

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20242416>

Original Research Article

Important factors associated with using kratom among the U. S. population aged 12 years and above in 2019

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Received: 14 May 2024

Revised: 22 June 2024

Accepted: 03 July 2024

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ABSTRACT

Background: The psychoactive Southeast Asian herb known botanically as *Mitragyna speciosa*, or Kratom, has recently gained appeal as an illicit drug across the world. Demographic factors may explain the increased use of Kratom. Many demographic characteristics and risk factors are associated with kratom use and mental health. This analytical inquiry used the 2019 NSDUH database to identify and investigate the factors linked with Kratom misuse in the United States.

Methods: This cross-sectional study monitored the 2019 National Survey on Drug Use and Health (NSDUH) dataset, involving a multistage representative area probability sampling method. The data was collected from the non-institutionalized U.S. population aged 12 and above, comprising 98% of the study group. The study used a sample size of 56,136, filtered on inclusion/exclusion criteria. The study findings would offer valuable insights for epidemiologists, policymakers, and the wider community to improve behavioural health.

Results: The study found that 66.45% of Kratom users were unmarried, with 33.55% being married, widowed, or divorced. The low p-value of 0.0001 suggested a link between Kratom consumption and marital status. Individuals without mental health education used Kratom at a higher rate (78%), but no significant relationship was found. Males consumed Kratom at a higher rate (58.76%), while females consumed 41.24%.

Conclusions: The study highlighted the impact of demographic factors like age, marital status, gender, income, and mental health education on Kratom consumption, with implications for public health policy.

Keywords: Abuse, Annual survey, Kratom, NSDUH, United States

INTRODUCTION

Southeast Asian-originated "kratom," or *Mitragyna speciosa* (a botanical name), is a tropical tree known for its euphoric, narcotic, and stimulant-like effects, with the primary psychotropic indole alkaloids such as mitragynine and 7-hydroxymitragynine found in kratom leaves.¹ Kratom comes as resins, extracts, tinctures, pills, capsules,

and powders, and it can also be ingested as a tea beverage or by chewing and munching the leaves.^{2,3} Kratom has been used to treat pain, fatigue, mental health difficulties, and substance withdrawal symptoms and cravings, especially those related to opiate use, even though the food and substance administration in the United States has not authorized these applications.^{4,5} Overuse of Kratom at higher dosages over an extended time is linked to

dependence; however, as Kratom is more easily adulterated than opioids, it can lead to increased drug toxicity and organ damage.⁶ The rising misuse of Kratom is a pressing concern in light of the opioid epidemic as it exhibits opioid-like properties, and overdose and mortality are risks. Hence, it is considered a "Drug of concern" by the Drug Enforcement Administration (DEA) and FDA due to its addictive properties. Researchers have found adverse effects from modest to severe dependence on continuous or recurrent use. Although Kratom and its products are legal in many places, U.S. and international regulatory bodies are reviewing new evidence to inform policy.⁶⁻⁸ Therefore, it needs time to persist in researching the potential adverse effects of Kratom and meticulously evaluate its consumption regulations.

Extracting information from various studies, weight loss, dry mouth, chills, nausea, vomiting, changes in urine, constipation, liver damage, sleeplessness, dizziness, hallucinations, delusions, and muscle discomfort have all been linked to Kratom.^{5,7} Kratom is a Schedule I substance in some areas due to its high potential for abuse and lack of medical benefit. The FDA had warned about Kratom's risks and addiction, and its usage can cause organ failure and death. The growing use and misuse of the substance are alarming for public health.⁸⁻¹⁰

Therefore, an oral consumption of Kratom may represent a leading risk in the context of public health before it goes beyond the reach of control.⁴ Substance Abuse and Mental Health Services Administration (SAMHSA) is a U.S. Department of Health and Human Services agency.¹² This agency leads public health programs to enhance behavioural health nationwide. It was founded in 1992 to provide information on mental health, substance abuse, services, and research. SAMHSA offers a National Substance Abuse Helpline, funding opportunities, and research on SUD, mental illness, and trauma-informed care. In addition, the National Survey on Drug Use and Health (NSDUH) assesses national, state, and local substance abuse and mental health.¹³

The 2019 National Survey on Drug Use and Health (NSDUH) provides a comprehensive analysis of demographic factors and risk elements contributing to the increasing prevalence of Kratom misuse among 12-year-olds and older. The study examines factors such as marital status, gender, income, and mental health education, revealing complex relationships with Kratom consumption. The research was aimed to provide detailed insights for epidemiologists, policymakers, and the wider community, improving our understanding of factors influencing Kratom use and enabling better public health policies and interventions. This study served as a foundation for future research and proactive policy development to address potential risks associated with Kratom consumption as its popularity continues to rise and public health implications become more apparent.¹¹

METHODS

This was cross-sectional retrospective study conducted on the database of 2019 National Survey on Drug Use and Health (NSDUH) for the period of 1 year. This study was performed with the permission from the institutional ethics committee, and employed a multistage representative area probability sampling method for the retrieval of the data.

Sample size

After applying the inclusion and exclusion criteria, the total number of observations included in the study was 12,830 individuals.

Inclusion criteria

The key predictor variable that was employed in the research was called ANYMHED2 to detect mental health education. It was recorded as MHEDU and divided into two categories: (1) for people who had received mental health education and (2) for people who had not received such education. KRATUSE (kratom use) is derived from the KRATREC variable and classified as follows: Kratom use during the last 12 months or never used Kratom at all.

Additional factors included in this study were age category (AGECAT), which was divided as (1) for less than 15 years, (2) for 16-25 years, (3) for 26-24 years, and (4) for more than 35 years; and another was marital status (MARIT) and segmented as: (1) for married, (2) for widowed, (3) for divorced, and (4) for never married; and lastly gender (Gender), was derived as (1) for male and (2) for female education (These variables have been recoded from the CATAG7, IRMARIT, IREDUHIGHEST, and IRSEX and IRPINC variables, respectively).

Exclusion criteria

The exclusion criteria included participants with missing or unanswered questions for any of the key variables (ANYMHED2, KRATUSE, AGECAT, MARIT, GENDER, IREDUHIGHEST) or incomplete observation such as incomplete data sets that did not allow for proper classification into the defined categories for mental health education, Kratom use, age, marital status, gender, or education.

Statistical analysis

This data was documented in the Microsoft excel sheet and descriptive statistics, bivariate and multivariate analysis were employed to rule out the findings. The analytical analysis methodology involved several variables to determine the use of Kratom among individuals. The data was imported directly from the NSDUH website in SAS 9.4. The study focused on seven variables, with the primary outcome variable being KRATEVER, which was not recoded and classified as (1) for Yes and (2) for No for the question "Ever used Kratom in life".

RESULTS

The frequency of Kratom users and non-users was 948 (1.71%) and 54605 (98.29%) individually. Data

distribution patterns were distributed across different values or categories in the AGE category; the frequency was the highest in the "35 or older" age group.

Table 1: Describing the variables by Use of Kratom.

Variable	Yes, ever used Kratom N (%)	Never used Kratom N (%)	P value
When I used Kratom last time			<0.0001
Within the last 12 months	195 (20.97)		
More than 12 months	288 (30.97)		
Never used Kratom	447 (48.06)		
Received mental health education			0.2661
No	43 (78.18)	10768(84.01)	
Yes	12 (21.82)	2049 (15.99)	
Age category			<0.0001
12-15 years old	30 (3.16)	8629 (15.80)	
16-25 years old	410 (43.25)	18165 (33.27)	
26-34 years old	259 (27.32)	8295 (15.19)	
35 or older	249 (26.27)	19516 (35.74)	
Gender			<0.0001
Male	557 (58.76)	25897 (47.43)	
Female	391 (41.24)	28708 (52.57)	
Marital status			<.0001
Married	192 (20.78)	16695 (34.60)	
Widowed	12 (1.30)	1305 (2.70)	
Divorced or separated	106 (11.47)	4373 (9.06)	
Never been married	614 (66.45)	25883 (53.64)	
Education			<.0001
10 th grade or less	8312.52)	13925 (35.44)	
11 th or 12 th grade	53 (7.99)	4080 (10.38)	
HSD/GED	252 (38.01)	11206 (28.52)	
College	275 (41.48)	10079 (25.65)	
Income			<.0001
Less than \$19,999	304 (40.32)	24456 (54.89)	
\$20000 - \$40,000	302 (40.05)	12189 (27.36)	
\$40000 - \$75000	148 (19.63)	7909 (17.75)	

Table 2: Unadjusted and adjusted analysis of krotom use and independent variables.

Variable	Unadjusted Odds ratio	95% CI	P value	Adjusted Odds Ratio	95% CI	P value
Received mental health education						
No	1.467	0.772,2.786	0.2421	1.504	0.788 2.874	0.2160
Yes	Ref	Ref	Ref	Ref	Ref	Ref
Age category						
12-15 years old	6.49	4.476,9.410	<0.0001	1.701	0.999 2.898	0.0505
16-25 years old	Ref	Ref	Ref	Ref	Ref	Ref
26-34 years old	0.723	0.617,0.846	<0.0001			
35 or older	1.769	1.509,2.073	<.0001			
Gender						
Male	0.633	0.556,0.721	<0.0001	0.972	0570,1.657	0.9168
Female	Ref	Ref	Ref	Ref	Ref	Ref
Income						
Less than \$19,999	1.505	1.235,1.835	<0.0001	<0.001	<0.001 >999.999	0.9904

Continued.

Variable	Unadjusted Odds ratio	95% CI	P value	Adjusted Odds Ratio	95% CI	P value
\$20000 - \$40,000	0.755	0.619,0.921	0.0056	<0.001	<0.001 >999.999	0.9893
\$40000 - \$75000	Ref	Ref	Ref	Ref	Ref	Ref

Table 3: Data descriptions.

	Frequency	Percentage
Ever used Kratom		
1 - Yes	948	1.71
2 - No	54605	98.29
When I used Kratom last time		
Within the last 12 months	195	20.97
More than 12 months	288	30.97
Never used Kratom	447	48.06
Received mental health education		
No	10931	83.91
Yes	2096	16.09
Age category		
12-15 years old	8878	15.82
16-25 years old	18745	33.39
26-34 years old	8601	15.32
35 or older	19912	35.47
Gender		
Male	26788	47.72
Female	29348	52.28
Marital status		
Married	16983	34.25
Widowed	1333	2.69
Divorced or separated	4515	9.11
Never been married	26750	53.95
Education		
10 th grade or less	14297	35.34
11 th or 12 th grade	4178	10.33
HSD/GED	11577	28.61
College	10406	25.72
Income		
Less than \$19,999	25145	54.85
\$20000 - \$40,000	12601	27.49
\$40000 - \$75000	8094	17.66

Data descriptions

In table 1, the descriptive statistics for various variables categorized by the use of Kratom is elaborated. Here's a breakdown of the variables and their distribution based on whether respondents have ever used Kratom or not. In comparison to the more than or last consumption in a 12-month period, the percentage of those who had never taken kratom was found to be greater at 48.06%. Twelve individuals (21.82%) who have used Kratom in the past reported getting mental health education, whereas twenty-nine people (15.99%) who have never used Kratom reported the same. 557 (58.76%) men and 391 (41.24%) women were among those who had ever taken kratom. The p values indicated the significance level of the association

between the use of Kratom and each variable. In this case, all variables appeared to be significantly associated with the use of Kratom, as the p-values are less than 0.05. The study was carried out to investigate the association between using Kratom and demographic parameters such as age, marital status, gender, income, and access to mental health education. To investigate the connections between these factors, we used three different types of analysis: descriptive, bivariate, and multivariate.

Descriptive analysis

Table 3 depicts the segmentation of the sample population regarding the Kratom variable. The results showed that whereas only 21.8% of those with mental health education

did not use Kratom, over 78% of those with limited access to such information had used Kratom. Therefore, a p-value of 0.2661 (higher than 0.05) indicated that the correlation between mental health and schooling was not statistically significant.

Furthermore, 33.555% of the population is married, widower, or divorced, whereas 66.45% of the population used Kratom and had never been married. Given that the never-married variable's p-value was only 0.0001, we can conclude that Kratom use and marital status are correlated. Moreover, men consumed Kratom at a rate of 58.76% higher than women, who constituted only 41.24% of the population. As a result, the gender p-value (p-value=0.0001) revealed that gender and Kratom use were related.

Bivariate analysis

Primarily, the bivariate analysis demonstrated that the population between the ages of 12 and 15 had a statistically significant 6.49-fold greater risk of using Kratom (OR=6.49; CI =4.476, 9.410; p-value=0.0001). In a population of 35 years or older, the likelihood of using Kratom was 1.769 times higher than in younger populations (OR=1.769; CI=1.509,2.073; p-value=0.0001). Furthermore, the odds of Kratom use were 1.505 times higher in the population with higher income (OR=1.505; CI =1.509-2.073; p-value=0.0001). The income of the population was statistically significant as the p-value is 0.0001. Finally, the odds of Kratom use were 1.467 times higher in the population with no mental health education (OR=1.467; CI =0.772,2.786; p-value=0.2421), and it was not statistically significant with a p-value of 0.2421.

Multivariate analysis

Initially, the multivariate analysis revealed that the population with the age group of 12 to 15 years had 1.70 greater odds of the Kratom use (OR=1.70; CI =0.999 2.898; p-value = 0.0505). However, after adjusting, the association between Kratom use and age group was statistically not significant. Secondly, the odds of the Kratom use were 1.504 higher in the population with no mental health education (OR=1.504; CI=0.788 2.874; p-value=0.2160), after adjusting the p-value of 0.2160, which was insignificant.

According to the results of epidemiological studies, populations without access to mental health education failed to show a statistically significant prevalence of Kratom use. Also, they assumed that the two main variables influencing Kratom use were marital status and age.

DISCUSSION

The consumption of Kratom may be linked to gender and marital status; men and singles seem to use Kratom more than married persons and women.^{12,13} Men are more likely

than women to participate in risky behaviours, and unmarried individuals may have fewer social connections, which increases their vulnerability to substance misuse, as per a study related to substance addiction.¹⁴ Kratom consumption was higher among low-income and mentally limited people. Low-income people may have difficulty getting high-quality medical care and addiction treatment, worsening Kratom's side effects. In addition, Kratom users who have not been educated about mental health may not know the drug's risks or how to obtain help.¹⁵⁻¹⁹ The study found that public health programs should target certain demographic groups to avoid Kratom addiction and promote safe use. For example, educating men and unmarried people about Kratom's hazards and encouraging them to build healthy coping skills may be beneficial.¹⁹⁻²¹ Unfortunately, coping techniques are less prevalent in these groups. In addition, low-income and uninsured people may use Kratom less if they have less access to addiction treatment and mental health education.¹⁴

Further scope in the analysis

Many other variables of demographic factors can be studied similarly and examined if any other factors can also be associated with the increasing misuse of Kratom. Kratom misuse and other substance abuse can be studied to check the association with other substance use. This data and study do not include the population in custody or the prisons. In contrast, that population can be found more vulnerable to Kratom use as they might be in prison because of the substance abuse.^{15,18}

Strengths

The National Survey on Drug Use and Health (NSDUH) is remarkable for its huge sample size and nationally representative structure. Therefore, the results can be extrapolated to all Americans. This study analyzed data from 56,000 12-year-olds. In addition, this study on the NSDUH dataset considered variables such as age, gender, education level, income, substance abuse, and mental health education. This facilitated more precise associations between the usage of Kratom and various metrics.

Limitations

Insufficient data exist on the global and domestic Kratom misuse and addiction rates.²² The low prevalence of self-reported Kratom usage among survey participants is one drawback of this study, which may lead to an underestimate of the actual amount to which Kratom is used among the general population or may have led to either over-reporting.^{15,23} In addition, there is a possibility that the data had no information on the concurrent use of Kratom with other substances, which may impact its health outcomes.²³ Finally, these statistics and studies do not include the population held in imprisonment or prisons, although research suggests that this population may be more susceptible to using Kratom.^{14,15,18}

CONCLUSION

This study suggested that kratom misuse seems to be associated with several demographic and educational factors. This association highlighted the necessity to restrict kratom use. Consumption of Kratom might be decreased by concentrating on the younger generation and those who lack awareness of mental health issues. Furthermore, the use of Kratom is associated with marital status and gender. Therefore, initiatives for prevention and intervention must take these traits into account.

Recommendations

To control the rising Kratom misuse, public health interventions may need to focus on some specific demographics to address Kratom addiction and promote safe use. For instance, educating men and unmarried people about Kratom's hazards and helping them cope may be helpful. In addition, low-income and uninsured people may use Kratom less likely if they have access to addiction treatment and mental health education. Finally, studies show personalized interventions are necessary to prevent kratom addiction and promote healthy use.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Dhankikar S, Arewar A, Quinn M, Besekar S, Patel D. Important factors associated with using kratom among the U. S. population aged 12 years and above in 2019. *Int J Basic Clin Pharmacol* 2024;13:605-11.