

TABLE S1 (COMPLETE VERSION) CHARACTERISTICS OF INCLUDED STUDIES

First author/ publication year	Country/ Region	Study design	Pesticides characteristics	Exposed Group (n)	Control Group (n)	Population aspects	Summary	Evaluated Immunological Parameters	Results (vs Control)	p value
Jacobsen- Pereira (2020)	South Brazil	control vs. case	Mixture of pesticides (fungicides. insecticides and herbicides)	43	30	31 men and 12 women	Investigation of the relationship between occupational exposure to pesticides and the immunological profile in farmers exposed to mixtures of pesticides for 15 years.	TNF (pg/ mL)	*0.69 vs. 0.03	0.72
								IL2 (pg/ mL)	*0.45 vs. 0.16	0.09
								IL4 (pg/ mL)	*0.72 vs. 0.33	0.39
								IL6 (pg/ mL)	*1.21 vs. 0.53	0.04
								IL10 (pg/ mL)	*0.33 vs. 0.02	0.08
								IFN-γ (pg/ mL)	*0.43 vs. 0.13	0.21
								IL17A (pg/ mL)	*0.25 vs. 0.12	0.94
								Total leukocytes (cells/mm ³)	**6860.00 vs. 6315.00	0.51
								Total T cells (cells/mm ³)	**1220.10 vs. 1004.72	0.04
								Total monocytes (cells/mm ³)	**569.96 vs. 425.80	< 0.05
								Total lymphocytes (cells/mm ³)	**1997.50 vs. 2020.00	0.75
								Neutrophils (cells/mm ³)	**4136.39 vs. 3855.00	0.58
								Eosinophils (cells/mm ³)	**120.84 vs. 125.16	0.33
								Basophils (cells/ mm ³)	**34.44 vs. 38.80	0.36
								Total B cells (cells/mm ³)	**191.79 vs. 261.19	0.01
								Total NK (cells/ mm ³)	**278.13 vs. 327.79	0.31
								Total DCs (cells/ mm ³)	**82.55 vs. 58.14;	< 0.05

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Corsini (2005)	Northern Italy	cross- sectional	Mancozeb®	13	13	13 vineyard workers (12 males and 1 female; mean age: 41. range: 25- 54) and 13 matched healthy (12 males and 1 female; mean age: 40. range: 25 - 50)	Investigated the immunological profile of farmers exposed to Mancozeb®, an EBDC fungicide, by determining several serum cellular and functional immune parameters	IgA (ng/dL)	**262 vs. 228	-
								IgG (ng/dL)	**979 vs. 1005	-
								IgE (ng/dL)	**42.5 vs. 60	-
								IgM (ng/dL)	**76 vs. 96	-
								CD3 (a.n)	**1981 vs. 14220.016	0.016
								CD19 (a.n)	**437 vs 233	0.004
								CD25 (a.n)	** 108.8 vs 162.4	0.0001
								CD4 (a.n)	**1330 vs 968	0.006
								Eosinophils (%)	**0.9% vs. 3.0%	0.0001
								Basophils (%)	**0.2% vs. 0.3%	-
								Neutrophils (%)	**57.6% vs. 53%	-
								Lymphocytes (%)	**32.4% vs. 36.2%	-
								Monocytes (%)	**7.2% vs. 9.2%	-
								TNF-alfa (pg/cell)	**0.034 vs 0.085	0.0001

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El Rahman (2017)	Dakahleya region, Egypt	cross- sectional	Mixture of pesticides (fungicides. insecticides and herbicides)	50	25	50 workers (Gender distribution: Male 98%. Female 2%; Mean age: 40.92) and 25 healthy (Gender distribution: Male 68%. Female 32%; Mean age: 29.24)	Screened sera of subjects chronically exposed to mixtures of pesticides, mainly organophosphorus compounds and others, for autoantibodies against cytoskeletal neural proteins in the presence of neurological symptoms.	S100-B (ng/lane)	*0.91 vs. 0.37	< 0.05
								GFAP (ng/lane)	* 4.07 vs. 0.79	< 0.05
								Tau (ng/lane)	*3.60 vs. 0.72	< 0.05
								MAP-2 (ng/lane)	*4.32 vs. 0.89	< 0.05
								NFP (ng/lane)	*2.75 vs. 0.60	< 0.05
								TUBULIN (ng/ lane)	*2.08 vs. 1.17	< 0.05
								MBP (ng/lane)	*6.29 vs. 0.82	<0.05
								CaMKII (ng/lane)	*3.08 vs. 0.67	<0.05
								MAG (ng/lane)	*3.50 vs. 0.63	<0.05
								alfaSyN (ng/lane)	*4.09 vs. 0.69	<0.05
Santos (2022)	Southeast, Brazil	cross- sectional	Mixture of pesticides (fungicides. insecticides and herbicides) - not specified	52	68	52 Agricultural workers vs nonagricultural workers (median age value = Exposure 43 vs. Control 38.5; p < 0.001). (Gender distribution: Male 53.8% vs Male control: 26.5%0.002)	Assessed the link between pesticide use and anti-cyclic citrullinated peptide (anti-CCP) antibodies and antinuclear antibodies (ANA) levels	ANA (U/mL)	**0.65 vs. 0.61	0.369
								Anti-CCP (U/mL)	**5.1 vs. 4.9	0.699

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Steerenberg (2008)	Bulgaria Finland Italy Netherlands	cross- sectional	Mixture of pesticides (fungicides, insecticides and herbicides) - not specified	248	231	Netherlands: 40 workers employed in flower bulb growing industry and 39 non-(mostly office employees). Italy: 47 vineyard workers and 45 non-controls. Finland: 52 potato farmers and 48 non-biological farmers. Bulgaria: 49 employees from a factory that produced mainly zineb (an EBDC pesticide) and 53 controls. and 61 greenhouse workers producing cucumbers and tomatoes and 56 controls. (Gender distribution: Male Exposure: 66.5% vs Male Control: 62.4%-) (median age value = Exposure 42.4 vs. Control 42.2-)	Evaluated the effect of prolonged exposure to low doses of pesticide mixtures in occupationally people and measured its effects on hematological parameters and immune defense components.	IgG1 (mg/mL)	*6.29 vs. 6.78	0.09
								IgG4 (mg/mL)	*0.0095 vs. 0.0071	<0.0001
								IgM (mg/mL)	*1.03 vs. 1.09	0.5
								IgA (mg/mL)	*1.44 vs. 2.34	<0.0001
								Complement C3 (g/L)	*1.22 vs. 1.16	0.048
								Complement C4 (g/L)	*0.26 vs. 0.24	0.01
								Glycoproteins (g/L)	*0.77 vs. 0.80	0.3
								ESR (g/L)	*5.59 vs. 5.27	0.5
								Leucocyte count (10 ³ /mm ³)	*6.88 vs. 6.170.0005	0.0005
								Lymphocytes (%)	* 33.9 vs. 34.5	0.6
								Monocytes (%)	*5.7 vs. 5.6	0.7
								Neutrophils (%)	*55.8 vs. 55.81	1
								Eosinophils (%)	*2.89 vs. 2.80	0.8
								CD3 (a.n)	*1603 vs. 1491	0.07
								CD4 (a.n)	*968 vs. 964	0.9
								CD8 (a.n)	*564 vs. 485	0.01
								CD19 (a.n)	*280 vs. 263	0.2
								ANA (odds ratio)	*0.62 vs. 1 (reference)	0.3
								AMA (odds ratio)	*5.70 vs. 1 (reference)	0.07
								SMA (odds ratio)	*0.65 vs. 1 (reference)	0.4
								Creatinine (µg/g)	*2.7 vs. 0.5;	< 0.05

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Simescu (2014)	Bucharest, Romania.	Coorte	Chlorpyrifos. trichloropyridinol (TCP). carbofurane. cypermethrin. dimethoate	108	27	18–78 years old; 19 males and 89 females	Evaluated the potential correlation between pesticide exposure and thyroid function, autoimmunity, and morphology in greenhouse workers.	TSH (μIU/mL)	**1.72 vs 1.28	-
				108	28			Free T4 (μIU/mL)	**16.68 vs 16.84	-
				18	15			Cholinesterase april 2010 (U/L)	**7829 vs 8246	-
				18	25			Cholinesterase august 2010 (U/L)	**6851 vs 8246	-
				18	12			Cholinesterase april 2011 (U/L)	**5347 vs 8246	-
				18	14			Cholinesterase may 2011 (U/L)	**6259 vs 8246	-
				18	12			Cholinesterase august 2011 (U/L)	**5521 vs 8246	-
				18	12			Cholinesterase august 2011 (U/L)	**5521 vs 8246	-
Saleh (2015)	Egypt	Cross- sectional	-	10	200	10 patients with pemphigus vulgaris (4 of them exposed to pesticides). 20 healthy first- degree relatives of patients with pemphigus vulgaris (parents. siblings. or children) (4 exposed to pesticides). and 200 healthy human (6 of them exposed to pesticides).	Investigated anti-Dsg3 antibodies in healthy Egyptians to determine reasons for increase in pemphigus patients in Egypt.	Dsg3 positivity in patients of rural areas		< 0.0001
								Dsg3 positivity in patients living near farms		< 0.0001
								Dsg3 positivity in patients to pesticides		0.0025

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Spiewak (2003)	Lublin Region, Eastern Poland	Cross- sectional	-	90	50	Group: 25 men and 65 women. aged 18-82 (median 44) years Control Group: 50 men aged 21-55 (median 35) years	Proceeded with a comparison of antinuclear antibody frequency between rural inhabitants exposed to pesticides and urban blood donors in Eastern Poland.	ANA positivity (Number of cases)	*30% vs 12%	0.0175
								anti-dsDNA	*12.2% vs 2%	-
Rosenberg (1999)	Saskatchewan, Canada	Cross- sectional	Mixture of pesticides (fungicides. insecticides and herbicides) - especified	209	97	54.3% males and the remaining female (mean age 49.3 ± 14.7 yr; range 16-87 yr).	Determined the prevalence of ANA in a rural population and evaluated its association with environmental and occupational exposures.	ANA positivity Pesticides (Number of cases)	*26.2% vs 23.2%	0.124
								ANA positivity Herbicide (Number of cases)	*39% vs 39%	0.06
								ANA positivity Insecticide (Number of cases)	*40% vs 38%	0.006
								ANA positivity Fungicide (Number of cases)	*25% vs 53%	0.681
								ANA positivity Carbamatos (Number of cases)	*26% vs. 56%	0.023
								ANA positivity Organoclorados (Number of cases)	*19% vs 59%	0.016

Legend: *mean; **median; - non specified