RESEARCH ARTICLE

Factors Influencing Demand for Medical Cannabis Use among Cancer Patients in the North of Thailand

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Abstract

Objective: Cancer treatments often cause side effects. Cannabis is a plant that has been studied and used to treat and relieve side effects from modern medicine. Medical cannabis (MC) was legalized in Thailand in 2019 with limited research on demand for its use. Therefore, this study aimed to identify factors associated with demand for MC use among cancer patients in the North of Thailand. **Methods:** This analytical cross-sectional study administered a multistage random sampling to recruit 1,284 cancer patients in northern Thailand to response a self-administered structured questionnaire. Generalized Linear Mixed Model (GLMM) was used to identify the determinants of demand for MC use among the population, presented adjusted odds ratios (adj.OR), 95% confidence intervals (95% CI), and p-values. **Result:** Nearly half of the respondents reported demand to use MC (44.0%). The factors that were significantly associated with demand to use MC included had high levels of health literacy about MC (adj.OR = 5.70; 95% CI: 4.08 to 7.96), higher levels of social support (adj.OR =5.50; 95% CI: 3.60 to 8.39), positive attitudes toward MC use (adj.OR = 2.56; 95% CI: 1.83 to 3.56), aged less than 30 (adj.OR =1.89; 95% CI: 1.21 to 2.93), diagnosis with cancerfor more than 12 months ago (adj.OR =1.73; 95% CI: 1.19 to 2.52) when controlling effect of other covariates. **Conclusion:** We found substantial demand for MC use among cancer patients. Health literacy,social support, attitudes about MC, age, and duration of having cancer were significantly associated with demand for MC use. Therefore, improving health literacy and social support, especially among older cancer patients, could help increasing demand for MC as a complementary medicine to treat cancers.

Keywords: Alternative medicine- contemporary medicine- ganja- marijuana

Introduction

While significant advancements in cancer therapy have been achieved, cancerremains a major medical and public health problem (Markham et al., 2020). Malignancies ranked as the second leading cause of death worldwide in 2018, accounting for an estimatedof 9.6 million deaths (WHO, 2018).The burden of cancer in Thailand is similarly significant, with more than 170,000 cancer cases and 114,000 cancer deathsrecorded in 2018, comprising over36% of the prematuredeaths attributable to non-communicable disease (WHO, 2020).Cancers of the liver, lung, colon and rectum, breast, stomach, and gallbladder are the most common sites for malignancy in Thailand, each contributing from 1 to 5% of all total deaths.Incidence of cancer types differs among the country's regionsdue to differences in cultural and lifestyle patterns (Virani et al., 2017). Liver and lung cancers, in particular,are expected to increase in the north and

northeast of the country.The magnitude of the problem requires not only sufficient access to the curative sector but also the integration of public health into optimal efforts for cancer diagnosis and therapy. The main goal should be to prolong the patient's life with the best possible quality of life (QOL) ("WHO | Cancer control. Knowledge into action," n.d.).

Cannabis is a plant that has been studied and used to relieve side effects from existing cancer treatments. The primary group of active chemicalsin cannabis is cannabinoids with several of these compounds used as medicinal substances.The two most commonly used compounds are delta-9 tetrahydrocannabinol (THC) and Cannabidiol (CBD),with both chemicals acting through the endocannabinoid system (Lal et al., 2021). These cannabinoids have been used as a pain reliever, antiemetic drug in chemotherapy treatment, appetite stimulant, stress reliever, and sleep aid (Abrams and Guzman, 2015). The use of cannabis in cancer patients, however, can

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cause side effects such as dry mouth, nausea, vomiting, confusion. Special attention is needed for older adults with cardiovascular disease in whom palpitations, tachycardia, high blood pressure can occur, as well as people with mental illness (Whiting et al.,2015; Sexton et al., 2016).

In Thailand, medical cannabis (MC) remains a new concept with only limited research available. The Thai government authorized the use of cannabis for medical purposes in 2019. The rapid introduction of MC has led to misconceptions and controversies, such as 1) the belief that cannabis can cure all diseases, 2) the growth of illegal cannabis trading through online media, and 3) the pursuit of marijuana among ineligible patients (SuphanchaimatandPavasuthipaisit, 2018; SaengkhamandOngkasingh, 2020).

MC use among cancer patients can be considered a form of complementary and alternative medicine (CAM). Demographics associated with use of CAM among cancer patients around the world have shown some notable trends. For example, young women with cancer in Italy were more like to use CAM therapies, including dietary supplements and herbs (Bonacchi et al.,2014). Similarly, in Ghana, being young, married, female, and having a high level of education were all factors that led to increased CAM use following cancer diagnosis (Yarneyet al.,2013). These trends mimic trends in the broader population. For example, in Norway, CAM usage was higher in younger, female, and educated individuals (Kristoffersen et al.,2021).

Clinical characteristics are also important. Patients that have undergone treatment for a long duration of time or had less success in treatment were more like to have higher awareness about CAM, which can affect subsequent usage (Choi et al.,2021). An advanced stage of cancer has been shown to be strongly related to CAM use (Naja et al.,2015). Increased usage of CAM has been associated among rural elderly cancer and among those who have more than one comorbidity (Ayele et al., 2017). Besides demographics and clinical characteristics, social attitudes and previous experience can be an important factor in determining CAM usage. For example, social networks and encouragement from family can strongly influence choices to use CAM (Labidi et al.,2020). Expectations of CAM effectiveness or dissatisfaction with current treatment have also been shown to increase the use of CAM (Tangkiatkumjai et al.,2020; Bauml et al., 2015). However, health literacy regarding CAM is also important, with young men having lower levels of health literacy (Sharoni et al.,2019).

Overall, while cultural and societal differences affect attitudes towards CAM among cancer patients, some similar trends are observed globally, including generally being associated with females, younger age, higher income, more advanced stages of cancer, and previous experience with or knowledge about CAM. Considering cannabis use in particular, MC may be slightly different. For example, MC has been shown to be more common among males compared to females (Haug et al.,2017). Furthermore, there may be higher levels of stigma associated with MC use (Leos-Toro et al., 2018).

Therefore, given the importance of culture, demographics, and laws, as well as the relative novelty of MC in Thailand, there is a need to understand the role of these factors in affecting MC use among cancer patients in Thailand. Given the higher incidence of cancer in northern Thailand relative to the rest of the country, we were interested in studying demand of MC use among cancer patients in the region. This study aimed to identify factors associated with demand of MC use among cancer patients in northern Thailand.

Materials and Methods

Study design

This cross-sectional study was conducted using an anonymous paper-based survey administered in out-patient cancer clinics located at six public hospitals within northern Thailand (within Ministry of Public Health Regions 1 to 3). The six hospitals were multistage randomly selected. ied

Participants

Any cancer patient with a cancer diagnosis, receiving treatment at one of the studied hospitals, aged 18 or older, and able to read and write in Thai were eligible for inclusion in the study. Recruitment took place between July 2020 and January 2021. Participants were recruited by register nurse. Participants who received end stage cancer diagnosis or whose severe symptoms prevented them from providing information were excluded.

Instrument

Data was collected using a self-administered questionnaire that include 6 items with structured question format about MC. Social support were assessed using social support questionnaire, which was coded into a score from 20 to 100. Attitudes were assessed using attitude about MC questionnaires, which was coded into a score from 15 to 45. Knowledge about MC were assessed using knowledge about MC questionnaires, which was coded into a score from 0 to 20, and health literacy about MC, were assessed using health literacy instruments, which was coded into a score from 47 to 188 and score from all questionnaires were converted to percentages. The survey was developed by the project team specifically for this research based on research questions and relevant literature. The questionnaire was test by five experts for validity. The questionnaire was trialed to test the reliability. The Cronbach's Alpha was 0.88 for sociodemographic factors, 0.86 for social support, 0.81 for attitudes, 0.94 for health literacy, and 0.84 for demand of MC use among cancer patients. The Kuder - Richardson was 0.75 for knowledge about MC use questionnaires.

Data Analysis

Data was entered into a database using STATA software with 100% of data entry checked for accuracy. Simple logistic regression was used to identify association between each individual independent variable and demand of MC use. The independent factors that had p-value smaller than 0.25 (Bursac et al.,2008) were processed in the multivariable analysis using a generalized linear

mixed model (GLMM) to identify factors associated with demand of MC use when controlling for the effect of other covariates. The magnitude of effectswere presented as adjusted odds ratio (adj.OR) and 95% confidence interval (CI), using a statistical significance levelα=0.05.

Ethical considerations

This research has been approved by the KhonKaen University Ethics Committee in Human Research base on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines. Record No. 4.3.01: 23/2020, Reference No. HE632157.

Results

Patient Characteristics

In total, 1,284 cancer patients were included in the final analysis.Most of the participants were females (61.7%), with a mean age of 58.3 ± 13.0 years (Table 1). Most reported being currently married or in domestic partnership (74.3%), having completed only primary school (64.7%), and earning amonthly income less than or equal to 10,000 THB (around 312 USD). Among possible health coverage schemes, around three quarters (76.3%) were covered under the Universal Coverage Scheme, which provides public health insurance coverage to those ineligibles for social health insurance (Social Security Scheme) or government fringe benefits (Civil Servant Medical Benefit Scheme). Many participants (69.4%) hada comorbidity in addition to cancer. The most common cancer sites were breast (30.8%), followed by colorectal (20.9%), and lung (9.7%). Theaverage time from diagnosis of cancer was 10.23 months with a large amount of variability (±16.57 months).Most participants (69.4%) were categorized into a group with cancer stage of II, III, or IV. Treatment included chemotherapy (59.3%), radiation therapy (19.8%), and surgery (13.2%). Almost one-third of participants had a high level of social support. (Table 1).

Knowledge, Attitudes, Health Literacy, and Demand for MC

A large majority of respondents (88.24%) reported having received information about MC (Table 1). The most common source of MC information was family (75.2%), television (52.6%), and social media (37.1%). Attitudes and knowledge about MC were well distributed with nearly equal numbers in the groups. Concerning health literacy, around half (56.5%) of the sample was categorized as having problematic health literacy. Overall, less than half of participants, (44.0%) report having a demand for MC (Table 1).

Bivariable analysis of factors associated with demand for MC use

Simple logistic regression was used to identify association between each individual independent variable and demand of MC use (Table 2). The independent factors that had p-value smaller than 0.25 were: age less than 30 (OR = 3.48; 95% CI: 1.72 – 7.03: p-value = 0.001), education higher than primary school (OR = 1.28; 95%

Table 1. Socio-Demographic Factors among Cancer Patients in the Northern of Thailand. (n=1,284)

Factors	Number	Percentage
Gender		
Female	792	61.7
Male	492	38.3
Age group (years)		
< 30	40	3.1
≥30	1,244	96.9
Mean ± S.D. = 58.3 ± 13.0		
Current relationship status		
Married/domestic partnership	954	74.3
Divorced/separated/widowed	227	17.7
Single	103	8
Highest education level		
Primary school	831	64.7
Junior high school and higher	453	35.3
Monthly income (THB)		
<10,000	867	67.5
≥10,000	417	32.5
Mean ± S.D. = 11,425.25 ± 13,598.54		
Scheme		
Universal Coverage	979	76.3
Civil Servant Medical Benefit	195	15.2
Social Security	110	8.6
Health status		
Comorbidity	891	69.4
No comorbidity	393	30.6
Primary cancer site		
Breast	395	30.8
Colorectal	268	20.9
Lung	124	9.7
Lymphoma	92	7.2
Cervical	74	5.8
Other	327	25.4
Time from diagnosis with cancer (month)		
< 12	1,072	62.6
≥12	212	37.4
Mean ± S.D. = 10.27±16.57		
Current treatment received		
Chemotherapy	762	59.3
Radiation therapy	254	19.8
Surgery	168	13.2
Other	100	7.8
Stage of Cancer		
Unknown	179	13.9
In situ	91	7.1
Stage I	200	15.6
Stage II-IV	814	69.4
Received information about cannabis		
Yes	1,133	88.2
No	151	11.8

Table 1. Continued

Factors	Number	Percentage
Source of MC information		
Family	965	75.2
Television	675	52.6
Social media	476	37.1
Doctor, pharmacist, and medical staff	142	11.1
Newspaper/ brochures	132	10.3
Radio	89	6.9
Academic article	83	6.5
Thai traditional medicine	75	5.8
Other	27	2.1
Social support		
Low (less than 60 percentage)	467	36.4
Moderate (60-79 percentage)	347	27
High (greater than or equal to 80 percentage)	470	36.6
Mean ± S.D. = 67.48 ± 13.44		
Attitude toward MC		
Poor (less than 60 percentage)	360	28
Fair (60-79 percentage)	439	34.2
Good (greater than or equal to 80 percentage)	485	37.8
Mean ± S.D. = 69.78 ± 15.47		
Knowledge about MC		
Low (less than 60 percentage)	386	30.1
Average (60-79 percentage)	471	36.7
Good (greater than or equal to 80 percentage)	427	33.3
Mean ± S.D. = 60.22 ± 21.00		
Health Literacy for medicinal cannabis use dimensions		
Inadequate (0-50 percentage)	189	14.7
Problematic (51-65 percentage)	726	56.5
Sufficient (66-84 percentage)	191	14.9
Excellent (85 percentage and over)	178	13.9
Mean ± S.D. = 63.50 ±12.84		
Demand to MC use		
No	719	56
Yes	565	44

CI: 1.01 – 1.61: p-value = 0.038), receiving health coverage outside the Universal Coverage Scheme (OR = 1.63; 95% CI: 1.27 - 2.10: p-value < 0.001), not have comorbidity (OR = 1.33; 95% CI: 1.05 – 1.68: p-value = 0.020), time from cancer diagnosis of 12 months or more (OR = 1.40; 95% CI: 1.04 – 1.88: p-value = 0.026), having previously received information about MC (OR = 1.58; 95% CI: 1.10 - 2.25: p-value = 0.012), high level of social support (OR = 6.66; 95% CI: 5.06 – 8.77; p-value <0.001), good attitude toward MC use (OR = 4.03; 95% CI: 3.04 – 5.34; p-value <0.001), good knowledge about MC use (OR = 2.76; 95% CI: 2.13 – 3.58; p-value <0.001),

and adequate to excellent levels of health literacy about MC (OR = 10.92; 95% CI: 8.09 – 14.73; p-value <0.001). (Table 2.)

Multivariable analysis of factors associated with demand for MC use

The multivariable analysis using GLMM with backward elimination indicated that the factors significantly associated with demand to MC use were: young age of <30 years old (adj.OR =1.89; 95% CI: 1.21 to 2.93), long time from diagnosis with cancer (adj. OR =1.73; 95% CI: 1.19 to 2.52), high social support (adj.OR =5.50; 95% CI: 3.60 to 8.39), positive attitude toward MC use (adj.OR = 2.56; 95% CI: 1.83 to 3.56), and Adequate- excellenthealth literacy about MC (adj. OR = 5.70; 95% CI: 4.08 to 7.96) when controlling other covariates (Table 3).

Discussion

We found that 44.0% of cancer patients in the North of Thailand reported having demand for MC use. This finding was comparable to actual marijuana usage among cancer patients reported in Alberta, Canada (Martell et al., 2018) and in the US(Tringale et al., 2017).Those countries have a longer history of MC legalization compared to Thailand. The Thai government has only recently legalized MC use in 2019. Demand for MC use in Thai society may be enhanced by recent attention. After controlling the covariates with backward elimination in the multivariate analysis, five variables were significantly associated with demand for MC use among cancer patients in northern Thailand. Those variables were higher health literacy about MC,higher social support, positive attitude toward MC use, young age, and longer time from diagnosis with cancers.

In our study, we also found that cancer patients that had adequate to excellent levels of health literacy about MC were 5.70 times more likely to report having demand to use MC when compared with those with insufficient and problematic levels of health literacy about MC. Health literacy has previously been shown to positively correlate with CAM usage (Smith et al., 2019). Another study reported that CAM usage was significantly associated with adequate levels of health literacy among whites in the U.S. (Bains et al., 2011).

People who reported moderate to high levels of social support were 5.50 times more likely to report demand for MC use when compared with those with low levels of social support. Social support has been shown to be related to CAM use in cancer patients (Reblin et al., 2019). It may be that most of the participants received social support from close friends and family members who provided information about MC products for patients to use.

Those participants who reported a fair to good attitude toward MC use were 2.56 times more likely to report demand for MC use when compared to those with poor attitudes toward MC use. A previous study measuring intention to use MC in northeast Thailand reported that those with positive attitudes toward MC were 3.74 times

Table 2. The Bivariable Analysis of Factors Associated with Demand to MC Use among Cancer Patients in the Northern of Thailand. (n=1,284)

Factors	Number	% Demand to MC use	Crude OR	95% CI	P-value
Sex					0.184
Male	492	46.34	1	-	
Female	792	42.55	0.85	0.68 - 1.07	
Age (years)					0.001
≥30	1,244	43.09	1	-	
< 30	40	72.5	3.48	1.72 - 7.03	
Current relationship status					0.236
Single/divorced/separated/widowed	330	41.21	1	-	
Married/domestic partnership	954	44.97	1.16	0.90 - 1.50	
Completed education					0.038
Primary school	831	41.88	1	-	
Junior/senior high school/trade or vocational training/University degree	453	47.9	1.27	1.01 - 1.60	
Scheme					0
Universal coverage	948	40.82	1	-	
Civil servant medical benefit /social security scheme	336	52.98	1.63	1.27 - 2.09	
Monthly income (THB)					0.105
≤ 10,000	867	42.45	1	-	
≥10,001	417	47.24	1.21	0.96 - 1.53	
Health status					0.02
Comorbidity	891	41.86	1	-	
Not have comorbidity	393	48.85	1.32	1.04 - 1.68	
Time from diagnosis with cancer (month)					0.026
< 12	1,072	42.63	1	-	
≥12	212	50.94	1.39	1.04 - 1.87	
Received information about cannabis					0.012
No	151	34.44	1	-	
Yes	1,133	45.28	1.57	1.10 - 2.24	
Social support					0
Low	467	17.77	1	-	
Moderate to high	817	59	6.65	5.05 - 8.76	
Attitude toward MC					0
Poor	360	21.67	1	-	
Fair to Good	924	52.71	4.02	3.03 - 5.34	
Knowledge about MC use					0
Low	386	27.46	1	-	
Average to good	898	51.11	2.76	2.13 - 3.57	
Health literacy about MC					
Inadequate- Problematic	915	28.85	1	-	0
Adequate- Excellent	369	81.57	10.91	8.09 - 14.72	

more likely to report having an intention to use MC when compared with those with poor to fair levels (Rakpanich et al., 2020).

Cancer patients aged less than 30 years were 1.89 times more likely to reportdemand for MC use when compared with those aged 30 years or older in our study. Youth has commonly been reported as a factor positively associated with CAM usage, including herbs and supplements(Bonacchi et al.,2014).Similarly, younger cancer patients may be more likely to prefer biological alternative medicines, such as plant-based medicines(Ciarlo et al.,2021).Reasons for these differences in the younger age may be better health, faster recovery after cancer, higher tolerance of side effects from treatment, and better abilities in searching for information.

Those participants who had been diagnosed at least

Table 3. The Multivariable Analysis of Factors Associated with Demand to MC Use among cancer patients in the Northern of Thailand. (n=1,284)

Factors	Number	% Demand to MC use	Crude OR	Adjust OR	95% CI	P-value
Age (years)						0.005
≥30	1,244	43.09	1	1	-	
< 30	40	72.5	3.48	1.89	1.21 - 2.93	
Time from diagnosis with cancer (month)						0.004
< 12	1,072	42.63	1	1	-	
≥12	212	50.94	1.39	1.73	1.19 – 2.52	
Social support						< 0.001
Low	467	17.77	1	1	-	
Moderate to high	817	59	6.65	5.5	3.60 – 8.39	
Attitude toward MC use						< 0.001
Poor	360	21.67	1	1	-	
Fair to Good	924	52.71	4.02	2.56	1.83 - 3.56	
Health literacy about MC						< 0.001
Inadequate/ Problematic	915	28.85	1	1	-	
Adequate/ Excellent	369	81.57	10.91	5.7	4.08 - 7.96	

12 months earlier were 1.73 times more likely to report demand for MC use when compared with those diagnosed less than to 12 months. Previous studies have reported that time from diagnosis with cancer was positively correlated with CAM use in cancer patients (Truant et al., 2013). One possibleexplanation is that when a person transitions to chronic illness, they begin searching for information on how to take care of their own health, in turn increasing their health literacy, resulting in a decision to use MC.

This cross-sectional study found that 44.0% of cancer patients in the North of Thailandreported demand to use MC. The significant factors associated with reported demand to use MC were adequate to excellent levels of health literacy on MC use,moderate to high level of social support, fair to good attitudes about MC use, younger age, and longer time from diagnosis with cancer controlling for other covariates.

Author Contribution Statement

All authors contributed equally to this work.

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Availability of data
The datasets are not publicly available due to ethical restrictions but are available from the corresponding author on reasonable request.

Conflict of interest
All authors declared no conflict of interest.

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