Original Article

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Effectiveness of Cannabis Sativa-Infused Drip Tea on Happiness Among Individuals Interested in Medical Cannabis-Based Care: A Quasi-Experimental Study

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Abstract:

Objective: Every human being desires to be happy. Cannabis is a plant that contains cannabinoid compounds that have pharmacological effects, with mood-altering properties. Therefore, the objective of this study was to investigate the acceptance and effects of cannabis-infused drip tea on happiness levels.

Material and Methods: Thirty volunteers interested in cannabis-based healthcare were selected using a purposive sampling method. The sample was divided into three groups (10 people/group, with each group receiving drip tea infused with 3%, 5%, and 7% w/w cannabis). The tea was prepared by steeping cannabis leaves in hot water for 30 minutes. Participants consumed the cannabis-infused drip tea daily before bedtime for a week.

Results: The results demonstrated a statistically significant increase in happiness levels between pre-experimental and post-experimental groups, indicating that cannabis-infused tea had a positive effect on participants' well-being. Among the formulations tested, the 7% w/w cannabis-infused drip tea yielded the highest level of happiness score. These results highlight the potential use of cannabis-infused tea in increasing happiness levels compared to typical baseline levels.

Conclusion: The use of herbal teas is a traditional approach employed by Thai traditional and folk medicine practitioners for health promotion and treatment. The findings from this study support the potential application of cannabis-infused tea in improving happiness levels. However, further studies are recommended to explore the long-term consumption of cannabis-infused tea to determine its efficacy and safety.

Keywords: Cannabis sativa, happiness, health, tea, THC, traditional medicine

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Introduction

Many countries currently allow the use of cannabis or cannabinoids for medical purposes, although guidelines regarding approved products and possession limits vary by country[1]. Since the 1930s, cannabis has been classified as a controlled substance in Thailand[2]. However, on February 18, 2019, Thailand passed legislation legalizing the use of cannabis for medical purposes[1]. This shift gained momentum through political support, particularly from parties that promoted cannabis legalization as a central policy during the 2020 elections. Thailand became the first country in Southeast Asia to enact such a reform through the amendment of the Narcotics Act B.E. 1979, now updated as the Narcotics Act B.E. 2562. Under this revised law, cannabis remains classified as a Class 5 drug, and recreational use is still prohibited[3]. The initial implementation followed a model similar to California's, permitting households to cultivate up to 7 cannabis plants for personal medicinal use[4]. The Ministry of Public Health in Thailand has issued guidelines for the treatment and use of cannabis in Thailand, aiming to raise public awareness about certified medical marijuana providers and standard practices. These guidelines include both modern and traditional applications for a variety of conditions. Healthcare professionals and traditional Thai medicine practitioners are required to complete short-term training programs to obtain licenses for dispensing medicines containing cannabis[5]. Three groups of medical cannabis products have been approved for use: (1) registered pharmaceutical drugs under the revised Narcotics Act, (2) certified Thai traditional medicine recipes containing cannabis (16 approved formulas), and (3) cannabis oils derived from traditional medicine preparations[6].

Cannabis contains more than 500 bioactive compounds, including two major cannabinoids: tetrahydrocannabinol (THC) and cannabidiol (CBD). Notably, cannabis contains relatively high amounts of Δ 9 -tetrahydrocannabinol (Δ 9 -THC), the primary psychoactive constituent[7]. Cannabis is considered a biologically active plant with more than 150 isolated phytocannabinoids[8]. Recently, the Sativa strain, composed of both THC and CBD, has attracted attention for its potential in treating psychiatric disorders associated with central nervous system dysfunctions[9]. Endocannabinoids play an important role in combating depression, generalized anxiety, and bipolar disorder. Therefore, *cannabis sativa* has been recommended as a therapeutic agent targeting the endocannabinoid system within the body and brain[10].

Currently, laws and regulations regarding the use of cannabis are rapidly evolving around the world[11,12]. However, there are notable differences in terms of policies across countries, including legalization. Research findings from European countries are more prevalent compared to those from Asian nations such as Thailand, Malaysia, India, Iran, and Nepal[13]. The use of cannabis for both medical and recreational purposes has been steadily increasing in recent years[14]. In particular, cannabis for medical consumption has significantly increased[15,16]. Patients commonly use cannabis to manage conditions such as chronic pain, anxiety, depression, or mood disorders[17,18]. About 55% of cannabis users primarily use it to manage psychiatric disorders[19]. Studies have also suggested that medical marijuana may serve as a substitute for approximately 60% of prescription medications. Moreover, synthetic cannabinoids such as nabilone have been studied for their potential in alleviating restlessness in patients with dementia[20]. Despite its therapeutic potential, about 26% of users consume cannabis recreationally for the purpose of enhancing mood or experiencing euphoria[21].

Happiness is closely associated with mental health. The Department of Mental Health defines happiness as: "Good mental health or well-being, which is derived from having the skills to solve everyday problems and the potential for self-development for a better quality of life."

It also involves mental resilience in response to changes in the social environment. In 2000, the Thai Government developed the Thai Mental Health Index (TMHI) as a tool for measuring both mental health and happiness. However, the TMHI does not encompass physical, mental, and social health dimensions comprehensively[22]. It also excludes euphoric mood, a state characterized by an exaggerated sense of well-being, which can be indicative of emotional disorders such as bipolar disorder. Humans desire happiness in life, a feeling caused by the secretion of certain chemicals by cells in the brain[23]. Neurotransmitters involved in regulating happiness include dopamine, oxytocin, serotonin, endocannabinoids, endorphins, adrenaline, norepinephrine, cortisol, and melatonin[24]. Happiness is an emotion influenced by various factors, including biology, cognition, behavior, and sociocultural elements[23]. Many sociological and psychological studies aim to investigate happiness and its relationship with health. Research suggests that impaired happiness could increase the risk of developing diseases. Happiness encompasses several elements, including emotional well-being (feelings of pleasure and happiness), as well as eudaimonic well-being (the meaning, purpose, and satisfaction of life)[25] .

Thai traditional medicine is a holistic medical practice that involves the examination, diagnosis, therapy, disease prevention, promotion, and restoration of well-being. It relies on a balance between the four basic elements: earth, water, wind, and fire[26]. These elements represent heat (fire), liquid (water), gas and air (wind), and flesh and bone (earth) of the body. An imbalance in the elements of the body, resulting from a deficit, surplus, or disability, could cause illness to occur[27]. Herbal medicine plays a central role in Asia[28]. Historically, herbs have been consumed because the phytochemicals found in their parts (leaves, flowers, fruits, bark, roots, and rhizomes) are important for human life and health. Regular consumption of a variety of plants and spices is beneficial due to their high antioxidant content, which contributes positively to overall health.

Tea is a pleasant drink made by steeping the leaves of tea plants in hot water. Known for its pleasant aroma, it is commonly consumed as part of daily routines. "Herbal tea" refers to a variation in which herbs are used as an alternative to traditional tea leaves. Herbal teas are popular around the world, with their use spreading from East to West. These teas are prepared through maceration or decoction to isolate the bioactive constituents. The specific health benefits of herbal tea depend on the primary ingredients, which typically consist of various types of herbs selected for their flavor and aroma. Secondary components of tea are often added to enhance the tea's bioactivity, flavoring, or coloring[27].

Every human being desires happiness, making it a subject of great research interest. Cannabis has emerged as a potential agent in promoting happiness, with literaturereporting its effectiveness in alleviating depression and anxiety[10]. However, there is limited research exploring the effects of cannabis on happiness. Therefore, this study aimed to evaluate the acceptance and effectiveness of cannabis-infused drip tea in enhancing happiness.

Material and Methods

Study design

This study employed a quasi-experimental design to assess the effects of cannabis-infused drip tea on happiness levels. A total of 62 individuals who showed interest in using medical marijuana for healthcare were initially recruited.

Sample size

Out of the 62 individuals, 2 declined to participate. According to the exclusion criteria, 23 participants were excluded due to the use of sedatives or other psychotropic

medications, and 7 were excluded for being over 59 years of age (Figure 1). The remaining 30 eligible participants were referred by the Institute for Research and Development of Hemp, Cannabis, and Herbs, Rajamangala University of Technology Isan, Sakon Nakhon Campus. These participants were then randomly assigned into 3 groups (10 people/group), each receiving a different concentration of cannabis-infused drip tea (3%, 5%, and 7% w/w)[29].

Inclusion criteria comprised individuals of any gender, aged between 20 and 59 years, in good health, able to communicate effectively, and voluntarily willing to participate in the study.

Exclusion criteria included people with a history of allergies to drugs or products containing cannabis, peppermint, or stevia. Pregnant or breastfeeding women and individuals taking sedatives or other psychoactive drugs were also excluded from participating (Figure 1).

The experiment used drip tea formulations containing 3%, 5%, and 7% w/w cannabis leaves. These prototype tea formulations were developed in Rajamangala University of Technology Isan, Sakon Nakhon Campus[29]. The identified active constituents included essential oils, flavoring substances, compounds with anti-inflammatory properties, antioxidants, antibacterials, antidiabetics, antifungals, and anticancer activities. The results revealed that the formulations containing 5% and 7% cannabis improved sleep quality. There were no adverse reactions reported during the use of this product[30].

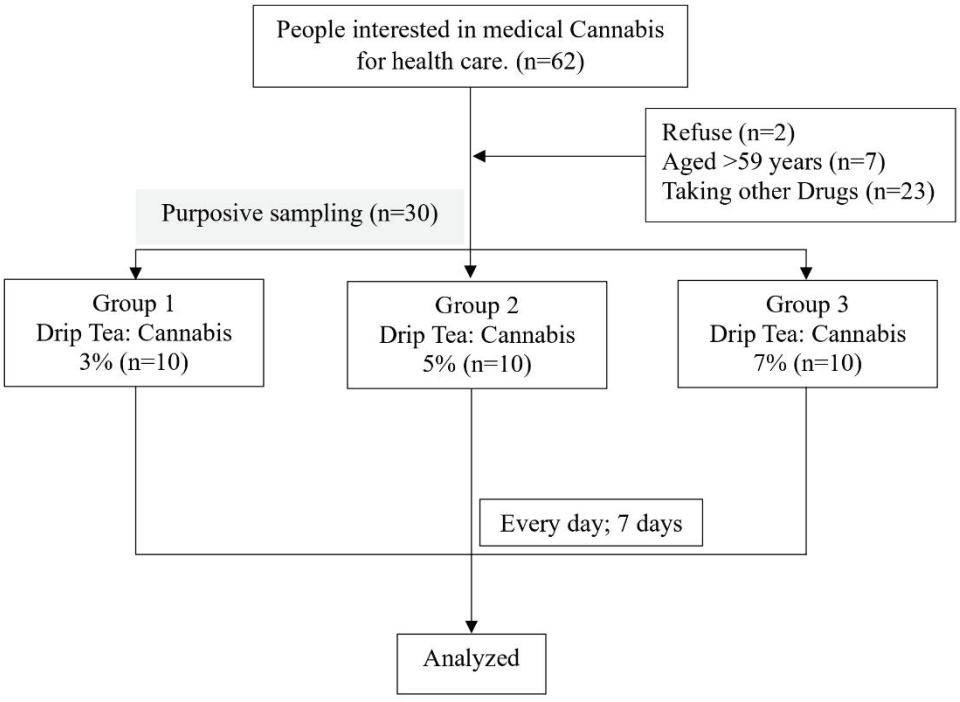


Figure 1 Flow chart of the study

Research instruments

Questionnaire for data collection

Part I: General information: this section included gender, age, average monthly income, chronic diseases, and consumption history of drugs or products containing cannabis.

Part II: Effectiveness of cannabis- infused drip tea on happiness based on Thai Mental Health Indicators (TMHI). The short version of TMHI, comprising 15 items, was used to evaluate the participants' happiness[22]. This tool is widely used to evaluate mental health in the Thai population and includes 4 domains: 1) mental state, 2) mental capacity, 3) mental quality, and 4) supporting factors. A previous study found substantial agreement between the long and the short versions of TMHI (kappa statistic 0.63).

Part III: Acceptance evaluation of cannabis-infused drip tea. The acceptability was evaluated in terms of appearance, odor, consistency, taste, and overall acceptability. A 9-point hedonic scale was used, ranging from "extremely dislike" to "extremely like"[31].

Part IV: Adverse reactions experienced during the use of the product and other suggestions were collected through an open-ended questionnaire.

Data collection

1. The purpose of the study, research methodology, potential risks or symptoms, and benefits of voluntary participation were clearly explained to all volunteers."

2. Thai traditional physicians specializing in cannabis screened and classified eligible participants. The volunteers signed a consent form and were divided into three groups using random sampling, and were subsequently given 3%, 5%, and 7%w/w cannabis-infused drip tea.

3. Prior to the intervention, participants completed a questionnaire that included part 1 (general information) and part 2 (effectiveness of cannabis-infused drip tea on happiness), serving as a pre-trial baseline assessment.

4. Each volunteer received 7 tea bags of cannabis-infused tea (0.75g/ tea bag), a measuring cup (volume of 250 ml), and written instructions on how to prepare and drink the tea.

5. Volunteers were instructed to prepare the drip tea at home by steeping one tea bag in 250 ml of hot water for 10 minutes. They were to consume the tea once daily, 30 minutes before bedtime, for a period of 7 consecutive days.

6. On Day 8, after the 7-day tea consumption period, participants were contacted for a phone interview to complete the following assessments:

Part II: Post-intervention evaluation of happiness using the TMHI

Part III: Product acceptance assessment

Part IV: Reporting of adverse reactions and additional suggestions

Data analysis

Demographic data were summarized using descriptive statistics in R. The median was analyzed using the Kruskal-Wallis test via the package "rstatix"[32]. To assess the changes in happiness levels before and after the consumption of cannabis-infused tea, a paired-sample Wilcoxon test was performed at a 95% confidence level (p-value<0.05), using the package "stats" in the R programming language[33].

Ethics in research

This work was approved by the Human Research Ethics Committee, Faculty of Natural Resources, Rajamangala University of Technology Isan, Sakon Nakhon Campus, Thailand. The ethical review process adhered to the principles outlined in the Declaration of Helsinki and Good Clinical Research Practices (ICH GCP). The study was approved under reference number: NRFIP-036.

Results

The study involved a total of 30 participants, equally divided into three groups. In Group 1, two-thirds of the members were male, predominantly aged between 40 and59 years. Group 2 had an equal number of male and female participants, with the majority falling within the 30-39 age bracket. Group 3 was primarily male, with most participants also in the 30-39 age range. Across all groups, most participants did not have chronic diseases and lacked a history of consuming drugs or products containing cannabis. Furthermore, there were non-significant differences in the characteristics of participants across the three groups, indicating a consistent distribution of demographic and health-related factors among the study population.

Table 2 presents the effectiveness of drip tea infused with cannabis on happiness. Prior to the trial, there were no significant differences in happiness scores between the groups. However, post-experimental data revealed statistically significant differences. The findings indicate that consuming drip tea containing 3%, 5%, or 7% cannabis resulted in increased happiness scores, surpassing the average baseline level of happiness.

The effectiveness of cannabis-infused tea on happiness was evaluated across 4 domains, with comparisons of before and after the trial (Table 3). The 3 and 5% w/w cannabis formulations were associated with improvements in mental state and supporting factors. Specifically, both formulations demonstrated improvements in life satisfaction and increased self-respect.

Table 1 Characteristics of participants

Characteristics	Group 1[a]	Group 2[b]	Group 3[c]	p-value
n (%)				
Gender				
Male	7 (70)	5 (50)	6 (60)	0.668
Female	3 (30)	5 (50)	4 (40)	
Age (years)				
20-29	1 (10)	2 (20)	1 (10)	0.149
30-39	1 (10)	5 (50)	6 (60)	
40-49	4 (40)	1 (10)	1 (10)	
50-59	4 (40)	2 (20)	2 (20)	
Average monthly income (Baht)				
Under 10,000 THB/month	3 (30)	6 (60)	4 (40)	0.171
10,000 – 20,000 THB/month	1 (10)	3 (30)	3 (30)	
20,001 – 30,000 THB/month	3 (30)	0 (0)	2 (20)	
More than 30,000 THB/month	3 (30)	1 (10)	1 (10)	
Chronic diseases				
None	9 (90)	9 (90)	9 (90)	1.000
Have a chronic disease	1 (10)	1 (10)	1 (10)	
Consumption history of drugs or products containing cannabis				
Never used.				
Have used.	10 (100)	9 (90)	7 (70)	0.142
	0 (0)	1 (10)	3 (30)	

*Between group: Kruskal-Wallis Test; $p<0.05$, [a]Drip Tea infused with 3% cannabis, [b]Drip Tea infused with 5% cannabis, [c]Drip Tea infused with 7% cannabis

Table 2 Effectiveness of drip tea infused with cannabis on happiness

	Group 1[a]		Group 2[b]		Group 3[c]		p-value
	Mean±S.D.	Interpret	Mean±S.D.	Interpret	Mean±S.D.	Interpret	
Before	29.70±3.19	Fair	31.40±3.17	Fair	31.00±5.81	Fair	0.329
After	31.20±3.08	Fair	35.00±3.46	Good	41.10±1.37	Good	0.000†
p-value	0.023*		0.000*		0.000*		

*Before-After; paired-sample Wilcoxon test, †Between Groups; Kruskal-Wallis test; p-value<0.05, [a]Drip Tea infused with 3% cannabis, [b]Drip Tea infused with 5% cannabis, [c]Drip Tea infused with 7% cannabis as a 7% component

Table 3 The effectiveness of drip tea infused with cannabis across the 4 domains

Domains	Group 1[a]		Group 2[b]		Group 3[c]	
	Mean±S.D.	p-value	Mean±S.D.	p-value	Mean±S.D.	p-value
1: Mental state						
Before	2.13±0.77	0.015*	2.18±0.62	0.000*	2.13±0.81	0.000*
After	2.28±0.74		2.48±0.68		2.83±0.38	
2: Mental capacity						
Before	1.90±0.71	0.407	1.83±0.75	0.131	1.97±0.89	0.000*
After	1.80±0.89		2.07±0.78		2.67±0.71	
3: Mental quality						
Before	1.83±0.65	0.766	2.17±0.70	0.802	2.00±0.87	0.000*
After	1.80±0.71		2.20±0.76		2.50±0.73	
4: Supporting Factors						
Before	1.90±0.55	0.008*	2.10±0.61	0.008*	2.10±0.66	0.000*
After	2.23±0.68		2.43±0.63		2.87±0.35	

*paired-sample Wilcoxon test; p-value<0.05, [a]Drip Tea infused with 3% cannabis, [b]Drip Tea infused with 5% cannabis, [c]Drip Tea infused with 7% cannabis

Tea infused with cannabis at 7% was found to be the most suitable formula for increased happiness. It contributed to improvements in life satisfaction, self-esteem, the ability to confront and accept problems, the ability to regulate emotions, a sense of confidence, a sense of empathy for others, and a greater sense of security with family.

Happiness is a psychological state influenced by the secretions of specific chemicals produced by brain cells[23]. Drinking cannabis-infused tea affects neurotransmitters due to the presence of active constituents, such as dopamine, oxytocin, serotonin, endocannabinoids, endorphins, adrenaline, norepinephrine, cortisol, and melatonin. These neurochemicals play a significant role in regulating overall psychological well-being[24].

None of the participants reported any adverse reactions after consuming the cannabis-infused drip tea. According to TMHI, the 7%w/w cannabis-infused tea was identified as the most suitable formulation, as it increased happiness across all the 4 domains.

Acceptance analysis of cannabis-infused drip tea showed that the formulation with 7% w/w cannabis had the highest average acceptance score. The formulations with 3% w/w and 5% w/w cannabis revealed medium preference and slightly increased preference levels, respectively (Figure 2).

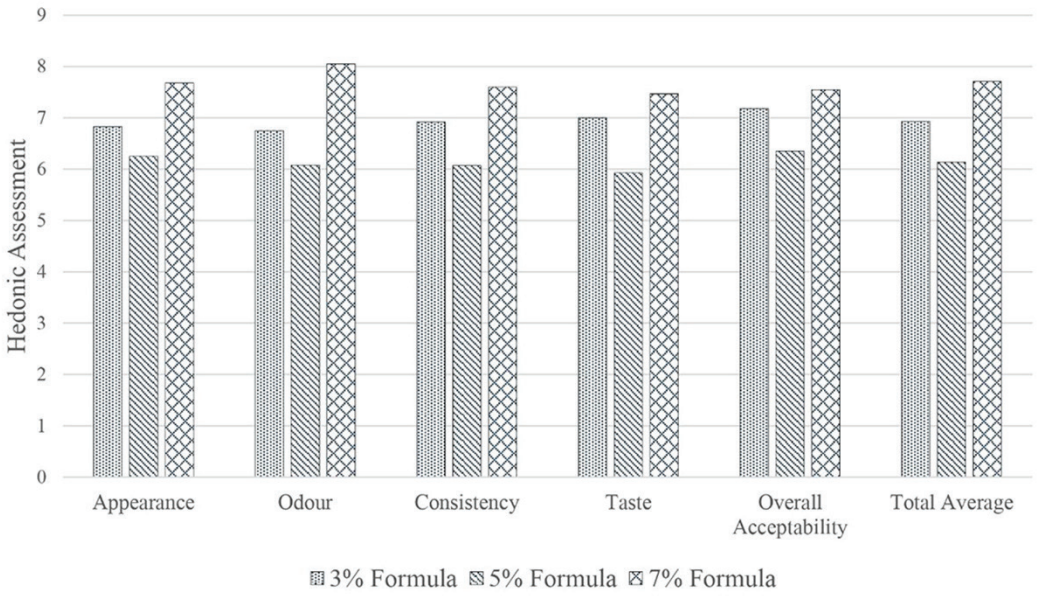


Figure 2 Acceptability results of drip tea infused with 3%, 5%, and 7% w/w cannabis

Discussion

The effectiveness of cannabis-infused drip tea on happiness was evaluated using prototype tea products developed under the project "prototype products containing cannabis" at Rajamangala University of Technology Isan Sakon Nakhon Campus, Thailand. The formulations included 3%, 5%, and 7% w/w cannabis. The results showed that consuming tea infused with 5% and 7% w/w cannabis 30 minutes before bed for 7 days had a significant impact on happiness compared to a normal scale. In contrast, the 3% formulation did not yield a statistically significant change in happiness scores before and after the trial. The findings suggest that the 5% and 7% cannabis-infused teas positively affected happiness, as reflected by an increase in positive index scores. Spillane et al[34]. reported an increase in the happiness scale with the appropriate formulation of cannabis-infused tea. Notably, the study indicated a reduced risk of inducing euphoric mood states, which are often associated with bipolar disorders and involve excessive happiness beyond typical emotional experiences. Cannabis contains phytocannabinoids, including cannabidiol (CBD), which possess a range of medicinal properties. CBD has been used in the treatment of diseases associated with central nervous system dysfunction[9]. Endocannabinoids play a key role in regulating mood disorders such as depression, generalized anxiety disorder, and bipolar disorder. The cannabis sativa strain has been recommended for supporting the body's endocannabinoid system, particularly its effects on the brain[10]. Furthermore, CBD has been shown to reduce pain levels in patients, potentially allowing them to decrease or discontinue the use of conventional painkillers[16]. Drinking cannabis-infused tea containing 5% and 7% concentrations approximately 30 minutes before bedtime for one week has shown potential in promoting relaxation, particularly in individuals with anxiety disorders or those at risk of severe psychological conditions, such as suicidal ideation. However, particular caution should be taken in individuals with an undiagnosed mental disorder,

a group that accounted for 12.9% before the legalization of cannabis and kratom in Thailand[35]. Medical cannabis has been associated with a reduction in anxiety, emotional instability, and depression symptoms by approximately 55%, according to studies related to mental health[19]. Literature on the diagnosis and treatment of individuals in suicidal crises, many of whom are diagnosed with bipolar disorder, has revealed a statistically significant correlation between traditional antidepressant use and increased suicide risk[36]. Therefore, cannabis-based tea products may be a promising avenue for healthcare research and therapeutic applications in treating neurodegenerative disorders.

Drip tea infused with cannabis impacted the level of happiness compared to the normal state of average baseline happiness. There is a possibility that the pharmacological effects of herbal substances infused in the cannabis-based drip tea, such as peppermint and stevia, contributed to the overall effects reported. Cannabis contains Δ-9-tetrahydrocannabinol (THC), which enters the brain and binds to the cannabinoid receptors (CB) of CB1 and CB2. This causes euphoria, relaxation, anxiety, happiness (sense of well-being), and regulation of the nervous system. Peppermint (*Melissa officinalis*) contains active constituents with the refreshing aroma of menthol, limonene, and neomenthol, which contribute to relaxation. Stevia contains stevioside, a sweetener that is very low in calories and used in small amounts as a sweetening agent[30].

Cannabis contains more than 560 compounds, 120 of which are cannabinoids. The Δ 9 -tetrahydrocannabinol and cannabidiol are the main compounds, and they have great pharmacological and therapeutic potential[37]. However, there have been reports of acute cannabis toxicity, which usually manifests as palpitations, anxiety, and chest pain. It is noteworthy that most cannabis intoxication cases are mild, and cannabis-related fatalities are rare[38]. The use of lower doses of cannabis has been reported to have a mild or moderate toxicity and adverse effects, including diarrhea, drowsiness, sedation, and upper respiratory disturbances. Toxicity and serious adverse effects have been reported when cannabidiol is used in combination with other drugs, such as clobazam and valproate[39].

Conclusion

Herbal tea is one of the approaches used by Thai traditional medicine practitioners to treat patients. In recent years, the emergence of alternative health beverages has gained increasing attention, particularly drip tea infused with cannabis, which aligns with traditional Thai medicinal principles. This formulation has been shown to improve circulatory function and stimulate the nervous system. Additionally, cannabis-infused tea enhanced the state of happiness without reported side effects. Therefore, this prototype tea could be consumed at the optimum dose to maintain health and well-being.

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Conflict of interest

There are no potential conflicts of interest to declare.

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