

Effect of Exercise Training On Cardiovascular Responses In Diabetic Autonomic Neuropathy

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Abstract : Background: Diabetes Mellitus is a chronic, multifaceted disorder caused by reduction in insulin action and secretion or the both, it's characterized by hyperglycemia and disruption of the metabolism of carbohydrates, fats and proteins, over time, it results in small and large vessels complications and neuropathies. This disease is ranked as the third cause of death and leading factor of blindness. One of the most overlooked of all serious complications of diabetes is cardiovascular autonomic neuropathy (CAN), which encompasses damage to the autonomic nerve fibers that innervate the heart and blood vessels, resulting in abnormalities in heart rate control and vascular dynamics The complications of diabetes mellitus are macro and micro vascular disorders, central, Peripheral and autonomic neuropathy. The autonomic neuropathy is the most common complication of the long standing diabetes Autonomic neuropathy is a well recognised complication of diabetes mellitus, and its incidence has been reported to be 20 - 40%.

Subjects and Methods: Fifty diabetic patients type-1, diagnosed by concerned Doctor with autonomic neuropathy, with duration of disease more than five years, their age ranged from 45 to 65 years old, they were be chosen from National Institute for Diabetes and Endocrine Glands, *They were randomly assigned to two equal groups.* Study group included twenty five diabetic patients with autonomic neuropathy, practiced a program of aerobic exercise with intensity from 60 to 75 % of maximal heart rate (HR_{max}) on treadmill for self limiting intensity for 3 sessions / week for three months and received their medical management (*16 men and 9 women, mean age was 52.2 ± 4.9 years*) that had been received aerobic moderate intensity exercise training on treadmill for 40 minutes, 3 times/week, day after day, for 3 months, while control group included twenty five diabetic patients with autonomic neuropathy they received only their medical treatment. All patients had been evaluated to measure age, Body mass index (BMI), fasting blood glucose, heart rate (HR) responses to valsalva maneuver , HR response to deep breathing ,HR response to change of position, systolic blood pressure (BP) response to valsalva maneuver , systolic BP response to sustained hand grip and systolic BP response to change of position. ECG machine and its accessories will be used to do stress test for each patient by attending physician and to monitor heart rate, rhythm, R-R interval and Q-T interval for each patient of both groups. *All measurements were done before and after the study program.*

Results: *After completion of the study, a significant improvement was observed in (BMI), fasting blood glucose, (HR) responses to valsalva maneuver, HR response to deep breathing, HR response to change of position, systolic blood pressure (BP) response to valsalva maneuver , systolic BP response to sustained hand grip and systolic BP response to change of position ($P < 0.05$), when compared to control group.*

Conclusion: Aerobic moderate intensity exercise training could improve cardio vascular responses in diabetic autonomic neuropathy. Aerobic exercise is a good method that improve cardiac autonomic neuropathy in type 1 diabetes mellitus.

Key words: Aerobic Exercise, type 1 diabetes mellitus, cardiac autonomic neuropathy.