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Acute Babesiosis During Pregnancy: A Systematic Review of Case Reports and Case Series

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Abstract

Babesiosis is a tick-borne protozoal infection that can range from asymptomatic to severe disease during pregnancy. We conducted a systematic search of Embase, Scopus, MEDLINE, Global Health, and CENTRAL from database inception through June 2026, in accordance with PRISMA guidelines. We used Boolean operators with MeSH and free-text terms related to babesiosis and pregnancy. Eligible studies reported confirmed babesiosis during pregnancy. Two reviewers independently screened titles and abstracts, and disagreements were resolved by consensus or adjudication by a third reviewer. A total of 474 records were screened, yielding seven case reports and one case series comprising ten unique cases. The most frequently reported clinical features were fever, chills, headache, and jaundice, with laboratory abnormalities that, in several instances, resembled HELLP syndrome. Three cases were complicated by co-infection with Lyme disease, anaplasmosis, or influenza. The primary therapeutic regimen across the cohorts was clindamycin combined with quinine, with adjunctive interventions reserved for severe cases. Maternal outcomes were generally favorable, and most treated cases were not associated with major complications. This review summarizes the limited published evidence on babesiosis in pregnancy and underscores its potential to mimic HELLP syndrome. Early recognition and timely treatment are essential to optimize maternal and neonatal outcomes. Additional prospective studies are needed to inform diagnosis and management.

Introduction

Babesiosis is a tick-borne parasitic infection caused by Babesia species, commonly found in Europe and the United States, primarily transmitted through bites from infected Ixodes ticks.[1] Its reported burden has increased in Europe and other regions, likely reflecting expanding tick habitats, improved surveillance, and greater clinical recognition.[2] Babesiosis can cause a wide spectrum of illness, from no symptoms at all to severe disease requiring hospitalization, transfusion, or other intensive support.[3] Diagnosis typically relies on peripheral blood smear, PCR, and serologic testing, while treatment depends on disease severity and parasite burden.[3] In pregnancy, babesiosis can present with hemolysis, thrombocytopenia, liver dysfunction, and adverse fetal or neonatal outcomes, which may potentially resemble HELLP (Hemolysis, Elevated Liver Enzymes, and Low Platelets) syndrome and make diagnosis more difficult, potentially delaying treatment.[3–5] Babesiosis is an emerging infection, yet data on its presentation, management, and pregnancy outcomes remain sparse. As a result, clinicians still lack strong evidence to guide treatment, and this review summarizes the available literature to improve awareness, support earlier diagnosis and management, and identify gaps for future research.

Methods

Protocol and Registration

The protocol for this systematic review was registered in advance in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number **CRD42024553750**.

Search Strategy

A systematic literature search was conducted in Embase, Scopus, PubMed (including MEDLINE), Global Health, and the Cochrane Central Register of Controlled Trials (CENTRAL) from database inception to June 30, 2026. The search strategy combined controlled vocabulary terms (e.g., MeSH terms) and free-text keywords related to pregnancy and babesiosis using Boolean operators (AND, OR). No restrictions on publication year or study design were applied.

Eligibility Criteria

Studies were selected according to predefined eligibility criteria. We included case reports, case series, observational studies, case-control studies, and cohort studies reporting babesiosis diagnosed during pregnancy. Eligible studies reported maternal clinical presentation, laboratory findings, diagnosis, treatment, pregnancy outcomes, or evidence of vertical transmission. Two reviewers independently screened titles and abstracts, followed by full-text assessment of potentially eligible articles. Disagreements were resolved through discussion, and when consensus could not be reached, a third reviewer adjudicated.

Inclusion Criteria

Studies were included if they reported confirmed babesiosis during pregnancy and involved pregnant women of any age or at any gestational age. Eligible studies reported clinical characteristics, laboratory findings, diagnostic methods, treatments, pregnancy outcomes, or evidence of vertical transmission. We included case reports, case series, cohort studies, and other observational study designs. Only articles published in English were considered.

Exclusion Criteria

Studies were excluded if they described probable rather than confirmed babesiosis or reported babesiosis diagnosed only after the pregnancy. Studies that included only non-pregnant populations, animal or laboratory research, or publications without original patient data, such as review articles, editorials, conference abstracts, or commentaries, were excluded. Articles published in languages other than English were also excluded.

Data Extraction

Two reviewers independently extracted data using a standardized Microsoft Excel data extraction form. Extracted variables included first author, publication year, country, study design, maternal age, gravidity, gestational age at diagnosis, clinical presentation, laboratory findings, diagnostic methods, treatment administered, gestational age at delivery, pregnancy outcomes, neonatal outcomes, evidence of vertical transmission, and follow-up information. Any discrepancies were resolved through discussion and, when necessary, consultation with a third reviewer.

Outcomes

The primary outcomes assessed in this review included the clinical manifestations of babesiosis during pregnancy, laboratory abnormalities associated with the infection, diagnostic modalities employed for its detection, therapeutic interventions used for management, and maternal, fetal, and neonatal outcomes, including the occurrence of vertical transmission.

Strategy for Data Synthesis

Owing to the rarity of babesiosis during pregnancy and the anticipated predominance of case reports and case series, a qualitative synthesis was performed. Studies were summarized according to patient characteristics, clinical presentation, diagnostic findings, treatment strategies, maternal outcomes, neonatal outcomes, and evidence of vertical transmission. Findings were presented descriptively using tables and figures. Meta-analysis was not performed because of expected clinical and methodological heterogeneity among included studies.

Risk of Bias (Quality) Assessment

Methodological quality was assessed using the tool developed by Murad et al. for case reports and case series. This instrument evaluates eight items across four domains: selection, ascertainment, causality, and reporting. Two reviewers independently assessed study quality, with disagreements resolved through discussion or consultation with a third reviewer.

Results

We identified a total of 474 articles through searches of Embase, Scopus, MEDLINE, CENTRAL, and the Global Health database. After removing duplicates, 268 articles remained for abstract screening. Following this screening process, 218 articles were excluded, leaving 50 articles for further evaluation. Based on our inclusion and exclusion criteria, we excluded an additional 42 articles, resulting in the inclusion of eight articles with ten cases in this systematic review, as illustrated in Figure 1.

Study and patient characteristics are illustrated in Table 1. Maternal age ranged from 30 to 44 years, with a median age of 32 years. Gestational age at diagnosis varied widely, from eight weeks of gestation in a patient with ectopic pregnancy to 38 weeks of gestation. Most patients had no documented co-infection. However, co-infections were reported in three cases, including anaplasmosis, H1N1 influenza infection, and Lyme disease. Information regarding vertical transmission was available for most cases. Vertical transmission was confirmed in one case involving a twin pregnancy diagnosed at 35 weeks of gestation, while no vertical transmission was reported in eight cases. One case did not report vertical transmission status. Overall, the available literature suggests that babesiosis during pregnancy has been reported across all trimesters, with vertical transmission appearing to be uncommon but possible.

Study	Design	Maternal age (years)	Gestational age at diagnosis	Co-infection	Vertical transmission
Luckett et al.[6]	Case report	31	25 weeks	No	No
Raucher et al.[7]	Case report	30	19 weeks	No	No
Mupombwa et al.[8]	Case report	30	38 weeks	Anaplasmosis	No
Brewer et al.[9]	Case report	32	23 weeks	No	No
Feder et al.[10]	Case report	31	37 weeks	No	No
Abittan et al.[11]	Case report	32	23 weeks	No	No
Fraser MD et al.[12]	Case report	37	8 weeks	No	No (Ectopic pregnancy)
Khangura et al.[13] (a)	Case series	35	28 weeks	H1N1	Not reported
Khangura et al.[13] (b)	Case series	34	27 weeks	Lyme disease	No
Khangura et al.[13] (c)	Case series	44	35 weeks	No	Yes (Twin delivery)

Table 1. Study and Patient Characteristics

The clinical presentations are elaborated in Table 2. Fever was the most common presenting symptom, occurring in eight patients (80%), followed by chills/rigor and fatigue/malaise, each reported in six patients (60%). Headache was present in four patients (40%), while myalgia/joint pain and dyspnea were each observed in three patients (30%). Jaundice, neck pain/sore throat/lymphadenopathy, back pain/abdominal pain, dark urine, and skin rash were each reported in two patients (20%). Edema, nasal bleeding, and decreased fetal movement were uncommon, each occurring in one patient (10%).

Clinical feature	n (%)
Fever	8 (80)
Chills/rigor	6 (60)
Fatigue/malaise	6 (60)
Headache	4 (40)
Myalgia/joint pain	3 (30)
Dyspnea	3 (30)
Jaundice	2 (20)
Sore throat/lymphadenopathy	2 (20)
Back pain/abdominal pain	2 (20)
Dark urine	2 (20)
Skin rash	2 (20)
Edema	1 (10)
Nasal bleeding	1 (10)
Decreased fetal movement	1 (10)

Table 2. Clinical presentation of patients (N = 10)

Laboratory findings are summarized in Table 3. All patients had anemia (100%). Thrombocytopenia and elevated liver enzymes were each observed in eight patients (80%), while elevated lactate dehydrogenase was present in seven patients (70%). When these findings occur simultaneously, they can resemble HELLP (Hemolysis, Elevated Liver Enzymes, and Low Platelet Count). Hyperbilirubinemia occurred in four patients (40%). Proteinuria, elevated creatinine or renal dysfunction, and hematuria/hemoglobinuria were each identified in three patients (30%). Low haptoglobin was documented in two patients (20%), whereas leukopenia and hyponatremia were each observed in one patient (10%).

Laboratory abnormality	n (%)
Anemia (low hemoglobin or hematocrit)	10 (100)
Thrombocytopenia	8 (80)
Elevated liver enzymes	8 (80)
Elevated lactate dehydrogenase	7 (70)
Hyperbilirubinemia	4 (40)
Proteinuria	3 (30)
Elevated creatinine/renal dysfunction	3 (30)
Hematuria/hemoglobinuria	3 (30)
Low haptoglobin	2 (20)
Leukopenia	1 (10)
Hyponatremia	1 (10)

Table 3. Laboratory abnormalities of patients (N = 10)

Diagnosis, treatment and outcomes of the reported cases are defined in Table 4. Peripheral blood smear was used for diagnosis in all cases and was supplemented by polymerase chain reaction (PCR) testing in four cases. Serologic testing was additionally performed in one case. Reported parasitemia levels ranged from <0.1% to 19.13% in peripheral blood smear. The most commonly used antimicrobial regimen was clindamycin plus quinine, either as initial or definitive therapy. Several patients required modification of therapy because of adverse effects like QT prolongation, cinchonism, drug allergies, or persistent parasitemia, with azithromycin and atovaquone frequently used as alternative or adjunctive agents. Treatment duration varied considerably, ranging from seven to ten days in uncomplicated cases to several weeks in patients with persistent or severe infection. Adjunctive therapies were frequently required, particularly in patients with severe disease or parasitemia. These included intravenous fluid resuscitation, red blood cell transfusions, platelet transfusions, vasopressor support, and exchange transfusion. Two patients underwent exchange transfusion because of increasing parasitemia or severe clinical manifestations. Overall, maternal recovery was achieved in most reported cases, with the majority resulting in term delivery. However, severe maternal complications were reported in two cases, including acute respiratory distress syndrome (ARDS), acute kidney injury (AKI), disseminated intravascular coagulation (DIC), shock liver, pancreatitis, peripartum cardiomyopathy, Sheehan's syndrome. One case with the highest parasitemia resulted in preterm delivery with confirmed vertical transmission and severe maternal complications of babesiosis.

Study	Diagnostic method	Antimicrobial therapy	Adjunctive treatment	Maternal Outcome
Luckett et al.[6]	PBS (4%)	Clindamycin IV 900 mg q8h + quinine 650 mg IV q8h for 8 days	IV fluids	Recovered; term delivery
Raucher et al.[7]	PBS (4.3%)	NR	Blood transfusion	Recovered; term delivery
Mupombwa et al.[8]	PBS (<0.1%)	Clindamycin + quinine; postpartum azithromycin + atovaquone + doxycycline	NR	Recovered; term delivery
Brewer et al.[9]	PBS (1%), PCR	Clindamycin + quinine switched to atovaquone + azithromycin + clindamycin	PRBC, exchange transfusion	Recovered; term delivery
Feder et al.[10]	PBS (2%), PCR	PO clindamycin 600 q8h + PO quinine 650 mg q8h for 7 days	NR	Recovered; term delivery
Abittan et al.[11]	PBS (1%), PCR, serology	Azithromycin 250mg/day (replacing Quinine) + Atovaquone 750 mg q12 h + Clindamycin	RBC exchange transfusion	Recovered; term delivery
Fraser MD et al.[12]	PBS (3-5%)	PO azithromycin + PO atovaquone for 10 days	NR	Ectopic pregnancy
Khangura et al.[13]	PBS (1.1-1.5%)	Clindamycin + quinine changed to azithromycin + atovaquone + rifampin, oseltamivir for H1N1	PRBC, vasopressor	ARDS, AKI, shock liver, pancreatitis, delivery outcome NR
Khangura et al.[13]	PBS (0.08%)	Clindamycin + quinine; amoxicillin for Lyme disease	NR	Recovered; term delivery
Khangura et al.[13]	PBS (19.13%)	IV clindamycin + PO quinine	Platelet transfusion, PRBC	

Study	Diagnostic method	Antimicrobial therapy	Adjunctive treatment	Maternal Outcome
				DIC, AKI, Sheehan's syndrome,
				Cardiomyopathy, preterm delivery, vertical transmission

AKI, Acute Kidney Injury; ARDS, Acute Respiratory Distress Syndrome; DIC, Disseminated Intravascular Coagulation; IV, Intravenous; NR, Not Reported; PBS, Peripheral Blood Smear; PCR, Polymerase Chain Reaction; PO, Per Oral; PRBC, Packed Red Blood Cell; q8h, Every 8 Hours; q12h, Every 12 Hours.

Table 4. Diagnostic Methods, Treatment, and Outcomes

Discussion

Babesiosis is a tick-transmitted parasitic infection that has been reported most often in the northern, midwestern, and northeastern United States, and it is increasingly recognized in parts of Europe, Asia, Africa, and South America.[14] Coinfection with Lyme disease is not uncommon in endemic regions.[15] In our review, three of ten pregnant patients had a documented coinfection, including Lyme disease, anaplasmosis, or H1N1, which supports the need to assess for concurrent infections when babesiosis is suspected during pregnancy. Vertical transmission has been described in neonatal cases.[16] In this review, it was confirmed in one of the reported pregnancies, underscoring the importance of timely diagnosis and treatment for maternal and neonatal benefit.

The clinical spectrum of babesiosis ranges from asymptomatic infection to severe systemic disease with rapid progression and, in some patients, relapse or death.[14] Pregnancy may increase vulnerability to severe disease because of an increase in T-suppressor lymphocytes and/or T-cytotoxic lymphocytes.[4,15,17] Consistently, fever with chills was the most common presentation (80%), followed by malaise, headache, and myalgia in our review. No vaccine is available, so prevention depends on avoiding tick exposure and following blood donation restrictions after a positive nucleic acid test.[18,19] Severe maternal complications occurred in two cases, particularly when parasitemia was high, and included ARDS, AKI, DIC, shock liver, pancreatitis, cardiomyopathy, Sheehan's syndrome, preterm birth, and vertical transmission in this study, which matches the complications of babesiosis in the general population.[20] This suggests that complications can occur in two out of every ten cases of babesiosis cases in pregnancy, highlighting the need for early diagnosis and treatment.

From a laboratory perspective, babesiosis commonly produces anemia, thrombocytopenia, and hemolysis, while lymphopenia may also occur.[15] In this study, anemia was present in all cases, and thrombocytopenia with elevated AST and ALT was seen in most cases, creating a pattern that can

resemble HELLP syndrome. The HELLP syndrome is a serious complication in the late trimester characterized by hemolysis or anemia, elevated liver enzymes, and low platelet count.[21,22] 50% of cases in our study were between 27 and 38 weeks of gestation. To avoid delays in diagnosis, babesiosis should always be considered as a differential diagnosis when laboratory results indicate a combination of low hemoglobin, elevated liver enzymes, and low platelets. This systematic review confirmed Babesia infection through peripheral blood smears, polymerase chain reaction (PCR), and, in some cases, via serology. Blood smear, PCR, and serology were the main diagnostic tools used in the reported cases, and PCR is particularly useful when parasitemia is low.[23–26]

Treatment in non-pregnant adults generally favors atovaquone and azithromycin.[15] The combination of atovaquone and azithromycin is as effective as a regimen of clindamycin and quinine in achieving a clinical response in mild to moderate babesiosis with fewer side effects in the general population.[27–29] In contrast to the use of atovaquone and azithromycin in non-pregnant women and the general population, most cases in this review received clindamycin plus quinine, likely because of historical practice, availability, and concern for transplacental infection. Some patients were later switched to atovaquone and azithromycin because of adverse effects or intolerance. Severe cases required supportive care such as fluids, blood products, exchange transfusion, or vasopressors, which is consistent with management strategies reported for advanced babesiosis.[30] In cases of co-infection, additional medications are added to simultaneously treat both the co-infection and babesiosis. Overall, the evidence remains limited to case reports and small case series, so larger studies and standardized reporting are still needed to validate these findings and better characterize clinical presentations, management strategies, and outcomes.

Conclusion

This review brings together the published evidence on babesiosis during pregnancy, a rare infection that may be associated with important maternal and neonatal complications, including vertical transmission. Because hemolytic anemia, thrombocytopenia, and elevated liver enzymes can resemble HELLP syndrome, diagnosis may be delayed. For that reason, babesiosis should remain in the differential diagnosis of pregnant patients with this laboratory pattern, especially in endemic areas or after possible tick exposure. Peripheral blood smear and PCR can help confirm the diagnosis, and evaluation for coinfection is also important. Prompt recognition, targeted testing, and timely treatment are likely to improve outcomes for both mother and infant. Although this review outlines the current evidence, substantial gaps remain. Larger multicenter studies and prospective registries are needed to define the epidemiology, pathophysiology, outcomes, and best treatment strategies for babesiosis in pregnancy.

Declarations

Conflict of Interest:

None

Consent for Publication

Consent is received from all authors. Patient consent is not applicable.

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None

Author Contribution

P.P conceived and designed the study, performed literature search, data extraction, data analysis, and drafted the manuscript.R.D contributed to study design, literature screening, data extraction, and critically revised the manuscript.S.G assisted in data extraction, quality assessment of included studies, and manuscript editing.S.S contributed to statistical analysis, interpretation of data, and manuscript revision.S.S assisted in literature search, data organization, and proofreading of the final manuscript.

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None

Data Availability

Yes, I have research data to declare and can be made available.

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Figures

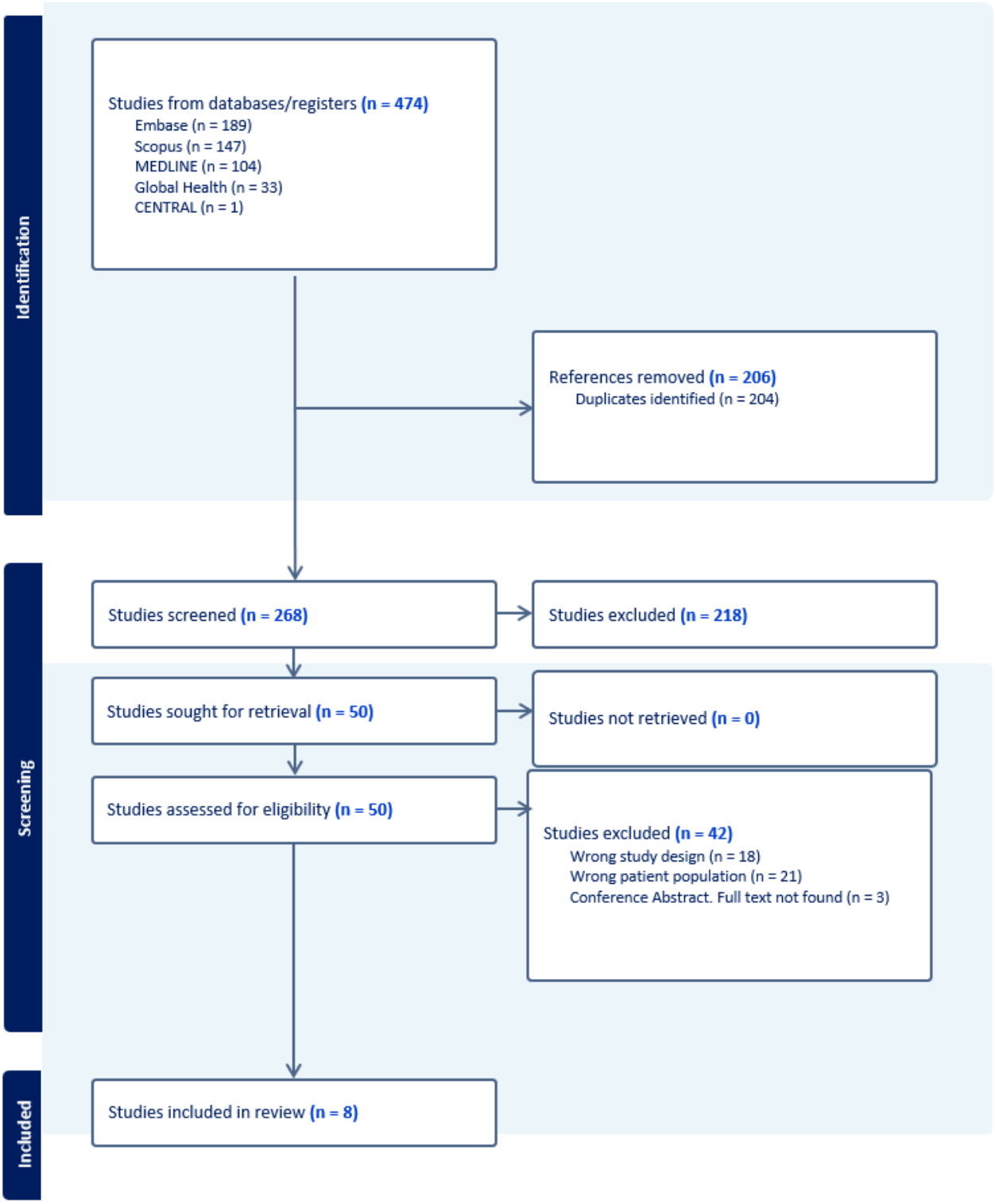

Figure 1

PRISMA flow diagram illustrating the search strategy assessing different databases.