

Association of Venous Leg Ulcers With Ankle Range of Motion in People Attending Chiropractic Mobile Clinics in the Dominican Republic

Patricia A. Tavares, DC, FCCOS(C),^a Victoria Landsman, MA, PhD,^{b,c} Nathalie Gomez, MD,^d Ariel Ferreiras, MD,^e and Ramon A. Lopez, MD^{d,f}

ABSTRACT

Objective: The goal of the study was to determine if there was an association between chronic venous disorders (CVDs), particularly venous leg ulcers, and ankle range of motion (ROM) in the Dominican Republic.

Methods: Chronic venous disorders were classified using the clinical manifestations portion (C) of the CEAP (clinical manifestations, etiology, anatomy, pathophysiology) method. The legs of participants attending mobile chiropractic clinics in rural, low-income areas in the Dominican Republic were assessed for clinical signs of CVD and venous ulcers. Ankle ROM was then measured, and photographs of the legs were taken. The 6 clinical stages of CVD were divided into 3 groups: normal legs (normal), no ulcer CVD, and ulcer CVD (healed and active). Multiple linear regression of ankle ROM against CVD grouping was used to test the association.

Results: Eight of the 837 patients for whom CVD classification was obtained had venous ulcers (healed or active) on at least 1 leg. About 30% relative reduction in ROM (ankle dorsiflexion plus plantar flexion) was observed between the ulcer group and the normal group. Regression analysis comparing legs with ulcers to healthy legs (normal), adjusted for age, gender, indicator for obesity, and previous leg trauma, revealed a significant decrease of approximately 14° ($P = .0007$) in ankle ROM. Age was also found to be strongly significant in the regression analysis, 1 year of aging was associated with a decrease of 0.16° ($P < .0001$) in ankle ROM (approximately 1.6° in 10 years).

Conclusion: A significant decrease was observed in ankle ROM for participants with active and healed leg venous ulcers compared with those without ulcers. There appeared to be an association between venous leg ulcers and ankle ROM in this sample. (J Chiropr Med 2017;xx:1-8)

Key Indexing Terms: *Venous Ulcers; Ankle; Range of Motion; Prevalence; Venous Insufficiency; Chiropractic*

INTRODUCTION

Venous disorders manifest themselves in a range of conditions from telangiectasis, valve incompetence, and varicose veins to later stages, referred to as chronic venous insufficiency (CVI), specifically involving venous hypertension causing pain, swelling, edema, skin changes, and ultimately venous ulcers.¹ CVI accounts for at least 80% of all chronic leg ulcers.² These conditions can lead to major disability and social impairment, are associated with chronicity and relapse³ and, therefore, have a huge impact on the health care system.

There is evidence that venous hypertension and CVI involve 3 major factors: vein patency, competence of valves, and proper calf muscle pump function.^{4,5} The calf muscles must contract and relax to move the ankle through its full range of motion (ROM), and in a leg with a competent

^a Division of Clinical Education, Canadian Memorial Chiropractic College, North York, Ontario, Canada.

^b Institute for Work and Health, Toronto, Ontario, Canada.

^c Division of Graduate Education and Research, Canadian Memorial Chiropractic College, North York, Ontario, Canada.

^d Private Practice, Santo Domingo, Dominican Republic.

^e Private Practice, Moca, Espaillat, Dominican Republic.

^f Fundación Sol Naciente, Santo Domingo, Dominican Republic.

Corresponding author: Patricia A. Tavares, DC, FCCOS(C), 46 Nottingham Dr, Etobicoke, ON M9A2W5, Canada. Tel.: +1 416 294 7743. (e-mail: ptavares@cmcc.ca).

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valvular system and patent veins, during plantar flexion specifically, to return blood to the heart from the venous plexus within the calf muscles.⁵ An intact system allows for blood to be propelled toward the heart. A failure of the system creates a deficit in the physiological emptying of the veins and venous hypertension that can then lead to venous ulceration.⁵

In low- and middle-income countries, where health care is not always adequate, venous disorders may not be treated early enough, and wound care may be less than adequate for subsequent ulcers that develop, as was observed by the lead study doctor. Moreover, there is evidence that poor healing rates have been associated with inadequate compression therapy.⁶ In addition, some individuals may not have access to or be able to afford drugs, such as pentoxifylline^{7,8} and iloprost,⁸ used to treat ulcers in high-income communities. Previous studies have examined venous insufficiency and venous ulceration in relationship to ankle ROM in populations with high socioeconomic status.^{9,10}

The primary objective of this study was to determine whether there is an association between chronic venous disorders (CVDs), particularly venous leg ulcers, and ankle ROM in a low-income, rural population of patients. Secondly, we were interested in estimating the prevalence of venous ulcers in this population.

METHODS

Design

This study is a cross-sectional observational multidisciplinary study that involved a chiropractic doctor specializing in joints and their ROM, along with medical doctors trained in vascular disease. Ethical approval for the study was obtained from the Office of Research Administration of the Canadian Memorial Chiropractic College, under Certificate No. 1303X05. In the Dominican Republic, ethical approval is not required for studies done on human subjects in which there is no intervention. Regardless, the study proposal was translated into Spanish and sent to CONABIOS (Consejo Nacional de Bioética en Salud) to apprise the national ethics board of the study.

Setting

Each year a group of 2 clinicians (1 being the lead study doctor) and a number of interns from the Canadian Memorial Chiropractic College travel to the Dominican Republic to provide chiropractic care for musculoskeletal conditions to people across the country. This service is provided free of charge and attracts individuals who cannot afford care for their conditions within their own country. A local medical doctor takes the chiropractic team to communities that he and others have determined to be in greatest need. These communities are located in rural villages or impoverished areas within larger towns and cities. Some communities are underserved with respect to the most basic public health care because there may be no public hospital nearby, and any private hospital is too expensive for those without access to insurance. Patients will

frequently wait the entire day to be seen, having arrived early in the morning after hearing about the outreach on the radio or seeing posters throughout their community.

People attending a Canadian Memorial Chiropractic College outreach clinic were asked to participate in this study. The study sample was made up of Spanish-speaking inhabitants of various towns across the Dominican Republic who chose to attend the free mobile chiropractic clinics of the outreach, held within local community buildings such as churches, community centers, and outdoor covered areas.

Variables

Clinical manifestations (the “C” in the CEAP [clinical manifestations, etiology, anatomy, pathophysiology] classification system) of venous disorders were defined as an independent variable for this study. Total ankle ROM was a dependent variable. Additional variables such as age, gender, body mass index (BMI), and previous (nonrecent) leg trauma were added as risk factors. The measurement methods used to collect the data on these variables are described in detail under Data Collection.

CEAP Classification System for CVDs

In this study, classification of the stages of CVDs was based on the CEAP classification system. This system was created in 1994 by the American Venous Forum and redefined in 2004.¹¹ Most published literature dealing with CVDs uses this classification system.¹¹

As the clinical setting of this study was mobile such that venues were not known in advance by the study team, and electricity might be randomly unavailable for hours at a time during the day, the use of objective diagnostic technology to evaluate involved venous anatomy and pathophysiology dysfunction to confirm venous origin would not have been feasible. Therefore, only the clinical manifestations portion (C) of the CEAP classification system was used, similar to another study by Belczak et al.¹⁰ The C of CEAP involves basic visual inspection and palpation, similar to that which could be done in a physician’s or chiropractor’s office. It does not use diagnostic equipment as would be used for the EAP portions of the classification system.

According to Etufugh and Philips,¹² venous ulcers can be diagnosed mainly clinically, and most ulcers are of venous origin and are an end stage of CVI. Most recently, Agarwal et al¹³ investigated the prevalence of varicose veins, skin trophic changes, and venous symptoms in a northern Indian population. As in this study of a Dominican population, the authors reported that they used observation and patient questions only, rather than diagnostic equipment, to perform the study.

Data Collection

The collection of data can be described as a 4-phase process that involves collaboration between medical

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