PERIPHERAL AND CENTRAL AUDITORY PATHWAYS FUNCTION IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Abstract:

This work aimed to investigate peripheral and central hearing function (auditory pathways) in patients with diabetes mellitus (DM). This study included 60 patients with mean age of 39.57±13.89 years and duration of illness of 7.37±5.15 years. We did routine pure tone audiometry (PTA) along with Auditory-Brainstem Response (ABR) at low and high repetition rate frequencies and Event-Related Potentials (ERPs). Fourteen patients (23.33%) had tinnitus and 18 patients (30%) had subjective hearing impairment. PTA reported peripheral auditory neuropathy in 30% (18/60) or (30/120) of ears examined versus 8.75% (7/80) for control subjects (P=0.001). Of them, bilateral sensorineural hearing impairment (SNHI) was reported in (72.22%; n=13). The latency of wave I was prolonged in 36.67% indicating auditory neuropathy. The latency of wave III and I-III and III-V inter peak latencies (IPLs) were delayed in 46.67% indicating impairment in the cochlear nucleus. The latency of wave V and III-V and I-V IPLs were delayed in 30% without impairment in wave I or III, indicating impairment in the activity of lateral lemniscus. Compared to control subjects, patients had higher hearing threshold at different frequencies (250-8000 Hz) (P = 0.0001), prolonged absolute latencies of waves I, III and V and I-III, III-V and I-V IPLs at 90dBHL low and high repetition frequencies and N100, N200, P200 and P300 components of ERPs (P = 0.0001) and reduced amplitudes of P200 and P300 (P = 0.0001). No significant differences were identified among different audiologic variables between patients with type 1 (T1DM) and type 2 (T2DM) diabetes mellitus. Patients who were uncontrolled on anti-diabetic medications had prolonged I-V IPLs at 90dBHL low (right: P=0.025; left: P=0.041) and high (right: P=0.047; left: P=0.036) repetition frequencies and reduced amplitudes of P300 (right: P=0.050; left: P=0.052). Significant correlations were identified between many audiologic variables and demographic-clinical and laboratory-variables. In multivariate analysis and after adjustment of other risk factors, there were increases in the odds for latency of wave III (OR 1.90; 95% CI 1.02 to 3.55, P = 0.044); I-III (OR 2.36; 95% CI 0.95 to 5.81; P = 0.06) and III-V (OR 2.36; 95% CI 0.95 to 5.81; P = 0.06) IPLs and amplitude of P300 (OR 2.36; 95% CI 0.95 to 5.81; P = 0.06) in relationship to the degree hyperglycemia. We conclude that, patients with DM have higher frequency of peripheral and central hearing impairment (i.e. acoustic nerve, auditory pathway throughout the brainstem till the auditory cortex). The degree of hearing impairment was significantly correlated with glycemic control. This knowledge is important for specialists serving those patients.

Keywords:

Diabetes mellitus, auditory function, Auditory-Brainstem Response, Event Related Potentials.

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