International Journal of Yoga, Physiotherapy and Physical Education
ISSN: 2456-5067
Impact Factor: RJIF 5.24
www.sportsjournal.in
Volume 3; Issue 1; January 2018; Page No. 29-32

Leg cramps: Symptom, causes and prevention

Dr. Ramesh Chand Chauhan
Assistant Professor, Physical Education Centre of Excellence, Govt. Degree College, Sanjauli, Shimla, Himachal Pradesh, India

Abstract
Cramps are sudden, involuntary, painful muscle contractions. Their pathophysiology remains poorly understood. One hypothesis is that cramps result from changes in motor neuron excitability (central origin). Another hypothesis is that they result from spontaneous discharges of the motor nerves (peripheral origin). Despite their commonality and prevalence, their cause remains unknown. Theories for the cause of muscle cramps are primarily based on anecdotal and observational studies rather than sound experimental evidence. Without a clear cause, treatments and prevention strategies for muscle cramps are often unsuccessful.

Keywords: calcium, cramp, quinine, potassium and magnesium

Introduction

Night leg cramps, also called nocturnal leg cramps, are painful, involuntary contractions or spasms of muscles in your legs, usually occurring when you're in bed. Cramps can be a real nightmare, especially when they wake you at night. These cramps are most often present in the calf muscles but can also occur in the thighs or feet. Nocturnal leg cramps are quite painful and cause the affected muscles to feel tight or knotted. Symptoms may last from several seconds up to several minutes. There might also be muscle soreness after the cramp goes away. Forcefully stretching the contracted muscle relieves the pain. Nocturnal leg cramps are more common in adults over age 50, but they also do occur in younger adults and children. Both men and women seem to be equally affected.

What causes nocturnal leg cramps?

- The cause of nocturnal leg cramps is often times unknown - in the majority of cases there is no underlying cause and we don't really know why it happens. One theory is that when a muscle tightens for a prolonged period, resulting in the muscle being shortened, it is stimulated to contract, causing it to go into a spasm (cramp) if it contracts further. This occurs more commonly while we are sleeping - our natural sleep position is with the knees slightly bent and the feet pointing downwards (shortening the calf muscle).
- **Inadequate blood supply:** Narrowing of the arteries that deliver blood to your legs (arteriosclerosis of the extremities) can produce cramp-like pain in your legs and feet while you're exercising. These cramps usually go away soon after you stop exercising.
- **Nerve Compression:** Compression of nerves in your spine (lumbar stenosis) also can produce cramp-like pain in your legs. The pain usually worsens the longer you walk. Walking in a slightly flexed position — such as you would use when pushing a shopping cart ahead of you — may improve or delay the onset of your symptoms.
- **Mineral Depletion:** Too little potassium, calcium or magnesium in your diet can contribute to leg cramps.

Magnesium

Magnesium deficiency is a common cause of muscle cramps, including leg cramps. However, simply taking magnesium will NOT necessarily fix muscle cramps every time, for every person. There are several situations where taking magnesium may be ineffective by itself:

1. Low potassium ("hypokalemia"). Potassium is found in most foods so dietary insufficiency is rare -- however, many diuretics ("water pills") often cause low potassium alongside low magnesium. Magnesium increases potassium absorption, but this may not be sufficient if a medication is causing large potassium loss.
2. High potassium ("hyperkalemia"). This is caused by renal insufficiency, or as a side effect of ACE inhibitors, angiotensin blockers, potassium-sparing diuretics, or mineralcorticoid resistance/deficiency.
3. Soft tissue calcification (not necessarily hypercalcemia). This is triggered by aging and exacerbated by excessive doses of calcium, especially along with Vitamin D, which greatly increases absorption. Excessive calcium is a risk factor for heart attacks and arterial damage, and is best consumed at a moderate level, spread throughout the day. Insufficient Vitamin K and magnesium can also exacerbate calcification.
4. Low sodium. Low salt diets can cause low sodium levels especially when combined with fluid loss, often due to exercise and/or heat exposure.
5. Statin use. Statins, prescribed for high cholesterol, are correlated with muscle cramps in patient reports. It is unclear at this time how statins cause cramps.
6. Beta-2 agonists. These are inhaler medications prescribed for asthma and COPD, which cause cramps very frequently.
7. Low calcium ("hypocalcemia"). Low serum calcium is known to cause cramps, but it only occurs if you have a very restricted or unusual diet, are grossly Vitamin D

deficient, have parathyroid problems, and/or have kidney damage/disease.
8. Proton-pump inhibitors. "PPIs" decrease your stomach acid, which may decrease the absorption of all minerals, including magnesium.

Calcium

Muscle cramps are the tightening of muscles that won't relax properly. To understand why this happens, you have to understand how muscles work. Calcium causes muscles to contract, and magnesium causes them to relax. Due to diets that are too high in dairy foods, like milk, cheese and yogurt, excess calcium is a very common problem in the American diet. What makes it worse is calcium supplements, especially when they are combined with Vitamin D, as this greatly increases the absorption of calcium. Vitamin D is very important, but when you take it with a calcium supplement, it is quite easy to get a calcium overload that can cause cramps, or make existing cramps worse.

In addition, as we age, the body generally "calcifies". This means that the tissues, including muscles, tend to accumulate calcium and "harden". This is part of the reason why cramps become very common among people age 50 and older.

If you suffer from muscle cramps, you need to try reducing your calcium intake, and add a high absorbing magnesium supplement, which counteracts the effects of the excess calcium and helps muscles relax.

Diuretics

Medications often prescribed for high blood pressure-also can deplete these minerals.

Some cases have been linked to muscle cramps are

- Sitting for long periods of time
- Exercising, injury, or overuse of muscles -Over-exertion of the muscles Being dehydrated, which means that your body has lost too much fluid
- Pregnancy. Cramps may occur because of decreased amounts of minerals, such as calcium and magnesium, especially in the later months of pregnancy.
- Standing or working on concrete floors Standing on a hard surface for a long time, sitting for a long time, or putting your legs in awkward positions while you sleep.
- Exposure to cold temperatures, especially to cold water
- Sitting improperly

Nocturnal leg cramps have also been linked to certain medical conditions and medications. These include:

- **Addison's Disease:** Alcoholism or alcohol abuse.
- **Cirrhosis:** Dehydration Dehydration / electrolyte imbalances.
- **Diarrhea:** Diuretics, Electrolyte imbalance, Flatfeet, Gastric bypass surgery.
- **Hypothyroidism:** (underactive thyroid)-- Kidney failure, Lead poisoning
- **Sarcoidosis:** A disease in which granulomatous (small growths or lumps) produces inflammation or swelling of the tissues in any part of the body.
- Muscle fatigue
- Motor neuron problems
- Oral contraceptives

Parkinson's Disease

- Peripheral artery disease (PAD)
- Some medications, including diuretics, salbutamol (used for treating asthma), and statins (used to lower blood lipid levels)
- Neuromuscular disorders (neuropathy, myopathy, motor neuron disease)
- Structural disorders (flat feet)
- Endocrine disorders (diabetes, hypothyroidism)
- Diuretics, statins, beta agonists
- Not having enough potassium, calcium, and other minerals in your blood
- Taking certain medicines, such as antipsychotics, birth control pills, diuretics, statins, and steroids

When should you worry about leg cramps?

In general, cramps are a sign that things are out of balance. If you have pain in your legs whenever you walk and the pain gets better after resting, tell your doctor. That might be a sign of claudication and the narrowing of the blood vessels in the legs could be a sign that you have narrowing of other blood vessels in your body, such as those supplying biood to the heart and brain. People with claudication are at a significantly increased risk of having a heart attack.

Leg cramps that begin after you've started a medication are also concerning. Sometimes the medications could be causing a decrease in blood flow to the legs, and sometimes (as is the case with certain cholesterol medications) they could be damaging the muscles. Technically, the pain from cholesterol medications is not a crampy pain, but generalized aches--though everyone is different.

Talk with your doctor if you have muscle cramps that keep coming back or are severe. These may be symptoms of another problem, such as restless legs syndrome. If cramps keep coming back, bother you a lot, or interfere with your sleep, your doctor may prescribe medicine that relaxes your muscles.

How can you stop a muscle cramp when it happens?

You may need to try several different ways to stop a muscle cramp before you find what works best for you. Here are some things you can try:

- Stretch and massage the muscle.
- Take a warm shower or bath to relax the muscle. A heating pad placed on the muscle can also help.
- Try using an ice or cold pack. Always keep a cloth between your skin and the ice pack.
- If your doctor prescribes medicines for muscle cramps, take them exactly as prescribed. Call your doctor if you have any problems with your medicine.
- Drink plenty of fluids. Sports drinks, such as Gatorade, will often help leg cramps
- Walk around, or jiggle your leg.
- Stretch your calf muscles. You can do this stretch while you sit or stand:
- While sitting, straighten your leg and flex your foot up toward your knee. It may help to place a rolled towel under the ball of your foot and, while holding the towel at

both ends, gently pull the towel toward you while keeping your knee straight.
- While standing about 2 ft (0.6 m) from a wall, lean forward against the wall. Keep the knee of the affected leg straight and the heel on the ground. Do this while you bend the knee of the other leg.
- If you think a medicine is causing muscle cramps. Before you take another dose, call the doctor who prescribed the medicine. The medicine may need to be stopped or changed, or the dose may need to be adjusted.
- If you are taking any medicine not prescribed by a doctor, stop taking it. Talk to your doctor if you think you need to continue taking the medicine.

How can you prevent muscle cramps?
- **Potassium and magnesium:** Even if lab tests are negative, sometimes taking potassium and magnesium can improve the symptoms. Magnesium supplements are safe (although they tend to loosen the bowels some), but potassium supplements shouldn't be taken without some supervision by your doctor.
- **Stay Hydrated:** As dehydration may increase the risk of leg cramps, drinking plenty water and other fluids which may prevent it.
- **Cut back on alcohol and caffeine:** Both of these can cause mild dehydration, which can make muscle cramps more likely.
- **Stretching Exercises:** Stretch your muscles every day, especially before and after exercise and at bedtime. These may help to reduce leg cramps occur. If you want to prevent leg cramps from occurring, do not over-exert yourself, or train for prolonged period.
- **Medications:** Quinine is an old medication that works really well. The problem is that it not only interacts with other medications, but it can itself have significant toxicity too. It's not available on the market for leg cramps, but some people find drinking a little tonic water, which contains quinine, can help. Diphenhydramine, or Benadryl taken at bedtime can help as well. When all else fails, talk to your doctor. There are some prescription medications that can help as well.
- **Footwear:** People with flat feet and other structural problems may be more susceptible to leg cramps. Proper footwear may help.
- **Food Habit:** Make sure you are eating healthy foods (especially if you are pregnant) that are rich in calcium, potassium, and magnesium.
- **Supporting your toes:** When lying down or asleep:

Lying on your back - prop up your feet with a pillow/cushion.
Lying on your front - let your feet hang over the end of the bed.
Bedding - keep blankets and sheets loose. This helps prevent your feet and toes from pointing downwards during sleep. Finally, I want to mention that leg cramps are not the same thing as Restless Legs Syndrome, which is not as painful but equally irritating.

Treatment of leg cramps

Hot Soak

Many professionals like personal trainers, coaches, and physical therapists also recommend magnesium on the outside of your body, in the form of Epsom salts. This old-school remedy can be applied to a wet cloth and pressed onto a cramped muscle, or you can add some to a hot bath for a soak. In fact, a hot soak provides relief for many, with or without Epsom salts. Dry heat may even help. If you're not near a bathtub, grab a heating pad. Start the pad on the lowest setting and only increase heat if you're not getting any soothing at all. If you have diabetes, a spinal cord injury, or another condition that might prevent you from feeling heat, a heating pad is not a good option.

Painkillers

Although painkillers can be effective in reducing pain, they take time to work. By the time they start working the leg cramp is probably gone. Therefore, they are probably not very useful. If an individual had a severe leg cramp and the muscle is tender afterwards, an OTC (over-the-counter, non prescription required) painkiller may help. Analgesic balm or a patch, both sold over-the-counter at pharmacies, can provide further relief. OTC pain relief medications that are formulated to treat menstrual cramps, such a Pamprin and Midol, can be an effective treatment for bed leg cramps.
You may also be able to prevent or alleviate muscle cramps in your legs by making simple lifestyle changes. Drinking plenty of water is essential, since cramps are often caused by dehydration. A healthy diet with plenty of fresh fruits and vegetables can also help to decrease the frequency of leg cramps.

Quinine

Some preliminary studies have found that a number of people benefit from taking quinine. There is no information yet about quinine's safety and long-term effectiveness. Some doctors may recommend quinine if the stretching has not helped, attacks are frequent, and/or the patient's quality of life is being undermined by the leg cramps. A course of treatment usually lasts from four to six weeks - the patient takes the medication just before going to bed.
Pregnant women should not take quinine. Individuals who had a previous reaction to quinine, those with previous hemolytic anemia, optic neuritis, and/or glucose 6-phosphate dehydrogenase deficiency should not take quinine.
As the quinine dosage is very low, side effects are rare. In rare cases the patient may develop a blood disorder. Some patients may develop cinchonism after long-term quinine therapy, which may cause vomiting, nausea, vision and/or hearing problems and dizziness. Patients with leg cramps on quinine therapy are usually monitored closely.

Get Moving

If you are experiencing leg cramps, the best thing that you can do is walk around," says certified personal trainer Henry Halse "This will send the signal that your muscle needs to contract and then relax. Think of it as hitting the reset button on the muscle." If all else fails, and you continue to have regular muscle cramps, Halse advises getting regular massages, which is a nice idea whether you have muscle cramps or not.
If there is no underlying cause the leg cramps will probably

get better without treatment.

Stretching

Relax the cramping muscle. Stop any activity that may have induced the cramp and lightly stretch the muscle, gently holding the stretch. You may even massage the muscle while or after you stretch, and maybe apply a heating pad as described above to the area after stretching.

Vitamins and Minerals: Potassium and magnesium for muscle cramps

Additionally, certain vitamins and minerals impact muscle function, particularly potassium and magnesium. A significant body of research has found that increasing your magnesium intake can help in reducing frequency of night time leg cramps, especially for pregnant women. Health experts recommend getting at least 300 milligrams of magnesium each day. A supplement can help you reach your daily allowance, and it can be supplemented by eating foods rich in magnesium, such as nuts, lentils, and quinoa.

Plan ahead for self-care if your leg cramps appear to be the result of strenuous exercise. Drink plenty of fluids and eat a well-balanced meal before heading out for a long run. Many athletes suggest eating a potassium-rich banana once you reach the finish line.

Conclusion

Conclusion Leg cramps is a common condition that can potentially cause disabling symptoms. Precipitating factors should be identified and treatment is directed at those with significant symptoms.

References

1. American Academy of Family Physicians. Nocturnal Leg Cramps. Accessed, 2014.
2. American Academy of Orthopaedic Surgeons. Muscle Cramp. Accessed, 2014.
3. Miller KC, Mack GW, Knight KL, Hopkins JT, Draper DO, Fields PJ, *et al*. Reflex inhibition of electrically induced muscle cramps in hypohydrated humans. Med Sci Sports Exerc. 2010; 42(5):953-961.
4. Minetto MA, Botter A. Elicitability of muscle cramps in different leg and foot muscles. Muscle Nerve. 2009; 40:535-544.
5. Minetto MA, Holobar A, Botter A, Farina D. Origin and development of muscle cramps. Exerc Sports Sci. Rev. 2013; 41(1):3-10.
6. Muscle cramp. American Academy of Orthopaedic Surgeons. http://orthoinfo.aaos.org/topic.cfm?topic=A00200. Accessed, 2015.
7. Muscle cramps. Merck Manual Professional Version. http://www.merckmanuals.com/professional/neurologic-disorders/approach-to-the-neurologic-patient/muscle-cramps. Accessed, 2015.
8. Vinetz JM, Clain J, Bounkeua V, Eastman RT, Fidock D. Chapter 49. Chemotherapy of Malaria. In: Brunton LL, Chabner BA, Knollmann BC, eds. Goodman & Gilman's The Pharmacological Basis of Therapeutics. 12th ed. New York: McGraw-Hill, 2011.
9. Winkelman JW. Nocturnal leg cramps. http://www.uptodate.com/home. Accessed, 2015.