

Chlamydia psittaci Meningitis, Chile, 2023

Appendix

PRISMA 2020 methodology

1. Eligibility criteria

Studies were included in the main table only if they met all of the following criteria:

- Human case report or case series with individual-level data.
- Clinical syndrome compatible with meningitis, meningoencephalitis, encephalitis, severe CNS infection, or status epilepticus attributable to CNS involvement.
- Detection of *Chlamydia psittaci* in cerebrospinal fluid or CNS material by PCR, qPCR, qRT-PCR, mNGS, 16S PCR plus sequencing, or an equivalent molecular method.
- No better alternative pathogen explaining the CNS syndrome, or, if a competing pathogen was detected, the uncertainty was explicitly acknowledged.
- Sufficient case-level data to allow extraction of at least age, sex, neurologic presentation, diagnostic method, sample type, treatment, and outcome.

The following were excluded from the main comparative table:

- Reports based only on serology, clinical neurologic manifestations, or non-CNS specimens without molecular detection in CSF or CNS tissue.
- Reports of psittacosis with neurologic symptoms (cranial nerve palsies, Guillain-Barré syndrome, cerebral infarction, myeloradiculitis, reversible splenic lesion syndrome) without evidence of direct CNS infection by *C. psittaci*.
- Reports labeled as 'CNS infection' when the organism detected in CSF was not *C. psittaci*.
- Reviews, narrative summaries, or articles without original case-level data.
- Veterinary or non-human reports.

2. Information sources

Two bibliographic databases were searched: PubMed/MEDLINE and Scopus, both on 30 June 2026. Supplementary sources included backward citation (reference-list) screening of all records meeting eligibility criteria, and consultation with co-authors, which identified additional records not captured by either database search (Newton et al. 1996, Punter et al. 2010, Gao et al. 2025, Tian et al. 2025, Denmark JC 1957, Hughes et al. 1995). LILACS/BVS (Virtual Health Library, Latin America and Caribbean) was searched on the same date using the same conceptual terms adapted to the BVS interface, returning 10 records. Eight were duplicates already captured by PubMed or Scopus, plus two within-LILACS duplicates of the same article. The two unique new records identified were: del Castillo M & Jáuregui Rueda H (Medicina B Aires, 1987), describing non-pulmonary manifestations of psittacosis in Argentina (excluded: serology-based, pre-molecular era); and Guilbride PDL (West Indian Med J, 1953), a Caribbean public health review (excluded at title/abstract: wrong study type). Del Castillo 1987 article is notable as the only Latin American report of extrapulmonary psittacosis identified in any of the three databases searched; its exclusion under strict criteria further supports the novelty of the present case.

3. Search strategy

The following search string was used in PubMed/MEDLINE on 30 June 2026 (no date or language filters):

("Chlamydia psittaci"[Title/Abstract] OR "Chlamydophila psittaci"[Title/Abstract] OR "psittacosis"[Title/Abstract]) AND ("meningitis"[Title/Abstract] OR "encephalitis"[Title/Abstract] OR "meningoencephalitis"[Title/Abstract] OR "central nervous system"[Title/Abstract] OR "cerebrospinal fluid"[Title/Abstract] OR "CSF"[Title/Abstract] OR "status epilepticus"[Title/Abstract] OR "neurological"[Title/Abstract])

This search returned 33 records.

The following equivalent string was used in Scopus on 30 June 2026 (Title/Abstract field, no date or language filters):

TITLE-ABS("Chlamydia psittaci" OR "Chlamydophila psittaci") AND TITLE-ABS("cerebrospinal fluid" OR "CSF" OR "meningitis" OR "encephalitis" OR "meningoencephalitis" OR "status epilepticus")

This Scopus search returned 40 records. Reference lists of all records meeting eligibility criteria were manually screened for additional relevant reports. Co-author consultation identified 6 further

records not captured by either database (Newton et al. 1996, Punter et al. 2010, Gao et al. 2025, Tian et al. 2025, Denmark JC 1957, Hughes et al. 1995). After removing 23 duplicates between PubMed and Scopus, 56 unique records were screened.

4. Study selection process

All 56 unique records (33 from PubMed + 40 from Scopus – 23 duplicates + 6 additional sources) were screened by title/abstract against the eligibility criteria. Thirty-two records were excluded at this stage for clearly wrong population (animal-only studies), wrong organism (*C. trachomatis*, *C. pneumoniae*), wrong study type (basic science, genomic characterizations, general reviews, wildlife surveillance studies), or irrelevant topic. The remaining 24 records were assessed at full text. Eighteen records were excluded under the strict CNS-molecular criteria (Appendix Table 1). Six studies met all eligibility criteria and were included. The present Chilean case was not counted as a case identified through the bibliographic search; it was included separately in the comparative table.

5. Data extraction items

For each included study, the following variables were extracted and tabulated in Appendix Table 2: country and year of publication; patient age and sex; epidemiologic exposure; main clinical syndrome; initial presentation; neurologic manifestations; meningeal signs; brain imaging findings; CSF cell count, protein, and glucose; routine CSF microbiology results; diagnostic method for *C. psittaci* and specimen type; orthogonal confirmation; competing pathogens; respiratory/systemic involvement; antibiotic treatment; ICU admission; mechanical ventilation; clinical outcome; proposed certainty category for CNS involvement; and key limitations. Data were extracted from published full texts or, where full text was unavailable, from the published abstract with explicit notation.

6. Results of the search

PubMed/MEDLINE (30 June 2026) returned 33 records; Scopus (30 June 2026) returned 40 records. After removal of 23 duplicates between the two databases, 50 unique records were obtained from database searches. Six additional records were identified through reference-list screening and co-author consultation, for a total of 56 unique records screened. Thirty-two records were excluded at title/abstract screening (animal studies, wrong organism, wrong study type). Of the 24 full-text articles assessed, 18 were excluded under the strict CNS-molecular criteria (Table 1). Six studies met all inclusion criteria: Walder et al. (2003, Austria), Shi et al. (2021, People's Republic of China), Yin et al. (2021, People's Republic of China), Davar et al. (2021, United States), Zhang et al. (2024, People's Republic of China), and Zhao et al. (2026, People's Republic of China). Combined with the present Chilean case, 7 cases are compared in the main comparative table (Appendix Tables 2 and 3).

The Scopus search identified five records not captured by PubMed (Cazenave-Roblot et al. 1988, Henrion et al. 2002, Korman et al. 1997, Kanerva et al. 2013, Ragnaud et al. 1985). All five were assessed at full text and excluded under the strict CNS-molecular criteria (Table). The LILACS/BVS search did not identify additional records of *C. psittaci* meningitis from Latin America.

Three cases (Walder 2003, Davar 2021, present case) were classified as 'confirmed–strong' based on molecular detection in CSF with orthogonal confirmation (sequencing, confirmatory PCR, or positive serology). Three additional cases (Shi 2021, Zhang 2024, Zhao 2026) were classified as 'probable–high' based on mNGS detection in CSF without additional independent confirmation. One case (Yin 2021) was classified as 'probable with coinfection caveat' because competing *Streptococcus pneumoniae* reads were also detected by mNGS.

The complete study selection process is shown in the Appendix Figure.

References (1–6, included studies; 7–26, excluded studies [full-text assessment])

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2. Shi Y, Chen J, Shi X, Hu J, Li H, Li X, et al. A case of *Chlamydia psittaci* caused severe pneumonia and meningitis diagnosed by metagenome next-generation sequencing and clinical analysis: a case report and literature review. *BMC Infect Dis*. 2021;21:621. [PubMed https://doi.org/10.1186/s12879-021-06205-5](https://doi.org/10.1186/s12879-021-06205-5)
3. Yin XW, Mao ZD, Zhang Q, Ou QX, Liu J, Shao Y, et al. Clinical metagenomic sequencing for rapid diagnosis of pneumonia and meningitis caused by *Chlamydia psittaci*. *World J Clin Cases*. 2021;9:7693–703. [PubMed https://doi.org/10.12998/wjcc.v9.i26.7693](https://doi.org/10.12998/wjcc.v9.i26.7693)
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11. Reis J, Le Faou A, Levy F, Kapfer MT, Gut JP. Confusional form of *Chlamydia psittaci* encephalitis. Diagnostic value of microimmunofluorescence. A case [in French]. *Presse Med*. 1985;14:87–89. [PubMed](#)
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Appendix Table 1. Full-text articles excluded after full-text assessment and reasons for exclusion from a study of *Chlamydia psittaci* meningitis, Chile, 2023.

Reference	Original reason for consideration	Decision	Reason for exclusion (strict CNS criteria)
Denmark JC, 1957	Historical ornithosis encephalitis	Excluded	Historical report; no modern molecular confirmation in CSF or CNS tissue.
Cazenave-Roblot F et al Med Mal Infect; 1988;18:391-3	Ornithosis with CNS involvement (cerebellar syndrome, urinary retention)	Excluded	CSF reported as normal; diagnosis based on serology only; no molecular detection in CSF.
Reis J et al., Presse Med;14 (2):87:1985	Confusional encephalitis attributed to <i>C. psittaci</i>	Excluded	Diagnosis based on microimmunofluorescence serology only; no molecular detection in CSF or CNS material.
Saeki S et al., No To Shinkei;48:1141:1996	Psittacosis with psychiatric symptoms, abnormal EEG/SPECT	Excluded	Neurologic syndrome described; no CNS molecular evidence of <i>C. psittaci</i> ; full text in Japanese.
Henrion E et al., Arch Pediatr;9 (8):810 2002	Severe psittacosis with multiorgan failure in a 10year-old boy; meningism on admission	Excluded	Meningism reported clinically but diagnosis based on serology; no molecular detection in CSF or CNS material.
Newton P et al., J Neurol Neurosurg Psychiatry 1996	Cranial nerve palsies associated with psittacosis	Excluded	Neurologic complication of psittacosis; <i>C. psittaci</i> not detected in CSF or CNS tissue.
Korman TM et al., Clin Infect Dis;25 (4):847 1997	Neurologic complications of Chlamydial infections: case report and review	Excluded	Primary case involves <i>C. pneumoniae</i> , not <i>C. psittaci</i> ; historical <i>C. psittaci</i> neurologic cases cited in review are serology-based only.
Punter MT et al., (case report) 2010	Myeloradiculitis/meningoencephalopathy after psittacosis	Excluded	Post-infectious or para-infectious neurologic syndrome; no direct detection of <i>C. psittaci</i> in CSF or CNS tissue.
Kanerva M et al., Otol Neurotol;34 (7) 2013	Microbiologic findings in acute facial palsy in children	Excluded	Cranial nerve palsy; neurologic complication of <i>C. psittaci</i> , not demonstrable CNS infection; <i>C. psittaci</i> not detected in CSF.
Wang J et al., Infect Drug Resist;17 2024	<i>C. psittaci</i> pneumonia complicated with Guillain-Barré syndrome	Excluded	Guillain-Barré syndrome = peripheral immune-mediated complication; <i>C. psittaci</i> not detected in CSF or CNS tissue.
Gao J et al., 2025	Psittacosis complicated by cerebral infarction	Excluded	Cerebrovascular complication of systemic psittacosis; <i>C. psittaci</i> not detected in CNS.
Ionescu AM et al., 2016 BMJ Case Rep; PMID 27620382	Pneumonia and meningoencephalitis	Excluded main table	<i>C. psittaci</i> DNA detected in sputum, not in CSF or CNS material. May be cited narratively as probable neurologic involvement but does not meet strict criterion 3.
Tian S et al., Neurologist. 2025 Sep 1;30 (5):303–306.	Psittacosis with 'CNS infection' and cerebral infarction	Excluded	Available description suggests the pathogen detected in CSF was not <i>C. psittaci</i> ; therefore, not evidence of <i>C. psittaci</i> CNS invasion.
Branley JM et al., 2014 New Microbes New Infect;2:7	Clinical features of endemic community-acquired psittacosis	Excluded	Respiratory psittacosis cohort; no CNS detection of <i>C. psittaci</i> reported.
Ni Y et al., 2023 Open Forum Infect Dis;10:ofac518	Multicenter psittacosis pneumonia cohort	Excluded	Respiratory psittacosis cohort; no CNS detection of <i>C. psittaci</i> reported.
Cizman M & Jazbec J, 1993 Pediatr Infect Dis J;12:903	Pediatric cohort; <i>C. psittaci</i> among etiologies	Excluded	Cohort-level serology; no individual-level CNS molecular data; criterion 4 (individual data) not met.
Ragnaud JM et al., Med Mal Infect;15(11):1985	Current aspects of <i>C. psittaci</i> infections: 32 cases	Excluded	Large case series from the pre-molecular era; diagnosis based on serology; no individual-level CNS molecular data.
del Castillo M & Jáuregui Rueda H, 1987 Medicina (B.Aires);47(3):322	Non-pulmonary manifestations of human psittacosis; case series, Argentina	Excluded	Diagnosis based on serology; pre-molecular era (1987); no molecular detection in CSF or CNS. Identified only in LILACS/BVS — the only Latin American case report on extrapulmonary psittacosis found in any of the three databases searched.
Hughes P et al., 1995 Respir Med;89:637	Narrative review of neurologic complications	Excluded	Narrative review without primary case-level data; criterion 5 not met.

Appendix Table 2. Characteristics of published cases with molecularly confirmed *Chlamydia psittaci* central nervous system infection identified through the PRISMA-guided systematic review, compared with the present case, for a study of *Chlamydia psittaci* meningitis, Chile, 2023.

Characteristic	Present case, Chile, 2023	Walder et al., Austria, 2003	Shi et al., People's Republic of China, 2021	Yin et al., People's Republic of China, 2021	Davar et al., United States, 2021	Zhang et al., People's Republic of China, 2024	Zhao et al., People's Republic of China, 2026
Age / sex	50-y-old man	62-y-old man	54-y-old woman	5-y-old boy	67-y-old man	72 y old woman	37-y-old man
Epidemiologic exposure	Farm worker; exposure to birds and livestock	Parrot owner	Denied direct bird, poultry, or horse contact	Exposure to birds	Travel to Sicily; parrot sightings	Not described	Not reported
Main clinical syndrome	Meningitis	Status epilepticus / neuroornithosis	Severe pneumonia with meningitis	Pneumonia and meningitis	Meningitis	Severe pneumonia with encephalitis (cerebral vasculitis)	Encephalitis (progressive frontotemporal/insular masslike lesion)
Initial presentation	Fever, myalgia, chills, headache, odynophagia	Fatigue, myalgia, sudden high fever	Headache, fever, dyspnea	Fever, dizziness, vomiting	Fever, night sweats, arthralgias, cough	Respiratory and neurologic symptoms	One month of seizures and unconsciousness
Neurologic manifestations	Persistent headache; no focal deficits	Generalized status epilepticus	Severe headache; memory loss	Seizures; meningitis manifestations	Neck stiffness; altered mental status	Headache, altered consciousness	Seizures, coma, progressive bilateral encephalitic lesions
Meningeal signs	Absent	Not specified	Not specified	Not specified	Present	Not reported	Not reported
Brain imaging	MRI: transient white matter hyperintensities (T2/FLAIR/DWI); follow-up normal	Not fully reported	Not reported	Not reported	Not reported	Cerebrovascular/vasculitis changes (limited data)	MRI: focal left frontal lesion progressing to bilateral frontotemporal and insular involvement
CSF cells (cells/mm ³)	1,033	Normal (no pleocytosis)	6	Not reported	373	Mild, 7 cells/μL	Not reported
CSF protein	1.21 g/L	0.93 g/L	0.267 g/L (normal)	Not reported	2.22 g/L	0.391 g/L	0.182 g/L
CSF glucose	50.1 mg/dL	Not reported	Not reported	Not reported	Not reported	3.48 mmol/L	4.37 mmol/L
Routine CSF microbiology	Gram stain and multiplex meningitis/encephalitis PCR panel negative	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Diagnostic method for <i>C. psittaci</i>	qPCR in CSF (IncA, CPSIT_0607) plus serology (IFA)	PCR and 16S sequencing in CSF	mNGS in CSF and BALF	mNGS in CSF	mNGS in CSF plus confirmatory CDC PCR in CSF	mNGS in blood and CSF	mNGS in CSF
Positive specimen	CSF (qPCR); serum (serology)	CSF	CSF and BALF	CSF	CSF	Blood and CSF	CSF
Orthogonal confirmation	Serology positive (IgG 1:128; IgM 1:10)	Molecular sequencing	Not clearly reported	Not clearly reported; competing organism detected	Confirmatory CDC PCR in CSF	Not reported	Not reported (no confirmatory PCR or serology)
Competing pathogens	Routine tests negative; multiplex panel negative	Not reported	No other relevant pathogen reported	<i>Streptococcus pneumoniae</i> reads also detected by mNGS	Not reported	Not reported	No other likely pathogens identified

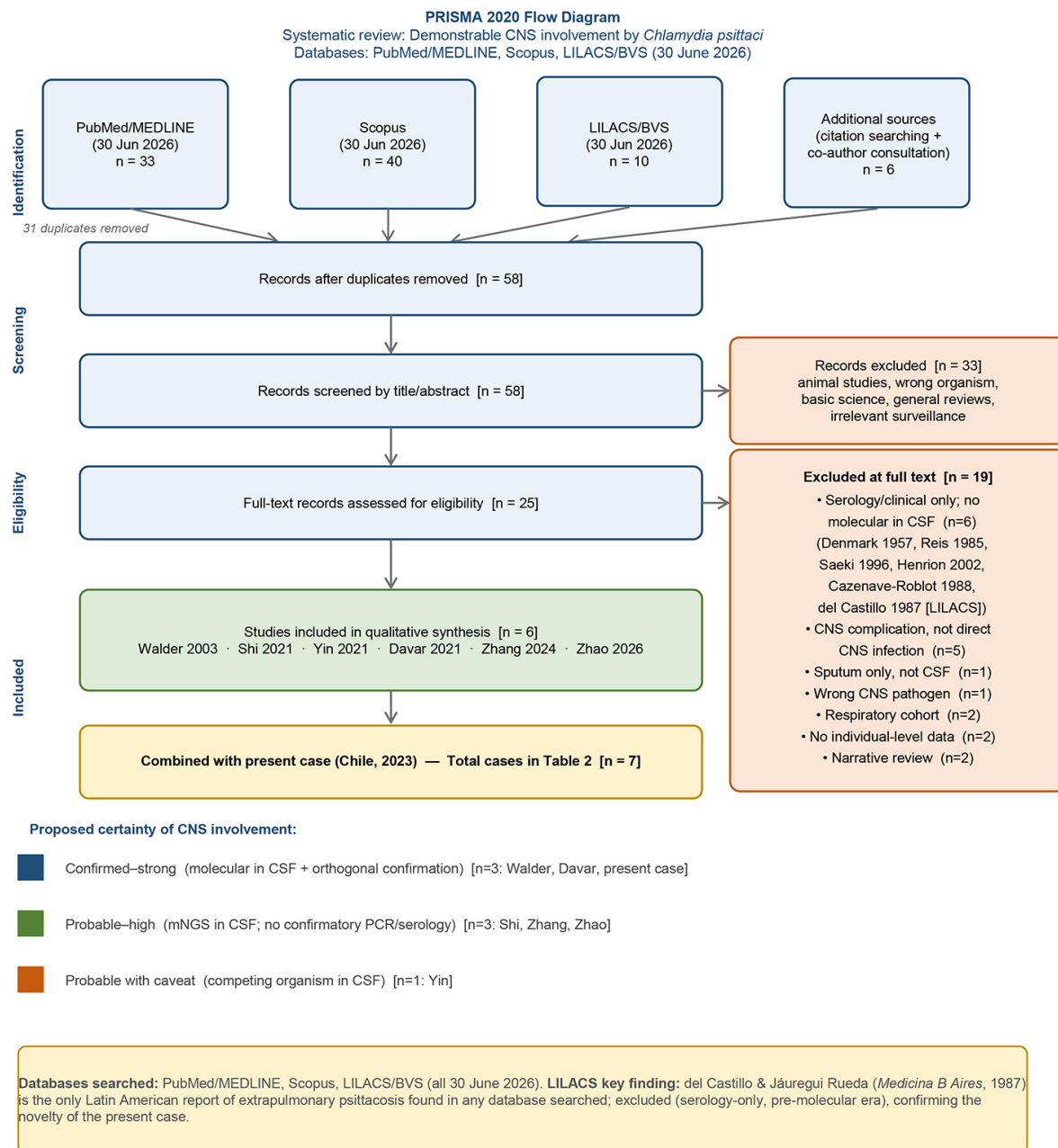
Characteristic	Present case, Chile, 2023	Walder et al., Austria, 2003	Shi et al., People's Republic of China, 2021	Yin et al., People's Republic of China, 2021	Davar et al., United States, 2021	Zhang et al., People's Republic of China, 2024	Zhao et al., People's Republic of China, 2026
Respiratory / systemic involvement	Mild systemic syndrome; no severe pneumonia	Systemic illness; no severe pneumonia described	Severe pneumonia; ARDS; mechanical ventilation	Pneumonia	Respiratory and systemic symptoms; no ARDS reported	Severe pneumonia	No pneumonia described in brief report
Treatment	Ceftriaxone/ampicillin (IV) → levofloxacin (oral, 7 d)	Doxycycline for 30 d	Doxycycline, moxifloxacin, azithromycin	Azithromycin, rifampin, vancomycin	Levofloxacin plus ampicillin/TMP-SMX	Azithromycin and Piperacillin/tazobactam switched to doxycycline for 10 d	Empirical: acyclovir, cefoperazone, methylprednisolone, IVIG; targeted doxycycline not clearly before death
ICU admission	No	Yes	Yes (prolonged course)	Not reported	Not reported	Yes	Yes
Mechanical ventilation	No	Yes (44 d)	Yes	Not reported	Not reported	Not reported	Not reported
Clinical outcome	Complete recovery	Slow recovery	Complete recovery	Complete recovery after targeted therapy	Complete recovery	Improved, discharged	Death
Proposed certainty of CNS involvement	Confirmed—strong (qPCR in CSF + serology + negative routine workup)	Confirmed—strong (PCR/16S sequencing in CSF)	Probable—high (mNGS in CSF; low CSF cell count)	Probable with coinfection caveat (mNGS in CSF; competing <i>S. pneumoniae</i> reads)	Confirmed—strong (mNGS + confirmatory CDC PCR in CSF)	Probable—high (mNGS in blood and CSF; no confirmatory PCR or serology reported)	Probable—high (mNGS in CSF; no confirmatory PCR, no serology, no read counts reported)
Key limitation	Single case; rarity of pathogen; reproducibility depends on molecular assay details	Historical molecular methods; limited extractable data	Low CSF cell count and mild CSF inflammation; low molecular signal	Competing <i>S. pneumoniae</i> detection; coinfection vs. coincidental detection unclear	No major limitation for CNS attribution	Limited published data; incomplete clinical description, no PCR or serology performed	Brief report; no read counts, no confirmatory PCR, no serology; antimicrobial course before death unclear

Abbreviations: ARDS, acute respiratory distress syndrome; BALF, bronchoalveolar lavage fluid; CDC, Centers for Disease Control and Prevention; CNS, central nervous system; CSF, cerebrospinal fluid; IFA, immunofluorescence assay; IVIG, intravenous immunoglobulin; mNGS, metagenomic next-generation sequencing; PCR, polymerase chain reaction; qPCR, quantitative PCR; TMP-SMX, trimethoprim-sulfamethoxazole.

Appendix Table 3. Summary characteristics of published cases of *Chlamydia psittaci* meningitis/encephalitis identified through a PRISMA 2020–guided systematic literature review, compared with the present case, for a study of *Chlamydia psittaci* meningitis, Chile, 2023

Extracted variable	Present case, Chile, 2023	Davar et al., United States, 2021	Shi et al., People's Republic of China, 2021	Yin et al., People's Republic of China, 2021	Zhao et al., People's Republic of China, 2026	Zhang et al., People's Republic of China 2024	Walder et al., Austria, 2003
Source type	Present case report	Published case report	Published case report	Published case series	Published case report	Published case report	Published case report
Country/year	Chile / 2023	United States / 2021	People's Republic of China / 2021	People's Republic of China / 2021	People's Republic of China / 2026	People's Republic of China / 2021	Austria / 2003
Age / sex	50 / Male	67 / Male	54 / Female	5 / Male	37 / Male	72 / Woman	62 / Male
Relevant exposure history	Farm worker; exposure to birds/livestock	Travel to Sicily; parrot sightings	Denied direct bird, poultry, or horse contact	Exposure to birds	Not described	Four chickens at home	Parrot owner
Clinical syndrome reported	Meningitis	Psittacosis meningitis	Severe pneumonia and meningitis	Pneumonia and meningitis	Severe meningoencephalitis	Severe pneumonia with encephalitis	CNS infection with status epilepticus
Initial clinical presentation	Fever, myalgia, headache, odynophagia	Fever, night sweats, arthralgias, cough	Headache, fever, dyspnea	Fever, dizziness, vomiting	Not described	Fever, delirium, cough and dyspnea	Fatigue, myalgia, sudden high fever
Neurologic manifestations	Persistent headache	Neck stiffness; altered mental status	Severe headache; memory loss	Convulsions	Seizures and unconsciousness	Headache, altered consciousness	Generalized status epilepticus
Meningeal signs	Absent	Present	Not specified	Present, Brudzinski-positive	Not specified	Not specified	Not specified
CSF pleocytosis	Yes; 1,033 cells/mm ³	Yes; 373 cells/mm ³	No; 6 cells/mm ³	Not described	No data	Mild, 7 cells/μL	No; normal CSF
CSF protein	1.21 g/L	2.22 g/L	0.267 g/L; normal	Not described	No data	0.391 g/L	0.93 g/L
Diagnostic specimen	CSF and serum	CSF	BALF and CSF	CSF	CSF	CSF and blood	CSF
Diagnostic method	qPCR and serology	mNGS plus confirmatory PCR	mNGS	mNGS	16S PCR plus sequencing	mNGS in blood and CSF	16S PCR plus sequencing
<i>C. psittaci</i> serology	Positive	Negative	Not reported	Not reported	No data	No data	Positive
Antibiotic treatment	Ceftriaxone/ampicillin followed by levofloxacin	Levofloxacin plus ampicillin/TMP-SMX	Doxycycline, moxifloxacin, azithromycin	Azithromycin, rifampin, and vancomycin	No data	Azithromycin and Piperacillin/tazobactam switched to doxycycline for 10 d	Doxycycline for 30 d
Hospital stay	Approximately 14 d	Approximately 17 d	28 d	23 d	No data	11 d	More than 50 d
Clinical outcome	Complete recovery	Complete recovery	Complete recovery	Complete recovery after targeted therapy	Died	Clinical recovery with radiologic improvement	Slow recovery
Reported complications	None	Ampicillin rash	Severe pneumonia, ARDS, mechanical ventilation	None	Bilateral frontotemporal lesions	Cerebral vasculitis, pulmonary embolism, pleural effusion	Refractory epilepsy, mechanical ventilation for 44 d
Main relevance	Reported case in Latin America	First case diagnosed using mNGS	Combined pneumonia–meningitis presentation	Rapid diagnosis using clinical metagenomic sequencing	Fatal case with space-occupying brain lesions	Psittacosis with cerebral vasculitis/encephalitis without typical meningitis	First CNS DNA diagnosis
Missing or unclear data	None for main variables	Limited by a single case report	Exposure history unclear	Potential coinfection with <i>Streptococcus pneumoniae</i>	Lack of relevant clinical data	No PCR or serology confirmation; no long-term neurologic follow-up.	Older report; limited comparability with current molecular diagnostics

Abbreviations: ARDS, acute respiratory distress syndrome; BALF, bronchoalveolar lavage fluid; CNS, central nervous system; CSF, cerebrospinal fluid; mNGS, metagenomic next-generation sequencing; qPCR, real-time quantitative polymerase chain reaction; TMP-SMX, trimethoprim-sulfamethoxazole.



Appendix Figure. PRISMA 2020 flow diagram for a study of *Chlamydia psittaci* meningitis, Chile, 2023.