RESEARCH ARTICLE

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Health Literacy and Demand for Medical Cannabis use among Colorectal Cancer Patients in Northern Thailand: A Cross-Sectional Study

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Abstract

Objective: This study aimed to explore health literacy and factors associated with demand for medical cannabis (MC) use among colorectal cancer (CRC) patients in Northern Thailand as a target group. **Methods:** This cross-sectional analytical study administered multistage random sampling to recruit 439 CRC patients in northern Thailand. Ethical approval and signed written informed consents were obtained from the patients, prior to the study. A standardized, self-administered structured questionnaire was used to obtain the sociodemographic characteristics, clinical characteristics, social support, attitudes toward MC, knowledge about MC, health literacy about MC, and questions on demand for MC use. The scores from all questionnaires were converted to percentages before analysis. **Results:** A total of 146 (33.26%) of patients with CRC reported demand to use MC. The multivariable analysis revealed that factors associated with demand for MC among CRC patients included: had high levels of health literacy about MC (adj.OR = 7.71; 95% CI: 4.28 to 13.87), aged less than 45 years (adj.OR =5.09; 95% CI: 2.78 to 9.34), positive attitudes toward MC use (adj.OR = 4.66; 95% CI: 2.68 to 8.10), and higher levels of social support (adj.OR =4.14; 95% CI: 2.39 to 7.17) when controlling effect of other covariates. **Conclusions:** Health literacy is an important factor affecting the demand for MC use of CRC patients. Therefore, improving health literacy, social support, and attitudes about MC especially among younger CRC patients, could help increase demand for MC as a complementary and alternative medicine alongside cancer treatment.

Keywords: Health literacy- medical cannabis- marijuana- colorectal cancer- tumor

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Introduction

Colorectal cancer (CRC) is the one of the most health problem. In 2020, CRC is the third most common cancer and the second cancer leading causes of cancer-related death in both sexes worldwide, accounting for an estimated 916,000 deaths and 1.93 million diagnoses, comprising over 9.4% of the premature deaths attributable to cancer [1]. The burden of CRC in Thailand is similarly significant, in 2023, 21,103 new cancer cases and 11,464 cancer deaths [2]. In addition, there has been a rising trend of this disease in Thailand same as worldwide. This rise in CRC can be attributed to western lifestyle, dietary, smoking, aging, obesity, lack of physical exercise [3]. Nowadays, standard treatments for CRC including surgery, chemotherapy, radiotherapy, and combination method. Advancements in CRC treatment have improved patients' quality of life (QoL), and higher survival rate. However, treatment may have adverse effects such as chemotherapy-induced nausea and vomiting (CINV), cachexia, pain associated with chemotherapy, and radiotherapy, and severe cancer-related symptoms, also costs for treating CRC was significant economic burden on patients and healthcare systems [4, 5]. Therefore, cannabis is one of the complementary and alternative medicines (CAM) that cancer patients decide use to treat cancer-related symptoms, and side effects from treatment [6].

Cannabis (marijuana) is a plant that originated in Central Asia and has been used for therapeutic purposes since ancient times, this plant is psychotropic. Cannabinoids (CBs) from cannabis, such as Δ9-tetrahydrocannabinol (Δ9-THC), cannabidiol (CBD),

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and terpenes [7]. Cannabinoids work through the endocannabinoid system via cannabinoid receptor 1 (CB1 receptor) in hippocampus, cerebellum, and basal ganglia. CB1 receptor are modulating nociceptive processing in the brain. Cannabinoid receptor 2 (CB2 receptor) are found in dorsal root ganglion sensory neurons and spinal cord areas. CB2 receptor are release of analgesic beta-endorphins reduce C-fiber activity in neuropathic pain [8, 9]. In cancer patient, cannabis is used to treat cancer pain, CINV, cachexia, insomnia, anxiety disorders, and tumor Suppressor. In addition, Cannabinoids show positive effects in the treatment of CRC [10, 11]. Even though, Cannabis has medical benefits, but several reported about cannabis use disorders (CUD): dizziness, dry mouth, euphoria, confusion, hallucinations, psychoactive effects, decreased memory, decreased concentration, myocardial infarction, stroke, cannabinoid hyperemesis syndrome (CHS) [12, 13]. Therefore, CRC patients to MC use safety, they should be adequate of health literacy about MC.

Health Literacy is the level of a person's ability to access, understand, appraise, and apply health information to inform health-related decisions and actions for themselves and others) [14]. Health literacy is an important factor affecting the health behavior and the use of the health service system of cancer patients [15]. Therefore, this study applies the concept of health literacy to medical cannabis. A previous study factors influencing demand for MC use among cancer patients in chemotherapy unit by Sukrueangkul et al. (2022) [16] reported that health literacy is a strong factor that has been shown to correlate with demand for MC usage. This result is like that of a previous study in USA by Pergam et al. (2017) [17] reported that cancer patients most had a strong interest in learning about cannabis during treatment and wanted information about MC from cancer providers for health-related decisions. Another study by Busch et al. (2015) [18], CRC patients with lower levels of health literacy were less likely to receive chemotherapy compared with participants with higher levels of health literacy. Therefore, health literacy related to health-related decisions and actions for themselves. However, demand for MC use do not depend on health literacy alone. Several studies reported found that Socioeconomic factor, and clinical characteristics are related demand for MC use among CRC patients.

MC use among CRC patients can be considered a form of CAM. Sociodemographic factors that appear to be related to CAM use among CRC patients. For example, cancer patients' use of complementary and alternative medicine in Sweden showed that female gender, younger age, higher education was predicted CAM use [19]. Similarly, in Korea, younger age, metastatic disease, previous exposure to CAM information, and experience with more types of CAM were significantly associated with CAM use [20]. These trends mimic trends in the broader population. For example, in Ethiopia, higher average monthly income, rural residency, and presence of co-morbidity were positively associated with the use of CAM [21].

Clinical characteristics are also important. For example, in Shanghai, China, cancer patients that have undergone or completed radiotherapy or chemotherapy reported a high prevalence of CAM use [22]. These trends mimic trends in the broader population. For example, in Korea, advanced stage of cancer, longer time since diagnosis, and higher need of CAM information were also significantly associated with CAM use [23]. Besides demographics and clinical characteristics, social support, attitudes toward MC, and health literacy can be an important factor in determining CAM usage. For example, in northern Thailand, health literacy, social support, and attitudes about MC were significantly associated with demand for MC use among cancer patients [24].

Therefore, given the importance of various factors that have been reviewed in previous studies, as well as the novelty of MC use in Thailand, it is imperative to study these factors to understand how these factors may affect the demand for MC use among CRC patients. Thus, to provide data that may direct MC policy, a target group was selected in Thailand. Given the higher incidence of CRC in northern Thailand relative to the rest of the country, we were interested in studying demand of MC use among CRC patients in the region. This study aimed to explore health literacy and factors associated with demand for MC use among CRC 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 that are cancer treatment centers within Ministry of Public Health Regions 1 to 3 (within Northern of Thailand). The six hospitals were multistage randomly selected.

Participants

Participants were eligible for inclusion based on the following criteria: Any cancer patient with a CRC diagnosis, receiving treatment at one of the studied hospitals, aged 18 or older, able to read and write in Thai, and mentally and physically able to answer the questionnaire were eligible for inclusion in the study. Recruitment took place between October 2020 and March 2021. Participants were recruited by registered nurse. Participants who received end stage cancer diagnosis or whose severe symptoms prevented them from providing information were excluded.

Instruments

Data were collected using a self-administered questionnaire that included 6 items with structured question format about MC. Social support was assessed using a social support questionnaire, which was coded into a score from 20 to 100. Attitudes about MC were assessed using a questionnaire, which was coded into a score from 15 to 45. Knowledge about MC was assessed using a questionnaire, which was coded into a score from 0 to 20. Finally, health literacy was assessed using a health literacy about MC instrument, which was coded into a score from 47 to 188. The scores from all questionnaires were converted to percentages before analysis. The

questionnaire was constructed after reviewing the literature and was evaluated by a panel of five experts in the field of health literacy, cancer, pharmacology, research methodology and other medical sciences for validity. The questionnaire was trialed to test the reliability. The overall average Cronbach's Alpha was 0.91 for the questionnaires.

Data Analysis

All data were analysed using the STATA software version 15.0 with 100% of data entry checked for accuracy. Descriptive statistics including frequency and percentage were used to describe categorical data, whereas mean and standard deviation were used for continuous data. Simple logistic regression was used to identify association between each individual independent variable and demand of MC use. The independent factors that had a p-value smaller than 0.25 [25] 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 effects was presented as adjusted odds ratio (adj.OR) and 95% confidence interval (CI), using a statistical significance level=0.05.

Ethical considerations

This research has been approved by the Lampang Cancer Hospital Ethics Committee in Human Research based on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines. Reference No. 8/2020.

Results

Patient Characteristics

In total, 439 CRC patients were included in the final analysis (Table 1). Most of the participants were males (57.6%), and 56.9% were elderly aged with a mean age of 57.8 ± 15.6 years. Most participants reported being currently married or in a domestic partnership (76.3%), having completed only primary school (66.7%), around three quarters (72.6%) having employed status, and earning a monthly income 5,000 to 10,000 THB (around 350 USD) (40.3%). Almost 63.3% of participants lived in rural areas. Considering health coverage, 75.1% were covered under the Universal Coverage Scheme, which is the government welfare health insurance. The average time from diagnosis of cancer was 9.47 months with a large amount of variability (±14.19 months). Almost three quarters of participants (72.2%) non-comorbidity in addition to cancer. around half (49.4%) of participants were categorized into a group with early stage of CRC. Treatment included surgery (41.4%), chemotherapy (34.6%), radiation therapy (16.1%), and palliative care (5.2%). A large majority of respondents (86.5%) reported having received information about MC. The most common source of MC information was family or close friends (72.8%), television/radio (57.1%), and social media (24.8%).

Social Support, Attitudes, Knowledge, Health Literacy, and Demand for MC use

Almost half of participants (56.2%) had a low level of social support (Table 1), while 46.4% had a poor level of positive attitudes about MC. Almost half (46.4%) of participants having a low level of knowledge about MC. Concerning health literacy, just over half were categorized as having problematic health literacy (59.0%). Overall, one-third of participants (33.2%) reported having a demand for MC.

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 45 years (OR = 4.06; 95% CI: 2.52 - 6.54: p-value < 0.001), having a higher monthly household income (OR = 1.58; 95% CI: 1.05 - 2.38 : p-value = 0.028), having a moderate to high level of social support (OR = 4.32; 95% CI: 2.83-6.60; p-value <0.001), having a fair to good attitude toward MC use (OR = 5.06; 95% CI: 3.21 – 7.99; p-value <0.001), having an average to good knowledge about MC use (OR = 2.54; 95% CI: 1.68 – 3.86; p-value <0.001), and adequate to excellent levels of health literacy about MC (OR = 7.66; 95% CI: 4.82 – 12.16; 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: age less than 45 years (adj.OR = 5.09; 95% CI: 2.78 to 9.34), moderate to high levels of social support (adj. OR = 4.14; 95% CI: 2.39 to 7.17), fair to good attitude toward MC use (adj.OR = 4.66; 95% CI: 2.68 to 8.10), and Adequate- excellent health literacy about MC (adj. OR = 7.71; 95% CI: 4.82 to 13.87) when controlling other covariates (Table 3).

Discussion

We found that 33.26% of CRC patients in Northern Thailand reported having demand for MC use. This finding was comparable to actual cannabis usage among CRC patients reported in Seattle, Washington State, USA [26] and British Columbia State, Canada [27]. Those countries have a longer history of MC legalization compared to Thailand. The Thai government has only recently legalized MC use in 2019. After controlling the covariates with backward elimination in the multivariate analysis, four variables were significantly associated with demand for MC use among CRC patients in northern Thailand. Those variables were high levels of health literacy about MC, age less than 45 years, positive attitude toward MC use, and higher levels of social support.

Health Literacy about MC, we found that over half of participant (59.0%) were categorized as having problematic health literacy. This result is similar to previous study in Istanbul, Turkey. 86% of participant displayed an inadequate or problematic to limited level of health literacy and were significant predictors of self-care management of cancer patients [28]. Besides, this

Table 1. Sociodemographic Factors among Colorectal Cancer Patients on Demand for Medical Cannabis Use in Northern Thailand (n=439)

Factors	Number	Percentage
Gender		
Male	253	57.63
Female	186	42.37
Age group		
< 45 years (young adult)	93	21.18
45-59 years (middle-aged adult)	96	21.87
≥ 60 years (elderly)	250	56.95
Mean ± S.D. = 57.89 ± 15.67		
Marital Status		
Married/domestic partnership	335	76.31
Divorced/separated/widowed	79	18.00
Single	25	5.69
Highest education level		
Primary school	293	66.74
Junior high school and higher	146	33.26
Employment Status		
Unemployed/Retired	120	27.33
Agriculturist/Employed/Government officer/Businesses	319	72.67
Monthly income (THB)		
< 5,000	104	23.69
5,000-10,000	177	40.32
10,001-15,000	47	10.71
>15,000	111	25.28
Mean ± S.D.= 12,144.95 ± 12,707.57		
Place of residence		
Rural area	278	63.33
Metropolitan area	161	36.67
Scheme		
Universal Coverage	330	75.17
Civil Servant Medical Benefit	72	16.40
Social Security	37	8.43
Health status		
Comorbidity	122	27.79
No comorbidity	317	72.21
Time from diagnosis with cancer (month)		
< 12	340	77.45
≥ 12	99	22.55
Mean ± S.D. = 9.47±14.19		
Stage of Cancer		
Unknown	42	9.57
Early-stage	217	49.43
Advance stage	180	41.00
Factors	Number	Percentage
Current treatment received		
Surgery	182	41.46
Chemotherapy	152	34.62
Radiation therapy	71	16.17
Palliative care	23	5.24
Other	11	2.51

Table 1. Continued

Factors	Number	Percentage
Received information about MC		
Yes	380	86.56
No	59	13.44
Source of MC information		
Family/Close friends	320	72.89
Television/ Radio	251	57.18
Social media	109	24.82
Doctor, pharmacist, and medical staff	49	11.16
Newspaper/ brochures/ Academic article	34	7.74
Thai traditional medicine	14	3.19
Other	34	7.74
Social support		
Low (less than 60 percentage)	247	56.26
Moderate (60-79 percentage)	77	17.54
High (greater than or equal to 80 percentage)	115	26.20
Mean ± S.D. = 62.07 ± 14.06		
Attitude toward MC		
Poor (less than 60 percentage)	204	46.47
Fair (60-79 percentage)	139	31.66
Good (greater than or equal to 80 percentage)	96	21.87
Mean ± S.D. = 69.56 ± 15.44		
Knowledge about MC		
Low (less than 60 percentage)	204	46.47
Average (60-79 percentage)	163	37.13
Good (greater than or equal to 80 percentage)	72	16.40
Mean ± S.D. = 57.69 ± 21.07		
Health Literacy for medicinal cannabis use dimensions		
Inadequate (0-50 percentage)	56	12.75
Problematic (51-65 percentage)	259	59.00
Sufficient (66-84 percentage)	83	18.91
Excellent (85 percentage and over)	41	9.34
Mean ± S.D. = 61.88 ± 12.20		
Demand to MC use		
No	293	66.74
Yes	146	33.26

result is similar to the results of a previous study that role of health literacy in cancer care by Holden et al. (2021) [29] Lower health literacy was associated with greater difficulties understanding and processing cancer related information, poorer QOL and poorer experience of care. In this study, the problematic health literacy, the one-third having demand for MC use, possibly due to: CRC patients have insufficient knowledge about MC, which is a barrier to accessing information about MC. Lack of information about MC, CRC patients are therefore afraid to use MC. On the other hand, CRC patients who have sufficient knowledge about MC, this is a group that has a high demand for MC use. Therefore, it clearly shows

Table 2. The Bivariable Analysis of Factors associated with Demand to MC Use among Colorectal Cancer Patients in Northern Thailand (n=439)

Factors	Number	% Demand to MC use	Crude OR	95% CI	P-value
Age group					<0.001
≥ 45 years (middle age to elderly)	346	26.30	1	-	
< 45 years (young adult)	93	59.14	4.06	2.52 - 6.54	
Monthly income (THB)					0.028
≤10,000	281	29.54	1	-	
≥10,001	158	39.87	1.58	1.05 - 2.38	
Social support					<0.001
Low	247	19.43	1	-	
Moderate to high	192	51.04	4.32	2.83 - 6.60	
Attitude toward MC					<0.001
Poor	204	15.69	1	-	
Fair to Good	235	48.51	5.06	3.21 - 7.99	
Knowledge about MC use					<0.001
Low	204	22.55	1	-	
Average to good	235	42.55	2.54	1.68 - 3.86	
Health literacy about MC					<0.001
Inadequate- Problematic	315	20.32	1	-	
Adequate- Excellent	124	66.13	7.66	4.82 - 12.16	

Table 3. The Multivariable Analysis of Factors associated with Demand to MC Use among Colorectal Cancer Patients in Northern Thailand (n=439)

Factors	Number	% Demand to MC use	Crude OR	Adjust OR	95% CI	P-value
Age group						<0.001
≥ 45 years (middle age to elderly)	346	26.3	1	1	-	
< 45 years (young adult)	93	59.14	4.06	5.09	2.78 - 9.34	
Social support						<0.001
Low	247	19.43	1	1	-	
Moderate to high	192	51.04	4.32	4.14	2.39 - 7.17	
Attitude toward MC						<0.001
Poor	204	15.69	1	1	-	
Fair to Good	235	48.51	5.06	4.66	2.68 - 8.10	
Health literacy about MC						<0.001
Inadequate- Problematic	315	20.32	1	1	-	
Adequate- Excellent	124	66.13	7.66	7.71	4.28 - 13.87	

that health literacy is what influences self-care behavior, and the use of the health service system by CRC patients.

In our study, we also found that CRC patients that had adequate to excellent levels of health literacy about MC were 7.71 times more likely to report having demand to use MC when compared with those with insufficient and problematic levels of health literacy about MC. This result is like that of a previous study among over all cancer in Northern of Thailand by Sukrueangkul et al. (2022) [24]. Health literacy is a strong factor that has been shown to correlate with demand for MC usage among cancer patients. Another study reported that CAM usage was significantly associated with adequate levels of health literacy among cancer patients in Turkey [30].

Cancer patients aged less than 45 years were 5.09 times more likely to report demand for MC use when compared with those aged 45 years or older in our study. This result is similar to previous study in Poland, Younger cancer patients has commonly been reported as a factor positively associated with CAM usage, including herbs and supplements [31]. A previous study use of CAM in Norway by Kristoffersen et al. (2021) [32] younger cancer patients use of CAM more likely than older. Reasons for these differences in the younger age may be better abilities in searching for information about CAM.

Those participants who reported a fair to good attitude toward MC use were 4.66 times more likely to report demand for MC use when compared to those with poor attitudes toward MC use. A previous study factors associated with demand for MC use cancer patients in

chemotherapy unit reported that those with positive attitudes toward MC 5.58 times more likely to report demand for MC use when compared with those with poor to fair levels [24], and similar to that of a previous study in Korea by Kwon et al. (2019) [33], which reported that a positive attitude toward MC was positively correlated with CAM use in cancer patients.

People who reported moderate to high levels of social support were 4.14 times more likely to report demand for MC use when compared with those with low levels of social support. This result is similar to previous study in Sweden, Social support has been shown to be related to CAM use in cancer patients [34], and previous study in Atlanta, Georgia State, USA by Singh et al. (2019) [35]. 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. Moreover, the government legalized cannabis. As a result, cancer patients are more likely to use MC to treat cancer-related symptoms.

This cross-sectional study found that 33.26% of CRC patients in the North of Thailand reported 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, age less than 45 years, positive attitude toward MC use, and higher levels of social support when controlling for effects of other covariates.

In conclusion, this study highlights the health literacy is an important factor affecting the demand for MC use of CRC patients in Northern Thailand. We found substantial demand for MC use among CRC patients. High levels of health literacy about MC, age less than 45 years, positive attitude toward MC use, and higher levels of social support were significantly associated with demand for MC use. Health literacy is an important factor affecting the demand for MC use of CRC patients. Therefore, improving health literacy, social support, and attitudes toward MC use, especially among younger CRC patients, could help increase demand for MC as a complementary and alternative medicine to alleviate side effects and enhance cancer treatment.

Limitations of the study

This study used only data from CRC patients in Northern Thailand. Therefore, the results may not apply to CRC cancer patients overall in Thailand.

Author Contribution Statement

All authors contributed equally in this study.

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Study Implication

The results showed that health literacy is an important factor affecting the demand for MC use of CRC patients in Northern Thailand. Therefore, improving health literacy, attitudes toward MC, and social support, especially among younger CRC patients, could help increase demand for MC as a complementary and alternative medicine to alleviate side effects and enhance cancer treatment.

Approval

The current study deals with primary data, so approval of the scientific body is not needed.

Ethical considerations

This research has been approved by the Lampang Cancer Hospital Ethics Committee in Human Research base on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines. Reference No. 8/2020.

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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