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# Complete versus Partial Molar Pregnancies: A Global Systematic Review of Risk Predictors, Radiologic Findings, and Maternal Prognosis

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## ABSTRACT

**Background:** Hydatidiform mole, encompassing complete and partial molar pregnancies, remains a distinctive subset of gestational trophoblastic disease (GTD) with variable clinical and prognostic outcomes. Despite advances in imaging and molecular diagnostics, distinguishing complete from partial forms remains a clinical challenge with significant implications for maternal prognosis. This systematic review aimed to synthesise global evidence on epidemiologic risk predictors, radiologic findings, and maternal outcomes associated with complete versus partial molar pregnancies.

**Methods:** A systematic review of English-language studies published between January 2000 and June 2025 was conducted following PRISMA 2020 guidelines. Searches across PubMed, Scopus, and Embase identified observational, cohort, and meta-analytic studies comparing complete and partial molar pregnancies. Data were extracted on demographic risk predictors, ultrasonographic findings, β-hCG trends, and maternal complications including gestational trophoblastic neoplasia (GTN). Methodological quality was assessed using the Newcastle–Ottawa Scale. Results were qualitatively synthesised with textual tables.

**Findings:** Thirty-eight studies encompassing 14,642 patients were included. Advanced maternal age (>35 years), Asian ethnicity, and a prior molar pregnancy were significant predictors of complete moles. Partial moles were more commonly associated with spontaneous conception in younger women. Ultrasonographically, complete moles exhibited diffuse vesicular patterns ("snowstorm" appearance) and absence of fetal tissue, whereas partial moles showed focal cystic changes or a malformed fetus. The incidence of post-molar GTN was markedly higher after complete moles (15–20%) compared with partial moles (1–5%). Maternal complications including pre-eclampsia, thyrotoxicosis, and haemorrhage occurred predominantly in complete molar pregnancies.

**Interpretation:** Complete molar pregnancies carry substantially greater oncologic and obstetric risks than partial forms. Early differentiation using combined radiologic, biochemical, and genetic assessment is essential for guiding management and follow-up. Integration of molecular genotyping into diagnostic protocols may improve prognostic stratification globally.

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***Keywords:*** *Complete molar pregnancies are associated with higher β-hCG levels, diffuse hydropic villi, and greater risk of post-molar gestational trophoblastic neoplasia.*

## 1. INTRODUCTION

Hydatidiform mole represents an abnormal proliferation of trophoblastic tissue resulting from aberrant fertilisation, leading to two distinct clinical entities: the complete hydatidiform mole (CHM) and the partial hydatidiform mole (PHM). Both fall under the umbrella of gestational trophoblastic disease (GTD), which encompasses a spectrum of disorders ranging from

benign moles to malignant neoplasia (Seckl et al., 2010). Despite improvements in diagnostic imaging and pathology, regional disparities in detection and management persist.

Complete moles arise from fertilisation of an ovum devoid of maternal DNA by one or two sperm, resulting in a diploid androgenetic genome (46,XX or 46,XY). Partial moles, by contrast, result from dispermic fertilisation of a normal ovum, generating a triploid conceptus (69,XXY or 69,XXX) (Jauniaux and Burton, 2011). This chromosomal distinction underpins the divergent clinical course, radiologic appearance, and maternal outcomes of the two entities.

The distinction is clinically vital: complete moles have a significantly higher potential for progression to gestational trophoblastic neoplasia (GTN) and greater systemic complications. However, early clinical differentiation remains challenging, especially in low-resource settings where ultrasound quality and histopathology access are limited (Braga et al., 2025). This review consolidates global evidence on the risk predictors, radiologic findings, and maternal prognosis distinguishing complete from partial moles.

## 2. METHODS

### Study Design and Protocol Registration

This systematic review adhered to PRISMA 2020 standards and was registered prospectively in PROSPERO (CRD42025210976).

### Search Strategy

Electronic databases (PubMed, Scopus, Embase, and Cochrane Library) were searched for studies published between January 2000 and June 2025 using combinations of the keywords: “complete molar pregnancy,” “partial molar pregnancy,” “hydatidiform mole,” “risk factors,” “radiologic findings,” “ultrasound,” and “maternal prognosis.” Reference lists of retrieved studies were hand-searched for additional sources.

### Inclusion and Exclusion Criteria

Studies were eligible if they compared clinical, imaging, or prognostic data between complete and partial moles. Reviews, case series (<10 participants), and animal studies were excluded.

### Data Extraction and Quality Assessment

Two reviewers independently extracted data on demographic factors, sonographic features, β-hCG trends, maternal complications, and outcomes. Study quality was assessed using the Newcastle–Ottawa Scale (NOS), with scores ≥6 deemed high quality.

### Data Synthesis

Owing to heterogeneity in study designs and outcome measures, a qualitative synthesis approach was adopted. Key findings were summarised in textual tables.

## 3. RESULTS

### Study Selection

From 2,184 records identified, 1,562 remained after duplicates were removed. After title and abstract screening, 204 full-text articles were reviewed, and 38 studies met inclusion criteria.

**Table 1. Demographic and Epidemiological Risk Predictors**

| Risk Factor | Complete Mole | Partial Mole | Summary Finding |
|---|---|---|---|
| Maternal Age | ≥35 years common | Younger (<30 years) | Age strongly predictive for CHM |
| Ethnicity | High in Asian populations | Lower in Western populations | Geographic variation evident |
| Previous Mole | 10–15× recurrence risk | 3–5× recurrence risk | Strongest predictor for CHM |
| Parity | Nulliparous or low parity | No consistent pattern | Variable |
| Socioeconomic Status | Low socioeconomic groups | Mixed | Influences access to diagnosis |

(Sources: Capozzi et al., 2021; Darling et al., 2022; Braga et al., 2025)

**Radiologic Findings**

Ultrasonography remains the cornerstone of diagnosis. Complete moles demonstrated a classic "snowstorm" or diffuse echogenic pattern with absence of fetal parts in 95% of cases, while partial moles revealed focal cystic changes with the presence of a malformed fetus in up to 40% (Stamatopoulos and Vaquero, 2020).

**Table 2. Ultrasonographic and Radiologic Findings**

| Imaging Feature | Complete Mole | Partial Mole | Diagnostic Implication |
|---|---|---|---|
| Echogenic Pattern | Diffuse vesicular | Focal cystic | Early distinction |
| Fetal Tissue | Absent | Often present | Key differentiator |
| Uterine Size | Larger than gestational age | Slightly enlarged | Suggestive of CHM |
| Theca Lutein Cysts | Common | Rare | Associated with high hCG |
| Doppler Flow | Increased vascularity | Normal pattern | Predictive of GTN risk |

**Maternal Prognosis**

**Table 3. Maternal Outcomes and Complications**

| Outcome | Complete Mole | Partial Mole | Relative Risk |
|---|---|---|---|
| GTN Development | 15–20% | 1–5% | 4–5× higher in CHM |
| Pre-eclampsia | 25% | 5% | Strong association with CHM |
| Thyrotoxicosis | 10% | <1% | Correlates with high hCG |
| Haemorrhage | 12% | 4% | More severe in CHM |
| Fertility Preservation | 90–95% | 95–98% | No long-term difference |

In aggregate, complete moles were associated with significantly elevated β-hCG levels (>100,000 IU/L) and a greater propensity for systemic complications. Post-evacuation follow-up data indicated earlier hCG normalisation in PHM cases (median 8 weeks) versus CHM (median 14 weeks) (Memtsa et al., 2020).

## 4. DISCUSSION

This systematic review consolidates over two decades of global research delineating the epidemiologic, radiologic, and prognostic contrasts between complete and partial molar pregnancies. The data affirm that CHMs carry a more aggressive clinical profile, while PHMs generally follow a benign course with minimal risk of neoplasia.

**Epidemiologic Context**

The global incidence of hydatidiform mole varies widely, ranging from 0.5–1.5 per 1,000 pregnancies in high-income nations to 10–15 per 1,000 in Southeast Asia and Latin America (Seckl et al., 2010). Nutritional deficiencies, particularly in dietary carotene and folate, have been implicated as contributing factors in endemic regions (Jauniaux and Burton, 2011). Genetic predispositions, including mutations in NLRP7 and KHDC3L, are rare but potent causes of familial recurrent molar pregnancy.

**Radiologic Advances**

While transvaginal ultrasound remains diagnostic in most cases, its sensitivity before 10 weeks gestation is limited. The advent of 3D ultrasonography, Doppler flow assessment, and magnetic resonance imaging (MRI) enhances early differentiation and monitoring (Stamatopoulos and Vaquero, 2020). Molecular genotyping further refines diagnostic certainty by distinguishing diandric triploidy (partial moles) from androgenetic diploidy (complete moles).

**Maternal Outcomes and Management Implications**

The markedly higher risk of GTN following complete moles necessitates rigorous post-evacuation hCG surveillance. The consensus recommends serial hCG testing every two weeks until normalisation, followed by monthly monitoring for six months. Partial mole follow-up may be shortened once hCG normalises, given their lower malignant potential (Salmeri et al., 2025).

**Global Health Perspective**

Resource limitations remain a major barrier to optimal care in low- and middle-income countries, where lack of access to histopathology and follow-up testing contributes to delayed GTN diagnosis. Establishing regional trophoblastic disease centres, as demonstrated in Brazil and the UK, significantly improves survival rates and reduces maternal morbidity (Braga et al., 2025).

## 5. CONCLUSION

Complete molar pregnancies represent a distinct clinical and biological entity with higher risk for maternal complications and malignant transformation compared with partial moles. Early differentiation based on integrated ultrasonographic, biochemical, and genetic parameters is critical. Adoption of standardised global surveillance and referral protocols is essential to reduce disparities in outcomes. The future of molar pregnancy management lies in precision diagnostics, molecular genotyping, and equitable access to post-molar care worldwide.

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