Supplementary Material

Is There an Association Between Parkinson's Disease and Periodontitis? A Systematic Review and Meta-Analysis

Supplementary Method

Literature search strategy in PubMed database

#1   Parkinson Disease [MeSH] OR Parkinsonian Disorders [MeSH]

#2   parkinson* Field: Title/Abstract

#3   PDD OR MCI-PD OR PD-MCI OR PD-CIND. Field: Title/Abstract

#4 (idiopathic parkinson* AND disease) OR (parkinson* AND (disease dement*)) OR (cognit* AND (PD OR parkinson*)) OR (CIND AND parkinson*). Field: Title/Abstract

#5   #1 OR #2 OR #3 OR #4

#6   Periapical diseases [MeSH] OR periodontal diseases [MeSH]

#7 dental* OR tooth OR teeth OR "tooth root*" OR (root* AND teeth) OR (tooth AND apex) OR (teeth AND apex) OR (teeth AND apices) OR periapical OR peri-apical OR dentoalveol* OR dento-alveol* OR periradicular OR peri-radicular. Field: Title/Abstract

#8 disease* OR abscess* OR granuloma* OR lesion* OR infect* OR inflam* OR pyorrhea* OR pathosis. Field: Title/Abstract
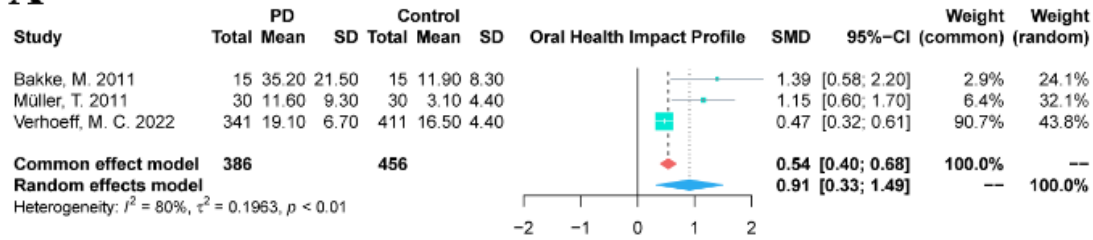
#9   #7 AND #8

#10 periodont* OR gingivitis OR gingiva* OR paradont* OR pericementiti*. Field: Title/Abstract
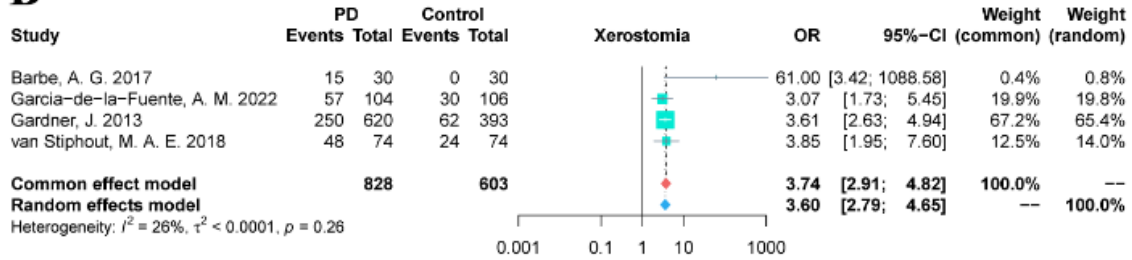
#11   #6 OR #9 OR #10

#12   #5 AND #11

Supplementary Figure 1. Forest plots of meta-analysis for the oral status in Parkinson's disease.
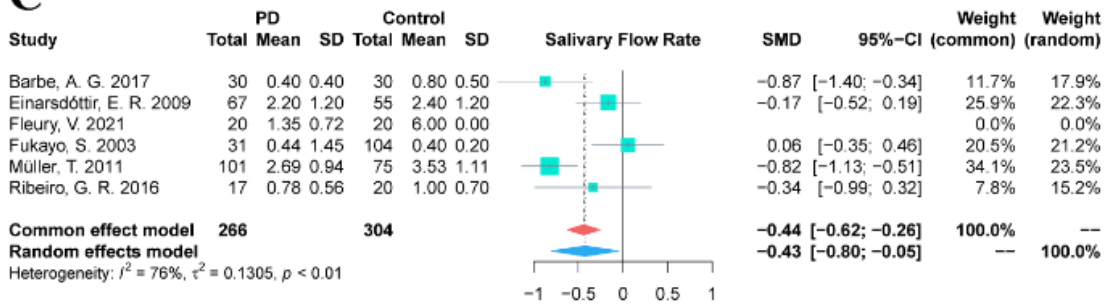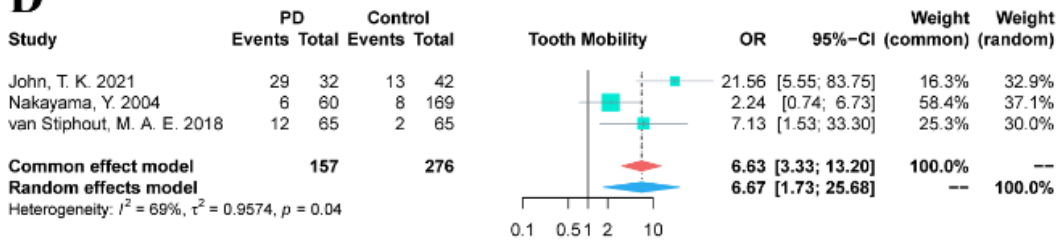
F

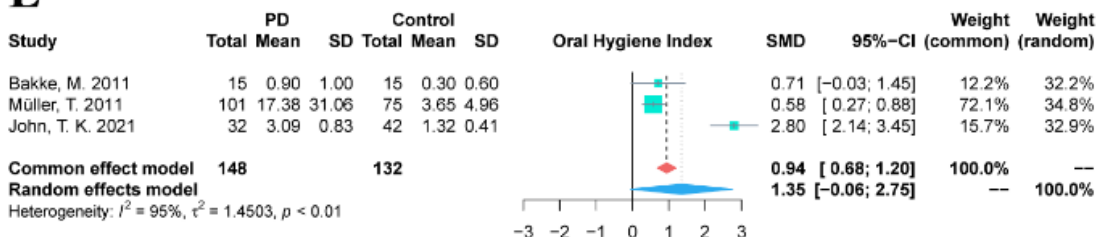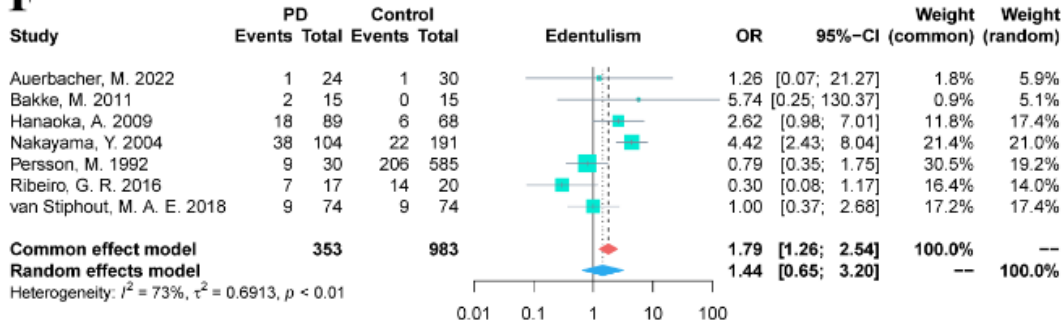| Study	PD Events	Total	Control Events	Total	Edentulism	OR	95%-CI	Weight (common)	Weight (random)
Auerbacher, M. 2022	1	24	1	30		1.26	[0.07; 21.27]	1.8%	5.9%
Bakke, M. 2011	2	15	0	15		5.74	[0.25; 130.37]	0.9%	5.1%
Hanaoka, A. 2009	18	89	6	68		2.62	[0.98; 7.01]	11.8%	17.4%
Nakayama, Y. 2004	38	104	22	191		4.42	[2.43; 8.04]	21.4%	21.0%
Persson, M. 1992	9	30	206	585		0.79	[0.35; 1.75]	30.5%	19.2%
Ribeiro, G. R. 2016	7	17	14	20		0.30	[0.08; 1.17]	16.4%	14.0%
van Stiphout, M. A. E. 2018	9	74	9	74		1.00	[0.37; 2.68]	17.2%	17.4%
Common effect model		353		983		1.79	[1.26; 2.54]	100.0%	--
Random effects model						1.44	[0.65; 3.20]	--	100.0%

Heterogeneity: $I^2 = 73\%$, $\tau^2 = 0.6913$, $p < 0.01$

0.01 0.1 1 10 100

G

Study	PD Total	Mean	SD	Control Total	Mean	SD	DMFT	SMD	95%-CI	Weight (common)	Weight (random)
Auerbacher, M. 2022	24	21.70	5.40	30	18.30	5.90		0.59	[0.04; 1.14]	8.5%	14.0%
Einarsdóttir, E. R. 2009	67	22.94	4.41	55	20.57	5.74		0.47	[0.10; 0.83]	19.7%	15.0%
Fukayo, S. 2003	31	19.30	8.35	104	25.80	3.06		-1.35	[-1.78; -0.92]	13.7%	14.7%
Garcia-de-la-Fuente, A. M. 2022	104	18.76	7.30	106	17.75	7.70		0.13	[-0.14; 0.40]	35.1%	15.4%
John, T. K. 2021	32	7.72	4.45	42	4.57	3.58		0.78	[0.31; 1.26]	11.3%	14.4%
Kennedy, M. A. 1994	28	21.10	4.90	14	16.40	7.96		0.76	[0.10; 1.42]	5.8%	13.3%
Ribeiro, G. R. 2016	17	24.82	3.76	20	26.85	2.18		-0.66	[-1.33; 0.01]	5.8%	13.3%
Common effect model	303			371				0.10	[-0.06; 0.26]	100.0%	--
Random effects model								0.10	[-0.50; 0.70]	--	100.0%

Heterogeneity: $I^2 = 91\%$, $\tau^2 = 0.5914$, $p < 0.01$

-1.5 -1 -0.5 0 0.5 1 1.5

H

Study	PD Total	Mean	SD	Control Total	Mean	SD	Tooth Loss	SMD	95%-CI	Weight (common)	Weight (random)
Auerbacher, M. 2022	24	9.00	6.90	30	6.40	7.80		0.35	[-0.20; 0.89]	8.1%	16.0%
Cicciù, M. 2012	45	13.36	2.01	45	9.53	2.33		1.75	[1.26; 2.23]	9.9%	16.4%
Einarsdóttir, E. R. 2009	67	10.24	9.09	55	6.80	8.80		0.38	[0.02; 0.74]	18.2%	17.3%
Garcia-de-la-Fuente, A. M. 2022	104	11.79	7.80	106	10.53	8.20		0.16	[-0.11; 0.43]	32.1%	17.7%
Müller, T. 2011	101	19.09	10.64	75	19.45	8.71		-0.04	[-0.34; 0.26]	26.4%	17.6%
Ribeiro, G. R. 2016	17	22.18	6.30	20	25.40	4.52		-0.58	[-1.24; 0.08]	5.4%	15.0%
Common effect model	358			331				0.28	[0.13; 0.43]	100.0%	--
Random effects model								0.34	[-0.26; 0.94]	--	100.0%

Heterogeneity: $I^2 = 89\%$, $\tau^2 = 0.5076$, $p < 0.01$

-2 -1 0 1 2

I

Study	PD Total	Mean	SD	Control Total	Mean	SD	Decayed Teeth	SMD	95%-CI	Weight (common)	Weight (random)
Auerbacher, M. 2022	24	4.00	3.30	30	1.00	1.90		1.13	[0.55; 1.71]	5.9%	12.4%
Cicciù, M. 2012	45	4.22	2.62	45	4.51	3.61		-0.09	[-0.50; 0.32]	11.6%	14.5%
Garcia-de-la-Fuente, A. M. 2022	104	2.25	3.03	106	1.65	2.33		0.22	[-0.05; 0.49]	27.0%	16.1%
Hanaoka, A. 2009	89	1.90	3.30	68	0.10	0.60		0.71	[0.39; 1.04]	18.7%	15.5%
Müller, T. 2011	101	2.90	6.64	75	0.67	2.04		0.43	[0.12; 0.73]	21.8%	15.8%
Persson, M. 1992	21	1.10	1.54	379	2.30	2.58		-0.47	[-0.91; -0.03]	10.2%	14.2%
Ribeiro, G. R. 2016	17	0.24	0.75	20	0.20	0.62		0.06	[-0.59; 0.70]	4.8%	11.5%
Common effect model	401			723				0.30	[0.16; 0.44]	100.0%	--
Random effects model								0.28	[-0.09; 0.65]	--	100.0%

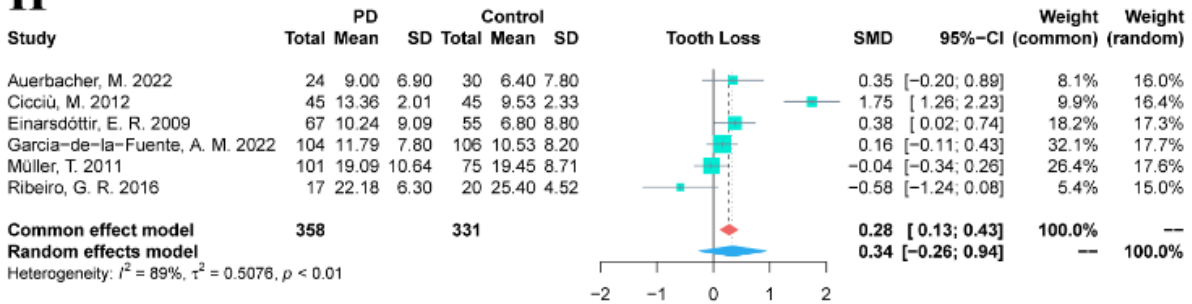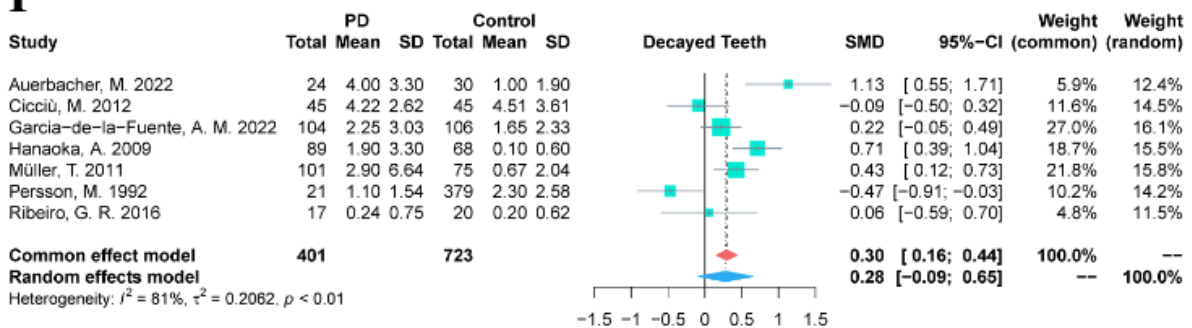Heterogeneity: $I^2 = 81\%$, $\tau^2 = 0.2062$, $p < 0.01$

-1.5 -1 -0.5 0 0.5 1 1.5

Oral status (A. Oral health Impact Profile-14; B. xerostomia; C. salivary flow rate; D. tooth mobility; E. oral hygiene index; F. edentulism; G. decayed, missing, and filled teeth index; H. tooth loss; I. Decayed teeth) of PD patients was compared to healthy control. The results were summarized in Table 3.

Supplementary Figure 2. Leave-one-out sensitivity analysis examining PPD (A), CAL (B), PI (C), and BoP% (D) in patients with Parkinson's disease
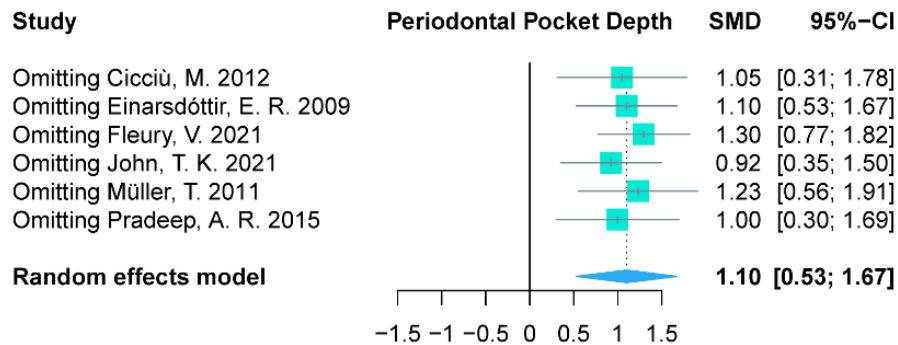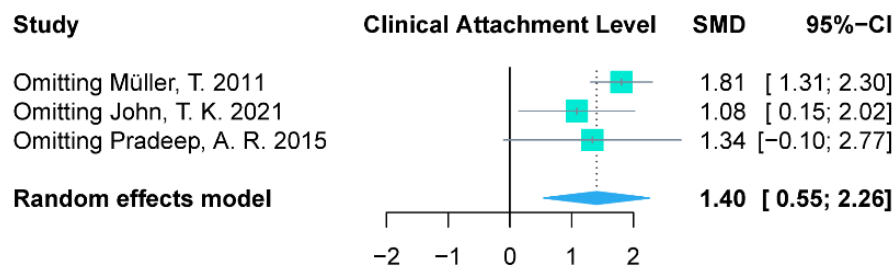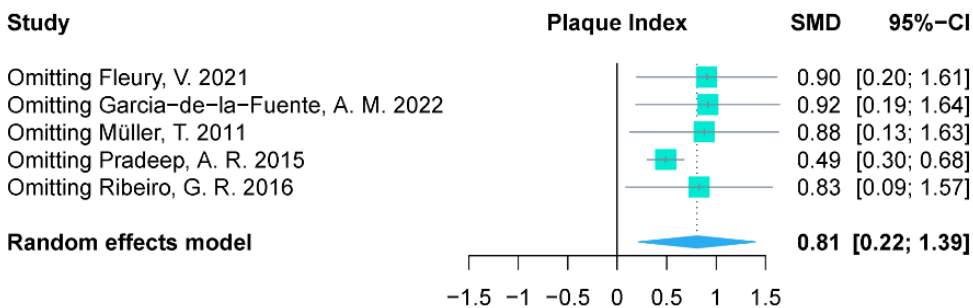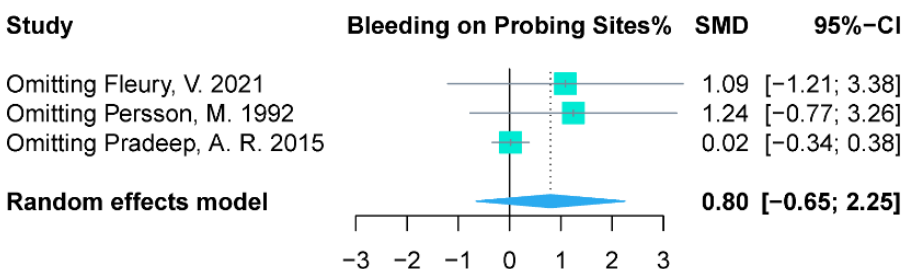

Sensitivity analysis showed that no individual study altered the direction of pooled effect of SMD, indicating that our results of the higher prevalence of periodontitis in PD patients were robust.