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Role of R-R interval variation study in the diagnosis of Cardiac Autonomic Neuropathy (CAN) in patients with Diabetes Mellitus (DM) in the Middle East population

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Introduction & Aim: Cardiac Autonomic Neuropathy (CAN) is a serious and common complication of diabetes. Meta-analyses of published data demonstrate that reduced cardiovascular autonomic function as measured by Heart Rate Variability (HRV) is strongly (i.e. relative risk is doubled) associated with an increased risk of silent myocardial ischemia and mortality. Despite its relationship to an increased risk of cardiovascular mortality and its association with multiple symptoms and impairments, the significance of CAN has not been fully appreciated and not studied in the Middle East population. Hence, we conducted a study to measure the HRV by R-R interval variability in diabetic patients to determine the incidence of autonomic neuropathy.

Method: A prospective analysis of 37 patients fulfilling the criteria for diagnosis of diabetes mellitus with/without neuropathic/autonomic symptoms was performed between Jan 2017 and Oct 2017. We followed a protocol where R-R interval variation and Sympathetic Skin Response (SSR) were studied in all patients. R-R interval variation was studied during (1) deep breathing (at rate of 6/min), (2) breath holding for 15 seconds and (3) standing. The coefficient of variation of RR interval during the procedure were studied for all the 3 above mentioned manoeuvers while the ratio of R-R interval maximum to R-R interval minimum was studied for procedures of deep breathing and breath holding only. Additionally, the ratio of the 30th:15th R-R interval was analyzed during standing only.

Result: Autonomic studies were performed in 37 diabetic patients. 70.2% (26/37) had abnormal study. HRV abnormality was found in 69.7% (23/33) of the patients. SSR abnormality was found in 35% of the patients (8/23). In diabetic patients without clinical features of sensory, motor or autonomic involvement, autonomic study abnormality was found in 80% (8/10). HRV abnormality was detected in 70% (7/10) and SSR abnormality in 12.5% (1/8). Among diabetic patients with features of autonomic neuropathy, 70% (7/10) had abnormal study. HRV abnormality was detected in 66.7% (6/9) and SSR abnormality in 33.3% (3/9). Among symptomatic (motor/sensory) diabetic patients without autonomic symptoms, 72% (13/18) had abnormal study. HRV abnormality was found in 70.6% (12/17) and SSR study abnormality in 41.2% (07/17). Among patients with HRV abnormalities, the abnormalities were detected in 11.5% (3/26) on deep breathing, 46.2% (12/26) on Valsalva maneuver and 69.2% (18/26) on standing (30^{th}:15^{th} R-R interval).

Conclusion: Cardiac autonomic involvement in DM is common (70.2%) as detected by our study, even in patients without clinical evidence of sensory/motor neuropathy (80% detected in our study) or autonomic neuropathy (72%). However, patients with clinical autonomic manifestations are associated with more incidence of electrophysiological abnormality (70%). R-R interval variation study is more sensitive (70%) than the sympathetic skin response study (35%). Among the maneuvers for measurements for R-R interval variation, abnormalities are detected more in standing compared to deep breathing and Valsalva.

Biography

Kashif Bin Naeem is currently working as a Specialist (Non-invasive) Cardiologist at Al Baraha Hospital, Dubai, Ministry of Health and Prevention, UAE. He has completed his Residency in Internal Medicine from London in 2007 and was awarded MRCP, UK. He has recently been awarded CESR (CCT equivalent) Certification in Cardiology, UK. He also holds Diplomate Certification in Comprehensive Echocardiography, NBE, USA. He is an active researcher and has several publications as well as abstracts in international meetings. He is the current Member of Dubai Research and Ethics Committee.

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