Cardiac autonomic neuropathy

Cardiac autonomic neuropathy (CAN) resulting from seizures has been implicated in sudden unexpected death in epilepsy in persons with epilepsy.

A study sought to determine the frequency and pattern of CAN in adult PWE in a tertiary hospital in South-western Nigeria and to determine the relationship between seizure variables and CAN.

Methods: A cross-sectional study of 80 adult PWE and 80 matched controls aged between 18 and 60 years was carried out between March 2012 and June 2013 at the Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria. Demographic and clinical data were obtained from all the study participants. Anxiety was excluded using the Hamilton Anxiety Scale. Those with conditions that could affect autonomic function, such as chronic renal failure, heart failure, Parkinson's disease, diabetes mellitus, anxiety, and psychiatric disorders and pregnant women were excluded. Five bedside cardiovascular reflex tests were performed on each subject after baseline heart rate and blood pressure (BP) had been recorded.

Results: The mean age of onset of epilepsy was 19 ± 10 years, whereas the mean duration of epilepsy was 10 ± 8 years. The mean seizure frequency was 14 ± 30 per month (median three seizures per month). Of the 80 patients evaluated, 42 (52.5%) had CAN, whereas none of the controls had CAN. Majority (69%) of the PWE with CAN had purely parasympathetic dysfunction, whereas 3% had purely sympathetic dysfunction and 10% had combined autonomic dysfunction. The PWE in this study had significantly lower tilt ratios and diastolic BP change with Isometric Hand grip as well as significantly higher systolic BP change on standing than the controls. Patients who had more than four seizures per month had higher odds of CAN than those with less frequent seizures (odds ratio 0.275, P value 0.023). Also, patients who had received treatment for less than 10 years were found to have greater odds of CAN than those who had received treatment for a longer period (odds ratio 11.676, P value 0.046).

Conclusion: CAN is common in adult PWE in South-Western Nigeria and the major predictors are short duration of treatment and frequent seizure episodes. Routine screening of these patients may help with early detection of autonomic dysfunction and provide an opportunity for intervention [1)].

Both diabetic distal symmetrical polyneuropathy (DSPN) and cardiac autonomic neuropathy (CAN) indicate the length-dependent pattern of disease. Decreased parasympathetic activity has been found in the early phase of CAN and sural sensory nerve action potential (SNAP) imply axonal loss in DSPN.

All patients with type 2 diabetes underwent cardiovascular autonomic function and nerve conduction studies (NCS). Lai et al., constructed modified composite autonomic scoring scale (CASS) and composite score of NCS to measure the severity of CAN and DSPN, respectively.

Patients with a longer duration of diabetes had a lower heart rate response to deep breathing (HR_DB), Valsalva ratio (VR), and baroreflex sensitivity (BRS), higher CASS, a higher percentage of CAN, lower sural SNAP, higher composite score of NCS, and a higher percentage of DSPN. Multiple linear regression analysis showed that only sural SNAPs were independently associated with mean HR_DB.

Sural SNAP was closely correlated with parameters of cardiovagal functions in patients with different durations of diabetes. The percentage and severity of CAN and DSPN increase with longer duration of diabetes.

The independent association of sural sensory nerve action potential amplitude and heart rate response to deep breathing with type 2 diabetes is important because combined testing increases diagnostic sensitivity and specificity [2].

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2)
Lai YR, Huang CC, Chiu WC, Liu RT, Tsai NW, Wang HC, Lin WC, Cheng BC, Su YJ, Su CM, Hsiao SY, Wang PW, Chen JF, Ko JY, Lu CH. Close relationship between cardiovagal function and sural sensory nerve action potential in type 2 diabetes. Clin Neurophysiol. 2019 May 8;130(7):1160-1165. doi: 10.1016/j.clinph.2019.03.036. [Epub ahead of print] PubMed PMID: 31102989.