4. García-Pavía P, Rapezzi C, Adler Y, et al. Diagnosis and treatment of cardiac amyloidosis: a position statement of the ESC Working Group on Myocardial and Pericardial Diseases. *Eur Heart J.* 2021;42:1554–1568.
5. Schafer EB, Tushak Z, Trankle CR, et al. False-Positive 99mTechnetium-Pyrophosphate Scintigraphy in Two Patients With Hypertrophic Cardiomyopathy. *Circ Heart Fail.* 2021;14:e007558.

https://doi.org/10.1016/j.recesp.2023.12.009

Circadian rhythm of heart rate in patients with heart failure

Patrón circadiano de la frecuencia cardiaca en pacientes con insuficiencia cardiaca

To the Editor,

After reading with interest the study published in *Revista Española de Cardiología* by de Juan Bagudá et al.,[1] we would like to make some observations that may be useful for readers.

Blood pressure (BP) and heart rate (HR) are 2 physiological variables showing a circadian rhythm with diurnal peaks and nocturnal valleys. These vital signs are crucial for optimizing pharmacological therapy in patients with heart failure (HF). However, in clinical practice, a single daily measurement is obtained from patients and no consideration is given to the likely circadian behavior of these variables. This may limit the value of the prescribed drugs that could be mitigated by using ambulatory blood pressure monitoring (ABPM). Studies have compared ABPM with in-office measurement to better stratify the cardiovascular risk, particularly when ABPM is used to assess systolic BP during sleep. Not only do patients with BP with a blunted sleep decrease show increased cardiovascular risk, but this risk is also elevated in patients with a HR with a blunted sleep decrease.[2,3]

In a study published by de Juan Bagudá et al.,[1] ABPM was conducted in patients with HF with a full spectrum of left ventricular ejection fraction (LVEF) values. The objective was to determine the prevalence and factors associated with the different phenotypes of diurnal hypertension and to elucidate the nocturnal BP patterns in patients with HF. The study selected 266 patients who did not show clinical decompensation and who were receiving optimal medical therapy for BP measurement in the office and via 24-hour ABPM. The authors classified the nocturnal patterns as dipper, extreme dipper, nondipper, and riser (reverse dipper). The patients' mean age was 71.8 ± 12 years; 177 (66.5%) were men and 210 (79%) had a previous diagnosis of hypertension. The most frequent nocturnal pattern was nondipper (42.9%), which was associated with worse functional class and a higher proportion of patients with HF and reduced LVEF. Notably, no differences were seen in nocturnal patterns according to LVEF. The authors highlighted 2 crucial facts. First, they detected a high prevalence of abnormal nocturnal BP patterns vs the general population or those with hypertension. According to these data, just 31% of patients with HF had a dipper pattern compared with 70% of the healthy population and those with hypertension. Second, patients with a nondipper pattern represented 42.9% of the sample, which is possibly related to the higher levels of catecholamines and circulating blood volume in the recumbent position.

The nocturnal nondipper pattern of BP and HR is little studied in HF. Some data suggest that HR with a blunted nocturnal drop may be associated with higher all-cause mortality vs BP with no nocturnal decrease.[3] Recently, Ogoyama et al.[4] demonstrated that patients with a nocturnal nondipper HR pattern who have elevated natriuretic peptide levels exhibit a higher risk of cardiovascular events. The study by de Juan Bagudá et al.[1] did not examine the importance of the HR-related parameters measured by ABPM in patients with stable HF. In addition, the authors found no differences in the baseline natriuretic peptide concentrations of their population according to BP phenotype. It would be interesting to know if the same happens with HR.

Accordingly, the circadian analysis of HR in patients with HF could help to facilitate the prognostic determination of patients with stable HF. Given that the nondipper pattern of BP is present in many patients with HF, similar findings to those of HR might be obtained. HR measurement does not require additional actions during ABPM, is easily obtained, and could provide the circadian pattern of HR in patients with HF for an optimal therapeutic approach and better discrimination of cardiovascular risk.

SEE RELATED CONTENT:
https://doi.org/10.1016/j.rec.2023.02.018

FUNDING

No funding received.

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the drafting of this letter.

CONFLICTS OF INTEREST

None.

Nestor Báez-Ferrer[a] and Alberto Domínguez-Rodríguez[a,b,c,*]

[a]*Departamento de Cardiología, Hospital Universitario de Canarias, La Laguna, Santa Cruz de Tenerife, Spain*
[b]*Facultad de Ciencias de la Salud, Universidad Europea de Canarias, La Orotava, Santa Cruz de Tenerife, Spain*
[c]*Centro de Investigación Biomédica en Red de Enfermedades Cardiovasculares (CIBERCV), Spain*

[*] Corresponding author.
E-mail address: adrvdg@hotmail.com (A. Domínguez-Rodríguez).

Available online 12 January 2024

REFERENCES

1. de Juan Bagudá J, Rodríguez Chaverri A, Caravaca Pérez P, et al. Twenty-four hour ambulatory blood pressure monitoring in patients with stable heart failure. Prevalence and associated factors. *Rev Esp Cardiol.* 2023;76:852–861.
2. Hermida RC, Ayala DE, Mojón A, et al. Cardiovascular disease risk stratification by the Framigham score is markedly improved by ambulatory compared with office blood pressure. *Rev Esp Cardiol.* 2021;74:953–961.
3. Baka T, Domínguez-Rodríguez A, Simko F. Consideration of nondipping heart rate during ambulatory blood pressure monitoring to improve cardiovascular risk assessment. *Rev Esp Cardiol.* 2022;75:355–356.

4. Ogoyama Y, Kabutoya T, Hoshide S, Kario K. The Combination of Non-dipper Heart Rate and High Brain Natriuretic Peptide Predicts Cardiovascular Events: The Japan Morning Surge-Home Blood Pressure (J-HOP) Study. *Am J Hypertens.* 2020;33:430–438.

https://doi.org/10.1016/j.recesp.2023.11.017

Circadian pattern of heart rate in patients with heart failure. Response

Patrón circadiano de la frecuencia cardiaca en pacientes con insuficiencia cardiaca. Respuesta

To the Editor,

We thank Báez-Ferrer and Domínguez-Rodríguez for their comments on our article.[1] A number of studies have used ambulatory blood pressure monitoring (ABPM) to evaluate nocturnal heart rate. In general, the higher the rate and the smaller its decrease compared with daytime values, the greater the risk of cardiovascular events. Most studies that have evaluated heart rate using ABPM measurements have been conducted in normotensive or hypertensive patients without established cardiovascular disease.[2] A number of studies, however, have found a link between adverse cardiovascular events and elevated nocturnal heart rate based on data from implantable cardioverter-defibrillators.[3,4] The aim of our study was to determine the prevalence of diurnal blood pressure patterns (controlled, uncontrolled, white coat, and masked hypertension) and nocturnal dipper, nondipper, and reverse dipper patterns in patients with different heart failure phenotypes (heart failure with reduced, slightly reduced, or preserved left ventricular ejection fraction). We decided not to include a heart rate analysis to avoid overloading the reader with information. In this regard, however, 2 key aspects of the population studied should be taken into account when interpreting our results: *a*) just 57.9% of the patients were in sinus rhythm, and *b*) 87.2% were taking beta-blockers and 9% were taking ivabradine.

We appreciate the practicalities of assessing heart rate in APBM studies, but believe that there are other, more convenient methods, such as Holter monitors, subcutaneous ECG monitors, and cardiac pacing devices. Notwithstanding, considering the scarcity of data on nocturnal heart rate variability in patients with heart failure, any new research that could help improve risk estimation and guide treatment adjustments will be very welcome.

FUNDING

No funding was received.

USE OF ARTIFICIAL INTELLIGENCE

Artificial intelligence was not used to produce this article.

AUTHORS' CONTRIBUTIONS

All the authors contributed equally to this document.

CONFLICTS OF INTEREST

The authors declare that they do not have any conflicts of interest in relation to this article.

Javier De Juan Bagudá,[a,b,c,*] Pedro Caravaca-Pérez,[d] Fernando Arribas Ynsaurriaga,[a,b,e] and Juan F. Delgado Jiménez[a,b,e]

[a]*Servicio de Cardiología, Hospital Universitario 12 de Octubre, Instituto de Investigación Sanitaria Hospital 12 de Octubre (imas12), Madrid, Spain*
[b]*Centro de Investigación Biomédica en Red de Enfermedades Cardiovasculares (CIBERCV), Spain*
[c]*Departamento de Medicina, Facultad de Medicina, Salud y Deporte, Universidad Europea de Madrid, Madrid, Spain*
[d]*Servicio de Cardiología, Hospital Clínic Universitari, Barcelona, Spain*
[e]*Facultad de Medicina, Universidad Complutense de Madrid, Madrid, Spain*

[*] Corresponding author.
E-mail address: javierdejuan166@hotmail.com (J. De Juan Bagudá).

Available online 16 March 2024

REFERENCES

1. De Juan Bagudá J, Rodríguez Chaverri A, Caravaca Pérez P, et al. Twenty-four hour ambulatory blood pressure monitoring in patients with stable heart failure. Prevalence and associated factors. *Rev Esp Cardiol.* 2023;76:852–861.
2. Hermida RC, Crespo JJ, Otero A, et al. Asleep blood pressure: significant prognostic marker of vascular risk and therapeutic target for prevention. *Eur Heart J.* 2018;39:4159–4171.
3. Garcia R, Warming PE, Narayanan K, et al. Dynamic changes in nocturnal heart rate predict short-term cardiovascular events in patients using the wearable cardioverter-defibrillator: from the WEARIT-France cohort study. *Europace.* 2023 https://doi.org/10.1093/europace/euad062.
4. D'Onofrio A, Marini M, Rovaris G, et al. Prognostic significance of remotely monitored nocturnal heart rate in heart failure patients with reduced ejection fraction. *Heart Rhythm.* 2023;20:233–240.

https://doi.org/10.1016/j.recesp.2023.12.019

SEE RELATED CONTENT:
https://doi.org/10.1016/j.rec.2023.11.017