

## **Impact of the *Ati vyayama* (excessive exercise) on pathological outcomes in the heart: A review of experimental studies on Wistar rats**

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Cardiac disorders are recognized as a leading cause of morbidity and mortality in the present world. Ayurveda authentic texts explain cardiac diseases under the heading of '*Hridroga*' and its etiopathogenesis. Charaka Samhitha has mentioned that '*Ati Vyayama*' (Excessive exercise) is an etiology leading to '*Hridroga*'. The objectives of this systematic review are to evaluate the effect of excessive exercise on the changes of the heart and understand the concept of '*Ati vyayama*' as a cause to manifest '*Hridroga*'; based on the available experimental animal studies in Wistar rats. Research articles published during 2019 and 2023 in ScienceDirect, PubMed, the Directory of Open Access Journals, and Google Scholar are rectified by using keywords; "swimming", "treadmill", "rotarod", "overtraining", "forced exercise", "excessive exercise", "exhaustive exercise", "exercise", "heart", "cardiac", "cardio", "myocardium" and Wistar albino. Open-access original research work consisting of exercise protocols based on swimming or treadmills for healthy Wistar rats were included. Studies to find pharmacological effectiveness and studies incorporated with disease-induced animal models were excluded. A total of 101 articles were rectified based on the abstracts, and 90 were excluded due to non-relevance and duplications. The finalized publications have revealed the impact of excessive exercise on manifestation of pathological changes in the rats' heart in acute, sub-acute, and chronic stages of exercising by increased oxidative stress, altered lipid metabolism, altered heart rate, and histopathological changes of the cardiac muscles of Wistar rats. Health-beneficial effects of regular trained exercise were recorded as promoting cardiomyocyte contractility, improvement in the intracellular Ca<sup>2+</sup> handling. These findings depend upon the respective exercise protocol, workload over the rat, intensity, and chronicity of the particular exercise. Thus, this review supports the statement that '*Ati vyayama*' can lead to manifest '*Hridroga*' and there are certain limits of aforesaid physical exercise for maintaining health in Wistar rats.

**Keywords:** *Ati Vyayama, Excessive exercise, Heart, Hridroga, Wistar rats*