VIEWPOINT

Dance, Heart Failure and Erectile Function: Perspective of Better Clinical Management?

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Abstract

In the pathophysiology of heart failure (HF), attention has been directed to sympathetic hyperactivity and low-intensity systemic inflammation, aspects also present in erectile dysfunction (ED). Physical exercise is a strategy that improves these parameters, which makes plausible the hypothesis that, when practiced through dance, exercise would provide better results. By combining physical activity and music, dance would be able to improve the functioning of central and peripheral neural networks additionally to other favorable mechanisms, contributing to the restoration of neurohormonal function and reduction of the inflammatory response, which would increase the efficacy of HF and ED treatment.

Introduction

Heart failure (HF) is a complex clinical syndrome of high morbidity and mortality rates, representing one of the major contemporary health problems. In the pathophysiology of HF, attention has been directed to sympathetic hyperactivity, ventricular remodeling and, more recently, inflammatory and prothrombotic factors. These physiopathological aspects have a close relationship to each other and have an influence on disease perpetuation, prognosis and severity.[1]

A high prevalence of sexual dysfunction, particularly erectile dysfunction (ED) has been reported among HF patients. ED has been considered a predictor of cardiovascular risk, and of cardiovascular and all-cause mortality. For this reason, ED has a major role in public health, by negatively affecting health and quality of life of patients,[2] with common characteristics of HF.

In this context, physical exercise, such as dancing and its own particularities, is an intervention with great potential to benefit both HF and ED conditions.

Keywords

Heart Failure / physiopathology; Exercise; Dance; Autonomic Nervous System; Inflammation.

Development

In ED and HF physiopathology, high levels of pro-inflammatory cytokines, associated with impaired autonomic nervous system have been reported,[3,4] which may be characterized as a phenomenon primarily inflammatory and neurovascular.

Sympathetic hyperactivity has an important compensatory role in the initial phase of HF. However, its maintenance contributes to further aggravation of cardiac dysfunction, which coexists with a significant increase in central and peripheral vasoconstriction,[1] which in turn increases penile smooth muscle tone and vasoconstriction of penile blood vessels, characteristic of ED.[3,4]

Similar to sympathetic hyperactivity, the systemic, low-degree inflammatory process, characterized as 'subclinical' in ED patients, contributes to endothelial dysfunction[3] and consequent reduction in penile arterial dilation capacity.[2] Both abnormal autonomic modulation and subclinical inflammation are equally present in ED and HF.[3]

Recently, neuroscience studies have identified a neural basis, which combined with humoral and immune activities, is able to reflexively regulate and adjust the inflammatory response under physiological conditions, referred to as the "inflammatory reflex".[5] In this respect, the nervous system, which receives information from the immune system by means of soluble mediators and sensory neurons, is also able to inhibit inflammation,[5] which is associated with both HF and ED.

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Nevertheless, in sympathetic hyperactivity and/or vagal suppression conditions, as in HF, such inflammatory reflex is impaired. In this case, physical exercise may play an important role by contributing to anatomical modulation and control of inflammation. These exercise effects can be beneficial to erectile function in ED.[6-8]

Traditionally, aerobic exercise prescribed to HF patients is of moderate intensity and constant load, *i.e.*, continuous training protocols that normally include conventional cyclic exercises. Such exercise programs may be monotonous, leading to low motivation and low adherence of patients to cardiac rehabilitation. In this regard, dancing is a playful, joyful activity that may be easily incorporated to social life, and a great potential alternative.[9,10]

Dance combines physical activity with music and thereby potentiates the physical, cognitive and emotional benefits, and promotes social integration.[9] Thus, dance enables a true synergism of positive effects promoted by physical exercise and music.[9,10] Similar to physical activity, music activates body functioning, particularly the nervous system. When music penetrates human ears, sound waves are converted into electrical activity that sends information to thalamic and subthalamic regions and to the limbic system, which is considered the unit responsible for emotions and social behaviors.[9]

The hypothalamus, which belongs to the limbic system and is considered the core of emotional expressions and sexual behavior, is also a central structure involved in the inflammatory reflex. This makes plausible the hypothesis that dancing can be an intervention capable to positively modulate inflammatory response by activation of cholinergic anti-inflammatory pathways, in a similar or even superior manner than conventional physical exercise, while promoting an increase in vagal activation.[5]

Considering similarities in the physiopathology that explain the high prevalence of ED in HF patients, a plausible hypothesis is that dancing may be effective in the concomitant treatment of both conditions. However, so far only one observational, case-control study performed by our group showed that patients with cardiovascular diseases (coronary diseases and hypertension), who were ballroom dancing practitioners, had a lower risk to develop sexual dysfunction, and no other study on the effect of dance in HF patients was found.[10] This represents a gap in the literature.

Conclusions

Considering the similarities in the physiopathology of HF and ED, particularly regarding autonomic modulation and inflammation, dance is shown as a promising therapy for both conditions. The lack of studies investigating the effects of dance in the concomitant treatment of both HF and ED is a gap in the literature to be filled.

Author contributions

Conception and design of the research: Carvalho T, Gonzáles AI, Lima DP, Santos ARS. Writing of the manuscript: Carvalho T, Gonzáles AI, Lima DP, Santos ARS. Critical revision of the manuscript for intellectual content: Carvalho T, Gonzáles AI, Lima DP, Santos ARS. Supervision / as the major investigador: Carvalho T, Gonzáles AI, Lima DP, Santos ARS.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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References

1. Triposkiadis F, Karayannis G, Giamouzis G, Skoularigis J, Louridas G, Butler J. The sympathetic nervous system in heart failure physiology, pathophysiology, and clinical implications. J Am Coll Cardiol. 2009;54(19):1747-62. doi: 10.1016/j.jacc.2009.05.015.

2. Alberti L, Torlasco C, Lauretta L, Loffi M, Salonia A, Margonato A, et al. Erectile dysfunction in heart failure patients: a critical reappraisal. Andrology. 2013;1(2):177-91. doi: 10.1111/j.2047-2927.2012.00048.x.

3. Rodrigues FL, Fais RS, Tostes RC, Carneiro FS. There is a link between erectile dysfunction and heart failure: it could be inflammation. Curr Drug Targets. 2015;16(5):442-50. PMID: 25892310.

4. Rodrigues FL, Lopes RA, Fais RS, de Oliveira L, Prado CM, Tostes RC, et al. Erectile dysfunction in heart Failure rats is associated with increased neurogenic contractions in cavernous tissue and internal pudendal artery. Life Sci. 2016;145:9-18. doi: 10.1016/j.lfs.2015.12.005.

5. Tracey KJ. The inflammatory reflex. Nature. 2002;420(6917):853-90. doi: 10.1038/nature01321.

6. Sties SW, Ulbrich AZ, Mara LS, Gonzáles AI, Netto AS, Carvalho T, et al. Influence of high intensity training on erectile function of patients with heart failure. Global Heart. 2013;1(9):270-1.

7. Hsu CY, Hsieh PL, Hsiao SF, Chien MY. Effects of exercise training on autonomic function in chronic heart failure: systematic review. Biomed Res Int. 2015;2015:591708. doi: 10.1155/2015/591708.

8. Guasch E, Benito B, Nattel S. Exercise training, inflammation and heart failure: working out to cool down. J Physiol. 2010;588(Pt 14):2525-6. doi: 10.1113/jphysiol.2010.194134.

9. Gomes Neto M, Menezes MA, Oliveira Carvalho V. Dance therapy in patients with chronic heart failure; a systematic review and a meta-analysis. Clin Rehabil. 2014;28(12):1172-9. doi: 10.1177/0269215514534089.

10. Gonzáles AI, Braga HO, Sties SW, Mara LS, Carvalho GD, Carvalho T, et al. Sexual function and cardiopulmonary capacity in coronary and hipertensive practitioners of dance. Rev Bras Ativ Fis Saúde. 2015;20(4):366-75. doi: http://dx.doi.org/10.12820/rbafs.v.20n4p366.