

## EDITORIAL

## Editorial: Effects of Physical Exercise on Left Ventricular Function in Type 2 Diabetes Mellitus: A Systematic Review

Gustavo Oliveira da Silva,<sup>1</sup> Marilia de Almeida Correia,<sup>1</sup> Raphael Mendes Ritti-Dias<sup>1</sup>

Universidade Nove de Julho,<sup>1</sup> São Paulo, SP – Brazil

Editorial referring to the article: [Effects of Physical Exercise on Left Ventricular Function in Type 2 Diabetes Mellitus: A Systematic Review](#)

Diabetes mellitus is characterized by a group of metabolic disorders marked by high blood glucose levels. Over 90% of people with diabetes have type 2 diabetes (T2DM).<sup>1</sup> The prevalence of T2DM has been increasing over the last decades worldwide, making it a serious global health concern. T2DM leads to an increased risk of the development of several health problems that result in high medical costs, poor quality of life, and higher mortality rates.<sup>2</sup> More specifically, high blood glucose levels can eventually cause overall vascular harm that can affect the heart, eyes, kidneys, and nerves leading to serious complications.<sup>1</sup> The vascular impairments of T2DM are amid the gravest consequences of the disease. Atherosclerosis is the main cause of the lower life expectancy in T2DM, with diabetic nephropathy and retinopathy being the leading factors responsible for end-stage renal disease and blindness.<sup>3</sup> The risk of cardiovascular events is increased in patients with T2DM in comparison to nondiabetic subjects.<sup>4</sup> In patients with cardiovascular diseases, such as peripheral arterial disease, T2DM is associated with a worse clinical and functional profile.<sup>5</sup>

Heart failure (HF) has been shown to be a frequent cardiovascular complication in T2DM patients.<sup>5</sup> There is a high number of T2DM in patients with the two most common forms of HF: impaired systolic left ventricular function and HF with preserved ejection fraction.<sup>6</sup> Patients with T2DM have a high risk to develop HF, and T2DM patients with HF have a mortality rate four times

greater than T2DM patients without HF.<sup>4,7</sup> Therefore, T2DM has been recognized as an independent risk factor for HF leading to the establishment of the term ‘diabetic cardiomyopathy’, that is defined as a myocardial disease in T2DM patients, not related to hypertension, coronary artery disease or other cardiac diseases.<sup>7,8</sup>

Exercise has been recommended as a non-pharmacological treatment for T2DM.<sup>9</sup> Various types of exercise such as aerobic and resistance training improve health and glycaemic control in patients with T2DM. Most of the benefits observed are the improvement in insulin sensitivity, postprandial hyperglycaemia, and cardiovascular risk.<sup>10</sup> However, data regarding the effects of aerobic and resistance exercise on indicators of left ventricular function in T2DM are less frequent and spread in the literature.

Petronilho et al.,<sup>11</sup> performed an interesting study summarizing the effects of physical exercise on left ventricular function in T2DM through a systematic literature review. After the literature search, five randomized clinical trials with T2DM patients submitted to resistance and aerobic exercise training were summarized. Assessment of methodological quality of the studies included revealed that four studies were considered to have good methodological quality and one to have fair quality. Frequent limitations present in the studies were lack of blinding, differences in baseline outcome data, not all outcome data being available for analysis, and insufficient information on randomization blinding or the number of individuals in the intervention group.

A total of 314 T2DM patients were included in the review, being either randomized to an exercise intervention (n = 176) or to usual care (n = 138). The exercise intervention protocols comprised aerobic and

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Mailing address: Gustavo Oliveira da Silva

Universidade Nove de Julho. Rua Vergueiro, 235. Postal code: 01525-000. Liberdade, São Paulo, SP - Brazil

E-mail: gustavo.pnt@hotmail.com.

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resistance exercises, or isolated aerobic exercises of either gym- (supervised) or home-based (unsupervised) training. The intensity of the exercises ranged from moderate to high-intensity interval training. The duration of the exercise sessions was 20 to 60 minutes, two to three times a week. The follow-up period for most studies was 12 weeks, one study had a follow-up period of four weeks and another of three years.

The results of the included studies indicated that exercise led to improvements in peak torsion, global longitudinal strain, global strain rate, time to peak untwist rate, early diastolic filling rate, and peak early diastolic strain rate. Also, high-intensity exercise was more effective in improving these variables than moderate-intensity exercise according to one of the studies. Overall, the findings of this systematic review demonstrated that exercise could improve different indicators of systolic and diastolic function in T2DM patients, more specifically systolic and diastolic strain, twist, and torsion.

A clear problem identified by the review is the low number of studies with few standardized variables and several biases. These limitations hindered the execution of statistical procedures. A missing point in this review is the lack of rating regarding the quality of the evidence.

Also, the fact that the studies from this review included only adults with T2DM limits the generalization of these results to elderly T2DM patients, since T2DM is more prevalent in elderly age.<sup>12</sup> And as a possible consequence of including only adults, the studies were comprised of an obese population that could lead to other mechanisms related to the chronic process of the disease<sup>13</sup> and, consequently, to the left ventricular function responses. Collectively these results suggest an urgent need for more studies with strong methodology in this topic, along with the inclusion of elderly T2DM patients.

The main messages of this study are:

- Exercise seems to lead to an improvement on left ventricular function, more specifically on systolic and diastolic strain, twist, and torsion in T2DM.
- Stronger studies are needed to draw more consistent conclusions regarding the effects of exercise on left ventricular function in this population.

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