

# Supplementary Material

## Effects of Oral Levodopa on Balance in People with Idiopathic Parkinson's Disease

**Supplementary Table 1.** Eligibility criteria

Inclusion	Exclusion
<b>Study design</b>	
Original research study Studies in English, French, or Dutch	Case study, case series, review, meta-analysis, editorials, book, letter, conference proceeding, animal studies Other than studies in English, French or Dutch
<b>Patients</b>	
Adults (>18 years) people with idiopathic PD	Secondary or atypical PD Juvenile PD Concurrent neurological or neurodegenerative conditions other than PD (Waiting for) surgical management of PD, e.g., deep brain stimulation, pallidotomy or thalamotomy Physical disabilities related to balance, e.g., Vestibular disorders Not able to stand without help
<b>Intervention</b>	
Oral Levodopa in combination with peripheral dopa decarboxylase inhibitors	Other than dopaminergic medication Non-oral pharmacological therapy for PD Intestinal gel (Levodopa-carbidopa) Dopamine agonist, COMT inhibitors, MAO inhibitors Combination preparation
<b>Comparison</b>	
OFF-medication state	Other types of Parkinson medication Subjects without PD
<b>Outcome</b>	
Balance evaluation Side effects Type, dose, and frequency of medication	Other than balance outcomes Cost effectiveness
COMT inhibitors, Catechol-O-methyltransferase inhibitors; MAO inhibitors, monoamine oxidase inhibitors; PD, Parkinson's disease	

**Supplementary Table 2. Search terms and results**

<b>Search terms and results PubMed (Medline)</b>		
N°	Search term	Results
#1	“Parkinson disease” [MeSH]	67 130
#2	“Parkinson*”[TIAB]	119 493
#3	#2 OR #3	126 957
#4	“Levodopa” [MeSH]	16 318
#5	“Levodopa”[TIAB]	11 739
#6	“L-dopa” [TIAB]	12 101
#7	“On medication”[TIAB]	5 120
#8	“Off medication”[TIAB]	1 144
#9	“On state”[TIAB]	3 624
#10	“Off state”[TIAB]	1 652
#11	“On-off phenomenon”[TIAB]	138
#12	#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14	186 410
#13	#3 AND #12	18 050
#14	“Postural balance”[MeSH]	23 475
#15	“Balance”[TIAB]	225 086
#16	“Postural”[TIAB]	31 769
#17	“Instability”[TIAB]	115 149
#18	“musculoskeletal equilibrium”[TIAB]	6
#19	“postural equilibrium”[TIAB]	162
#20	“Berg Balance Scale” [TIAB] OR “BBS” [TIAB]	3928
#21	“Timed up and go test”[TIAB] OR “TUG”[TIAB]	4860
#22	“Tinetti balance test”[TIAB]	14
#23	“Performance-oriented mobility assessment”[TIAB] OR “POMA- balance”[TIAB]	172
#24	“Balance evaluation systems test”[TIAB] OR “BESTest”[TIAB]	265
#25	“Mini-Balance evaluation systems test”[TIAB] OR “Mini-BESTest”[TIAB]	186
#26	“Functional reach test”[TIAB] OR “FRT”[TIAB]	1 770
#27	“Fullerton Advanced Balance Scale” [TIAB]	44
#28	“Push and release test”[TIAB]	9
#29	“Center of Mass”[TIAB] OR “Centre of Mass”[TIAB] OR “COM”[TIAB]	13 132
#30	“Center of Pressure”[TIAB] OR “Centre of Pressure”[TIAB] OR “COP”[TIAB]	8 996
#31	“Center of gravity”[TIAB] OR “Centre of gravity”[TIAB] OR “COG”[TIAB]	5524
#32	“Ellipse area”[TIAB]	228
#33	“Time-to-boundary”[TIAB]	51
#34	“Limits of stability”[TIAB] OR “LOS”[TIAB]	31 773
#35	“Posturography”[TIAB] OR “posturographic”[TIAB]	2215
#34	“Anterior-posterior sway”[TIAB] OR “AP sway”[TIAB] OR “Medial-lateral sway”[TIAB] OR “ML sway”[TIAB] OR “Mediolateral sway”[TIAB]	245
#35	“integrated time to boundary”[TIAB] OR “iTTB”[TIAB]	5
#36	“Kinetics” [TIAB] OR “Kinematics” [TIAB]	258 458
#37	“Functional Balance Standing Scale”[TIAB]	0
#38	#14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37	292 604
#39	#3 AND #13 AND #38	1297
<b>#39</b>	<b>#3 AND #13 AND #38, Filters: MEDLINE, journal article</b>	<b>1118</b>

<b>Search terms and results Embase</b>		
N°	Search term	Results
#1	“Parkinson disease”/de AND [embase]/lim	142 673
#2	“Parkinson*”:ti,ab,kw AND [embase]/lim	156 795

#3	#1 AND #2	184 024
#4	“Levodopa”/de AND [embase]/lim	47 112
#5	“Levodopa”:ti,ab,kw AND [embase]/lim	17 583
#6	“L-dopa”:ti,ab,kw AND [embase]/lim	14 136
#7	“On medication”:ti,ab,kw AND [embase]/lim	7 573
#8	“Off medication”:ti,ab,kw AND [embase]/lim	1 927
#9	“On state”:ti,ab,kw AND [embase]/lim	3 117
#10	“Off state”:ti,ab,kw AND [embase]/lim	1 733
#11	“On-off phenomenon”:ti,ab,kw AND [embase]/lim	155
#12	#6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13	64 357
#13	“Balance”:ti,ab,kw AND [embase]/lim	228 675
#14	“Postural”:ti,ab,kw AND [embase]/lim	36 155
#15	“body equilibrium”/de AND [embase]/lim	12 485
#16	“body equilibrium”:ti,ab,kw AND [embase]/lim	130
#17	“instability”:ti,ab,kw AND [embase]/lim	121 005
#18	“musculoskeletal equilibrium”:ti,ab,kw AND [embase]/lim	53
#19	“postural equilibrium”:ti,ab,kw AND [embase]/lim	160
#20	“Berg Balance Scale”/de AND [embase]/lim	2 396
#21	“Berg Balance Scale”:ti,ab,kw AND [embase]/lim	2 575
#22	“BBS”:ti,ab,kw AND [embase]/lim	3 921
#23	“Functional Balance Standing Scale”:ti,ab,kw AND [embase]/lim	0
#24	“Timed up and go test”/de AND [embase]/lim	3 520
#25	“Timed up and go test”:ti,ab,kw AND [embase]/lim	2 729
#26	“TUG”:ti,ab,kw AND [embase]/lim	4 502
#27	“Tinetti balance test”:ti,ab,kw AND [embase]/lim	14
#28	“Performance-oriented mobility assessment”/de AND [embase]/lim	651
#29	“Performance-oriented mobility assessment”:ti,ab,kw AND [embase]/lim	186
#30	“POMA-balance”:ti,ab,kw AND [embase]/lim	11
#31	“Balance evaluation systems test”:ti,ab,kw AND [embase]/lim	177
#32	“BESTest”:ti,ab,kw AND [embase]/lim	313
#33	“Mini-Balance evaluation systems test”:ti,ab,kw AND [embase]/lim	86
#34	“Mini-BESTest”:ti,ab,kw AND [embase]/lim	216
#35	“Functional reach test”:ti,ab,kw AND [embase]/lim	590
#36	“FRT”:ti,ab,kw AND [embase]/lim	1 827
#37	“Fullerton Advanced Balance Scale”:ti,ab,kw AND [embase]/lim	38
#38	“Push and release test”:ti,ab,kw AND [embase]/lim	12
#39	“Center of Mass”:ti,ab,kw AND [embase]/lim	3 025
#40	“Centre of Mass”:ti,ab,kw AND [embase]/lim	991
#41	“COM”:ti,ab,kw AND [embase]/lim	27 035
#42	“Center of Pressure”:ti,ab,kw AND [embase]/lim	3 549
#43	“Centre of Pressure”:ti,ab,kw AND [embase]/lim	1 040
#44	“COP”:ti,ab,kw AND [embase]/lim	7 169
#45	“Center of gravity”:ti,ab,kw AND [embase]/lim	1 435
#46	“Centre of gravity”:ti,ab,kw AND [embase]/lim	547
#47	“COG”:ti,ab,kw AND [embase]/lim	6 608
#48	“Ellipse area”:ti,ab,kw AND [embase]/lim	284
#49	“Time-to-boundary”:ti,ab,kw AND [embase]/lim	40
#50	“Limits of stability”:ti,ab,kw AND [embase]/lim	462
#51	“LOS”:ti,ab,kw AND [embase]/lim	48 213
#52	“Posturography”:ti,ab,kw AND [embase]/lim	2 270
#53	“Stabilography”/de AND [embase]/lim	2 618
#54	“Anterior-posterior sway”:ti,ab,kw AND [embase]/lim	74
#55	“Medial-lateral sway”:ti,ab,kw AND [embase]/lim	45
#56	“mediolateral sway”:ti,ab,kw AND [embase]/lim	65
#57	“ML sway”:ti,ab,kw AND [embase]/lim	66
#58	“AP sway”:ti,ab,kw AND [embase]/lim	74

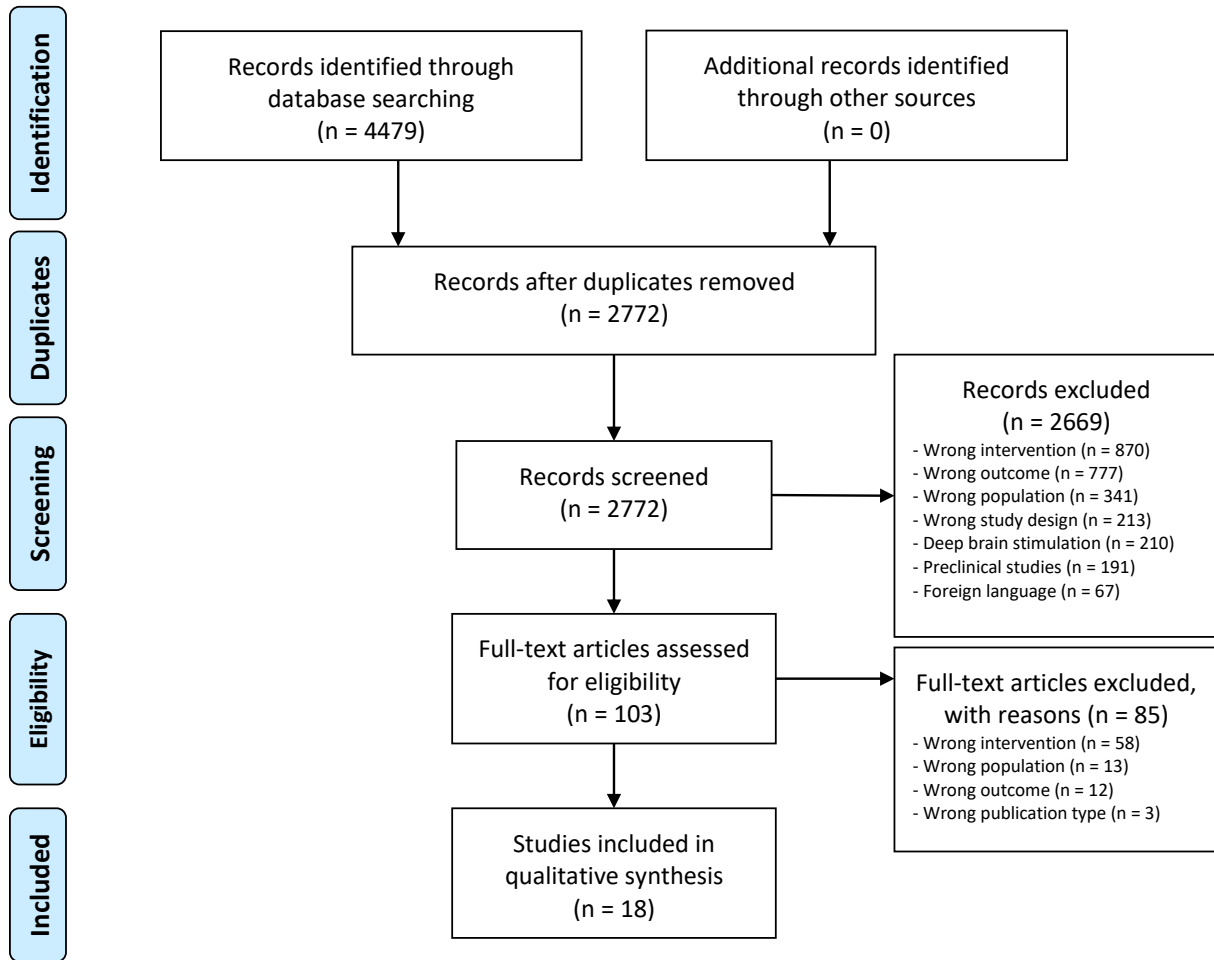
#59	“integrated time to boundary”:ti,ab,kw AND [embase]/lim	1
#60	“ITTB”:ti,ab,kw AND [embase]/lim	10
#61	“posturographic”:ti,ab,kw AND [embase]/lim	585
#62	“Kinetics”:ti,ab,kw AND [embase]/lim	228 971
#63	“Kinetics”/de AND [embase]/lim	80 859
#64	“Kinematics”:ti,ab,kw AND [embase]/lim	20 827
#65	“Kinematics”/de AND [embase]/lim	24 807
#66	#13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61	744 939
#67	#5 AND #14 AND #62	2920
<b>#68</b>	<b>#63 AND ‘article’/it</b>	<b>1 418</b>

### Search terms and results Web of Science

N°	Search term	Results
#1	TS= (Parkinson*)	178 793
#2	TS= (Levodopa)	16 623
#3	TS= (L -dopa)	16 236
#4	TS= (On medication)	175 793
#5	TS= (Off medication)	6 752
#6	TS= (On-off phenomenon)	1 155
#7	TS= (on-state)	20 371
#8	TS= (off-state)	9438
#9	#2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8	232 180
#10	TS= (Postural balance)	13 716
#11	TS= (Instability)	394 539
#12	TS= (postural)	38 406
#13	TS= (Balance)	744 549
#14	TS= (musculoskeletal equilibrium)	206
#15	TS= (postural equilibrium)	1 267
#16	TS= (Berg Balance Scale)	2 340
#17	TS= (BBS)	3 892
#18	TS= (Functional balance standing scale)	641
#19	TS= (Timed up and go test)	5 618
#20	TS= (TUG)	5 227
#21	TS= (Tinetti balance test)	348
#22	TS= (Performance oriented mobility assessment)	242
#23	TS= (POMA-balance)	9
#24	TS= (Balance evaluation systems test)	2 812
#25	TS= (BESTest)	331
#26	TS= (Mini-balance evaluation systems test)	91
#27	TS= (Mini-BESTest)	222
#28	TS= (Functional reach test)	7 472
#29	TS= (FRT)	2 487
#30	TS= (Fullerton Advanced Balance Scale)	68
#31	TS= (Push and release test)	434
#32	TS= (Center of mass)	110 000
#33	TS= (Center of pressure)	79 716
#34	TS= (Centre of mass)	110 000
#35	TS= (Centre of pressure)	79 716
#36	TS= (COP)	20 899
#37	TS= (COM)	49 587

#38	TS= (center of gravity)	16 018
#39	TS= (centre of gravity)	16 018
#40	TS= (COG)	10 607
#41	TS= (Limits of stability)	140 726
#42	TS= (LOS)	67 580
#43	TS= (ellipse area)	2 548
#44	TS= (posturography)	2 494
#45	TS= (Anterior-posterior sway)	759
#46	TS= (medial-lateral sway)	417
#47	TS= (mediolateral sway)	517
#48	TS= (ML sway)	395
#49	TS= (AP sway)	372
#50	TS= (integrated time to boundary)	7 214
#51	TS= (posturographic)	552
#52	TS= (kinetics)	730 293
#53	TS= (kinematics)	103 587
#54	TS= (time to boundary)	177 528
#55	#10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR#20 OR #21 OR #22 OR#23 OR #24 OR #25 OR#26 OR #27 OR #28 OR#29 OR #30 OR #31 OR #32 OR #33 OR #34 OR#35 OR #36 OR #37 #38 OR#39 OR #40 OR #41 OR #42 OR #43 OR #44 OR#45 OR #46 OR #47 #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54	2 5553 018
#56	#1 AND #9 AND #40	1905
#57	<b>#41 AND Document types: (Article)</b>	<b>1558</b>

Supplementary Figure 1. PRISMA flowchart



**Supplementary Table 3. Demographic data individual studies**

Citation	Eligibility criteria	Sample size (n)	Age	Sex (♂/♀)	UPDRS – M	Hoehn and Yahr score <sup>a</sup>	Disease duration	Dose and time between intake and ON testing
Baston 2016 [1]	Idiopathic PD Levodopa Medication  No other musculoskeletal or neurological impairment	HYI/II: 33 HYIII/IV: 37	HYI/II: 67 (5) HYIII/IV: 67 (7)	HYI/II: 24/9 HYIII/IV: 20/17	OFF: 35 (8) HYI/II: 35 (8) HYIII/IV =42 (11) ON: HYI/II: 29 (8) HYIII/IV =35 (10)	HYI/II: 33 HYIII/IV: 37	NR	125% of the usual dose after 60 min
Burleigh 1995 [2]	Idiopathic PD Levodopa Medication	11	61.6 (4.5)	6/5	NR	HYIII/IV: 11	13 (6-35) <sup>b</sup>	100% of the usual dose after 60 min
Burleigh 1997 [3]	Idiopathic PD Levodopa Medication	6	66.7 (6.2)	NR	NR	HYIII/IV: 6	NR	100% of the usual dose OFF-ON: 60 min ON-OFF: NR
Curtze 2015 [4]	Idiopathic PD Levodopa Medication  No other musculoskeletal or neurological impairments	HYII: 52 HYIII/IV: 52	HYII: 66.7 (5.5) HYIII/IV: 66.3 (6.6)	HYII: 40/30 HYIII/IV: 34/18	OFF HYII: 32.8 (10.5) HYIII/IV: 38.8 (11.9) ON HYII: 27.7 (12.2) HYIII/IV: 31.8 (11.5)	HYII: 52 HYIII/IV: 52	HYII: 7.2 (3.9) HYIII/IV: 10.4 (6.8)	125% of the usual dose after 60 min
Fetoni 1997 [5]	Idiopathic PD Levodopa Medication No dementia	9	64 (8.4)	3/6	OFF: 44.5 (8.2) ON: 9.8 (8.7)	HYIII/IV: 9	10.7 (7)	250 mg Levodopa + 25 mg carbidopa after 90 min
Foreman 2011 [6]	Idiopathic ambulatory PD and > 40 years  No surgical management, uncontrolled motor fluctuations or other balance disorders	F: 22 NF: 14	F: 71.0 (11.4) NF: 66.6 (10.0)	F: 14/8 NF: 10/4	OFF: F: 27.3 (8.0) NF: 25.4 (10.0) ON: F: 17.0 (8.1) NF: 11.6 (6.4)	OFF: F: 3 (2.5-4) <sup>b,c</sup> NF: 2.5 (1.5-3) <sup>b,c</sup> ON: F: 2.5 (1.5-4) <sup>b,c</sup> NF: 2.25 (1.5-2.5) <sup>b,c</sup>	F: 8.2 (4.6) NF: 4.6 (3.3)	100% of the usual dose after 60-90 min
Frank 2000 [7]	Idiopathic PD  No neurological, psychological, musculoskeletal disorders affecting posture	10	61 (6)	4/6	NR	HYIII/IV: 10	NR	100% of the usual dose after 30 min
Franzen 2009 [8]	Idiopathic PD (HYII/III) Levodopa medication	15	63 (8)	15/0	OFF: 34.5 ON: 24	HYII/III: 15 <sup>c</sup>	6.5	100% of the usual dose after 60 min

Citation	Eligibility criteria	Sample size (n)	Age	Sex (♂/♀)	UPDRS – M	Hoehn and Yahr score <sup>a</sup>	Disease duration	Dose and time between intake and ON testing
	No atypical PD symptoms or other neurological disorders							
Horak 1996 [9]	Idiopathic PD At least partially responsive to Levodopa	13	61 (6)	7/6	NR	HYIII/IV: 13	11.1 (7.1)	100% of the usual dose after 60 min
Horak 2016 [10]	Idiopathic PD No neurological or orthopaedic disorders No walking impairments or walking aids needed	100	66.6 (6.4)	74/26	OFF: 39.9 (11.9) ON: 29.8 (11.9)	OFF: 2.51 (0.57) ON: 2.33 (0.53)	8.8 (5.8)	125% of the usual dose after 60 min
King 2008 [11]	Idiopathic PD	13	63 (2)	9/4	OFF: 46.5 (17.3) ON: 25.2 (17.4)	HYII: 2 <sup>c</sup> HYIII/IV=11 <sup>c</sup>	12.4 (7)	100% of the usual dose after > 45 min
Mehdizadeh 2019 [12]	Idiopathic PD MMSE > 21	140	60.5 (12.3)	93/47	NR	HYI/II: 140	NR	100% of the usual dose after 60 min
Nova 2004 [13]	Idiopathic PD (≥ HY 2.5) Levodopa medication No knee/hip osteoarthritis, diabetes or balance impairment	23	58.8	18/5	OFF: 50.6 ON: 32.0	ON: 2.7 <sup>c</sup> OFF: 3.1 <sup>c</sup>	10	100% of the usual dose after 30-60 min
Palmisano 2019 [14]	Idiopathic PD Able to perform stand to walk trials No other neurological, vestibular, cognitive, cardiac diseases, postural hypotension, diabetes, orthopaedic problems/major surgery	F: 9 NF: 15	F: 72* NF: 62*	Total: 12/12 F: 2/7 NF: 10/5	OFF: F: 36* NF: 25.5* ON: F: 18* NF: 8*	NR	F: 9* NF: 10*	200 mg Levodopa + 50 mg benserazide after 60 min
Palmisano 2020 [15]	Idiopathic PD No other neurological, vestibular, cognitive, cardiac diseases, postural hypotension, diabetes, orthopaedic problems. No start hesitation, FoG and L-dopa-related motor fluctuations	13	61.62 (9.13)	8/5	OFF: 26.36 (7.63) ON: 9.54 (4.78)	OFF: 2.62 (0.51) ON: 2.62 (0.51)	10.84 (4.51)	200 mg Levodopa + 50 mg benserazide after 60 min



Citation	Eligibility criteria	Sample size (n)	Age	Sex (♂/♀)	UPDRS – M	Hoehn and Yahr score <sup>a</sup>	Disease duration	Dose and time between intake and ON testing
Peterson 2016 [16]	Idiopathic PD Levodopa medication Able to stand > 1 h without aid  No neurological problems, no orthopaedic injuries, with balance influence	22	66.2 (7.7)	14/8	OFF: 29.2 (10.9) ON: 24.8 (12.4)	NR	6.5 (4.2)	100% of the usual dose and timing NR
Schlenstedt 2017 [17]	Idiopathic PD No neurological disorders or DBS Orthopaedic injuries with influence on gait/balance	19	65.7 (7.6)	12/7	OFF: 30.0 (9.1) ON: 24.6 (9.7)	2.1 (0.3)	6.6 (4)	100% of the usual dose and after <120 min
Valkovic 2008 [18]	Idiopathic PD No neurological or musculoskeletal disorder Cognitive deficits that preclude cooperation	F: 36 NF: 46	F: 65.1 (9.3) NF: 62.4 (8.8)	64/18	OFF: F: 39.4 (8.0) NF: 27.1 (9.1) ON: F: 23.9 (9.0) NF: 13.8 (7.5)	OFF: F: 3.31 (0.68) <sup>c</sup> NF: 2.23 (0.47) <sup>c</sup> ON: F: 2.58 (0.8) <sup>c</sup> NF: 1.54 (0.55) <sup>c</sup>	F: 11.4 (5.3) NF: 5.4 (3.8)	100-125% of the usual dose and after 60 min

Values are presented as mean (SD)

DBS, deep brain stimulation; F, Fallers; NF, Non fallers; HYI-HYIV, Hoehn and Yahr scale I-IV; MMSE, Mini-Mental State Examination; NR, Not reported; UPDRS – M, Unified Parkinson's Disease Rating – Motor subscale score.

<sup>a</sup> Hoehn and Yahr scores are presented as mean (SD) or as the total number of participants (n) in the specified category

<sup>b</sup> Mean (range)

<sup>c</sup> Modified Hoehn and Yahr score

**Supplementary Table 4. Results of quality assessment**

	1) Study question/objective clear?	2) Prespecified eligibility or selection criteria?	3) Representativity of study participants?	4) All eligible participants enrolled?	5) Sample size sufficiently large?	6) Intervention clearly described and delivered consistently?	7) Outcome measures prespecified/reliable?	8) Blinding of researcher?	9) Did the statistical methods examine changes in outcome pre and post intervention (including p value)?	10) Multiple measurements of outcome pre and post intervention?	Quality score /10
Baston 2016 [1]	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	Yes	Yes	8
Burleigh 1995 [2]	Yes	No	Yes	NR	No	Yes	Yes	NR	Yes	No	5
Burleigh 1997 [3]	Yes	No	Yes	NR	No	Yes	Yes	NR	Yes	No	5
Curtze 2015 [4]	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	Yes	Yes	8
Fetoni 1997 [5]	Yes	Yes	Yes	NR	No	Yes	Yes	Yes	Yes	No	7
Foreman 2011 [6]	Yes	Yes	Yes	No	No	Yes	Yes	NR	Yes	No	6
Frank 2000 [7]	Yes	No	Yes	NR	No	Yes	Yes	NR	Yes	Yes	6
Franzén 2009 [8]	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	Yes	No	7
Horak 1996 [9]	Yes	Yes	Yes	No	No	Yes	Yes	NR	Yes	Yes	7
Horak 2016 [10]	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	Yes	Yes	8
King 2008 [11]	Yes	Yes	Yes	NR	No	Yes	Yes	NR	Yes	Yes	7
Mehdizadeh 2019 [12]	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	No	No	6
Nova 2004 [13]	Yes	Yes	Yes	NR	No	Yes	Yes	NR	Yes	No	6
Palmisano 2019 [14]	Yes	Yes	Yes	NR	No	Yes	Yes	NR	Yes	Yes	7
Palmisano 2020 [15]	Yes	Yes	Yes	NR	No	Yes	Yes	NR	Yes	Yes	7
Peterson 2016 [16]	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	Yes	Yes	8
Schlenstedt 2017 [17]	Yes	Yes	Yes	NR	No	Yes	Yes	NR	Yes	Yes	7
Valkovic	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	No	No	6

2008 [18]

NR, Not reported

**Supplementary Table 5. Outcome details**

	<b>Intervention</b>	<b>Outcome measure</b>	<b>Unit</b>	<b>Definition</b>	<b>Outcome</b>
Baston 2016 [1]	Standing posturography (inertial sensors at the trunk)	RMS AP sway CoM	m/s <sup>2</sup>	Root mean square of the movement of the CoM in the AP direction	ROT
		Percentage of time in ankle strategy	%	% of posturography time using ankle strategy	MA
		Percentage of time in hip strategy	%	% of posturography time using hip strategy	MA
Burleigh 1995 [2]	Standing posturography (force plate)	AP sway mean amplitude CoP	cm	The mean amplitude of the movement of the CoP in the AP direction	ROT
		SD of AP sway amplitude CoP	/	The standard deviation of the amplitude of the AP sway of the CoP	ROT
		AP sway mean velocity CoP	cm/s	Mean velocity of the movement of the CoP in the AP direction	MA
		Sway length	cm	Pathlength of the movement of the CoP	ROT
Burleigh 1997 [3]	Step initiation (self/cued, force plate & camera- based tracking)	Sway velocity CoM - self initiated	cm/s	Mean velocity of the movement of the CoM at heel-off	ROT
		Anticipation phase - self initiated	ms	Time from initial increase in the swing limb Fz to the time of heel-off	ROT
		Push off phase - self initiated	ms	Time from heel-off to foot-off of the initial swing limb	ROT
		AP sway CoM velocity– self initiated	cm/s	Velocity of the CoM in the AP direction	ROT
		Sway velocity CoM - response to cue	cm/s	Mean velocity of the movement of the CoM at heel-off	ROT
		Reaction time phase - response to cue	ms	Time from cue to initial increase of swing limb Fz	MA
		Anticipation phase - response to cue	ms	Time from initial increase in the swing limb Fz to the time of heel-off	ROT
		Push off phase - response to cue	ms	Time from heel-off to foot-off of the initial swing limb	ROT
		Step length - response to cue	cm	Length of first step	ROT
		AP sway CoM velocity (cm/s) – response to cue	cm/s	Velocity of the CoM in the AP direction	ROT
		Backward platform translation (3.6 cm at 5 cm/s, force plate & camera-based tracking)		Sway velocity CoM	cm/s
Reaction time phase	ms			Time from cue to initial increase of swing limb Fz	MA
Anticipation phase	ms			Time from initial increase in the swing limb Fz to the time of heel-off	ROT

		Push off phase	ms	Time from heel-off to foot-off of the initial swing limb	ROT
		Step length	cm	Length of first step	ROT
<hr/>					
	<b>Intervention</b>	<b>Outcome measure</b>	<b>Unit</b>	<b>Definition</b>	<b>Outcome</b>
Curtze 2015 [4]	Standing posturography (full-body inertial sensors)	AP sway RMS	m/s <sup>2</sup>	Root mean square of acceleration time series in AP direction	ROT
		ML sway RMS	m/s <sup>2</sup>	Root mean square of acceleration time series in ML direction	MA
		AP mean sway velocity	m/s	Mean velocity of derivative of acceleration in AP direction	MA
		ML mean sway velocity	m/s	Mean velocity of derivative of acceleration in ML direction	MA
		Centroidal frequency AP	Hz	Centroidal frequency in AP direction; variability of the acceleration traces power ranging from 0 to 1	MA
		Centroidal frequency ML	Hz	Centroidal frequency in ML direction; variability of the acceleration traces power ranging from 0 to 1	MA
		Frequency dispersion/sway dispersion AP	/	AP frequency dispersion; dimensionless measure of variability of the frequency content of the power spectral density (0 for a pure sinusoid, it increases with spectral bandwidth to 1)	ROT
		Frequency dispersion/sway dispersion ML	/	ML frequency dispersion; dimensionless measure of variability of the frequency content of the power spectral density (0 for a pure sinusoid, it increases with spectral bandwidth to 1)	ROT
		Normalized jerk AP	/	Smoothness of sway, time derivative of AP acceleration normalized to range of AP acceleration excursion and duration	MA
		Normalized jerk ML	/	Smoothness of sway, time derivative of ML acceleration normalized to range of AP acceleration excursion and duration Smoothness	MA
	Step initiation (full-body inertial sensors)	APA duration	s	Time from APA onset to end	MA
		APA latency	s	Time from APA onset to heel strike	ROT
		APA peak AP	g	Peak trunk acceleration forward from baseline	MA
		APA peak ML	g	Peak trunk acceleration lateral from baseline	MA
RoM first step		°	Range of motion of the leg	MA	
		Duration of first step	s	Duration of first step	ROT
Fetoni 1997 [5]	Clinical test	Pull test + arise from chair	/	Test for postural reflexes (rise from chair and pull test)	MA



	<b>Intervention</b>	<b>Outcome measure</b>	<b>Unit</b>	<b>Definition</b>	<b>Outcome</b>
Foreman 2011 [6]	Clinical test	TUG	s	The time that a person takes to rise from a chair, walk three meters, turn around 180 degrees, walk back to the chair, and sit down while turning 180 degrees	MA
		Pull test	/	In this test the examiner stands behind the patients and by pulling on their shoulder tries to make them fall backwards.	MA
Frank 2000 [7]	Posturography (camera-based tracking)	Time to reach peak CoP	ms	Time to reach peak CoP	ROT
		Dorsiflexor torque	N*m/ms	The torque calculated from the integral below the baseline torque (quiet stance) until it recovered above this level	ROT
		Onset of gastrocnemius contraction	ms	Timing of gastrocnemius contraction when fast rising to the toes referenced to the peak of dorsiflexion torque (0 ms) responsible for preparatory postural adjustment.	ROT
		Onset of tibialis anterior contraction	ms	Timing of tibialis anterior contraction when fast rising to the toes referenced to the peak of dorsiflexion torque (0 ms) responsible for preparatory postural adjustment.	ROT
		Peak CoM AP displacement	cm	Maximal displacement of the CoM in cm	ROT
		Peak CoP AP displacement	cm	Maximal displacement of the CoP in cm	ROT
Franzen 2009 [8]	Clinical test	TUG	s	The time that a person takes to rise from a chair, walk three meters, turn around 180 degrees, walk back to the chair, and sit down while turning 180 degrees	MA
		BBS	/	Berg Balance Scale as described by Berg et al.[19]	MA
		FRT	cm	Patients must stand beside a horizontally placed tape at shoulder level, with shoulders perpendicular to the measuring tape and both arms stretched out in a 90° shoulder flexion. Then they were instructed to “reach forward as far as you can without losing balance or taking a step” and the number of centimetres they reached from the initial position is measured	ROT
		360° turn	s	Time to make a 360 degrees turn	ROT
		180° turn	s	Time to make a 180 degrees turn	ROT

	<b>Intervention</b>	<b>Outcome measure</b>	<b>Unit</b>	<b>Definition</b>	<b>Outcome</b>
Horak 1996 [9]	Posterior platform translation (various amplitudes, force plate & camera-based tracking)	AP CoM sway velocity	mm/s	Velocity of the CoM in the AP direction during platform translation (12 cm)	ROT
		Peak CoM AP displacement	cm	Maximal displacement of the CoM in cm during platform translation (12 cm)	MA
		Peak CoP AP displacement	cm	Maximal displacement of the CoP in cm during platform translation (12 cm)	ROT
		Time to reach peak CoP	ms	Time to reach peak CoP during platform translation (12 cm)	ROT
Horak 2016 [10]	Posturography (full-body inertial sensors)	Jerk	m <sup>2</sup> /s <sup>5</sup>	Time derivate of acceleration	ROT
		Sway mean amplitude	m/s <sup>2</sup>	Mean distance from center of CoM	ROT
		RMS of sway mean distance	m/s <sup>2</sup>	RMS of CoM	ROT
		Sway pathlength	m/s <sup>2</sup>	Total length of CoM trajectory	ROT
		Acceleration range	m/s <sup>2</sup>	Range of CoM displacement	ROT
		Sway area	mm <sup>2</sup> /s	Area spanned from the CoM per second	ROT
		Mean frequency of sway	Hz	Mean frequency of sway	ROT
		CoM acceleration range	m	Range of CoM displacement (inverted pendulum model)	ROT
	RMS of CoM	m	RMS of CoM (inverted pendulum model)	ROT	
	Step initiation (full-body inertial sensors)	Step length	Deg	Length of first step	MA
Peak ML acceleration		m/s <sup>2</sup>	Peak of acceleration in ML direction	MA	
King 2008 [11]	Lateral platform translation (12 cm at 14.6 cm/s, camera-based tracking)	Step length	mm	Length of first step during side step strategy	MA
		Step velocity	m/s	Velocity of first step during side step strategy	MA
		Step latency	ms	The time of surface translation to first detectable vertical motion of the lateral malleolus marker of the stepping foot compared with back- ground, stationary stance during side step strategy	MA
	Trials with APA	%	Percentage of trials with APA	ROT	
	APA latency	ms	Time between start of perturbation and the moment when the difference in weight loading began to displace from its background level during side step strategy	ROT	
	Peak APA	N	The maximal displacement of the participants' weight on a given trial	MA	



	<b>Intervention</b>	<b>Outcome measure</b>	<b>Unit</b>	<b>Definition</b>	<b>Outcome</b>
King 2008 [11]	Lateral platform translation (12 cm at 14.6 cm/s, camera-based tracking)	Step strategy	/	Which step strategy is used (side step, cross over, no step)	ROT
		% falls side step strategy	%	Fall percentage in side step strategy	ROT
		% falls cross over strategy	%	Fall percentage in cross over step strategy	ROT
Nova 2004 [13]	Clinical test	BBS	/	Berg Balance Scale as described by Berg et al.[19]	ROT
Palmisano 2019 [14]	Step initiation from sitting (force plate & camera-based tracking)	Peak AP velocity	m/s	Peak velocity of the CoM in the AP direction during step initiation	MA
		Stabilisation duration	s	Duration of the stabilisation (Peak of the vertical Th8-marker velocity to the time of gait initiation (heel-off of the swing limb))	MA
		Seat off velocity	m/s	Velocity at seat off	ROT
Palmisano 2020 [15]	Step initiation from standing (force plate & camera-based tracking)	Imbalance phase duration	s	Duration between APA onset and heel off	MA
		Imbalance phase CoP displacement AP/ML	mm	CoP displacement during imbalance phase in AP/ML direction	MA
		Imbalance phase CoP average velocity AP/ML	mm/s	CoP average velocity during imbalance phase in AP/ML direction	MA
		Imbalance phase CoP maximal velocity AP/ML	mm/s	CoP maximal velocity during imbalance phase in AP/ML direction	ROT
		Unloading phase duration	s	Duration between heel off and toe off of the swing leg	ROT
		Unloading phase CoP displacement AP	mm	CoP displacement during unloading phase in AP direction	ROT
		Unloading phase CoP average velocity AP	mm/s	CoP average velocity during unloading phase in AP direction	ROT
		Unloading phase CoP maximal velocity AP	mm/s	CoP maximal velocity during unloading phase in AP direction	ROT
		First step length	m	Length of first step	MA
		First step average velocity	m/s	Average velocity first step	MA

	<b>Intervention</b>	<b>Outcome measure</b>	<b>Unit</b>	<b>Definition</b>	<b>Outcome</b>
Peterson 2016 [16]	Backwards/ forwards perturbation (15 cm at 56 cm/s, force plate & camera-based tracking))	Step latency forward perturbation	ms	Time between perturbation onset and foot lift- off	MA
		Step latency backward perturbation	ms	Time between perturbation onset and foot lift- off	ROT
		Step length forward perturbation	m	The AP distance between the 2 feet at first foot contact.	MA
		Step length backward perturbation	m	The AP distance between the 2 feet at first foot contact.	ROT
		Number of steps forward perturbation	/	The number of foot- falls between perturbation onset and the time of maximum CoM displacement.	ROT
		Number of steps backward perturbation	/	The number of foot- falls between perturbation onset and the time of maximum CoM displacement.	ROT
		CoM displacement forward perturbation	m	The AP distance travelled by the whole-body CoM	MA
		CoM displacement backward perturbation	m	The AP distance travelled by the whole-body CoM	ROT
		Margin of stability sway/ML sway backward/forward perturbation	m	The distance between the boundary of support and the extrapolated CoM (XCoM) at first foot contact	ROT
		Clinical test	Mini BESTest	/	The Mini BESTest is a 14-item test scored on a 3-level ordinal scale (0-2)
Schlenstedt 2017 [17]	Step initiation (force plate & camera-based tracking)	ML size of APA	mm	The maximal ML distance from 2 consecutive local CoP peaks toward the stepping leg	MA
		Step length	m	Distance between the left and right heel markers at the moment of first foot contact	MA
		Step duration	s	Time from toe off to first foot contact	MA
		Step velocity	m/s	Step length/step duration	MA
	Response to perturbation (6 cm at 4 cm/s or 15 cm at 56 cm/s, force plate & camera-based tracking))	ML size of APA small/big perturbation	mm	The maximal ML distance from 2 consecutive local CoP peaks toward the stepping leg	MA
		Step length small/big	m	Distance between the left and right heel markers at the moment of first foot contact	MA
		Step duration small/big perturbation	s	Time from toe off to first foot contact	MA
	Step velocity small/big perturbation	m/s	Step length/step duration	MA	

	Clinical test	Mini BESTest	/	The Mini BESTest is a 14-item test scored on a 3-level ordinal scale (0-2)	MA
Valkovic 2008 [18]	Clinical test	Pull test	/	In this test the examiner stands behind the patients and by pulling on their shoulder tries to make them fall backwards.	MA
		Push and Release test	/	It this test the postural response to a sudden release of a subject pressing backward on an examiner's hands placed on the subject's back is measured	MA

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AP, anterior-posterior; ML, mediolateral; APA, anticipatory postural adjustment; BBS, Berg balance scale; CoM, Center of mass; CoP, Center of pressure; Deg, degrees; MA, meta-analysis; ND, not determined; FRT, functional reach test; F<sub>z</sub>, vertical force; NS, not significant; RMS, root mean square; RoM, range of motion; ROT, residual outcome tables; SD, standard deviation; TUG, timed up and go.

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