

Dietary Intake and Plasma Levels of Polyunsaturated Fatty Acids in Early-Stage Parkinson's Disease

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Supplementary Table S1. Plasma polyunsaturated fatty acid levels according to medication in Parkinson's disease

Plasma level (µg/mL)	Levodopa			MAO-B inhibitor			Dopamine agonist			COMT inhibitor			Amantadine		
	Yes n=28	No n=10	p-value	Yes n=28	No n=10	p-value	Yes n=26	No n=12	p-value	Yes n=10	No n=28	p-value	Yes n=18	No n=20	p-value
ALA	21.1 (9.7)	23.8 (11.9)	0.491	21.4 (10.3)	23.0 (10.6)	0.690	21.9 (10.1)	21.8 (11.0)	0.985	18.3 (10.1)	23.1 (10.2)	0.286 ^a	20.7 (9.8)	22.9 (10.8)	0.522
EPA	16.8 (7.7)	14.1 (6.0)	0.328	15.1 (7.0)	19.0 (7.7)	0.141	16.4 (7.4)	15.5 (7.4)	0.841 ^a	15.1 (7.0)	16.5 (7.5)	0.604	16.2 (7.1)	16.0 (7.7)	0.951
DHA	14.8 (6.1)	13.1 (6.5)	0.465	14.0 (6.2)	15.3 (6.2)	0.584	14.6 (6.7)	13.8 (5.0)	0.724	16.0 (7.4)	13.8 (5.6)	0.321	14.0 (6.9)	14.6 (5.5)	0.443 ^a
LA	246.6 (67.5)	275.1 (77.5)	0.277	259.6 (76.1)	238.7 (51.4)	0.427	261.9 (78.9)	237.1 (45.4)	0.319	211.8 (50.4)	269.2 (71.0)	0.025	247.5 (74.3)	260.0 (96.1)	0.593
AA	38.2 (14.0)	34.9 (7.2)	0.757 ^a	38.8 (13.8)	33.2 (7.3)	0.442 ^a	38.6 (13.2)	34.6 (11.1)	0.312 ^a	38.9 (17.8)	36.8 (10.5)	0.568 ^a	37.9 (15.8)	36.9 (9.2)	0.828 ^a

Data are described as mean (standard deviation); The *p*-values marked in bold indicate significant differences between groups.

For group comparisons, Student's *t*-test was used if not otherwise indicated; ^aMann-Whitney *U* test

Abbreviations: PUFAs, polyunsaturated fatty acids; MAO-B, monoamine oxidase-B; COMT, catechol-O-methyltransferase; ALA, alpha-linolenic acid; EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid; LA, linoleic acid; AA, arachidonic acid

Supplementary Table S2. Association between the Unified Parkinson's Disease Rating Scale item scores and plasma polyunsaturated fatty acid levels in Parkinson's disease

Age-adjusted	Items	Plasma concentrations (µg/mL)											
		ALA		EPA		DHA		LA		AA		ω-6/ω-3 ratio ^a	
		ρ	p	ρ	p	ρ	p	ρ	p	ρ	p	ρ	p
UPDRS I	Intellectual impairment	0.069	0.687	0.207	0.220	0.355	0.031	-0.203	0.229	0.362	0.028	-0.358	0.029
	Thought disorder	-0.056	0.742	0.198	0.241	0.258	0.123	-0.199	0.236	0.087	0.609	-0.231	0.170
	Depression	-0.351	0.033	-0.185	0.272	-0.062	0.716	-0.424	0.009	-0.184	0.275	-0.025	0.886
	Motivation/initiative	-0.198	0.240	-0.101	0.551	-0.033	0.844	-0.140	0.407	0.332	0.044	-0.059	0.731
UPDRS II	Speech	0.093	0.585	-0.134	0.429	-0.154	0.363	0.117	0.491	0.003	0.987	0.015	0.929
	Salivation	0.055	0.745	0.142	0.403	0.297	0.075	-0.216	0.198	0.442	0.006	-0.318	0.055
	Swallowing	-0.111	0.513	-0.086	0.615	0.267	0.110	-0.414	0.011	0.298	0.073	-0.272	0.103
	Handwriting	0.094	0.581	0.278	0.095	0.209	0.214	-0.049	0.771	0.262	0.118	-0.330	0.046
	Cutting food and handling utensils	-0.101	0.553	0.095	0.576	0.084	0.623	-0.144	0.396	-0.061	0.722	0.008	0.965
	Dressing	0.138	0.415	-0.015	0.928	-0.184	0.276	0.134	0.429	0.047	0.782	0.121	0.475
	Hygiene	-0.052	0.760	0.187	0.268	0.052	0.758	-0.118	0.488	0.127	0.455	-0.134	0.428
	Turning in bed and adjusting bed cloths	-0.242	0.148	-0.262	0.117	-0.216	0.199	-0.089	0.600	0.005	0.976	0.140	0.410

	Falling (unrelated to freezing)	0.126	0.458	0.264	0.115	0.186	0.271	-0.052	0.762	0.064	0.708	-0.270	0.106
	Freezing when walking	0.143	0.400	0.190	0.260	0.178	0.293	0.004	0.981	0.030	0.859	-0.246	0.141
	Walking	-0.186	0.271	-0.156	0.356	-0.080	0.639	-0.306	0.066	-0.060	0.726	0.037	0.827
	Tremor	-0.143	0.397	0.166	0.325	0.072	0.672	-0.184	0.276	-0.068	0.691	-0.081	0.632
	Sensory complaints related to parkinsonism	0.040	0.815	0.171	0.311	0.173	0.307	0.046	0.786	0.023	0.890	-0.111	0.514
UPDRS III	Speech	0.014	0.936	0.196	0.246	0.127	0.453	-0.317	0.056	0.029	0.863	-0.281	0.092
	Facial expression	-0.027	0.872	-0.202	0.230	-0.039	0.818	-0.103	0.543	-0.177	0.295	0.073	0.669
	Tremor at rest	0.059	0.728	-0.050	0.769	0.056	0.744	-0.129	0.447	0.143	0.399	-0.199	0.238
	Action or postural tremor of hands	-0.196	0.244	-0.005	0.975	-0.155	0.360	-0.267	0.110	-0.165	0.328	0.022	0.898
	Rigidity	-0.331	0.046	-0.249	0.137	-0.070	0.679	-0.380	0.020	-0.202	0.231	0.005	0.979
	Finger taps	-0.179	0.289	-0.292	0.080	-0.237	0.158	-0.134	0.431	-0.362	0.028	0.094	0.580
	Hand movements	-0.232	0.167	-0.147	0.386	0.001	0.994	-0.096	0.570	-0.042	0.804	0.040	0.814
	Rapid alternating movements of hands	-0.084	0.620	0.009	0.957	0.055	0.748	-0.149	0.379	-0.301	0.070	-0.123	0.469
	Leg agility	-0.133	0.432	0.053	0.753	0.203	0.227	-0.158	0.350	0.277	0.097	-0.147	0.387
	Arising from chair	-0.352	0.033	-0.216	0.200	-0.031	0.855	-0.421	0.010	-0.061	0.719	0.090	0.595
	Posture	-0.038	0.823	0.112	0.511	0.028	0.868	-0.191	0.258	0.110	0.515	-0.200	0.236
	Gait	-0.190	0.261	-0.169	0.318	-0.041	0.808	-0.417	0.010	-0.073	0.667	0.031	0.854

	Postural stability	-0.086	0.612	0.064	0.705	0.049	0.773	-0.237	0.159	0.011	0.948	-0.076	0.655
	Body bradykinesia and hypokinesia	-0.230	0.171	-0.030	0.860	0.019	0.910	-0.156	0.357	-0.109	0.522	0.044	0.794
		Plasma concentrations ($\mu\text{g/mL}$)											
Sex-adjusted		ALA		EPA		DHA		LA		AA		ω-6/ω-3 ratio^a	
	Items	ρ	p	ρ	p	ρ	p	ρ	p	ρ	p	ρ	p
UPDRS I	Intellectual impairment	0.101	0.552	0.221	0.189	0.441	0.006	-0.147	0.386	0.481	0.003	-0.351	0.033
	Thought disorder	-0.044	0.794	0.209	0.215	0.263	0.116	-0.194	0.251	0.089	0.601	-0.244	0.145
	Depression	-0.349	0.034	-0.176	0.299	-0.066	0.699	-0.424	0.009	-0.178	0.293	-0.048	0.777
	Motivation/initiative	-0.178	0.291	-0.086	0.611	0.019	0.910	-0.114	0.502	0.376	0.022	-0.071	0.675
UPDRS II	Speech	0.220	0.192	-0.083	0.627	-0.128	0.449	0.127	0.455	0.019	0.912	-0.073	0.670
	Salivation	-0.185	0.272	0.025	0.883	0.325	0.049	-0.185	0.274	0.515	0.001	-0.113	0.507
	Swallowing	-0.192	0.254	-0.122	0.473	0.314	0.058	-0.358	0.030	0.384	0.019	-0.183	0.279
	Handwriting	0.031	0.854	0.240	0.152	0.266	0.112	-0.007	0.967	0.361	0.028	-0.247	0.141
	Cutting food and handling utensils	-0.023	0.891	0.141	0.407	0.105	0.538	-0.138	0.414	-0.039	0.818	-0.057	0.739
	Dressing	0.070	0.679	-0.055	0.745	-0.285	0.087	0.086	0.614	-0.119	0.481	0.159	0.346
	Hygiene	-0.066	0.699	0.184	0.275	0.078	0.645	-0.101	0.551	0.162	0.338	-0.119	0.484
	Turning in bed and adjusting bed cloths	-0.225	0.180	-0.250	0.136	-0.153	0.365	-0.059	0.728	0.101	0.552	0.132	0.436

	Falling (unrelated to freezing)	0.057	0.739	0.234	0.163	0.106	0.531	-0.090	0.597	-0.065	0.704	-0.239	0.155
	Freezing when walking	-0.044	0.797	0.112	0.509	0.103	0.542	-0.032	0.850	-0.078	0.646	-0.133	0.432
	Walking	-0.153	0.366	-0.137	0.419	-0.066	0.698	-0.301	0.071	-0.042	0.803	0.004	0.983
	Tremor	-0.136	0.423	0.174	0.302	0.017	0.918	-0.208	0.217	-0.156	0.356	-0.110	0.515
	Sensory complaints related to parkinsonism	0.008	0.961	0.158	0.350	0.153	0.365	0.039	0.818	0.000	0.999	-0.090	0.597
UPDRS III	Speech	-0.116	0.493	0.144	0.397	0.080	0.637	-0.348	0.035	-0.028	0.870	-0.206	0.221
	Facial expression	0.074	0.662	-0.158	0.349	-0.027	0.873	-0.104	0.541	-0.164	0.331	-0.007	0.967
	Tremor at rest	0.034	0.842	-0.065	0.702	0.061	0.721	-0.123	0.470	0.144	0.394	-0.176	0.298
	Action or postural tremor of hands	-0.123	0.469	0.037	0.827	-0.168	0.322	-0.278	0.096	-0.197	0.243	-0.054	0.749
	Rigidity	-0.278	0.096	-0.218	0.194	0.002	0.993	-0.352	0.033	-0.074	0.662	-0.042	0.804
	Finger taps	-0.141	0.404	-0.272	0.104	-0.248	0.140	-0.143	0.398	-0.358	0.030	0.049	0.772
	Hand movements	-0.113	0.507	-0.085	0.617	0.112	0.510	-0.053	0.753	0.117	0.492	-0.049	0.772
	Rapid alternating movements of hands	-0.050	0.770	0.030	0.862	0.099	0.562	-0.127	0.454	-0.195	0.246	-0.145	0.391
	Leg agility	-0.161	0.342	0.045	0.790	0.177	0.295	-0.168	0.321	0.207	0.218	-0.141	0.405
	Arising from chair	-0.389	0.017	-0.225	0.180	-0.006	0.972	-0.401	0.014	-0.006	0.974	0.110	0.515
	Posture	-0.069	0.685	0.097	0.567	0.081	0.635	-0.156	0.357	0.199	0.238	-0.159	0.349
	Gait	-0.252	0.132	-0.196	0.244	-0.066	0.697	-0.427	0.008	-0.097	0.567	0.063	0.709

Postural stability	-0.151	0.373	0.038	0.825	-0.031	0.857	-0.275	0.100	-0.117	0.491	-0.055	0.747
Body bradykinesia and hypokinesia	-0.151	0.372	0.009	0.957	-0.079	0.643	-0.198	0.240	-0.282	0.091	-0.052	0.761

The p -values marked in bold indicate statistical significance.

ρ : Spearman's rank correlation coefficient after adjusted for age or sex.

^a ω -6/ ω -3 ratio = (LA+AA)/(ALA+EPA+DHA)

Abbreviations: UPDRS, Unified Parkinson's Disease Rating Scale; PUFAs, polyunsaturated fatty acids; ALA, alpha-linolenic acid; EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid; LA, linoleic acid; AA, arachidonic acid