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EDITORIAL

HEART RATE VARIABILITY AS A FUNCTIONAL MARKER OF DEVELOPMENT

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The normal growth includes maturation and an enlargement of the body size. The pace and speed of these changes vary from person to person and are conditioned by hereditary and environmental factors[1]. Nowadays, physical maturity beginsearlier than a century ago, probably due to better nutrition, general health and living conditions.

However, development is the progressive ability of human beings to perform increasingly complex functions[2]. This process is the result of the interaction between biological factors specific to the species and the individual and cultural factors, inherent in thesocial environment where that individual is inserted.

The maturation of the central nervous system and consequent reflex integrity, the performance on cognitive aspects, intelligence, adaptation, inter-relationship with the environment and constitution of the psyche are aspects which confirm that development goes beyond a biological determination and needs anapproach of multiple concepts, therefore, multidisciplinary[3].

Thus, the acquisition of new skills is directly related not only to the age of the child, but also to interactions experienced with other human beings in their social group, characterizing the development as a factor of two-way relationships where the child influences and is influenced by those that surround it.

The autonomic nervous system (ANS) plays a fundamental role in growth and development, providing conditions for individuals to be prepared to overcome the inherent difficulties in adapting to age. In this line, the ANS corroborates important role in regulating physiological processes of the human body both in normal and pathological conditions[4].

It is thus necessary the development of the simple and reliable technique to better assess these developmental processes from the portrait of biological variable[4]. Among the techniques used in its evaluation, the heart rate variability (HRV) has emerged as a simple and noninvasive measure of autonomic impulses, representing one of the most promising quantitative markers of autonomic balance. HRV describes the fluctuations in the interval between consecutive heartbeats (RR intervals), as well as oscillations between consecutive instantaneous heart rates[4.5], and is therefore dependent on the activity of the sympathetic and parasympathetic nervous system[6.7]. This can be evaluated either by linear analysis, time domain and frequency domain, and through nonlinear analysisof chaos-based domain[4.5].

This is a measure that can be used to assess the ANS modulation under physiological conditions, such as in situations of wakefulness and sleep, different body positions, physical training, and also in pathological conditions. A high variability in heart rate is a sign of good adaptation, featuring a healthy individual, with efficient autonomic mechanisms, while low variability is often an indicator of abnormal

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and insufficient adaptation of ANS, implying the presence of physiological malfunction in the individual.

Several studies have analyzed the behavior of ANS in cases of obesity and used for this analysis, HRV. Several articles have addressed this issue, including making association with physiological and pharmacological variables[8].

The potential use of HRV induced by amusical auditory stimulus, as a clinical indicator to assess and identify health problems involving the autonomic changes, is promising[9]. This technique can be used as a tool for early diagnosis and prognosis of autonomic dysfunction in individuals exposed to intense sounds for long periods [4-11].

In the study by Alveset al.[5]there was a decreased parasympathetic activity in the evaluation of HRV during cardiovascular autonomic tests and functional capacity of subjects with diabetes mellitus types 1 and 2[5]. In obese children there were changes in ANS, which according to the authors[7], demonstrate the need for early care for this population to avoid future complications in growth and development[7].

Moreover, the increase of overweight / obesity has been a concern in recent years due to the growing body of knowledge that links poor diet and sedentary lifestylesto the weight gain and body fat in children[11] and, moreover, implications of short and long term for health, including changes in cardiac autonomic function[12]. There is suggestion of reduced HRV in overweight / obesity[13].

Heart rate variability is an important tool for evaluating heart health. Reduced HRV is associated with increased morbidity and mortality from cardiovascular disease[14],congenital heart disease[15], diabetic neuropathy[16] and other diseases and physiological processes. There is general lack of literature on heart rate variability in apparently healthy children, especially in relation to their weight status. Understanding how HRV is associated with overweight / obesity may be essential in planning interventions targeting prevention efforts to improve cardiovascular health and reduce overweight and obesity in children.

Changes in patterns of HRV provides a sensitive and early indicator of health impairments[4]. High HRV is a sign of good adaptation, featuring a healthy individual with efficient autonomic mechanisms[4]. Conversely, low HRV is often an indicator of abnormal and inadequate adaptation of ANS, which may indicate the presence of physiological malfunction in the patient, requiring further investigation to find a specific diagnosis[10].

HRV is an important tool for assessing the ANS, which has an important role in maintaining homeostasis. Its use is diverse and it stands as a predictor of the internal functions of the body, both in normal and pathological conditions, characterizing current instrument evaluation and identification of problems in the health, growth and human development. Here's an important line of research, focusing on the health of children and adolescents.

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