



## SHORT REPORT

## Is headache during pregnancy a higher risk for serious secondary headache cause? A HEAD study report

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## Abstract

**Objectives:** Pregnancy is defined as a 'red flag' in headache assessment. We aimed to describe the prevalence and causes of serious secondary headache in pregnant ED patients.

**Methods:** Unplanned secondary analysis of HEAD Study/HEAD Colombia data.

**Results:** 3.2% (117/3643) of ED headache patients aged 18–50 years were pregnant, of whom six (5.1%) had a serious secondary cause identified. The proportion of patients with serious headache causes was not significantly different between pregnant female, non-pregnant female and male patient subgroups ( $P = 0.89$ ).

**Conclusion:** Inclusion of pregnancy as a 'red flag' in ED headache assessment is not supported by these data.

**Key words:** emergency department, headache, pregnancy.

pregnant women, non-pregnant women and men.

## Introduction

Pregnancy has been regarded as a 'red flag' in headache assessment despite the scarcity of evidence to support this.<sup>1</sup> The HEAD (Headache in Emergency Departments) study and its Colombian partner study (HEAD-Colombia) provided an opportunity to seek this evidence. The objectives of the present study were:

1. To describe the prevalence and causes of serious secondary headache in patients aged 18–50 years who presented to a participating ED and who were pregnant.
2. To test the hypothesis that the proportion of serious secondary headache in patients aged 18–50 years is not different between

## Methods

The parent study was a health record review study of adult patients with headache presenting to 69 healthcare facilities in 11 countries (HEAD and HEAD-Colombia). The methodology has been published previously.<sup>2</sup> Inclusion for this unplanned secondary analysis was age 18–50 years inclusive.

Serious secondary headache was defined as the composite of subarachnoid haemorrhage (SAH), ICH, meningitis, encephalitis, cerebral abscess, intracranial neoplasm, hydrocephalus, arterial dissection, stroke/TIA, hypertensive crisis, pregnancy-related hypertension/eclampsia, temporal arteritis, intracranial hypertension (IIH), ventriculoperitoneal shunt complications, cerebral venous thrombosis or reversible cerebral vasoconstriction syndrome.

Analysis is descriptive and by comparison of proportions, based on sex and pregnancy status. No sample size calculation was performed because this was a secondary analysis.

The lead ethics approval was by Melbourne Health Human Research Ethics Committee (HREC/43148/MH-2018). Approval was obtained for participating sites according to local requirements. The study was registered with Australia and

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New Zealand Clinical Trials Register (trial number 376695).

## Results

Sample derivation and outcome are shown in Figure 1. Our sample included 2423 (2423/3643, 66.5%) women, 117 of whom were pregnant (117/2423, 4.8%). In patients who were pregnant, the most frequent headache diagnoses were primary headache not otherwise specified 48.7% (57/117), migraine 27.3% (32/117), musculoskeletal/tension headache 5.1% (6/117) and viral illness 3.4% (4/117).

Six pregnant patients had a serious secondary cause identified (5.1%, 95% confidence interval [CI] 2.4–10.8%) – two preeclampsia, two SAH, one ICH and one IIH.

The two patients with SAH both reported so-called thunderclap onset, severe headache – the worst headache they had ever experienced, together with nausea and vomiting. The patient with IIH reported new visual disturbances and had papilloedema on fundoscopy. One of the patients with preeclampsia had a severe headache peaking within 1 h. The other had BP exceeding 140/90 mmHg. The remaining

patient (with ICH) had no previous headache history and presented with a 2- to 3-day history of severe headache associated with nausea and vomiting.

The proportion of patients aged 18–50 years with serious secondary headache cause was not significantly different between pregnant female, non-pregnant female and male patient subgroups (Omnibus  $X^2 = P = 0.89$ , odds ratio 1.07, 95% CI 0.46–2.48).

## Discussion

At least in theory, the risk of a serious secondary headache is higher during pregnancy because of physiologic changes, including hypercoagulability and hormonal changes.<sup>3</sup> Previously reported red flags for headache in pregnancy are shown in Box 1. These are largely drawn from red flags that apply to adults generally, with the addition of pregnancy-related BP elevation.<sup>4</sup> Previous studies have varied in the reported prevalence of a serious secondary cause from 14% to 53%,<sup>3</sup> but the quality of this evidence is weak. Our data suggest that the prevalence of serious secondary headache in pregnant ED patients is

not significantly different from non-pregnant ED patients of a similar age. Further, in our study, all had clinical features that would have been concerning in the absence of pregnancy.

There are some limitations that should be considered in interpreting these results. This secondary analysis was underpowered to detect small differences between proportions. The classification of headache as the main symptom and ED diagnosis were based on clinician judgement. Although patients were identified prospectively, some data were collected retrospectively.<sup>5</sup> Some cases of serious secondary headache may

### BOX 1. Previously reported headache 'red flags' in pregnancy

#### Clinical history

- Peak intensity within 5 min
- New headache type as opposed to worsening of previous headache type
- Change in previously stable headache pattern
- Headache that wakes from sleep
- Headache that changes with posture
- Headache precipitated by physical activity or Valsalva manoeuvre
- Known thrombophilia
- Trauma
- Neurological symptoms such as weakness, visual disturbance etc.
- History of malignancy, HIV, active infection or pituitary disorders
- Associated seizure
- Recent travel at risk of infection disease

#### Clinical examination

- Neurological signs
  - Fever
  - Elevated BP (>140/90)
- Modified from Negro *et al.*<sup>3</sup>

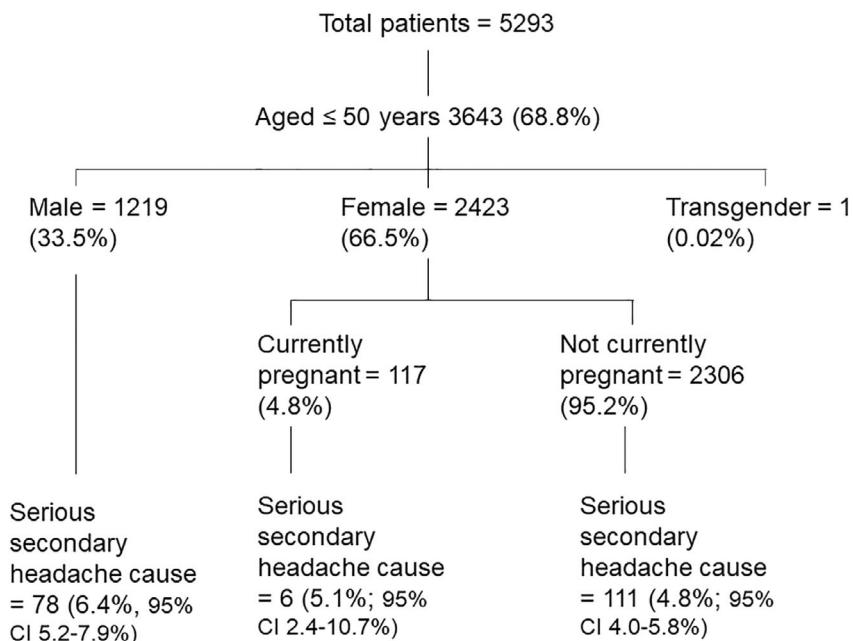


Figure 1. Sample derivation and outcome.

have been missed, resulting in underestimation of prevalence. We did not collect stage of pregnancy data. Our data relates only to patients attending an ED for care. The prevalence of serious secondary headache in pregnant patients using other care pathways is not addressed by the present study. The design of the study and resource limitations precluded the assessment of inter-rater reliability of data collection. That said, our data represent 'real world' experience across a large number of EDs.

## Conclusion

The present study did not find a difference in the prevalence of serious secondary headache caused between pregnant and non-pregnant ED patients presenting with a headache. Based on these data, the inclusion of pregnancy as a 'red flag' in ED headache assessment is not supported.

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## Competing interests

AMK and GK are section editors for *Emergency Medicine Australasia*.

## Data availability statement

Data may be available, subject to HREC approval

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## Supporting information

Additional supporting information may be found in the online version of this article at the publisher's web site:

**Appendix S1.** HEAD Study investigators.