University of Chieti-Pescara, Chieti, Italy

[5] Department of Psychiatry, University of Cambridge, Cambridge, UK

Correspondence
Darshan Singh, Centre for Drug Research, Universiti Sains Malaysia, Gelugor, Penang 11800, Malaysia.
Email: darshan@usm.my

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Abstract

Objective: *Kratom* (*Mitragyna speciosa*. Korth) is an indigenous medicinal plant of Southeast Asia. This review paper aims to describe the trends of kratom use in Southeast Asia.

Design: A literature review search was conducted through ScienceDirect, Scopus, ProMed and Google Scholar. Twenty-five articles illustrating kratom use in humans in Southeast Asia were reviewed.

Results: Kratom has long been used by rural populations in Southeast Asia as a remedy for common ailments, to fight fatigue from hard manual work, as a drink during social interaction among men, and in village religious functions. Studies based on self-reports suggest that prolonged kratom use does not result in serious health risks or impair social functioning. Two recent trends have also emerged: (a) Kratom is reportedly being used to ease withdrawal from opioid dependence in rural settings; whereas (b) in urban areas, adulterated kratom cocktails are being consumed by younger people to induce euphoria.

Conclusions: Legal sanctions appear to have preceded serious scientific investigations into the claimed benefits of ketum. More objective-controlled trials and experiments on humans need to be conducted to validate self-report claims by kratom users in the community.

KEYWORDS

kratom, Malaysia, mitragynine, opiate, Thailand

1 | INTRODUCTION

Kratom (*Mitragyna speciosa*. Korth) from the Rubiaceae or coffee family is a tropical medicinal plant in Southeast Asia (Hassan et al., 2013; Saingam, Assanangkornchai, Geater, & Balthip, 2012; Singh, Narayanan, & Vicknasingam, 2016) where it has historically been used for a variety of purposes. This plant is known as kratom or tom/thom in Thailand. There are other species of Mitragyna in Thailand such as *Mitragyna parvifolia* (Roxb.) Korth., M. hirsute Havil., *Mitragyna diversifolia* (Wall. Ex G.Don) Havil., which call krathum. Native people in Thailand do not use these plants for chewing or boiling. In Malaysia, the plant is widely referred to as ketum, although other names like bia and biak are sometimes also used. Kratom plants (Figure 1) can be widely found in Thailand, Malaysia, Borneo, Philippine, New Guinea, and Africa (Lee, 1957). Nearly 25 alkaloids have been isolated from *M.speciosa* with mitragynine and 7-hydroxymitragyine being the active compounds. These alkaloids are reported to produce morphine-like effects (Hassan et al., 2013).

Previous studies on kratom use in Southeast Asia have described the demographic-characteristics of kratom users, reasons for kratom use, and the spread of kratom from its original context of use to western countries where it is viewed as an herbal product capable of providing a "legal" high and is increasingly being sold through the internet and local smart shops (Cinosi et al., 2015; Singh et al., 2016). However, to our knowledge, no systematic review has been conducted to specifically analyse the changing trends of kratom use within the Southeast Asian context itself—branching out from its traditional uses to new uses not evident in earlier years. We attempt to fill this gap and discuss the implications of these developments. In this paper, we confine ourselves to the terms kratom and ketum and use them interchangeably.

2 | METHOD

A literature review search was conducted through ScienceDirect, Scopus, ProMed, and Google Scholar. We used keywords such as

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FIGURE 1 Kratom leaves and trees

"kratom", "ketum," and "*Mitragyna speciosa*" to search for relevant research articles on kratom use in humans. Out of the 90 identified articles, 25 published articles mainly on kratom use in Southeast Asia were selected and reviewed. Out of the 19 articles, 11 articles were on Malaysia, and eight articles were on Thailand. The types of studies included three review papers; eight in-depth qualitative interviews; four case reports; two reference texts; and two short-communications.

3 | RESULTS

3.1 | Traditional uses

Kratom has been used for a wide variety of purposes in Southeast Asia, including for its perceived medical value, and antifatigue properties. It is also used as a recreational drink when relaxing and socialising, largely among men, and in some Thai villages, as part of small religious ceremonies.

Kratom leaves are used widely by women in villages as a household remedy for common ailments such as fever, cough, hypertension, diabetes, pain, and anxiety. It is also applied as a wound poultice, and believed to be a deworming agent and appetite suppressor (Assanangkornchai, Muekthong, Sam-Angsri, & Pattanasattayawong, 2006; Burkill, 1935; Burkill & Haniff, 1930; Lee, 1957; Saingam et al., 2012). One Malaysian study cited self-reports of ketum being used as an aphrodisiac to heighten sexual desire (Vicknasingam, Narayanan, Beng, & Mansor, 2010). Interestingly, the only medical use of kratom in the West has been to treat chronic pain (Singh et al., 2016).

Men, on the other hand, consume kratom in the morning to improve work productivity and to combat fatigue. The coca and opium-like effects help manual labourers (e.g., farmers, rubber tapers, machine drivers, and fisherman) and those working in the blistering heat to continue without tiring (Hassan et al., 2013; Suwanlert, 1975; Vicknasingam et al., 2010). Most male workers learn to use kratom from other users in the community (Suwanlert, 1975). In earlier periods in Malaya, when opium use was common in Malaya, those who relied on opium reportedly turned to ketum in times of opium scarcity (Burkill, 1935; Burkill & Haniff, 1930).

In the evenings, men use kratom as a drink when they relax and socialise (Saingam et al., 2012). In villages, kratom is also served as a drink to male guests during social gatherings (Saingam et al., 2012; Tanguay, 2011). It serves as a substitute for alcohol among Muslims in Malaysia and South Thailand because alcohol consumption is against Islamic teachings (Tanguay, 2011; Tungtananuwat & Lawanprasert, 2010). Because kratom users are not considered to be alcohol users, they are free from the social stigma attached to those consuming alcohol (Saingam et al., 2012). Kratom has also earned a place in some village religious ceremonies where it is offered to a god or spirit as a precious gift for fulfilling their desires or vows (Saingam et al., 2012).

3.2 | Social context

Kratom users are not discriminated against as are alcohol or drug users. The tolerant view of male ketum users has become embedded in village society because of several factors. Ketum consumption is accepted as an aid to hard work that augment incomes to support families (Assanangkornchai et al., 2006). Most family members expressed no reservations about male family members habitually using kratom (Assanangkornchai et al., 2006). Kratom users are viewed as hard-working people, as compared to users of cannabis, alcohol, and tobacco, who are labelled as lazy and bad people, possibly because they are seen to be indulging in the habit for their individual pleasure (Saingam et al., 2012). Kratom users also do not engage in bullying, hurting, quarrelling, or fighting, unlike alcohol users (Saingam et al., 2012).

In Malaysia, a study found that ketum users expressed no guilt about their use, as they are responsible, working members who contribute to the well-being of the family (Ahmad & Aziz, 2012). However, many ketum users did admit that their family members were not always accepting of their ketum use habit (Ahmad & Aziz, 2012).

3.3 | Routes of kratom use and supply

There are several modes of ingesting kratom; the leaves can be smoked, chewed, brewed into herbal tea, or used together with coffee or sweet beverages (Hassan et al., 2013). In Thailand, kratom users

often chew fresh kratom leaves (Suwanlert, 1975). Sugar and sweet beverages (e.g., Coca-Cola, Pepsi, and Fanta) are sometimes added to mask its bitter taste. The leaves are usually chewed several times a day depending on needs (Suwanlert, 1975). Regular users use it many times a day (Singh, Muller, & Vicknasingam, 2014; Suwanlert, 1975; Vicknasingam et al., 2010). Despite it being declared illegal, kratom leaves can be purchased easily, whereas regular users usually have their own kratom plant for personal consumption (Saingam et al., 2012).

In Malaysia, ketum is commonly drunk as a solution (referred to as juice or tea) made from boiled ketum leaves (Singh et al., 2014). The process of making ketum juice is not as complex as preparing illicit substances. Ketum traders often prefer to buy older ketum leaves from ketum cultivators when preparing ketum juice. The fresh ketum leaves are usually washed with water to remove traces of dirt. It is then thrown into a boiling water in a pot (with the quantity of leaves depending on the amount of packets the trader plans to produce). Soon after, the temperature of the boiling water is reduced and the preparation is left to brew at low heat for a maximum of 4 hr. It is stirred every half an hour, to ensure that the leaves do not get stuck on the surface of the port and burn as it will emit an unpleasant burnt taste. The preparation emits a strong odour when it has been brewed properly. The brewed ketum juice is left to cool before being packed into small plastic bags and sold for consumption. The packets are also chilled with ice to enable it to last for about 3 days.

Each packet of ketum juice (containing between 250 and 300 ml of fresh ketum juice) is usually sold in Malaysia at RM5 (USD = 1.20; Singh et al., 2014). It can be bought quite easily from illegal ketum distributors in the community.

3.4 | Effects and side effects

Kratom has unique narcotic properties, which combine psychostimulant and opiate-like effects at higher doses (Harun, Hassan, Navaratnam, Mansor, & Shoaib, 2015). The effects are primarily influenced by the plant variety, which can either have a red vein or white vein leaf. In Thailand, the red vein leaf is preferred because of its potency (Saingam et al., 2012; Suwanlert, 1975). The kratom plant contains various phytochemicals with over 40 structurally related alkaloids of which mitragynine is the principal alkaloid (66% of total crude base extract from Thai leaves), and 7-hydroxymitragynine is the minor constituent (it exhibited 13- and 46-fold higher potency than morphine and mitragynine). *Mitragyna speciosa* is reported to produce morphine-like effects (Hassan et al., 2013), although both these alkaloids are reported to produce dose-dependent antinociceptive effects and are linked to its growing use for its pain-relieving properties in the West (Hassan et al., 2013; Singh et al., 2016).

Regular kratom use can become habit forming, yet it never acquired a bad reputation like opium smoking has (cited in Jansen & Prast, 1988a). Regular users, rather than those who use it irregularly, are more likely to increase their kratom intake over time (Singh et al., 2014; Suwanlert, 1975; Vicknasingam et al., 2010). Lee (1957) noted that there were no reports of adverse physical or psychological symptoms even among chronic users. And on cessation of use, only mild withdrawal discomforts were reported. Kratom users, in general, claimed they felt elated, strong, and active after using or consuming it (Suwanlert, 1975). Vicknasingam et al. (2010) record that users of ketum reported increased work capacity, heightened sexual desire, and increased levels of physical activity. Similarly, Ahmad and Aziz (2012) reported claims of being energised, alert, relaxed, contented, sedated, and light-headed by ketum users. Feeling hot and sweaty, experiencing improved sexual performance, and having a sense of euphoria were the other effects that users claimed. All these effects usually last between 1 to 6 hours (Ahmad & Aziz, 2012).

Long-term kratom use has also been associated with constipation, weight loss, insomnia, dryness of the mouth, frequent micturition, dehydration (increased thirst), tiredness, darkening of skin, and low sexual drive (Assanangkornchai et al., 2006; Saingam et al., 2012; Suwanlert, 1975; Vicknasingam et al., 2010). In general, however, it appears that kratom users in Southeast Asia are able to tolerate well the effects of regular ketum use (Jansen & Prast, 1988b). There have been different studies linking *M.speciosa* preparation and mitragynine administration with elevated blood pressure, hepatotoxicity, and nephrotoxicity effects in rats (Harizal, Mansor, Hasnan, Tharakan, & Abdullah, 2010). Impaired cognitive behavioural function (Apryani, Hidayat, Moklas, Fakurazi, & Idayu, 2010; Ismail, Jayabalan, Mansor, Müller, & Muzaimi, 2017; Yusoff et al., 2014), unpleasant withdrawal symptoms (Yusoff et al., 2014), and toxicity and mortality incidences have been reported in humans (Singh et al., 2016).

3.5 | Dependence and withdrawal

Kratom has been found to be addictive, and prolonged use can lead to dependence and withdrawal problems (Burkill, 1935; Saingam, Assanangkornchai, Geater, & Lerkiatbundit, 2014; Saingam, Assanangkornchai, Geater, & Lerkiatbundit, 2016; Singh et al., 2014; Vicknasingam et al., 2010). In fact, regular users were found to face higher odds of increasing their kratom intake overtime as compared to occasional users (Cinosi et al., 2015; Saingam et al., 2016; Singh et al., 2014; Suwanlert, 1975). Both physical and psychological difficulties have been associated with kratom withdrawal. The former include sleeping difficulties, decreased appetite, vomiting, muscle spasms, sweating, fever, abdominal pain, diarrhoea, headache, hot flashes, watery eyes and nose, hiccups, shakiness and tremors, body aches and muscle pains, and cramps (Cinosi et al., 2015; Singh et al., 2014). The latter include hostility, aggression, mental confusion, delusion, hallucination, and persecutory ideation (Singh et al., 2014; Suwanlert, 1975).

Most kratom users reported dealing with these symptoms in their own way. These include methods such as chewing and spitting out the fibre, drinking copious amount of water, working strenuously to draw the attention away from the unpleasant effects, having a cold shower and by sleeping it out (Assanangkornchai et al., 2006). In most cases, the withdrawal effects usually last between 1 to 3 days (Saingam et al., 2016; Singh et al., 2014). The severity of kratom dependence and withdrawal symptoms depend on the quantity and frequency of kratom use (Singh et al., 2014; Vicknasingam et al., 2010). Those who consumed ≥3 glasses of kratom juice daily (with each glass containing about 350 ml of kratom juice and a mitragynine content ranging between 83.4 to 74.6 mg) were more likely to report severe kratom dependence and withdrawal symptoms (Singh et al., 2014).

There have been anecdotal reports of the use of benzodiazepine by ketum users in Peninsular Malaysia to treat their kratom dependence and to manage their withdrawal symptoms due to its anxiolytic effects (Singh et al., 2014). However, the prevalence of benzodiazepine use among kratom users in Southeast Asia has not yet been studied. It should be noted that there have been no evidence to suggest that ketum users are more likely to use illicit substances or that ketum use acts as a gateway to illicit drug use.

3.6 | Social functioning

Regular kratom use does not appear to cause any significant impairment in the social functioning of kratom users (Singh, Muller, & Vicknasingam, 2015). Even regular users who are dependent on kratom have not reported that their habit has interfered with or undermined their social functioning. Most kratom users in Southeast Asia are employed, married, and live with their family (Assanangkornchai et al., 2006; Saingam et al., 2012; Singh et al., 2015). None of them have reported any major health problems since the onset of their ketum use (Singh et al., 2015).

There is also no evidence to suggest that kratom users engage in risky HIV and or criminal behaviours (Singh et al., 2015). In Thailand, people often preferred a kratom-using son-in-law, rather than an alcohol-using one, since the use of the latter often destroys friendships and cause accidents and quarrels (Saingam et al., 2012).

3.7 | Ketum toxicity

Preclinical information related to the toxic effects of ketum use especially among kratom users in Southeast Asia remains poorly documented, despite the surge in kratom toxicity cases reported in the West (Hassan et al., 2013; Singh et al., 2016). Acute administration of mitragynine produces anxiolytic-like effects attributed to the interactions among opioidergic receptor systems (Hazim, Ramanathan, Parthasarathy, & Muzaimi, 2014). Findings from animal studies have indicated that *M.speciosa* is toxic and may cause lethal effects at higher doses (Hassan et al., 2013; Ismail et al., 2017). Recent findings from a Poison Centre in Thailand recorded 52 kratom exposure cases that were reported to the Centre's surveillance system from 2005 to 2009. Out of the 52 cases, 76.9% were kratom poisoning cases (e.g., palpitation and seizure), whereas 23.1% were kratom withdrawal cases (e.g., myalgia, insomnia, fatigue, and chest discomfort) (Trakulsrichai et al., 2013). In fact, some of the reported kratom poisoning and withdrawal cases may have been precipitated by the concomitant use of other illicit substances (Trakulsrichai et al., 2013). Suwanlert (1975) found that long-term kratom users become thin, have darker face, develop mouth dryness, and constipation. Similarly, Vicknasingam et al. (2010) reported that long-term ketum users suffer weight loss, dehydration (increased thirst), and constipation. In order to alleviate these unpleasant conditions, kratom users usually attempt to work strenuously, drink ice water, take cold shower, eat sour fruit, and try to sleep it out (Assanangkornchai et al., 2006). It has been hypothesised that kratom users in Southeast Asia are better able to tolerate high levels of kratom use on a regular basis (Jansen & Prast, 1988a). However, more clinical studies are needed to determine the chronic toxic effects of kratom in humans.

3.8 | Legal status

Ketum is banned in Malaysia, and has been criminalised in Thailand since 1943. In Malaysia, ketum is regulated under the Poisons Act, 1952. Although the cultivation of ketum trees is considered to be nonillegal, those caught for distributing ketum or in possession of processed ketum leaves can be fined up to a maximum of RM10,000 or sentence to a 4-year jail term, or both (Vicknasingam et al., 2010). More recently, the Malaysian government has proposed a new bill in parliament to reschedule ketum from the Poisons Act 1952, to the Dangerous Drugs Act, 1952. Had this succeeded, the bill would have resulted in more severe punishment being meted out to ketum users. The move was however put on hold as many parliamentarians were not convinced that ketum poses such a threat as to warrants its inclusion in the Dangerous Drugs Act, 1952 (The Star, April 2015).

In Thailand, on the other hand, kratom was first regulated under the Kratom Act, 1943. In 1979, the Thai government finally decided to reschedule kratom under the Thai Narcotics Act, which is less punitive than the earlier Kratom Act, 1943 (Tanguay, 2011). Kratom is not only illegal in Southeast Asia but is also currently controlled in several European Union member states such as Denmark, Finland, Lithuania, Poland, Romania and Sweden (Singh et al., 2016), and the United Kingdom under the more recent Psychoactive Substances Bill (May 2016). Many other western countries are also rethinking the legal status of kratom.

3.9 | Emerging trends in kratom use in Southeast Asia

In the past, kratom was relied upon by rural Southeast Asian communities both as a traditional medicinal remedy for common ailments and to improve work capacity (Suwanlert, 1975), aside from featuring also as a social drink among men, and its use in small village religious ceremonies.

Two new trends in usage have emerged. The findings from a cross-sectional study in Malaysia showed many illicit drug users in the northern region of the country (and close to the borders of Thailand) were using ketum as a cheap alternative to reduce their dependence on illicit substances, as well as to suppress opiate withdrawal symptoms (Vicknasingam et al., 2010).

A more disturbing trend is the use of ketum in urban settings among younger people in Thailand and Malaysia. It is being used as a narcotic and alcohol substitute (Singh et al., 2016; Tanguay, 2011; Tungtananuwat & Lawanprasert, 2010). In Thailand, the home-made 4 × 100 kratom cocktail nick named *sii koon roi* has become popular among teenagers and young adults. The 4 × 100 concoction is usually made of brewed kratom tea, cough syrup (e.g., diphenhydramine), and Coca-Cola, whereas an assortment of substances such as anxiolytics, antidepressants, and analgesics are also added based on consumers preferences (Tungtananuwat & Lawanprasert, 2010). The 4 × 100 concoction is reported to provide better euphoria (Tanguay, 2011; Tungtananuwat & Lawanprasert, 2010). In fact, there is rising concern

about the rapid diffusion of 4 × 100 particularly among young people in the community (Tanguay, 2011). The use of 4 × 100 with poly drugs (anxiolytic or antidepressant) can be fatal due to its multidrug toxicity (Tungtananuwat & Lawanprasert, 2010).

In Malaysia, similar trends are emerging; the 4 × 100 cocktail, which is known as *koroi* (e.g., Coca-Cola, cough syrup, and kratom juice), is slowly becoming popular among both young and older aged kratom users in the community. The use of *koroi* is reported to provide a better high. In fact, those who wish to self-treat their illicit drug and alcohol dependence problem also use the 4 × 100 cocktail (Tanguay, 2011).

4 | DISCUSSION

The kratom use has a long tradition among the village folk in rural Southeast Asia. It has been relied upon as a remedy for common ailments, to ward off fatigue from working under the sweltering sun, and as a drink during social interaction among men. It is also sometimes used in village-based religious functions in Thailand. Using kratom in these societies is akin to drinking coffee and is a practice that is deeply rooted among the local people.

Despite the potential for addiction, people in the community generally believe that using kratom or being dependent on it carries little risks, as compared to heroin, *yaba*, cannabis, or alcohol (Tanguay, 2011). This belief is reinforced by the fact that it appears not to cause significant physical impairments or adversely affect social functioning. Cases of toxicity associated with ketum use have also been few in the Southeast Asian context.

The recent criminalisation of ketum use has undermined what has been held as a relatively harmless practice in these societies without proper investigation. The fact that the findings about the medicinal value of ketum and its relative harmlessness, despite prolonged use, emerge from studies based on surveys and self-reports cannot in itself be a basis for legal sanctions against its use. Instead, these claims should be investigated with scientific rigour, lest we risk losing the proverbial baby with the bath water. Furthermore, recent reports of ketum being used as a cheap alternative to reduce dependence on illicit substances, as well as to suppress opiate withdrawal symptoms, suggest a further potential use that supports the case for a thorough investigation into the claimed benefits of this widely available plant. More scientific investigations to delineate the therapeutic and other potentials of kratom are sorely needed. Without proper scientific data, an attempt to determine its legal status is akin to shooting in the dark.

For the moment, cocktail concoctions of ketum mushrooming in urban areas among the young looking for greater euphoric effects for entertainment should be the target of legal attention or sanctions. These cocktails can become fatal and as damaging as other illicit substances that have been banned.

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CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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