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The Prevalence, Characteristics, and Factors Associated with Chinese Herbal Medicine Use Among Chinese Middle-Aged and Older Adults with Chronic Lung Disease: A Cross-Sectional Study

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Purpose: Identifying factors that influence Chinese herbal medicine (CHM) use in chronic lung disease (CLD) patients can inform targeted strategies to boost CHM use. However, the prevalence and factors affecting CHM use for treating CLD in middle-aged and older Chinese patients remain understudied. This study aims to examine the prevalence and influencing factors of CHM use among middle-aged Chinese patients with CLD.

Patients and Methods: The data analyzed in this study were extracted from the China Health and Retirement Longitudinal Study in 2018. A cross-sectional analysis of 2784 participants aged 45 years and older taking CHM for CLD was included, and influencing factors (demographic characteristics, health status, and healthcare service use) predicting the use of CHM for CLD were identified through multivariate logistic regression model.

Results: The prevalence of using CHM to treat CLD was 22.4% (624/2784). Compared to participants with CLD who did not use CHM, those with CLD who used CHM were more likely to be female, and non-smoking, non-drinking, purchased insurance (OR=2.35; 95% CI=1.09, 5.04), went to a traditional Chinese medicine hospital (OR=3.5; 95% CI=1.96, 6.25) and self-treatment (OR=1.67; 95% CI=1.33, 2.10), the health status being poor (OR =1.74; 95% Cl=1.18, 2.56), asthma (OR=1.55; 95% Cl=1.16, 2.09) and depression (OR =1.42; 95% Cl=1.14, 1.75). In the additive interaction analysis, patients who tend to self-medicate and with depression were most likely to use CHM (OR=2.52; 95% Cl=1.85, 3.42).

Conclusion: A considerable middle-aged and older Chinese patient with CLD uses CHM for treatment. Multiple factors can influence CHM use, particularly self-treatment and depression.

Keywords: influencing factors, Chinese herbal medicine, chronic lung disease, Chinese, middle-aged and older adults, cross-sectional study

Introduction

Chronic lung disease (CLD), including chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, pneumoconiosis, interstitial lung disease, and pulmonary fibrosis, are characterized by impaired lung function. These diseases accounted for over 4 million deaths worldwide, which represented 7% of all deaths in 2017.[1] Over the past three decades, the total number of deaths related to CLD has risen by 18.0%.[2] Tobacco use and air pollution, with smog, vehicle emissions and industrial pollution being among the most serious environmental and public health problems in today's industrialized nations,[3,4] are main causes leading to damage to the bronchial and alveolar tissues, ultimately resulting in respiratory dysfunction.[5] This problem has also become more prominent in

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China as industrialization accelerating in low- and middle-income countries. Studies have shown that middle-aged and older people are more vulnerable to the effects of air pollution than younger people.[6,7] Thus, CLD in the middle-aged and above patients should be play more attention.

Chinese herbal medicine (CHM) has been used for centuries to prevent and treat CLD. Ancient medical documents, such as the Shennong Ben Cao Jing and Shang Han Lun, comprehensively recorded traditional Chinese medicine (TCM) theories such as resolving phlegm, alleviating coughs, and calming wheezing, along with numerous prescriptions for treating CLD. It is reported that more than 80% of people in developing countries rely on CHM for treatment of diseases.[8] According to China's National Bureau of Statistics, the value of industrial output from TCM reached USD$68 billion (RMB418 billion) in 2011 with an annual growth rate of 37.9%.[9] This shows that the value of Chinese medicine is increasingly recognized. Generally speaking, TCM prescriptions are usually composed of two or more kinds of CHM. These prescriptions are based on thousands of years of clinical application and modern research of Chinese medicine. At present, hundreds of CHM have shown good curative effects in the treatment of pneumonia, asthma, CLD and lung cancer. The realization of curative effects mainly depends on the bioactive compounds or metabolites contained in CHMs, such as saponins, flavonoids, alkaloids and phenolic acids. These ingredients are effective in relieving acute respiratory symptoms and improving lung dysfunction.[10–13]

Patients with CLD can take CHM formulas to tonify the lungs and kidneys, replenish qi and strengthen the spleen, resolve phlegm and relieve cough at the same time. A multicenter, randomized, double-blind, placebo-controlled bed trial showed that Xuanbai Chengqi Decoction was effective in relieving the total symptom score of patients with acute exacerbation of COPD, improving atherosclerosis, improving lung function and exercise capacity, and increasing oxidation/antioxidant index.[14] Compared with western medicine treatment, CHM was effective in relieving exacerbation symptoms in the short term.[15] CHM treatment had the long-term treatment advantage of overall regulation. Meta-analyses highlight the anti-inflammatory effects of CHM in COPD patients, evidenced by reductions in serum levels of IL-6, IL-8, tumor necrosis factor-alpha, and transforming growth factor-beta.[16] Randomized controlled trials further demonstrate that the Chinese herbal prescription, Yi-Qi-Hua-Tang, has better efficacy than Western medicines in enhancing lung function, alleviating clinical symptoms and enhancing the quality of life for COPD patients.[17] Moreover, Li suggested that comprehensive therapy based on TCM patterns significantly improve lung function and psychological well-being in COPD patients.[18]

Pulmonary disease is one of the important health problems that directly affect the quality of life of patients with CLD, and antibiotics, bronchodilators and glucocorticoids are commonly used in clinical treatment of pulmonary diseases. However, long-term use of these drugs inevitably produces many side effects and fails to reverse the progressive decline in lung function and, most importantly, to reduce global lung disease progression and mortality. In recent years, there has been increasing interest in complementary and alternative medicine, not only patients seeking help but also health care providers studying the effectiveness of various therapies and management techniques. It is worth noting that CHM have good efficacy in controlling or improving lung infections, tuberculosis, interstitial lung diseases, asthma and pulmonary fibrosis, reducing symptoms[19–21] and delaying disease progression with minimal side effects.[22,23] Due to the different clinical symptoms and signs of CLD patients, Chinese medicine practitioners will adopt different herbal formulas to treat these patients. To date, the factors influencing the utilization of CHM among patients with CLD have not been assessed extensively. Considering the widespread use of CHM in the world especially in China, coupled with the higher prevalence of CLD among middle-aged and elderly individuals, it is imperative to identify the factors influencing CHM use among Chinese middle-aged and older patients with CLD. This information is vital for informing safer and more effective treatment and care strategies. Hence, the objective of this study was to utilize national survey data to estimate the prevalence, characteristics, and factors associated with CHM use among Chinese middle-aged and older patients with CLD.

Methods

Study Design and Study Population

This study constitutes a secondary analysis of a nationwide longitudinal survey, namely the China Health and Retirement Longitudinal Study (CHARLS). Previous studies have reported the details of study design and evaluation protocol about the CHARLS.[24] Briefly, CHARLS is the first high-quality micro-database that can represent families and individuals of Chinese people aged ≥45 years. And it is used to analyze China's population aging problem. In 2011–2012, more than 17,000 individuals aged ≥45 years from 450 communities and administrative villages across 28 provinces in China were enlisted by using multistage probability sampling. Subsequently, these participants underwent biennial follow-ups. The questionnaire design of CHALRS is patterned after the US Health and Retirement Study (HRS) and related aging surveys around the world. The CHARLS questionnaire consists of eight modules: (a) household registration form, (b) basic information, (c) family, (d) health status and function, (e) healthcare and insurance, (f) work, retirement and pension, (g/h) income, expenditure and assets, (i/j) housing characteristics and interviewer observations. At enrollment and subsequently, every individual needs to complete a standardized questionnaire. The response rate and data quality of CHARLS rank among the top in similar projects worldwide, and the data has been widely used and recognized in the academic community.

In the CHARLS 2018 dataset, 19816 participants were enrolled. We first excluded 16426 participants with age <45 years old (n=2326) and without CLD (n=16194). And then, 606 participants missing information on taking CHM were excluded. Finally, a total of 2784 individuals aged ≥45 years with data of taking CHM to treat CLD were extracted (Figure 1).

Assessment of CHM Use

CHM use was assessed by asking individuals a question "Are you now taking Chinese traditional medicine to treat CLD or its complications?". Participants were classified as CHM use if their response was affirmative, while not if response was negative.

Assessment of Demographic Characteristics

Demographic data including age, gender, education, area of residence, marital status, receive income, smoking and alcohol consumption were obtained by a uniform self-reported questionnaire. Age was stratified into two categories: middle-aged (45–64 years old) and older (65 years old and above). Education was classified as illiterate, primary

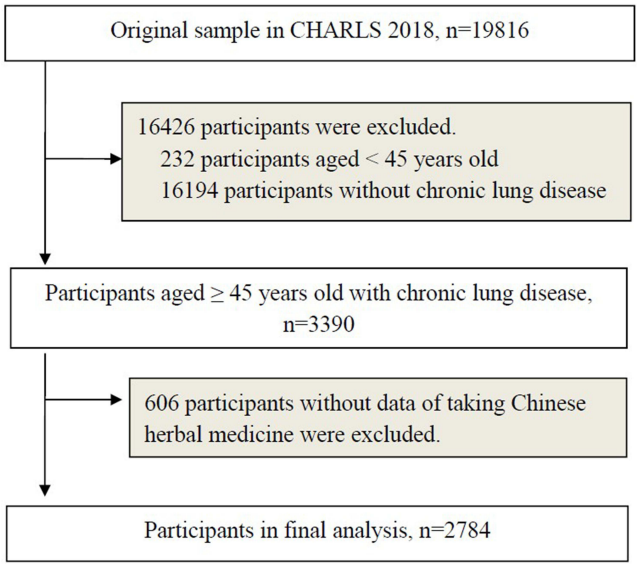

Figure 1 Flowchart of study participants.

school and below, or middle school and above. Area of residence was classified as urban and village. Marital status was classified as married and others (including unmarried, separated, divorced, and widowed). Receive income was determined as yes if individuals had received any wage and bonus income in the past year while as no if they had not received any. Smoking and alcohol consumption were grouped into three groups: never, former, and current groups.

Assessment of Health Services

Health services encompassed insurance status, types of medical facilities, and self-treatment. Insurance status refers to a variety of medical insurance types, including urban employee medical insurance, urban and rural resident medical insurance, and private medical insurance, and it was classified into two categories: yes and no. The types of medical facilities included three categories: general hospital, specialized hospital and Chinese medicine hospital, and were obtained based on participants' outpatient treatment visits in the last 4 weeks. General hospital is a comprehensive medical facility that provides a wide range of healthcare services to fit the majority of medical needs. Specialized hospital focuses on the diagnostic and treatment services for specific diseases or health issues, such as, oncology hospitals, women's hospital, pulmonary hospital. Chinese medicine hospital emphasizes the use of TCM theories and practices for diagnosis and treatment. Self-treatment data were collected base on whether individuals had taken any medicine purchased or stored by themself or delivered by others.

Assessment of Health Status

Health status encompassed general health status, chronic conditions, depression and satisfaction. General health status was rated as three categories by themselves: good, fair, and poor. Chronic conditions included 14 chronic conditions (hypertension, CLD, diabetes, cancer, CLD, liver disease, heart disease, stroke, kidney disease, stomach disease, psychiatric problems, memory-related disease, arthritis, and asthma) and were assessed base on the participants' answers about whether they had received a diagnosis from a doctor for each respective condition. The Center for Epidemiologic Studies Depression Scale short form was used to assess depression, with a score of ≥12 points as a criterion in previous studies. Satisfaction was evaluated through a self-report question: how satisfied are you with your life? And it was classified as either satisfied or unsatisfied groups.

Statistical Analysis

Chi-square tests were performed to examine differences in categorical variables (demographic characteristics, health services, and health status) between the two groups of participants with or without CHM use. The logistic regression model, which initially included all variables that had a bivariate $P<0.2$, was performed to determine the statistically significant factors associated with the use of CHM in participants aged ≥45 years with CLD. We used logistic regression model to assess the joint effect as previous studies,[25,26] which includes additive interaction and multiplicative interaction. The additive interaction of self-treatment and depression on CHM use was assessed by creating dummy variables of four categories based on the joint exposures of self-treatment and depression. The relative excess risk due to interaction (RERI), the attributable proportion (AP), and the synergy index (S) were calculated to test additive interaction. The multiplicative interaction was assessed by adding the product term of self-treatment and depression to the logistic regression model.

The Stata 15.0 SE (Stata Corp LP., College Station, Texas, USA) was used for analyses, and statistical significance was defined as two-tailed P values less than 0.05.

Results

In this study, 2784 individuals ≥45 years old with CLD were included in the analysis, and 22.4% (624/2784) individuals were using CHM to treat CLD. Compared to participants with CLD who did not use CHM, those with CLD who used CHM were more likely to be female, non-smoker, non-drinker. The difference in terms of age, education level, area of residence, marital status, and receive income between two groups was not significant (Table 1).

Table 1 Associations Between CHM Use and Demographic Characteristics, by Chinese Middle-Aged and Older Adults with CLD

Demographic Characteristics	CHM Use			P
	Total (n=2784)	No (n=2160)	Yes (N=624)	
Age				0.190
Middle-aged adults	1305 (46.88)	1031 (47.73)	274 (43.91)	
Older adults	1436 (51.58)	1098 (50.83)	338 (54.17)	
Gender				<0.001
Male	1513 (54.35)	1213 (56.16)	300 (48.08)	
Female	1271 (45.65)	947 (43.84)	324 (51.92)	
Education level				0.480
Illiterate	693 (24.89)	530 (24.54)	163 (26.12)	
Primary school and below	1314 (47.20)	1016 (47.04)	298 (47.76)	
Middle school and above	777 (27.91)	614 (28.43)	163 (26.12)	
Area of residence				0.250
Urban	479 (17.21)	362 (16.76)	117 (18.75)	
Village	2305 (82.79)	1798 (83.24)	507 (81.25)	
Marital status				0.590
Married	2093 (75.18)	1629 (75.42)	464 (74.36)	
Other	691 (24.82)	531 (24.58)	160 (25.64)	
Receive Income				0.083
Yes	465 (16.70)	376 (17.41)	89 (14.26)	
No	2314 (83.12)	1779 (82.36)	535 (85.74)	
Smoking status				0.038
Never	1358 (48.78)	1025 (47.45)	333 (53.37)	
Ever smoker	633 (22.74)	496 (22.96)	137 (21.96)	
Current smoker	790 (28.38)	636 (29.44)	154 (24.68)	
Alcohol consumption				0.005
Never drinker	1748 (62.79)	1319 (61.06)	429 (68.75)	
Former drinker	156 (5.60)	125 (5.79)	31 (4.97)	
Current drinker	877 (31.50)	713 (33.01)	164 (26.28)	

Notes: Data are presented as number (proportion %). Missing data: Age=43, Receive Income=5, Smoking status=3, Alcohol consumption=3.

When compared to individuals who did not use CHM for CLD, CHM users with CLD were more likely to have insurance, to visit a Chinese medicine hospital and have self-treatment. The difference in visiting a general hospital or a specialized hospital between the two groups was not significant (Table 2).

As for health status, compared to individuals who did not use CHM for CLD, those used CHM for CLD were more likely to have worse general health status, kidney disease, emotional problems, asthma, depression, and being unsatisfied. The difference in hypertension, dyslipidemia, diabetes, cancer, liver diseases, heart disease, stroke, stomach disease, memory-related disease, arthritis. (Table 3).

Table 4 presents the statistically significant predictors of CHM use in middle-aged and older individuals with CLD. Participants with insurance [odds ratio (OR)=2.35; 95% Confidence Interval (CI) =1.09, 5.04] were more likely to use CHM than those without insurance. Compared to individuals who did not go to a Chinese medicine hospital or treat themselves, those who have gone to a Chinese medicine hospital (OR=3.50; 95% CI=1.96, 6.25) and treated themselves (OR=1.67; 95% CI=1.33, 2.10) were more likely to use CHM. Individuals who rated their general health status being poor (OR=1.74; 95% Cl=1.18, 2.56) had higher odds of using CHM when compared with those who rated good. Further, participants with asthma (OR=1.55; 95% Cl=1.16, 2.09), and depression (OR=1.42; 95% Cl=1.14, 1.75) were more likely to use CHM than those without such diseases.

In the joint effect analysis, when compared with individuals who did not treat themselves and without depression, the ORs (95% Cl) of CHM use were 1.33 (95% Cl=0.89, 1.97) for individuals who did not treat themselves and with

Table 2 Associations Between CHM Use and Health Services, by Chinese Middle-Aged and Older Adults with CLD

Health Services	CHM Use			P
	Total (n=2784)	No (n=2160)	Yes (N=624)	
Insurance status[a]				0.047
Yes	2704 (97.13)	2089 (96.71)	615 (98.56)	
No	77 (2.77)	68 (3.15)	9 (1.44)	
General Hospital[b]				0.240
No	2515 (90.34)	1959 (90.69)	556 (89.10)	
Yes	269 (9.66)	201 (9.31)	68 (10.90)	
Specialized Hospital[c]				0.270
No	2751 (98.81)	2137 (98.94)	614 (98.40)	
Yes	33 (1.19)	23 (1.06)	10 (1.60)	
Chinese Medicine Hospital[d]				<0.001
No	2730 (98.06)	2132 (98.70)	598 (95.83)	
Yes	54 (1.94)	28 (1.30)	26 (4.17)	
Self-treatment[e]				<0.001
No	882 (31.68)	746 (34.54)	136 (21.79)	
Yes	1897 (68.14)	1409 (65.23)	488 (78.21)	

Notes: Data are presented as number (proportion %). Missing data: Insurance status=3, Self-treatment=5. [a] Insurance status: medical insurance, primarily comprising urban employee medical insurance, urban and rural resident medical insurance, and private medical insurance. [b] General Hospital: hospital providing comprehensive healthcare services. [c] Specialized Hospital: hospital focused on specific health issues. [d] Chinese Medicine Hospital: hospital emphasizing traditional Chinese medicine theories and practices. [e] Self-treatment: taking medication without professional medical guidance.

Table 3 Associations Between CHM Use and Health Status, by Chinese Middle-Aged and Older Adults with CLD

Health Status	CHM Use			P
	Total (n=2784)	No (n=2160)	Yes (N=624)	
General health status[a]				<0.001
Good	290 (10.42)	252 (11.67)	38 (6.09)	
Fair	1146 (41.16)	920 (42.59)	226 (36.22)	
Poor	1167 (41.92)	843 (39.03)	324 (51.92)	
Hypertension				0.190
No	2430 (87.28)	1895 (87.73)	535 (85.74)	
Yes	354 (12.72)	265 (12.27)	89 (14.26)	
Dyslipidemia				0.920
No	2417 (86.82)	1876 (86.85)	541 (86.70)	
Yes	367 (13.18)	284 (13.15)	83 (13.30)	
Diabetes				0.150
No	2592 (93.10)	2019 (93.47)	573 (91.83)	
Yes	192 (6.90)	141 (6.53)	51 (8.17)	
Cancer				0.073
No	2732 (98.13)	2125 (98.38)	607 (97.28)	
Yes	52 (1.87)	35 (1.62)	17 (2.72)	
Liver Disease				0.330
No	2619 (94.07)	2037 (94.31)	582 (93.27)	
Yes	165 (5.93)	123 (5.69)	42 (6.73)	

(*Continued*)

Table 3 (Continued).

Health Status	CHM Use			P
	Total (n=2784)	No (n=2160)	Yes (N=624)	
Heart Attack				0.088
No	2471 (88.76)	1929 (89.31)	542 (86.86)	
Yes	313 (11.24)	231 (10.69)	82 (13.14)	
Stroke				0.110
No	2596 (93.25)	2023 (93.66)	573 (91.83)	
Yes	188 (6.75)	137 (6.34)	51 (8.17)	
Kidney disease				<0.001
No	2580 (92.67)	2021 (93.56)	559 (89.58)	
Yes	204 (7.33)	139 (6.44)	65 (10.42)	
Stomach Disease				0.620
No	2452 (88.07)	1906 (88.24)	546 (87.50)	
Yes	332 (11.93)	254 (11.76)	78 (12.50)	
Emotional Problems				0.001
No	2713 (97.45)	2116 (97.96)	597 (95.67)	
Yes	71 (2.55)	44 (2.04)	27 (4.33)	
Memory-Related Disease				0.850
No	2676 (96.12)	2077 (96.16)	599 (95.99)	
Yes	108 (3.88)	83 (3.84)	25 (4.01)	
Arthritis				0.980
No	2526 (90.73)	1960 (90.74)	566 (90.71)	
Yes	258 (9.27)	200 (9.26)	58 (9.29)	
Asthma				<0.001
No	2499 (89.76)	1962 (90.83)	537 (86.06)	
Yes	285 (10.24)	198 (9.17)	87 (13.94)	
Depression[b]				<0.001
No	1488 (53.45)	1215 (56.25)	273 (43.75)	
Yes	1088 (39.08)	780 (36.11)	308 (49.36)	
Satisfaction[c]				0.004
Satisfied	2142 (76.94)	1685 (78.01)	457 (73.24)	
Not satisfied	434 (15.59)	310 (14.35)	124 (19.87)	

Notes: Data are presented as number (proportion %). Missing data: general health status=181, depressive symptoms=208, satisfaction=208. [a] General health status: self-rated health by participants. [b] Depression: The Center for Epidemiologic Studies Depression Scale ≥12 points. c Satisfaction: self-rated life satisfaction by participant.

Table 4 Logistic Regression Identifying the Statistically Significant Predictors of CHM Use by Chinese Middle-Aged and Older Adults with CLD

Predictors of CHM Use	Odds Ratio	95%CI	P
Insurance status[a]			
No	Reference		
Yes	2.35	(1.09, 5.04)	0.029
Chinese Medicine Hospital[b]			
No	Reference		
Yes	3.50	(1.96, 6.25)	<0.001
Self-treatment[c]			
No	Reference		
Yes	1.67	(1.33, 2.10)	<0.001

(*Continued*)

Table 4 (Continued).

Predictors of CHM Use	Odds Ratio	95%CI	P
General health status[d]			
Good	Reference		
Fair	1.38	(0.95, 2.02)	0.094
Poor	1.74	(1.18, 2.56)	0.005
Asthma			
No	Reference		
Yes	1.55	(1.16, 2.09)	0.003
Depression[e]			
No	Reference		
Yes	1.42	(1.14, 1.75)	0.001

Notes: [a] Insurance status: medical insurance, primarily comprising urban employee medical insurance, urban and rural resident medical insurance, and private medical insurance. [b] Chinese Medicine Hospital: hospital emphasizing traditional Chinese medicine theories and practices. [c] Self-treatment: taking medication without professional medical guidance. In Table 4 [d] General health status: self-rated health by participants. [e] Depression: The Center for Epidemiologic Studies Depression Scale ≥12 points.

Table 5 The Joint Effect of Self-Treatment and Depression on Chinese Herbal Medicine Use

Joint Exposure		N	Chinese Herbal Medicine Use		
Self-Treatment	Depression		n	OR [a]	P
No	No	518	70	Reference	
No	Yes	288	54	1.33 (0.89, 1.97)	0.164
Yes	No	970	203	1.57 (1.16, 2.11)	0.003
Yes	Yes	799	254	2.52 (1.85, 3.42)	<0.001

Notes: a Adjusted for receive income, Chinese medicine hospital, self-treatment, general health status, diabetes, stroke, kidney disease.

depression, 1.57 (95% Cl=1.16, 2.11) for those who had treat themselves and without depression, 2.52 (95% Cl=1.85, 3.42) for those who had treat themselves and with depression (Table 5). A statistically significant additive interaction was observed between self-treatment and depression on CHM use (RERI 0.63, 95% Cl=0.01, 1.24; AP 0.25, 95% Cl=0.01, 0.49). However, the multiplicative interaction between self-treatment and depression on CHM use (OR=1.21; 95% Cl=0.77, 1.90) was no significant.

Discussion

From this nationally cross-sectional study, we found that the use of CHM in middle-aged and older Chinese patients with CLD was 22.4%. The use of CHM was associated with factors including gender, smoking, alcohol consumption, health status, insurance status, choice of treatment, and chronic diseases.

In China, CHM is traditional medicine, which is more widely accepted by the general population. And CHM is often used as an adjunct to treat CLD. In our study, women, non-smokers and non-drinkers had higher odds for CHM use among middle-aged and older CLD patients. These findings align with previous research indicating that women are more inclined than men to use herbal remedies.[27–29] We infer that women may be better health-conscious than men and seek medication immediately at the slightest irregularity of symptoms. Thus, the female population may have a greater incentive to seek CHM management to reduce the risk of subsequent CLD. Studies have reported that smoking and alcohol consumption are risk factors for CLD,[30] but the use of herbal medicines was lower in such patients in this study. One possible explanation for this finding is that the proportion of CLD patients treated with CHM is higher in women,

and women are less likely to smoke and drink alcohol.[31] In addition, individuals with CLD who purchased insurance, visited Chinese medicine hospital, self-treatment, self-rated poor health, had depression and asthma would be more likely to take CHM for treatment. Patients with insurance have greater access to medical resources, and some insurance plans cover the cost of TCM treatments, facilitating easier access to herbal medicine. TCM hospitals primarily offer treatments such as herbal medicine, acupuncture, and massage. Patients who have visited TCM hospitals have a more comprehensive understanding of TCM's efficacy and a higher acceptance rate. Self-treating patients are more inclined to try herbal medicine as the natural safety profile of herbal remedies makes them a preferred alternative to chemical drugs when considering potential side effects. Herbal medicine treatments are typically personalized based on the patient's specific symptoms and constitution, making this tailored approach more appealing to self-treating patients.[32] In the context of chronic conditions where ongoing management is required, the coexistence of visiting TCM hospital and self-treatment is common, reflecting the complex and multifaceted nature of healthcare utilization among CLD patients. Additionally, the culture of TCM reinforces Chinese people's preference for CHM treatment,[33] particularly among people who self-rated poor health or have specific diseases such as depression and asthma.

Furthermore, the influence of depression on treatment adherence and self-management is well documented.[34] Given these factors, we examined the joint effect of self-treatment and depression on CHM use among CLD patients. The results show the joint effect is greater than the sum of their individual effects. It has been reported that the risk of depressive symptoms in CLD group is increased by 17%.[35,36] They may need more frequent herbal treatments, desire to enhance the management of their chronic ailments or increase access to herbal medicines. Additionally, it is possible that individuals experiencing anxiety are more inclined to pursue alternative herbal treatments as a means to mitigate the symptoms of their chronic conditions.[37] The efficacy and safety of Chinese herbs in depressive symptoms have been reported in studies.[38] These may be the reasons for the increased use of CHM in patients with depressive symptoms.

Currently, there exist numerous treatment strategies for CLD, with the primary approach involving the use of bronchodilators either alone or in conjunction with anti-inflammatory medications such as corticosteroids. However, prolonged use of steroids may result in severe side effects, such as serious infections like pneumonia or fractures induced by steroid usage. Therefore, it is crucial to effectively manage CLD with minimal treatment-related side effects, which is why an increasing number of individuals are opting for a combination of TCM and Western medicine.[39] Interest in complementary and alternative medicine is growing, not only among patients seeking help but also among health care providers studying the effectiveness of various treatment and management techniques. The effectiveness of CHM prescriptions for CLD has been proven, and the diversity of CHM formulations can be well adapted to the diverse clinical symptoms and signs of patients with CLD. Therefore, in the alternative treatment of CLD, CHM treatment is accepted by more and more patients. Given the growing interest in complementary and alternative medicine, our study's findings are timely and relevant. They not only contribute to the knowledge on influencing factors of CHM use in CLD treatment but also inform healthcare providers and policymakers when they develop strategies that promote the use of CHM in CLD treatment.

In our study, there are still some limitations. First, the information in the database comes from the self-report questionnaire, which inevitably has the existence of recall bias. Second, there is lacking data about dosage and frequency of CHM use in patients with CLD in this database. Therefore, we cannot further analyze the characteristics, and factors associated with dosage and frequency of CHM use. Finally, this is an observational cross-sectional study. While it provides valuable insights, such study designs cannot be used to establish a causal relationship between influencing factors and CHM use.

In summary, CHM is widely used in the treatment of CLD in China, and associated with several factors, including insurance status, visiting a TCM hospital, self-treatment, self-rated poor health status, history of asthma and depression. Those findings will support health care providers and policymakers in making measures regarding the development of CHM for CLD treatment.

Abbreviations

CHM, Chinese herbal medicine; CLD, chronic lung disease; TCM, traditional Chinese medicine; COPD, chronic obstructive pulmonary disease; CHARLS, the China Health and Retirement Longitudinal Study; RERI, the relative

excess risk due to interaction; AP, the attributable proportion; S, the synergy index; OR, odds ratio; CI, Confidence Interval.

Ethics approval and informed consent

The original CHARLS received approval from by the Ethical Review Committee of Peking University (IRB00001052-11015). All procedures adhered to pertinent guidelines and regulations. Informed consent was provided by participants. Additionally, our study was approved by the Ethics Committee of The Fifth People's Hospital of Ganzhou (GZWY-EC -2024237).

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Author Contributions

Hui Tian and Xiaorong Zhu contributed equally to this work and share first authorship. All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no disclosures relevant to the paper.

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