# Migraines in pregnancy and select adverse pregnancy outcomes

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## Background and Objective

- There is limited evidence, particularly in large studies, about the association between maternal migraine and adverse pregnancy outcomes.
- Objective was to assess risk factors associated with maternal migraine, and the risk of maternal stroke (pregnancy/delivery or postnatal), postpartum hemorrhage, and preterm birth in a large birth records cohort.

## Study Design

- The sample was selected from liveborn, non-anomalous singleton deliveries in California between 22 and 42 weeks gestation in 2007-2012.
- Migraines were identified from ICD-9 codes (346) in emergency department or hospital discharge records during pregnancy or delivery.
- ICD-9 codes were used to identify stroke (ischemic stroke: 433, 434, 436; hemorrhagic stroke: 430, 431) and postpartum hemorrhage (666).
- Gestational age was obtained from birth records.
- Log-linear regression was performed to estimate risk ratios and 95% confidence intervals.
- Clinical characteristic models were adjusted for maternal race/ethnicity, payer source, age, pre-pregnancy BMI, WIC participation, and nativity.
- Outcome models were adjusted for the same covariates, plus diabetes, mental illness, drug or alcohol abuse or dependence, and pregnancy smoking.

## Results

- The sample included:
  - 2,866,316 women with no indication of migraine
  - 23,032 women with one migraine occurrence in pregnancy (8 per 1,000 pregnancies)
  - 3,408 women with more than one occurrence of migraine in pregnancy (1 per 1,000 pregnancies)
- Having a migraine code was associated with hypertensive disorders (gestational/pre-existing), diabetes (gestational/pre-existing), mental illness, pregnancy smoking, alcohol or drug abuse/dependence.
- One migraine occurrence was associated with an increased risk of preterm birth, pregnancy/delivery and postnatal stroke, and postpartum hemorrhage.
- Multiple migraine occurrences in pregnancy had similar risk estimates to one migraine occurrence.
- Limitations: unable to determine whether these were active migraines. Further, women with less severe migraines were likely misclassified as unexposed.

## Conclusion

- Maternal migraines in pregnancy are associated with an increased risk of adverse pregnancy outcomes, particularly stroke in the prenatal/delivery period.
- These findings, particularly the strong association with maternal stroke, suggest an increased surveillance for pregnant women with migraines.

Migraines in pregnancy were associated with an increased risk of preterm birth, stroke, and postpartum hemorrhage.

Risk estimates were strongest for stroke during pregnancy/delivery

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**Figure 1. Sample selection**

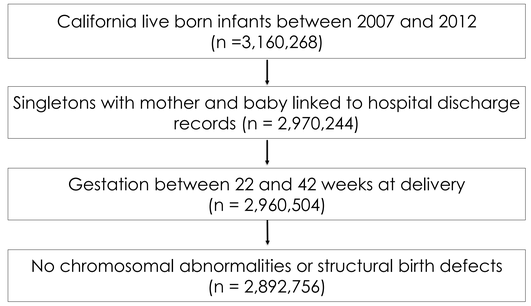


**Table 1. Clinical characteristics among women with or without a diagnosis of migraines in pregnancy.**

| | No migraine (n=2,866,316) | One migraine occurrence (n=23,032) | More than one migraine occurrence (n=3,408) |
|---|---|---|---|
| | aRR (95% CI) | aRR (95% CI) | aRR (95% CI) |
| Hypertensive disorder | reference | 1.7 (1.6, 1.8) | 2.4 (2.2, 2.5) |
| Diabetes | reference | 1.2 (1.2, 1.3) | 1.5 (1.4, 1.7) |
| Depression | reference | 4.9 (4.7, 5.2) | 8.7 (7.9, 9.5) |
| Anxiety | reference | 5.0 (4.8, 5.3) | 9.5 (8.7, 10.4) |
| Bipolar disorder | reference | 5.1 (4.7, 5.4) | 9.7 (8.7, 10.9) |
| Pregnancy smoking | reference | 1.5 (1.4, 1.5) | 2.1 (1.9, 2.3) |
| Alcohol abuse | reference | 2.5 (2.3, 2.9) | 4.5 (3.6, 5.5) |
| Drug abuse | reference | 2.6 (2.5, 2.7) | 5.7 (5.2, 6.2) |

**Table 2. Adverse pregnancy outcomes among women with or without a diagnosis of migraines in pregnancy.**

| | No migraine (n=2,866,316) | One migraine occurrence (n=23,032) | More than one migraine occurrence (n=3,408) |
|---|---|---|---|
| | aRR (95% CI) | aRR (95% CI) | aRR (95% CI) |
| Preterm birth | reference | 1.4 (1.3, 1.4) | 1.8 (1.7, 2.0) |
| Pregnancy/delivery stroke | reference | 6.8 (4.5, 10.4) | 8.7 (4.3, 17.8) |
| Postnatal stroke | reference | 2.0 (1.0, 3.9) | 3.8 (1.4, 10.5) |
| Postpartum hemorrhage | reference | 1.5 (0.4, 1.6) | 1.5 (1.3, 1.8) |

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