

## ORIGINAL RESEARCH

## Patient-Reported Leg Cramp Treatments and Their Effectiveness

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**Background:** Leg cramps are common and distressing to patients who report using many treatment options, some of which have potential for significant adverse effects. Such treatments are often under-reported to their clinicians, and additional sources for information are sought. Our study investigates patient-reported treatment choices and treatment helpfulness for leg cramp symptom relief, as well as their use of the Internet to identify treatments.

**Methods:** A newly developed cross-sectional survey was administered in Midwest primary care clinics.

**Results:** Of 714 survey respondents, 365 reported experiencing leg cramps and are included in our report. The mean age of our participants was 52.2 years (SD = 16.7). The sample was 70.4% female, 90.2% white, and 71.5% rural. Pharmacological treatment options for leg cramps were cited less frequently than nonpharmacological treatments. The most common and helpful pharmacologic interventions were over-the-counter analgesics. Nonpharmacologic treatments included massage, stretching, and walking. Of patients who experienced leg cramps, 30.8% (n = 100) reported looking up treatments on the Internet. The most popular interventions found on the Internet were hydration with either water or electrolyte drinks, potassium, magnesium, and massage of the affected muscle.

**Conclusions:** Patients with leg cramps use a variety of treatment options. Many nonpharmacological treatment options are at least somewhat beneficial, which thus present less estimated risk with more benefit. Nearly one-third of patients with leg cramps could be at potential risk of medication adverse events, particularly from over-the-counter analgesics. The use of the Internet could be seen as being problematic in nearly the same proportion. (J Am Board Fam Med 2024;37:1123–1129.)

**Keywords:** Cross-Sectional Studies, Family Medicine, Family Physician, Leg, Muscle Cramp, Muscle Spasm, Patient Reported Outcome Measures, Primary Health Care, Surveys and Questionnaires, Therapeutic Use

## Introduction

Leg cramps are sudden involuntary localized skeletal muscle contractions of the lower extremities, persisting for seconds to minutes, that are typically painful and distressing to the patient.<sup>1</sup> In healthy adults, the incidence of leg cramps occurs in 50 to 60% of the population.<sup>2,3</sup> They are thought to be mainly idiopathic in origin but can be associated with medication use or underlying medical conditions such as peripheral vascular disease, renal disease, pregnancy, or electrolyte imbalances.<sup>1,3,4</sup>

Treatment options for leg cramps are not well-characterized. There are currently no prescribed medications or therapies that have been approved for leg cramps or found to be particularly efficacious.<sup>3</sup> The Food and Drug Administration (FDA) previously approved quinine sulfate for the treatment of nocturnal leg cramps based on several large randomized controlled studies.<sup>5</sup> However, quinine was found to cause a variety of adverse effects and significant toxicities, including cinchonism as well as immune thrombocytopenia, drug-mediated thrombotic microangiopathy and hemolysis, resulting in the removal of FDA approval for the treatment of leg cramps in 2009.<sup>6</sup> Other studies identified as many as 30 different interventions, medications, assorted supplements, and nondrug therapies to address leg cramps, including analgesics, antiepileptic drugs, calcium salts, diltiazem, magnesium salts, multivitamin and mineral supplements, quinine, sodium chloride, stretching exercises, verapamil, vitamin B6 (pyridoxine) and vitamin E.<sup>7–10</sup>

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Quinine is not the only leg cramp treatment option that may be associated with adverse events. A systematic review on the effectiveness and safety of interventions used for idiopathic leg cramps and leg cramps in pregnancy found many of the results inconclusive, unknown, or contradictory.<sup>9</sup>

Many treatments, particularly pharmacologic options, may not be efficacious and may pose a risk to patients. A European patient-report study found the potential for adverse events was seen in one-third of patients using medications.<sup>7</sup> Over-the-counter (OTC) nonsteroidal anti-inflammatory drugs (NSAIDs) have multiple adverse side effects including gastrointestinal bleeding, cardiovascular side effects and NSAID-induced nephrotoxicity.<sup>11</sup> In addition, acetaminophen is well-known to be associated with significant liver damage.<sup>12,13</sup> Multivitamins and mineral supplements have a wide variety of significant adverse effects with limited evidence of health benefits and the potential for drug interactions.<sup>14</sup> Magnesium and calcium, often promoted as treatments for leg cramps, have not been found to be particularly effective and may cause abdominal bloating, diarrhea, and muscle weakness, as well as constipation and kidney stones.<sup>14–16</sup>

While there is some limited efficacy evidence regarding the use of nonpharmacologic treatments, such as stretching, increasing hydration, elevation of the legs or massage of the lower limbs, none can be specifically recommended.<sup>17,18</sup> Stretching and other nonpharmacological interventions are generally regarded as benign.<sup>8,17</sup> However, while the addition of salt to drinking water was found to be effective in reducing the rate of cramping, inadequate or excessive electrolytes, particularly sodium or potassium, can also cause adverse side effects.<sup>19,20</sup>

As a result of pain, distress, and frequent occurrence, patients with leg cramps typically seek advice from varying sources. One Australian study indicated that 64% of patients sought leg cramp treatment advice from their general practitioner.<sup>21</sup> However, other studies have shown that only 35% to 40% of patients have discussed their leg cramps with their physician.<sup>22,23</sup> Many Americans (69%) reported having used the Internet as their first resource when seeking health or medical information,<sup>24</sup> but more information is needed on how patients use the Internet for treatment advice for leg cramps. Patient self-treatment for symptom relief without clinician oversight may increase the risk of adverse side effects.<sup>25</sup>

Studies on leg cramps in primary care have been remarkably sparse over the past thirty years and

patient-reported outcomes are emerging as critical to research.<sup>26</sup> Given that half, or more, of the primary care population is afflicted, often for prolonged periods of months to years, the “expectations from treatments” and efficacy are underexplored, and “the safety of a potential treatment must be prioritized.”<sup>7</sup> The most recent study done in the United States (US) in a primary care setting was in a cohort of predominantly elderly white males at a veterans clinic more than 30 years ago. In this sample, 20% reported receiving treatment and the results were poor; quinine sulfate was the most popular and effective option in 50% of the medically treated patients.<sup>4</sup> However, quinine has the highest evidence for adverse effects.<sup>5,6,27</sup>

There is a profound gap in the current understanding of how adult US patients who experience this common condition manage their symptoms. Our study addresses this gap with the overall goal of estimating the potential risk from management of leg cramps in this population, particularly in regards to over-the-counter (OTC) medications. This is the first study performed in the US on patient-reported treatments for leg cramps that includes adult primary care patients across the age spectrum and with men and women equally represented. Our specific aims are to report:

1. Patient-reported treatment choices for leg cramps including OTC and prescribed medications, supplements, and non-pharmacologic options,
2. Patient-reported helpfulness and adverse effects of these treatments, and
3. How patients used the Internet for solutions about leg cramp interventions and what they found.

## Methods

### *Study Design and Population*

This study is an expansion of a previous study. Cross-sectional data were collected in June/July 2021 and June/July 2022 in 1 urban and 5 rural primary care clinics in a midwestern state.<sup>23</sup> Patients younger than age 19, pregnant individuals, and patients who could not read English were excluded. All patients aged 19 and above who could read English were asked to participate in the study when they checked in for their clinic appointment. This project was reviewed and approved by the University of Nebraska Medical Center Institutional Review Board (IRB).

### *Measures*

Because there are no validated surveys addressing leg cramps, corresponding treatment options, and

adverse events from treatments, the researchers developed their own survey (Appendix). Some questions were adapted from a questionnaire used with patients at an ambulatory veterans' clinic in the United States<sup>4</sup> and others from a French study of nocturnal leg cramps in primary care patients over the age of 60.<sup>7,28</sup> We defined leg cramps as “spasmodic, painful, involuntary muscle contractions when resting, lasting from a few seconds to minutes, usually affecting the calf and foot, that is, Charley horse.”<sup>7,21,28</sup>

A list of the most commonly used treatment options was compiled from the findings of the Lorenzo<sup>7</sup> study as well as UpToDate recommendations.<sup>3,29</sup> Participants could also report additional treatments in an open-ended “Other” option. Patients were asked if they had tried the listed treatments, to characterize their helpfulness and to report any side effects they experienced. We also asked if patients used the Internet for answers about leg cramp treatments and, if so, what they found.

Demographic variables included age, gender, ethnicity, and race. The survey included questions assessing characteristics of their leg cramps, including frequency, duration, severity, and impact on daily living, as well as questions regarding activity levels, health history, and specific characteristics regarding their leg cramps, but these findings are not included in the current analyses. Results regarding prevalence and impact of leg cramps have been published separately.<sup>23</sup>

### Statistical Analyses

Descriptive summary statistics were obtained using SPSS v28.0. Means and standard deviations are presented for continuous outcomes, and frequencies and percents are provided for categorical outcomes.

### Results

The final sample included 714 respondents, 365 (51.1%) of whom reported experiencing leg cramps; this article reports on these 365 respondents. The mean age of our participants was 52.2 years (SD = 16.7) (Table 1). The sample was 70.4% female, 90.2% white, and 71.5% rural.

Table 2 represents treatment and their usefulness for leg cramps as reported by patients who experienced leg cramps. Overall, the most frequently used treatments were nonpharmacologic. A total of 78.2% of patients have tried massaging the

**Table 1. Demographics**

Age (M, SD)	52.2	16.7
Gender (#, %)		
Female	255	70.4%
Male	107	29.6%
Are you Hispanic/Latino (#, %)		
No	336	94.9%
Yes	18	5.1%
Race (#, %)		
White	321	90.2%
Black	26	7.3%
Asian	2	0.6%
Native American	1	0.3%
Other	1	0.3%
More than one race selected	5	1.4%
Location (#, %)		
Urban	104	28.5%
Rural	261	71.5%

*Abbreviations:* M, Mean; SD, Standard deviation.

affected muscle and 83.9% reported at least some benefit from this (Somewhat or Usually helpful). The most popular pharmacologic interventions were analgesics. Of these, 31.4% of respondents reported use of acetaminophen, and 30.5% tried an NSAID. Acetaminophen was also one of the most helpful pharmacologic interventions, with 79.4% reporting at least some benefit.

Treatments reported by patients in the open-ended “Other” field include potassium, hydration, pickle juice, and mustard (Table 3). Few side-effects were reported by the patients from the listed medications or interventions. One person reported swelling as a side effect of acetaminophen, 2 reported stomach issues with ibuprofen, and 1 person reported difficulty and or pain with stretching, walking and massage.

Of the patients who experienced leg cramps, 30.8% (n = 100) reported looking up treatments on the Internet. The most frequently identified medication/supplement recommendations were potassium (mentioned by 15 participants) and magnesium (mentioned by 14 participants); 1 participant indicated a recommendation for quinine. The most commonly identified nonpharmaceutical treatments found on the Internet were hydration with either water or electrolyte drinks (mentioned by 30 participants), followed by stretching (mentioned by 18 participants). Recommendations of mustard intake, placing a bar of soap in the bed,

**Table 2. Patient-Reported Treatment Efficacy for Leg Cramps**

	Have you tried this treatment?				If you tried this treatment, was it helpful in relieving your leg cramps?							
	No		Yes		No Response		Not Helpful		Somewhat Helpful		Usually Helpful	
	#	%	#	%	#	%	#	%	#	%	#	%
Non-pharmacologic treatments												
Massage of the affected muscle	71	21.8%	254	78.2%	20	7.9%	21	8.3%	116	45.7%	97	38.2%
Stretching	84	25.8%	241	74.2%	20	8.3%	19	7.9%	106	44.0%	96	39.8%
Walking	108	33.3%	216	66.7%	18	8.3%	18	8.3%	91	42.1%	89	41.2%
Hot shower/Warm bath	206	63.8%	117	36.2%	9	7.7%	13	11.1%	55	47.0%	40	34.2%
Keeping legs warm in bed	225	70.3%	95	29.7%	9	9.5%	9	9.5%	42	44.2%	35	36.8%
Pharmacological treatments												
Verapamil	319	99.4%	2	0.6%	0	0.0%	0	0.0%	2	100.0%	0	0.0%
NSAIDs	226	69.5%	99	30.5%								
Aleve/Naproxen Sodium	276	86.0%	45	14.0%	3	6.7%	5	11.1%	25	55.6%	12	26.7%
Advil/Ibuprofen	232	71.4%	93	28.6%	3	3.2%	16	17.2%	52	55.9%	22	23.7%
Tylenol/Acetaminophen	223	68.6%	102	31.4%	3	2.9%	18	17.6%	56	54.9%	25	24.5%
Magnesium supplements	269	83.0%	55	17.0%	9	16.4%	8	14.5%	29	52.7%	9	16.4%
Quinine	317	98.1%	6	1.9%	0	0.0%	2	33.3%	1	16.7%	3	50.0%
Vitamin B supplements	274	85.1%	48	14.9%	8	16.7%	11	22.9%	21	43.8%	8	16.7%
Calcium supplements	264	82.0%	58	18.0%	10	17.2%	15	25.9%	29	50.0%	4	6.9%
Vitamin E supplements	291	91.2%	28	8.8%	7	25.0%	6	21.4%	12	42.9%	3	10.7%

Abbreviation: NSAID, Non-Steroidal Anti-Inflammatory Drug.

and the consumption of pickle juice (for which there is emerging data supporting its possible benefits were reported).<sup>30</sup>

## Discussion

Our study reports that patients with leg cramps have tried a variety of treatments, many of which do not have corresponding evidence of efficacy. A majority of patients who tried any of the treatments listed on the survey found them to be at least somewhat beneficial. The most frequently indicated pharmacologic interventions were OTC acetaminophen and NSAIDs, used by approximately 30% of patients. Nearly 1 in 3 patients consulted the Internet for medical guidance on leg cramps.

We could find only one other study that addressed the use of OTC medications for leg cramps.<sup>7</sup> The authors of this study concluded that 1 in 3 patients took possibly harmful medications or supplements (primarily magnesium and quinine) to treat their leg cramps.<sup>7,13,25</sup> While our findings also suggest that nearly one-third of patients may be taking potentially harmful medications to treat their leg cramps, in our study, the risk comes from the

use of OTC analgesics, such as acetaminophen and NSAIDs. These OTC analgesic medications have a high risk for unintentional misuse which poses a threat to patient safety.<sup>25,31,32</sup> In addition, although quinine is no longer approved for leg cramps in the US, a few patients in our study still reported its use. The risk for adverse events from medications and supplements may be exacerbated due to the fact that leg cramps disproportionately affect older individuals and individuals with poor health, both of which are high-risk populations that may be more susceptible to medication side effects and interactions.<sup>15</sup>

In our sample, nonpharmacologic interventions were more popular and effective for leg cramp relief than reported pharmacologic therapies. Nonpharmacologic therapies for symptom control are relatively harmless, easy to perform, and have little to no cost to the patient.<sup>7</sup> Our study participants report almost no adverse effects from nonpharmacologic interventions, which corresponds with findings that have found them to be safe and somewhat efficacious.<sup>17,33</sup>

Just over 30% of patients who reported experiencing leg cramps have looked to the Internet for treatment answers, while only 5% of participants in a 2012 Australian study did so.<sup>17</sup> Combined with



**Table 3. Other Treatments Mentioned by Participants**

Medications/Supplements			Non-Drug		
	"Other" Treatment Tried	Found on Internet		"Other" Treatment Tried	Found on Internet
Potassium	3	15	Hydration/Water/Gatorade/Electrolytes	6	30
Magnesium		14	Stretching		18
Calcium (Tums)		3	Banana	4	9
Tylenol		2	Pickle Juice	5	7
Supplements		2	Massage		7
Multivitamin	1	2	Heat	3	5
Unspecified OTC meds		2	Mustard	1	4
B6		2	Ice	1	4
			Exercise/Move		4
Gabapentin		1	Hot showers/warm bath	1	3
Ibuprofen		1	Bar of soap near feet while sleeping		1
			Muscle rub lotion		1
Vitamin E		1	Essential oils		1
Iron		1	Compress		1
Quinine		1	Milk	1	
Muscle relaxants	3		Thera	1	
Leg cramp med?	1		Less sodium intake		1
Ropinirole (Requip)	1		Salt		1
			Vinegar	1	

Abbreviation: OTC, Over-the-counter.

the fact that patients often do not discuss their leg cramps with their health care clinicians, these Internet solutions lead to concerns for potential toxicity. For example, patients may be unaware of chronic changes in the liver or kidneys from prolonged use of OTC medications and unsupervised use of potassium supplements can be associated with toxicity from hyperkalemia.<sup>20,25</sup> Even simple things like excessive water intake and nonpharmacological treatments have been shown to have adverse effects.<sup>34,35</sup> The fact that our study group reported so few side effects may reflect a risk that both serious and milder side effects are not being recognized by patients or their clinicians.

Our study has the advantage of describing patient-reported outcomes which is an approach that is emerging as critically important in designing research, because it captures information regarding the patient experience that is often not evident to clinicians.<sup>26,36</sup> Our study was limited by the nature of self-reported data, which includes issues such as recall bias, social desirability, and measurement error.<sup>37</sup> Our study was also limited by the racial and ethnic demographics of a typical midwestern, largely rural,

population. In addition, we did not include dosage of medications or duration of treatments, preventing us from examining how usefulness of a treatment would be impacted by a dose effect.

Although we listed the most common treatment modalities, we were unable to list every potential treatment option for leg cramps and may therefore have overlooked some treatments; we offered an "other" category to help identify relevant treatments that were not included in our list. One potential treatment that has an unclear role in our study, and in the literature in general, is gabapentin.<sup>15</sup> Since it is unclear whether gabapentin use mitigates or exacerbates leg cramps, the question addressing its use was asked in an earlier part of the questionnaire, separate from other treatment options. In our sample, 8.8% of those who have leg cramps take gabapentin, compared with 1.7% of those who do not have leg cramps. While these data do not contribute conclusively to determining the usefulness or aggravation of leg cramps by gabapentin, it adds to the literature on the use of this medication in the primary care setting.

An accurate assessment of risk to the patients from leg cramp treatments cannot be made, as

patients typically are not knowledgeable about side effects of medications and, unless they are severe or investigated by their provider, they are difficult to capture on a survey. Since leg cramps are underreported, and effects are likely to be subtle, chronic, multicausal, and difficult to detect, the population at risk from leg cramps management can only be postulated at this time. Future researchers should assess leg cramp treatments and therapies in a diverse patient population. Studies should also include medical record review and targeted questioning to better assess benefits and harms from OTC and prescribed medications.

## Conclusion

Our study reports that the management of leg cramps by primary care patients consists of a wide variety of treatment options with limited demonstrated efficacy, often with guidance from the Internet and risk potential in nearly one-third of patients. Adverse effects are probably underrecognized. Treatment options for leg cramps must be further investigated, and safe and effective recommendations identified to reduce patient distress and minimize harm from potentially unguided management. Results of our study provide information on current practices which could facilitate the design of interventional studies which may identify safe and efficacious means to alleviate this distressing and common condition.

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