

Clinical Outcomes and Healthcare Perspectives on Adolescent Kratom Use in the Czech Republic: A Study Protocol

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ABSTRACT: Kratom (*Mitragyna speciosa*), a plant native to Southeast Asia, has gained global popularity due to both its dose-dependent stimulant and sedative effects. This has raised concerns, particularly around adolescent use, as regular consumption can lead to dependence and withdrawal symptoms. In the Czech Republic, kratom is reportedly used alongside cannabis among adolescents. However, there is limited clinical data on the impact of kratom dependence within this demographic. This study aims to address this gap by exploring adolescent kratom use from the clinical and healthcare policy perspectives. It employs a mixed-methods approach, comprising a systematic review of existing literature, a pilot study involving healthcare professionals, and retrospective clinical case reports of adolescent kratom users from an outpatient addiction clinic. The systematic review will synthesise knowledge on kratom's effects and treatment strategies, while

the pilot study will explore healthcare workers' experiences and challenges in managing adolescent kratom use. The case reports will provide detailed insights into clinical presentations and treatment outcomes. By integrating these perspectives, the study seeks to improve understanding of adolescent kratom use and dependence, and inform the development of targeted, evidence-based treatment strategies, ultimately contributing to enhanced healthcare practices and policy development for addressing kratom use in this vulnerable population.

Keywords | Kratom – Kratom Use – Adolescents – Healthcare – Czech Republic

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1. INTRODUCTION

Mitragyna speciosa, commonly known as kratom, is a plant indigenous to Southeast Asia (Jansen & Prast, 1988). Initially, its use was confined to its native regions. However, it has expanded globally in recent decades. Its widespread use has led to increasing concerns, particularly in Europe and the United States (Schimmel et al., 2021; Sharma et al., 2022).

Due to its unique alkaloid composition, kratom exhibits dose-dependent pharmacological effects: at low doses, it acts as a stimulant, while at higher doses, it functions as a sedative (Singh et al., 2020). These properties have popularised its use for various purposes, including recreational use, pain relief, mood enhancement, energy-boosting and alleviation of opioid withdrawal symptoms (Singh et al., 2016). However, regular kratom use may lead to dependence, with potential withdrawal symptoms ensuing upon cessation (Singh et al., 2014).

Adolescents (10 to 19 years old) are particularly at risk for illicit drug use, with emerging evidence of increasing kratom use among this demographic worldwide (Gulley & Juraska, 2013). Adolescence represents a critical period of neurodevelopment, during which the brain undergoes significant maturation, particularly in regions responsible for impulse control, decision-making, and risk evaluation (Crews et al., 2016). Drug exposure during this developmental phase can lead to severe and long-lasting consequences compared to exposure in adulthood (Suhaimi et al., 2023). Its growing use among adolescents and youths raises significant concerns, as it poses risks to their physical, physiological, and psychological development, making this population especially vulnerable (Khalid et al., 2023; Sharma et al., 2022; Jandáč & Štastná, 2023). Studies have demonstrated that kratom exposure during adolescence may induce persistent cognitive and behavioural impairments, along with enduring alterations in brain structure and function that extend into adulthood. The adolescent brain is especially susceptible to the adverse effects of early kratom use (Suhaimi et al., 2023; Zul Aznal et al., 2022).

In the Czech Republic, kratom has become a commonly used substance among adolescents, second only to cannabis. According to the Health Behaviour in School-aged Children (HBSC) study (2022), which examines the health and behaviours of Czech school-aged children, 8.5% of 15-year-olds reported having tried kratom. Boys were significantly more likely than girls to have used kratom, with 10.2% of boys and 6.2% of girls reporting lifetime use. Among both genders, 2.2% had used it within the past 30 days, while 0.7% reported regular use. Despite its growing popularity among adolescents, kratom remains legal and widely available. However, there are ongoing efforts to regulate it as a psychomodulating substance and restrict its sale to adults, though no such regulation has been implemented as of early 2025 (Chomynová et al., 2023).

Furthermore, the growing popularity of kratom has sparked debates regarding its potential public health implications. While studies show that kratom has been used primarily by adults for pain management and opioid or methamphetamine withdrawal (Govarthnapanay et al., 2025), opinions on its safety remains divided. Some advocate for its therapeutic

benefits, whereas others emphasise its potential for misuse and dependence, particularly among vulnerable populations (Grundmann, 2017; Post et al., 2019). In the Czech Republic, the unrestricted availability of kratom further exacerbates concerns, especially regarding its impact on young users. Its wide availability may encourage experimentation and habitual use among adolescents, who may lack the awareness of its potential consequences (Chomynová et al., 2023).

While the prevalence of kratom use among adolescents is well-documented, a significant gap remains in understanding how kratom dependence specifically impacts this age group. There is a lack of comprehensive data on the clinical effects of kratom dependence among adolescents and how the Czech healthcare system currently addresses this issue, particularly in terms of treatment protocols and intervention strategies. By focusing on these aspects, this study aims to provide crucial insights into the clinical and healthcare challenges of adolescent kratom dependence and contribute to the development of more targeted prevention and intervention strategies tailored to the unique vulnerabilities of this population.

1.1 RESEARCH PROBLEM

Kratom is widely available in the Czech Republic without clear legal restrictions. In fact, the lack of regulations surrounding kratom use has raised significant concerns, particularly its use among minors. An underdeveloped approach to addiction treatment in children and adolescents further complicates effective intervention for young kratom users in the country. Globally, existing studies on kratom use among young people reveal substantial research gaps, particularly in the limited clinical understanding among healthcare professionals regarding how to effectively manage and treat kratom dependence in young users (Bin Abdullah, 2020). Furthermore, current literature provides inadequate data on risk factors, therapeutic approaches, and long-term outcomes, impeding the development of comprehensive treatment strategies for this young population (Bin Abdullah, 2020). Additionally, the lack of studies on case-specific clinical data studies limits healthcare providers to provide evidence-based personalised treatment plans. These limitations suggest the need for further research to refine treatment approaches and support the development of tailored care strategies for young kratom users. Our study aims to address this gap by synthesising existing knowledge, exploring healthcare providers' current experiences, and analysing case outpatient case reports to provide key insights into treatment strategies, ultimately improving care and outcomes for adolescent kratom users presenting with a dependence syndrome.

1.2 AIM & OBJECTIVES

This study aims to investigate kratom use among young people, i.e., adolescents (10 – 19 years old) and youths (15 – 24 years old) from clinical and healthcare perspectives. It also analyses existing clinical data to develop case studies for deeper insights into treatment approaches and strategies. The objectives of this study are to: 1) Synthesise existing knowledge on kratom use,

its effects, treatment strategies, and clinical outcomes among adolescents and youths through a systematic review; 2) Explore the experiences, practices, and challenges faced by healthcare professionals treating children and adolescent kratom users in the Czech Republic and identify gaps in current treatment responses; 3) Review and analyse retrospective clinical case reports from the outpatient addiction treatment clinic to document the clinical presentations of kratom addiction, treatment approaches, and outcomes of young kratom users. Collectively, this research will contribute to a comprehensive understanding of adolescent kratom use and dependence, with the goal of improving clinical care and targeted treatment strategies.

2. STUDY DESIGN

This study consists of three distinct parts, each aimed at gaining insights into adolescent kratom use in the Czech Republic from various clinical and healthcare perspectives. It includes a systematic review of kratom use, its effects, and treatment strategies; a pilot study with healthcare professionals' experiences in treating young kratom users, and an analysis of clinical case reports from an outpatient clinic.

The systematic review will synthesise existing literature on kratom's effects, dependence potential, and treatment strategies with predefined inclusion and exclusion criteria. The pilot study will explore the experiences and challenges faced by healthcare professionals treating young kratom users, while also evaluating healthcare system responses and identifying gaps in treatment protocols. Although the sample size is expected to be small, the recruitment of diverse health professionals will be done to ensure data saturation is achieved. Lastly, the analysis of retrospective case reports from an outpatient addiction treatment clinic will document the clinical presentations, treatment approaches, and outcomes of children and adolescent kratom users. Cases will be selected and analysed based on inclusion and exclusion criteria within a predetermined time frame. This integrated design allows for a multifaceted exploration of kratom use, from clinical case insights to the healthcare system's response, enabling a thorough understanding of the challenges and opportunities in managing kratom use among young people.

3. METHODS AND ANALYSES

3.1 SYSTEMATIC REVIEW

The systematic review will be conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and protocol (Page et al., 2021). This review will systematically identify and evaluate scientific literature concerning kratom use among adolescents and youths, focusing on treatment management protocols, health outcomes, adverse effects, and treatment strategies. It will also provide comprehensive clinical insights into kratom use in this demographic and identify gaps in current research to suggest areas for future studies. The review will focus on individuals aged 10-24 years, examining case reports and case series that describe the physical and mental health outcomes, as well as treatment and

management strategies for kratom use. Only studies published in English will be included. To maximise data coverage, no publication date restrictions will be applied.

The search strategy will cover databases such as PubMed, Scopus, Web of Science, and Google Scholar, using the search terms: ("Kratom" OR "Mitragyna speciosa" OR "Mitragynine") AND ("Youths" OR "Adolescents" OR "Paediatrics" OR "young adults" OR "teenagers" OR "juveniles") AND ("Case report" OR "case series" OR "case study" OR "case presentation"). The search terms will be adapted to the syntax and filters of each database.

Two independent reviewers will screen titles and abstracts for relevance, with disagreements resolved by a third reviewer. Full-text screening will follow, focusing on extracting data such as study characteristics (i.e., authors, year, country, and study design), participant characteristics (i.e., age, gender, and sample size), details of kratom use (i.e., frequency, dosage, and method of use), and reported outcomes (i.e., health effects, psychological impact, social consequences, and treatment strategies).

The findings will be analysed through narrative synthesis, categorising health outcomes, adverse effects, and treatment strategies, while assessing common themes across studies. Thematic analysis will be conducted using a matrix to organise, compare and synthesise the extracted data. Key findings from each study will be compared to highlight effective treatment protocols and strategies. The quality of case reports will be assessed using the Joanna Briggs Institute Critical Appraisal Checklist for Case Reports to inform the interpretation of findings (Moola et al., 2017). This analysis will also identify gaps in the current literature, providing recommendations for future research to improve treatment and management of kratom use among young people.

3.2 KCARE_24 STUDY

This mixed-methods pilot study employs both qualitative and quantitative research approaches to explore the experiences of healthcare workers who treat children and adolescents with kratom use problems in the Czech Republic. Notably, the country offers dedicated addiction-specialised services for this age group, making it a key context for this research. The study population includes healthcare professionals such as doctors, addiction specialists, and psychologists currently involved in the treatment of kratom users under the age of 18. A sample size of at least 20 participants will be recruited for the quantitative component to ensure a diverse range of responses, while three to five participants will be selected for the qualitative component to provide in-depth insights into individual experiences. These sample sizes balance feasibility and data coverage based on the exploratory nature of this pilot study. The inclusion criteria require participants to be currently practicing in the Czech Republic and to have direct experience treating adolescent kratom users. Healthcare workers without such experience or who are not actively practicing will be excluded. Participants will be recruited through the specialised network for children and adolescents' addictology (*Děti a dospívající adiktologie*), where these professionals are typically registered (<https://dada.snncls.cz/>).

Data collection for the quantitative component will involve an online structured questionnaire administered via Google Forms. The survey will gather information on demographics, professional backgrounds, experiences with kratom cases, treatment approaches, and challenges encountered. For the qualitative component, in-depth semi-structured interviews will be conducted with a subset of participants, either in person or via secure video conferencing. These interviews aim to delve into detailed experiences, specific cases handled, challenges faced, and strategies used in treating adolescent kratom use. The questionnaire and interviews will be conducted in English. All data will be securely stored in a password-protected database, and interview recordings will be transcribed and anonymized to ensure participant confidentiality.

Quantitative data will be analysed using basic descriptive statistics to summarize demographic information and survey responses. For the qualitative data, interviews will be transcribed, coded and analysed using thematic analysis. Key themes will be identified inductively and grouped based on clinical presentation and treatment challenges that reflect the experiences and perspectives of healthcare workers treating adolescent kratom users.

This study has been approved by the National Monitoring Centre for Drugs and Addiction Ethics Committee (Ref. no.: EKNMS-7/2024).

3.3 CASE STUDY

The case study focuses on documenting specific medical cases of children and adolescents undergoing treatment for kratom dependence at the Outpatient Addiction Treatment Service for Children and Adolescents. All patients included will be under the age of 18 and have been diagnosed with kratom dependence. The data for this study will be collected by a child treatment expert who directly provides treatment to these individuals. The entire data collection process will be supervised by the Head of the Treatment Service. The collected information will include patient demographics, clinical indicators, and treatment process. Data on kratom use history will cover the duration, amount of kratom use, and consumption pattern. Clinical indicators will include the symptoms of dependence and withdrawal, along with their severity. The presence of co-occurring health conditions, as well as results from psychological or psychiatric assessments will also be recorded. Treatment details will include medications administered, treatment duration, and supportive therapies provided. Any adverse effects experienced during or post-treatment will also be documented.

The case reports will be analysed in accordance with the CARE guidelines (for CAse REports) (Gagnier et al., 2013), ensuring that all relevant data points are systematically and clearly presented. The analysis will focus on providing a comprehensive overview of the clinical presentation, treatment process and its effectiveness, and observed outcomes. These clinical case studies will complement the systematic review and pilot study to offer a perspective from actual clinical settings for the development of evidence-based treatment protocols for adolescent kratom dependence.

4. DISCUSSION

4.1 IMPLICATIONS FOR POLICY AND GUIDELINES

The findings from this study have important implications for both policy development and the establishment of treatment guidelines for kratom use among adolescents. Firstly, the study highlights significant gaps in the existing clinical knowledge and understanding related to kratom use and treatment practices in minors, underscoring the need for more structured and evidence-based treatment protocols. Policymakers can use these insights to advocate for the inclusion of kratom-specific guidelines in the national addiction treatment frameworks, especially for vulnerable populations such as children and adolescents. This includes the development of standardised screening tools, diagnostic criteria, and treatment protocols for healthcare providers treating adolescent kratom users in clinical settings.

In terms of treatment guidelines, the study's findings suggest the need for tailored care strategies that address the unique needs of adolescent kratom users, who have different clinical profiles compared to adult users. The study highlights the importance of incorporating both detoxification and psychological support as part of a comprehensive treatment plan. Furthermore, insights from the pilot study on healthcare workers' experiences reveal a need for a standardised treatment guideline and improved knowledge to effectively manage adolescent kratom use. This includes detoxification protocols, management of co-occurring mental health conditions, and treatment of polysubstance use, which are commonly associated with kratom dependence in this age group.

Collectively, these implications point towards the necessity of a more integrated, multi-level approach to kratom addiction treatment, involving regulatory oversight, evidence-based clinical practice guidelines, and ongoing professional training for healthcare providers to strengthen the healthcare system's response to kratom dependence in adolescents.

4.2 STRENGTHS AND LIMITATIONS

The proposed study design has strengths and limitations that should be acknowledged. The implications for policy and guidelines related to clinical practice and treatment guidelines in the context of adolescent kratom use are discussed as well.

One of the key strengths of this study is its comprehensive mixed-methods approach, which integrates both qualitative and quantitative research methodologies: systematic review, pilot study, and case report analysis. This triangulation of data sources allows for a more robust and multidimensional understanding of adolescent kratom use by exploring clinical outcomes, healthcare workers' experiences, and detailed clinical case data. The study's focus on an understudied population—adolescent kratom users, also fills a critical gap in current research. This is particularly important given the growing concerns over kratom use among minors and the absence of well-established treatment protocols for this age group. A key strength of this study

is the inclusion of a systematic review which provides a structured synthesis of existing global, regional and local evidence on kratom use among adolescents, laying the foundation for subsequent studies. Another strength lies in the inclusion of a pilot study involving healthcare professionals on their challenges and treatment practices, which provides practical insights that can inform policy development and lead to more effective treatment strategies. Moreover, the inclusion of case reports allows the study to delve into individual cases, offering valuable clinical data that can contribute to a deeper understanding of kratom dependence in adolescents and inform evidence-based treatment approaches.

Despite its strengths, the study has several limitations. First, the small sample size for the pilot study, particularly in the qualitative component, involving only three to five participants, may limit the generalisability of the findings, as it might not capture the full diversity of healthcare professionals' experiences or broader trends. Nevertheless, this exploratory approach is critical in a context where research on adolescent kratom users is lacking. Next, the absence of adolescent voices limits understanding on their lived experiences and kratom use. Another limitation is that the study is geographically specific to the Czech Republic, which may limit the applicability of the findings to other regions where kratom use and healthcare practices may differ. Nonetheless, the study offers valuable insights into healthcare system preparedness for countries with similar health challenges and landscapes. Additionally, the study relies on self-reported data from healthcare workers, which may introduce response bias, as participants could underreport challenges or overreport successes due to personal or professional reasons. Moreover, language or translation may limit how healthcare experiences or case data are interpreted.

5. CONCLUSION

This study protocol provides a structured, mixed-methods approach to investigating kratom use among adolescents from clinical and healthcare perspectives. Through a systematic review, pilot study, and clinical case reports, the study aims to generate valuable insights into the health implications, treatment challenges, and gaps in healthcare related to adolescent kratom use. Findings from this study will inform future research, contribute to evidence-based treatment strategies, and support policy discussions regarding kratom regulation and adolescent health interventions in the Czech Republic.

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