


Use of Complementary Traditional Chinese Medicines by Adult Cancer Patients in Taiwan: A Nationwide Population-Based Study

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Abstract

Background. Many patients with cancer seek complementary and alternative medicine treatments. We investigated the use of traditional Chinese medicine (TCM) by adult cancer patients in Taiwan. **Methods.** We reviewed the Registry for Catastrophic Illness Patients Database of Taiwan, and included all adult patients diagnosed cancer, based on the International Classification of Diseases (ninth revision), from 2001 to 2009 and followed until 2011. This database allowed categorization of patients as TCM users (n = 74620) or non-TCM users (n = 508179). All demographic and clinical claims data were analyzed. **Results.** Compared with non-TCM users, TCM users were younger and more likely to be female, white-collar workers, and reside in highly urbanized areas. The average interval between cancer diagnosis and TCM consultation was 15.3 months. The most common cancer type was breast cancer in TCM users (19.4%), and intrahepatic bile duct cancer in non-TCM users (13.6%). The major condition for which TCM users visited clinics were endocrine, nutritional and metabolic diseases, and immunity disorders (23.2%). A total of 33.1% of TCM users visited TCM clinics more than 9 times per year and their time from diagnosis to first TCM consultation was 5.14 months. The most common TCM treatment was Chinese herbal medicine. The common diseases for which cancer patients sought TCM treatment were insomnia, malaise and fatigue, dizziness and headache, gastrointestinal disorders, myalgia and fasciitis, anxiety, and depression. Overall, TCM users had a lower adjusted hazard ratio (aHR) for mortality (aHR = 0.69, 95% CI = 0.68-0.70) after adjustment for age, sex, urbanization of residence, occupation, annual medical center visits, and annual non-medical center visits. **Conclusions.** This study provides an overview of TCM usage among adult cancer patients in Taiwan. TCM use varied among patients with different types of cancer. Physicians caring for cancer patients should pay more attention to their patients' use of complementary TCM.

Keywords

acupuncture, cancer, complementary and alternative medicine, National Health Insurance Research Database, traditional Chinese medicine

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Introduction

Cancer is a leading cause of death worldwide. In the United States, the most common prevalent cancers are prostate cancer (43%), colorectal cancer (9%), and melanoma (8%) in males, and breast cancer (41%), uterine cancer (8%), and colorectal cancer (8%) in females.¹ According to data from the Ministry of Health and Welfare in Taiwan, the most common causes of cancer deaths in Taiwan are lung cancer, liver cancer, colorectal cancer, breast cancer, and oral cancer.² Despite improvements in cancer therapies, the incidence of most cancers continues to increase.

The most common treatments for cancer are chemotherapy, radiotherapy, and surgery. Many cancer patients experience symptoms or therapy-related side effects such as chemotherapy-induced nausea and vomiting,³ fatigue, paresthesias, chronic pain, constipation, and anorexia.⁴ Because these conditions can significantly decrease quality of life, many patients in Taiwan seek complementary and alternative medicine (CAM), especially Chinese herbal medicines⁴ and acupuncture,⁵ as palliative treatments.⁶ Some studies have examined the benefits of traditional Chinese Medicine (TCM) for patients undergoing different cancer treatments. For example, there is evidence that Bu-zhong-yi-qi-tang decreases the toxic effects of chemotherapy and radiotherapy,⁷ Huang-qin-tang (PHY 906) reduces chemotherapy-induced diarrhea, vomiting, nausea, and fatigue,⁸ and Kuan-Sin-Yin improves autonomic function and cancer-related symptoms in patients with metastatic colon cancer.⁹ In addition, acupuncture can reduce chemotherapy-induced nausea/vomiting¹⁰ and aromatase inhibitor-induced arthralgia.¹¹ Moreover, 25% to 47% of cancer patients in North America seek herbal medicines as part of their treatments.¹²

The Taiwan National Health Insurance (NHI) program began in 1995, and data from 2015 indicate the insurance rate for the whole population was 99.6%.¹³ The National Health Institutes developed an NHI Research Database (NHIRD) that provides data on the insured population's use of TCM and Western medical treatments. Previous studies using the NHIRD have examined the complementary utilization of TCM with conventional cancer therapies in patients with breast cancer,¹⁴ leukemia,¹⁵⁻¹⁷ gastric cancer,¹⁸ liver cancer,¹⁹ and prostate cancer.²⁰

We used the NHIRD to examine the use of TCM among all adult cancer patients in Taiwan. Our previous study showed that 62.4% of children in Taiwan with cancer sought complementary TCM treatment.²¹ However, there has been no large-scale investigation of the complementary utilization of TCM among adult cancer patients in Taiwan. Thus, we enrolled all cancer patients who were at least 18 years old from the Registry for Catastrophic Illness database of

the NHIRD. Our purpose was to identify the characteristics of cancer patients who used TCM in Taiwan.

Materials and Methods

Data Source

All data were acquired from the NHIRD, which is maintained by the NHRI of Taiwan.²² The NHI program has provided reimbursement for TCM since 1996. Chinese herbal medicines, acupuncture/moxibustion, and Chinese orthopedics and traumatology therapy are reimbursed in the NHI program.²³ Qi management, exercise, dietary therapy, nutritional counseling, mediation, folk therapies, and other practices provided in nonclinical settings outside the NHI program are not reimbursed. The data in the NHIRD include diagnostic code, age, sex, urbanization of residence, occupation, hospitalizations, clinical visits, assessments, procedures, prescriptions, and medical costs. The NHIRD also has a Registry for Catastrophic Illnesses Patient Database (RCIPD), and all patients with catastrophic illness, such as type 1 diabetes,²⁴ rheumatoid arthritis,²⁵ and cancer,²¹ are in this database. All cancer patients in the database are given catastrophic illness certificates (CICs) based on pathological, laboratory, and clinical diagnoses by experts, and the database is regularly reviewed by the NHI administration. All cancer patients holding CICs have no copayments for receipt of cancer-related treatments, including Western medicine and TCM. A CIC is canceled when a patient dies.

Study Subjects

Because of the high rate of medical insurance coverage in Taiwan, there are nearly 23 million people in the NHIRD. Moreover, all cancer patients are also enrolled in the RCIPD. Thus, we enrolled all cancer patients from the RCIPD who received diagnoses based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes 140-208. Cancer patients older than 18 years who were registered in the RCIPD as having a CIC between January 2001 and December 2009 were included in this study and followed until December 2011. A total of 1 100 656 patients were diagnosed with cancer during this period, including 582 799 adults (older than 18 years) with newly diagnosed cancer from 2001 to 2009. Among these adult cancer patients, those who had at least one TCM outpatient clinical record were defined as TCM users ($n = 74\,620$), and others as non-TCM users ($n = 508\,179$). We also divided the study cohort into 3 age groups: 18 to 39 years, 40 to 59 years, and ≥ 60 years. We used the definition of urbanization of residence, described previously,^{26,27} to compare patients living in urban and rural areas. Level 1 represents the highest degree of urbanization and level 4 the lowest.

Table 1. Demographic Characteristics of Taiwanese Adults Diagnosed With Cancer From 2001 to 2009 Who Used and Did Not Use Traditional Chinese Medicine (TCM).

Variable	No TCM (n = 508 179), n (%)	TCM (n = 74 620), n (%)	P	Odds Ratio (95% CI)
Age at baseline, y, mean (SD) ^a	62.5 (15.1)	55.5 (13.5)	<.0001	
18-39	39 075 (7.7)	9 183 (12.3)		2.26 (2.19-2.34)
40-59	175 280 (34.5)	37 888 (50.8)		2.07 (2.03-2.12)
≥60	293 824 (57.8)	27 549 (36.9)		Reference
Sex			<.0001	
Female	218 582 (43.0)	39 440 (52.9)		1.59 (1.56-1.62)
Male	289 597 (57.0)	35 180 (47.1)		Reference
Urbanization			<.0001	
1 (highest)	136 340 (26.8)	21 524 (28.8)		1.13 (1.10-1.16)
2	146 522 (28.8)	23 377 (31.3)		1.16 (1.13-1.19)
3	83 102 (16.4)	12 053 (16.2)		1.06 (1.02-1.09)
4 (lowest)	142 206 (28.0)	17 665 (23.7)		Reference
Occupation			<.0001	
White-collar ^b	66 934 (19.2)	15 879 (30.0)		1.37 (1.33-1.40)
Blue-collar ^c	174 617 (50.2)	24 610 (46.4)		1.05 (1.02-1.07)
Others ^d	106 366 (30.6)	12 501 (23.6)		Reference
Annual medical center visits, mean (SD) ^a	16.0 (16.7)	11.2 (15.9)	<.0001	1.02 (1.02-1.02)
Annual non-medical center visits, mean (SD) ^a	13.3 (17.0)	8.71 (15.4)	<.0001	1.02 (1.02-1.03)
Time from diagnosis to first TCM consultation, mo, median (interquartile range)		15.3 (20.4)		
Time from diagnosis to first TCM consultation in patients with >9 TCM clinical visits/year, mo, median (interquartile range)		5.14 (14.4)		

^at test.^bWhite collar: civil services, institution workers, enterprise, business, and industrial administration personnel.^cBlue collar: farmers, fishermen, vendors, and industrial laborers.^dOthers: retired, unemployed, and low-income populations.

Ethics Statement

The Research Ethics Committee of China Medical University and Hospital approved this study (CMUH104-REC2-115). The NHIRD is provided by the NHI Administration, and managed by the NHRI of Taiwan. Data were anonymized and deidentified before being sent to the NHRI for database construction, and was further scrambled before release. Therefore, it is impossible to use the NHIRD to identify individuals (<http://nhird.nhri.org.tw>).

Statistical Analysis

We analyzed the data using SAS software, version 9.2 (SAS Institute Inc, Cary, NC, USA). The chi-square test and regression analysis were used to compare categorical variables, such as age, sex, urbanization of residence, occupation, annual visits to medical centers, and cancer types, and the *t* test was used to compare continuous variables. We also calculated the number of TCM visits and the TCM medical options by classification of TCM users into 4 groups: 1 to 3 visits/year, 4 to 6 visit/year, 7 to 9 visits/year, and more than

9 visits/year. In this analysis, the medical options were: only Chinese herbal medicines, only acupuncture or traumatology, and use of both treatments. The incidence rate ratio (IRR) for common diseases of non-TCM users and TCM users was also calculated. We estimated the IRR and 95% confidence intervals (CIs) using Poisson regression. A *P* value <.05 was defined as statistically significant.

Results

We identified 1 100 656 cancer patients in the RCIPD, and 582 799 adults who had newly diagnosed cancer between 2001 and 2009. Among them, 74 620 (12.8%) patients were TCM users, and 508 179 (88.2%) were non-TCM users. Table 1 shows the demographic characteristics of these 2 groups. There were significant differences in age, sex, urbanization of residence, and occupation. More specifically, the average age of TCM users was 55.5 years, and that of non-TCM users was 62.5 years; most TCM users were 40 to 59 years old (50.8%) and most non-TCM users were aged 60 years or older (57.8%). More females (52.9%) than males (47.1%) were TCM users. Relative to non-TCM

Table 2. Types of Cancer in Adults Who Used and Did Not Use Traditional Chinese Medicine (TCM).

Cancer ^a (ICD-9-CM)	No TCM (n = 508 179), n (%)	TCM (n = 74620), n (%)	P
Cancer type			<.0001
140-146, 148-149	36 005 (7.1)	5422 (7.3)	
147	9392 (1.8)	3923 (5.3)	
150	11 571 (2.3)	1 139 (1.5)	
151	26 749 (5.3)	2672 (3.6)	
153, 154	68 860 (13.6)	9455 (12.7)	
155	69 177 (13.6)	9185 (12.3)	
162	58 168 (11.4)	6870 (9.2)	
173	8423 (1.7)	348 (0.5)	
174	48 171 (9.5)	14 453 (19.4)	
180	17 015 (3.3)	2314 (3.1)	
182	6770 (1.3)	1 116 (1.5)	
183	6754 (1.3)	1 810 (2.4)	
185	22 659 (4.5)	2 138 (2.9)	
188	16 676 (3.3)	1 520 (2.0)	
193	12 622 (2.5)	1 717 (2.3)	
200-208	23 100 (4.5)	3 011 (4.0)	
Others	66 067 (13)	7 527 (10.1)	

^aICD-9-CM codes: 140-146, Malignant neoplasm of lip, tongue, major salivary glands, gum, floor of mouth, other and unspecified parts of mouth, and oropharynx; 147, Malignant neoplasm of nasopharynx; 148-149, Malignant neoplasm of hypopharynx, and other and ill-defined sites within the lip, oral cavity, and pharynx; 150, Malignant neoplasm of esophagus; 151, Malignant neoplasm of stomach; 153, Malignant neoplasm of colon; 154, Malignant neoplasm of rectum, rectosigmoid junction, and anus; 155, Malignant neoplasm of liver and intrahepatic bile ducts; 162, Malignant neoplasm of trachea, bronchus, and lung; 173, Other malignant neoplasm of skin; 174, Malignant neoplasm of female breast; 180, Malignant neoplasm of cervix uteri; 182, Malignant neoplasm of body of uterus; 183, Malignant neoplasm of ovary and other uterine adnexa; 185, Malignant neoplasm of prostate; 188, Malignant neoplasm of bladder; 193, Malignant neoplasm of thyroid gland; 200, Lymphosarcoma and reticulosarcoma and other specified malignant tumors of lymphatic tissue; 201, Hodgkin's disease; 202, Other malignant neoplasms of lymphoid and histiocytic tissue; 203, Multiple myeloma and immunoproliferative neoplasms; 204, Lymphoid leukemia; 205, Myeloid leukemia; 206, Monocytic leukemia; 207, Other specified leukemia; 208, Leukemia of unspecified cell type.

users, more TCM users lived in urbanized areas (level 1: 28.8% vs 26.8%; level 2: 31.3% vs 28.8%), and fewer TCM users lived in less urbanized areas (level 3: 16.2% vs 16.4%; level 4: 23.7% vs 28.0%). Significantly more white-collar workers were TCM users than non-TCM users (30.0% vs 19.2%). Among TCM users, the average interval from diagnosis of cancer to the first visit for TCM treatment was 15.3 months.

We used the ICD-9-CM codes to classify the types of cancers in TCM users and non-TCM users (Table 2). The results indicate a significant difference in the types of cancers in these 2 groups ($P < .0001$). The most common cancer in the TCM group was malignant neoplasm of the female breast (ICD code: 174; 19.4%) and the most common cancer in the non-TCM group was malignant neoplasm of liver and intrahepatic bile ducts (ICD code: 155; 13.6%).

We also used ICD-9-CM codes to analyze the frequency of clinical visits for other major diseases in the two groups (Table 3). TCM users mainly visited clinics for endocrine, nutritional and metabolic diseases, and immunity disorders (23.2%), genitourinary system diseases (16.6%), and injury and poisoning diseases (12.5%). The three leading reasons for clinical visits by non-TCM users were the

same, but the percentage of visits due to endocrine, nutritional and metabolic diseases, and immunity disorders was only 17.9%.

We investigated the type of TCM treatment and frequency of TCM clinical visits by grouping patients into 4 categories defined by the annual number of TCM visits (Table 4). A total of 43.1% of patients had TCM visits 1 to 3 times per year, and 33.1% had TCM visits more than 9 times per year. The major type of TCM treatment was Chinese herbal medicine alone ($n = 69\,086$).

Patients with breast cancer had the highest percentage of TCM users (19.4%), so we further investigated the utilization of TCM by these patients. Tumor/node/metastasis (TNM) staging of breast cancer is not available in the NHIRD, so we categorized patients according to conventional treatment procedures. The results show that breast cancer patients who received no conventional treatment sought TCM treatment at a median of 1.9 months after diagnosis, but those who received a combination of surgery, chemotherapy, and radiotherapy sought TCM treatment at a median of 15.7 months after diagnosis. Patients who received surgery plus chemotherapy sought TCM treatment at 5.6 months after diagnosis, and patients

Table 3. The Distribution of Clinical Visits of Adult Cancer Patients Who Used and Did Not Use Traditional Chinese Medicine (TCM) by Major Disease Categories/Diagnosis.

Disease (ICD-9-CM)	No TCM (n = 51 953 106), n (%)	TCM (n = 13 026 388), n (%)
Infectious and parasitic disease (001-139)	390 480 (0.7)	84 412 (0.6)
Endocrine, nutritional and metabolic disease, and immunity disorders (240-279)	971 5878 (17.9)	3 150 038 (23.2)
Blood and blood-forming organs (280-289)	1 398 842 (2.6)	305 053 (2.2)
Mental disorder (290-319)	283 594 (0.5)	98 866 (0.7)
Nervous system (320-389)	797 890 (1.5)	225 037 (1.7)
Circulatory system (390-459)	2 930 296 (5.4)	658 114 (4.8)
Respiratory system (460-519)	4 618 230 (8.5)	758 911 (5.6)
Digestive system (520-579)	5 772 574 (10.6)	1 353 203 (10)
Genitourinary system (580-629)	8 645 889 (15.9)	2 250 576 (16.6)
Complications of pregnancy, childbirth, and the puerperium (630-676)	3 961 746 (7.3)	804 419 (5.9)
Skin and subcutaneous tissue (680-709)	21 580 (0)	6 037 (0)
Musculoskeletal system and connective tissue (710-739)	2 295 414 (4.2)	518 123 (3.8)
Congenital anomalies (740-759)	4 777 852 (8.8)	1 106 024 (8.1)
Certain conditions originating in the perinatal period (760-779)	66 262 (0.1)	15 852 (0.1)
Symptoms, signs, and ill-defined conditions (780-799)	3 683 (0)	886 (0)
Injury and poisoning (800-999)	6 272 896 (11.5)	1 690 837 (12.5)

Table 4. Types of Treatments Received at Clinical Traditional Chinese Medicine (TCM) Visits by Adult Cancer Patients.

No. of TCM Clinical Visits	Only Chinese Herbal Medicines (N = 69 086), n (%)	Only Acupuncture or Traumatology (N = 459), n (%)	Both Treatments (N = 5 075), n (%)	Total (N = 74 620), n (%)
1-3	30 841 (44.6)	387 (84.3)	929 (18.3)	32 157 (43.1)
4-6	10 504 (15.2)	39 (8.5)	779 (15.3)	11 322 (15.2)
7-9	5 869 (8.5)	16 (3.5)	536 (10.6)	6 421 (8.6)
>9	21 872 (31.7)	17 (3.7)	2 831 (55.8)	24 720 (33.1)

receiving surgery alone sought TCM treatment at 1.1 months after diagnosis (Table 5).

We further analyzed cancer patients who had more than 9 TCM clinical visits per year, because TCM would presumably have the greatest impact on this group. These patients visited TCM clinics an average of 5.14 months after diagnosis of cancer (Table 1). Analysis of breast cancer patients according to the type of conventional treatments they received indicated that those who had more than 9 TCM visits per year had a shorter median interval between diagnosis of cancer and the first TCM visit in each of the 5 treatment groups relative to those who had 9 or fewer TCM visits per year (Table 5). We also found that those who had more than 9 TCM visits per year had more cancer-related or treatment-related conditions than those who had 9 or fewer TCM visits per year (Table 6).

We also compared the IRRs for other diseases in TCM users and non-TCM users (Table 7) to identify the major

reasons why cancer patients sought TCM treatment. The results show that cancer patients with insomnia, malaise, fatigue, dizziness, headache, gastrointestinal disorders, myalgia and fasciitis, anxiety and depression were significantly more likely to seek TCM treatment (Table 7).

We used a Cox regression model to compare overall mortality in TCM users and non-TCM users (Table 8). After adjustment for age, sex, urbanization of residence, occupation, number of annual medical center visits, and number of annual non-medical center visits, we found that TCM users had a significantly lower adjusted hazard ratio (aHR) of mortality (aHR = 0.69, 95% CI = 0.68-0.70).

Discussion

Our study provides an overview of TCM usage by adult cancer patients from Taiwan. Previous national surveys have also examined the use of CAMs by cancer patients,

Table 5. Time From Diagnosis of Breast Cancer to the First Traditional Chinese Medicine (TCM) Consultation in Patients Who Received Different Types of Conventional Treatments.

Type of Conventional Treatment	Visited TCM Clinics 9 or Fewer Times per Year		Visited TCM Clinics More Than 9 Times Per Year	
	n	Median Interval, mo (IQR)	n	Median Interval, mo (IQR)
None	302	1.9 (13.7)	111	0.72 (12.2)
Surgery + CT + RT	3998	15.7 (25.4)	1476	12.4 (19.8)
Surgery + CT	5722	5.6 (15.2)	2469	4.13 (9.21)
Only surgery	2828	1.1 (10.5)	1351	0.79 (3.05)
Others	1603	5.3 (18.0)	657	3.31 (11.3)

Abbreviations: CT, chemotherapy; IQR, interquartile range; RT, radiotherapy.

Table 6. The Distribution of Clinical Conditions of Traditional Chinese Medicine Users.

Disease (ICD-9-CM)	Visited TCM Clinics 9 or Fewer Times per Year (n = 49 900), n (%)	Visited TCM Clinics More Than 9 Times per Year (n = 24 720), n (%)	χ^2 P Value
Pain (338, 338.0-338.4, 716, 716.9, 724.1-724.5, 729.5, 784.0, 784.1, 786.5, 789.0, and 789.6)	34 514 (69.2)	18 786 (76.0)	<.0001
Nausea, vomiting, dyspepsia, gastritis, and abdominal pain (787.0, 536.2, 536.8, 535, 789.0, and 787.9)	31 782 (63.7)	17 171 (69.5)	<.0001
Insomnia (780.5 and 307.4)	21 675 (43.4)	13 242 (54.3)	<.0001
Dizziness and headache (780.4 and 784.0)	22 032 (44.2)	12 944 (52.4)	<.0001
Myositis and myalgia (729.1 and 729.4)	17 401 (34.9)	10 590 (42.8)	<.0001
Constipation (564.0, 564.00-564.02, and 564.09)	15 449 (31.0)	8 237 (33.3)	<.0001
Anxiety and depression (300, 311, and 309)	14 001 (28.1)	8 025 (32.5)	<.0001
Hot flashes (627.2, 627.3, and 782.62)	5 322 (10.7)	3 701 (15.0)	<.0001
Malaise and fatigue (780.7)	6 337 (12.7)	3 454 (14.0)	<.0001
Diarrhea (787.91)	1 848 (3.70)	1 203 (4.87)	<.0001
Lymphedema (457.0, 457.1, 457.2, 457.8, 624.8, 729.81, and 757.0)	987 (1.98)	826 (3.34)	<.0001
Weight loss (783.21, and 799.4)	1 558 (3.12)	685 (2.77)	.008
Xerostomia (527, 527.0, and 527.7)	405 (0.81)	290 (1.17)	<.0001
Dyspnea (786.0)	4 892 (9.80)	2 482 (10.0)	.31

such as the 2012 US National Health Interview Survey,²⁸ the British National Health Service,²⁹ the Korean Cancer Patient Experience Study,³⁰ and the European Partnership for Action Against Cancer (EPAAC) Survey.³¹ A previous comprehensive systemic review that examined CAM use by cancer patients from 18 countries found that the overall prevalence was 40%, the greatest use was in the United States and the lowest was in Italy and The Netherlands, and there was an increase from 25% usage in the 1970s and 1980s, to more than 32% in the 1990s, and 49% after 2000.³² To our knowledge, the present study is the first large-scale population-based investigation of complementary TCM usage by adult cancer patients in Taiwan.

TCM treatments are highly accepted in Taiwan, partly because the NHI program covers TCM and Western medical services and makes these services affordable to all

enrollees. The overall use of TCM in Taiwan has increased from 26.59% in 2000 to 28.66% in 2010.³³ Our study shows that cancer patients who were female, 40 to 59 years old, resided in highly urbanized areas, and had white-collar jobs were more likely to use TCM. Although there were more male than female cancer patients in our cohort, females had greater utilization of TCM health care services. This is in accordance with our previous studies of other diseases,^{27,34,35} which reported that females were more likely to use TCM.³⁶ The association of residence in highly urbanized areas with TCM use might be because access to TCM resources is greater in more urbanized areas.^{35,37} In addition, TCM usage by white-collar cancer patients may be higher because these workers often have more money, allowing them to search for additional treatments.³⁸ Other studies also reported greater CAM usage by white-collar workers.^{28,39-42}

Table 7. Incidence Rate Ratio (IRR) of Common Diseases in Cancer Patients Who Used and Did Not Use Traditional Chinese Medicine (TCM), With Stratification by Patient Age (Years).

Disease (ICD-9-CM)	No TCM, n (%)	TCM, n (%)	IRR (95% CI)
Insomnia (780.5 and 307.4)			
All	136 099 (26.8)	35 101 (47.0)	1.32 (1.30-1.33)
18-39	10 303 (26.4)	4 120 (44.9)	1.49 (1.44-1.55)
40-59	52 003 (29.7)	18 780 (49.6)	1.41 (1.39-1.43)
≥60	73 793 (25.1)	12 201 (44.3)	1.27 (1.25-1.30)
Malaise and fatigue (780.7)			
All	45 554 (9.0)	9 791 (13.1)	1.10 (1.07-1.12)
18-39	2 590 (6.6)	956 (10.4)	1.38 (1.28-1.48)
40-59	13 832 (7.9)	4 572 (12.1)	1.29 (1.25-1.33)
≥60	29 132 (9.9)	4 263 (15.5)	1.13 (1.09-1.16)
Dizziness and headache (780.4 and 784.0)			
All	171 598 (33.8)	34 976 (46.9)	1.04 (1.03-1.05)
18-39	13 326 (34.1)	4 270 (46.5)	1.20 (1.16-1.24)
40-59	58 535 (33.4)	17 202 (45.4)	1.15 (1.13-1.17)
≥60	99 737 (33.9)	13 504 (49.0)	1.04 (1.02-1.06)
Cough, common cold, and upper respiratory tract infection (786.2, 460, and 465)			
All	295 610 (58.2)	58 164 (77.9)	1.00 (0.99-1.01)
18-39	27 590 (70.6)	7 667 (83.5)	1.04 (1.01-1.06)
40-59	111 064 (63.4)	29 764 (78.6)	1.05 (1.03-1.06)
≥60	156 956 (53.4)	20 733 (75.3)	1.02 (1.00-1.03)
Nausea, vomiting, dyspepsia, gastritis, and abdominal pain (787.0, 536.2, 536.8, 535, 789.0, and 787.9)			
All	243 474 (47.9)	48 953 (65.6)	1.03 (1.02-1.04)
18-39	20 712 (53.0)	6 162 (67.1)	1.11 (1.08-1.14)
40-59	87 105 (49.7)	24 707 (65.2)	1.11 (1.09-1.12)
≥60	135 657 (46.2)	18 084 (65.6)	1.03 (1.01-1.04)
Myositis and myalgia (729.1 and 729.4)			
All	120 936 (23.8)	27 991 (37.5)	1.18 (1.17-1.20)
18-39	10 090 (25.8)	3 437 (37.4)	1.27 (1.22-1.32)
40-59	47 458 (27.1)	14 816 (39.1)	1.22 (1.20-1.24)
≥60	63 388 (21.6)	9 738 (35.3)	1.18 (1.16-1.21)
Anxiety and depression (300, 311, and 309)			
All	89 779 (17.7)	22 026 (29.5)	1.25 (1.23-1.27)
18-39	6 317 (16.2)	2 400 (26.1)	1.42 (1.35-1.49)
40-59	33 588 (19.2)	11 709 (30.9)	1.36 (1.33-1.39)
≥60	49 874 (17.0)	7 917 (28.7)	1.22 (1.19-1.25)

Table 8. Hazard Ratios (HRs) and 95% Confidence Intervals of the Association Between Traditional Chinese Medicine (TCM) Usage and Mortality in Adult Cancer Patients.

	Deaths	Mortality	Crude HR (95% CI)	Adjusted ^a HR (95% CI)
No TCM	273 887	16.68	1.00	1.00
TCM	32 851	10.20	0.65 (0.64-0.66) ^b	0.69 (0.68-0.70) ^b

^aAdjusted for age, sex, level of urbanization, occupation, annual medical center visits, and annual non-medical center visits.

^bP < .0001 for crude and adjusted HRs.

We found that our overall study population had a low rate of TCM usage (12.8%). Cancer patients registered in the RCIPD have no copayments for visiting TCM or Western medical doctors. Therefore, medical expenditures do not explain the low usage of TCM in our population.

Patients with poor health status or chronic health problems are more likely to seek CAM treatments.⁴³ For example, our previous studies revealed that 63.11% of children with allergic rhinitis and 57.95% of children with asthma used TCM,⁴⁴ higher than the overall average use of TCM by

children (22.5%).²³ Our recent study also found that 70.4% of patients with psoriasis used TCM,⁴⁵ much higher than the overall percentage of TCM users in Taiwan (28.66%).³³ We propose 2 possible explanations for the low use of TCM in our population. First, some cancer patients may seek alternative therapies outside the NHI system. TCM is integrated into Taiwan's health care system, and deemed a mainstream therapy in Taiwan. However, some cancer patients may seek folk therapies, dietary therapies, or nutritional counseling in nonclinical settings, outside the NHI program.³⁷ Second, some oncologists have negative views about TCM usage. TCM is popular in Taiwan, but utilization is often determined by the patient's own beliefs, rather than a physician's recommendation. A previous study reported that 70% of oncologists from the United States agreed to combine CAM with conventional treatments for curable disease, but only 48% of oncologists from China and Taiwan agreed.⁴⁷ Although cancer patients in China and Taiwan have used CAM therapies, such as TCM, for centuries, there is limited communication about TCM usage among patients, TCM practitioners, and oncologists. A recent national survey of oncologists in China reported that 75.6% of them did not want to initiate discussions about CAM use.⁴⁶ A previous study in Taiwan showed that policy makers resist recommendation of TCM, because they were educated as Western medical practitioners or under the modern Western medicine paradigm.⁴⁷ However, an increasing number of medical centers in Taiwan employ an integrative approach to cancer treatment, in outpatient⁴⁸ and inpatient⁴⁹ settings, in an effort to better meet the needs of cancer patients. This could improve communication among patients, TCM practitioners, and oncologists.

The average time from diagnosis of cancer to the first TCM visit was 15.3 months in our population. Some patients, possibly after receiving chemotherapy or radiotherapy, might visit a TCM clinic for consultation regarding long-term discomfort. A previous study reported that patients who had cancer for longer durations were more likely to use TCM.⁶ These patients might have more time to learn about TCM treatments or a greater desire for TCM treatment after suffering from long-term discomfort. Cancer patients often seek TCM treatments for symptoms related to treatment side effects.³¹ We found that the major disease categories of TCM users were endocrine, nutritional and metabolic diseases, and immunity disorders. Many cancer patients suffer from immunocompromised status, malnutrition, or cachexia, and seek complementary treatments to boost their immune function and improve their nutritional status.⁵⁰⁻⁵² However, the time to first TCM treatment varied depending on the standard care being provided in different stages. For example, patients with advanced breast cancer who received surgery, chemotherapy, and radiotherapy, sought TCM treatments 15.7 months after diagnosis; however, patients who received surgical resection alone sought

TCM treatments 1.1 months after diagnosis. Previous studies found that patients with poor health status or who were unsatisfied with conventional therapy were more likely to try complementary therapies.^{37,42} We suggest that future studies investigate the relationship between clinical outcome and utilization of TCM by cancer patients.

Our analysis of the types of TCM treatments used indicated most patients chose Chinese herbal medicine. This choice depends on disease severity and the attitudes and beliefs of patients and health care providers, and may therefore vary among different countries.^{30,52-54} The CAM therapies used in other countries include vitamins/minerals, manipulative therapies, acupuncture, herbal remedies, homeopathy, mind-body therapies, and others. In contrast, Chinese herbal medicine is more accepted in Taiwan, partly because it is a part of the Chinese culture. Interestingly, cancer patients in Europe also commonly use herbal medicines.^{31,55} As more countries provide funding for TCM research,⁵⁶ it is important to clarify the combined effect of these integrative approaches on cancer outcomes and cancer-related symptoms.⁵⁰ Notably, the percentage of our patients who used acupuncture (including acupuncture/traumatology alone and acupuncture with CHM) was only 7.4%. This low utilization of acupuncture is also in accordance with a previous cross-sectional study of 2499 cancer patients, which indicated that only 5% of cancer patients used acupuncture with a conventional treatment.⁶ According to a previous report⁵⁷ and our unpublished data, the use of acupuncture in Taiwan increased from 6% in 1996 to 10.9% in 2011. There is evidence that acupuncture reduces certain cancer-related conditions.^{10,11} Thus, policy makers and physicians should seek to include acupuncture in their treatment plans.

We also identified the most common conditions for which cancer patients seek TCM. Previous studies also indicated that chronic pain, insomnia, and fatigue as major issues faced by cancer patients after their treatment.⁵⁸ Complementary TCM treatment may help in managing symptoms associated with cancer or cancer treatment. For example, TCM treatments such as acupuncture¹⁰ and Chinese herbal medicines⁸ can reduce chemotherapy-induced nausea/vomiting. Acupuncture may alleviate cancer-pain and aromatase inhibitor-induced arthralgia in cancer patients.^{11,59} TCM can also reduce cancer-related symptoms, such as fatigue, poor appetite, and depression.^{9,60,61} Thus, health care providers should consider more widespread use of TCM to relieve the discomfort of their cancer patients.

An advantage of our study is that sample bias was very small, because we examined all adult cancer patients from Taiwan. The NHIRD is also a good source for assessment of survival rates, herb-drug interactions, and cost-effectiveness analyses. In this study, we found that TCM users had a lower risk of mortality than nonusers, with an aHR of 0.69.

Other studies investigating similar research questions in patients with various types of cancer are ongoing or recently published by us and other research groups.^{14,15,17,18,62} However, there were still some limitations in this study. It is hard to attribute the better survival of the TCM patients to TCM itself. This population has high socioeconomic status and white-collar jobs, and perhaps other confounders that could account for the improved survival. We also cannot exclude the possibility that some cancer patients might have purchased proprietary Chinese medicines or supplements that contain Chinese herbal ingredients from pharmacies that were not covered by NHI. Moreover, the NHI does not provide reimbursement for qi management, exercise, dietary therapy, nutritional counseling, meditation, and other complementary therapies. The NHI program only reimburses Chinese herbal medicines prescribed by licensed TCM doctors. We therefore did not include services provided by medical facilities not contracted with the NHI program (fewer than 10%).¹³ In addition, this study was based on NHI data, instead of questionnaire surveys, which usually include different variables.³²

Conclusion

This study provides an overview of TCM usage by adult cancer patients in Taiwan. Complementary TCM utilization varied among patients with different types of cancer. Physicians caring for cancer patients should be aware of the use and need of complementary TCM by cancer patients.

Authors' Note

The interpretation and conclusions contained herein do not represent those of National Health Insurance Administration, Ministry of Health and Welfare, or National Health Research Institutes.

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