

Original Research

Heat therapy in the treatment of musculoskeletal pain: current pharmacy practice and perspectives

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Abstract

Objectives: Musculoskeletal pain is a complex condition affecting millions of people worldwide. Even though heat as a form of thermal therapy is often used by healthcare professionals as a treatment option, alone or as a complement to other treatments, there are no specific guidelines and recommendations in the literature on the correct use of this therapy. The aim of this research was to explore the pharmacists' attitudes and level of knowledge on heat therapy among different EU countries and to identify eventual needs in guidance and training. **Methods:** An international Board of experts from the participating countries was established to achieve consensus on the questions to be included in the questionnaire. The experts formulated the questions based on their professional experience and the published literature and reached consensus on 20 questions. Questionnaires were disseminated only to pharmacists currently dealing with patients. In order to exclude pharmacists and participants who did not meet this requirement, two questions were inserted at the beginning of the survey. If the respondents answered "no" to one or both of these questions, their answers were excluded from the analysis. **Results:** Two hundred eighty-one questionnaires were included in our analysis. Heat therapy is a common therapeutical approach recommended by European pharmacists, who often do not find that a referral to other levels of care is necessary. This study identified a clear need for guidance on recommendation principles, such as correct timing and administration, highlighting the need for guidance and training opportunities. **Conclusions:** Our findings indicate that there are significant opportunities to enhance pharmacists' education and training on the use of HT. The absence of clear recommendations and a robust scientific foundation for HT underscores the need for specific guidelines. Developing such guidelines is essential to bridging the existing gap in the literature, ensuring that pharmacists are better equipped to advise on the effective and safe use of heat therapy.

Keywords: Community pharmacy; Drug utilisation; Education; Guidelines

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INTRODUCTION

Musculoskeletal (MSK) pain is a common manifestation of numerous conditions that can be related to temporary or lifelong limitations in functioning and participation¹. An analysis of the Global Burden of Disease (GBD) conducted in 2019 reported that approximately 1.71 billion people globally live with MSK conditions, the greatest contributor to years lived with disability (YLDs) worldwide². The most prevalent MSK disorder is low back pain (LBP) followed by neck pain (NP), pain in limb joints, and other chronic pain syndromes¹. As highlighted in the systematic analysis of the GBD Study 2021, LBP is the single highest contributor to disability burden worldwide. In 2020, LBP affected 619 million people globally and it is expected that there will be a 36.4% increase in the total number of LBP cases by 2050³.

People living with MSK disorders often experience loss of mobility and independence, reduction of daily life function, distress and self-perceived poor health, leading to an impaired quality of life⁴. These effects result in increased absenteeism from work and loss of productivity and the need for medical treatment. MSK pain has been managed through a variety of therapies, often combined. Among pharmacological therapies,



oral analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs) are the most commonly used medicines⁵. Within non-pharmacological therapies, heat application stands out as one of the most traditional methods used for this purpose and a long-established practice in clinical practice, with its use documented for centuries in addressing a wide range of disorders and conditions⁶. Heat can be administered locally as topical heat pads or wraps, hot baths, heat lamps, shortwave therapy and ultrasound. Heat therapy (HT) is usually included in a multimodal approach in the treatment of MSK pain and a consensus on its use has been achieved for low back, neck, knee and wrist pain and in delayed-onset muscle soreness (DOMS)^{7,8,9}. A study published in 2018 promotes the ability of heat to induce protective effects that mitigate muscle injuries and enhance therapeutic effects that facilitate recovery¹⁰. While its benefits in managing different types of pain are well established and have been proved in different kinds of pain¹¹, there is still a lack of specific clinical guidelines detailing the use of HT, dosage, indications and contraindications. Current recommendations remain generic. While other types of therapies have been widely established as first-line products for the treatment of MSK pain, such as NSAIDs and analgesics, heat therapy hasn't been the subject of similar studies, nor have the educational needs of healthcare personnel been assessed¹².

Moreover, due to its safety, effectiveness, reliability, and accessibility, HT is widely used not only by physicians and physical therapists but is also independently recommended by pharmacists in their daily practice. However, no data currently exists on pharmacists' specific practices regarding HT, and it remains unknown how they are integrating HT into patient care. In order to explore pharmacists' attitudes towards HT among different EU countries, the advice they give to patients with MSK pain and their level of knowledge on the use and recommendations of this therapy, an international advisory board, including different health professionals, was set up. A web survey was developed, translated and disseminated in three European countries – Italy, Spain and Portugal, distributed via the mailing lists of four scientific societies and associations.

METHODS

Survey

To address the objectives of this study, an international advisory Board comprising experts in Physical Medicine and Rehabilitation, Orthopaedics, Physiotherapy and Pharmacy from the participating countries was assembled, based on their involvement in previous research on this topic. Two online meetings were held to achieve consensus on the questions and response options to be included in the questionnaire. The experts drew upon their professional experience and the published literature to formulate the questions. Ultimately, consensus was reached on 20 questions, which were organized into three distinct sections. 1. Socio-demographic characteristics (Q1-Q6), 2. HT use and recommendations (Q7-Q17), and 3. Pharmacist opinions (Q18-Q20). Only community pharmacists currently dealing with patients were included in the survey.

In order to exclude pharmacists and participants who did not meet this requirement, two questions were inserted at the beginning of the survey (Table 1). If the respondents answered "no" to one or both of these questions, their answers were excluded from the analysis. Twelve of the questions required a single answer (Q1-7, Q12, Q15-17, Q20); four questions offered the possibility to give multiple answers (Q8, Q13-14, Q19); in Q18 a scale was used to give a score (range 0-10). In questions Q9-Q11, respondents were asked to put themselves in specific situations and provide a 'yes or no' response to each option.

Table 1: Inclusion criteria		
Questions		% (n/N) (Total n= 291)
Do you have a degree in Pharmacy/ Pharmaceutical Sciences?	No	1.0% (3/291)
	Yes	99.0% (288/291)
Are you currently working in a community pharmacy?	No	2.7% (8/291)
	Yes	97.3% (283/291)

The questionnaire was accompanied by a glossary explaining what the authors meant by MSK pain, LBP, NP, knee pain, menstrual pain and red flags. The latter was defined as "signs and symptoms found in the patient history and clinical examination that may tie a disorder to a serious pathology". Furthermore, the questionnaire was translated into native languages by the expert panel. The Board members, who are also the authors of this paper, ensured that the questionnaire was both comprehensive and aligned with the study's objectives.

Thanks to the involvement of four scientific societies and associations that publicized the link to the web survey and invited their members to participate, the survey was distributed to pharmacists across the three countries involved (Italy, Spain and Portugal). At the end of the Survey, the Board reviewed and commented on the results. The present survey was available for participants to reply between 29th August and 23rd October 2023.

No personally identifying data were collected, and all participants' answers remained anonymous throughout the study. Furthermore, no incentives were provided to the respondents.

Data Analysis

Categorical variables were summarised as frequencies (n) and percentages (%). Quantitative variables were described using medians and interquartile ranges (Q1-Q3).

Chi square test or Fisher exact test were used to compare categorical variables between two or more groups. Mann-Whitney U test was used to compare continuous variables (Q18a and Q18b) between two groups.

Multivariable logistic regression was used to evaluate the impact of pharmacist's opinions (adjusting for gender, age and country of practice) on some decisions reported (to recommend HT to people with diabetes and to take red flags



into account), Odds Ratio (OR) and the relative confidence interval at 95% (CI95%) were reported. A p value <0.05 was considered statistically significant.

All the analyses were conducted with SAS Version 9.4.

RESULTS

A total of 291 questionnaires were collected, of which 281 met the inclusion criteria and were analysed.

Most respondents (58%) were aged between 30 and 50 (Q1) and the female gender was the most represented (81%) (Q2) (Table 2). The distribution of gender and age was significantly different in the three countries ($p=0.036$) (Table 3). With Q4 we found that 37.4% of the respondents had more than 20 years of experience working in a community pharmacy (Q4). Most of the respondents (75%) stated they counsel 0 – 10 patients with MSK pain in a day (Q6) (Figure 1). From Q7 emerges that 42% of respondents recommend HT to 11-30% of patients with MSK pain (Table 4). Red flags are not considered as potential contraindications when recommending HT by

42% of the participants (Q8b). This rate decreases to 35% in younger pharmacists, and it is lower in Portugal (31%) than in Spain (46%) and Italy (55%).

With Q9 we found that 79% of participants recommend HT to older patients (70+), 60% to people with diabetes (Figure 2) – this rate raising to 75% in Italy (differences by country, $p=0.050$) and 68% in younger pharmacists (differences by class of age, $p=0.651$). HT is also recommended to patients with poor circulation by 31% of respondents and this percentage reaches 49% in Italy and 42% in younger participants. A further analysis relating red flags and contraindications of HT revealed that 59% of participants who recommend HT to people with diabetes states to consider red flags. Moreover, while open wounds, hematoma and bleeding are considered contraindications for HT by 92% and 88% of respondents respectively (Q10), acute trauma and acute inflammation are considered to be contraindications by approximately 50% of pharmacists.

When asked to express their level of agreement with several statements about HT (Q11), more than 70% of respondents agreed with all the statements (Supplemental material S1). With

Table 2: Socio-demographic characteristics		
Questions		% (n/N) (Total n= 281)
How old are you?	20-30	11.0% (31/281)
	30-50	58.0% (163/281)
	>50	31.0% (87/281)
What is your gender?	Female	80.8% (227/281)
In which country are you located?	Italy	18.1% (51/281)
	Portugal	35.6% (100/281)
	Spain	46.3% (130/281)
How long have you been working in the community pharmacy business?	0-5 years	16.7% (47/281)
	6-10 years	15.7% (44/281)
	11-15 years	18.1% (51/281)
	16-20 years	12.1% (34/281)
	>20 years	37.4% (105/281)
	No	49.1% (138/281)
Have you attended a postgraduate course after graduation?	Yes	50.9% (143/281)
	No	49.1% (138/281)
On average, how many patients with MSK pain do you usually advise in a day?	0-10	75.1% (211/281)
	Nov-40	24.6% (69/281)
	More than 40	0.4% (1/281)

Table 3: Gender and classes of age by country					
		Italy	Portugal	Spain	p-value
		%(n/N) (Total n= 51)	%(n/N) (Total n= 100)	%(n/N) (Total n= 130)	
Gender	Female	68.6% (35/51)	86.0% (86/100)	81.5% (106/130)	0.036
	Male	31.4% (16/51)	14.0% (14/100)	18.5% (24/130)	
Age	20-30	13.7% (7/51)	11.0% (11/100)	10.0% (13/130)	<0.001
	30-50	76.5% (39/51)	70.0% (70/100)	41.5% (54/130)	
	>50	9.8% (5/51)	19.0% (19/100)	48.5% (63/130)	

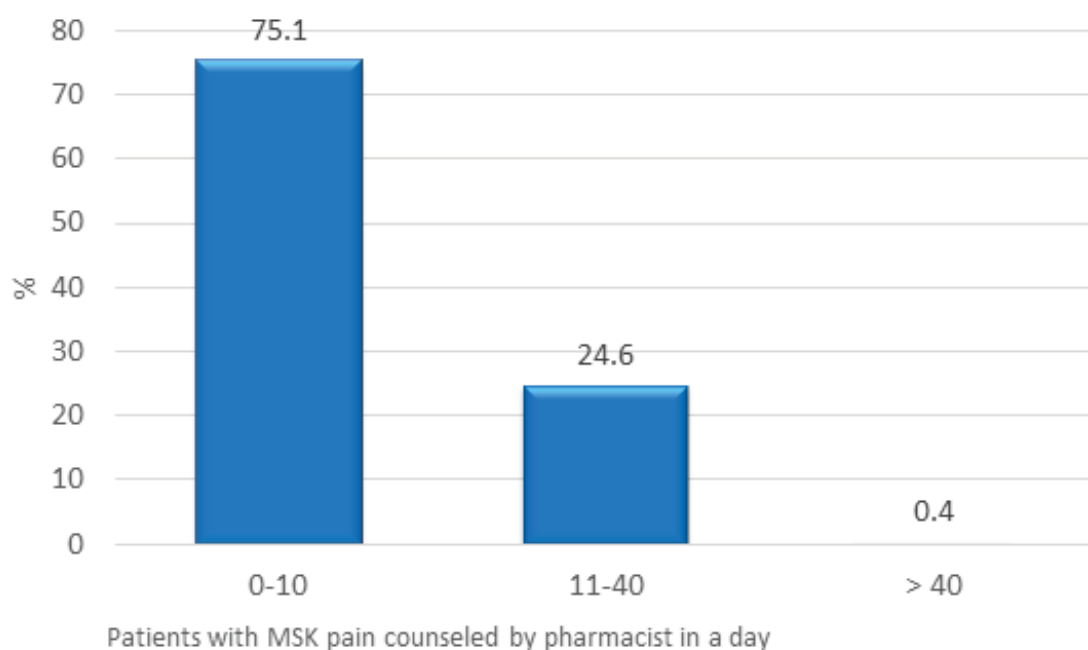


Figure 1. On average, how many patients with MSK pain do you usually counsel in a day?

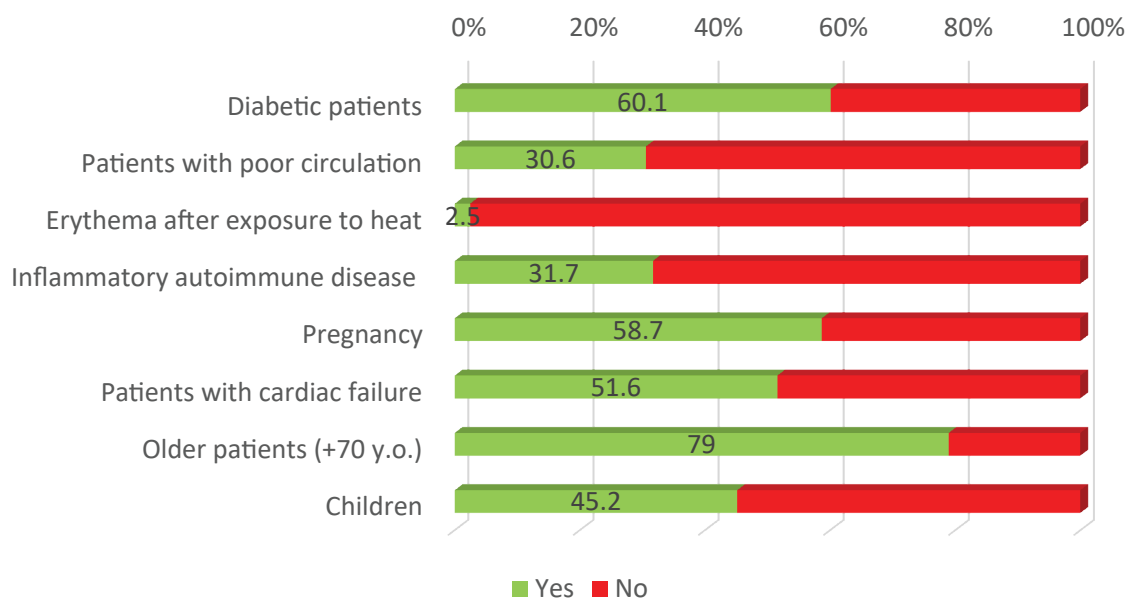


Figure 2. Would you recommend HT to any of these groups?

Table 4: Questions Q7, Q8a, Q8b		
Questions		% (n/N) (Total n= 281)
Q7. Considering 100 patients with MSK pain	0-10%	24.6% (69/281)
what percentage do you recommend heat	11-30%	42.0% (118/281)
therapy to?	31-50%	17.8% (50/281)
	>50%	15.7% (44/281)
Q8a.Would you recommend HT for any	LBP	94.3% (265/281)
of the following conditions?	Neck pain	87.5% (246/281)
	Knee pain	23.5% (66/281)
	Menstrual pain	69.0% (194/281)
	Other	11.7% (33/281)
Q8b.Would you consider any of the following	Current duration of the pain	68.7% (193/281)
before recommending HT?	Previous medical evaluation of the pain	59.8% (168/281)
	Red flags	57.7% (162/281)

Q12 we found that 47% of participants often considered HT as a part of a multimodal treatment. The factor that most influences the pharmacist's choice to recommend HT for MSK pain is pain characteristics (74%) (Q13). When it comes to selecting HT products, the most followed criterion among pharmacists is the products adaptability to the concerned anatomical area (59%) (Q14). The cost of the product is always taken into account by 22% of respondents (Q15) and 11,4% of them states that, in their practice, HT is frequently recommended by other healthcare professionals beforehand (Q17) (Supplemental material S2). With Q16, 46% of participants stated that 11-30% of MSK patients will not need any other healthcare services to address their pain.

When asked how confident and experienced pharmacists feel when counselling HT (Q18a - Q18b) in a range 1-10, we obtained a median value of 7 (Supplemental material S3).

Further analyses relating respondents who recommend HT in all of those cases where it should be cautiously recommended (Q9) and their level of confidence (Q18a) and experience (Q18b) were performed. Participants who would recommend HT to patients with diabetes report higher confidence than the others ($p<0.001$). Furthermore, a multivariable logistic regression considering "patients with diabetes" as the outcome, and class of age, sex and country and Q18a as predictor showed that the probability to recommend HT to patients with diabetes increases with greater confidence (OR=1.39 CI95% 1.18 -1.64 $p<0.001$) (Supplemental material S4).

A similar consideration was done for red flags as an outcome. Firstly, considering Q18a as a predictor within class of age, sex and country, the multivariable logistic regression showed that the probability to take into account red flags does not significantly increase with greater confidence (OR=1.21 CI95% 1.03 -1.41 $p=0.18$). Subsequently, the same analysis was performed considering Q18b as a predictor, showing that the probability to take into account red flags increases with greater experience (OR=1.16 CI95% 1.01 -1.34 $p=0.041$) (Supplemental material S5).

With Q19, 55% of participants stated to gather information from the literature when they do not feel confident in recommending HT, 46% refer to the physician and 31% refer to a colleague. In particular, the percentage of participants who refer to a colleague was higher in Portugal (43%), than in Italy (25%) and Spain (24%).

DISCUSSION

This international survey involving pharmacists among Italy, Portugal and Spain offers novel insights on the degree of knowledge, use and recommendations of HT to patients with MSK pain.

To our knowledge, this is the first study involving practicing community pharmacists throughout Europe that specifically analyses the degree of pharmacists' awareness of the risk-benefit profile of HT.

Our findings show that pharmacists frequently recommend HT to patients with MSK pain (42% of respondents recommend it to a percentage of patients with MSK ranged between 11% and 30%). In case of uncertainty in the management of HT, most of them refer to general recommendations that can be found in the literature or contact a colleague/physician. However, literature does not provide detailed guidelines on HT; the knowledge and rationale for the decision whether to use HT or not is a fundamental basis for recommending it properly. In addition, the lack of uniformity in the indications and contraindications of HT products, the absence of a package leaflet and the mainly empirical use of this class of products are all factors that contribute to insecurity in advising this therapy¹¹. Hence, the importance of raising pharmacists' awareness of the risks and benefits of this kind of therapy. During our analysis, we found that Portuguese respondents (43%) are more likely to seek advice from a colleague when feeling unsure. This finding might be explained by the large number of community pharmacists within the same pharmacy¹³.

One relevant finding of this study is the possible misuse of HT



among pharmacists. According to the survey answers, HT is being recommended to patients with diabetes, patients with poor circulation, inflammatory autoimmune disease and with cardiac failure. It is also being recommended to older patients (70+) and children. These are all situations that require special precautions in the use of this type of therapy because of the possible altered perception of heat, among several other factors¹⁴. As an additional finding, it has to be noted that those who would recommend HT to patients with diabetes are the ones who report a higher confidence level.

Furthermore, a high rate of respondents (42%) does not take possible red flags into account. This data certainly needs to be contextualized within the framework of different countries and also according to the age group considered, but it is still a figure that cannot be ignored. Although this phenomenon primarily concerns the younger age group (65% of participants aged 20-30), more than 50% do not consider red flags in any age group, indicating that it is a widespread attitude.

These results indicate a systemic gap in knowledge and highlights the urgent need for structured education on HT's contraindications and precautions.

Lastly, cross-country comparisons revealed that Italian pharmacists showed the least confidence in recommending HT and were most aware of their limited knowledge on indications and contraindications for HT, reinforcing the need for country-specific educational interventions.

Study limitations and future directions

For the first time, we have a study providing an in-depth overview on the use of HT among European pharmacists. However, it has several limitations that must be considered. Firstly, despite providing the glossary, we do not exclude that some terms may have been interpreted differently from what was the authors' intention. Secondly, we are aware that results might be biased by the demographic characteristics of respondents. In particular, the age of Spanish participants does not reflect the current workforce in the country (48,5% of respondents is <50). This may be caused by the means used to disseminate the survey: scientific societies and associations publicizing the link to the survey on their websites. Since most responses come from Spain, this may have influenced our

results to some extent. Thirdly, we are aware that several of the questions in the questionnaire may raise the response 'it depends' instead of a 'yes or no' answer, which is harder to conclude from. The questionnaire was developed by the authors of this paper who created the questions based on the literature and their professional experience. Furthermore, since pharmacists' roles can vary by country, differences in training and education, scope of practice, and cultural and healthcare system across the three countries could explain the varying approaches in recommending and perceiving HT. Our results highlight the need for pharmacists to be trained on HT, which is the starting point both for providing specific courses to this group of health professionals and for writing guidelines on how and when to use HT, as both literature and clinical practice are still very limited on the subject.

CONCLUSION

Our survey provided valuable insight into the current use of HT by European pharmacists for managing MSK pain, especially in the treatment of LBP and NP. While HT is commonly recommended, this study raises concerns about a potential misuse of HT in high-risk populations, unless its recommendation is accompanied with appropriate information on precautions. The findings underline the need to enhance pharmacists' education on HT and to develop clear clinical guidelines for its appropriate use. Such measures could improve patient safety and optimize treatment outcomes. Future work should include post-training evaluations to assess how targeted pharmacists' education influences pharmacists' clinical decision making and confidence regarding HT.

AUTHOR CONTRIBUTIONS

All authors contributed to designing the study, formulating the questionnaire and analyzing the data. Jaime Acosta-Gómez also contributed with statistical and writing assistance.

CONFLICT OF INTEREST

Jaime Acosta-Gómez, Thilo Hotfiel, Ema Paulino and Luis Sequeira de Medeiros have received consulting or honorarium fees from Angelini Pharma.

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