



ELSEVIER

Contents lists available at ScienceDirect

## Scandinavian Journal of Pain

journal homepage: [www.ScandinavianJournalPain.com](http://www.ScandinavianJournalPain.com)

Observational study

## Prevalence of chronic compartment syndrome of the legs: Implications for clinical diagnostic criteria and therapy



Jan Roar Orlin<sup>a,b,\*</sup>, Ingvild Haabesland Lied<sup>b</sup>, Einar Stranden<sup>c</sup>, Henrik Underthun Irgens<sup>b</sup>, John Roger Andersen<sup>b,d</sup>

<sup>a</sup> Section of Orthopaedic Surgery, Department of Surgical Sciences, University of Bergen, Bergen, Norway

<sup>b</sup> Department of Orthopaedics, Førde Central Hospital, N-6807 Førde, Norway

<sup>c</sup> Department of Vascular Investigations, Oslo Vascular Centre, Oslo University Hospital Aker and University of Oslo, N-0424 Oslo, Norway

<sup>d</sup> Department of Health Studies, Sogn and Fjordane University College, N-6803 Førde, Norway

## HIGHLIGHTS

- Leg pain and cramps at night was reported by 24% of 2308 persons.
- The estimated population prevalence of chronic compartment syndrome was 7.6%.
- Chronic compartment syndrome occurs in persons of all ages and levels of activity.

## ARTICLE INFO

## Article history:

Received 7 August 2015

Received in revised form 13 January 2016

Accepted 18 January 2016

## Keywords:

Chronic compartment syndrome

Prevalence

Leg pain

Leg cramps

## ABSTRACT

**Introduction:** Poorly defined musculoskeletal disorders are a common clinical problem and have considerable psychosocial impact. Chronic compartment syndrome (CCS) of the legs has primarily been noted in young athletes and soldiers. The epidemiology of CCS in the general population has not been studied previously. The aim of this study was to establish the prevalence of CCS of the legs in the general population and to study its association with possible etiological factors.

**Methods:** A two-stage population survey was performed, using a questionnaire followed by clinical examination. A sample of 3000 individuals aged 25–75 years was randomly selected from the general population. A clinical examination was offered to those answering “Yes” to the following question: “Do you wake up at nights due to leg pains or cramps, causing you to walk around?” Intracompartmental pressures in the leg were measured in 13 persons randomly selected from among those diagnosed with CCS after the clinical examination.

**Results:** Of the 3000 persons contacted, 2308 (76.9%) responders were included in the study. Leg pain or cramps at night was reported by 24% of the respondents. Age, rheumatic disease, use of hormone medication, heart failure, leg oedema, and peripheral arterial disease were all significantly associated with leg pain or cramps ( $P < 0.05$ ). Among 286 persons with leg pain who underwent a subsequent clinical examination, 91 persons (31.9%) were classified as definite CCS. This suggests a CCS prevalence of 7.6% in the total sample ( $[24\% \times 31.9\%/100]$ ). In 13 of the individuals with CCS intracompartmental pressure was measured before and after performance of the step test exercise. One individual had a post-exercise pressure  $>15$  mmHg. None had post-exercise pressure past the conventional threshold of  $>30$  mmHg.

**Conclusion:** Nocturnal leg pain or cramps is a common symptom. A significant part of the general population (7.6%) may have CCS of the legs, with symptoms ranging from very mild to severe.

**Implications:** Considering the high prevalence of CCS found in this study, it is likely that a large proportion of those presenting with muscular pain actually have CCS. These persons are usually advised to increase their physical training to achieve some degree of pain relief. However, CCS patients may instead experience both increased leg pain and a proximal myalgia, which is possibly a referred pain. A demanding “gold standard” test (requiring identification of elevated intracompartmental pressures), unclear

\* Corresponding author at: Department of Orthopaedics, Central Hospital (FSS), N-6800 Førde, Norway. Tel.: +47 91191750.  
E-mail address: [ja-or@online.no](mailto:ja-or@online.no) (J.R. Orlin).

diagnostic criteria, poor long-term results from incomplete surgery, and an uncertain explanation for what may be termed referred pain seem to have delayed the acceptance of CCS as a common cause of leg pain/cramps and numbness. At the same time, the enormous costs to society and the reduced quality of life of patients require that such disease entities are correctly diagnosed as they can be effectively treated by simple, low-risk surgical procedures.

© 2016 Scandinavian Association for the Study of Pain. Published by Elsevier B.V. All rights reserved.

## 1. Introduction

Musculoskeletal disorders have a large impact on societies worldwide, yet are underdiagnosed and undertreated [1–3]. Poorly defined forms of musculoskeletal disorders, such as low back pain and some upper extremity syndromes, are common in clinical practice [4–7]. Many population-based studies of these conditions do not have clearly defined diagnostic criteria, but are based on global or whole-limb estimates of pain and reduced function [7–9]. While these studies serve to highlight the importance of musculoskeletal disorders, the diagnostic groups are not always helpful to the clinician. Therefore, there is a need to study the prevalence of precisely defined clinical entities.

Surgeons regularly come across the acute forms of compartment syndrome in fractures, crush injuries, and vascular catastrophes. The first known description of chronic anterior compartment syndrome was given by Wilson in 1912 [10]. In his diary from the Scott expedition, he describes this condition in himself on his way back from the South Pole. The first scientific report was given by Vogt in 1943 [11], and the first monograph was presented by Renemann in 1975 [12]. Typically, in the compartment syndrome, a claudication-like pain is experienced after walking or running, which means that symptoms worsen following physical activity [11,12]. The entity has mostly been found in young soldiers [12] and is clinically well described in athletes [13–16].

The nerve entrapment disorders comprise an important part of soft-tissue musculoskeletal disorders. Carpal tunnel syndrome is perhaps the best known. Its prevalence has been reported to be 3.8% in the general population [17], though the majority of cases are not medically diagnosed. However, only 70% of those with carpal tunnel syndrome had median nerve neuropathy on electrophysiological examination. In asymptomatic controls, median nerve neuropathy was found in 18% of persons, with prevalence increasing with age. It seems a paradox that tarsal tunnel syndrome, the equivalent in the foot to carpal tunnel syndrome in the hand, is frequently conceived as plantar fasciitis despite that the sensitivity in the sole of the foot is supposed to be reduced in the first and normal in the latter. Although peripheral nerves are compressed in chronic compartment syndrome (CCS)—as shown by the reduction of skin sensitivity in distribution of the nervus fibularis superficialis, the nervus fibularis profundus, and the nervus suralis—the nerve compression in CCS of the leg has traditionally not been viewed as a peripheral nerve entrapment syndrome.

No studies have investigated the prevalence of CCS in the general population. With the present study we aimed to establish the prevalence of CCS of the legs in a general population. We performed a two-stage population survey. A questionnaire to collect background information was followed by clinical examination in a subset of the sample and intracompartmental pressure measurements in a further subset. The pressure measurement results in the present study were equivalent to the results in a recent study [18], indicating that a thorough clinical examination could be preferred instead of the previous “gold standard” requiring intracompartmental pressure measurements before and after exercise [19].

## 2. Methods

### 2.1. Population and sampling

We performed this cross-sectional study in the county of Sogn and Fjordane, Norway. The study was approved both by the Regional Ethical Committee of Western Norway (REK III 050.02) and by the Central Bureau of Statistics, Norway (June 13th 2002). Financial support was provided by the University of Bergen.

The sampling frame was all individuals aged 25–75 years listed in the Central Population Register of Norway as on June 25th 2002. From the total population of 107,280, a random sample of 3000 participants, stratified by gender, was selected. A one-page postal questionnaire with pre-paid return postage was mailed to each of the selected individuals. Two reminders were sent to nonresponders.

### 2.2. Questionnaire

The questionnaire contained questions related to musculoskeletal pains in the extremities, and possible hormonal, circulatory, and rheumatic risk factors. The question “Do you wake up at nights due to leg pains or cramps, causing you to get out of bed and walk around?” (Yes/No) was used to screen respondents. Respondents who answered “Yes” to this question ( $n=551$ ) were contacted by phone and offered a thorough neuro-orthopaedic examination.

### 2.3. Clinical examination

Those who were contacted were informed that in addition to the clinical examination there was the possibility of being selected for intracompartmental pressure measurements, and consent for the same was obtained. The clinical examination, conducted by two of the co-authors (HUI and IHL), was focused on the spine, hip, lower leg, and foot, and included palpation of lower extremity arteries and a thorough neurological examination [18]. Our diagnostic criteria required the presence of tenderness upon palpation of the compartments, along with decreased sensitivity in the distribution of one or both rami of the fibular nerve and/or the tibial nerve.

The participants were also asked to complete a questionnaire seeking detailed description of their leg pain. The provocative exercise, a step test exercise, was performed as follows: participants were asked to perform a “walking on the spot” motion, by quickly alternating between standing on the heels and on the toes. Skin sensitivity over the dermatomes in the lower extremities was tested before and after the exercise.

### 2.4. Diagnostic criteria

The participants were classified into three groups: definite compartment syndrome, possible compartment syndrome, and others (not compartment syndrome). Classification was based on the following criteria:

Download English Version:

<https://daneshyari.com/en/article/8623395>

Download Persian Version:

<https://daneshyari.com/article/8623395>

[Daneshyari.com](https://daneshyari.com)