Characteristics and Trends of Chronic Pain Among Chinese Middle Aged and Elderly People in the Past Decades: Based on China Health and Retirement Longitudinal Study

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Abstract

Background: As one of the most common symptoms perplexing aged people, an understanding about chronic pain is needed with the aging of population in China. This study aimed to figure out the characteristics and trends of chronic pain among Chinese middle aged and elderly people in the past decades.

Methods: The nationwide survey data of China Health and Retirement Longitudinal Study from 2008 to 2015 were analyzed to describe the characteristics of chronic pain, including its prevalence, intensity and location, pain patients' quality of life, treatment, and recognitions on pain. Chi-square test and t test were used to compare chronic pain in different years and among participants in different demographic groups. Binary logistic regression was applied to explore factors affecting chronic pain.

Result: A total of 62481 middle aged and elderly participants were investigated on chronic pain in 2008, 2011, 2012, 2013 and 2015, and 30.13% of them suffered from chronic pain. The factors affecting chronic pain included age, gender, education, living area, disability, chronic disease, occupation, and food expenditure. Chronic pain located mostly in waist, accounting 13.60% of body pain, followed by legs and knees. Patients with mild, moderate, and severe pain accounted 37.38%, 29.70% and 32.92%, respectively. Pain patients slept 5.86 (± 2.05) hours one night in average, which was significantly shorter than overall participants. There were 75.20% of pain patients suffered from depression, which was significantly more than that among overall participants. From 2013 to 2015, the proportion of pain patients receiving no treatment decreased from 39.35% to 26.80%, and the prevalence of taking traditional Chinese medicine, western medicine, acupuncture, and professional massage therapy all increased. Patients' recognition on pain became diversified by time.

Conclusion: There were 30.13% of Chinese middle age and elderly people suffering from chronic pain, which were more likely to happen in female, rural, and chronic diseases patients. Chronic pain interfered significantly on patients' quality of life, and mainly located in waist, legs, and knees. In recent years, more patients received treatment to relieve pain, which might indicate a gradual awareness of chronic pain among middle age and elderly in China.

Introduction

Chronic pain was defined by the International Association for the Study of Pain (IASP) as pain that was related to obvious or potential tissue damage and lasted for more than 3 months or longer than normal tissue healing time [1–2].

Chronic pain affects 20% of the world's population and this prevalence is increasing all over the world [3]. Though chronic pain occurs at any age, it troubles most among aged people. As one of the most common symptoms of elderly people, the prevalence of chronic pain was as high as 55% for people over 60-year-old [4]. In China, 30% of the population suffered from chronic pain, most of whom were the elderly [5], and 80%~85% of Chinese people over 65 years old suffered from pain-related diseases [6].

Chronic pain affects people in many ways and should be perceived as a disease rather than a symptom. Basically, pain causes barriers in physical activity, which often accompanied with emotional, sleeping, and metabolic dysfunction. In the long term, pain leads to physical disability and depression, declining in quality of life (QoL) [7, 8], even difficulty in economic situation [9].

However, in contrast with its high prevalence and great harm, the treatment of chronic pain is usually inadequate. Aged people were less active in pain treatment, and many of them chose to endure pain until it was serious enough to interfere their body functions [10]. In Chinese culture, pain was regarded as a normal expected outcome of aging, and this may exacerbate people's neglect of pain. Thus, it is worthy to study on characteristics and treatment of pain in China, especially under the condition of rapid aging of population in China.

Recently, many studies have focused on chronic pain in China. Wang analyzed the influencing factors of chronic pain in urban hospitals from east China [11], and Zhang studied about healthcare-seeking behavior of Chinese pain patients at a hospital from west China [12]. As most of these studies are cross-sectional analysis, and there is still a lack of research on chronic pain from time dimension.

Thus, this study is aimed to figure out the characteristics and trends of pain and treatment among Chinese elderly people in recent decade through analyzing data from China Health and Retirement Longitudinal Study (CHARLS) from 2008 to 2015.

Methods

Study setting and population

CHARLS is a nationally representative survey of Chinese residents ages 45 and older as well as their spouses to serve the needs of scientific research on the middle aged and elderly, held by Peking University. Middle aged in this study referred to people over 45 and under 60, and elderly referred to people over 60. The pilot survey of CHARLS was conducted in two provinces (Gansu and Zhejiang) in 2008 and baseline national wave of CHARLS is being fielded in 2011, covering 28 provinces, then followed by the regular survey every year since then. Chronic pain condition was surveyed in 2008, 2011, 2012, 2013 and 2015, and distribution of samples in each year were shown in Table 1.

Table 1
Gender and age distribution of participants in surveyed years

Year	Overall participants	Population in gender (%)		Population in age (%)	
		Male	Female	45~	60~
2008	2685	48.49	51.51	54.68	45.32
2011	17707	47.88	52.12	55.64	44.36
2012	2380	48.02	51.98	56.88	43.12
2013	18612	47.46	52.54	51.12	48.88
2015	21097	47.58	52.42	42.39	57.61

The CHARLS questionnaire includes the following modules: demographics, family structure/transfer, health status and functioning, biomarkers, health care and insurance, work, retirement and pension, income and consumption, assets (individual and household), and community level information.

Variables and measurement

The characteristics of chronic pain were measured by its location, intensity, and interference on patients' QoL. The intensities of pain were assessed by patients themselves with a scale from mild, moderate to severe. The QoL in this study included patients' sleeping hours and depression status, measured by 10-item Centre for Epidemiological Studies Depression Scale (CES-D-10). CHARLS surveyed above variables in each of the above 5 years, except for intensity of pain in 2015.

The treatment of pain was surveyed in 2013 and 2015, and its options were various mainstream therapies that patients received to relieve pain, including taking traditional Chinese medicines (TCM), taking western medicines, acupuncture, and professional massage therapy.

Patients' recognition on pain was learnt from a quiz containing 3 situational questions simulating different kinds of pain in daily life, conducted in 2008, 2011 and 2012. Patients' feedback on these questions reflected their identification of pain and its intensity.

Other variables about participants were selected from 4 modules of CHARLS, including demographic module (age, gender, marital status, education and living area), health status and functioning module (disability, chronic disease, smoking and drinking) and work module (occupation), income and consumption module (weekly food expenditure).

In this study, marital status was divided into married and non-married, and the latter one included single, widow, and divorce. Education level of semiliterate referred to people who did not finish elementary school and could read partially. Smoking people contained people who were smoking and who used to smoke, and non-smoking people referred to people never smoked. Dinking people referred to people who drink regularly and occasionally, and non-drinking people referred to people never drink. Food expenditure meant money spent on food, including food purchases, eating out expenditure, alcohol, cigarettes, cigars, and tobacco expenditure. As the variables about income was different in each year, the weekly food expenditure was a relatively appropriate variable to measure participant' economic status.

Statistics analysis

Prevalence of pain among overall participants and among patients with chronic diseases were calculated. Demographic characteristics of overall participants and pain patients were described, including age, gender, marital status, education, smoking, drinking, disability, disease, occupation, and weekly food expenditure. Binary logistic regression was applied to figure out factors affected pain condition. Characteristic, treatment, and recognition of pain were described. Chi-square test and t test were used to analyze the differences of characteristics of pain in each year and among participants in different demographic characteristics. Stata15.1 and SPSS 21.0 were used in data analysis.

Results

Characteristics of pain patients

Among the total 62481 participants surveyed in 2008, 2011, 2012, 2013 and 2015, 18824 of them reported body pain condition, accounting 30.13% of overall participants. The demographic characteristics of the participants were shown in Table 2.

Table 2

Chronic pain among participants with different demographic characteristics and comparisons of demographic distribution between overall participants and pain patients

		Overall participants	Chronic pain patients	Chronic pain prevalence (%)	χ^2	P
Gender	Male	29465	7100	24.10	567.922	0.000***
	Female	32232	11652	36.15		
Age	45~	27859	8183	29.37	39.129	0.000***
	60~	27793	9104	32.76		
Marital status	Non-married	8260	2883	34.90	51.709	0.000***
	Married	54037	15938	29.49		
Education	Illiterate and semiliterate	26659	9763	36.62	608.351	0.000***
	Elementary school	12428	3823	30.76		
	Middle school	11653	2866	24.59		
	High school and above	7135	1348	18.89		
Living area	Rural	42892	13826	32.23	269.335	0.000***
	Urban	10759	2308	21.45		
Disability	Yes	13513	5480	40.55	433.813	0.000***
	No	48417	13300	27.47		
Chronic disease	Having at least one chronic disease	39580	14588	36.86	836.786	0.000***
	None	13255	2464	18.59		
Smoking	Yes	24518	6460	26.35	178.653	0.000***
	No	37171	12358	33.25		
Drinking	Yes	20885	5351	25.62	195.169	0.000***
	No	40709	13457	33.06		
Occupation	Agriculture	31004	10324	33.30	135.054	0.000***
	Non-agriculture	30773	8437	27.42		
Weekly per capita food expenditure	≤50	25373	8534	33.63	125.521	0.000***
	[50,100)	16001	4928	30.80		
	≥ 100	17630	4707	26.70		
Note: *** $P\leq0.001$						

Chronic pain was more likely to happen in female, over-60-year-old, married people, illiterate and semiliterate, nonsmoker, nondrinker, disabled, chronic disease patients, rural residents, people engaged in agriculture, and people spent less than 50 yuan on food weekly. Though most of pain patients suffered from at least one chronic disease, the prevalence of pain varied in different chronic diseases (Table 3).

Table 3
Prevalence of pain among patients with different chronic diseases

	Total Patients	Patients with chronic pain	Chronic pain prevalence (%)
Kidney disease	3715	1844	49.64
Arthritis	19503	9106	46.69
Psychiatric problem	814	373	45.82
Liver disease	2448	1104	45.10
digestive disease	13634	6098	44.73
Memory-related disease	901	390	43.29
Heart disease	7057	3053	43.26
Chronic Lung disease	6104	2638	43.22
Cancer	634	265	41.80
Stroke	1388	571	41.14
Diabetes	3379	1271	37.61
Dyslipidemia	5528	2012	36.40
Hypertension	14225	4982	35.02

The most common diseases were arthritis, hypertension, and digestive disease among all participants. Kidney disease has the highest prevalence of chronic pain, followed by arthritis and psychiatric problem.

Factors of chronic pain

Binary logistic regression was applied to explore factors affected chronic pain (Table 4). Variables with significant correlations in univariate analysis were entered into regression as independent variables, and continuous variables like age and weekly food expenditure were transferred into categorical variables.

Table 4
Multivariate analysis of the factors for pain

	B	OR	95%CI	P
Age				0.000***
45 ~		Ref		
50 ~	0.173	1.189	1.079–1.310	0.000***
55 ~	0.035	1.036	0.942–1.139	0.466
60 ~	0.032	1.033	0.937–1.139	0.515
65 ~	0.041	1.042	0.936–1.159	0.451
70 ~	-0.094	0.910	0.806–1.028	0.130
75 ~	-0.067	0.935	0.825–1.060	0.295
Female vs male	0.460	1.584	1.461–1.718	0.000***
Rural vs urban	0.327	1.386	1.266–1.517	0.000***
Education				0.000***
Illiterate and semiliterate		Ref		
Elementary school	-0.166	0.847	0.788–0.911	0.000***
Middle school	-0.290	0.749	0.691–0.811	0.000***
High school	-0.516	0.597	0.538–0.663	0.000***
Married vs non-married	-0.063	0.939	0.868–1.015	0.115
Disability vs non-disability	0.399	1.491	1.385–1.605	0.000***
Hypertension	0.062	1.064	0.995–1.138	0.068
Dyslipidemia	0.234	1.264	1.146–1.393	0.000***
Diabetes	0.115	1.122	0.996–1.263	0.058
Cancer	0.413	1.511	1.158–1.973	0.002**
Chronic Lung disease	0.344	1.410	1.291–1.541	0.000***
Liver disease	0.413	1.511	1.322–1.727	0.000***
Heart disease	0.255	1.291	1.185–1.407	0.000***
Stroke	0.381	1.463	1.214–1.763	0.000***
Kidney disease	0.620	1.859	1.664–2.076	0.000***
Digestive disease	0.524	1.689	1.584–1.802	0.000***
Psychiatric problem	0.628	1.875	1.439–2.442	0.000***
Memory-related disease	0.146	1.157	0.905–1.479	0.245
Arthritis	0.806	2.239	2.114–2.371	0.000***
Smoker vs non-smoker	0.050	1.052	0.973–1.137	0.207
Drinking vs non-drinking	-0.015	0.985	0.922–1.052	0.655
Agricultural work vs non-agricultural work	0.100	1.105	1.038–1.176	0.002**
Weekly food expenditure				0.000***
50-		Ref		

Note: CI, confidence interval; OR, odds ratio; ** $P \leq 0.01$; *** $P \leq 0.001$.

	B	OR	95%CI	P
50–100	-0.063	0.939	0.880–1.002	0.059
100+	-0.149	0.862	0.801–0.927	0.000***
Note: CI, confidence interval; OR, odds ratio; ** $P \leq 0.01$; *** $P \leq 0.001$.				

The factors affecting chronic pain contained age, gender, education, living area, disability, dyslipidemia, cancer, chronic lung diseases, liver disease, heart disease, stroke, kidney disease, digestive disease, psychiatric disease, arthritis, occupation and weekly food expenditure. While marriage, hypertension, diabetes, memory-related disease, smoke, and drink were not associated with pain.

Characteristics of chronic pain

Characteristics of pain were described by location and intensity of pain, as well as interferences of pain on patients' quality of life, measured by sleep and depression.

Based on the locations of body pain reported by pain patients, the proportion of patients with pain in each area of body was analyzed (Fig. 1). The darker the color, the higher its proportion. Chronic pain located most in waist, accounting 13.60% of all the body areas, followed by legs and knees, accounting 10.30% and 9.37% respectively.

According to patients' self-assessed on pain intensity in average of four surveyed years, patients with mild, moderate, and severe pain accounted 37.38%, 29.70% and 32.92%, respectively. The pain intensity in each year was different (Table 5).

Table 5
Self-assessed pain intensity

Year	Pain patients	Percentage of pain patients in different degrees (%)		
		Mild	Moderate	Severe
2008	409	41.06	29.67	29.28
2011	5644	25.10	36.39	38.43
2012	836	28.95	28.23	42.82
2013	5965	49.79	23.60	26.60

The percentage of participants with mild pain was 40.06% in 2008, which decreased to 25.10% in 2011. Since 2011, the percentage of people with mild pain has significantly increased from 25.10–49.79%. The proportion of participants with moderate and severe pain gradually decreased from 2011 to 2013.

The interference of pain on patients' QoL was measured by sleeping and depression.

The participants with pain condition slept for 5.86 (± 2.05) hours one night in average, which was significantly shorter than 6.32 (± 1.89) hours of overall participants ($t = 32.14$, $P \leq 0.000$).

The CES-D-10 was used to measure the mental health and depression condition of respondents, with the minimum score of 0 and the maximum score of 30. As the general standard adopted, the respondents are considered to have a depression condition with a total score of more than 10. By comparing the scores of overall participants and pain patients from 2008 to 2015, it was found that the percentage of population with depression was 75.20% among pain patients, which was significantly more than the 55.73% depression accounting in overall participants ($\chi^2 = 2187.630$, $P < 0.000$).

Percentages of depression population on overall participants and on pain patients in each year were varied (Fig. 2).

Treatment on chronic pain

A total of 11808 pain patients were surveyed about treatment they received to relieving pain in 2013 and 2015, and 33.14% of them did not take any treatment to relieve pain in average.

Among the patients receiving treatment, the most popular therapy was taking western medicine, accounting 46.48% in average, which was more than twice of the second popular therapy of taking TCM. Acupuncture and professional massage therapy were less received by pain patients

The proportion of patients receiving treatment differed between 2013 and 2015 (Table 6).

Table 6
Treatment on pain in 2013 and 2015

	Population (%)		χ^2	<i>P</i>
	2013	2015		
Taking western medicine	2308 (38.69)	3180 (54.42)	293.660	0.000***
Taking TCM	738 (12.37)	1425 (24.39)	284.828	0.000***
Acupuncture	193 (3.23)	804 (13.76)	422.927	0.000***
Professional massage therapy	392 (6.57)	714 (12.22)	110.919	0.000***
Other therapy	853 (14.30)	811 (13.88)	0.431	0.512
None	2347 (39.35)	1566 (26.80)	209.650	0.000***
Total pain patients	5965	5843		
*** <i>P</i> < 0.001				

Proportion of patients receive no treatment decreased from 39.35% in 2013 to 26.80% in 2015, meaning that more people received medical services to relieve pain. The prevalence of taking TCM, taking western medicine, acupuncture treatment and professional massage therapy all increased ($P < 0.000$) among pain patients in 2015, comparing with that in 2013.

Among all the survey pain patients in these two years, the prevalence of taking TCM, western medicine, acupuncture, professional massage therapy or no treatment was analyzed by demographic characteristics, with Bonferroni-corrected applied in demographic variables within more than 2 groups, including education and weekly food expenditure. The therapies that pain patients received differed from some of their demographic characteristics (Table 7).

Table 7
Prevalence of therapy among pain patients by demographic characteristics

	Overall	TCM		Western medicine		Acupuncture		Professional massage therapy		None	
		Population (%)	<i>P</i>	Population (%)	<i>P</i>	Population (%)	<i>P</i>	Population (%)	<i>P</i>	Population (%)	<i>P</i>
Overall	11808	18.32		46.48		8.44		9.37		33.14	
Gender											
Male	4204	17.17	0.005**	42.24	0.000***	7.30	0.000***	8.14	0.000***	37.18	0.000***
Female	7182	19.19		49.02		9.30		10.23		30.41	
Age											
[45,60)	4731	17.92	0.004**	45.97	0.005**	9.64	0.063	10.02	0.227	33.38	0.023*
≥ 60	4981	20.24		48.84		8.55		9.30		31.22	
Marriage											
Married	9435	18.21	0.002**	28.28	0.000***	8.74	0.836	9.59	0.598	33.28	0.006**
Non-married	1688	21.33		48.82		8.59		9.18		29.86	
Living area											
Rural	9611	18.29	0.002**	47.58	0.000***	7.99	0.000***	8.12	0.000***	33.20	0.008**
Urban	1374	21.76		41.92		13.46		18.12		29.62	
Education											
Illiterate and semiliterate	5271	18.69	0.144	49.80	0.000***	7.30	0.099	7.21	0.000***	32.48	0.244
Elementary school	2149	18.33		45.18		8.84		8.66		33.50	
Middle school	1632	16.61		40.56		8.58		11.58		34.38	
High school and above	766	16.32		34.86		7.70		16.97		35.51	
Smoking											
Smoked	852	16.90	0.092	38.73	0.000***	6.57	0.015*	9.86	0.675	38.73	0.000***
Non-smoked	7277	19.29		47.81		9.07		10.32		31.08	
Drinking											
Drinking	3327	17.49	0.055	41.81	0.000***	7.72	0.039*	9.62	0.708	35.98	0.000***
Never drink	8113	19.03		48.47		8.91		9.39		31.67	
Disability											
Yes	489	23.72	0.002**	52.35	0.006**	12.07	0.005**	12.68	0.012*	25.77	0.000***
No	10296	18.27		46.07		8.40		9.29		33.36	
Occupation											
Agriculture	5986	18.24	0.244	47.36	0.119	8.35	0.158	7.78	0.000***	34.20	0.001**
Non-agriculture	5092	19.11		45.88		9.11		11.49		31.19	
Weekly food expenditure (Yuan)											

Note: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$.

	Overall	TCM		Western medicine		Acupuncture		Professional massage therapy		None	
		Population (%)	<i>P</i>	Population (%)	<i>P</i>	Population (%)	<i>P</i>	Population (%)	<i>P</i>	Population (%)	<i>P</i>
≤50	4772	18.52	0.556	47.15	0.001**	7.71	0.003**	8.24	0.000***	33.84	0.025*
[50,100)	2282	19.59		48.16		9.55		10.43		30.63	
≥ 100	2189	19.05		42.94		9.87		12.47		32.39	
Note: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$.											

In general, male, over-60-year-old, married, rural, smoking, drinking, nondisabled patients, patients engaged in agricultural work, and patients spending less than 50 yuan on food weekly were more likely to receive no treatment on pain.

In terms of specific therapies, female and disabled patients were more likely to receive any kind of analgesic therapies than male patients and non-disabled patients, respectively. Patients over 60 years old and non-married patients were more likely to take both TCM and western medicine than those under 60 and married patients, respectively. Urban patients were more likely to receive TCM, acupuncture and professional massage therapy than rural patients, while rural patients were more likely to take western medicine. With the increase of education, the proportion of patients taking western medicine decreased, while the proportion of patients receiving professional massage therapy increased. The proportions of nonsmokers and nondrinkers receiving western medicine and acupuncture were higher than those who smoked and drink, respectively. Compared with the patients engaging in agricultural work, the patients who were not engaged in agricultural work were more likely to receive professional massage therapy. Patients who spend less than 100 yuan per week on food were more likely to take western medicine, while those who spend more than 50 yuan per week on food were more likely to receive acupuncture and professional massage therapy.

Recognition on chronic pain

The quiz to measure patients' recognition on pain included the following 3 situational questions simulating different kinds of pain in daily life.

Question 1: Zhang Jun/Wang Hong has a headache once a month that is relieved after taking a pill. During the headache he/she can carry on with his/her day-to-day affairs. Overall, in the last month, how much of bodily aches or pains did Zhang San/Wang Hong have?

Question 2: Zhou Wei/Li Li has pain that radiates down his/her right arm and wrist during his/her day at work. This is slightly relieved in the evenings when he/she is no longer working on his/her computer. Overall, in the last month, how much of bodily aches or pains did Zhou Wei/Li Li have?

Question 3: Zhao Liang/Zhou Yan has pain in his/her knees, elbows, wrists, and fingers, and the pain is present almost all the time. Although medication helps, he/she feels uncomfortable when moving around and holding and lifting things. Overall, in the last month, how much of bodily aches or pains did Zhao Liang/Zhou Yan have?

The options of above questions contained none, mild, moderate, severe, and extreme. The proportion of each options for same question varied by years (Fig. 3).

In general, the assessment on pain became diversified. For all the 3 situations, the percentage of assessment on severe and extreme pain increased from 2008 to 2011, also, patients assessing no pain accounted more in 2012 than previous years.

For the situation in question 1 and 2, the assessment used to be concentrated in mild pain, while then diversified to any other pain intensities in 2012. For question 3, though assessment become polarize to both none and severe by time, the assessing criteria seemed to become loose for the majority choices changed from moderate to severe.

Discussion

This study focused on the characteristics and trends of chronic pain among middle aged and elderly people in China. It showed that 30.13% of the middle aged and elderly Chinese people suffered from chronic body pain, which was consistent with pain prevalence in previous studies, usually between 28.9% and 59.3% [13].

Gender differences was found in the prevalence of chronic pain. Female elders were more likely to suffer from chronic pain than male, mostly because of both physical and emotional difference. Firstly, along with the increase of age, the change of female sex hormone could affect sensitivity of pain, leading to a lower pain threshold than male. Secondly, females were more willing to express their pain feelings clearly [14].

Rather than increasing with age, the risk of chronic pain changed more complicated. As the OR value of age shown in the regression, when other variables remain unchanged, the risk of pain among people of 50–69 was higher than that of 45–49, however, by the age of 70, the risk of pain was lower than that of 45–49. The possible reason was that people over the age of 70 often had physical deterioration and their sensitivity to pain might decrease due to various disease they suffered [15].

Besides, other socio-economic factors could also affect chronic pain. This study found that patients living in rural areas, with less education, and engaged in agricultural work were more likely to suffer from chronic pain. In fact, these people in China were usually with inferior socioeconomic status, and had limited access to medical resources, causing their high risks of pain [16–18]. This result indicated that more attention should be paid on pain issues among people with limited resources.

The characteristics of chronic pain in this study were consistent with previous studies. Chronic pain located most in waist, legs, and knees, and this might be associated with the most common pain-related diseases reported by aged people, namely arthritis (rheumatoid arthritis and osteoarthritis), dorsalgia, and fibromyalgia syndrome [19]. Chronic pain caused less sleep and higher prevalence of depression, as a result of the complex interplay between pain intensity, depression and quality of life [20].

Inadequate treatment on chronic pain was also found in this study. There were 33.14% of chronic pain patients not receiving any treatment to relieve pain, especially for male, rural, disabled patients, smoker, drinker, patients engaged in agricultural work, and spending less on food, namely patients in lower economic level. For patients receiving analgesic treatment, the most popular therapy was taking western medicine, accounting over twice of patients taking TCM. This result was mainly because rural patients – who made up most of the Chinese elderly – were more likely to receive western medicines, while urban patients were more likely to receive TCM. Comparing with taking medication, patients who were highly educated and not engaged in agricultural work were more likely to receive non-pharmacological treatment like professional massage therapy.

Trends of chronic pain were manifested in the change of treatment and patients' recognition on pain in the past decade. The proportion of people receiving treatment on pain increased, indicating a positive change of patients' awareness on pain. This result may attribute from comprehensive reasons. A recent study summarized that the change of policy for analgesic medicines as well as the treating perception on pain had made great progress in past years in China [21], which probably affected patients' analgesic treatment. Meanwhile, the improvement of social support in China in the past decades might also help for aged patients on pain issues [22].

The change of patients' recognition on pain was an interesting result. Though it seemed that a diversified change of recognition was observed, it could not prove a definite improvement of recognition. As a feeling based on patients' self-assessment, biases in pain assessment were found because of the degradation of thinking and the ageing of perception and memory of aged people [23]. Thus, the change of recognition on pain was still hard to define, and further study will be needed on the trend of patients' recognition on chronic pain among Chinese elders.

The strengths of this study manifest in the large sample size and a combination of data from several years. The characteristics and trends of pain can provide reference for chronic pain management among middle aged and elderly in China. However, this study has limitations. Firstly, some of the options of surveyed questions were not the same in each year. For example, pain intensity was surveyed in 2008, 2011, 2012, and 2013, while the options in 2015 were only "yes or no" in the same question about pain. Thus, the dependent variable of regression could only be "pain or not", losing some information about intensity. Secondly, the questionnaire in 2014 was not involved in pain and this might affect the continuity of the results about trends.

Conclusion

There were 30.13% of Chinese middle age and elder people suffering from chronic pain, which were more likely to happen in female, rural and people with chronic diseases. Chronic pain interfered significantly on patients' quality of life, and mainly located in waist, legs, and knees. More patients received treatment to relieve pain in recent years, which might indicate gradual awareness of pain among middle age and elderly in China.

Abbreviations

CES-D-10

10-item Centre for Epidemiological Studies Depression Scale

CHARLS

China Health and Retirement Longitudinal Study

IASP

The International Association for the Study of Pain

QoL

Quality of life

TCM

Traditional Chinese medicine

Declarations

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Authors' contributions

EL designed the study. YW cleaned original data. EL and YW conducted data analysis and wrote the first draft of the manuscript. YB monitored and critically reviewed the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was reviewed and approved by the ethics committee of Institute of Chinese Medical Sciences, University of Macau. Professor Yan Ru is the chairman of the committee.

Consent for publication

Not applicable.

Competing interests

The authors have no competing interests.

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Figures

Figure 1

Proportion of pain in each body location

Figure 2

Percentage of depression population on overall participants and on pain patients in each year

Figure 3

Options of questions from pain patients in each year