REM sleep behavior and motor Parkinsonism: a cross sectional analysis

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**Objective**
To evaluate the association between Rapid Eye Movement Sleep Behavior Disorder (RBD) and motor symptoms in Parkinson’s disease (PD).

**Background**
RBD may be a prodromal state for PD. Patients with RBD may have up to a 65% risk of developing PD within 10 years. However, the relationship between RBD and motor parkinsonism has not been evaluated in untreated PD.

**Design/Methods**
The study population consisted of 418 untreated PD patients who completed the Movement Disorders Society - United Parkinson’s Disease Rating Scale (MDS-UPDRS) and RBD questionnaires at the baseline visit of the Michael J. Fox Foundation funded Parkinson’s Progression Markers Initiative (PPMI). Univariate and multivariate logistic regression models were used for the cross sectional analysis. The outcome variable, MDS-UPDRS-3 score, was classified into 4 categories (Very mild, mild, moderate and severe). RBD score, based on the RBD questionnaire, was treated as a binary variable with an RBD score above 5 classified as RBD symptomatology. Statistical procedures were performed with STATA, Version SE 12 for Windows (College Station, TX). As appropriate, t-tests and the chi-square statistic were used to investigate baseline group differences. Significance was set a priori at p < .05.

**Results**
A total of 418 participants with data on RBD questionnaire scores, GDS scores, MDS-UPDRS 3 scores and demographic variables were reviewed. Of the 418 PD patients, 113 (27.03%) were classified as PD patients with likely RBD (Fig. 1). The odds of having worse motor symptoms were 1.66 times greater in participants with RBD \((p = 0.028, 95\% CI = 1.057, 2.62)\). Even when age, gender and GDS scores were taken into account, the association between RBD and MDS-UPDRS 3 scores was significant \((OR=1.69, SE=1.26, p=0.025)\). Greater proportion of those with RBD were categorized as having moderate motor findings (Fig.2). Depression and gender were not associated with motor symptoms in the multivariate models.

**Conclusions**
We report that a RBD questionnaire score of greater than 5, indicative of RBD symptoms, is an independent predictor of worse motor findings in newly diagnosed PD patients. One of the strengths of the study is that the association is not potentially confounded by PD medications. One of the limitations of our analysis is that the RBD questionnaire is primarily a screening tool, not a diagnostic one.

The relationship between RBD and motor findings of PD remains unclear, but the presence of such relationship in early, untreated patients is the least confounded such evidence thus far.

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Conflict of Interest declaration: The authors of this manuscript have nothing to disclose.

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**Table 1. Demographic and Clinical Characteristics**

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<th>PATIENTS WITH RBD (%)</th>
<th>PATIENTS WITHOUT RBD (%)</th>
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<tr>
<td>GENDER (MALE)</td>
<td>72.57%</td>
<td>62.30%</td>
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<tr>
<td>DEPRESSION (GDS&gt;5)</td>
<td>47 (33.1)</td>
<td>91 (66.9)</td>
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<tr>
<td>AGE (MEAN)</td>
<td>63.04 YEARS</td>
<td>62.87 YEARS</td>
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**Figure 1. Distribution of RBD in our sample**

**Figure 2. Distribution of severity of motor symptoms in participants with RBD and without RBD**

**Variation of severity of motor symptoms with RBD**