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Medical Cannabis Prescription Practices and Quality of Life in Thai Patients: A Nationwide Prospective Observational Cohort Study

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Keywords
Medical cannabis · Quality of life · Traditional Thai medicine · Cannabis oil · Pain management

Abstract

Introduction: The legalization of cannabis in Thailand has renewed interest in its traditional medical use. This study aimed to explore the prescribing patterns of traditional practitioners and assess the impact of cannabis oil on patients' quality of life, with a specific focus on comparing outcomes between cancer and non-cancer patients. ***Methods:*** We conducted a prospective observational cohort study across 30 sites in 21 Thai provinces to analyze the use of "Ganja Oil," a cannabis extract in 10% coconut oil, prescribed for symptoms like pain, anorexia, and insomnia across a diverse patient group, including cancer and migraines. Quality of life was assessed using the Edmonton Symptom Assessment Scale (ESAS) and EQ-5D-5L at baseline, 1, 2, and 3 months. The study included a predefined subgroup analysis to compare the effects on cancer versus non-cancer patients. Data management was facilitated through Research Electronic Data Capture (REDCap), with statistical analysis performed using Stata/MP. ***Results:*** Among 21,284 participants, the mean age was 54.10 ± 15.32 years, with 52.49% being male. The baseline EQ-5D-5L index was 0.85 ± 0.24. Significant differences in EQ-5D-5L indices were seen between cancer patients (0.79 ± 0.32) and non-cancer patients (0.85 ± 0.23; $p < 0.001$). ESAS scores also differed significantly between these groups for all symptoms, except anxiety. The most frequent prescription of Ganja Oil was oral administration at bedtime (88.26%), with the predominant dosage being three drops daily, approximately 0.204 mg of tetrahydrocannabinol in total. Post-treatment, significant improvements were noted: the EQ-5D-5L index increased by 0.11 points (95% CI: 0.11, 0.11;

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$p < 0.001$) overall, 0.13 points (95% CI: 0.12, 0.14; $p < 0.001$) for cancer patients, and 0.11 points (95% CI: 0.10, 0.11; $p < 0.001$) for non-cancer patients. ESAS pain scores improved by −2.66 points (95% CI: −2.71, −2.61; $p < 0.001$) overall, −2.01 points (95% CI: −2.16, −1.87; $p < 0.001$) for cancer patients, and −2.75 points (95% CI: −2.80, −2.70; $p < 0.001$) for non-cancer patients, with similar significant improvements in other symptoms. ***Conclusion:*** Our study indicates potential benefits of Ganja Oil for improving quality of life among Thai patients, as a complementary treatment. These findings must be viewed in light of the study's design limitations. Further controlled studies are essential to ascertain its efficacy and inform dosing guidelines.

Introduction

Cannabis sativa L., historically mired in controversy, has recently gained international attention due to its legalization for medical purposes in several countries. This plant and its derivatives, ranging from pure cannabinoids to partially purified extracts, are increasingly acknowledged for their therapeutic potential in treating a variety of persistent health conditions. These include pain, appetite loss, epilepsy, nausea, vomiting, and abnormal muscle tone, as highlighted in recent studies [1]. However, the existing evidence presents a complex picture, with preclinical studies suggesting clinical benefits alongside a notable lack of high-quality randomized controlled trials (RCTs) that cast uncertainty on these outcomes [2–4].

In the realm of cancer care, patients frequently endure significant physical and mental health deterioration with pain being a pivotal factor affecting their quality of life [5–7]. Conventional treatments, primarily nonsteroidal anti-inflammation drugs and opioids, often lead to severe side effects such as gastrointestinal issues, kidney damage, and central nervous system impacts [8, 9]. Cannabis-based treatments have emerged as promising alternatives, supported by evidence from RCTs, though the data's low certainty underscores the need for cautious interpretation [10].

Furthermore, the effectiveness of cannabis in mitigating symptoms associated with migraines, fibromyalgia, and specific types of epilepsy like Dravet and Lennox-Gastaut syndromes, some of which have received FDA approval, demonstrates its potential yet also highlights the mixed quality of research findings [11–13]. Cannabis's efficacy in improving appetite and managing insomnia exemplifies its complementary therapeutic value despite the evidence requiring larger sample sizes for confirmation [14–17]. The anti-inflammatory and neurological effects of cannabis, underpinned by its interaction with various receptors, offer insights into its potential for treating inflammatory and neurological conditions. However, recent meta-analyses call for a more nuanced understanding of its benefits, given the limited and low-quality evidence in specific domains [18–21].

In Thailand, the medical legalization of cannabis on February 18, 2019 [22], marked a significant turning point, transitioning from its traditional medicinal use to modern healthcare recognition. Despite growing public acceptance, this transition has revealed a notable gap due to the lack of standardized prescribing protocols, merging traditional practices with evidence-based medicine. This divide, coupled with the absence of comprehensive national studies post-legalization, underscores the urgent need for research to clarify cannabis's clinical usage patterns in the new legal context. The formula for "Ganja Oil," a formulation combining cannabis with coconut oil, was developed by Mr. Decha Siripat. However, the right to manufacture and officially name it "Ganja Oil" was granted to the Department of Thai Traditional and Alternative Medicine (DTAM), Ministry of Public Health, Thailand. This transition from traditional formulation to official recognition highlights the complexities of integrating traditional cannabis applications within regulated healthcare systems. Mr.Decha's advocacy, while raising awareness, underscores the potential risks of circumventing evidence-based standards and the importance of standardized dosing for patient safety and efficacy. While some retrospective and prospective observational studies have explored the impact of cannabis on quality of life and its clinical usage patterns [23–27], a comprehensive nationwide observational study in Thailand, particularly post-legalization, is conspicuously absent. This gap emphasizes the need for in-depth research on the clinical usage patterns of cannabis products in the country, bridging the divide between traditional wisdom and contemporary medical practices to ensure safe and effective patient care.

Our nationwide prospective observational cohort study, conducted across 30 sites in 18 provinces within 13 Thai regions, seeks to bridge the gap between traditional cannabis use and evidence-based medical practice. The study was designed to investigate the prescription patterns of traditional medicine practitioners, specifically their use of "Ganja Oil" for treating a wide range of conditions, with a specific emphasis on comparing outcomes between cancer and non-cancer patients. This

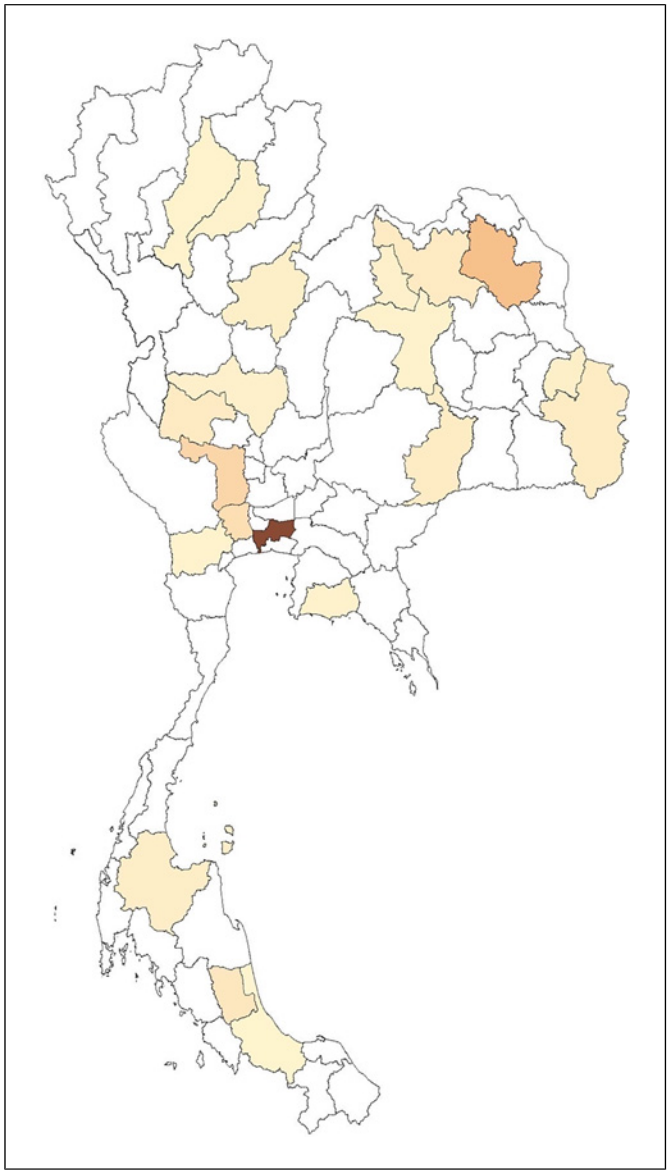

Fig. 1. Representing hospitals spanning provinces across 13 regions in Thailand.

comparative analysis is crucial for understanding the differential impacts of cannabis oil across varied patient demographics and diseases. Our research contributes to the global discourse on cannabis in medicine, underscoring the need for rigorous empirical research to inform clinical practice in the post-legalization era. By examining the use of "Ganja Oil" within both traditional and modern medical frameworks, out study seeks to ensure that its application is grounded in a balance of traditional wisdom and contemporary medical evidence. We recognize and respect the official nomenclature of "Ganja Oil" by Thai health authorities, emphasizing the cultural and regulatory context that shapes its usage in Thailand. Through this comprehensive approach, our goal is to provide actionable insights that support safe, effective, and standardized cannabis-based treatments for both cancer and non-cancer patients.

Methods

Study Design and Setting

This prospective observational cohort study was conducted in 30 hospitals spanning 18 provinces across 13 regions in Thailand (shown in Fig. 1). Traditional medicine practitioners at these sites were invited to participate. Each patient, following a clinical assessment, was prescribed Ganja Oil during the initial visit and at subsequent monthly visits for 2 months. They received three bottles of Ganja Oil per visit, in accordance with the regimen recommended by their Thai traditional medicine practitioner. Follow-up evaluations to assess the efficacy and safety of Ganja Oil were conducted at 1, 2, and 3 months post-prescription.

Patient Population

From September 1, 2019, to October 31, 2020, we enrolled 21,284 patients displaying symptoms amenable to treatment with Thai cannabis oil, as determined by traditional practitioners. Exclusion criteria included severe allergy to cannabis, chronic severe diseases, severe psychiatric conditions (e.g., bipolar disorder), a history of drug abuse or heavy alcohol use, cannabis intake within 1 month prior to enrollment, pregnancy or breastfeeding, and liver or kidney dysfunction.

Study Medication

The Ganja Oil was produced by the DTAM, Ministry of Public Health, Thailand. This oil was extracted from local cannabis using a 10% coconut oil method. Comprehensive analysis through high-performance liquid chromatography with diode array detection and mass spectrometry detection revealed the oil's cannabinoid composition. The results confirmed that the oil contains 1,846.90 mg of tetrahydrocannabinol (THC) per kg. When translated to per milliliter concentrations, given the oil's density, this equates to approximately 1.701 mg of THC per mL, translating further to about 0.068 mg of THC per drop. Alongside THC, the oil also contains 3.04 mg/kg of CBD (0.003 mg/mL, 0.0001 mg/drop) and 185.04 mg/kg of CBN (0.170 mg/mL, 0.007 mg/drop), as certified by the analysis code TRCM65/05232. This formulation, ensuring a therapeutic balance with minimal psychoactive effects, aligns with the prescriptions of Thai traditional medicine practitioners. The analysis confirmed the absence of any biological contaminants, ensuring the product's purity and safety for research and clinical purposes.

To maintain its stability and preserve its efficacy, the oil was packaged in amber glass bottles. The Thai Food and Drug Administration initially approved Ganja Oil for research applications under the Approval No. 13/2562, which specified a 5-mL packaging. Subsequently, it received authorization for clinical use under number G-80005/65, this time in 10-mL bottles, reflecting its

recognized therapeutic value. This progression led to its inclusion in the National List of Herbal Medicine (NLHM), marking its acceptance for broader medical application within Thailand.

Data Collection and Management

Data collection and management in our study were meticulously carried out by the practitioners of Thai traditional medicine, in collaboration with conventional medicine doctors at each site. This multidisciplinary team approach ensured not only the comprehensive collection of data but also the prioritization of patient safety. Together, they assessed patients through interviews and physical examinations, determining the necessity of cannabis oil treatment on a case-by-case basis to ensure that its use was both appropriate and beneficial for each patient. At the initial visit (week 0), they gathered comprehensive information, including demographic details and baseline health statuses, using the Edmonton Symptom Assessment Scale (ESAS) and EQ-5D-5L. Additionally, we documented initial cannabis prescription patterns to capture therapeutic approaches. During follow-up visits from week 4, 8, and 12, we continued to assess participants' health through ESAS and EQ-5D-5L, along with practice patterns. To monitor participant safety throughout the study, continuous assessments were conducted using the Naranjo Algorithm, as guided by the Thai FDA. All collected data were managed through the Research Electronic Data Capture (REDCap) system, hosted by Chulalongkorn University, ensuring secure and efficient data handling.

Outcomes

The primary outcomes of this study focused on two key areas: (1) the documentation of Ganja Oil prescribing patterns by Thai traditional medicine practitioners, including dosage, frequency, and administration routes and (2) the assessment of the quality of life of patients undergoing treatment with Ganja Oil. For the quality-of-life assessment, our study utilized the EQ-5D-5L index, which quantifies health outcomes in a range from −0.283 (indicating the worst health state) to 1 (the best health state), and the ESAS, scoring symptom intensity from 0 (no symptoms) to 10 (worst possible symptoms).

The EQ-5D-5L, specifically validated for Thai patients with chronic diseases, provides a reliable metric for evaluating health-related quality of life across five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is rated on a five-level scale, from no problems to extreme problems, ensuring a comprehensive assessment of the patient's health status. This instrument's validity within the Thai context is supported by its strong correlation with other recognized quality-of-life measures such as WHOQoL-BREF and SF-12v2, and its test-retest reliability has been reported with weighted kappa values at 0.82 [28].

Additionally, the Thai version of the ESAS has demonstrated significant face validity and internal consistency in our study population, with Cronbach's alpha indicating inter-item consistency at 0.7458 for inpatients and 0.89 for outpatients. Notably, 95% of patients found the questionnaire to be clear and understandable, reflecting its validity. Beyond its use in cancer care, the ESAS has also been effectively applied to evaluate symptoms in patients with various chronic conditions, including kidney diseases, heart failure, pulmonary disorders, hepatic diseases, and sickle cell anemia, underscoring its versatility and comprehensive scope in symptom assessment [29, 30].

Safety assessments were conducted using the Naranjo Algorithm to systematically evaluate and identify any adverse effects associated with Ganja Oil usage. It is a validated tool comprising 10 questions that assess various factors related to the adverse event, such as the timing of its occurrence after drug administration, its response to discontinuation or dose adjustment, and the possibility of other causes. Answers to these questions are categorized as yes, no, or "do not know," with each response assigned a point value ranging from −1 to +2. The total score categorizes the reaction's likelihood, with scores of 9 or higher indicating a definite adverse drug reaction (ADR), 5 to 8 suggesting a probable ADR, 1 to 4 signifying a possible ADR, and 0 or less indicating a doubtful ADR. This method allows for a nuanced determination of the causal relationship between Ganja Oil administration and any observed adverse events, enhancing the reliability of our safety assessment process. The use of the Naranjo Algorithm in our study aligns with its established utility in clinical research for distinguishing true drug-related adverse events from coincidental occurrences [31, 32].

Throughout the study, patients underwent physical examinations and completed the aforementioned quality-of-life assessments during each visit. Concurrently, Thai traditional practitioners meticulously recorded details of Ganja Oil usage, including dosage, frequency, and any adjustments made to the regimen, providing a comprehensive overview of its application in a clinical setting. This dual approach allowed us to systematically evaluate the impact of Ganja Oil on patients' quality of life and gain insights into the real-world practice patterns of its prescription among Thai traditional medicine practitioners.

Statistical Analysis

Patient characteristics were reported as means and standard deviations for normally distributed data. A paired *t*-test compared quality-of-life measurements between weeks 0 and 4. For longitudinal analysis from week 0 to week 12, we employed Generalized Estimating Equations, chosen for their effectiveness in handling correlated observations and missing data under the missing at random assumption, common in observational studies. Subgroup analyses were conducted to compare outcome between cancer and non-cancer participants using two independent sample *t*-tests. A p value of less than 0.05 was considered statistically significant. All statistical analyses were performed using Stata/MP software version 15 (StataCorp LLC, College Station, TX, USA).

Results

Participant Demographics and Baseline Characteristics

Our study enrolled 21,284 participants, with an average follow-up duration of 91.65 ± 23.00 days. The mean age was 54.10 ± 15.32 years, with a mean weight of 62.97 ± 13.30 kilograms and a mean height of 162.48 ± 10.09 centimeters, resulting in an average body mass index of 24.11 ± 18.44 kg/m^2. The mean systolic and diastolic

blood pressures were 128.54 ± 17.98 mm Hg and 75.56 ± 12.45 mm Hg, respectively, accompanied by an average pulse rate of 82.54 ± 13.11 beats per minute. The cohort consisted of 47.51% females (n = 10,096) and 52.49% males. Prior cannabis use was reported by 4.16% (n = 886) of participants. Occupation distribution was as follows: unemployed, 26.90% (n = 5,005); employees, 21.30% (n = 3,963); private sector owners, 18.77% (n = 3,492); government officers, 11.87% (n = 2,209); agricultural workers, 11.61% (n = 2,160); others, 6.93% (n = 1,289); students, 1.45% (n = 269); and missing data, 1.17% (n = 217).

The prevalent underlying conditions included hypertension (21.33% [n = 4,539]), dyslipidemia (13.16% [n = 2,802]), and diabetes mellitus (11.93% [n = 2,504]). Less frequent conditions were cardiovascular disease (1.58% [n = 336]), chronic kidney disease (1.39% [n = 295]), psychiatric disorders (0.76% [n = 162]), and liver disease (0.73% [n = 155]). Among participants, 13.50% (n = 2,873) reported various cancers, with the most common types being breast (20.47%, n = 588), colon (15.70%, n = 451), lung (14.55%, n = 418), liver (13.30%, n = 382), prostate (5.33%, n = 153), cervical (4.91%, n = 141), and stomach cancer (1.95%, n = 56).

Throughout the study, we observed an incremental increase in the loss to follow-up rate: 20.95% (4,458 participants) by the fourth week, 27.73% (5,903 participants) by the eighth week, and reaching 32.01% (6,814) by the twelfth week. The baseline EQ-5D-5L index was 0.85 ± 0.24, indicating a generally good quality of life. Average ESAS scores for symptoms were as follows: pain, 3.77 ± 3.28; tiredness, 2.70 ± 2.97; nausea, 0.71 ± 1.76; depression, 1.06 ± 2.22; anxiety, 1.89 ± 2.73; drowsiness, 1.49 ± 2.44; inappetence, 1.56 ± 2.66; general unwell-being, 2.22 ± 2.88; and shortness of breath, 1.30 ± 2.34 (Table 1).

Comparison of Pre-Treatment Outcomes for Cancer and Non-Cancer Patients

Comparing cancer and non-cancer participants, those with cancer had a significantly lower baseline EQ-5D-5L index (0.79 ± 0.32 vs. 0.85 ± 0.23; $p < 0.001$). For ESAS symptoms, cancer patients reported higher scores in tiredness (3.24 ± 3.14 vs. 2.62 ± 2.93; $p < 0.001$), nausea (1.00 ± 2.17 vs. 0.66 ± 1.68; $p < 0.001$), inappetence (2.45 ± 3.17 vs. 1.42 ± 2.54; $p < 0.001$), unwell-being (2.87 ± 3.14 vs. 2.12 ± 2.82; $p < 0.001$), and shortness of breath (1.79 ± 2.75 vs. 1.22 ± 2.26; $p < 0.001$) but lower scores in pain (3.30 ± 3.22 vs. 3.84 ± 3.28; $p < 0.001$), depression (0.91 ± 2.05 vs. 1.08 ± 2.24; $p < 0.001$), and drowsiness (1.31 ± 2.33 vs. 1.52 ± 2.46; $p < 0.001$) than non-cancer counterparts. Anxiety scores did not differ significantly between the groups (1.96 ± 2.79 vs. 1.88 ± 2.73, respectively; $p < 0.001$) (Table 2).

Medication Administration Patterns

In this study, Ganja Oil was administered orally to 88.26% (n = 18,786) of the participants primarily before bedtime, which was the recommended timing for its use. A smaller subset received instructions to take the oil after meals and at bedtime (6.62%, n = 1,410) or before meals (1.15%, n = 245). Regarding dosage, the most common regimen involved taking three drops daily (38.40%, n = 7,214), with five drops daily (27.00%, n = 5,072) and one drop daily (22.21%, n = 4,173) as other frequent dosing patterns (Table 3).

As for the frequency of administration, the vast majority of participants (97.2%) used Ganja Oil daily. A small percentage used it only as needed (1.5%), every other day (0.25%), or just once (0.13%). In terms of administration routes, oral intake was the most common (92.99%), with non-oral methods being rare (0.12%). A combination of oral and non-oral routes was used by a minority of participants (0.23%).

Outcome Measures after Treatment

Following 3 months of treatment, significant improvements ($p < 0.001$) were observed in overall and both cancer and non-cancer groups in terms of the EQ-5D-5L index and all ESAS symptoms (shown in Fig. 2). The average increase in EQ-5D-5L index were 0.11 points (95% CI: 0.11, 0.11), 0.13 points (95% CI: 0.12, 0.14), and 0.11 points (95% CI: 0.10, 0.11), respectively. The most pronounced change was seen in ESAS pain scores, which decreased by −2.66 points (95% CI: −2.71, −2.61), −2.01 point (95% CI: −2.16, −1.87), and −2.75 points (95% CI: −2.80, −2.70), respectively. Other symptoms including tiredness, nausea, depression, anxiety, drowsiness, inappetence, unwell-being, and shortness of breath also showed marked improvements (Table 4). To further elucidate, Table 5 presents the outcomes of administering a single drop of Ganja Oil daily, demonstrating notable symptom improvement at week 4 across different conditions. The table specifically quantifies changes in pain (ESAS: Pain), insomnia (ESAS: Drowsiness), and anorexia (ESAS: In-appetite), underscoring Ganja Oil's diverse therapeutic effects.

Adverse Drug Reactions

In this study, which included 67,681 patient visits, ADRs were observed in 281 cases, translating to a rate of 0.42% of visits. Classified according to the Medical Dictionary for Regulatory Activities (MedDRA) terminology, the most frequent ADRs were dry mouth (0.18%, 119 visits), dizziness (0.06%, 39 visits), somnolence (0.03%, 20 visits),

Table 1. Baseline characteristics of study participants (n = 21,284)

Variables	n (%)	Mean±SD
Follow-up length		91.65±23.00
Gender (female)	10,096 (47.51)	
Age, years		54.10±15.32
Weight, kg		62.97±13.30
Height, cm		162.48±10.09
BMI, kg/m^2		24.11±18.44
Systolic blood pressure, mm Hg		128.54±17.98
Diastolic blood pressure, mm Hg		75.56±12.45
Pulse, beats/min		82.54±13.11
Prior cannabis use	886 (4.16)	
Occupation		
Unemployed	5,005 (26.90)	
Employee	3,963 (21.30)	
Private sector owner	3,492 (18.77)	
Government officer	2,209 (11.87)	
Agriculture	2,160 (11.61)	
Others	1,289 (6.93)	
Student	269 (1.45)	
Missing	217 (1.17)	
Comorbidities		
Hypertension	4,539 (21.33)	
Dyslipidemia	2,802 (13.16)	
Diabetes mellitus	2,540 (11.93)	
Cardiac disease	336 (1.58)	
Renal disease	295 (1.39)	
Psychiatric disease	162 (0.76)	
Liver disease	155 (0.73)	
Non-cancer	18,411 (86.50)	
Cancer	2,873 (13.50)	
Breast	588 (20.47)	
Colon	451 (15.7)	
Lung	418 (14.55)	
Liver	382 (13.3)	
Prostate	153 (5.33)	
Cervix	141 (4.91)	
Stomach	56 (1.95)	
Loss to follow-up rate		
Week 4	4,458 (20.95)	
Week 8	5,903 (27.73)	
Week 12	6,841 (32.01)	

BMI, body mass index.

abdominal pain (0.02%, 13 visits), palpitations (0.02%, 12 visits), renal impairment (0.01%, 9 visits), headache and insomnia (0.01%, 7 visits each), dyspepsia (0.01%, 6 visits), and nausea (0.01%, 5 visits). Additionally, several less common ADRs, grouped under "other," totaled 49 cases (0.07%) and encompassed symptoms like thirst, oral anesthesia, hyperhidrosis, tachycardia, asthenia, decreased appetite, changes in body temperature sensation, flatulence, hypoesthesia, mania, muscular weakness, rash, among other unique reactions, as detailed in Table 6.

Discussion

Implications of Legalizing Medical Cannabis

The global trend toward legalizing medical cannabis, as seen in countries like the USA, Canada, and many in Europe, marks a pivotal change in medical practice [33, 34]. While previous studies on cannabis users' quality of life have been limited in scope and size, often focusing on chronic pain relief [23–26], our study in Thailand, a country recently embracing medical cannabis on a

Table 2. Baseline quality-of-life scores by cancer status

Factor	Overall (n = 21,284)	Subgroup		
		cancer (n = 2,873)	non-cancer (n = 18,411)	p value
EQ-5D-5L	0.85±0.24	0.79±0.32	0.85±0.23	<0.001
ESAS				
Pain	3.77±3.28	3.30±3.22	3.84±3.28	<0.001
Tiredness	2.70±2.97	3.24±3.14	2.62±2.93	<0.001
Nausea	0.71±1.76	1.00±2.17	0.66±1.68	<0.001
Depression	1.06±2.22	0.91±2.05	1.08±2.24	<0.001
Anxiety	1.89±2.73	1.96±2.79	1.88±2.73	0.131
Drowsiness	1.49±2.44	1.31±2.33	1.52±2.46	<0.001
In-appetite	1.56±2.66	2.45±3.17	1.42±2.54	<0.001
Unwell-being	2.22±2.88	2.87±3.14	2.12±2.82	<0.001
Shortness of breath	1.30±2.34	1.79±2.75	1.22±2.26	<0.001

Statistical analysis: two independent sample t-tests.

Table 3. Ganja Oil prescription patterns by Thai traditional practitioners

Prescription pattern	Cannabis drops					
	<2	2	3	4	>4	total
Every day + before meals	71	26	95	7	46	245
Every day + after meals	1	0	6	0	4	11
Every day + before sleep	4,173	1,997	7,214	330	5,072	18,786
Every day + before meals + after meals	0	1	2	0	0	3
Every day + before meals + before sleep	21	37	43	3	18	122
Every day + after meals + before sleep	3	15	331	27	1,034	1,410
Other	117	93	207	6	284	707
Total	4,386	2,169	7,898	373	6,458	21,284

national scale, offers significant insights. It highlights practice patterns of traditional doctors, contributing to the foundation for future RCTs.

Quality of Life and Dose-Response Relationships

We observed significant improvements in EQ-5D-5L and all ESAS symptoms, with the most pronounced effects in addressing insomnia, pain symptoms, cancer-related discomfort, and migraines. Particularly notable were the ESAS pain scores, which may be linked to the antinociceptive properties of THC. Current research suggests that THC may alleviate pain through multiple pathways, including the activation of CB1 and CB2 receptors [35], modulation of TRPV1 channels [36], and engagement with PPAR receptors [2, 37, 38]. However, it is important to note that the understanding of these mechanisms is evolving, and the exact pathways through which THC exerts its analgesic effects are still under investigation. Additionally, the clinical relevance of these mechanisms in pain management and the potential for individual variability in response to THC treatment underscore the complexity of its action.

However, the literature presents mixed findings on cannabis's efficacy compared to placebo in pain reduction [39] and its short-term benefits for sleep improvement in chronic pain conditions [40, 41]. Furthermore, cannabis may temporarily alleviate sleep onset delay and enhance slow wave sleep, but chronic use may lead to tolerance and increased dependency risk. Besides pain management, cannabis has shown promise in improving the quality of life for cancer patients by inhibiting cancer cell proliferation and promoting apoptosis [42, 43] and in reducing the

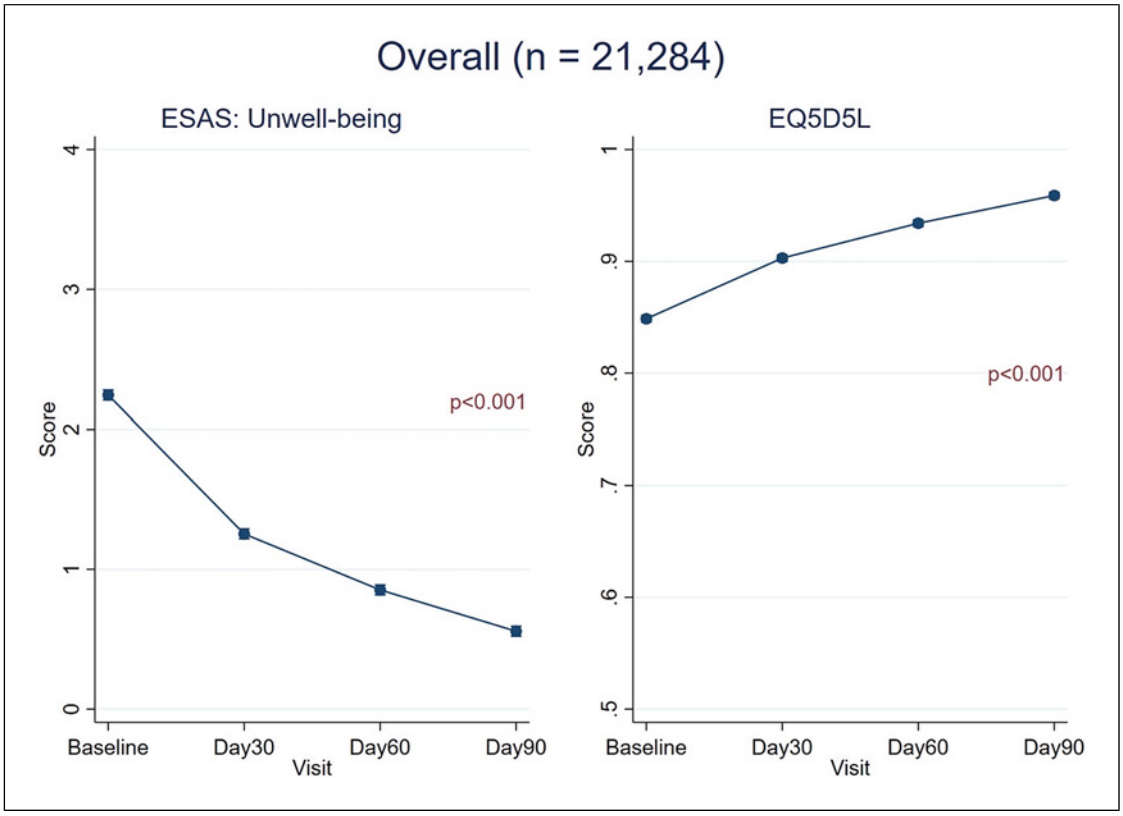

Fig. 2. Representing the EQ-5D-5L index and all ESAS symptoms in both cancer and non-cancer groups.

Table 4. Changes in quality of life and symptom severity from baseline to week 12

Factor	Overall (*n* = 21,284)		Subgroup			
			cancer (*n* = 2,873)		non-cancer (*n* = 18,411)	
	mean difference (95% CI)	*p* value	mean difference (95% CI)	*p* value	mean difference (95% CI)	*p* value
EQ-5D-5L	0.11 (0.11, 0.11)	<0.001	0.13 (0.12, 0.14)	<0.001	0.11 (0.10, 0.11)	<0.001
ESAS						
Pain	−2.66 (−2.71, −2.61)	<0.001	−2.01 (−2.16, −1.87)	<0.001	−2.75 (−2.80, −2.70)	<0.001
Tiredness	−2.02 (−2.06, −1.97)	<0.001	−2.15 (−2.28, −2.02)	<0.001	−1.99 (−2.03, −1.94)	<0.001
Nausea	−0.49 (−0.51, −0.46)	<0.001	−0.66 (−0.74, −0.58)	<0.001	−0.46 (−0.49, −0.43)	<0.001
Depression	−0.79 (−0.82, −0.75)	<0.001	−0.59 (−0.69, −0.50)	<0.001	−0.81 (−0.85, −0.78)	<0.001
Anxiety	−1.44 (−1.48, −1.40)	<0.001	−1.46 (−1.58, −1.35)	<0.001	−1.44 (−1.48, −1.40)	<0.001
Drowsiness	−1.04 (−1.08, −1.01)	<0.001	−0.79 (−0.90, −0.68)	<0.001	−1.08 (−1.12, −1.04)	<0.001
In-appetite	−1.20 (−1.24, −1.17)	<0.001	−1.67 (−1.78, −1.56)	<0.001	−1.12 (−1.16, −1.08)	<0.001
Unwell-being	−1.67 (−1.71, −1.62)	<0.001	−1.97 (−2.10, −1.85)	<0.001	−1.61 (−1.65, −1.57)	<0.001
Shortness of breath	−0.91 (−0.94, −0.87)	<0.001	−1.11 (−1.21, −1.00)	<0.001	−0.87 (−0.90, −0.83)	<0.001

Statistical analysis: GEE. GEE, Generalized Estimating Equation.

Table 5. Effects of a daily drop of cannabis oil on symptoms over 4 weeks across different conditions

Factor	Overall (n = 3,337)		Cancer (n = 406)		Migraine (n = 257)		Parkinson's (n = 134)	
	difference (95% CI)	p value	difference (95% CI)	p value	difference (95% CI)	p value	difference (95% CI)	p value
Pain	−1.42 (−1.53, −1.31)	<0.001	−1.07 (−1.38, −0.77)	<0.001	−3.00 (−3.44, −2.56)	<0.001	−1.08 (−1.63, −0.52)	<0.001
Insomnia	−0.39 (−0.49, −0.30)	<0.001	−0.55 (−0.79, −0.32)	<0.001	−0.86 (−1.25, −0.47)	<0.001	−0.38 (−0.88, 0.12)	0.136
Anorexia	−0.59 (−0.68, −0.50	<0.001	−0.92 (−1.18, −0.65)	<0.001	−1.20 (−1.57, −0.83)	<0.001	−0.48 (−0.88, −0.08)	0.020

Statistical analysis: paired t-test.

frequency, intensity, and duration of migraine headaches [44, 45].

In our study, the prevalent practice involved administering no more than three drops of Ganja Oil at bedtime. This oil was a combination of cannabis and coconut oil containing 0.08 mg of THC per drop. Notably, the effectiveness of a single drop varied significantly depending on the specific medical condition being treated. For example, patients with Parkinson's disease, cancer, and migraines found considerable relief from symptoms such as pain, insomnia, and anorexia when using this oil. Interestingly, migraine sufferers reported a relatively higher degree of pain relief compared to those with cancer or Parkinson's disease. These observations could inform policy decisions regarding the controlled use of cannabis oil.

Presently, Ganja Oil is classified under "Category 3" on the NLHM, which pertains to project-based implementation supported by national and public sponsors. However, the encouraging results of our study suggest that Ganja Oil could be upgraded to "Category 2," a classification reserved for specialized herbal recipes prescribed by traditional practitioners. Such a reclassification would aid in establishing foundational guidelines for optimal dosing. Nonetheless, it is important to emphasize the continuing need for personalized dosing strategies, considering the variability in individual responses to cannabis oil treatment.

Integration of Traditional and Conventional Medicine

The integration of traditional medicine with conventional medical practices emerged as a key aspect of our study. We aim to harmonize care processes, where patients are managed by both conventional and traditional medicine practitioners. This study exemplifies harmonizing different philosophical viers, with the prescribing practice pattern information being useful for future studies. While traditional practitioners complement rather than replace specialists, this integration can enhance overall patient care. However, challenges such as prescribing difficulties and the lack of extensive research remain [46, 47]. Our approach in a newly legalized context could serve as a model for other nations, illustrating the impact of research-driven policy on healthcare.

Study Limitations and Future Research

Our study offers important insights into the use of medical cannabis in a clinical setting, yet it has notable limitations that merit discussion. Chief among these is the absence of a control group, which inherently limits the robustness of our conclusions by precluding direct causal inferences and comparisons. This methodological constraint is particularly relevant in light of observations regarding the administered THC could be considered sub-therapeutic. Such a dosage raises considerations about the potential for placebo effects to influence the reported outcomes. A significant limitation that further impacts the study's conclusions is the observed loss to follow-up rate of approximately 32.01%, particularly noted by week 12. The specific reasons for participant dropout were not collected, which hinders our understanding of the factors influencing attrition and may introduce bias into the results. This aspect underscores the need for future research to systematically collect data on reasons for dropout, to implement strategies aimed at minimizing loss to follow-up, and to explore its potential effects on study outcomes. Additionally, the findings' generalizability may be constrained by the unique cultural and regulatory contexts of Thailand, which might not be representative of other regions. While self-reported prescription data from practitioners provide valuable insights, they may not fully reflect the complexity and precision of clinical practices. Moreover, the study did not

Table 6. Overview of ADRs

Demographic details of patients reporting ADRs (n = 151)		ADR instances (n = 281)	
factor	n (%)	type	n (%)
Gender		Dry mouth	119 (0.18)
Female	73 (48.34)	Dizziness	39 (0.06)
Male	78 (51.66)	Somnolence	20 (0.03)
Average age	58.89±13.16	Abdominal pain	13 (0.02)
Average BMI	23.31±3.96	Palpitation	12 (0.02)
		Renal impairment	9 (0.01)
		Headache	7 (0.01)
		Insomnia	7 (0.01)
		Dyspepsia	6 (0.01)
		Nausea	5 (0.01)
		Thirst	4 (0.01)
		Anesthesia oral	3 (0)
		Hyperhidrosis	3 (0)
		Tachycardia	3 (0)
		Asthenia	2 (0)
		Decreased appetite	2 (0)
		Feeling of body temperature change	2 (0)
		Flatulence	2 (0)
		Hypoesthesia	2 (0)
		Mania	2 (0)
		Muscular weakness	2 (0)
		Rash	2 (0)
		Anxiety	1 (0)
		Azotemia	1 (0)
		Cerebrovascular disorder	1 (0)
		Constipation	1 (0)
		Depression	1 (0)
		Fatigue	1 (0)
		Flushing	1 (0)
		Gravitational edema	1 (0)
		Hemorrhoids	1 (0)
		Hyperkinesia	1 (0)
		Hypertension	1 (0)
		Edema	1 (0)
		Pruritus	1 (0)
		Stomatitis	1 (0)
		Tongue disorder	1 (0)

BMI, body mass index.

fully address various uncontrolled confounding factors, particularly nonmedical ones, which could have impacted the outcomes.

Future research should prioritize multicountry, multicenter studies incorporating control groups to bolster the robustness and extend the applicability of the findings. Investigating optimal dosing regimens for different conditions and symptoms, as well as the long-term effects of medical cannabis use, is essential. Additionally, our study's methodology and process of obtaining ethics approval across multiple sites could serve as a model for similar studies.

Another area for future exploration, emerging from our findings, is the investigation of unconventional cannabis applications, such as vaginal applications for pelvic pain relief. This aspect was less explored but showed potential benefits, contrasting with the predominant focus on oral or smoked cannabis in the existing literature [48, 49]. Patients' growing interest in topical vulvar and vaginal cannabis products indicates a need for further research in this area.

Collaborative efforts blending traditional and conventional medicine could lead to innovative, integrated healthcare models, expanding the therapeutic potential of cannabis in diverse clinical contexts.

Conclusion

This nationwide study marks a substantial step forward in the comprehension of medical cannabis, particularly highlighting its effectiveness in enhancing the quality of life for patients in a real-world setting. It underscores the importance of identifying optimal dosages and the potential benefits of integrating traditional medicine practices with conventional medicine approaches. Although the study faces certain limitations, such as the lack of a control group and potential regional specificities, it provides crucial insights that could inform future research directions and aid in shaping healthcare policies related to medical cannabis use. The findings lay the groundwork for further exploration into personalized treatment plans and the broader application of cannabis in medical therapy.

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Statement of Ethics

The Ethical Review Committee for Research in Human Subjects, Ministry of Public Health, Thailand, gave ethical approval for this study (Ref.No.36-2562). The study was registered with the Thai Clinical Trial Registry (No. TCTR20191231001).

The study was conducted in accordance with the Declaration of Helsinki and the International Conference on Harmonization Good Clinical Practice guidelines. All participants provided written informed consent after receiving a thorough explanation of the study methods and conditions. Participants retained the right to withdraw consent at any stage.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Krit Pongpirul conceptualized and designed the study. Pramote Stienrut, Krit Pongpirul, Pimlada Pongchaichanon, Ornpapha Chanhom, Panthakan Jeamjumrus, Preecha Nootim, Mala Soisamrong, Anchalee Chuthaputti, Kulthanit Wanaratna, and Tewan Thaneerat collected the data. Krit Pongpirul, Phanupong Phutrakool, Chatuthanai Savigamin, and Pim Sermsaksasithorn analyzed and interpreted the data. Krit Pongpirul, Chatuthanai Savigamin, and Pim Sermsaksasithorn drafted the manuscript. Preecha Nootim, Tewan Thaneerat, and Kulthanit Wanaratna supervised the study. All the authors reviewed and approved the final version of the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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