

THE RECENT USE OF HEART RATE VARIABILITY FOR RESEARCH

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Heart rate variability (HRV) is a non-invasive method that analysis cardiac autonomic regulation^{1,2}. The use of this method was previously validated in physiological experiments^{3,4}, which performed pharmacological stimulation of the sympathetic and parasympathetic nervous systems and made relationship with the traditional time and frequency domain analysis of HRV, confirming the use of this method to evaluate cardiac autonomic regulation. Moreover, HRV has also been used to predict mortality after cardiacevents⁵ and it has been considered as a marker of stress⁶.

An easy and economic access to HRV analysis through heart rate monitors, which are well recognized in the literature^{7, 8} helped researches to use this method to evaluate cardiac autonomic regulation. In the last 15 years this method has received great attention. After a careful search on Pubmed/Medline, the term "heart rate variability" was present in 1,013 manuscripts in 2014, in 2013 this number was 972 and in 2012 it was 729⁹. We realize that each year the number of groups that use HRV in their studies has considerably increased.

In this context, I raise points that are worth to mention. Firstly, advantages include additional information for cardiac autonomic responses in pathological situations¹⁰⁻¹², during physiological stress^{13,14}, association with social function¹⁵ for instance. It is currently clear that autonomic nervous system is related to several conditions.

Nevertheless, before starting to study HRV analysis, relevant details of this method should be discussed in order to avoid misunderstanding of results. For example, HRV consider the interval between consecutive heart beats², reflecting parasympathetic and sympathetic cardiac autonomic modulation, it does not directly measures sympathetic or parasympathetic activity. There are different methods that quantify it, i.e. plasma levels

of norepinephrine and epinephrine¹⁶, renal sympathetic nerve activity¹⁷ and parasympathetic nerve activity¹⁸.

In 1996, the Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology published methodological considerations regarding traditional time and frequency domain analysis of HRV². This seminal publication aimed to permit appropriate comparisons. Since then, new methods related to the chaos theory applied on organic systems and heart rate dynamics has been investigated¹⁹.

This year the European Society of Cardiology together with the European Heart Rhythm Association and co-endorsed by the Asia Pacific Heart Rhythm Society reviewed the literature abovementioned in 1996¹⁹. They addressed the use of non-conventional methods (nonlinear) which had been used in a significant number of patients (more than 200 cases) finding only 21 studies from the thousands already published. They described in details nonlinear methods as Detrended fluctuation analysis with α_1 and α_2 components, Hurst Exponent, Correlation Dimension and Largest Lyapunov Exponent.

In this sense, I take this opportunity to reinforce attention of researchers around the world to keep being extremely careful when using HRV for their analysis. Important factors are necessary to consider, such as sample frequency to use when digitalizing the electrocardiogram, filtering records, caution with stationary data and whether to interpolate an electrocardiogram to enhance accuracy of R wave. Therefore, investigators around the world will keep helping us to discover the unlimited mysteries of science.

The current number of the Journal of Human Growth and Development is composed by a total of 15 original manuscripts. The journal keeps

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contributing to Scopus and 8 more database, including Lilacs and the Directory of Open Access Journals.

An elegant study performed by Alves²⁰ analyzed laboratory variables of cerebrospinal fluid in subjects with enterovirus meningitis. As a main finding, it was reported that cerebrospinal fluid protein and glucose levels change according to age.

In this line, Formiga and coworkers²¹ evaluated the global and motor development of preterm infants, with respect to the performance in the chronological age and corrected age for prematurity.

The authors observed that in the first year of age risks and problems can be overestimated.

The importance of the first year of life is supported by Ferreira et al²², which performed a prospective cohort to describe the profile of growth in normal infants during the first year of life. The authors reported that children with normal birth weight showed appropriate growth, based on the WHO 2006, during the first year of life, and that a high birth weight tends to result in more increased growth rate during the first year of life.

In this context, the editorial board wish you an excellent read.

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