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Patterns of Kratom Use among Male Drug Users in the Deep South of Thailand

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Abstract

Kratom *(Mitragyna speciosa)* is a psychoactive plant which is native to Southeast Asia and is currently used recreationally. Psychoactive substances in kratom can interact with other substances and result in fatal physiological effects. However, no study has assessed substance use among men who used kratom in the deep south of Thailand. The objective of this study was to describe the patterns of kratom use among drug users in the deep south of Thailand and their associated factors. We established data collection sites in three provinces in the deep south region of Thailand and recruited 414 male drug users to participate in a survey interview by respondent-driven sampling. We assessed participant characteristics, self-reported history and patterns of drug use, and history of treatment for drug addiction using descriptive statistics and multivariate logistic regression analyses. Overall, 353 (85.3%) reported using kratom in the past 6 months. Among men who used kratom, 218 (61.8%) reported polydrug use, most commonly with methamphetamine. Kratom polydrug use was less common among those from Yala Province and among those who used drugs with peers. Kratom polydrug use was more common among those who had received drug treatment within the past 6 months, those who had received treatment ≥2 times, and those who had received treatment from facilities that were potentially connected to the Thai military. Treatment providers from the non-health sectors should make sure to comprehensively assess and ensure availability of treatments for multiple drug use.

Keywords: Kratom, Polydrug use, Southern Thailand

Introduction

Kratom *(Mitragyna speciosa Korth)* is a plant native to Southeast Asia whose leaves are used in traditional medicine[1]. However, kratom is also addictive with a variety of serious withdrawal effects[2]. Although kratom use has been criminalized in Thailand since 1943 and is a Class-V addictive substance[3], the lifetime prevalence of kratom use in the entire Thai adult population is estimated to be between 2.5% to 3.0%[4,5].

Among those living in Thailand's deep south, a region affected by decades-long armed conflict with severe effects on the mental health of the local population[6], kratom is the most commonly-used drug. In this region, kratom is used recreationally as a homemade iced cocktail called "4x100" that consists of three basic ingredients: Coca-Cola, tea made from boiled kratom leaves, and either codeine or diphenhydramine-containing cough syrup[7–9]. Psychoactive substances in kratom can interact with other chemicals in the cocktail or with other drugs, the physiological effects of which can be fatal[10–12].

Polydrug use refers to the use of two or more drugs, and is classified by the WHO into two types: concurrent use (i.e., the use of more than one drug at the same time), and sequential use (i.e., the use of one drug taken after the other)[13]. People who use kratom commonly report lifetime history of use of another illegal substance[4]. However, despite the potential harms from drug interactions, no study has assessed substance use among men who used kratom in the deep south of Thailand, or factors associated with polydrug use in this population. Such information can contribute to evidence-based program planning and policy in areas of behavioral health and harm reduction. The objective of this study was to describe the patterns of kratom use and their associated factors among drug users in the deep south of Thailand.

Materials and Methods

Study Design, Participants and Setting

We conducted a cross-sectional study among drug users in the southern border provinces of Thailand. Study participants included men, aged 18-40 years, who used any of the following substances within six months prior to their recruitment: 1) kratom (plants, leaves or cocktail); 2) heroin; 3) amphetamine-based stimulants (methamphetamine, ice, ecstasy); or 4) cannabis. Women were excluded because of cultural reasons that could have affected their safety[14,15].

Sample Size Calculation

The survey was conducted with the aim of assessing drug use patterns among drug users in the study area. Based on a prevalence of current drug use with kratom in the past 12 months of 11.3% in a previous study[5], we estimated that 11.3% of participants in our study also used more than one substance (p=0.113). We calculated the sample size for estimation of proportion based on the finite source population of 240,000 males aged over 18 years in the study area, at 95% level of confidence and margin of error (delta) of 3.5% from the estimates. Our initial calculated sample size was 314 drug users. We then made an adjustment based on an assumed non-response rate of 25% and obtained the final sample size of 393 male drug users.

Study Assessment Tool and Study Variables

The study assessment tool consisted of an interview questionnaire with five parts: 1) general characteristics of the interview participant; 2) history of drug use; 3) Alcohol, Smoking and Substance Involvement Screening Test (ASSIST); 4) history of drug treatment; and 5) access to drug treatment.

Our study outcome (dependent variable) was pattern of drug use. The outcome was defined based on information obtained about history of drug use (part 2 of the interview questionnaire). Enumerators asked the participants "Have you used the following substance within the past six months?" with binary "Yes"/"No" answer choices. Those who answered "Yes" were then asked about the age of initiation, frequency of use within the past six months, and method of use. In this study, we focused on kratom plus three other most commonly used illegal substances in the Thai population: methamphetamine, cannabis, and heroin[5]. We categorized participants who reported only kratom use in the past six-months as kratom-only drug users, and participants who reported using at least one of the three substances in the past six months with kratom as kratom polydrug users.

Our exposures (independent variables) of interest were factors associated with kratom use, which included: general characteristics from part 1 (age, province of residence, education, income, occupation, marital status); history of drug use from part 2 (using drugs with peers, using drugs outdoors, reason for first drug use), and history of drug treatment from part 4 (treatment within last six months, type of treatment provider, frequency of treatment). Type of treatment provider included never

treated, health sector providers (methadone clinic, psychiatric hospital, provincial hospital, or district hospital), and non-health sector providers (prison, religious school, camp operated by the police or military, or the Department of Probation).

Recruitment of Study Participants

We recruited our study participants through multistage respondent-driven sampling. After receiving ethical approval, we established temporary data collection sites at rental houses in the three provinces of the deep south region, with one site per province. We then contacted the research unit of a government hospital responsible for drug treatment in the region, notified them of our study, and requested their assistance. We asked the staff of the research unit to identify three former patients residing in the three provinces who had returned to their community, with one patient per province. These former patients were our initial "seed" participants. Staff from a local non-governmental organization that worked closely with the hospital and the patients helped us to contact the seed participants based on contact information provided by the hospital and asked the seed participants to visit the study site in their province. When the seed participants visited the study site, the study site staff informed the participants about the study and asked for their written informed consent to participate in the study interview. After the interview, each participant received 200 THB ($6.50 USD) in remuneration and were given three coupons with unique identification numbers. We told the participants to refer their drug-using peers in the community to participate, and that the participant would receive 50 THB ($1.60 USD) for each person who visited the study site with coupons bearing their unique IDs, and the process would repeat with the new visitors.

Data Collection

We assigned three trained research assistants with more than 10 years of field experience to each of the three data collection sites. When a potential participant came to the data collection site with a coupon, one research assistant would ask screening questions using the pre-enumeration screening form regarding history of drug use (type of drug used in the past six months, street name, methods of use, effect of drug, withdrawal effect, and street price). The research assistant would then indicate on the pre-enumeration screening form whether they believed that the potential participant was a genuine drug user, based on the potential participant's responses combined with observation of his physical characteristics. Potential participants who were determined by the screening research assistant to be genuine drug users were then informed about the study and asked for their written informed consent. The research assistant who was responsible for screening then referred the participant to one of two research assistants who conducted the survey interview using an interview questionnaire, i.e., the study tool. During the survey interview, participants were free to refuse to answer any question or withdraw from the study at any time.

Statistical Analysis

We described the pattern of use of the four categories of substances (heroin, methamphetamine, cannabis, kratom) using frequency and percentages. The association between our exposures (independent variables) and our outcome (dependent variable, i.e., polydrug use of kratom vs. kratom-only use) were assessed using descriptive statistics and logistic regression analyses. We included all variables whose crude odds ratios and 95% confidence interval were statistically significant in the multivariate logistic regression analyses in order to calculate adjusted odds ratios and 95% confidence intervals. Data were analyzed using R statistical software with epicalc package[16].

Ethical Approval

Ethical approval for this project was granted by the Human Research Ethics Committee, Faculty of Medicine, Prince of Songkla University, Thailand.

Results

A total of 414 drug users were recruited after 11 waves of referrals, among whom 353 people (85.3%) had used kratom within the past six months. Among the kratom users, 218 (61.8%) also had used other substances within the past six months, most commonly methamphetamine (190 people, or 53.8% of all kratom users) (Table 1).

Table 1 Prevalence (95% CI) of substance use in the past six months among 414 study participants

Substance Use Combination	n	%	95% CI
1 substance			
Heroin only	5	1.2	0.4, 2.9
Methamphetamine only	16	3.9	2.3, 6.3
Cannabis only	7	1.7	0.7, 3.6
Kratom only	135	32.6	28.2, 37.4
2 substances			
Heroin & Methamphetamine	19	4.6	2.9, 7.2
Heroin & Cannabis	0	0.0	-
Heroin & Kratom	2	0.5	0.1, 1.9
Methamphetamine & Cannabis	8	1.9	0.9, 3.9
Methamphetamine & Kratom	106	25.6	21.5, 30.1
Cannabis & Kratom	25	6.0	4.0, 8.9
3 substances			
Heroin & Methamphetamine & Cannabis	6	1.4	0.6, 3.2
Heroin & Cannabis & Kratom	1	0.2	0.0, 1.5
Heroin & Methamphetamine & Kratom	10	2.4	1.2, 4.5
Methamphetamine & Cannabis & Kratom	64	15.5	12.1, 19.4
4 substances			
Heroin & Methamphetamine & Cannabis & Kratom	10	2.4	1.2, 4.5

With regard to the association between pattern of drug use and demographics, participants from Yala Province were significantly less likely than participants from other provinces to be polydrug users (Adjusted OR = 0.52, 95% CI = 0.30, 0.90) (Table 2). With regard to history of drug use, participants who used drugs with peers were significantly less likely than participants who used drugs alone to be polydrug users (Adjusted OR = 0.39, 95% CI = 0.17, 0.86). With regard to history of treatment, participants who were more likely to be polydrug users included those who had received treatment within six months prior to the survey (vs. those who had never received treatment) (Adjusted OR = 2.73, 95% CI = 1.24, 6.00), those who had received treatment from facilities run by non-health sectors (vs. those who had never received treatment) (Adjusted OR = 2.25, 95% CI = 1.14, 4.43), and participants who had received treatment ≥2 times (Adjusted OR = 3.64, 95% CI = 1.55, 8.56). These associations remained statistically significant after adjusting for one another.

Table 2 Factors associated with polydrug use involving kratom (vs. kratom-only use) among study participants (n=353 kratom users)

Variables	Total sample (n=353)	Kratom-only (n=135)		Kratom polydrug (n=218)		Crude OR (95% CI)	Adjusted OR (95% CI)[a]
		n	%	n	%		
Demographics							
Age (years)							
≤25	194	80	41.2	114	58.8	Ref	-
>25	159	55	34.6	104	65.4	1.13 (0.65, 1.99)	-
Province							
Pattani	123	40	32.5	83	67.5	Ref	Ref
Yala	126	62	49.2	64	50.8	0.50* (0.27, 0.90)	0.52*(0.30, 0.90)
Narathiwat	104	33	31.7	71	68.3	0.92 (0.47, 1.79)	1.29 (0.72, 2.32)
Education level							
Below high school	254	89	35.0	165	65.0	Ref	-
High school and above	99	46	46.5	53	53.5	0.80 (0.46, 1.39)	-
Income (Baht)							
≤3000	150	57	38.0	93	62.0	Ref	-
>3000	203	78	38.4	125	61.6	0.73 (0.39, 1.35)	-
Occupation							
Laborer	201	72	35.8	129	64.2	Ref	-
Other	152	63	41.4	89	58.6	0.74 (0.41, 1.32)	-
Marital status							
Ever married	98	31	31.6	67	68.4	Ref	-
Never married	255	104	40.8	151	59.2	0.69 (0.37, 1.26)	-
History of drug use							
Use with peer or alone							
Alone	48	9	18.8	39	81.3	Ref	Ref
With peer	305	126	41.3	179	58.7	0.41* (0.18, 0.93)	0.39*(0.17, 0.86)
Place of use							
Indoor	156	54	34.6	102	65.4	Ref	-
Outdoor	197	81	41.1	116	58.9	0.84 (0.52, 1.37)	-
Reason for first use							
Socialization							
No	128	54	42.2	74	57.8	Ref	-
Yes	225	81	36.0	144	64.0	1.16 (0.69, 1.95)	-
Recreation							
No	249	105	42.2	144	57.8	Ref	-
Yes	104	30	28.8	74	71.2	1.64 (0.93, 2.91)	-
Curiosity							
No	70	33	47.1	37	52.9	Ref	-
Yes	283	102	36.0	181	64.0	1.70 (0.94, 3.07)	-

Table 2 Factors associated with polydrug use involving kratom (vs. kratom-only use) among study participants (n=353 kratom users) (cont.)

Variables	Total sample (n=353)	Kratom-only (n=135)		Kratom polydrug (n=218)		Crude OR (95% CI)	Adjusted OR (95% CI)[a]
		n	%	n	%		
Increased work endurance							
No	324	121	37.3	203	62.7	Ref	-
Yes	29	14	48.3	15	51.7	0.70 (0.28, 1.68)	-
Treatment history							
Never	253	114	45.1	139	54.9	Ref	Ref
>6 months ago	59	17	28.8	42	71.2	1.13 (0.57, 2.21)	1.03 (0.54, 2.01)
Within last 6 months	41	4	9.8	37	90.2	2.31* (1.03, 5.15)	2.73*(1.24, 6.00)
Type of treatment provider							
Never treated	253	114	45.1	139	54.9	Ref	Ref
Health sector	41	7	17.1	34	82.9	1.21 (0.61, 2.43)	1.26 (0.64, 2.46)
Non-health sector	59	14	23.7	45	76.3	2.14* (1.07, 4.29)	2.25*(1.14, 4.43)
Frequency of treatment							
Never	253	114	45.1	139	54.9	Ref	Ref
1 time	61	18	29.5	43	70.5	0.75 (0.39, 1.43)	0.78 (0.41, 1.48)
≥2 times	39	3	7.7	36	92.3	3.48* (1.48, 8.20)	3.64*(1.55, 8.56)

* Statistically significant at 95% level of confidence (p<0.05)

[a] Adjusted for all variables with statistically significant Crude OR

Discussion

In this study, we described the patterns of kratom use and factors associated with use of kratom with other drugs (vs. using kratom only) among men in the deep south of Thailand. We found that three-fifths of kratom users reported using other drugs. There were negative associations between use of kratom with other drugs and province of origin and history of using drugs alone, and positive associations with history of recent treatment, history of treatment from non-health sectors, and history of receiving treatment two times or more.

The majority of kratom users in our study who also used other substances reported that they used methamphetamine. This finding might have been influenced by the depressant effect of kratom, which can reduce the negative effect of stimulants (e.g., anxiety, hypertension, palpitations)[17]. Future studies should also consider assessing the association between polydrug use and risky behaviors such as dropping out of school, self-harm, unprotected sex and perpetration of violence, in order to understand drug users in a broader context[18,19].

Kratom users who used other drugs were less likely than kratom-only users to use drugs with peers, and more likely to have received treatment in the last six months, received treatment in facilities run by non-health sector organizations, and received treatment more than once. The higher likelihood of use with peers among kratom-only users could have been influenced by the relatively lower level of social stigma against kratom compared to "hard drugs", and kratom is conventionally used as a means for social bonding[9]. With regard to history of treatment, non-health sector facilities were predominantly operated by the Thai military and received compulsory hard-drug treatment cases from the Department of Probation, Ministry of Justice[20,21]. The difference in receiving treatment from non-health sector facilities could have been attributed to deviant behaviors, in which polydrug users might have been more likely to engage[18,19], as well as the higher legal penalties for use of hard drugs compared to kratom.

A number of considerations and caveats are advised in the interpretation of our findings. The first

consideration is with regard to outcome measurement. Though our drug use assessment methods were similar to those used in a national survey[5], we did not collect information on whether the drugs were actually used separately, sequentially, or concurrently. Our definition of "polydrug use" was based on the assumption that among those who reported using two or more drugs in the past six months, there would be some individuals with sequential or concurrent polydrug use. Information on the pre-enumeration screening form could have provided additional details, but were unfortunately excluded from our study as they were part of the eligibility determination process. Furthermore, there was no separation between the use of kratom as part of the 4x100 cocktail and traditional use of kratom, thus we did not have the information on the extent that the observations were confounded or modified by substances in the 4x100 cocktail. Future studies should include questions on pattern of drug use that assess polydrug use with greater construct validity.

The second point of consideration is with regard to potential selection bias. Responses among peers in the multistage respondent-driven sampling process may vary, and these variations could have introduced selection bias to the study. More importantly, the eligibility of a potential participant to take part in the study was based on the screening enumerator's own assessment of whether the potential participant was actually a drug user. This process introduced subjectivity to the eligibility determination process which could have introduced selection bias to the study.

The third point of consideration is with regard to potential information bias. Although screening and interview were conducted separately by two different research assistants, the screening and interview processes were done consecutively at the same data collection site, thus the research assistant who administered the interview might have overheard the screening conversation and was not completely blind to the participant's history prior to the interview. This scenario could have introduced observer bias into our study, although the structured nature of the questionnaire and lack of probing questions would be expected to mitigate this effect. Social desirability also could have influenced the participants' answers regarding drug use pattern. However, given the context of the peer-based referral process which entailed a level of trust[22,23], social desirability bias was likely lesser of an issue of concern compared to observer bias.

The fourth point of consideration is with regard to sample size. Sample size calculation for this study was based on the estimation of prevalence of drug use. The study might not have adequate power to evaluate the association between the exposures (independent variables) and drug use (dependent variables). In other words, the study might not have had adequate statistical power to rule out chance as the best explanation of the observed findings.

The last point of consideration is with regard to generalizability. In our study, we decided to start with one seed participant per study site/province based on internal discussions regarding logistical feasibility and quality control of the recruitment process. We aimed to achieve long referral processes in order for respondents in the terminal wave to be independent from respondents in the initial wave, increasing the diversity of the respondents. However, our study also did not include non-Muslim or female drug users. Participants recruited through the multistage respondent-driven sampling or snowballing technique often exclude other members of the population of interest[24], thus limiting the generalizability of our findings only to the base population from whom the samples were selected.

Conclusion

We found a relatively high prevalence of the use of kratom with other drugs among men in the deep south of Thailand recruited through multistage respondent-driven sampling, particularly among those who received treatment from non-health sectors. Treatment providers from non-health sectors should make sure to comprehensively assess and ensure availability of treatment of multiple drug use.

Author Contributions

Conceptualization: MT, SA; Methodology: MT, LBC, SA; Validation: MT, WW; Analysis planning, Formal analysis and Interpretation: MT, WW; Investigation: MT, SA; Resources: SA; Data Curation: MT, SA; Writing: WW; Writing - Review & Editing: MT, SA, LBC; Supervision: WW, SA; Project administration: MT; Funding acquisition: SA

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Conflicts of Interest

None

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