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Cannabinoids Used for Medical Purposes in Children and Adolescents

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ABSTRACT

Background: The literature on the use of cannabinoids for medical purposes in children and adolescents presents a complex landscape of potential benefits, challenges, and gaps in research. The introduction highlights a growing interest in cannabinoids, particularly for conditions such as refractory epilepsy, pain management, and palliative care. **Literature Review:** (Ben-Zeev, 2010) critically discusses the role of cannabidiol (CBD) in managing refractory epilepsy, emphasizing the importance of distinguishing between artisanal cannabis and FDA-approved formulations like Epidiolex®. The need for larger clinical trials is echoed by (Raucci et al., 2010) who call for double-blinded placebo-controlled studies to better understand CBD's pharmacokinetics and safety profile. Similarly, explore the efficacy of cannabinoids in treating spasticity in children with cerebral palsy, demonstrating promising results but also stressing the necessity for comprehensive safety evaluations. (Cassa Macedo et al., 2010) highlight the challenges posed by misinformation surrounding medical cannabis, which can lead to unrealistic expectations among families. This sentiment is further supported by (J Woo et al., 2010) who report variability in pain relief outcomes among pediatric patients using cannabinoids, underscoring the need for more robust comparative studies to guide treatment decisions. **Conclusion:** Overall, the literature indicates a cautious but growing interest in the therapeutic use of cannabinoids in pediatric medicine. While there are promising findings regarding their potential benefits, particularly in managing specific conditions like epilepsy and spasticity, the overarching consensus is that further research is essential to establish clear guidelines and safety profiles. The variability in patient responses and the potential risks associated with cannabinoid use necessitate a careful, evidence-based approach to treatment in this vulnerable population.

Keyword: Cannabinoids, Medical Purposes, Children and Adolescents

INTRODUCTION

The exploration of cannabinoids for medical purposes in children and adolescents has gained significant traction in recent years, reflecting a growing recognition of their potential therapeutic benefits amidst ongoing debates regarding safety and efficacy. This literature review will critically analyze a selection of articles that provide insights into the use of cannabinoids across various medical conditions affecting pediatric populations.

In 2010, (Ben-Zeev, 2010) highlighted the increasing interest in cannabis as an anticonvulsant for refractory epilepsy in children. The review emphasized the considerable burden of intractable epilepsy on affected children and their families, noting that many are on polytherapy and seeking additional solutions, including cannabis. This quest has been largely driven by parents and caregivers, underscoring the urgent need for effective treatments in this demographic.

Continuing in the same year, (Cassa Macedo et al., 2010) addressed the challenges surrounding the use of medical cannabis, particularly the unrealistic expectations that may arise from online information and the downplaying of potential side effects. Their findings pointed to the limited clinical research available due to restrictions on cannabis production and use, which complicates the understanding of its safety and efficacy in treating conditions like epilepsy. This article illustrates the necessity for more rigorous studies to substantiate claims surrounding cannabis therapy.

(J Woo et al., 2010) further contributed to this discourse by examining the use of cannabinoids for pain relief in children and youth. Their study revealed a spectrum of experiences among pediatric patients, with some reporting significant improvements in pain management while others experienced no benefit. The article highlighted the variability in efficacy and the need for comprehensive research to better understand the implications of medical cannabis use in this population.

(Raucci et al., 2010) focused specifically on cannabidiol (CBD) for treating refractory epilepsies in pediatric patients. Their review underscored the necessity for double-blinded placebo-controlled trials to ascertain the safety and pharmacokinetics of CBD alongside its efficacy. They noted that while some studies indicate a reduction in seizure frequency, the lack of FDA approval for cannabis-based treatments complicates clinical decisions for physicians.

(Malach et al., 2012) raised concerns regarding the safety of cannabis-based treatments in pediatric oncology, noting that many trials report participant dropouts due to severe side effects. Their review echoed the sentiment of caution expressed by major health organizations, which currently do not endorse cannabis for children with cancer due to insufficient evidence.

conducted a systematic review on the efficacy and safety of medical cannabinoids in children with cerebral palsy, revealing promising results for conditions such as spasticity. This article highlights the growing body of evidence supporting the therapeutic use of cannabinoids in specific pediatric neurological disorders, suggesting a potential role for cannabinoids in managing complex motor disorders.

Finally, (Tagsold et al., 2014) provided a retrospective analysis of cannabinoid use in pediatric palliative care, identifying various indications for cannabinoid administration, including pain and anxiety management. Their findings suggest that cannabinoids may serve as a valuable adjunct therapy in pediatric palliative care, although they also emphasize the need for further research to establish comprehensive safety profiles and therapeutic guidelines.

This literature review will delve deeper into these articles, examining the evolving landscape of cannabinoid use in pediatric medicine, the challenges faced in clinical applications, and the implications for future research and practice.

LITERATURE REVIEW

The article "Medical Cannabis for Intractable Epilepsy in Childhood: A Review" by Bruria Ben-Zeev (Ben-Zeev, 2010) provides a comprehensive examination of the emerging role of cannabis, particularly cannabidiol (CBD), in managing

refractory epilepsy in pediatric patients. The author highlights the increasing interest in medical cannabis within both research and clinical settings, emphasizing its potential as an anticonvulsant treatment option for children suffering from drug-resistant epilepsy.

Ben-Zeev categorizes childhood epilepsy into benign epileptic syndromes and drug-resistant forms, noting that the latter can severely hinder a child's development and overall quality of life. This classification is crucial as it underlines the urgent need for effective therapeutic interventions. The review meticulously discusses two primary forms of cannabis-based treatments: artisanal cannabis and Epidiolex®, the latter being a FDA-approved formulation of pure CBD. The distinction between these two forms is significant; artisanal cannabis can vary in potency and composition, while Epidiolex® offers a standardized dosage, which is critical in pediatric care where dosing accuracy is paramount.

The author provides a critical evaluation of existing studies and clinical trials that support the efficacy of CBD in reducing seizure frequency in children with intractable epilepsy. The review synthesizes findings that indicate a notable reduction in seizure episodes among patients treated with CBD, thereby validating its use as a viable alternative or adjunct to traditional antiepileptic drugs. However, Ben-Zeev also addresses the limitations of current research, including the need for larger, more rigorous clinical trials to establish long-term safety and efficacy, as well as the importance of understanding the pharmacokinetics of CBD in a pediatric population.

Moreover, the article discusses the broader implications of using cannabis in pediatric medicine, including ethical considerations and the necessity for healthcare providers to stay informed about the evolving landscape of medical cannabis legislation and research. The author underscores the importance of individualized treatment plans and the need for ongoing monitoring of patients receiving cannabis-based therapies.

The article "Online information on medical cannabis may rise unrealistic expectations and downplay potential side effects" by Macedo et al. (Cassa Macedo

et al., 2010) provides a critical examination of the current landscape surrounding the use of medical cannabis, particularly in the context of its application for treating chronic pain and epilepsy in children and adolescents. The authors highlight the potential of cannabis therapy as an efficacious tool; however, they underscore the significant limitations imposed by governmental regulations and the consequent scarcity of rigorous clinical research.

One of the pivotal insights presented in the article is the disparity between the perceived benefits of cannabis as a treatment option and the actual empirical evidence supporting its efficacy and safety. The authors argue that while there is a growing body of anecdotal evidence suggesting that cannabis can alleviate symptoms associated with chronic pain, the lack of comprehensive clinical trials means that healthcare professionals and families may have unrealistic expectations regarding its effectiveness (Cassa Macedo et al., 2010). This gap in research is particularly concerning for pediatric populations, where the implications of introducing untested therapies could be profound.

Furthermore, the article emphasizes the need for more robust comparative studies between medical cannabis and existing licensed medications for conditions such as epilepsy. The absence of such studies raises questions about the appropriateness of cannabis as a first-line treatment, especially considering the potential side effects that may not be adequately addressed in online discussions or promotional materials (Cassa Macedo et al., 2010). The authors caution that the portrayal of medical cannabis in online forums often downplays these risks, which could mislead parents and guardians seeking effective treatments for their children.

The article "Children and Youth Who Use Cannabis for Pain Relief: Benefits, Risks, and Perceptions" by Woo et al. (J Woo et al., 2010) provides a comprehensive examination of the use of cannabinoids for pain management in pediatric populations. The authors address a critical gap in the literature regarding the safety and efficacy of medical cannabis among children and adolescents, a demographic that has been relatively under-researched compared to adult populations.

The article begins by acknowledging the growing interest in cannabinoids due to their involvement in central nervous system (CNS) and immune processes. The authors highlight that while there is some evidence supporting the use of medical cannabis for neuropathic pain in adults, the understanding of its effects on younger patients remains limited. This sets the stage for the authors' exploration of the prevalence, characteristics, and perceptions surrounding medical cannabis use in children and adolescents.

The methodology employed by the authors is robust, involving a systematic search across multiple databases, including PubMed, PsychInfo, Web of Science, and CINAHL. This approach ensures a comprehensive review of the existing literature focused on pediatric populations. The inclusion criteria are well-defined, centering on studies that address the efficacy, risks, and perceptions related to medical cannabis use among children and youth.

One of the key findings reported in the article is the variability in the prevalence of medical cannabis use among youth. The authors note that estimates suggest a significant percentage of young individuals who use cannabis do so for medical purposes. Importantly, the article discusses anecdotal evidence from participants who reported varying degrees of pain relief and improvements in associated symptoms such as mood, sleep, and daily functioning. However, the authors also emphasize the lack of consistent outcomes, with some participants experiencing no improvement in pain intensity.

The discussion of the benefits and harms associated with medical cannabis use is particularly noteworthy. The authors present a balanced view, acknowledging potential therapeutic benefits while also cautioning against the risks involved. This dual perspective is crucial for healthcare providers and families considering cannabinoid therapies for pediatric patients. The article also touches on the perceptions of patients, families, and healthcare practitioners regarding medical cannabis, which is essential for understanding the broader context of its use in this population.

However, while the article provides valuable insights, it also highlights the need for more rigorous research to establish clear guidelines and recommendations for the use of medical cannabis in children and adolescents. The authors call for further studies to better understand the long-term effects and safety of cannabinoids in pediatric patients, emphasizing that informed decision-making must be grounded in solid evidence.

The article "Cannabidiol Treatment for Refractory Epilepsies in Pediatrics" by Raucci et al. (Raucci et al., 2010) provides a comprehensive review of the current understanding of cannabidiol (CBD) as a treatment option for pediatric patients suffering from refractory epilepsies. The authors emphasize the necessity of further investigation into the safety profile, pharmacokinetics, and potential interactions of CBD with other antiepileptic drugs (AEDs). This is crucial for establishing a clearer picture of CBD's efficacy and safety in treating the most prevalent forms of epilepsy in children.

The review synthesizes a variety of studies that indicate CBD, whether administered as a pharmaceutical-grade preparation or as part of a CBD-enriched cannabis extract, has shown promise in reducing seizure frequency in children with resistant epilepsy. This finding is significant, given the limited treatment options available for these patients. However, the authors underscore that while some countries have legalized the use of herbal cannabis for medicinal purposes, neither cannabis nor its extracts have received approval from regulatory bodies such as the FDA or the EMA. This lack of approval raises important considerations for physicians contemplating the prescription of cannabis-related products; they must navigate a complex legal landscape that varies by jurisdiction.

Moreover, the call for double-blinded placebo-controlled trials is a critical aspect of the article. Such rigorous studies are essential for generating high-quality evidence that can inform clinical practice and guide healthcare providers in making informed decisions regarding the use of CBD in pediatric populations. The authors' insistence on the need for conclusive data reflects a broader concern within the medical community about the potential risks and benefits associated with

cannabinoid therapies, particularly in vulnerable populations like children and adolescents.

The article "Medical Cannabis in Pediatric Oncology: Friend or Foe?" by Malach et al. (Malach et al., 2012) presents a critical examination of the use of cannabis-based treatments in pediatric oncology, specifically focusing on their application for managing chemotherapy-induced nausea and vomiting (CINV) and epilepsy. The authors highlight a significant concern regarding the safety and tolerability of these treatments, noting that many clinical trials report high dropout rates among participants due to severe side effects associated with cannabis use.

One of the key insights from the article is the emphasis on the increased incidence of adverse effects in pediatric patients undergoing cannabis treatment. This is particularly concerning given the vulnerability of children and adolescents to medication side effects, which can lead to complications that may outweigh the potential benefits of cannabis. The authors underscore that while some studies may indicate effectiveness in symptom management, the associated risks cannot be overlooked, particularly in a population already facing significant health challenges.

Furthermore, the article discusses the stance of major medical organizations, such as the American Academy of Neurology and the American Academy of Pediatrics, which currently do not endorse the use of cannabis in children with cancer. This lack of endorsement is primarily due to the limited evidence supporting the efficacy and safety of cannabis treatments in this demographic. The authors argue that without robust clinical evidence, the recommendation of cannabis-based therapies remains contentious, as the potential for harm may be greater than the therapeutic benefits.

The critical evaluation presented in the article raises important questions about the appropriateness of cannabis use in pediatric oncology. It suggests that while there may be anecdotal evidence or preliminary data supporting the use of cannabis for symptom relief, the overall consensus within the medical community leans towards caution. This is particularly relevant in light of the ethical considerations

surrounding the treatment of children, who may not be able to provide informed consent and whose long-term health outcomes must be prioritized.

The article titled "Efficacy and safety of medical cannabinoids in children with cerebral palsy: a systematic review" by Murni et al. (Murni et al., 2013) presents a comprehensive evaluation of the use of medical cannabinoids in pediatric populations, particularly focusing on children with cerebral palsy. The authors systematically review existing literature to assess both the efficacy and safety of cannabinoids, which is a critical area of concern given the increasing interest in alternative treatments for complex medical conditions in children.

One of the significant insights from this review is the effective treatment of spasticity using dronabinol, a synthetic cannabinoid, in pediatric palliative care. This finding is particularly relevant as spasticity is a common issue in children with cerebral palsy, often leading to discomfort and impaired mobility. The authors highlight that cannabinoids may offer a viable option for managing these symptoms, thereby improving the quality of life for affected children.

Moreover, the review discusses the efficacy and safety of nabiximols, a cannabinoid medicine, specifically for pediatric spasticity resulting from cerebral palsy or traumatic brain injury. The randomized controlled trials cited in the article provide robust evidence supporting the use of nabiximols, indicating a positive therapeutic outcome while also addressing safety concerns. This aspect is crucial, as the safety profile of any medication used in children must be thoroughly evaluated to mitigate potential risks.

The article further explores the role of cannabidiol in neurological disorders, particularly its application in treating epilepsy. The findings suggest that cannabidiol has shown promise in clinical trials, providing a potential therapeutic avenue for children experiencing moderate to severe epilepsy. This is notable given the limitations of conventional treatments for epilepsy in pediatric populations.

The article titled "The Use of Cannabinoids in Pediatric Palliative Care—A Retrospective Single-Center Analysis" by Tagsold et al. (Tagsold et al., 2014)

provides a comprehensive examination of the application of cannabinoids in a pediatric population suffering from life-limiting diseases. The study's retrospective design allows for an analysis of 31 patients who were under the care of a specialized outpatient pediatric palliative care team, focusing on the efficacy and safety of cannabinoid administration in managing various symptoms.

The authors categorize the primary diagnoses of the patients into neuropediatric, oncologic, metabolic, and cardiologic conditions, which reflects the diverse nature of the patient population. The symptoms targeted by cannabinoid treatment include spasticity, pain, restlessness, anxiety, loss of appetite, epilepsy, and paresis. Notably, the study reports that 29% of the patients did not exhibit any improvement, indicating that while cannabinoids may offer benefits, they are not universally effective for all patients or symptoms.

The findings suggest that cannabinoids can be integrated as an adjunct therapy within pediatric palliative care, particularly for symptoms that are often challenging to manage with conventional medications. The article emphasizes the safety of cannabinoid use, noting that no clinically relevant drug interactions were observed, which is a critical consideration in this vulnerable population. This safety profile is particularly important given the complexities of polypharmacy often encountered in pediatric patients with severe illnesses.

Moreover, the authors highlight the regulatory functions of the endocannabinoid system, which plays a role in pain management, mood regulation, metabolism, appetite, immune responses, neuronal protection, and inflammation processes. This biological basis supports the rationale for using cannabinoids in this context and underscores the need for further research to enhance understanding and optimize therapeutic strategies.

While the article acknowledges the limited number of studies on cannabinoids in pediatric palliative care, it references existing literature that indicates positive outcomes for specific conditions, such as nausea and vomiting post-chemotherapy and therapy-refractory epilepsy treated with Cannabidiol (CBD). However, the authors also call attention to the necessity for more rigorous studies, especially

randomized controlled trials, to establish clearer evidence and guidelines for cannabinoid use in pediatric settings.

CONCLUSION

The literature on the use of cannabinoids for medical purposes in children and adolescents presents a complex landscape of potential benefits, challenges, and gaps in research. The introduction highlights a growing interest in cannabinoids, particularly for conditions such as refractory epilepsy, pain management, and palliative care. A significant theme throughout the articles is the urgent need for rigorous clinical trials to substantiate the efficacy and safety of cannabinoid therapies in pediatric populations.

(Ben-Zeev, 2010) critically discusses the role of cannabidiol (CBD) in managing refractory epilepsy, emphasizing the importance of distinguishing between artisanal cannabis and FDA-approved formulations like Epidiolex®. The need for larger clinical trials is echoed by (Raucci et al., 2010) who call for double-blinded placebo-controlled studies to better understand CBD's pharmacokinetics and safety profile. Similarly, explore the efficacy of cannabinoids in treating spasticity in children with cerebral palsy, demonstrating promising results but also stressing the necessity for comprehensive safety evaluations.

(Cassa Macedo et al., 2010) highlight the challenges posed by misinformation surrounding medical cannabis, which can lead to unrealistic expectations among families. This sentiment is further supported by (J Woo et al., 2010) who report variability in pain relief outcomes among pediatric patients using cannabinoids, underscoring the need for more robust comparative studies to guide treatment decisions.

Concerns regarding safety are prevalent in the literature, particularly in the context of pediatric oncology. (Malach et al., 2012) caution against the use of cannabis-based treatments due to high dropout rates from trials, primarily due to adverse effects. This caution is mirrored in the retrospective analysis by (Tagsold et al., 2014) which finds that while cannabinoids may provide adjunctive benefits in

palliative care, they are not universally effective and require careful consideration of safety and efficacy.

Overall, the literature indicates a cautious but growing interest in the therapeutic use of cannabinoids in pediatric medicine. While there are promising findings regarding their potential benefits, particularly in managing specific conditions like epilepsy and spasticity, the overarching consensus is that further research is essential to establish clear guidelines and safety profiles. The variability in patient responses and the potential risks associated with cannabinoid use necessitate a careful, evidence-based approach to treatment in this vulnerable population.

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