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Rapid eye movement (REM) sleep without atonia detection is a prerequisite for diagnosis of REM sleep behavior disorder (RBD). As the visual gold standard method is time-consuming and subjective, several automated methods have been proposed. This study aims to compare their performances: The REM atonia index (RAI), the supra-threshold-REM-activity metric, the Frandsen index, the short/long muscle activity indices, and the Kempfner index algorithms were applied to 27 healthy control participants (C), 25 patients with Parkinson's disease (PD) without RBD (PD-RBD), 29 patients with PD and RBD (PD + RBD), 29 idiopathic patients with RBD, and 36 patients with periodic limb movement disorder (PLMD). The indices were calculated in various configurations: (1) considering all muscle activities; (2) excluding the ones related to arousals; (3) excluding the ones during apnea events; (4) excluding the ones before and after apnea events; (5) combining configurations 2 and 3; and (6) combining configurations 2 and 4. For each of these configurations, the discrimination capability of the indices was tested for the following comparisons: (1) (C, PD-RBD, PLMD) vs (PD + RBD, RBD); (2) C vs RBD; (3) PLMD vs RBD; (4) C vs PD-RBD; (5) C vs PLMD; (6) PD-RBD vs PD + RBD; and (7) C vs PLMD vs RBD. Results showed varying methods' performances across the different configurations and comparisons, making it impossible to identify the optimal method and suggesting the need of further improvements. Nevertheless, RAI seems the most sensible one for RBD detection. Moreover, apnea and arousal-related movements seem not to influence the algorithms' performances in patients' classification.

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