EFEITOS DA DEPRESSÃO NA MODULAÇÃO AUTONÔMICA CARDÍACA

Yasmim Mota de Moraes¹
Cicero Jonas Rodrigues Benjamin²
Luana Bezerra Mangueira³
José Ramon Alcântara da Silva⁴
Guilherme Correia Alcantara⁵
Eli Carlos Martiniano⁶
Érico Luiz Damasceno Barros⁷
Vitor Engrácia Valenti⁸
Milana Drumond Ramos Santana⁹

RESUMO

Características psicológicas como a depressão podem ser fatores de risco para doenças cardiovasculares. Devido à influência que o sistema nervoso autônomo (SNA) exerce sobre a frequência cardíaca, a Variabilidade da Frequência Cardíaca (VFC) tem sido amplamente utilizada para análise do controle autônomo sobre a frequência cardíaca. Objetivou-se verificar a influência da depressão na VFC. Trata-se de uma revisão integrativa, cuja busca foi delineada nas bases de dados Literatura Latino-Americana e do Caribe (LILACS) e Medical Literature Analysis and Retrieval System On-line (MedLine) via Biblioteca Virtual de Saúde (BVS) que tivessem sido publicados nos últimos 5 anos (2012-2017), durante os meses de setembro a novembro do ano de 2017. Neste processo, utilizou-se o operador booleano AND, na associação dos seguintes descritores: Depressão; Frequência Cardíaca; Sistema Nervoso Autônomo. Identifica-se o aumento da modulação simpática em indivíduos depressivos apresentando influência negativa sobre os índices de análise da VFC.

PALAVRAS CHAVE: Depressão, Frequência Cardíaca, Sistema Nervoso Autônomo.

ABSTRACT

Psychological characteristics such as depression may be risk factors for cardiovascular diseases. Due to the influence of the Autonomic Nervous System (ANS) on heart rate, Heart Rate Variability (HRV) has been widely used for the analysis of autonomic control over heart rate. The aim of this study was to analyze the influence of depression on HRV. This is an integrative review. The search was delineated in the databases of Latin American and Caribbean Literature (LILACS) and Medical Literature Analysis and Retrieval System On-line (MedLine) via the Virtual Health Library (VHL) those have been published in the last 5 years (2012-2017), during the months of September to November 2017. In this process, the Boolean operator AND was used in the association of the following descriptors: Depression; Heart Rate; Autonomic Nervous System. It identifies the increase in sympathetic modulation in depressive individuals showing negative influence on the contents of the HRV analysis.

KEY WORDS: Depression, Heart Rate, Autonomic Nervous System.

¹ Graduanda em Nutrição, Faculdade de Juazeiro do Norte, Ceará, Brasil. Autor para correspondência: yasmimota@gmail.com
² Graduando em Nutrição, Universidade de Pernambuco, Campus Petrolina, Pernambuco, Brasil.
³ Graduando em Nutrição, Faculdade de Juazeiro do Norte, Ceará, Brasil.
⁴ Tecnólogo em Alimentos, Instituto Centro de Ensino Tecnológico CENTEC - FATEC Cariri, Juazeiro do Norte, Ceará, Brasil.
⁵ Graduando em Nutrição, Faculdade de Juazeiro do Norte, Ceará, Brasil.
⁶ Mestrando em Enfermagem pela Universidade Regional do Cariri (URCA), Crato, Ceará, Brasil.
⁷ Mestrado em Odontologia, CEUMA, Faculdade de Juazeiro do Norte, Ceará, Brasil.
⁸ Pós-Doutor em Fisiopatologia, Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brasil.
⁹ Pós-doutorado em Ciências da Saúde pela Faculdade de Medicina do ABC, Faculdade de Juazeiro do Norte, Ceará, Brasil.

DOI: dx.doi.org/10.19095/rec.v6i1.420
INTRODUCTION

The Autonomic Nervous System (ANS) carries out a control on the cardiovascular system by means of transmissions by the nerves connected to the heart, it uses the information sent by the baroreceptors and chemoreceptors, atrial and ventricular receptors, and from them, handles and triggers changes in various compensation systems: changes in the respiratory system, vasomotor system, renin-angiotensin-aldosterone system and thermoregulatory system.

Epidemiological studies indicate that psychological characteristics the example of depression can be risk factors for cardiovascular diseases. The monitoring of depressive symptoms in patients with heart disease increases the risk of death associated with cardiovascular dysfunctions.

Depression is one of the most common mental disorders, affects people of all ages and in various parts of the world, this being considered the second main disease triggered throughout life. At the expense of population growth associated with aging, the global burden by depressive disorders increased by 37.5% between 1990 and 2010.

This disorder has been suggested as a predictor of cardiovascular diseases, where the adverse events depend on the level of depression, the higher the symptoms predict serious cardiac complications that are induced by mental stress.

Due to the influence that the ANS exerts on the heart rate, the study of its variability has been appointed as an indicator for the screening of some normal and pathological conditions, widely used for the analysis of the autonomic control of the Heart Rate Variability (HRV).

This is a non-invasive tool and practice that seeks to understand the oscillations of heartbeats, providing important parameters related to the sympathetic and parasympathetic modulation on the R-R intervals, which are the results of the active form of the ANS on the heart rate.

This way the aim of this study is to analyze the influence of depression in heart rate variability.

METHOD

There was performed an integrative review of the literature, being the search strategy outlined in the databases of Latin American and the Caribbean Literature (LILACS) and Medical Literature Analysis and Retrieval System Online (MEDLINE) via the Virtual Health Library (VHL). In the definition of the descriptors there were employed the Descriptors in Health Sciences (DeCS), a dictionary of indexing terms created by Bireme. The period of implementation of the searches was during the months of September to November of 2017.

In this process we used the Boolean operator AND, on the association of the following descriptors: Depression; Heart Rate; Autonomic Nervous System. Then, there was performed for screening studies, evaluating them for inclusion or exclusion. To do this, we used a spreadsheet matrix to have a control of all articles found in databases, with the following discrimination: author and year, title, journal, sample, country, main findings, conclusion, reason for exclusion.

Subsequently, there was an application of inclusion and exclusion criteria and discard duplicate abstracts. The inclusion criteria of the articles were: 1) be available in full; 2) studies in Portuguese and English; 3) which had been published in the last 5 years (2012-2017). The exclusion criterion was given to articles that were not originals, theses, dissertations and monographs.

The jobs that remained in the sample after passing through the identification and selection criteria were printed and analyzed in the presence of two researchers, evaluating them through reading in its entirety. After this, the authors gathered to discuss about each study, focusing on the importance of this and if it was in accordance with the aims of the research. Through this analysis of eligibility, the studies were still subject to being excluded from the study. However, by making reference to the theme of research, the majority of studies those came to be read in full had inclusion in the final sample.

RESULTS

Applied the mentioned descriptors, appeared 170 articles those made reference to the association of terms searched, all abstracts were read and those who made reference to the topic entered in the sample, these were entered in the spreadsheet matrix, after exclusion of duplicates and application of inclusion and exclusion criteria, remained 18 works those were printed to read full. Of these, 13 studies were excluded because they did not fit the theme of the research, leaving 5 articles. The search and selection process is illustrated in Figure 1.

Then, for presentation of the results of the articles were included in Table 1, discriminating the following items: author and year, sample indices evaluated and main conclusions. Finally, we carried out a descriptive analysis of the sample and the quality of the results of evaluations, accompanied by the discussion of the material.

DISCUSSION

Various markers presented with modifications in its physiological activity, it observes that in patients affected by a pathological condition of depression, indices of parasympathetic class were sensitive to its reduction, was still relevant data such as the occurrence of excitation of the sympathetic activity and its relationship with the level of illness.

There are studies that show a significant relationship between cardiovascular diseases and depression. Some authors contextualize this debate with the objective of seeking ways to highlight and interconnect methods to evaluate how is the operation of physiological systems. The HRV has been an instrument to understand autonomic dysfunctions, comparing healthy individuals with mental health problems.

An important assumption is elucidated in studies of Sgoff et al., it is suggested that the onset of depression develops a deficit in the autonomic cardiac activity, however, one cannot discard that this deficit can be generated as a result of pharmacological therapy. When analyzing the instrument as the prospect of adverse effect cited is notorious that studies involving the depressive disorder and its drug interaction on the cardiac autonomic activity is necessary to ensure that this perspective is expected with due scientific value.
Table 1 - Presentation of the results:

<table>
<thead>
<tr>
<th>Author and year</th>
<th>Goals</th>
<th>Sample</th>
<th>Evaluated indices</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATRON et al., 2012</td>
<td>Examine the relationship between postoperative depression and reduced HRV.</td>
<td>11 patients with depression and 22 patients without depression, undergoing heart surgery.</td>
<td>SDNN, RMSSD, LF, HF, LF/HF</td>
<td>HRV indices were significantly lower in patients with depression than those without depression. The discoveries arising from this study suggests that depression may be related to problems of parasympathetic activity.</td>
</tr>
<tr>
<td>PATRON et al., 2014</td>
<td>Examine whether the emotional deregulation could be a mediator of the relationship HVF reduced by depression observed after cardiac surgery.</td>
<td>The 25 study depressed patients and 43 not depressed after heart surgery.</td>
<td>SDNN, RMSSD, NN50, VLF, LF, HF</td>
<td>The current findings extend the relationship with reduction of depression to HVF patients after heart surgery. In addition, our study suggests that post-operative depression is most likely to be associated with reduced vagal modulation at heart than the excessive sympathetic activity.</td>
</tr>
<tr>
<td>WANG et al., 2013</td>
<td>Explore the cardiac autonomic function and heart arrhythmia in the depression, the correlation between the severity of depression and related indices the HVF and the prevalence of arrhythmia.</td>
<td>53 individuals with major depressive disorder (MDD) were compared with 53 healthy individuals.</td>
<td>SDNN, SDANN, RMSSD, PNN50, HF, LF, LF/HF</td>
<td>The findings suggest that depression is accompanied by autonomic nervous system cardiac dysfunction and, in addition, the severity of depression is related to the severity of this dysfunction. Individuals with depression appear to be susceptible to disease and/or ventricular premature atrial.</td>
</tr>
<tr>
<td>MINASSIAN et al., 2014</td>
<td>Assess the relationship between Post-Traumatic Stress Disorder (PTSD) and HVF in a large group of Marines to active duty.</td>
<td>Four battalions of male sailors (N=2430) 1 were evaluated to 2 months before the invasion of combat.</td>
<td>SDNN, RMSSD, LF, HF, LF/HF</td>
<td>This cross-sectional analysis of a large cohort supports associations between PTSD and HVF reduced when accounts for symptoms of LCT and depression.</td>
</tr>
<tr>
<td>MEERWIJK et al., 2014</td>
<td>Examine the relationship between HRV at rest and psychological pain.</td>
<td>The sample of the study consisted of adults (N = 35) pretended he had been diagnosed with depressive disorder (self-reported).</td>
<td>HF, LF, HF/LF</td>
<td>The results suggest a state of arousal characterized by increased sympathetic activity for people characterized with psychological pain.</td>
</tr>
</tbody>
</table>

Legends: TDM = Major Depressive Disorder; PTSD = post-traumatic stress disorder; RMSSD = square root of the average of the square of the differences between normal RR intervals adjacent; SDNN = standard deviation of all normal RR intervals; LF = low frequency component; HF = high frequency component; LF/HF = ratio between the low and high frequency components; VLF = very low frequency component; pNN50 = percentage of RR intervals adjacent difference of length greater than 50ms.
To relate the depression when caused in post-operative condition notes that this could be related to changes in HRV, since it was found that there is a significant dysfunction in patients with depression compared to those without depression, measured by the SDNN index. However, when we analyzed the rMSSD indices and HF, we found a reduced vagal control, yet the LF/HF indicated an imbalance of driving friendly.

In agreement with the findings described above, a study in which it was evaluated the Major Depressive Disorder (MDD) obtained results of lower variability when compared with normal individuals, analyzing SDNN, RMSSD and pNN50. This change in the autonomous nerve function can be explained by the MDD is a classification of depression in a way that presents symptoms in greater intensity in the individual.

Another study assumed that the occurrence of depressive symptoms and post-traumatic stress disorder (PTSD) would result in less variability compared to PTSD isolated. However, the authors found that the correlations of the depressive symptoms with PTSD are not associated with a suppression of HRV, although the severity of the symptom of PTSD and depressive symptoms were strongly related. The absence of relationship of depressive symptoms and HRV constitute a limitation inherent in the study. The author suggests that the form of analysis of the indices is difficult to draw firm conclusions about the operation friendly compared to the parasympathetic nervous system, by the absence of rigorous experimental controls.

An important factor to be taken into consideration is the intensity level inherent to each depressive, because according to their severity and packaging, the cardiac autonomic imbalance may vary, they may be by post-traumatic events, containment space, level of psychological pain, among others. The psychological pain is a characteristic that encompasses the context of depression, it has a direct relationship with the cardiac autonomic system. Findings suggest that there is a significant decrease in HRV with the increase of this symptomatology, being more evident in patients who do not use antidepressants.

As noted, it is a fact that the depressive disorder can trigger changes in the conduction of the autonomic nervous system activity of the individual and that such changes affect the physiological function of the heart, then, it is suggested that such disorders when not treated or when observed only in isolated form, may present other complications such as cardiovascular comorbidities and other diseases aggravated by a deficit of the activity of the vagus nerve.

Thus, it appears that the depression that is a phenomenon which causes physiological changes in the system of the individual can be easily associated with alterations in the cardiac autonomic modulation.

**CONCLUSION**

Depression has a negative influence on the indices of analysis of Heart Rate Variability. It is possible to identify the increase of sympathetic modulation in depressive individuals, as a result of physiological changes and behavioral state caused by the disease.
REFERENCES


