

An app to help assess the severity of symptoms in chronic fatigue syndrome

July 1 2021



The technology uses a chest strap connected to a mobile app that measures heart rate variability. Credit: UAB/UPC/Vall d'Hebron

Chronic fatigue syndrome / myalgic encephalomyelitis (CFS/ME) is a disabling disease, in which people have great difficulties in carrying out

their daily activities. Despite its high prevalence, there are still no effective tools for its diagnosis, monitoring and treatment. To better understand and promote follow-up, as well as stratify fatigue in these patients, Vall d'Hebron, the Universitat Autònoma de Barcelona (UAB) and the Universitat Politècnica de Catalunya - BarcelonaTech (UPC) have developed a mobile application that could be useful in the assessment of the severity of fatigue in this syndrome, especially in women. The results of the study in which this technology has been tested have been published in the journal *Sensors*.

The technology developed by the UAB and UPC researchers consists of a chest strap with a sensor capable of measuring certain cardiac hemodynamic variables, connected via Bluetooth to a mobile app. The [mobile application](#) allows you to record and monitor heart rate variability and share the analyzed results with the medical staff who supervise patients.

Specifically, this study analyzed the relationship between heart rate variability and severity of symptoms among women and men with CFS/ME. This parameter is closely related to heart rate, that is, the number of beats per minute of the heart. However, the time that passes between two consecutive beats is not always exactly the same, but small differences that fall within normality can be detected: this is what is known as [heart rate variability](#) (HRV).

In previous studies published in the *Journal of Translational Medicine*, HRV had already been related to the assessment of the severity of fatigue in women with CFS/ME. "Specifically, we had observed that this variability was lower in patients with CFS/ME, especially in the most disabling cases," explains Dr. Jesús Castro, coordinator of the laboratory in Chronic Fatigue Syndrome / Myalgic Encephalomyelitis of the Rheumatology group of the Vall d'Hebron Research Institute (VHIR). A priori, it is considered positive to have a high variability, as it is an

indicator of the proper functioning of the autonomic nervous system. "In this work we wanted to verify the relationship between HRV and the syndrome in both women and men with CFS/ME compared to healthy controls and its usefulness for monitoring patients," adds Dr. Castro.

In line with previous studies, it was found that HRV measurement with mobile app technology could predict the severity of disabling fatigue in patients with chronic fatigue syndrome/myalgic encephalomyelitis. This was especially observed in the case of women, but this relationship was not so clear in the case of men. "We demonstrated that the use of the app would be especially useful for the monitoring of women suffering from this syndrome, which clearly have a lower variability of heart rate compared to healthy women," says Dr. Rosa M Escorihuela, from the Department of Psychiatry and Legal Medicine of the UAB. Thus, HRV would be a good predictor marker of the severity of fatigue during the clinical course of the disease.

The study was carried out with 77 patients with this CFS/ME (32 men and 45 women) and their results were compared with those of a control group. The HRV evaluation was carried out in 3 sessions of 5 minutes, separated between one and three weeks and under controlled conditions.

This study has been carried out, in part, thanks to the R&D project PID2019-107473RB-C21, coordinated by researchers from the UAB and the UPC, and funded by the Ministry of Science and Innovation.

An improved non-invasive technology

Dr. Juan Ramos Castro, from the Electronic and Biomedical Instrumentation group and the Department of Electronic Engineering at the UPC, comments that "the experience of the UAB and UPC research groups has made it possible to correct the most important limitations presented by this technology such as errors in the measurement of

cardiac variability produced by incorrect placement of the chest strap and / or the movement and breathing of the patient during recording, and obtaining the records under controlled conditions to reduce the influence of other external factors. The results of the analysis are stored in a single and secure server and can be consulted through a specific platform." Dr. Lluís Capdevila, researcher at the Department of Basic, Evolutionary and Educational Psychology and the Sports Research Institute of the UAB, adds that "it is a non-invasive technology that is easy to use by patients or users, through your mobile device. In this way, they can perform self-assessments in ecological situations and could be monitored in real time."

As Dr. Capdevila comments, "the same system originated and has been used successfully for real-time monitoring and follow-up of the relationship between physical effort and recovery, both in athletes and in the general population. For example, sports clubs such as Futbol Club Barcelona (women's basketball and soccer sections) or New York City FC have used this system, and national teams such as the Spanish Basketball Federation, the Spanish Field Hockey Federation (men's and female), or the Spanish Federation of Mountain Sports and Climbing."

Vall d'Hebron, member of the European Network on Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

In Catalonia it is estimated that there are currently between 350,000 and 500,000 people affected by chronic fatigue syndrome / myalgic encephalomyelitis, and 2 out of 3 affected people are women.

Worldwide, a prevalence of between 17 and 25 million people with this affection is estimated. In addition, these numbers are predicted to double by 2030 due to persistent COVID-19, a condition in which patients have similar symptoms: this is known as postviral chronic

fatigue syndrome, which has been previously described in other coronaviruses (SARS-CoV-1 and MERS) for other viruses such as Ebola, Epstein-Barr and Cytomegalovirus.

Severe fatigue is the main symptom of CFS/ME, in addition to problems with immediate memory and speed of information processing and concentration, intolerance to physical / mental exercise, pain and dizziness. This syndrome can be very disabling, but even so, there are currently no diagnostic biomarkers or specific therapeutic options, so it is important that experts in the field work in a coordinated way to improve the care and management of these patients.

In this sense, Drs. José Alegre and Jesús Castro, both from Vall d'Hebron, are members for Spain in the European Network on Chronic Fatigue Syndrome / Myalgic Encephalomyelitis (EUROMENE), which includes 55 professionals from 22 European countries. A consensus document on therapeutic and diagnostic approaches for this syndrome was recently published in the journal *Medicina*.

This document brings together the diagnostic criteria used in the participating countries as well as the experience of professionals in the management and treatment of patients, taking into account both pharmacological and non-pharmacological therapies. In addition, experts present recommendations, from Europe and internationally, for the care of these patients. "It is necessary to have a health system that takes into account patients with chronic [fatigue](#) syndrome / myalgic encephalomyelitis, a pathology that has a great socioeconomic impact," says Dr. José Alegre, from the Experience Unit in Syndromes of Central Awareness of the Rheumatology Service of the Vall d'Hebron University Hospital. Experts consider that it would be necessary to have between 2 and 4 specialist doctors for every million inhabitants with the support of a multidisciplinary team, such as nurses, physiotherapists, rehabilitators, occupational therapists, psychologists, nutritionists, social workers, etc.

It should be noted that not all countries have the same services for the care of patients with CFS/ME. In this sense, Catalonia is leading in terms of the care of these patients, since in our territory there are various units formed in this area to diagnose and treat this [syndrome](#). Specifically, Vall d'Hebron has an Experience Unit in Central Sensitization Syndromes, within the Rheumatology Service, which works on both [chronic fatigue syndrome](#) / [myalgic encephalomyelitis](#) and fibromyalgia.

More information: Lluís Capdevila et al, Analysis of Gender Differences in HRV of Patients with Myalgic Encephalomyelitis/Chronic Fatigue Syndrome Using Mobile-Health Technology, *Sensors* (2021). [DOI: 10.3390/s21113746](https://doi.org/10.3390/s21113746)

Provided by Autonomous University of Barcelona

Citation: An app to help assess the severity of symptoms in chronic fatigue syndrome (2021, July 1) retrieved 25 April 2024 from <https://medicalxpress.com/news/2021-07-app-severity-symptoms-chronic-fatigue.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.