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Does marijuana work in pain of cancer origin?

Czy marihuana działa na ból pochodzenia nowotworowego?

1. Introduction and Objective

According to the latest analysis by GLOBOCAN, there are more than 1.5 million new cancer cases worldwide each year [1]. Pain, an intrinsic companion of many cancer cases, often becomes the first and alarming sign of the presence of the disease.

In the context of the fight against cancer, appropriate pain assessment and management are a key element for improving the quality of life of cancer patients. Optimal pain management not only provides relief from the experience of suffering, but also affects patients' health outcomes [2], which is particularly important in terminal cancer states. Tumors cause pain through a variety of mechanisms, depending on the location, size and type of cancer. This understanding of the complexity of the interaction between cancer and pain becomes crucial for effective treatment, and for improving patients' quality of life.

1.1. Pain in cancer diseases

Pathophysiology of cancer pain includes: pressure on nerve structures [3], tissue damage [4], tissue breakdown [5], inflammation [6] and metastasis formation [7]. Table 1 presents the pathophysiological mechanisms of pain in cancer.

Treatment of cancer pain includes various strategies, such as interventional therapies (e.g., nerve blocks) and causal treatments such as surgery, chemotherapy or radiation therapy. Another important component of treatment is pharmacotherapy, which includes the use of painkillers such as opioids or cannabinoids, which have become increasingly popular in recent years [8]. The purpose of this work is to present cannabis and the mechanism of analgesic action of cannabis in pain of cancer origin, with a special focus on pain in cancer.

Tab. 1. *Pathophysiological mechanisms of pain in cancer*

Pressure on nerve structures	Tumors can put pressure on nerves, tissues or organs, which can lead to pain [3].
Tissue damage	Invasive tumors can lead to tissue damage and degradation, which is a potential source of pain [4].
Tissue breakdown	Some cancers can induce tissue breakdown processes, which can also result in painful conditions [5].
The inflammatory proces	Tumors can cause inflammation in the surrounding areas, which is one of the factors contributing to the pain [6].
Metastasis	Tumors that metastasize to other areas of the body can induce pain in these specific areas [7].

1.2. Cannabis

Hemp is a plant belonging to the hemp family. The three main varieties are hemp seed (Cannabis sativa), cannabis indica and wild hemp (Cannabis ruderalis). A division into chemotypes depending on the ratio of delta 9-tetrahydrocannabinol (THC) and cannabidiol (CBD) is also used. Hemp products have long been used for recreational purposes. There are many forms under which hemp products exist. The dried flower form is called marijuana, and the resin of the plant has the name hashish [9]. Cannabis is increasingly present in our society both for its recreational (natural cannabis and synthetic cannabinoids) and medical use (pharmaceutical cannabinoids and medical cannabis). In 2015, an estimated 183.3 million people aged 15–64 years used cannabis (3.8% of global population) 1. Cannabis use is most prevalent among young people ages 15 to 34 (13.9 % using in the past year) 2. Among 15 to 16 year-old school students

in Europe and United States last month cannabis use was 8% and 15%, respectively. [10] 3. Hemp contains more than 500 different chemical molecules, including flavonoids, terpenoids, more than 100 different cannabinoids and other bioactive molecules. Cannabinoids are believed to play a major role in the biological effects of cannabis. Two of them draw particular attention, Delta 9-tetrahydrocannabinol (THC) and cannabidiol (CBD) [11]. THC has strong psychoactive and pain-relieving properties, while CBD is also believed to modulate pain sensation and has anti-inflammatory and immunomodulatory, anticonvulsant, antiemetic, and neuroprotective effects, while its psychoactive effects are much weaker, and it may even reduce the adverse effects of THC [12].

Fig. 1. *Structural formula of tetracanabidiol and canabidiol*

1.3. Medical use of hemp

Medical cannabis (medical marijuana) is a broad term for the use of hemp for therapeutic purposes. The use of cannabinoids in medicine is increasingly common. Up to 40% of cancer patients use cannabinoids to treat pain in countries such as Canada and Germany [13].

Cannabis for medicinal purposes is available in the form of hemp flower in standardized THC to CBD ratios. These formulations include Bediol, Bedrobinol, Bedrocan and Bedrolite [14]. Also available in some European countries is Sativex, which contains 1:1 THC/CBD [10]. Among the synthetic cannabinoids used in medicine are dronabinol (synthetic THC, Marinol) and nabilone (Cesamet). Among the new drugs approved by the FDA is Epidiolex [15].

Cesamet is indicated for severe nausea and vomiting associated with chemotherapy in patients over the age of 18, Epidiolex is approved for convulsions in Lennox-Gastaut or Dravet syndrome from the age of 2, Marinol for anorexia in AIDS patients, and for nausea and vomiting associated with chemotherapy in patients with failure of standard therapy. Sativex is indicated for the treatment of spasticity associated with multiple sclerosis [16].

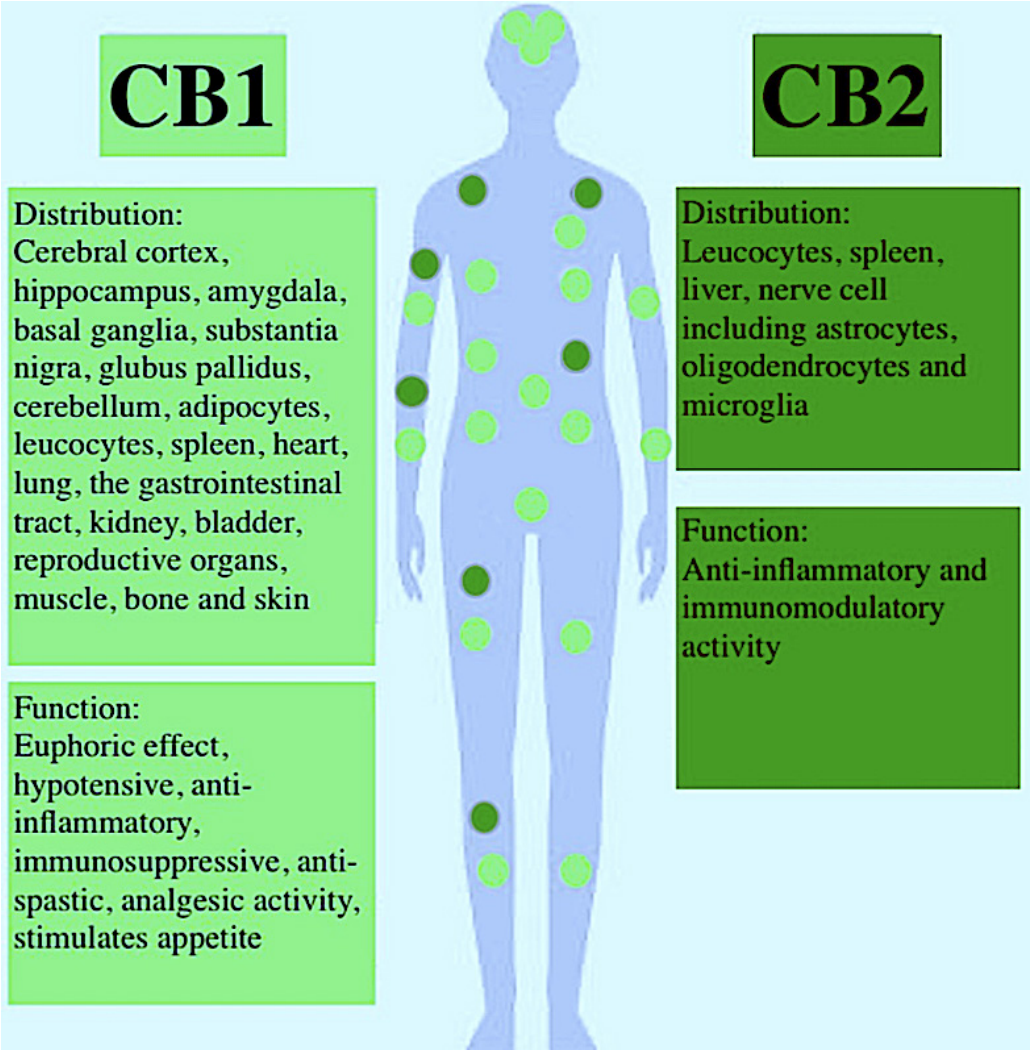

Fig. 2. *The distribution and functions of CB1 and CB2 receptors*

2. Review methods

A search of the PubMed/MEDLINE database was conducted to identify articles meeting specific inclusion and exclusion criteria. The database was searched using the following keywords: "cancer pain" and 'cannabis'. The literature search was conducted considering studies published with full access to the content, mainly from the last 5 years.

To ensure the quality and relevance of the studies, inclusion criteria were adopted including only full-text publications on the topic of cancer pain and the use of cannabis

in its treatment. The exclusion criteria included review articles, systematic reviews and meta-analyses to focus only on original studies.

The article selection process identified 40 publications that met the above criteria and could be included in further analysis. This ensured that the data collected would be up-to-date, based on the latest scientific findings and directly related to the clinical problem under study, which is cancer pain management using cannabis.

3. Description of the state of the knowledge – Mechanisms of action

3.1. The endocannabinoid system

The endocannabinoid system is a neuromodulatory system that plays an important role in response to endogenous and environmental stimuli. It consists of cannabinoid receptors CB 1 and CB 2 and also endocannabinoids, or endogenously produced ligands, which are responsible for the binding and activation of cannabinoid receptors. [17]

The distribution and functions of CB1 and CB2 receptors are shown in figure 2 [18].

3.2. Endocannabinoids

Anandamide and 2-arachidonoyl sn -glycerol (2-AG) are endocannabinoids that are produced in damaged tissues to combat inflammation by activating cannabinoid receptors. Anandamide, in a reaction catalyzed by fatty acid amide hydrolase, can be broken down to arachidonic acid and ethanolamine [19] or can be directly converted by COX-2 into proalgetic prostamides [20]. Anandamide acts in response to inflammation and nerve damage, and is responsible for modulating nociceptive signals through activation of local CB1 receptors. 2-AG has a role in the descending modulation of pain occurring during acute stress. Anandamide and 2-AG during tissue injury provide the first response to nociceptive signals [21].

A study conducted by Iryna A. Khasabova et al. on a mouse model shows that CB1 and CB2 receptor agonists exhibit analgesic effects in cancer pain. They demonstrated that injection of the CB1 receptor agonist ACPA reduced cancer-related mechanical pain hypersensitivity through activation of peripheral CB1 receptors. Injection of the CB2 receptor agonist AM1241 reduced mechanical pain hypersensitivity in the tumor limb through activation of peripheral CB2 receptors. Both substances had efficacy comparable to morphine [22].

There is evidence that CB1 and CB2 receptors are involved in analgesic effects in cancer pain. However, more studies involving this issue, particularly studies in a human model, need to be conducted.

3.3. Anti-inflammatory effects of cannabinoids

Cannabinoids, especially CBD, exhibit anti-inflammatory properties. Inflammation often accompanies cancer and can contribute to feelings of pain. The anti-inflammatory effects of cannabinoids can help alleviate this aspect of pain [18].

The mechanism for the anti-inflammatory effect can be sought in studies showing that CBD inhibits the production of nitrite and the expression of the iNOS (nitric oxide synthase) protein, which is induced by beta-A [23]. In addition, CBD can inhibit the production of chemokines by human B cells and has shown the ability to inhibit T-cell responses and reduce the release of bioactive tumor necrosis factor (TNF) [23].

C. D. Verrico et al. also describe a decrease in TNFα levels after CBD treatment. In addition, the study showed a decrease in serum levels of the pro-inflammatory factor, interleukin-6, and an increase in levels of interleukin-10, an anti-inflammatory cytokine [24].

Cannabinoids have the ability to affect mast cell receptors, leading to an inhibition of the release of inflammatory substances and an increase in the release of analgesic opioids. This action aims to relieve inflammation in the body [25].

3.4. Effects on GPR3 receptors

In the context of neuropathic pain after spinal cord injury, Ruiz-Medina et al. found that GPR3 knockout mice exhibited hyperalgesia and reduced morphine antinociception compared to wild-type mice. These findings show the importance of GPR3 receptors in the regulation of neuropathic pain. [26]

GPR3 receptor may play an important role in mediating the analgesic effects of cannabidiol in the context of neuropathic pain and cancer-related pain and anxiety. [27]

The discovery that GPR3 is one of the potential targets for cannabidiol (CBD) opens up new possibilities for understanding the mechanisms of action of CBD in pain management. CBD is not a potent ligand for GPR3, GPR6 or GPR12, but this finding makes it worth researching more potent ligands and applying them in pain treatment. [26]

However, further clinical studies are needed to confirm the efficacy and safety of cannabinoids in the treatment of cancer pain.

3.5. Transient receptor potential

CBD activates vanilloid type-1 (TRPV1) and type-2 (TRPV2) channels [35], but some synthetic cannabinoids also [28].

The transient receptor potential vanilloid type 1 (TRPV1) channel is present in significant amounts at the terminals of pain fibers (C and Aδ fibers) in the skin, dorsal

medullary ganglia and central nervous system. When activated, the channel causes an influx of ions, especially calcium, into the cell, leading to depolarization and a burning pain sensation. This channel responds to pain-causing substances such as capsaicin [29]. Unlike capsaicin, however, they activate the channel mainly to a non-expanded state, where capsaicin activates it to a state with expanded pores, which causes the sensation of pain. The effect produced by cannabinoids is also significantly prolonged relative to capsaicin. Thus, they can more benignly lead to receptor desensitization through increased internalization and destruction [30]. In a study in rats, intraperitoneal administration of CB2 agonists reduced pain intensity regardless of the presence of TRPV1 channels, while intraperitoneal administration required the presence of TRPV1 to exert an analgesic effect, this indicates that TRPV channels play an important role in the process of neuropathic pain, but this role has yet to be precisely defined [29].

3.6. Synergism of cannabis with opioids

Opioids are commonly used in the treatment of chronic moderate to severe pain [31], but their use carries numerous side effects related to abuse and addiction. [32] In order to minimize the adverse effects of these substances, studies have been initiated on the synergistic effects of cannabis and opioids. The goal of these studies is to potentially increase analgesic efficacy and reduce the required dose of opioids.

Ziva D. Cooper and colleagues reported on the effects of co-administration of opioids and cannabinoids. They used the cold compressor test (CPT) to study the analgesic effects of a combination of oxycodone and smoked cannabis. Cannabis use alone, unlike oxycodone, did not increase pain threshold or tolerance. In contrast, the combination of both substances resulted in an increase in pain threshold and tolerance to values exceeding those observed with oxycodone alone [33].

4. Results of clinical trials to date in the use of marijuana for cancer pain

To date, there have been a number of studies examining how marijuana works to control cancer pain. One study conducted compared the efficacy of THC:CBD extract, THC alone and placebo in patients dealing with incurable cancer-related pain. Results after two weeks showed a significant change in the Numerical Rating Scale (NRS) in favor of THC:CBD (Sativex) compared to the placebo group. In contrast, no significant change was observed for THC alone. There was also no change in the median dose of opioid medication or number of doses between treatment groups. However, a higher frequency of nausea and vomiting was observed in the THC:CBD group compared to the placebo group [34]. The extension study tested THC:CBD oralmucosal spray

in patients previously participating in a three-group study. This time, in a two-week randomized trial, patients self-titrated the dose of THC:CBD spray or THC spray. The results showed that patients using THC:CBD experienced a reduction in pain severity. Additionally, patients reported improvements in insomnia and fatigue [35].

Nabiximols was tested on patients with poorly controlled chronic cancer pain. Patients received a low, medium or high dose of this formulation for five weeks. The results indicated that the number of patients reporting analgesia was higher in the Nabiximols-treated group than in the placebo group, especially among the low- and medium-dose patients. [36]

In another study, where Nabiximols was used as adjunctive therapy in advanced cancer patients with chronic uncontrolled pain, patients self-titrated Nabiximols or placebo. Results indicated that Nabiximols was more effective than placebo in terms of quality of life. [37]

Despite these positive results, the body of research indicates that there is insufficient evidence to unequivocally recommend the use of cannabinoid-based drugs as a single treatment for cancer pain. There is some evidence to suggest that cannabinoids can control cancer pain, but more research is needed in this area.

5. Side effects of cannabinoids

Studies describe side effects, of which one can mention those involving the central nervous system and peripheral side effects. The first group includes feelings of euphoria, disorientation, decreased concentration, drowsiness, loss of motor coordination, headaches and dizziness. The second group, on the other hand, includes symptoms such as reduced blood pressure, accelerated heartbeat, pupil constriction, bronchodilation, decreased or increased gastrointestinal activity and muscle relaxation [23].

Recurrent multiple sclerosis and urinary tract infections, the occurrence of depression, schizophrenia are also mentioned as side effects of cannabinoid use. Additionally, by virtue of the fact that some cannabinoids (including CBD) are metabolized in the liver, they can cause interactions with drugs that alter CYP3A4 or affect liver function [39].

Small amounts of tetrahydrocannabinol (THC), pass into breast milk.

A study by Susan J. Astley et al. found that daily use of cannabis in lactating women can cause delayed motor development of the child, but showed no effect on growth and intellectual development [40].

6. Conclusion

Patients with cancer often face feelings of chronic pain, mainly the problem of treating this type of pain affects palliative patients. The pathophysiology of cancer pain involves various mechanisms, such as pressure on nerve structures, tissue damage, tissue breakdown, inflammation and metastasis formation. The treatment of cancer pain is based on various strategies, including interventional therapies, causal treatment and pharmacotherapy.

The work pays particular attention to the analgesic properties of cannabinoids, especially CBD, which also exhibits anti-inflammatory, immunomodulatory, anticonvulsant, antiemetic and neuroprotective effects. There is growing interest in the medical use of cannabis, especially in the treatment of cancer patients.

The paper also examines the mechanisms of action of cannabinoids, including their effects on the endocannabinoid system, endocannabinoids (anandamide and 2-AG) and CB1, CB2, GPR3 and TRPV receptors. Studies suggest that cannabinoids may affect pain receptors and channels, which may have a role in alleviating cancer pain.

Clinical studies on the use of cannabis in cancer pain show some promising results, but there is a need for further research to unequivocally confirm the efficacy and safety of cannabinoids in this area.

References:

1. Bray F, Ferlay J, Soerjomataram I, i wsp. *Globalne statystyki dotyczące nowotworów 2018: szacunki GLOBOCAN dotyczące zapadalności i śmiertelności na świecie dla 36 nowotworów w 185 krajach*. CA Cancer J Clin. 2018 listopad;68(6):394–424. https://doi.org/10.3322/caac.21492.
2. Scarborough BM, Smith CB. *Optymalne leczenie bólu u pacjentów z chorobą nowotworową w dobie współczesnej*. CA Cancer J Clin. 2018 maj;68(3):182–196. https://doi.org/10.3322/caac.21453.
3. Coveler AL, Mizrahi J, Eastman B, i wsp. Precision Promise Consortium. *Leczenie bólu związanego z rakiem trzustki*. Onkolog. 2021 czerwiec;26(6):e971-e982. https://doi.org/10.1002/onco.13796.
4. Shkodra M, Caraceni A. *Leczenie bólu neuropatycznego bezpośrednio spowodowanego rakiem: aktualizacja*. Cancers (Basel). 2022 kwi 14;14(8):1992. https://doi.org/10.3390/cancers14081992 .
5. Pysz-Waberski D, Bulska-Będkowska W, Wachuła E *Leczenie bólu przewlekłego w onkologii — współpraca onkologa z psychoonkologiem*, Onkol Prakt Klin Edu 2019;5(4):257–265.
6. Zhang Q, Bang S, Chandra S, i wsp. *Zapalenie i zakażenie w bólu i rola GPR37*. Int J Mol Sci. 20 listopada 2022;23(22):14426. https://doi.org/10.3390/ijms232214426.
7. Zheng XQ, Wu YH, Huang JF, i wsp. *Neurofizjologiczne mechanizmy bólu kości wywołanego rakiem*. J Adv Res. 2021 11 czerwca;35:117–127. https://doi.org/10.1016/j.jare.2021.06.006.
8. Scarborough BM, Smith CB. *Optymalne leczenie bólu u pacjentów z chorobą nowotworową w dobie współczesnej*. CA Cancer J Clin. 2018 maj;68(3):182–196. https://doi.org/10.3322/caac.21453.

9. Turgeman I, Bar-Sela G. *Zastosowanie konopi w onkologii paliatywnej: przegląd dowodów na popularne wskazania*. Isr Med Assoc J. 2017 luty;19(2):85–88.

10. Papaseit E, Pérez-Mañá C, Pérez-Acevedo AP, i wsp. *Kannabinoidy: z garnka do laboratorium*. Int J Med Sci. 6 sierpnia 2018;15(12):1286–1295. https://doi.org/10.7150/ijms.27087.

11. Strona RL 2nd, Allen LA, Kloner RA, i wsp. *Komitet Farmakologii Klinicznej Amerykańskiego Towarzystwa Kardiologicznego i Komitet Niewydolności Serca i Transplantacji Rady Kardiologii Klinicznej; Oświadczenie naukowe Amerykańskiego Towarzystwa Kardiologicznego*. Circulation. 2020 Sep 8;142(10):e131-e152. https://doi.org/10.1161/CIR.0000000000000883.

12. Perucca E. *Kanabinoidy w leczeniu padaczki: wreszcie twarde dowody?* J Epilepsy Res. 2017 31 grudnia;7(2):61–76. https://doi.org/10.14581/jer.17012.

13. Häuser W, Welsch P, Klose P, i wsp. *Skuteczność, tolerancja i bezpieczeństwo leków na bazie konopi w leczeniu bólu nowotworowego: systematyczny przegląd z metaanalizą randomizowanych badań kontrolowanych*. Schmerz. 2019 paź;33(5):424–436. https://doi.org/10.1007/s00482–019–0373–3.

14. Khurshid H, Qureshi IA, Jahan N, i wsp. *Systematyczny przegląd fibromialgii i najnowsze osiągnięcia w leczeniu: czy lecznicza marihuana to nowa nadzieja?* Cureus. 2021 20 sierpnia;13(8):e17332. https://doi.org/10.7759/cureus.17332.

15. Kulesza B, Mazurek M, Kurzepa J. *Czy kannabidiol (CBD) może pomóc w bólu dolnej części pleców?*. Ann Agric Environ Med. 2023;30(3):549–554. https://doi.org/10.26444/aaem/168674.

16. Pagano C, Navarra G, Coppola L, i wsp. *Kanabinoidy: zastosowanie terapeutyczne w praktyce klinicznej*. Int J Mol Sci. 2022 marzec 19;23(6):3344. https://doi.org/10.3390/ijms23063344.

17. 17. Schurman LD, Lu D, Kendall DA, i wsp. *Mechanizm molekularny i farmakologia kannabinoidów*. Handb Exp Pharmacol. 2020;258:323–353. https://doi.org/10.1007/164_2019_298.

18. Kulesza B, Mazurek M, Kurzepa J. *Czy kannabidiol może działać przeciwbólowo?* Fundam Clin Pharmacol. 16 sierpnia 2023 r. https://doi.org/10.1111/fcp.12947.

19. Piomelli D, Mabou Tagne A. *Terapie oparte na endokannabinoidach*. Annu Rev Pharmacol Toxicol. 6 stycznia 2022 r.;62:483–507. https://doi.org/10.1146/annurev-pharmtox-052220–021800.

20. Massaro M, Martinelli R, Gatta V, i wsp. *Identyfikacja na podstawie transkryptomu nowych właściwości przeciwzapalnych i rozszerzających naczynia krwionośne kwasu tłuszczowego n-3, kwasu dokozaheksaenowego, w komórkach śródbłonka naczyniowego w warunkach prozapalnych [poprawiono]*. PLoS One. 2015 Jun 26;10(6):e0129652. https://doi.org/10.1371/journal.pone.0129652 .

21. Hohmann AG, Suplita RL, Bolton NM, i wsp. *Mechanizm endokannabinoidowy dla analgezji wywołanej stresem*. Nature. 2005 Jun 23;435(7045):1108–12. https://doi.org/10.1038/nature03658.

22. Khasabova IA, Gielissen J, Chandiramani A, i wsp. *Agoniści receptora CB1 i CB2 promują analgezję poprzez synergię w mysim modelu bólu nowotworowego*. Behav Pharmacol. 2011 wrzesień; 22(5– 6):607–16. https://doi.org/10.1097/FBP.0b013e3283474a6d.

23. Zuardi AW *Kannabidiol: od nieaktywnego kannabinoidu do leku o szerokim spektrum działania*. Revista brasileira de psiquiatria (Sao Paulo, Brazylia: 1999), 30(3), 271–280. https://doi.org/10.1590/s1516–44462008000300015.

24. Verrico CD, Wesson S, Konduri V, i wsp. *Randomizowane, podwójnie zaślepione, kontrolowane placebo badanie codziennego kannabidiolu w leczeniu bólu związanego z chorobą zwyrodnieniową stawów u psów*. Pain. 2020 Sep 1;161(9):2191–2202. https://doi.org/10.1097/j.pain.0000000000001896.

25. Wilkie G, Sakr B, Rizack T. *Zastosowanie marihuany leczniczej w onkologii: przegląd*. JAMA Oncol. 1 maja 2016;2(5):670–675. https://doi.org/10.1001/jamaoncol.2016.0155.

26. Ruiz-Medina J, Ledent C, sValverde O, *Receptor sierocy GPR3 bierze udział w bólu neuropatycznym po uszkodzeniu nerwów obwodowych i reguluje antynocycepcję wywołaną morfiną*, Neurofarmakologia (2011).

27. Wu J, Chen N, Liu Y, i wsp. *Badania nad zaangażowaniem receptora sprzężonego z białkiem G-3 w efekty kannabidiolu na reakcje zapalne pierwotnych astrocytów myszy i mikrogleju*. PLoS One. 2021 13 maja;16(5):e0251677 https://doi.org/10.1371/journal.pone.0251677.

28. De Petrocellis L, Ligresti A, Moriello AS, i wsp. *Wpływ kannabinoidów i ekstraktów z konopi wzbogaconych kannabinoidami na kanały TRP i enzymy metaboliczne endokannabinoidów*. Br J Pharmacol. 2011 sierpień;163(7):1479–94. https://doi.org/10.1111/j.1476–5381.2010.01166.x.

29. Wilkerson JL, Alberti LB, Thakur GA, I wsp. *Agoniści receptora kannabinoidowego 2 (CB2R) podani obwodowo tracą działanie antyallodyniczne u myszy z wyłączonym genem TRPV1, podczas gdy podanie dooponowe prowadzi do antyallodynii i zmniejszenia ekspresji GFAP, CCL2 i TRPV1 w rdzeniu kręgowym grzbietowym i zwoju korzeniowo-grzbietowym*. Brain Res. 2022 1 stycznia;1774:147721. https://doi.org/10.1016/j.brainres.2021.147721.

30. Mickle AD, Shepherd AJ, Mohapatra DP. *Kanały sensoryczne TRP: kluczowe przetworniki nocycepcji i bólu*. Prog Mol Biol Transl Sci. 2015;131:73–118. https://doi.org/10.1016/bs.pmbts.2015.01.002.

31. Kotlińska-Lemieszek A. *Jak skutecznie i bezpiecznie stosować opioidowe leki przeciwbólowe. Indywidualny wybór opioidu u pacjentów z bólem nowotworowym z perspektywy 2022 roku*. Medycyna Paliatywna/Palliative Medicine. 2022;14(3):109–124. https://doi.org/10.5114/pm.2022.126738.

32. Mercadante S, Arcuri E, Santoni A. Tolerancja wywołana opioidami i hiperalgezja. Leki na OUN. 2019 października;33(10):943–955. https://doi.org/10.1007/s40263–019–00660–0.

33. Cooper ZD, Bedi G, Ramesh D, i wsp. *Wpływ jednoczesnego podawania oksykodonu i palonej marihuany na analgezję i ryzyko nadużywania*. Neuropsychopharmacology. 2018 wrzesień;43(10):2046–2055. https://doi.org/10.1038/s41386–018–0011–2.

34. Lichtman AH, Lux EA, McQuade R, i wsp. *Wyniki podwójnie zaślepionego, randomizowanego, kontrolowanego placebo badania nabiximols Oromucosal Spray jako terapii wspomagającej u pacjentów z zaawansowanym nowotworem i przewlekłym niekontrolowanym bólem*. J Pain Symptom Manage. 2018 luty;55(2):179–188.e1. https://doi.org/10.1016/j.jpainsymman.2017.09.001.

35. Brisbois TD, de Kock IH, Watanabe SM, i wsp. *Delta-9-tetrahydrokannabinol może łagodzić zaburzoną percepcję chemosensoryczną u pacjentów onkologicznych: wyniki randomizowanego, podwójnie zaślepionego, kontrolowanego placebo badania pilotażowego*. Ann Oncol. 2011 wrzesień;22(9):2086–2093. https://doi.org/10.1093/annonc/mdq727.

36. Levy C, Galenbeck E, Magid K. *Konopie w leczeniu objawów u osób starszych*. The Medical Clinics of North America. 2020 maj;104(3):471–489. https://doi.org/10.1016/j.mcna.2020.01.004.

37. Dykukha I, Malessa R, Essner U, i wsp. *Nabiximols w przewlekłym bólu neuropatycznym: metaanaliza randomizowanych badań kontrolowanych placebo*. Pain Med. 20 kwietnia 2021;22(4):861–874. https://doi.org/10.1093/pm/pnab050.

38. Levy C, Galenbeck E, Magid K. *Konopie w leczeniu objawów u osób starszych*. The Medical Clinics of North America. 2020 maj;104(3):471–489. https://doi.org/10.1016/j.mcna.2020.01.004.

39. Dalal R, Kudur V. *Ocena i leczenie bólu za pomocą leczniczej marihuany*. https://www.ncbi.nlm.nih.gov/books/NBK568763/ [Aktualizacja 9 marca 2022]. W: StatPearls.

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Abstract:

Introduction and objective: Pain is often the first symptom of cancer. Effective pain management is key to improving the quality of life for cancer patients, especially in advanced stages of the disease. Treatment of cancer pain includes interventional therapies, surgery, chemotherapy, radiation therapy and pharmacotherapy, including opioids and cannabinoids. Cannabis contains a number of chemical compounds, including THC and CBD, which have different therapeutic properties. THC has analgesic and psychoactive effects, while CBD has anti-inflammatory, immunomodulatory and analgesic properties, but is less psychoactive.

Review methods: PubMed/MEDLINE databases were searched with entry criteria of „full text" and exclusion criteria of „review articles", „systematic reviews", and „meta-analyses", considering studies from the last 5 years. The focus was on the keywords „cancer pain", „cannabis"; eventually 40 publications were included.

Abbreviated description of the state of knowledge: The study showed that THC extract (Sativex) relieved cancer pain more effectively than placebo, while THC alone showed no significant difference. Patients using nabiximole experienced less pain and a better quality of life compared to placebo. Despite the positive results, more research is needed to recommend cannabinoids as a stand-alone treatment for cancer pain.

Summary: In the context of the fight against cancer, proper assessment and treatment of pain are a key element in improving the quality of life of cancer patients. Optimal pain management not only provides relief from the experience of suffering, but also affects patients; health outcomes, which is particularly important in terminal cancer states. Understanding the complexity of the interaction between cancer and pain is becoming crucial for effective treatment and improving patients' quality of life.

Keywords: Cannabis, cancer, pain management, Cannabis, cancer pain, palliative patients

Streszczenie:

Wprowadzenie i cel: Ból jest często pierwszym objawem raka. Skuteczne leczenie bólu jest kluczem do poprawy jakości życia pacjentów chorych na raka, zwłaszcza w zaawansowanych stadiach choroby. Leczenie obejmuje terapie interwencyjne, chirurgię, chemioterapię, radioterapię i farmakoterapię, w tym opioidy i kannabinoidy. Konopie indyjskie zawierają szereg związków chemicznych, w tym THC i CBD, które mają różne właściwości terapeutyczne. THC ma działanie przeciwbólowe i psychoaktywne, podczas gdy CBD ma właściwości przeciwzapalne, immunomodulujące i przeciwbólowe, ale jest mniej psychoaktywne.

Metody przeglądu: Bazy danych PubMed/MEDLINE zostały przeszukane z kryteriami wejścia „pełny tekst" i kryteriami wyłączenia „artykuły przeglądowe", „przeglądy systematyczne" i „metaanalizy", biorąc pod uwagę badania z ostatnich 5 lat. Skoncentrowano się na słowach kluczowych „ból nowotworowy", „marihuana"; ostatecznie uwzględniono 40 publikacji.

Skrócony opis stanu wiedzy: Badanie wykazało, że ekstrakt THC (Sativex) łagodził ból nowotworowy skuteczniej niż placebo, podczas gdy samo THC nie wykazało znaczącej różnicy. Pacjenci stosujący nabiximole doświadczali mniejszego bólu i lepszej jakości życia w porównaniu z placebo. Pomimo pozytywnych

wyników, potrzebne są dalsze badania, aby zalecić kannabinoidy jako samodzielną metodę leczenia bólu nowotworowego.

Podsumowanie: W kontekście walki z chorobą nowotworową właściwa ocena i leczenie bólu są kluczowym elementem poprawy jakości życia chorych na nowotwory. Optymalne leczenie bólu nie tylko zapewnia ulgę w doświadczaniu cierpienia, ale także wpływa na pacjentów; wyniki zdrowotne, co jest szczególnie ważne w stanach terminalnych nowotworów. Zrozumienie złożoności interakcji między rakiem a bólem staje się kluczowe dla skutecznego leczenia i poprawy jakości życia pacjentów.

Słowa kluczowe: Konopie indyjskie, rak, leczenie bólu, ból nowotworowy, pacjenci paliatywni

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