CLINICAL ARTICLE

Preference of Orthopedic Practitioners Toward the Use of Topical Medicine for Musculoskeletal Pain Management in China: A National Survey

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Objective: Musculoskeletal pain is having growing impacts worldwide with clinical challenge in pain management. The purpose of the present study is to investigate the preferences of orthopedic surgeons of China for using medicine in musculoskeletal pain.

Methods: A questionnaire was developed, including the following domains, personal information, medication preference for pain treatment, and perceptions of topical medicine. Ten participants were selected to confirm the consistency of questionnaire. A cross-sectional survey was conducted in orthopedic physicians with different specialties in different regions of China *via* the online survey platform. The participants' survey results were analyzed one-way and multi-way using chi-square test and logistic regression.

Results: The pre-survey analysis results of 10 randomly selected investigators were a mean weighted kappa coefficient of 0.76 (range 0.61–0.89), which indicated the substantial consistency of the present questionnaire. A total of 1099 orthopedic surgeons (mean age, 41.67 ± 8.31 years) responded to our survey, most of whom were male (90.72%), and most of whom worked in level III hospitals (63.24%) and trained in modern medicine (71.43%). Most surgeons who participated in the survey had used topical analgesics in their clinical work (95.81%), and most preferred to use topical analgesics (39.50%) or a combination of oral analgesics (28.87%). Primary reasons for preferring topical analgesics were as follows: less adverse reactions (68.01%); ease of use (60.90%); and not interfering with other oral medications (49.60%). The preference for prescribing topical analgesics increased with the education level of the respondent, where statistically significant differences were seen ($P < 0.05$). In addition, the level of the respondent's hospital, type of hospital, the respondent's profession, and their participation in surgical work influenced their preferences for topical analgesics ($P < 0.05$).

Conclusion: Orthopedic surgeons across China have different medication preferences in the treatment of musculoskeletal pain. The educational background of the physician largely influences the preference when selecting

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Received 6 April 2022; accepted 23 July 2022

medications. To better improve the treatment of musculoskeletal pain, there is a need to improve the overall medical education of practitioners and to disseminate clinical practice guidelines.

Key words: Musculoskeletal pain; National survey; Practitioner; Preference; Topical medicine

Introduction

Musculoskeletal disorders are a diverse group of diseases affecting the bones, joints, ligaments and tendons, and associated soft tissues, and include more than 150 different diagnoses. These disorders are often characterized by pain, decreased skeletal function, and reduced quality of life, such as back and neck pain, osteoarthritis, rheumatoid arthritis and fractures.[1,2] Patients with chronic musculoskeletal disorders usually have greatly reduced mobility, which may cause serious mental health disorders. They are also at increased risk of morbidity or mortality from other chronic diseases occurring as co-morbidities, such as cardiovascular disease, hypertension, diabetes, and cognitive disorders.[2,3] Pain is the most common symptom for patients with clinical presentation of musculoskeletal disorders. Among patients with chronic pain, musculoskeletal pain accounts for the largest proportion of cases in all geographical regions and at all age groups worldwide.[4] Musculoskeletal pain is also considered one of the most common causes of physical disability.[2,5]

Recent studies showed that the overall prevalence of chronic musculoskeletal pain in Europe was 35.7%, ranging from 18.6% in Switzerland to 45.6% in France. This incidence continued to rise due to aging of the global population.[6,7] The global scale of the problem was comparable to cardiovascular disease and chronic respiratory disease combined, with musculoskeletal pain affecting one in two people aged 18 and older in the US, and nearly three in four people aged 65 and older.[8] Due to its chronic and persistent nature, it imposes a huge financial burden on patients and the health care system. Chronic management of musculoskeletal disorders cost the U.S. healthcare system a staggering 213 billion dollars in 2011.[2]

Despite their high incidence and prevalence, major musculoskeletal disorders causing the greatest impacts to patients and healthcare systems had no effective cure and required ongoing management, including arthritis and bone diseases. Due to its chronic nature, the therapeutic management of musculoskeletal pain remained a major clinical challenge.[7] There were several treatments for musculoskeletal pain, of which medication was considered a simple and effective basic treatment, and it was important to know how to use it safely and effectively. In recent years, the drug crisis and safety issues arising from over-reliance on opioids in China and other Western countries had attracted widespread attention and high alert.[9] Opioids were no longer recommended in treating musculoskeletal pain due to the increased risk of adverse reactions and treatment interruptions.[10,11] Recently, the Chinese Medical Association Pain Society, which regulated the development of treatment guidelines for clinical pain, has been focusing on promoting the treatment of musculoskeletal pain using non-opioid analgesics.[9]

Recently, many primary studies and reviews reported on musculoskeletal pain management in Western societies.[7,10–13] Considering the anatomical and physiological differences between Asian and Western populations, there were fewer reports on musculoskeletal pain in Asian populations.[14,15] Therefore, the present study investigated 1099 physicians in a total of 29 provinces in China to understand the preferences and reasons for the use of topical or oral analgesics in musculoskeletal pain management by different surgeons, aiming to provide evidence for pain management in Asian populations.

Methods

Participants

Modern medicine and traditional Chinese medicine practices co-existed at all levels within the Chinese healthcare system.[16] Among the professional attributes of physicians, we also considered the specialties of Traditional Chinese Medicine (TCM) and integrative medicine (i.e., services that combine TCM and modern medicine) in addition to modern medicine. At the same time, hospitals in China are classified into first, second and third levels according to the "Hospital Grading Management Standards" based on hospital size, research direction, talent and technical strength, and medical hardware and equipment.[17] Therefore, the inclusion criteria for participants in this study were orthopedic surgeons registered as practicing physicians in modern medicine, TCM, and integrative medicine at all levels of hospitals in China.

Questionnaire Design

The purpose of the present study was to investigate the preferences and perceptions of Chinese orthopedic surgeons regarding the use of topical or oral analgesics in the treatment of musculoskeletal pain. The questionnaire was first brainstormed and designed by the study initiator, and later discussed and modified by a panel of experts (Table S1). Further, a cross-sectional survey was sent to participants through the online survey platform "sojump" (Changsha Ranxing Information Technology Co., Ltd., Changsha, China), which included the following questions: 11 questions on the participant's personal information; 10 questions on the participant's preferences for pain medication; and 10 questions on the participant's perceptions of different topical analgesics. All questions were designed by the researcher with reference to the ideas in the relevant articles.[18–20]

Consistency Analysis in Pre-survey

In the present survey, 10 participants were randomly selected to fill out the questionnaire again by random sampling method 10 days after the first time, and by analyzing and comparing the results of the two questionnaires. The kappa statistic was used for the consistency test,[21] when the kappa coefficient was <0, the consistency strength was poor, 0.00–0.20, slight, 0.21–0.40, fair, 0.41–0.60, moderate, 0.61–0.80, substantial, and 0.81–1.00, almost perfect.[22]

Survey Indicators

Outcomes of the survey included the percentage of participants using analgesics to manage patients with musculoskeletal pain, the types of analgesics used, and the participant's preferences and opinions on the use of modern analgesics, herbal analgesics, oral analgesics, and topical analgesics. Personal information of the participant was also collected, including gender, age, length of service, hospital class and type, education, professional title, medical specialty and subspecialty, and clinical work characteristics. Based on the characteristics of participants, their preferences were compared regarding the selection of treatment method for musculoskeletal pain.[19]

Statistical Analysis

All data were analyzed using the statistical package IBM SPSS Statistics for Windows (Version 24.0; IBM Corp, Armonk, NY, USA), e.g., mean +/− SD, *P* value. One-way and multi-way analyzes of the number and percentage of participants were performed using chi-square tests and logistic regression. A *P* value of <0.05 was considered statistically significant.

Results

Pre-survey Results

Among the 10 participants who participated in the consistency analysis, the analysis comparing the results of the two questionnaires yielded a mean weighted kappa coefficient of 0.76 (from 0.61 to 0.89) for the 10 participants, with six of the results lying in the range of 0.61–0.80 and four in the range of 0.81–1.00, with the results indicating the substantial consistency strength.

Participant Demographics

A total of 1099 orthopedic surgeons from 616 different hospitals or health service centers across 29 Chinese provinces or municipalities responded to our survey. The proportion of participants by region is shown in Fig. 1. Most participants were male (90.72%), with an average age of 41.67, and 16.29 years average length of service. They were primarily based at level III hospitals (63.24%) and modern medicine hospitals (66.06%). Most respondents had a bachelor's (44.13%) or Master's (42.13%) degree, were trained in modern medicine (71.43%), occupied roles of deputy chief physician (32.85%) and attending physician (41.95%), and were who mostly involved in operations (60.05%). The majority have used topical analgesics (95.81%) in their clinical work. The characteristics of all participants was shown in Table 1.

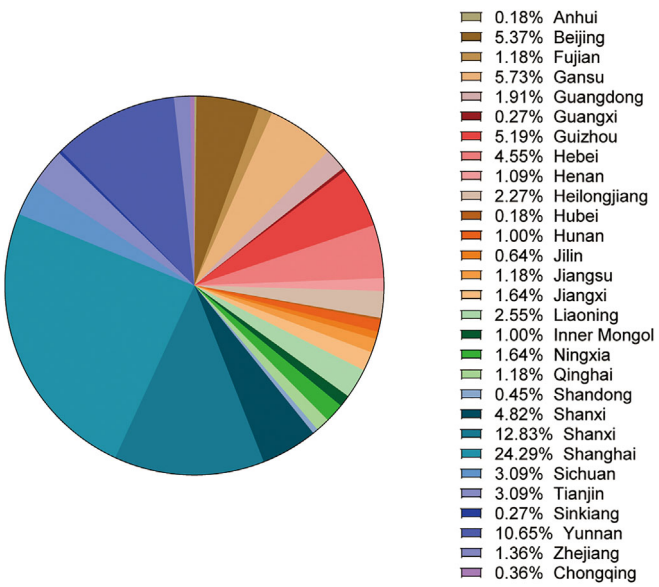


Fig. 1 Diagram of the proportion of participating physicians by region in China. The numbers on the graph mean the percentage of doctors in the region who participated in the survey as a percentage of total participants

Preference in Prescribing Medication for Musculoskeletal Pain Management

Most respondents gave preference to topical analgesics (39.50%) or a combination of topical and oral analgesics (28.87%) in the treatment of musculoskeletal pain, while others preferred to make different choices depending on the degree and extent of the patient's pain (17.38%). Among all respondents, 36.28% prescribed topical analgesics to nearly a quarter of their patients, while 28.30% prescribed to nearly half of their patients. Among respondents who prescribed topical analgesics, 52.61% have made prescriptions in <25% of the available drug classes, and 39.51% have made prescriptions in 25%–50% of drug classes. Moreover, 48.53% of these respondents chose modern topical analgesics, while 34% chose a combination of modern and herbal topical analgesics (Fig. 2).

Reasons Guiding Preferences for Prescribing Medication

Respondents showed differing preferences for topical and oral analgesics, or for modern and herbal analgesics (Figs 3 and 4). Primary reasons for preferring topical analgesics included less adverse reactions (68.01%), ease of use (60.90%), and not interfering with other oral medications (49.60%). Primary reasons for preferring modern analgesics included clear mechanisms of action (68.82%), ability to

TABLE 1 Demographics of orthopedic practitioners

Demographics	Sample
Gender, *n* (%)	
Male	997 (90.72)
Female	102 (9.28)
Age, years, mean ± SD	41.67 ± 8.31
Age, group, years, *n* (%)	
20–29	50 (4.55)
30–39	420 (38.22)
40–49	428 (38.94)
50–59	172 (15.65)
60–69	27 (2.46)
≥70	2 (0.18)
Duration of clinical work, years	
Mean ± SD	16.29 ± 9.24
Type of hospital, *n* (%)	
Western Medicine	726 (66.06)
Chinese Medicine	189 (17.2)
Combination of Chinese and Western Medicine	184 (16.74)
Level of hospital, *n* (%)	
Level I	108 (9.83)
Level II	296 (26.93)
Level III	695 (63.24)
Education attainment, *n* (%)	
Polytechnic	26 (2.37)
Undergraduate	485 (44.13)
Master's degree	463 (42.13)
Doctorate	125 (11.37)
Profession, *n* (%)	
Western medicine	785 (71.43)
Chinese medicine	202 (18.38)
Combination of Chinese and Western medicine	109 (9.92)
Others	3 (0.27)
Title, *n* (%)	
Chief physician	168 (15.29)
Deputy chief physician	361 (32.85)
Attending physician	461 (41.95)
Attending physician below	109 (9.92)
Work characteristics, *n* (%)	
Surgical work, permanent surgery	660 (60.05)
Surgical work, occasional surgery	172 (15.65)
Surgery work, never surgery	42 (3.82)
Long-term outpatient work	225 (20.47)
Orthopedic specialties, *n*(%)	
Orthopedics (not subspecialized)	681 (61.97)
Spine	76 (6.92)
Joint	153 (13.92)
Orthopedic trauma	78 (7.08)
Sports medicine	87 (7.92)
Others	24 (2.19)
Weekly clinic hours, *n* (%)	
Half day	150 (13.65)
1 day	390 (35.49)
2–3 day	264 (24.02)
4–5 day	217 (19.75)
6–7 day	78 (7.09)
Whether topical analgesics have been used, *n* (%)	
Yes	1053 (95.81)
No	46 (4.19)

Abbreviation: SD, standard deviation.

achieve desired effects (57.25%), and sufficient literature base (38.43%), while the reasons for preferring herbal analgesics included: more acceptable to patients or requested by patients (60.87%), less adverse reactions (55.43%), and more specific effects (54.89%).

The primary reasons for not choosing modern analgesics were as following, more adverse reactions (47.83%), high cost (36.96%), and non-specific effects (24.46%). Moreover, reasons for not choosing herbal analgesics included unclear mechanisms of action (55.49%), more adverse reactions (28.63%), and poor effects (27.06%).

For respondents who preferred to use non-steroidal anti-inflammatory drugs (NSAIDs), the main reasons included rapid onset of effects (68.47%), few adverse reactions (49.58%), and recommended by guidelines (42.64%). However, the participants who used topical NSAIDs felt that this class of drugs needed improvement on characteristics, including difficult to apply (47.78%), mediocre pain relief efficacy (44.86%), and high cost (31.25%).

Influencing Factors for Prescribing Topical Analgesics

The potential factors contributing to participant preferences in prescribing topical analgesics for treating patients with musculoskeletal pain are presented in Table S2. The preference for prescribing topical analgesics increased with the education level of the respondent, where statistically significant differences were seen ($P < 0.05$). In addition, the level of the respondent's hospital, type of hospital, the respondent's profession, and their participation in surgical work influenced their preferences for topical analgesics ($P < 0.05$) (Table 2).

The participants' choices for the type of topical analgesic were significantly influenced by their level of education, title, and involvement in surgery ($P < 0.05$). Respondents with higher education level and those involved in surgical procedures tended to apply a wider variety of topical analgesics ($P < 0.05$). As one of the most widely applied topical analgesics, prescriptions for topical NSAIDs were related to the level and type of hospital, as well as the respondent's level of education, profession, involvement in surgery, and subspecialty ($P < 0.05$). Respondents with higher education level and those involved in surgical procedures were more inclined to treat with topical NSAIDs ($P < 0.05$). In addition, topical NSAIDs were often used in the treatment of acute traumatic pain ($P < 0.05$).[23] In aspect of applying topical NSAIDs, orthopedic practitioners with limited experience, undergoing training in modern and herbal medicine, and those treating oncologic or other types of pain were more likely to refer to the guidelines for application ($P < 0.05$) (Table 2).

Discussion

Modern medicine and traditional herbal medicine co-existed at all levels within the Chinese medical system. There was large heterogeneity in the preferences of practicing physicians in their approach in treating musculoskeletal pain. The present study gave insights into the trends seen in these preferences and the influencing factors, by surveying 1099 physicians with different educational levels and professional experiences, from 616 hospitals of different levels and

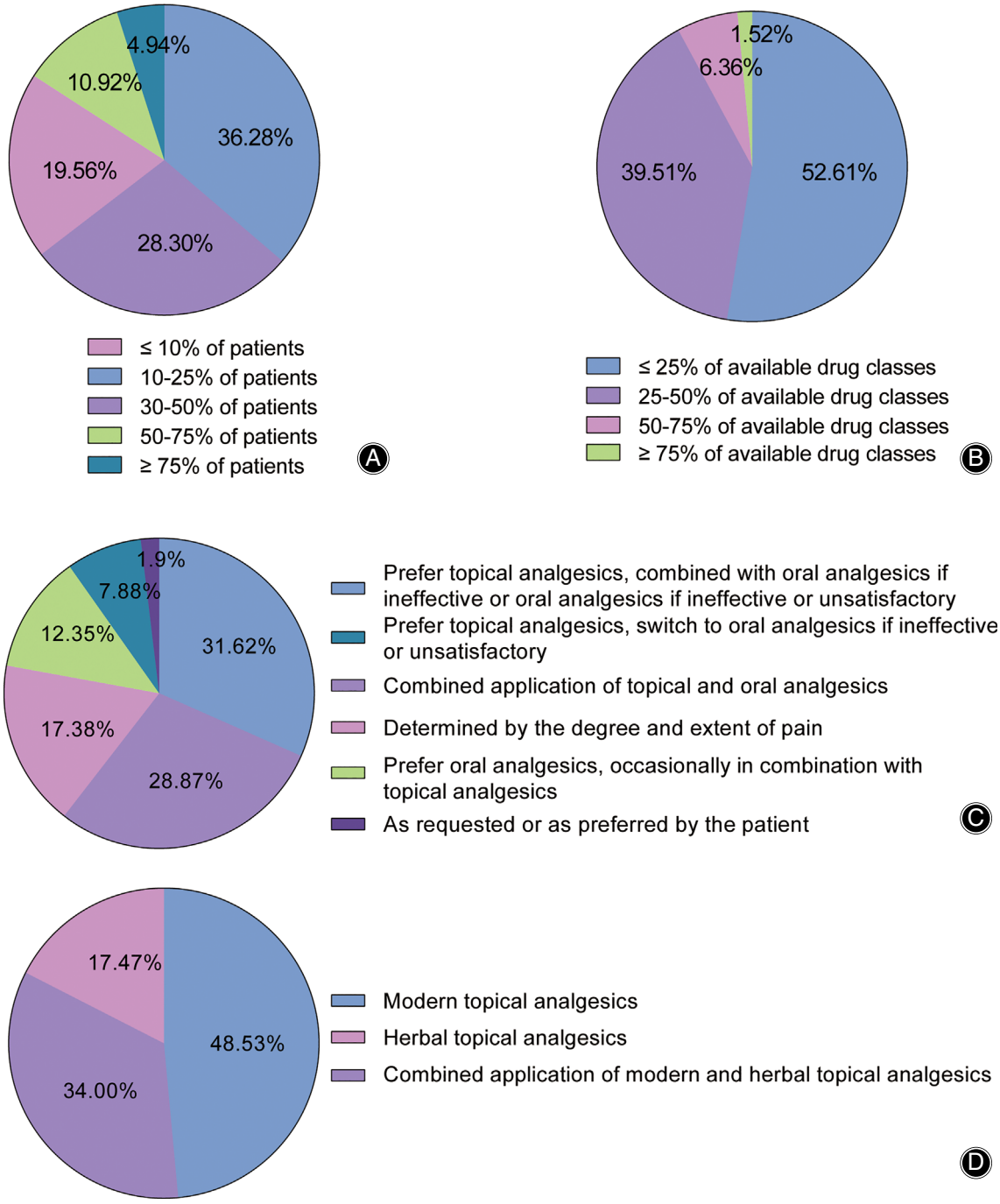


Fig. 2 Preference in using medicine for musculoskeletal pain management. (A) Percentage of patients who were prescribed topical analgesics by the respondent for musculoskeletal pain. (B) Percentage of topical analgesic types prescribed by the respondent from the available drug classes. (C) Respondent's preference in prescribing topical and oral analgesics. (D) Respondent's preference for modern or herbal analgesics

specialties, in 29 provinces or cities across China. The findings from the Chinese population-based questionnaire could offer useful insights to medical systems in other Asian countries which also have prominent practices in herbal medicine.

Oral Analgesics vs Topical Analgesics

Pharmacological treatment is often preferred by clinicians for the acute or chronic management of pain, including musculoskeletal pain.[24,25] Oral and topical analgesics are the two broad categories of medication available, both of which are

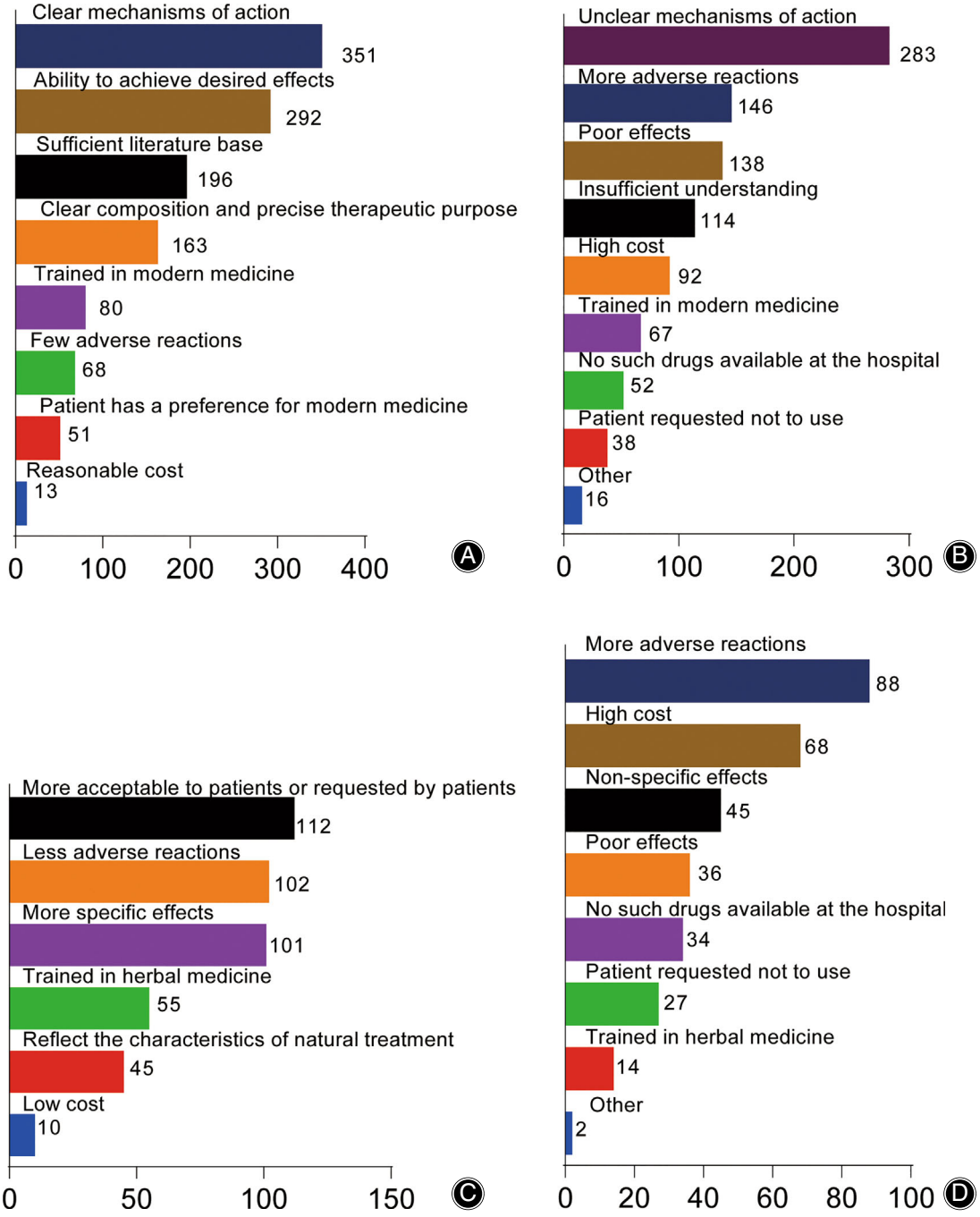
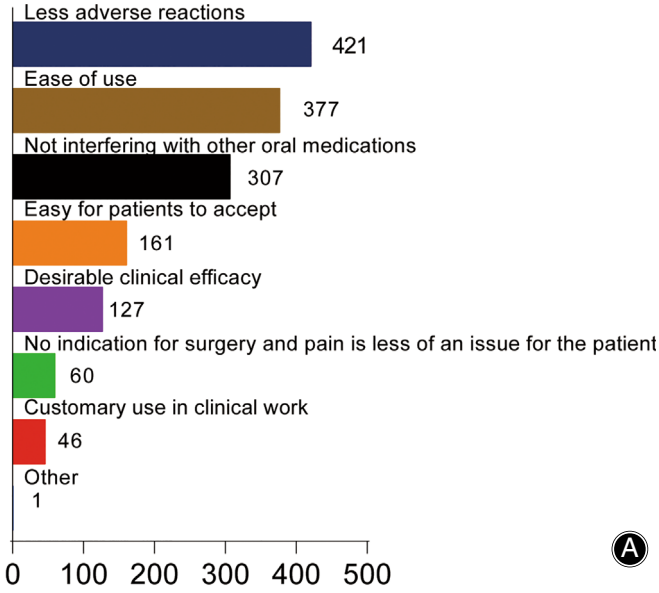
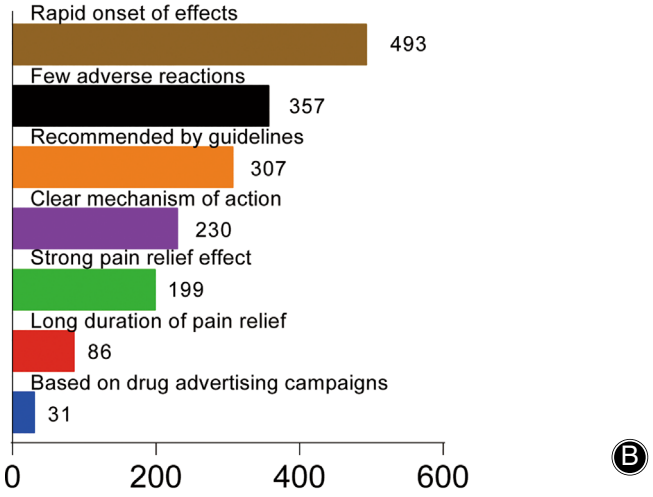


Fig. 3 The factors in choice preferences of topical medicine. (A) Primary reasons for preferring modern analgesics. (B) Primary reasons for not choosing herbal analgesics. (C) Reasons for preferring herbal analgesics. (D) Reasons for not choosing modern analgesics

regarded as effective in managing various types of clinical pain. Some studies found that topical analgesics could be more effective in relieving early surgery-related pain.[24,26] Oral analgesics might be more useful for relieving pain associated with internal organs but with risk of gastrointestinal disorders in some patients.[27] In addition, although commonly prescribed, oral NSAIDs have some nephrotoxicity since they are metabolized by the kidneys.[28] In comparison, adverse events associated with topical analgesics were usually limited to local discomfort. Thus, topical analgesics had advantageous in treating musculoskeletal pain, where the medication could be applied directly to the site of pain with its actions limited to the application site.[29,30] In addition, studies found that the patients' preferences for topical or oral





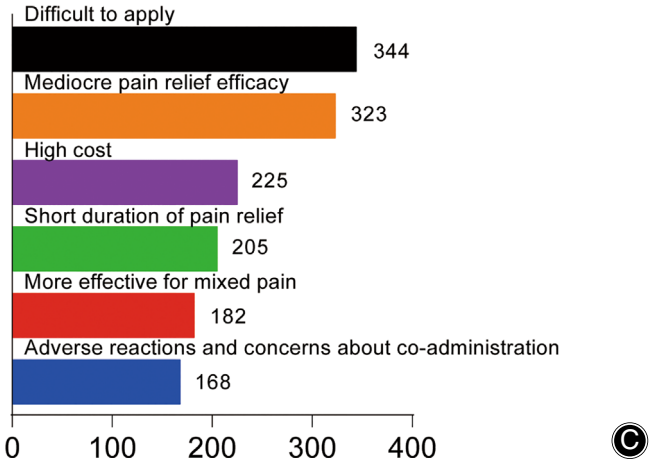


Fig. 4 Perceptions of topical analgesics and non-steroidal anti-inflammatory drugs (NSAIDs). (A) Reasons for preferring topical analgesics. (B) Reasons for using topical NSAIDs. (C) Aspects needing improvement in current topical NSAIDs

treatment might have an important impact on perceived benefits and potential adverse effects, which had to be considered during recommendation.[31]

Traditional Herbal Medicine

Furthermore, there was a portion of the Chinese population of clinicians and patients who had a strong preference in applying traditional herbal medicine for musculoskeletal pain.[32] A number of herbal analgesics were shown to provide effective pain relief through clinical trials, for instance, the *Cortex Daphnes (Zushima)* patch in relieving knee pain due to osteoarthritis.[33] Nevertheless, some other commonly used topical herbal analgesics were limited by confirmed clinical evidence in their efficacy, such as arnica gel, comfrey extract gel, and capsicum extract gel. Thus, it made it more difficult for clinicians to conduct definitive recommendations for the use of these products.[34] Due to the small sample size of many studies on herbal analgesics, we have to tread with caution when interpreting published evidence on their safety and efficacy.

Influencing Factors

The most interesting findings arising from the present study were related to the influencing factors for Chinese orthopedic surgeons in their selection and application of analgesics for the treatment of musculoskeletal pain. The independent factor that influencing participants' medication preferences was participants' level of education. Clinicians with a higher education level tended to prefer topical analgesics when treating musculoskeletal pain, and they were also more willing to choose a wider variety of topical analgesics. Possible reasons for this observation may be that clinicians with higher education are more likely to refer to guidelines for topical analgesics prescription. They were willing to consider the clinical application guidelines of medications, and apply topical analgesics with reference to these guidelines when dealing with the corresponding symptoms. In addition, due to differences in China's hospital hierarchy,[17] physicians with higher education also tend to work more often in higher-rated hospitals. Thus, the larger proportion of topical medicine in higher-rated hospitals might be due to the above reasons.

Strengths and Limitations

Although some strengthens were mentioned, several limitations must be considered when interpreting the results. First, although we surveyed clinicians across 29 provinces in China, we did not average the number of participants among cities due to their large number. Clinical practices might vary across geographical regions within China due to differences in climate, culture, economy, medical level and other factors. Therefore, the primary objective of the present study did not

TABLE 2 Factors for doctors' preference in medicine selection

			Single-factor analysis		Multi-factor analysis	
Proportion of patients applying topical analgesics overall	<30%	≥30%	*F*	*P*	OR	*P*
Education attainment, *n*			9.90	**0.02**		
Polytechnic	17	8			0.37	**0.05**
Undergraduate	263	202			0.57	**0.01**
Master's degree	255	186			0.55	**<0.01**
Doctorate	53	69			—	—
Painful diseases encountered at work, *n*						
Acute traumatic pain	231	170	0.82	0.37		
Chronic musculoskeletal pain	549	442	5.50	0.14		
Others (e.g., Tumor-based pain)	145	92	9.69	**0.02**		

			Single-factor analysis		Multi-factor analysis	
Proportion of types of topical analgesics applied to a single prescription	<25%	≥25%	*F*	*p*	OR	*p*
Education attainment, *n*			22.03	**<0.01**		
Polytechnic	19	6			0.13	**<0.01**
Undergraduate	259	206			0.38	**<0.01**
Master's degree	233	208			0.45	**<0.01**
Doctorate	43	79			—	—
Title, *n*			9.40	**0.02**		
Chief Physician	88	74			—	—
Deputy Chief Physician	186	162			1.03	0.88
Attending Physician	215	228			1.29	0.29
Attending physicians below	65	35			0.64	0.19
Clinical work characteristics, *n*			3.05	0.08		
Participation in surgery	434	368			0.68	**0.03**
Non-participation in surgery	120	131			—	—

			Single-factor analysis		Multi-factor analysis	
Whether to give preference to topical analgesics	Yes	No	*F*	*P*	OR	*P*
Level of hospital, *n*			13.07	**<0.01**		
Level I	57	45			—	—
Level II	104	183			0.58	**0.04**
Level III	255	409			0.54	**0.02**
Type of hospital, *n*			6.90	**0.03**		
Western medicine	270	430			—	—
Chinese medicine	85	93			1.20	0.44
Combination of Chinese and Western medicine	61	114			0.66	0.06
Education attainment, *n*			3.98	0.26		
Polytechnic	9	16			0.45	0.33
Undergraduate	170	295			0.59	**0.02**
Master's degree	182	259			0.81	0.11
Doctorate	55	67			—	—
Profession, *n*			9.18	**0.01**		
Western medicine	284	472			—	—
Chinese medicine	96	100			1.27	0.29
Combination of Chinese and Western medicine	36	65			0.99	0.96
Clinical work Characteristics, *n*			19.49	**<0.01**		
Participation in surgery	287	515			0.55	**<0.01**
Non-participation in surgery	129	122			—	—

			Single-factor analysis		Multi-factor analysis	
Whether to use topical NSAIDs	Yes	No	*F*	*P*	OR	*P*
Level of hospital, *n*			49.35	**<0.01**		
Level I	54	48			—	—
Level II	161	126			0.61	0.07
Level III	505	159			1.30	0.32
Type of hospital, *n*			21.25	**<0.01**		
Western medicine	511	189			—	—
Chinese medicine	102	76			0.78	0.29
Combination of Chinese and Western medicine	107	68			0.95	0.80

TABLE 2 Continued

Whether to use topical NSAIDs	Yes	No	Single-factor analysis F	Single-factor analysis P	Multi-factor analysis OR	Multi-factor analysis P
Education attainment, *n*			26.90	**<0.01**		
Polytechnic	12	13			0.33	**0.04**
Undergraduate	288	177			0.57	**0.04**
Master's degree	321	120			0.71	0.20
Doctorate	99	23			—	—
Profession, *n*			27.26	**<0.01**		
Western medicine	552	204			—	—
Chinese medicine	108	88			0.71	0.15
Combination of Chinese and Western medicine	60	41			0.77	0.32
Clinical work characteristics, *n*			39.92	**<0.01**		
Participation in surgery	589	213			2.13	**<0.01**
Non-participation in surgery	131	120			—	—
Painful diseases encountered at work, *n*						
Acute traumatic pain	300	101	12.41	**<0.01**		
Chronic musculoskeletal pain	678	313	0.25	0.97		
Others (e.g., tumor-based pain)	163	74	0.80	0.85		

Is the choice of topical NSAIDs recommended by the guidelines	Yes	No	Single-factor analysis F	Single-factor analysis P	Multi-factor analysis OR	Multi-factor analysis P
Duration of clinical work, years						
Mean ± SD	16.98 ± 9.17	15.02 ± 8.74			0.97	**0.05**
Level of Hospital, *n*			8.50	**0.01**		
Level I	18	36			—	—
Level II	56	105			0.72	0.40
Level III	233	272			1.26	0.52
Profession, *n*			7.51	**0.02**		
Western medicine	232	320			—	—
Chinese medicine	40	68			0.78	0.39
Combination of Chinese and Western medicine	35	25			2.20	**0.02**
Painful diseases encountered at work, *n*						
Acute traumatic pain	174	126	0.09	0.77		
Chronic musculoskeletal pain	393	285	4.51	0.21		
Others (e.g., Tumor-based pain)	77	86	10.06	**0.02**		

Abbreviations: NSAIDs, non-steroidal anti-inflammatory drugs; OR, odds ratio; SD, standard deviation; bold value indicates statistically positive.

consider these specific factors. Second, stratified analysis was not performed according to some categories like participant title, work characteristics, and specialty, due to limited sample size. Finally, although a total of 1099 doctors participated in this survey, the sample size is still inadequate. Thus, it was unable to survey every different type or mechanism of drug. Further survey with larger sample size is still required.

Conclusion

Clinicians across China have widely different preferences when prescribing pharmacological in treating patients with musculoskeletal pain. The level and type of hospital, as well as the clinician's level of education may influence their preferences when selecting medications. To improve future medical care in musculoskeletal pain management in China, it is important to dedicate resources toward increasing the overall level of medical education for practitioners, as well as dissemination of clinical practice guidelines.

Author Contributions

Project conceptualization: Mei, F.Y., Xing, D. & Lin, J.H. Study design: Mei, F.Y.& Xing, D. Data collection/validation: Mei, F.Y., Xing, D., Zhang, L.Y., Gao, J.X., Wang, B., Zhou, Q., Xu, Y.K., Zhou, C., Zhao, J.G., Li, P., Zhao, Y., Yuan, T., Fu, W.L., Li, C., Jin, Y.H. & Yang, P. Data analysis: Mei, F.Y. & Xing, D. Result interpretation: Mei, F.Y., Li, J.J. & Xing, D. Reporting & editing: Mei, F.Y., Li, J.J., Xing, D. & Lin, J.H. Final approval of the version to be submitted: Mei, F.Y., Li, J.J., Xing, D. & Lin, J.H. Project guarantor:

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Funding Information

This study was supported by Peking University People's Hospital Scientific Research Development Funds (No. RDX2020-02).

Supporting Information

Additional Supporting Information may be found in the online version of this article on the publisher's web-site:

Table S1

Table S2 Factors for doctors' preference in medicine selection

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