Supporting Information

Exposure to Inorganic Arsenic and Lead and Autism Spectrum Disorder in Children: A Systematic Review and Meta-Analysis

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Table S1: Data used in statistical analysis for lead

Author and Year	Age	cases	Controls	Mean/ median cases	SD/ range cases	Mean/ median control	SD/ range control	Sample type
Adams et al., 2013[1]	5 – 16 years	55	44	1.04 µg/dl	0.98	0.88 µg/dl	0.66	Blood
Cohen et al., 1976[2]	2 – 13 years	34	10	25.4 µg/dl	17	15.2 µg/dl	4.2	Blood
Macedoni et al., 2015[3]	3 – 9 years	52	22	3.08 µg/dl	3.433	1.86 µg/L	0.724	Blood
Rahbar et al., 2014[4]	2 – 8 years	100	100	2.55 µg/dl	2.02	2.72 µg/dl	2.02	Blood
Tian et al., 2011[5]	34 – 54 months	37	15	1.30 µg/dl	1.01	1.30 µg/dl	0.58	Blood
Laura et al., 2011[6]	2 – 6 years	28	32	0.447 µg/dl	0.264	0.385 µg/dl	0.202	Blood
Mohamed et al., 2016[7]	3 – 8 years	31	20	7.44 µg/dl	3.45	6.99 µg/dl	3.56	Blood
Albizzati et al., 2012[8]	6 – 16 years	17	20	0.59 µg/g	0.22	0.62 µg/g	0.26	hair
Mohamed et al., 2015[9]	2.5 - 15 years	100	100	3.31 µg/g	3.92	2.06 µg/g	2.45	Hair
Lakshmi Priya et al., 2011[10]	4 – 12 years	15	50	17.97 µg/g	2.15	1.56 µg/g	0.18	Hair
Shearer et al., 1982[11]	Mean 8 years	12	12	3.5 µg/g	2 to 25	4.7 µg/g	0 to 20	Hair
Skalny et al., 2017[12]	3 – 8 years	33	33	0.568 µg/g	0.363 - 0.872	0.679 µg/g	0.476 - 1.107	Hair
Blaurock-Busch et al., 2011[13]	3 – 9 years	25	25	0.01 µg/g	0.02	0.01 µg/g	0.01	Hair
Wecker et al., 1985[14]	2 – 11 years	12	22	12.6 µg/g	1.6	10.7 µg/g	1.2	Hair
Adams et al., 2013[1]	5 – 16 years	55	44	0.57µg/g creatinine	0.86	0.32µg/g	0.45	Urine
Yorbik et al., 2010[15]	3 – 12 years	30	20	1.19 µg/g-creatinine	1.98	4.63 µg/g-creatinine	3.83	Urine
Blaurock-Busch et al., 2011[13]	3 – 9 years	25	25	8.45 mcg/g creatinine	7.33	3.36 mcg/g creatinine	4.11	Urine

* statistically significant difference among cases and controls

Table S2: Data used in statistical analysis for Arsenic

Author and Year	Age	cases	Controls	Mean/ Median cases	SD/ range cases	Mean/ median control	SD/ range control	Sample type
Adams et al., 2013[1]	5 – 16 years	55	44	0.43 µg/dl	0.093	0.433 µg/dl	0.084	Red blood cell
Laura et al., 2011[6]	2 – 6 years	28	32	8.53 µg/dl	2.43	1.45 µg/dl	0.696	Blood
Adams et al., 2013[1]	5 – 16 years	55	44	0.330 µg/dl	0.075	0.337 µg/dl	0.056	Blood
Li et al., 2018[16]	3 – 8 years	180	184	1.216 µg/dl	1.373	0.411 µg/ L	0.802	Blood
Al Ayadhi et al., 2005[17]	1 – 14 years	65	80	1.8 µg/g	0.16	0.23 µg/g	0.05	Hair
Blaurock-Busch et al., 2011[13]	3 – 9 years	25	25	0.20 µg/g	0.26	0.06 µg/g	0.04	Hair
Kern et al., 2007[18]	1 – 6 years	45	45	0.06µg/g	0.06	0.09 µg/g	0.08	Hair
Skalny et al., 2017[19]	3 – 8 years	33	33	0.0343 µg/g	0.0260 - 0.0434	0.0426 µg/g	0.0210 - 0.0862	Hair

Table S3: Sensitivity analysis for the meta-regression using the DerSimonian–Laird method and the Student T-test, by consecutively excluding one study from the main analysis models.

Exposure	Biomarkers	Exclude study	Mean(Case)	SD(Case)	I2(Case)	Heterogeneity P(Case)	N(Case)	T-test P-value
Arsenic	Hair	Al Ayadhi et al. 2005	0.03	0	0.00	0.745	103	<0.001
Arsenic	Hair	Blaurock et al. 2011	0.62	0.58	38.36	0.091	143	<0.001
Arsenic	Hair	Kern et al. 2007	0.68	0.57	38.36	0.091	123	<0.001
Arsenic	Hair	Skalny et al. 2017	0.69	0.56	38.07	0.093	135	<0.001
Arsenic	Blood	Adam et al. 2013a	2.88	2.36	83.03	0.003	263	<0.001
Arsenic	Blood	Laura et al. 2011	0.37	0.06	0.00	0.583	290	0.333
Arsenic	Blood	Adam et al. 2013b	2.91	2.33	82.47	0.003	263	<0.001
Arsenic	Blood	Li et al. 2018	2.55	2.4	83.29	0.003	138	<0.001
Lead	Hair	Albizzati et al. 2012	7.00	3.2	96.41	0.00	197	<0.001
Lead	Hair	Mohamed et al. 2015	6.37	3.25	96.56	0.00	114	<0.001
Lead	Hair	Lakshmi Priya et al. 2011	3.63	2.27	93.45	0.00	199	0.006
Lead	Hair	Shearer et al. 1982	5.73	3.12	96.54	0.00	202	<0.001
Lead	Hair	Skalny et al. 2017	7.00	3.2	96.45	0.00	181	<0.001
Lead	Hair	Blaurock et al. 2011	7.11	3.16	95.88	0.00	189	<0.001
Lead	Hair	Wecker et al. 1985	4.73	3.05	94.06	0.00	202	<0.001
Lead	Blood	Adam et al. 2013	1.31	0.71	30.32	0.14	282	<0.001
Lead	Blood	Cohen et al. 1976	0.88	0.42	15.22	0.27	303	<0.001
Lead	Blood	Macedoni et al. 2015	0.85	0.41	13.62	0.16	285	<0.001
Lead	Blood	Rahbar et al. 2014	0.75	0.37	8.81	0.18	237	<0.001
Lead	Blood	Tian et al. 2011	1.07	0.6	22.03	0.15	300	<0.001
Lead	Blood	Laura et al. 2011	1.62	0.64	0.00	0.34	309	<0.001
Lead	Blood	Mohamed et al. 2016	0.65	0.30	3.54	0.47	306	<0.001
Lead	Urine	Adam et al. 2013	1.68	1.91	0.00	0.34	55	<0.001
Lead	Urine	Yorbik et al. 2010	1.15	2.05	12.28	0.29	80	0.001
Lead	Urine	Blaurock et al. 2011	0.67	0.79	0.00	0.77	85	0.499

Exposure	Biomarkers	Exclude study	Mean(Control)	SD(Control)	I2(Control)	Heterogeneity P (Control)	N(Control)	
Arsenic	Hair	Al Ayadhi et al. 2005	0.05	0.01	0.00	0.792	103	
Arsenic	Hair	Blaurock et al. 2011	0.12	0.06	24.41	0.062	158	
Arsenic	Hair	Kern et al. 2007	0.10	0.06	24.25	0.062	138	
Arsenic	Hair	Skalny et al. 2017	0.13	0.06	22.33	0.067	150	
Arsenic	Blood	Adam et al. 2013a	0.49	0.28	26.41	0.28	260	
Arsenic	Blood	Laura et al. 2011	0.37	0.05	0.00	0.64	272	
Arsenic	Blood	Adam et al. 2013b	0.50	0.19	11.25	0.35	260	
Arsenic	Blood	Li et al. 2018	0.37	0.05	0.51	0.19	120	
Lead	Hair	Albizzati et al. 2012	3.24	1.84	99.67	0.00	242	
Lead	Hair	Mohamed et al. 2015	2.91	1.81	99.76	0.00	162	
Lead	Hair	Lakshmi Priya et al. 2011	3.06	1.89	99.52	0.00	212	
Lead	Hair	Shearer et al. 1982	2.52	1.63	99.72	0.00	250	
Lead	Hair	Skalny et al. 2017	3.22	1.85	99.69	0.00	229	
Lead	Hair	Blaurock et al. 2011	3.35	1.80	99.18	0.00	237	
Lead	Hair	Wecker et al. 1985	0.76	0.33	57.26	0.06	240	
Lead	Blood	Adam et al. 2013	2.92	1.34	50.48	0.07	199	
Lead	Blood	Cohen et al. 1976	1.05	0.37	53.90	0.05	233	
Lead	Blood	Macedoni et al. 2015	2.89	1.47	56.26	0.05	221	
Lead	Blood	Rahbar et al. 2014	1.20	0.42	55.90	0.05	143	
Lead	Blood	Tian et al. 2011	2.97	1.44	55.82	0.05	228	
Lead	Blood	Laura et al. 2011	1.52	0.36	53.60	0.05	211	
Lead	Blood	Mohamed et al. 2016	1.15	0.40	49.25	0.00	223	
Lead	Urine	Adam et al. 2013	4.04	2.80	0.00	0.82	45	
Lead	Urine	Yorbik et al. 2010	0.36	0.45	0.00	0.46	69	
Lead	Urine	Blaurock et al. 2011	0.80	1.35	19.94	0.26	64	

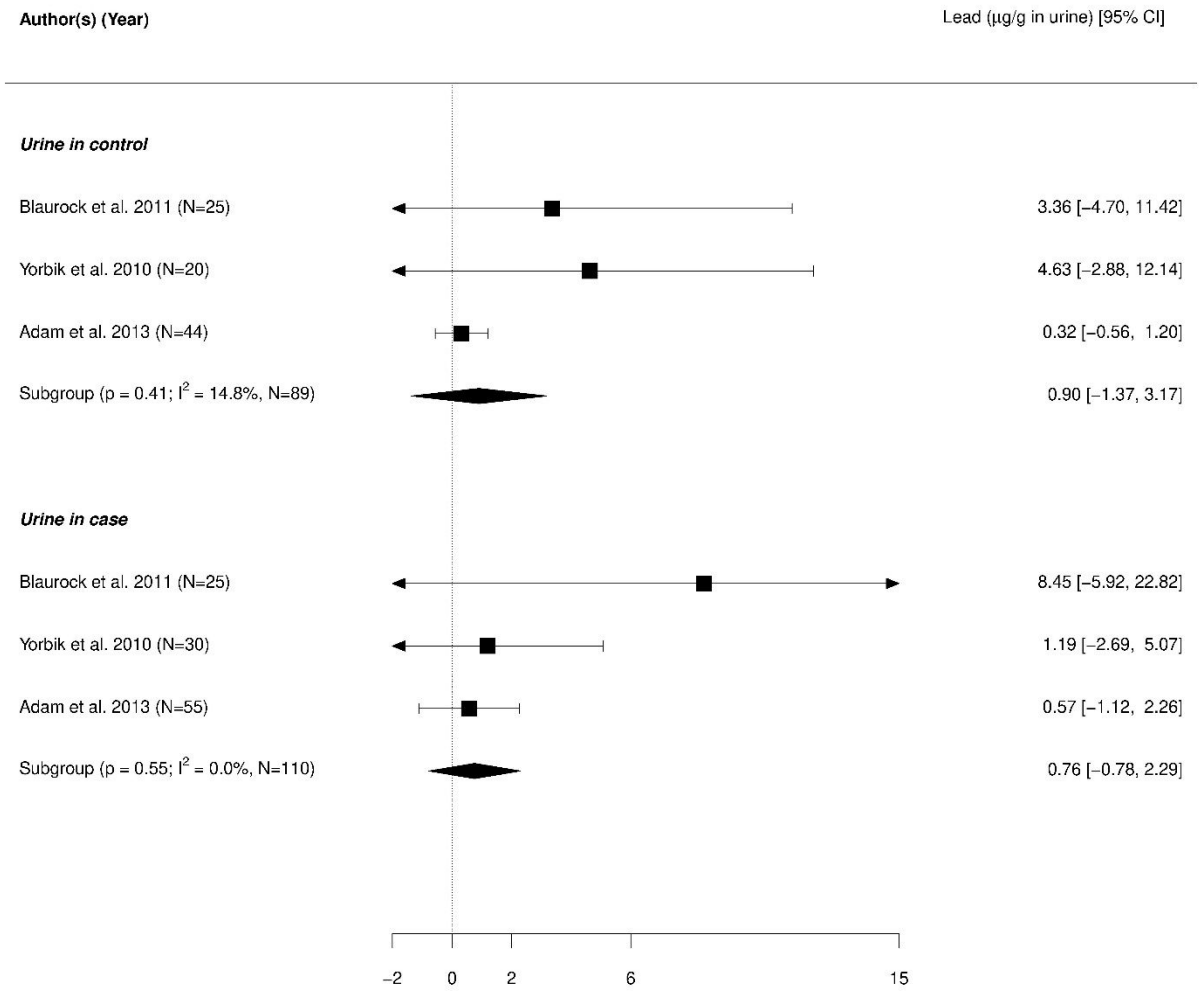

Figure S1: Forest plots for urinary lead exposure concentrations (mean and 95% confidence interval) in the case and control groups

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