

Murine Typhus in Canary Islands, Spain, 1999–2015

Appendix

Table 1. Cutoff values for patients who have murine typhus in Canary Islands, Spain, 1999–2015*

Laboratory findings	Cutoff values
Anemia	<12 g/dL Hb in women, <13 g/dL Hb in men
Leukopenia	<4,000 / μ L
Leukocytosis	>11,000/ μ L
Thrombocytopenia	<150,000/ μ L
Increased ESR	Upper limit of normality calculated according to age and sex
Decrease in Quick ratio	<80%
Increased aPTT ratio	>1.2
Increased plasma creatinine	>1.2 mg/dL
Hyponatremia	<135 mEq/L
Plasma creatine kinase	>232 U/L
Increased plasma urea	>40 mg/dL
Increased plasma LDH	>190 U/L
Increased plasma ALT	>35 U/L
Increased plasma AST	>35 U/L
Increased plasma alkaline phosphatase	>136 U/L
Increased plasma GGT	>85 U/L
Microhematuria	>5 RBCs/ mm^3
Proteinuria	Positive urine test strip
Leukocyturia	>10 WBCs/ mm^3

*ALT, alanine aminotransferase; aPTT: activated partial thromboplastin time; AST, aspartate aminotransferase; ESR, erythrocyte sedimentation rate; GGT, γ -glutamyl transpeptidase; LDH, lactate dehydrogenase; PT, prothrombin time; WBCs, white blood cells.

Table 2. Complication criteria for patients who have murine typhus in Canary Islands, Spain, 1999–2015*

Complication	Criteria
Hepatitis	ALT or AST increase ≥ 10 times the upper limit of reference range
Acute renal failure	Increased creatinine $\times 1.5$ or ≥ 0.3 mg/dL from baseline
Meningitis	Suggestive signs or symptoms AND pleocytosis (>10 WBCs/ mm^3) in cerebrospinal fluid
Pneumonia	Suggestive signs or symptoms AND development of pulmonary infiltrates on radiograph

*ALT, alanine aminotransferase; AST, aspartate aminotransferase; WBCs, white blood cells.

Table 3. Complications for patients who have murine typhus in Canary Islands, Spain, 1999–2015

Complication	Total, no. (%)	IgM $\geq 1:1,280$, no. (%)*	4x IgG titer increase, no. (%)†	p-value
Hepatitis	22 (10)	5 (6.9)	17 (14.4)	0.35
Acute renal failure	21 (9.8)	11 (15.9)	10 (6.8)	0.05
Meningitis	12 (5.6)	4 (5.8)	8 (5.5)	0.99
Pneumonia	9 (4.2)	4 (5.8)	5 (3.4)	0.47

*Patients given a diagnosis by testing of 1 sample (criterion 1).

†Patients given a diagnosis by testing of 2 consecutive samples (criterion 2).

Table 4. Case series patients who have murine typhus in Canary Islands, Spain, 1999–2015

Characteristic	Bernabeu (1), Sevilla, 1999	Miguélez (2), Tenerife, 2003	Hernández (3), Gran Canaria, 2003	This study, Gran Canaria, 2020
No. patients	104	32	22	221
Design	Prospective	Retrospective	Retrospective	Retrospective
Distribution by season	Summer–fall	No predominance	Summer	Summer–fall
Mean age, y	37.9	49	28	40
Sex, M:F	1.2:1	1.91:1	21:1	2.75:1
Cases in urban areas, %	63.5	21.9	Unknown	91.4

Table 5. Main series of single-center cases of murine typhus worldwide*

Study	Country	Year	Design	No. patients	Mean age, y	M:F
Taylor (4)	Texas (USA)	1986	Retrospective	200	35	1:1
Dumler (5)	Texas (USA)	1991	Retrospective	80	48	1:1.5
Silpapojakul (6)	Thailand	1992	Retrospective	137	Unknown	1.3:1
Tselentis (7)	Greece	1992	Retrospective	49	Unknown	Unknown
Gikas (8)	Greece	2004	Prospective	87	39	1.4:1
Phongmany (9)	Laos	2006	Prospective	41	40	1.7:1
Punda-Polic (10)	Croatia	2007	Prospective	57	38	1:1
Zimmerman (11)	Nepal	2008	Prospective	50	28	1:1.8
Adjemian (12)	Texas (USA)	2010	Prospective	53	39	1.3:1
Paris (13)	Laos	2011	Prospective	55	31	Unknown
Chaliotis (14)	Greece	2012	Prospective	90	43	2.1:1
Chang (15)	Taiwan	2012	Retrospective	81	50	2.1:1
Psaroulaki (16)	Cyprus	2012	Prospective	193	37	1.9:1
Walter (17)	France	2012	Retrospective	32	42	1:1
Anyfantakis (18)	Greece	2013	Retrospective	165	Unknown	1.3:1
Znazen (19)	Tunisia	2013	Retrospective	43	41	Unknown
Tsioutis (20)	Greece	2014	Prospective	49	42	1.6:1
Aouam (21)	Tunisia	2015	Retrospective	73	33	1.8:1
Hamaguchi (22)	Vietnam	2015	Retrospective	193	47	2.6:1
Grouteau (23)	France	2019	Prospective	61	35	1:1

*Pediatric, Spanish, and studies including <30 cases were excluded.

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