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Abstract — Kratom (Mitragyna speciosa) is an indigenous plant known for its traditional medicinal use, and for its addiction potential, in Southeast Asia. In recent years, kratom and its major alkaloid, mitragynine, spread worldwide with largely unknown effects on behavior and mental health. Recent studies show that kratom use can lead to dependence and that mitragynine works as an addictive drug in animal studies. Nevertheless, kratom preparations were also suggested as a less harmful substitute in opiate withdrawal. Potential side-effects of prolonged kratom use, however, are currently unclear. The aim of this study was to investigate the social functioning of regular kratom users in Malaysia. A cross-sectional survey was carried out in three northern states of Peninsular Malaysia investigating 293 regular kratom consumers using the Addiction Severity Index in a snowball sampling technique. Findings showed that regular kratom users do not experience major impairments in their social functioning, despite being dependent on kratom for prolonged periods. Our findings suggest that chronic kratom administration does not significantly impair social functioning of users in a natural context in Malaysia.

Keywords — dependence, kratom, mental health, social functioning

INTRODUCTION

The recreational use of novel psychotropic “herbal highs” as legal alternatives to conventional controlled drugs may impose an adverse risk in humans (Bilinski et al. 2012; Johnson et al. 2013). Kratom (Mitragyna speciosa) is an indigenous medicinal plant of Southeast Asia (Adkins et al. 2011; Ward et al. 2011; Prozialeck et al. 2012; Hassan et al. 2013). Herbal preparations of kratom are increasingly found and used in Europe and the US, either as a pure preparation (Cornara et al. 2013; Forrester 2013) or as one ingredient of “legal high” or “herbal high” preparations, which are distributed under various names such as Krypton, K2, or Spice (Dresen et al. 2010; Arndt et al. 2011). While the main psychoactive components of these preparations are believed to be synthetic cannabinoids and herbs only being used as carriers (Cornara et al. 2013), a recent report identified a series of K2 products that did not contain any known cannabinoid, but did contain kratom’s main alkaloid, mitragynine, as a psychoactive compound (Logan et al. 2012).
Historically, peasant workers in Malaysia and Thailand have chewed, smoked, and brewed kratom leaves as an herbal remedy to cure benign illnesses. Manual laborers commonly use kratom as a narcotic panacea to combat fatigue, as it helps to improve laborious work productivity under the sweltering sun. Kratom is banned in Malaysia, but it is still traditionally used for its therapeutic value and socioeconomic reasons. Lately, morphine users in Malaysia have started using kratom to reduce their dependence on morphine (Singh et al. 2014; Vicknasingam et al. 2010). Several reports suggest now that kratom might have a treatment potential for opiate addiction since it appears to improve the functioning of opiate users (Thuan 1957; Jansen and Prast 1988a; Suwanlert 1975; Vicknasingam et al. 2010; Ahmad and Aziz 2012). The use of kratom and mitragynine as a substituting drug for heroin was also reported in single cases from the US (Boyer et al. 2007; 2008; Neerman et al. 2013). Findings based on animal studies support the view that kratom might indeed alleviate opiate-like withdrawal symptoms (Khor et al. 2011; Idayu et al. 2011). Kratom and its main psychotropic constituent, mitragynine, are now seen as a global health issue due to their adverse effects in humans (Hassan et al. 2013).

Findings from previous studies elucidated the effects of chronic kratom use in humans (Singh et al. 2014; Helander et al. 2013; Neerman et al. 2013; Rosenbaum et al. 2012; Holler et al. 2011; Havemann-Reinecke 2011; Kroonstad et al. 2012; Kapp et al. 2011; Nelsen et al. 2010; Sheleg and Collins 2011; McWhirter & Morris 2010; Assanangkornchai et al. 2007; Trakulsrichai et al. 2013). The majority of long-term kratom users reported developing dependence, and were unable to cease from its use, mainly due to its unpleasant withdrawal symptoms (Singh et al. 2014; Vicknasingam et al. 2010; Saingam et al. 2013). However, these impairments are less pronounced than in opiate addicts, allowing local users to substitute their heroin consumption with the cheaper and seemingly less dangerous kratom (Vicknasingam et al. 2010; Singh et al. 2014).

While anecdotal reports suggest less severe side-effects and a better social functioning, to date no objective measures have been used to assess the social functioning of regular kratom users. The aim of this study was to systematically determine whether prolonged and regular kratom use impairs the social functioning of regular kratom users.

**MATERIALS AND METHODS**

**Study Design and Participants**

A cross-sectional survey was carried out between January and December 2012 in three northern states of Peninsular Malaysia (Penang, Perlis, and Kedah). These states were selected based on the increasing media reports on kratom abuse and the widespread use of kratom in rural communities engaged in agriculture work. A total of 293 regular kratom users from 15 different communities were recruited using a snowball sampling technique. First, researchers sought the assistance of village heads, who then introduced key informants who were able to persuade kratom users in their community to participate in the survey. Second, key informants were briefed on the objectives of study, and asked to refer potential kratom users to the study. All interviews were conducted in the community by a senior research officer. Since the population in these areas mainly speaks the national language, all interviews were conducted in Malay. Written consent was obtained, and respondents were assured that no personally identifiable information would be elicited. Each interview lasted for about 20 minutes. As compensation, respondents received RM 20 (approximately US$ 6) for their time spent on the interview. Only respondents older than 18 years of age and with a self-reported kratom use of at least six months were considered for inclusion. We excluded respondents who were currently enrolled in formal drug treatment programmes (e.g., methadone maintenance therapy) and tested positive for illicit drugs (methamphetamine, amphetamine, benzodiazepine, morphine, and cannabis) in a urine toxicology test. The study was reviewed and approved by the Human Ethics Committee of Universiti Sains Malaysia.

**Instrument and Data Analysis**

The fifth edition of the *Addiction Severity Index* (ASI) by McLellan et al. (1980) was used to assess the social functioning of kratom users. The ASI has been extensively used with out-of-treatment drug-using populations and in clinical settings. The ASI assessed the social functioning of kratom users in the last 30 days based on multiple domains such as medical, employment, criminal, drug use, family and social relationship, and psychiatric issues. SPSS software was used to analyze the study data, and descriptive statistics were used to describe respondent’s socio-demographic characteristics.

**RESULTS**

**Sociodemographic Characteristics**

The demographic characteristics of the sample are presented in Table 1. Respondents were all male and current kratom users, predominantly of Malay origin. As a consequence of social reticence, female kratom users usually felt reluctant to participate in the survey. The majority of the respondents were between 18 and 30 years old (65%), with an average mean age of 28 years. About three-fifths were single and 40% were married. About two-thirds (66%) had completed upper-secondary education (11 years of education). Four-fifths (85%) of the respondents were employed. Most (87%) worked as manual laborers. More than half (52%) had more than a three-year history of kratom use, while the average duration of kratom use in this study was...
four years. One-third reported using kratom mainly due to peer influence/curiosity (37%), to enhance physical tolerance to hard work (35%), and as a substitute for illicit drugs (15%), such as heroin and cannabis.

Medical Status
Sixty-one percent of respondents had no history of hospital admission. About 39% had a previous history of hospital treatment for health problems other than kratom use. About 4% had chronic medical problems, such as diabetes and hypertension, and were currently on treatment. More than four-fifths (90%) reported to have experienced no medical problems in the last 30 days. None of the respondents in this study had endured any medical problems directly related to kratom use, and none felt in need of treatment for their kratom use or dependence problems. Respondents believed that kratom can curatively allay their medical symptoms.

Employment Status
Eighty-seven percent were manual laborers, including farmers, fisherman, rubber tappers, drivers, and contractors, while 13% were administrators and factory operators. Fifty-eight percent claimed that they were not dependent on anyone else for financial support, which is a low number for this area of Malaysia. About 42% admitted that they sometimes relied on their family members for support in terms of, e.g., money or shelter. We also assessed respondent’s employment patterns, and found that half (51%) have been in full-time positions in the last three years, while 38% held part-time employment and 11% were unemployed. More than half (58%) received monthly income, while 29% received daily wages. Half (53%) had dependents who were relying on them for food and other basic necessities. Four-fifths of respondents (80%) had not experienced employment problems in the last 30 days. Only 19% were being bothered by their employment problems during this time, frequently originating from local circumstances related to their work, like the monsoon season that causes heavy rainfall. Usually, kratom was used after an exhausting work day; otherwise, during the evening among colleagues.

Drug Use Status
Almost all respondents (83%) were aware that kratom might be addictive and can cause dependence. All respondents preferred to purchase processed kratom juice from illegal kratom traders in the community. Usually, kratom packs contain about 350 ml fluid and are sold at a price of RM 5.00. Respondents claimed that it is safer to buy kratom than to cultivate it on their land, as the latter will cause problems with enforcement agencies. None of the respondents had used any illicit drugs in the last 30 days, except for kratom. This was confirmed by the urine toxicology test prior to the interview. Almost 99% claimed kratom was among one of the major substances that they were dependent on. Most (82%) had previously tried to abstain from kratom use. Based on respondents’ kratom cessation history, more than 27% had ended their kratom abstinence within one to three days, 20% within one week, 8% within two weeks, 8% in less than one month, 10% in more than three months, and 8% more than one year ago. About 61% of respondents spent between RM 100-450 a month on kratom, 18% spent RM 50-100, while 21% spent RM 500, respectively (the average monthly income in Malaysia is RM 5000 according to The Star, 31 March 2013). Most acknowledged their wasteful kratom habit, but they also believed that kratom can make them work harder and earn extra income that might compensate for the costs.
Legal Status

None of the respondents in this study was a repeat offender or had been propelled into criminal activities. About 1% was undergoing mandatory police supervision for a previous drug-related offense. Most had never been incarcerated or charged for violent crimes or other offenses. However, about 10% were prosecuted in the past for drug use offenses. Sixteen percent were summoned in the past for driving violations (e.g., speeding, beating traffic lights, driving without a valid license). About 2% had a previous history of imprisonment. Because kratom was an offense, respondents in this study always tried to conceal their kratom use from others.

Family/Social Status

More than 54% were living with their parents in the last three years, 41% lived with family, and 5% stayed with friends. When asked whether they were satisfied with their present living arrangements, 87% (254/293) reported that they were satisfied. Forty-one percent chose to spend most of their spare time with their family, while 59% did so with friends. Most respondents reported having significant interaction in the last 30 days with their family and friends. Few reported that they had an insufficient interaction in the last 30 days with their mother (3%), father (3%), siblings (3%), spouse (2%), or children (2%). Few reported that they were bothered in the last 30 days by their family (1%) or by social problems (3%).

Psychiatric Status

Almost all respondents had never sought treatment before for any kind of psychological or emotional problem. However, 13% reported depressive symptoms in the past 30 days. Other symptoms reported were anxiety (14%); hallucinations (< 1%); trouble understanding, concentrating, or remembering (17%); trouble controlling violent behavior (6%); and serious thoughts of suicide (< 1%). It was not clear whether the self-reported psychological symptoms were a result of the kratom use, or whether they preceded kratom use.

DISCUSSION

Social Functioning in Malaysian Kratom Users

The kratom plant is known for its efficacy in folk medicine in Southeast Asia (Hassan et al. 2013). Kratom is commonly ingested in the form of an “herbal tea” to improve rigorous work performance under the sweltering sun, to combat fatigue, as well as for its opioid agonist-like effects (Watanabe et al. 1997) in weaning morphine users off their dependence. Given that psychoactive drug consumption often involves a trade-off between acute desirable effects and long term adverse effects (Müller and Schumann 2011a; 2011b; Singh et al. 2014), we asked whether chronic kratom consumption might change social functioning in the natural environment of users in Malaysia. This study provides new insights into the social functioning of regular kratom users in Malaysia. Findings from this study showed that respondents experienced few impairments in their social functioning, despite being dependent on kratom for prolonged periods (Singh et al. 2014). Our findings are in agreement with an earlier study which indicated that chronic kratom administration does not worsen the physical and mental well-being of kratom users (Thuan 1957). The lack of information on addiction potential and toxic effects at very high doses may have contributed to the spreading of kratom into Europe and the United States, where it is now sold as an herbal ingredient of so-called “legal highs” (Dresen et al. 2010; Arndt et al. 2011), and used for the self-management of chronic pain and withdrawal from opioid analgesics (Boyer et al. 2007; 2008). At present, kratom and its main psychoactive constituent, mitragynine, remain of global concern among health authorities, primarily because of the increasingly reported deleterious effects in humans (Neerman et al. 2013; Kapp et al. 2011; Nelsen et al. 2010; Kroonstad et al. 2011; McWhirter and Morries 2010; Holler et al. 2011; Trakulsrichai et al. 2013; Forrester 2013; Havemann-Reinecke 2013) and emerging findings from systematic studies in animals (Stolt et al. 2014; Yusoff et al. 2014).

The rural Malay community in the northern states of Malaysia commonly used kratom to treat benign health problems such as diabetes and hypertension (Hassan et al. 2013). Kratom misuse is a regional issue that is socio-economically influenced by rural Malay traditions, creating the perception that kratom is safe to be consumed for numerous purposes (Singh et al. 2014). Kratom was claimed to have opium-like as well as cocaine-like effects, and was used to abate opiate withdrawal symptoms during an opium shortage in Malaysia (Jansen and Prast 1988a). Indeed, frequent and prolonged kratom use could eventually lead to dependence, withdrawal, and craving in humans (Singh et al. 2014). Kratom induces dose-dependent effects: stimulant effect at lower doses and depressant effects at higher doses (Babu et al. 2008; Suwanlert 1975; Yusoff et al. 2014). Manual laborers in Malaysia usually used kratom for its stimulant effects, as it helps to intensify physical endurance against laborious work. Most of the respondents in this study were manual laborers (e.g., farmers, fisherman, and rubber tappers). Kratom is reported to “calm the mind” when used for prolonged periods (Suwanlert 1975). Though a kratom-using habit was viewed as better than illicit drugs (Assanangkornchai et al. 2007), its use is currently banned in Malaysia and Thailand. The majority of the respondents in this study believed that, although kratom is addictive, it does not create any social and health risks like opioid drugs or cannabis. Most of the respondents claimed they were dependent on kratom, but they knew how to control its use. In Malaysia, kratom is used as a substitute...
to reduce addiction to other drugs, as well as to ameliorate opiate withdrawal symptoms (Vicknasingam et al. 2010). In the US and Europe, kratom preparations are used recreationally; for example, to self-treat alcohol and opiate withdrawal symptoms (Boyer et al. 2007; 2008). Most long-term kratom users claimed that they were unable to cease from kratom use because of its unpleasant withdrawal symptoms which interfered with their daily functioning (Suwanlert 1975; Vicknasingam et al. 2010; Singh et al. 2014). To date, there are no reported mortality cases related to kratom use in Malaysia. It seems users are able to tolerate the effects of chronic kratom use on a daily basis (Jansen and Prast 1988b). Regular kratom users are more likely to increase their kratom intake over time. Similarly, they are also bound to experience energy decline as a result of prolonged kratom use. In order to rejuvenate energy depletion, kratom users will usually consume more kratom to enable them to function as normal (Suwanlert 1975).

Kratom users in this sample did not engage in risky drug injection behaviors as heroin users do, and so were less vulnerable to infectious diseases like HIV and Hepatitis C. Kratom is orally ingested as a solution; in fact, all of the respondents in this study drank pure kratom juice mainly in the morning, afternoon, and evenings. Ninety percent of the respondents reported no adverse health problems in the last 30 days, despite being dependent on kratom for prolonged periods. Findings from existing studies showed that sleeping problems or insomnia are common withdrawal symptoms often reported by long-term kratom users. In order to overcome sleep problems which are often accompanied by pain, kratom users will usually use kratom before they sleep. In addition, long-term kratom users often experienced multiple withdrawal symptoms during kratom cessation. Findings from a recent study showed that 64% of regular kratom users usually endure kratom withdrawal symptoms for one to three days after ceasing kratom use (Singh et al. 2014). About 73% of regular kratom users also reported experiencing at least five different psychological withdrawal symptoms (e.g., nervousness, tension, depressed mood, anger) during the first day of kratom cessation; however, none had any suicidal ideation (Singh et al. 2014). Indeed, few respondents in this study reported psychological problems such as depression and anxiety. However, at this juncture we are not sure whether the reported disorders are contributed by kratom, or are a consequence of other underlying factors.

Kratom is not as expensive as amphetamine-type stimulants or heroin. Kratom users do not need to engage in criminal activities to support their dependence. Kratom can be easily cultivated, or purchased from illegal kratom traders in the community. A kratom habit is non-destructive, and allows kratom users to amicably socialize and chat with their colleagues. All of the respondents in this study have good family and social relationships. However, there is an ambivalent reaction from the family of kratom users, and the majority opposed kratom use fearing that it would insidiously lead to severe addiction problems.

**Study Limitations**

The study population and kratom use, though reflecting a large population in Malaysia and Thailand, may not be representative of Western kratom users. The typical Malaysian kratom user lives in rural areas where social functioning is determined by village communities and local employment. Therefore, the consumption is embedded in everyday work and social activities, where desired effects of the drug can be used to enhance both physical work performance and socializing, and to relax after hard work (Müller and Schumann 2011a; Singh et al. 2014). Families and peers are usually well aware of the kratom consumption and exert a certain level of control, but also of encouragement. This is based on a long cultural history of the kratom use in Southeast Asia with naturally developed mechanisms of control. This is different in Western cultures where the goals of use are different (e.g., to self-medicate for alcohol abuse), where kratom/mitragynine preparations became available in higher concentrations, and where social control is not developed. It should be noted that the present findings, which suggest few social impairments after regular kratom use, do not rule out that an escalating use of kratom or mitragynine, as reported from the US and Europe (Boyer et al. 2007; Havemann-Reinecke 2013), may still result in major deficits in social functioning and work performance.

Another issue is that social functioning was only measured by subjective report. As such, our results show only that the consumers do not feel impaired in this respect. This may explain the very low rate of subjective suffering and treatment seeking in relation with the self-reported kratom dependence (Singh et al. 2014). At present, there is no objective measure of family or social interaction partners of the kratom’ users social behavior or work performance.

**CONCLUSION**

Kratom is currently used for its psychotropic properties in a systematic way in Southeast Asia. Here, we report that the regular use of kratom preparations in Malaysia, which may well lead to dependence, does not interfere with social functioning at the subjective level of the consumers. This may further encourage cautious testing of kratom preparations as a potential substitute for heroin in opiate addicts.

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