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REVIEW

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# Bell's palsy in pregnancy: A scoping review of risk factors, treatment and outcomes

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## Abstract

**Objective:** There are limited studies reporting on Bell's palsy and pregnancy. Our study aimed to evaluate risk factors, current treatment options and facial function outcomes in women who developed Bell's palsy in pregnancy. To our knowledge this is the first review analyzing these factors.

**Data sources/review methods:** A search of PubMed/MEDLINE, Embase, Web of Sciences and Scopus was carried out. Studies describing risk factors, treatment and/or facial function outcomes of Bell's palsy in pregnancy were included. PRISMA-Scr guidelines were followed.

**Results:** The search yielded 392 abstracts, of which 15 studies were included for analysis. It was not possible to perform a meta-analysis due to small numbers and quality of studies. There were 559 patients included from the 15 studies. The third trimester was the most common time for Bell's palsy to occur ($n = 364$, 65%). Pre-eclampsia was the most common co-morbidity reported. The most common treatment was corticosteroids and the majority of patients had a complete recovery of their palsy (58%, $n = 192$).

**Conclusion:** This analysis has evaluated all available data concerning risk factors, treatment and facial function outcomes of BP in pregnancy. The third trimester is the most common time for Bell's palsy to occur in pregnancy. There is currently a lack of high quality evidence into this condition in pregnancy.

**Level of evidence:** 1.

KEYWORDS
Bell's palsy, pregnancy, scoping review

## 1 | INTRODUCTION

Bell's palsy (BP) is an idiopathic peripheral facial palsy, due to inflammation of the facial nerve leading to dysfunction. The annual incidence of BP is 25 per 100,000 and its exact cause is not fully understood, but a viral etiology is favored.[1]

BP has been described in association with pregnancy and has an estimated prevalence of 45 cases per 100,000 pregnant women.[2] It has

been observed that almost all cases of BP in pregnancy occur during the third trimester and puerperium.[3] Another study found much higher rates of gestational hypertension and pre-eclampsia amongst pregnant women with BP compared with a general obstetric population.[4] A recent meta-analysis investigation incidence of BP in pregnancy as well as comorbidities and complications concluded that there is a low incidence of BP in pregnant women with the majority of cases occurring the third trimester.[5]

There is limited research into BP in pregnancy, particularly its treatment and outcomes in terms of facial function. We conducted a review to evaluate these factors.

## 2 | METHODS

We formulated our search strategy using the PEO framework (population, exposure, outcomes). The population under investigation was pregnant women, being defined as conception up until 6 weeks postpartum, including the puerperium. The exposure of interest was Bell's palsy. The outcomes of interest were risk factors for BP in pregnancy, all available medical and surgical treatments as well as facial function outcomes.

### 2.1 | Data sources

This review was conducted and reported in accordance with preferred reporting items for systematic reviews and meta-analysis extension for scoping reviews (PRISMA-Scr).[6] Following PRISMA-Scr guidelines, a search was carried out using PubMed/MEDLINE, Embase, Web of Sciences and Scopus by two independent researchers (HJ, FS). The following search strategy was used: "Bell's palsy" OR "facial palsy" AND "pregnancy" OR "puerperium". All titles were scanned to assess relevance before abstracts were reviewed. Full text studies were then reviewed and data extracted (Figure 1). The search was conducted on September 14, 2022. An updated search was performed on May 30, 2023, which led to the addition of one study.

### 2.2 | Inclusion and exclusion criteria

Studies were included for analysis if they met the following criteria: (1) all randomized control trials or observational studies with a prospective or retrospective design that evaluated Bell's palsy in pregnant women and (2) studies must contain data points other than incidence in pregnant women with BP. Exclusion criteria were (1) single case reports, reviews, letters, opinion pieces, conference papers and meta-analyses and (2) studies that assessed Bell's palsy in a range of patient cohorts but did not contain a subgroup analysis of pregnant women.

### 2.3 | Data extraction

Each reviewer extracted these data variables: title and reference data (author, year, country), population characteristics (number in study, age, co-morbidities), pregnancy characteristics (gravidity, stage in pregnancy, complications), disease characteristics (grade of palsy, laterality, recurrent), treatment given and disease outcome in terms of facial function. All data were recorded independently by two reviewers in separate databases to limit selection bias (HJ, FS). These were compared at the end of the process by a third reviewer, disparities clarified and duplicates removed (JH).

### 2.4 | Statistical analysis

Data was analyzed using IBM® SPSS® ver 26. Descriptive analyses were performed on all data and are presented in absolute numbers, unless otherwise indicated.

## 3 | RESULTS

A total of 15 studies met inclusion criteria and were included in the review. The studies included were published over a 59-year period (1964–2023), with most studies originating in the USA ($n = 6$, 40%), followed by Israel and Thailand ($n = 2$, 13%). The cohort consisted of 559 patients with a mean age of 28.7 ± 2.3 years.

### 3.1 | Characteristics of palsy

Of the 15 studies, 6 studies reported the laterality of Bell's palsy. There were 252 cases of unilateral palsy and 5 of bilateral palsy. Only three studies reported the grade of palsy at diagnosis, with 114 patients (87%) having a complete palsy at diagnosis, and the remaining 17 patients an incomplete palsy. One of these studies, Phillips et al., used the House-Brackmann (HB)[7] grading scale at diagnosis and defined a complete facial palsy as a HB V or VI. The majority of cases occured during the third trimester, with the peurperium being the second most common time for BP to occur. Nine studies reported patient gravidity with most patients being gravida 1 ($n = 87$), while 83 patients were equal or greater than gravida 2. (Table 1).

### 3.2 | Comorbidities or puerperal complications

Comorbidities or puerperal comorbidities were reported in 156 of the patients in the cohort. The most common comorbidity or complication was pre-eclampsia, which was present in 59 of the patients, followed by induction of labor in 45 cases (Table 2).

### 3.3 | Interventions performed

Nine studies reported on interventions received by patients. The most frequent intervention was steroids alone in 164 patients, followed by a combination of steroids and antivirals in 16 patients (Table 3).

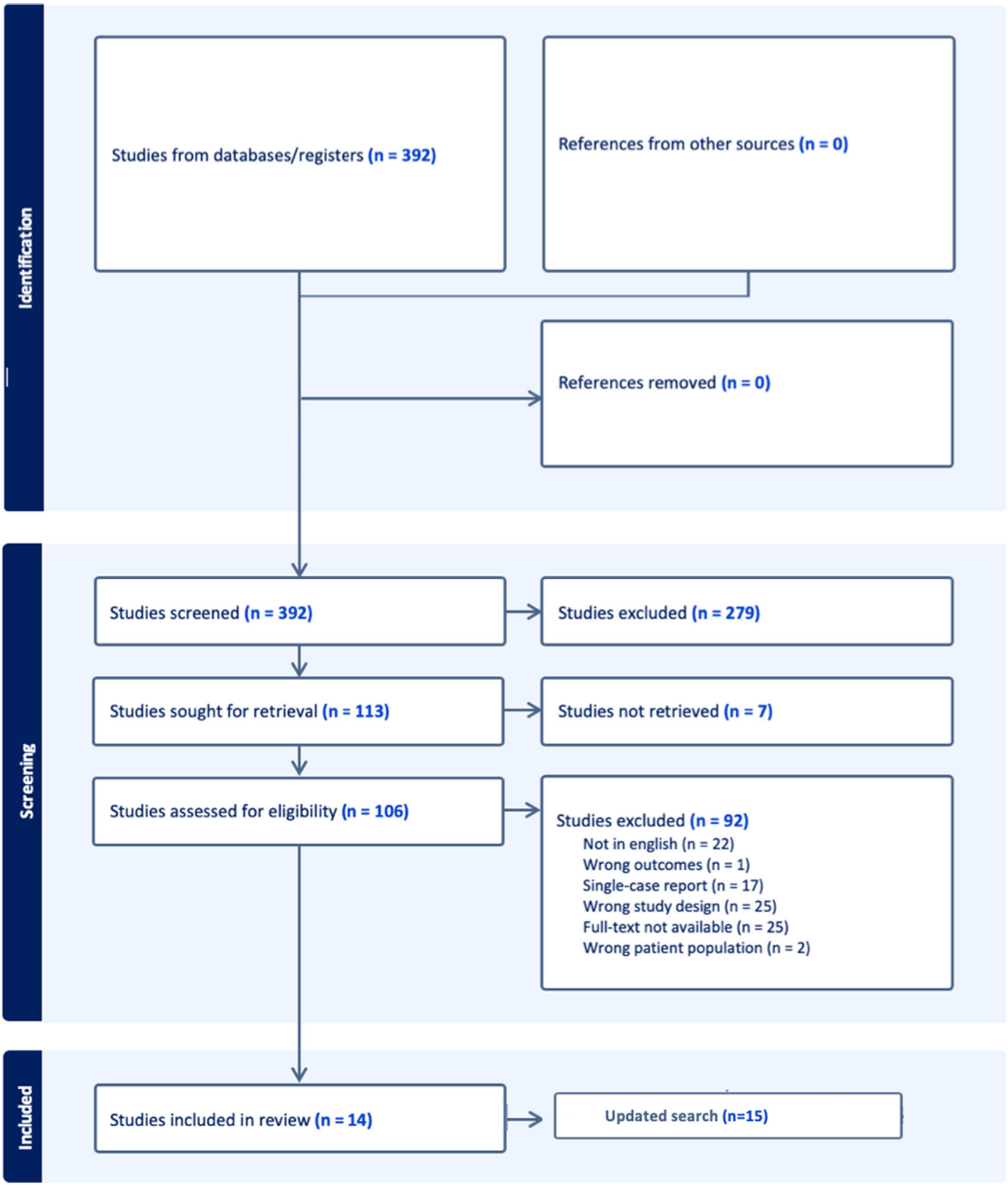


**FIGURE 1** PRISMA flow chart.

### 3.4 | Outcomes

Facial palsy outcomes were reported in 10 studies. The majority of patients had a complete recovery of their facial palsy ($n = 192$, 58%) and 21 patients (6%) had a recurrence of their facial palsy (Table 4).

## 4 | DISCUSSION

The exact etiology of Bell's palsy (BP) is unknown, however viral reactivation within the geniculate ganglion, inflammation of the nerve within the limited space of the temporal bone and subsequent ischemic insult is favored.[8,9] During pregnancy there are multiple factors

**TABLE 1** Characteristics of included studies.

| Included study | Country | *N* | Age (mean) | Characteristics of palsy | | Timing of palsy | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Side (unilateral/bilateral) | Grade (complete/incomplete) | First and second trimester | Third timester | Puerperium |
| Katz et al.[14] | Israel | 42 | | 41/1 | | 3 | 38 | 1 |
| Korczyn[36] | Israel | 11 | 27.4 | | | 3 | 4 | 2 |
| Choi et al.[37] | Korea | 28 | 30.8 | | | 9 | 11 | 8 |
| Dorsey and Camann[15] | USA | 36 | 28 | | | 0 | 25 | 11 |
| Edwards[38] | USA | 9 | 26 | 9/0 | | 0 | 7 | 2 |
| Gillman et al.[21] | USA | 77 | 27.9 | | 60/17 | 9 | 54 | 14 |
| Hilsinger et al.[2] | USA | 42 | | | | 6 | 31 | 5 |
| Leelawai et al.[39] | Thailand | 8 | 30 | | | 1 | 6 | 1 |
| Leelawai et al.[40] | Thailand | 8 | 31.5 | | | 1 | 6 | 1 |
| Mair et al.[26] | Norway | 6 | 25.3 | 5/1 | | 3 | 3 | 0 |
| Phillips et al.[22] | USA | 51 | 31.4 | | 51/0 | 1 | 41 | 8 |
| Pourrat et al.[41] | France | 3 | 30.3 | 3/0 | 3/0 | 0 | 2 | 1 |
| Robinson and Pou[25] | USA | 15 | 24.9 | 14/1 | | 2 | 12 | 1 |
| Shmorgun et al.[16] | Canada | 41 | 29 | | | 1 | 33 | 4 |
| Lansing et al.[20] | Sweden | 182 | 31 | 180/2 | | 36 | 91 | 55 |
| Total | | 559 | 28.7 | 252/5 | 114/17 | 75 | 364 | 114 |

**TABLE 2** Comorbidities/puerperal complications.

| Included study | Diabetes | Hypertension | Pre-eclampsia | HELLP | PROM/induction |
|---|---|---|---|---|---|
| Katz et al.[14] | 10 | 10 | 24 | | 5/31 |
| Korczyn[36] | | | | | |
| Choi et al.[37] | 1 | 1 | | | |
| Dorsey and Camann[15] | 2 | | 7 | 1 | 0/3 |
| Edwards[38] | | 3 | | | |
| Gillman et al.[21] | | | | | |
| Hilsinger et al.[2] | | | 2 | | |
| Leelawai et al.[39] | 1 | 1 | | | |
| Leelawai et al.[40] | 1 | 1 | 1 | | |
| Mair et al.[26] | | | | | |
| Phillips et al.[22] | 4 | 6 | 7 | | |
| Pourrat et al.[41] | | | | 1 | 0/1 |
| Robinson and Pou[25] | | | 9 | | |
| Shmorgun et al.[16] | | 4 | 9 | | 0/10 |
| Lansing et al.[20] | | | | | |
| Total | 19 | 26 | 59 | 2 | 5/45 |

that may contribute the development of an idiopathic facial nerve palsy. Nerve compression may occur as a result of perineural oedema due to fluid retention which is most pronounced during the third trimester. This mechanism is thought to be the cause of the increased incidence of carpal tunnel syndrome seen in pregnancy.[10] Also during the third trimester and puerperium, there are elevated levels of free circulating cortisol in maternal blood leading to immunosuppression which may contribute to the increased prevalence of BP during this time.[11] Additionally, hypercoagulability which is present in the late stages of pregnancy may lead to vasa nervorum thrombosis and BP.[12]

**TABLE 3** Interventions performed.

| Included study | Physiotherapy | Steroids alone | Antibiotics alone | Steroids + antiviral | Steroids + antibiotics | Surgery |
|---|---|---|---|---|---|---|
| Katz et al.[14] | | | | | | |
| Korczyn[36] | | | | | | |
| Choi et al.[37] | | | | | | |
| Dorsey and Camann[15] | | 2 | | | | |
| Edwards[38] | 7 | 29 | | | | |
| Gillman et al.[21] | | 26 | | | | |
| Hilsinger et al.[2] | | 6 | | | | 2 |
| Leelawai et al.[39] | | | | | | |
| Leelawai et al.[40] | | | | | | |
| Mair et al.[26] | | 2 | | | | 1 |
| Phillips et al.[22] | | 15 | 1 | | | |
| Pourrat et al.[41] | | 2 | | 15 | 1 | |
| Robinson and Pou[25] | 2 | 2 | | 1 | | 2 |
| Shmorgun et al.[16] | | | | | | |
| Lansing et al.[20] | | 80 | | | | |
| Total | 9 | 164 | 1 | 16 | 1 | 5 |

**TABLE 4** Outcomes.

| Included study | Complete recovery | Incomplete recovery | Recurrence of palsy |
|---|---|---|---|
| Katz et al.[14] | | | |
| Korczyn[36] | 7 | 2 | |
| Choi et al.[37] | | | |
| Dorsey and Camann[15] | | | |
| Edwards[38] | 5 | 1 | |
| Gillman et al.[21] | 60 | 17 | 9 |
| Hilsinger et al.[2] | 29 | 2 | |
| Leelawai et al.[39] | 6 | 2 | |
| Leelawai et al.[40] | | | |
| Mair et al.[26] | 3 | 3 | |
| Phillips et al.[22] | [a] | [a] | |
| Pourrat et al.[41] | 2 | 1 | |
| Robinson and Pou[25] | 13 | 1 | |
| Shmorgun et al.[16] | | | |
| Lansing et al.[20] | 67 | 112 | 12 |
| Total | 192 (58%) | 141 (42%) | 21 |

[a]Outcomes reported in terms of median eFACE (clinician graded facial function scale) score.

The stage of pregnancy at the time of onset of BP was reported in all studies. In all studies, the third trimester was the most common time for BP to occur, accounting for 65% in the pooled data.

The exact relationship between hypertensive disorders of pregnancy and BP is not known. As previously discussed, the physiologic changes in the third trimester that may predispose to BP are exacerbated in pre-eclampsia. Significant oedema in subcutaneous and nerve tissues as well as a hypercoagulable state are hallmarks of pre-eclampsia.[13] The largest cohort reporting their analysis of the relationship between hypertensive disorders of pregnancy and BP was by Katz et al. The majority of patients in their cohort developed BP in the third trimester. They found that pregnant women with BP exhibited higher rates of severe pre-eclampsia than those without (9.5% vs. 1.1%, $p < .001$). Researchers also found that obesity, chronic hypertension and pre-eclampsia were independent risk factors for BP in pregnancy. This analysis also controlled for confounders such as maternal age and fertility treatment.[14] Shmorgun et al. and Dorsey et al. found that gestational hypertension and pre-eclampsia occurred at a rate of nearly five times in pregnant women with BP than anticipated in the general obstetric population.[15,16] Shmorgun et al. also reported that 7% of

pregnancies in their cohort were twin pregnancies, which is higher than the general obstetric population at 3%.[16,17] Multifoetal pregnancies are also known to be at higher risk for pre-eclampsia.[18] In non-pregnant cohorts, uncontrolled hypertension has been found to be a risk factor for BP.[19]

The mainstay of treatment for BP is with corticosteroids used sometimes in conjunction with antivirals. Nine studies reported on treatment received which included: corticosteroids, antiviral agents, antibiotics and physiotherapy. Insufficient data and study heterogeneity meant we were unable to assess benefit from treatments given in the pooled studies. Gillman et al. found that pregnant women with BP were far less likely to be prescribed corticosteroids and antivirals than nonpregnant controls with BP which was echoed by Phillips et al. and Lansing et al.[20–22] The latter study suggests that the risk of teratogenicity may lead clinicians to be more conservative with medical therapy in pregnant patients. The use of systemic corticosteroid in the first trimester may confer a modest increase in the risk of cleft lip with or without cleft palate. There is little evidence that their use independently increases the risk of preterm birth, pre-eclampsia or fetal growth restriction. Corticosteroids used in late pregnancy appears safe, however as with all medical treatment in pregnancy an assessment of risk: benefit ratio must be done.[23,24] Surgical decompression of the facial nerve was reported in three studies. Hilsinger et al. reported two patients who initially received no medical treatment with one developing complete resolution of their palsy following surgery.[2] Mair et al. and Robinson et al. reported three patients in total who underwent surgery, one was lost to follow up, one showed commencing reinnervation on electrical studies at 5 months post-procedure and the last patient was reported to have 85% return of function at follow up.[25,26] In their treatment guideline for BP the National Institute for Health and Care Excellence (NICE) recommend treatment with prednisolone within 72 h of onset of the facial palsy, eye care and they also note that antiviral treatment may have a small benefit if used in combination with prednisolone but should not be used alone.[27] The American Academy of Otolaryngology—Head and Neck Surgery (AAO-HNS) also recommend steroids within 72 h which can be used in combination with an antiviral agent.[28] NICE recommend referral to a facial palsy specialist if there is no improvement after 3 weeks or incomplete recovery by 5 months while AAO-HNS recommend specialist referral if there is incomplete recovery by 3 months. Both guidelines recommend referral to an ophthalmologist if there is ocular involvement. A recommendation for or against surgical decompression could not be made by AAO-HNS due to the absence of high quality evidence. To our knowledge there are no current guidelines for the management of this condition in the pregnant population.

There is very little data in the literature regarding facial function outcomes of pregnant women with BP. Ten studies reported facial function outcomes, however most of these studies contained very small numbers making it difficult to assess. Lansing et al. reported the largest cohort and found that pregnant women had a poorer facial function outcomes compared with postpartum and nonpregnant women. They also found that facial function at the initial visit was the most important prognosticator. Researchers were unable to demonstrate an effect of corticosteroid treatment and as discussed previously only a third of pregnant women in their study received this treatment.[20] Phillips et al. found worse long-term facial function outcomes in pregnant women with BP than nonpregnant controls. They reported their results by way of median eFACE (clinician graded facial function score). With this tool "0" represents the most extreme asymmetry with "100" representing complete symmetry with the contralateral side.[29] At long-term follow up they reported a median eFACE score of 77 amongst pregnant women who developed BP compared with 84 in the non-pregnant group ($p < .001$). Researchers then completed a sub analysis of those treated with and without steroids, amongst pregnant and non-pregnant controls. Women who developed BP in pregnancy and treated with steroids had worse median eFACE scores at follow-up compared with their non-pregnant counterparts also treated with steroids (median eFACE 78 vs. 82, $p = .023$). The same was found for those not given steroids with median eFACE scores of 70 reported in pregnant women and 85 in non-pregnant controls ($p = .038$). This lead researchers to suggest that prognosis is worsened by factors specific to pregnancy.[22] In their study, Gillman et al. noted that pregnant women were more likely to develop a complete facial palsy (65%) compared with non-pregnant controls (45%–52%). They also found that pregnant women who developed a complete palsy had a significantly worse recovery, with only 52% improving to a House-Brackmann grade I or II compared with 77%–88% of the control group. This result may be biased as only 35.5% of the pregnant group received corticosteroids compared with 59.6% of the non-pregnant controls with complete facial paralysis.[21] In another study, full recovery of facial function was reported in 93.5% of 31 pregnant women with BP who underwent long-term follow-up. However, in this study there were 11 patients lost to follow-up, nine of whom were initially reported to have severe facial nerve dysfunction at diagnosis.[2]

There are numerous reports of facial function outcomes in non-pregnant cohorts. Complete recovery rates of 85%–95% with early corticosteroid treatment have been reported.[30] Even without intervention, more than 90% of people with incomplete paralysis and approximately 70% of those with complete paralysis make a complete recovery within 6 months.[28] The likelihood of significant improvement is dependent upon the initial severity of the facial palsy.[31] Improved prognosis has been shown to be associated with a younger age at onset, signs of functional improvement by 2 weeks and initiation of steroids within 72 h.[32] Some factors that have been found to be associated with poorer outcomes are hypertension and diabetes. However good antihypertensive treatment has been found to be associated with a favorable outcome.[33] Yoo et al. in their study assessing factors associated with a favorable outcomes in BP, found that the absence of diabetes was also associated with a favorable outcome.[19] Only one study reported on recurrence, they found a rate of 12%,[21] which is in keeping with rates reported in non-pregnant individuals.[34,35]

## 5 | CONCLUSION

This analysis has evaluated all available data concerning risk factors, treatment and facial function outcomes of BP in pregnancy. There is currently a lack of high quality evidence regarding the management of these patients. Whether BP in pregnancy confers a worse prognosis in terms of facial function is not conclusive, further research in this area is required. To our knowledge this is the first review reporting on facial function outcomes of BP in pregnancy.

### CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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