**Appendix: Summary of fall risk factors in the synucleinopathies**

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| --- | --- | --- |
| **Risk Factors** | **Found to be a risk factor** | **Not found to be a risk factor** |
| **Non-modifiable risk factors** |  |  |
| * Increased age | (1, 2) | (3-14) |
| * Gender | (15, 16) | (1-4, 7-13, 17-19) |
| Disease severity   * H&Y Scale | (1, 3-5, 7, 11-13, 15, 18, 20-24) | (8, 10, 17, 25, 26) |
| * UPDRS total score | (1, 3, 4, 6, 8, 13, 14, 20, 21, 23, 25) |  |
| * UPDRS motor sub-score | (2-4, 6, 7, 10, 11, 18, 20, 22-24, 26, 27) | (5, 8, 12, 13, 17, 25) |
| * Disease duration | (2-4, 7, 11, 15, 18, 19, 23, 24, 26, 27) | (1, 2, 6, 9, 12, 13, 20, 21, 25) |
| **Medications** |  |  |
| Parkinsonism-specific medications   * Levodopa equivalent dose | (4, 6, 11, 13, 20, 24) | (3, 5, 8, 17, 18, 25, 26) |
| * Dopamine agonists | (14) | (3, 11, 17, 20) |
| * Amantadine | (15) | (6) |
| * COMT inhibitor |  | (11, 20) |
| * MAO inhibitor |  | (11) |
| Other medications   * Benzodiazepines | (11) | (20) |
| * Anti-cholinergics |  | (6, 17, 20) |
| * Anti-psychotics |  | (6, 16, 19) |
| * Narcotics |  | (6) |
| * Cardioactives |  | (20, 28) |
| * Anti-depressants | (6, 15) | (20) |
| * Polypharmacy |  | (1, 6) |
| **Motor dysfunction** |  |  |
| * Tremor |  | (6, 15, 17, 29) |
| * Dyskinesias | (3, 21, 30) | (4, 20, 26, 27, 29) |
| * Axial rigidity |  | (20, 29) |
| * Limb rigidity | *(29)* |  |
| * Speech disturbance | *(29)* |  |
| * Dysphagia | *(29)* |  |
| * Pyramidal signs | *(29)* |  |
| **Balance & mobility** |  |  |
| Postural instability   * PIGD phenotype | (1-3, 6, 11, 17, 22) | (13, 26) |
| * Tinetti balance score | (3, 16, 25) |  |
| * Berg Balance scale | (3, 24, 26, 27, 31) |  |
| * Functional reach | (24, 26, 30) | (3) |
| * Postural sway | (3, 20, 30, 31) | (16) |
| * Tandem stand | (22, 30) |  |
| * Single-leg stand | (17, 22) | (13) |
| * Pull-test | (27, 30-33) | *(29)* |
| * Coordinated stability test | (30, 32) | (20, 26) |
| * Mini-BESTest | (12, 18) |  |
| * Tandem walk | (16) |  |
| Transfers   * TUG | (3, 4, 10, 13, 15, 20, 24, 31) | (26) |
| * Sit-to-stand | (12, 13, 30) | (5, 17) |
| Freezing of gait   * FOG-q | (3, 8, 11, 12, 18, 21, 27, 30, 32) | (17) |
| * UPDRS Freezing | (2, 4, 20, 26, 34) | (1, 17) |
| Slowed mobility   * Tinetti gait | (3, 16, 25) |  |
| * Slowed velocity | (5, 10, 13, 17, 22, 27, 30) | (20, 32) |
| * Ambulatory capacity score | (6) |  |
| * Dynamic gait index | (24) | (26) |
| **Non-Motor features** |  |  |
| Autonomic dysfunction   * Symptomatic orthostasis | (3) |  |
| * Orthostatic hypotension | (6, 20, 35) | (4, 14, 17, 23, 25) |
| * Urinary incontinence | (23) | (20) |
| * Total autonomic symptom score | (16, 28) | *(29)* |
| * Time taken for blood pressure to return to baseline on standing | **(28)** |  |
| Psychiatric symptoms   * REM Behavior disorders | (35) |  |
| * Visual Hallucinations   Depression scales |  | *(29)* |
| * CES-D | (23) |  |
| * GDS | (1) | (5, 12, 13, 17, 18) |
| * MADRS | (2) |  |
| * Zung depression score |  | (25) |
| * HDRS |  | (8) |
| * BDI-II |  | (9) |
| Fear of falling   * By questionnaire |  | (25) |
| * FES * PDQ-39: Fear of falling | (24, 26, 27)  (1, 6) | (8) |
| * ABC | (5, 18, 22, 26) | (11, 13, 17) |
| Fluctuations   * Motor | (15) | (4, 15, 26) |
| * Cognitive | (36) |  |
| **Cognitive impairment** |  |  |
| Global impairment   * MMSE total | (2, 10, 20, 27, 30) | (3-5, 7, 12, 13, 21, 23, 25, 26) |
| * MMSE orientation | (30, 32) |  |
| * SCOPA-Cog | (6) |  |
| * MoCA total |  | (9, 17, 22) |
| * Clinical Dementia Rating Scale | (34) |  |
| * CAMCOG score |  | (16, 28) |
| * NPI aberrant motor behavior |  |  |
| * Caregiver-reported |  | *(29)* |
| Frontal impairment   * FAB | (20, 25, 30) | (1, 32) |
| * MMSE Attention/Concentration |  | (30) |
| * Power of attention | (14, 22) | (17) |
| * OTS |  | (17) |
| * TMT B-A |  | (9) |
| * MDRS-IP | (18) |  |
| Visuospatial impairment   * MoCA visuospatial | (22) |  |
| * ADAS Constructions | (36) |  |
| Processing speed   * SDMT total | (6) |  |
| * Cognitive reaction time | (14) |  |
| Memory impairment   * Immediate/Delayed recall | (15) |  |
| * PRM |  | (17) |
| * SRM |  | (17) |
| * MMSE memory sub-score |  | (30) |
| Verbal impairment   * Semantic fluency | (15) |  |
| * MMSE language | (30) |  |
| Dual-Tasking   * By questionnaire | (27) |  |
| * Dual-motor task | (9) |  |
| * Motor-cognitive task |  | (9, 10) |
| **Activities of Daily Living/Quality of Life** |  |  |
| * UPDRS ADL sub-score | (3-8, 11, 24, 26) |  |
| * PDQ | (1, 15) | (17, 25) |
| * Schwab & English score | (11, 21, 24, 26) | (26) |
| * PADLS | (27) |  |
| * EQ-5D total | (6) |  |
| * SF8 | (25) |  |
| * SADS | (8) |  |
| * Physical activity score | (28) |  |
| * Barthel scale | **(16)** |  |
| Use of assistive devices | (13) | (23) |
| **Other impairments** |  |  |
| * Visual | (20, 23) |  |
| * Proprioception | (30) | (1) |
| * Light touch |  | (20) |
| * Hand/foot reaction time |  | (20) |
| * Lower extremity strength | (20, 30) |  |

Studies assessing fall risk in PD were limited to prospective studies within the last 10 years. Those that compared frequent vs infrequent fallers: (4, 7, 10-13, 15, 16, 18, 24). Studies listed in **bold** assessed fall risk factors in DLB. The study listed in *italics* assessed fall risk factors in MSA.

ABC: Activities-Specific Balance Confidence scale; ADAS: Alzheimer’s disease assessment scale; BDI-II: Beck depression inventory II; CES-D: Center for epidemiological studies depression scale; EQ-5D: EuroQOL 5 dimensional questionnaire; FES: Falls efficacy scale; GDS: Geriatric depression scale; HDRS: Hamilton depression rating scale; HY: Hoehn and Yahr; MADRS: Montgomery and Asberg depression rating scale; MDRS-IP (Mattis dementia rating scale-initiation/perserveration subset; MMSE: Mini mental status exam;

MoCA: Montreal cognitive assessment; NPI: Neuropsychiatric inventory; OTS: One touch stocking of Cambridge;PADLS: Parkinson's disease activities of daily living scale; PDQ: Parkinson’s disease questionnaire; PRM: Pattern Recognition Memory; SADS: Self-Assessment disability scale (SADS); SCOPA-Cog: Scales for Outcomes in Parkinsons-Cognition; SDMT: Symbol digit modalities test; SRM: Spatial Recognition Memory; SF-8: Short-form health survey; TUG: Timed up-and-go.

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