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NORTHERN ILLINOIS UNIVERSITY

Exploring Medicinal Cannabis Use in Pediatric Oncology

A Capstone Submitted to the

University Honors Program

In Partial Fulfillment of the

Requirements of the Baccalaureate Degree

With Honors

Department Of

Nursing

By

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Capstone Faculty Approval Page

Capstone Title: Exploring Medicinal Cannabis Use in Pediatric Oncology

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Abstract

Changes in cannabis legality in the United States over recent years have led to an increased interest in the use of cannabis in medicine. One area in which this interest has sparked controversy is pediatric oncology. This capstone aimed to review the available literature on this topic in order to synthesize current opinions and determine the pros and cons surrounding medicinal cannabis use within pediatric oncology. The overall opinion of providers and patients alike is pro-cannabis. However, a majority of providers feel pediatric medicinal cannabis use is only appropriate in certain situations. There is limited empirical evidence supporting or refuting pediatric medicinal cannabis use. Nonetheless, there is data confirming the efficacy of cannabis in reducing the symptoms of chemotherapy as well as indications of potential anticancer effects. In contrast, concerns surrounding the potential long-term effects of early cannabis use have prevented mainstream acceptance of cannabis as a treatment option for pediatric patients. It is imperative that additional research be conducted on this topic in order for patients, their families, and health care providers to make informed decisions surrounding the utilization of cannabis in pediatric oncology treatment regimens.

Exploring Medicinal Cannabis Use in Pediatric Oncology

Recent changes in the legality of cannabis across the United States in the past decade have led to an increased interest in medicinal cannabis use among medical professionals. There are currently 29 states in which medicinal cannabis is legal and several other states where legalization efforts are being made (Spaulding, 2017). Several studies have confirmed the effectiveness of cannabis in combating the adverse symptoms of chemotherapy in adults, but little data involving the pediatric population exists. While medicinal cannabis is a widely accepted therapy among health care providers treating adults, usage is still controversial in pediatrics.

Per the American Academy of Pediatrics (AAP), medicinal cannabis use is opposed in individuals under the age of 21 except in the case of chronic or severely debilitating conditions (Spaulding, 2017). The biggest concern among providers is the lack of knowledge surrounding the long-term effects of cannabis use in children. However, there is evidence suggesting potential benefits of cannabis use; cannabis may offer analgesic effects, can be used to combat nausea, has exhibited cytotoxic properties in some cancers, etc. (Abrams, 2016; Andradas, 2021; Jia et al., 2006; McKallip et al., 2006). Due to the commonality of severe chemotherapy side effects in children and the increasing evidence supporting cannabis, it is likely that interest in medicinal cannabis use among pediatric patients, their families, and medical professionals alike will continue to climb. Because of this it is important that a greater understanding of the safety and efficacy of medicinal cannabis use within this community be fostered. The aim of this capstone was to explore the current opinions of providers, patients, and their families as well as determine the benefits and repercussions of medicinal cannabis use within the pediatric oncology community.

Methodology

Searches were conducted using the databases CINAHL and PubMed and the search engine Google. Google was included as a means to gain insight into patient and family opinion and relevant first-hand experiences with medicinal cannabis. Key words and Boolean operators used to conduct the searches included marijuana OR cannabis OR pot OR weed AND pediatric oncology OR pediatric cancer OR childhood cancer OR children with cancer. From search results 8 peer-reviewed published articles and 2 websites with patient testimonies were selected for review.

Results

Provider Standpoint

A 2018 study conducted by Ananth et al. surveying 288 pediatric oncology providers in Illinois, Massachusetts, and Washington provided ample insight into provider perspective on the use of medicinal cannabis in children with cancer. Most providers surveyed exhibited open-mindedness surrounding the use of medicinal cannabis in pediatric oncology patients; 92% of providers reported willingness to help children with cancer gain access to cannabis and approval of cannabis use in the management of chemotherapy symptoms. Responses to survey questions regarding the form of cannabis used elicited interesting results; 89% of providers supported using oral forms of cannabis and 57% supported patients smoking cannabis (Ananth et al., 2018). Smoking cannabis is associated with greater adverse side effects compared to other forms of cannabis consumption. The increased risk associated with smoking is likely the reason significantly less support was given. However, considering the concern around the potential side effects of pediatric cannabis use in general, the amount of support given to smoking cannabis was surprisingly high. In agreement with AAP guidelines, most providers found medicinal

cannabis use appropriate in children with severe conditions (near end of life, undergoing treatment with palliative intent, malignancies, and relapse). Less, but still a significant amount, found use appropriate in patients undergoing treatment with curative intent (52%), and even less in early stages of treatment (35%). Only 2% of providers felt that the use of medicinal cannabis in children was never appropriate (Ananth et al., 2018).

Provider reluctance to endorsing medicinal cannabis use in adults is driven mostly by the unknown potential for side effects, lack of data on the topic, and lack of FDA regulation. When considering use within the pediatric community, additional concerns must be considered; regular cannabis use has been associated with dependence, impaired neurocognitive development, and poor academic achievement (Ananth et al., 2018). Due to the lack of data in support of pediatric cannabis use, providers habituated to evidence-based practice find controversy in giving their support as there is no empirical evidence that the benefits of cannabis use in children with cancer outweigh the potential for harm. This being said, 93% of providers surveyed reported being in favor of the conduction of clinical trials to investigate the use of cannabis in children (Ananth et al., 2018). The above data is indicative of future advancements within medicinal cannabis as well as continually increasing support within the medical community. Pediatric oncology health care providers must take it upon themselves to remain up to date on emerging research in order to provide their patients with the most accurate information and recommendations regarding the safety and efficacy of medicinal cannabis.

Patient and Family Standpoint

Information regarding patient and family opinion on medicinal cannabis use was gathered from online patient testimonials. Two children, Sophie Ryan and Rylie Maedler, have both benefitted greatly from the use of medicinal cannabis as part of their treatment regimen.

Sophie's Story

Sophie was only 8 ½ months old when she was diagnosed with a low-grade Optic Pathway Glioma brain tumor that was causing nystagmus of the left eye. Her treatment plan involved a 13-month chemotherapy protocol with the goal of halting tumor growth; any level of tumor shrinkage was to be considered hugely successful. Sophie's parents immediately began investigating alternative treatment options and discovered high-concentration THC and CBD cannabis oils. Sophie took the cannabis oils in conjunction with her chemotherapy regimen throughout the 13-month protocol. Sophie experienced limited side effects; lethargy was noted early on but subsided as she her body acclimated, and increased appetite was considered to be a positive side effect due to chemotherapy induced anorexia. Although Sophie's treatment wasn't aimed at tumor shrinkage, the combination of cannabis oil and chemotherapy shrunk her tumor nearly 90%. Additionally, she experienced minimal adverse chemotherapy symptoms, which is extremely uncommon given the toxicity of chemotherapy in a patient her age. Optic Pathway Glioma brain tumors have an extremely high reoccurrence rate so, even though Sophie's treatment was successful, her tumor did recur several times. Each time, cannabis was used in conjunction with chemotherapy and each time her treatment was successful. Sophie is now in remission and has not experienced any developmental delays as a result of her cannabis use. Sophie's story is a true testament to the potential of cannabis and it's benefits when used in conjunction with chemotherapy.

Rylie's Story

Rylie was 7 years old when she was diagnosed with aggressive giant cell granuloma (AGCG) bone tumors. AGCG is an extremely rare and aggressive tumor that eats away at facial bones. Rylie had an extremely severe case of AGCG; the tumors ate away her palette, maxilla,

sinus, left cheek, and the lower portion of her eye orbits. Rylie's tumor team found only one viable option for treatment: an 18-month minimum chemotherapy regimen. The team warned Rylie and her family that even if the tumor was successfully treated, it would most likely recur, and she would be deformed for life. When searching for remedies for Rylie's pain and swelling, her mother came across cannabis. Pain relief was noticed immediately, however, that is not the most notable outcome of Rylie's cannabis use. Within months she exhibited bone regeneration and tumor shrinkage. Rylie never started chemotherapy and has been in remission for 7 years. For Rylie, cannabis was effective in treating her tumors by itself. She currently still uses cannabis for epilepsy and to ensure there is no tumor regrowth. Rylie's experience with cannabis is incredible and proves there is still much to be discovered regarding the potential uses of cannabis.

Benefits of Cannabis Use

Besides numerous patient testimonials on their successes in using medicinal cannabis, there is also significant scientific evidence implicating the potential successes of utilizing medicinal cannabis in conjunction with and as a replacement for current cancer treatments. Cannabis has proven useful in the management of common chemotherapy symptoms in adults; it is beneficial in reducing anorexia, chemotherapy-induced nausea and vomiting, pain, insomnia, and depression (Abrams, 2016). Cannabis, although less potent than other antiemetics, has proven to be the only source of relief for many patients. In fact, THC was more effective in treating chemotherapy-induced nausea and vomiting in pediatric cancer patients than prochlorperazine, a common anti-nausea medication (Andradas, 2021). Additionally, cannabis is the only antiemetic that also offers appetite stimulation.

Aside from aiding in symptom management, several studies indicate cannabis may have anticancer effects. Studies have suggested that cannabis induces cell death in leukemias including T-cell acute lymphoblastic leukemia, an extremely aggressive and chemo-resistant cancer. Cannabinoids amplify intracellular stress, damaging mitochondrial membrane potential, and subsequently causing cell death (Jia et al., 2006; McKallip et al., 2006). Furthermore, the utilization of a combination of cannabis and chemotherapy showed an increase in the magnitude of cell death compared to chemotherapy alone (Powles et al., 2005). These findings are extremely exciting considering the potential cannabis has as an alternative cancer treatment to other more aggressive traditional cancer treatments.

Risks of Cannabis Use

The biggest risk surrounding medicinal cannabis use in children is the unknown. There is little data surrounding the long-term effects of cannabis use among children, but there are implications that regular use may have negative effects. Squeglia et al. (2009) determined that adolescents who use cannabis experience decreased concentration, impaired motor control, delayed reaction times, and alterations in judgement. It is important to consider that this data was derived from adolescents using cannabis recreationally, meaning additional factors could have played a role in these outcomes. Adolescent cannabis use has also been linked to changes in the developing prefrontal cortex, increasing an individual's risk for developing psychosis and other negative mental health outcomes. However, increased risk for psychosis was found to be caused by a greater cumulative cannabis usage rather than a younger age of first use (Moore et al., 2007). Evidence suggests potential risks of cannabis use in children and adolescents, however, there is not adequate data to aid in determining if the risks are prevalent enough to nix cannabis use within this population. Due to the lack in volume of concrete evidence supporting or refuting

medicinal cannabis use within pediatrics, and specifically pediatric oncology, it is imperative that this topic continue to be investigated in order to provide guidance to physicians, patients, and their families when determining the most safe and effective treatment options available.

Conclusions

It is inconclusive at this time whether the benefits or risks of medicinal cannabis use among pediatric oncology patients outweigh one another. There are ample patient testimonials describing the miracle like results cannabis has provided, however scientific research remains inadequate. There are obvious risks to the use of cannabis in children and adolescents, however additional research needs to be done to determine if those risks are severe enough to contraindicate cannabis as a treatment options, especially when used as a replacement for other more aggressive forms of cancer treatment. The overall opinion among providers regarding cannabis use and additional research is positive, as most pediatric oncology providers expressed support of both. It is essential for additional research to be conducted on both the benefits and risks of cannabis use in pediatric oncology in order to provide physicians with adequate data to determine the most safe and effective treatment options for their patients.

References

- Abrams, D. I. (2016). Integrating cannabis into clinical cancer care. *Current Oncology*, 23(S2), S8-S14. <https://doi.org/10.3747/co.23.3099>
- Ananth, P., Ma, C., Al-Sayegh, H., Kroon, L., Klein, V., Wharton, C., ... Wolfe, J. (2018). Provider Perspectives on Use of Medical Marijuana in Children With Cancer. *Pediatrics*, 141(1), 1-10. <https://doi.org/10.1542/peds.2017-0559>
- Andradas, C., Truong, A., Bryne, J., & Endersby, R. (2021). The Role of Cannabinoids as Anticancer Agents in Pediatric Oncology. *Cancers*, 13(157), 1-14. <https://doi.org/10.3390/cancers13010157>
- CannaKids. (n.d.) *Sophie's Story*. <https://cannakids.org/sophies-story/>
- Jia, W., Hedge, V. L., Singh, N. P., Sisco, D., Grant, S., Nagarkatti, M., & Nagarkatti, P. S. (2006). Delta9-tetrahydrocannabinol-induced apoptosis in Jurkat leukemia T cells is regulated by translocation of Bad to mitochondria. *Mol Cancer Res.*, 4(8), 546-562. <https://doi.org/10.1158/1541-7786.MCR-05-0193>
- Maedler, R. (2021). *About Me*. Rylie Maedler. <https://ryliemaedler.com>
- McKallip, R. J., Jia, W., Schlomer, J., Warren, J. W., Nagarkatti, P. S., & Nagarkatti, M. (2006). Cannabidiol-induced apoptosis in human leukemia cells: A novel role of cannabidiol in the regulation of p22phox and Nox4 expression. *Mol Pharmacol.*, 70(3), 897-908. <https://doi.org/10.1124/mol.106.023937>
- Moore, T. H., Zammit, S., Lingford-Hughes, A., Barnes, T. E., Jones, P. B., Burke, M., & Lewis, G. (2007). Cannabis use and risk of psychotic or affective mental health outcomes: a systematic review. *The Lancet*, 370(9584), 319-328. [https://doi.org/10.1016/S0140-6736\(07\)61162-3](https://doi.org/10.1016/S0140-6736(07)61162-3)

- Powles, T., Poele, T., Shamash, J., Chaplin, T., Propper, D., Joel, S., Oliver, T., & Liu, W. M. (2005). Cannabis-induced cytotoxicity in leukemic cell lines: the role of the cannabinoid receptors and the MAPK pathway. *Blood*, *105*(3), 1214-1221.
<https://doi.org/10.1182/blood-2004-03-1182>
- Spaulding, C. (2017). *Perspectives on the Use of Medicinal Marijuana in Children*. American Academy of Pediatrics. <https://www.aappublications.org/news/2017/12/13/Perspectives-On-The-Use-Of-Medicinal-Marijuana-In-Children-Pediatrics-12-13-17>
- Squeglia, L. M., Jacobus, J., & Tapert, S. F. (2009). The Influence of Substance Use on Adolescent Brain Development. *Clinical EEG and Neuroscience*, *40*(1), 31-38.
<https://doi.org/10.1177%2F155005940904000110>