Pharmacological Pain Relief and Women’s Satisfaction with Birth Experience: A Systematic Review

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Abstract

Background: There is an increasing interest in healthcare systems worldwide for maternal satisfaction with childbirth experience. The WHO launched a recommendation in 2018 regarding women’s right to equal intrapartum care, where the importance of pharmacological pain relief was highlighted. Objectives: To assess the current knowledge regarding the impact of obstetric pharmacological pain relief on maternal satisfaction with childbirth. Search strategy: Pub Med, Cochrane, EMBASE and CINAHL were searched for studies in English language, published after 1999 that investigated the effect of pharmacological pain relief on women’s birth satisfaction after vaginal delivery. Selection criteria: Studies reporting assessments of subjective satisfaction with childbirth in women planned for vaginal delivery. Data Collection and Analysis: Results were summarised qualitatively. A forest plot is presented for the five studies where comparable association measures were available. Due to the heterogeneity between studies and indirectness of measuring instruments, no meta-analyses were performed. Main Results: In total, 8,847 women were included from 11 studies: one randomised controlled study, ten observational studies, all with moderate or high risk of bias. Inconsistent methods were used to measure outcome; consequently, no conclusion could be drawn regarding a possible correlation between pharmacological pain relief and birth satisfaction. Conclusions: This systematic review could not show a correlation between pharmacological pain relief and women’s experiences of childbirth, mainly because a large heterogeneity between the studies. In order to evaluate pain relief during labour and improve women’s childbirth experiences, high quality research is urgently needed. Keywords Childbirth-satisfaction, Birth-experience, Pharmacological pain relief, pregnancy, labour

Introduction

Maternal birth satisfaction is of great importance for both the individual and the society. A negative experience affects the early connection between mother and child and can further lead to post-traumatic stress disorder (PTSD) and fear of birth in future pregnancies, with an increasing number of requests for operative deliveries.¹⁻³ Healthcare systems worldwide, including care during pregnancy, have, in the last decades, moved from authority-based organisations towards an increasingly patient-focused approach.⁴⁻⁶ Diverging aims, definitions and outcomes in studies reflect the complexity of the childbirth experience.⁷⁻¹² Some authors promote non-medical births, and some have a positive attitude towards pharmacological treatment, but with main focus on the effectiveness of reducing the actual pain, not the overall satisfaction.¹³⁻¹⁶ A secondary outcome in studies with a non-medical focus is often an aim to decrease the use of pharmacological pain relief,¹⁷⁻²¹ introducing a bias that makes it difficult to evaluate a possible positive effect from medical pain treatment. The World Health Organisation (WHO) makes an important statement in its recommendations for “Intrapartum care for a positive childbirth experience” from 2018,²² concluding that labouring
women have the right to pain relief when giving birth.

Participation in decision-making during labour and a close contact with the midwife have proved to be crucial elements for a positive birth experience.\textsuperscript{23-26} Other significant elements for satisfaction with childbirth are time of assessment,\textsuperscript{27-29} where women tend to rate most positive immediately post-partum, explained by a ‘halo effect’ from having a healthy child,\textsuperscript{27} and parity of the woman, where nulli-parous and multiparous women react to different aspects of childbirth.\textsuperscript{30} None of the following factors: pain relief,\textsuperscript{10, 31} pain itself,\textsuperscript{32, 33} mode of delivery,\textsuperscript{7, 34} medicalised level of care,\textsuperscript{8, 34-36} and obstetric interventions,\textsuperscript{25, 37, 38} offer a simple solution of how to improve the birth experience, as results are contradictory.\textsuperscript{26, 29, 38-40} It is not clear whether the negative satisfaction reported when given pain relief depends on the need for pain relief,\textsuperscript{28, 29} less support from midwives after pain relief,\textsuperscript{10, 41} or if it is due to the analgesic method itself.

With pharmacological pain relief, most authors refer to medical agents applied orally, parenterally or regionally, which is the definition used in this systematic review.

The purpose of this systematic review is to compile existing knowledge on pharmacological pain relief and its possible association with women’s satisfaction with childbirth.

\textbf{Methods}

The systematic review was conducted according to the PRISMA guideline,\textsuperscript{42} recommendations by the Swedish Agency for Health Technology Assessment and Assessment of Social Services (SBU),\textsuperscript{43} and the GRADE protocol.\textsuperscript{44, 45} The study was registered in PROSPERO (prospective register of systematic reviews) on 18 December 2018 (ID 116744). The literature search was carried out with the assistance of an information specialist, starting on 11 February 2019, with the last update conducted in September 2020. Three search strings were applied: 1. Labor, Delivery, Parturition. 2. Pain, Analgesia. 3. Patient satisfaction. The complete search strategy is presented in Table S1.

\textbf{Search strategy}

An electronic systematic literature search was made in PubMed, CINAHL, EMBASE and the Cochrane Library. Limitations for language (English) and time of publication (within the last 20 years) were applied for the search. No limits were set due to study design. Reference lists of retrieved articles and systematic reviews that were found through the search process were screened for additional titles. Editorials, commentaries, study protocols, pilot studies and conference abstracts were excluded. Information that was not supplied in the original articles have not been requested from the authors.

All articles identified were independently screened by two reviewers (MUE and HG), using the reference management program Rayyan QCRI (http://rayyan.qcri.org).\textsuperscript{46} Articles were first screened using the title and abstract, according to a study protocol with defined inclusion and exclusion criteria. If the reviewers were of different opinions during the selection phase, the paper in question was assessed in full text. Selected articles were retrieved in full text and assessed for eligibility. Any disagreements after assessing papers in full text were resolved by the third author (HB). A PRISMA flow chart is presented in Figure 1.

\textbf{Selection criteria}

The study populations in the included studies were women who had given birth by vaginal delivery in a hospital. Studies were included where pharmacological pain relief had been administered to women during vaginal delivery. Comparator groups included women not receiving pharmacological pain relief. We defined pharmacological pain relief as administration of opioids, local anaesthetics, non-steroid analgesics and inhaled nitrous oxide. The outcome in eligible studies was women’s subjective evaluation of their Birth Experience. Different methods and tools were used in the included studies to measure overall satisfaction with childbirth. Studies where the outcome was satisfaction with care, and studies evaluating pain relief, not overall satisfaction, were excluded.

\textbf{Data extraction}
A data extraction sheath was used when collecting data from eligible articles. Data relating to general information (author, year of publication, country, study design, sample size, parity and age of participants), information about comparator group without pharmacological pain relief, method used to evaluate satisfaction with birth experience and timing of assessment of birth satisfaction, were extracted. It was considered an early assessment if less than two months had passed since delivery, and a later assessment if more than two months had passed, based on knowledge of how women’s description of satisfaction with birth experience changes over time. Studies that did not meet the eligibility criteria, or those that could not be found in full text were excluded with reported reasons. (Table S2).

Evaluation of birth experience had different labels in the included studies and will be used interchangeably in this text, e.g. maternal satisfaction, birth experience, recall of birth and satisfaction with childbirth.

See Table 1 for the summary of included articles. Results are presented using a forest plot (Figure 2) for studies where information was supplied for calculation of relevant association measures. No meta-analysis was performed due to the heterogeneity and low quality of the studies. Where numerical data were not available for calculation for a forest plot, the results were summarised qualitatively. The statistical software STATA 17.0 (StataCorp, College Station, Texas, US) was used for data visualisation.

One study presented the reversed outcome, where the outcome measured was a negative birth experience. To be able to compare with the other trials, we calculated an inversed odds ratio.

Quality and risk of bias assessment

The eligible studies were controlled for risk of bias independently by two researchers (MUE, HG) based on recommendations and protocols from the Swedish Agency for Health Technology Assessment and Assessment of Social Services (SBU). The SBU protocols are translations into Swedish of the Cochrane Collaboration tools, Cochrane revised risk of bias tool for randomised trials (RoB 2) for included randomised trials, and Risk of bias in non-randomised studies-of interventions (Robins-I) for non-randomised trials. We assessed the included RCT for risk of selection bias, performance bias, attrition bias and reporting bias. Eligible observational studies were assessed for risk of confounding, biased selection of participants, biased classification of interventions, deviation from intended interventions, missing data, biased measurements of outcomes and biased selection of reported results. Trials where no stratification or regression analysis was made to control for confounding factors were excluded with the reason “unacceptable high risk of bias” (Table S3). A summary of the risk of bias assessment is presented in Figure S1, using the tool Robvis. For an overall assessment of quality and relevance, the Grades of recommendation, assessment, development and evaluation (GRADE) protocol were applied. This model uses five considerations when assessing evidence: study limitations, consistency of effect, imprecision, indirectness and publication bias.

Results

Systematic search

A PRISMA flowchart describes the selection process (Figure 1). Search of electronic databases resulted in 4,332 reports. Hand search of reference lists gave 35 records. After titles and abstracts were screened, 140 articles were retrieved, out of which two could not be found in full text. The reasons for exclusion at abstract level were inappropriate population (caesarean section or diverse surgical interventions), intervention (no pharmacological pain relief was involved) or outcome (only pain score was evaluated, with no measure of overall satisfaction). Reasons for exclusion of articles being assessed in full text are supplied in Table S2. In total, 11 trials, containing 12 reports, were found to be eligible and included in the systematic review.

Study characteristics

Included studies are described in Table 1. Of the eligible studies, there were one RCT, five prospective cohort studies, two retrospective cohort studies, two cross-sectional studies and one case-control study. No qualitative study fulfilled the inclusion criteria. One of the studies included two intervention-comparator groups, which is why this review includes 12 reports from 11 articles. Five of the
studies were conducted in Sweden (5,382 women),\textsuperscript{10, 31, 57, 58, 60} one in Brazil (70 women),\textsuperscript{55} one in Chile (1,534 women),\textsuperscript{30} one in Italy (111 women),\textsuperscript{56} one in Germany (335 women),\textsuperscript{39} one in the Netherlands (1,293 women)\textsuperscript{59} and one in the US (122 women).\textsuperscript{61}

Nine of the included studies had received ethical approval from review or ethical boards. According to Rijnders et al.,\textsuperscript{59} no ethical approval is needed in the Netherlands if no invasive procedures are involved. No information about ethical approval was supplied by Waldenström et al. 1999.\textsuperscript{58}

Altogether, 8,847 women, aged between 16 and 47 years, participated in the studies reported in this systematic review. Foetal or maternal medical concerns were exclusion criteria in five studies.\textsuperscript{39, 50, 55, 60, 61} Seven studies excluded women due to language barriers.\textsuperscript{10, 31, 56-58, 60, 61} Rijnders et al \textsuperscript{59} included 42% home births. Also, 8–20% of the women in ten of the included studies delivered with unplanned caesarean section. Parity, mode of birth and age are characteristics of participants, as described in Table 1.

This review did not analyse the implication of individual risk factors or personal attributes on maternal satisfaction.

The interventions of interest for this systematic review were different sorts of pharmacological pain relief. For seven of the included studies, assessing the effect of pharmacological pain relief on birth experience was one of several aims. Primarily, those articles studied birth satisfaction related to water birth,\textsuperscript{61} mode of delivery\textsuperscript{39} or medical interventions in general during labour.\textsuperscript{10, 31, 56, 58}

**Assessment of birth satisfaction**

In seven of the included studies, numerical data were not available to present results graphically; hence, they are reported narratively only. Five relative risks (RRs) of intervention versus comparator from four studies are presented in the forest plot Figure 2, and only two RRs are statistically significant, with one favouring pharmacological pain relief and the other favouring giving birth without medical pain relief.

The overall birth experience was less positive in six of the included studies. Four of these articles included women receiving epidural analgesia, one study using unspecified pharmacological pain management and one study where women who had received nitrous oxide scored less positive. Combined Spinal Epidural (CSE) analgesia was correlated with a higher maternal satisfaction in one article. No significant difference in maternal satisfaction was seen between women with or without pharmacological pain relief after adjusting for confounders in four studies. The timing of assessment of Birth Satisfaction in the included studies varied from one hour to three years post-partum. No difference in outcome was seen in studies with an early versus late assessment of birth experience. A summary of assessment tools found in this systematic review is presented in Table S2. Four reports used dichotomised Likert scales, where low scores indicate a negative response and high scores a positive response. It should be acknowledged that more than 30 other tools to measure satisfaction with birth experience are available.\textsuperscript{62, 63, 64}

**Quality and bias assessment**

Of the 17 studies selected for quality assessment, six studies were excluded, due to unacceptably high risk of bias, as no regression analysis was performed regarding relevant confounders.

Four of the remaining studies were assessed as having an overall high risk of bias. Moderate risk of bias was considered in seven studies, and no study was deemed as having a low risk of bias. The included RCT had an overall moderate risk of bias, with low risk of bias in random sequence allocation, selective reporting and loss to follow-up, and moderate risk of bias when it came to blinding of participants and assessors.

The final results were downgraded according to the GRADE protocol\textsuperscript{44, 45} for overall quality of evidence due to heterogeneity of the primary outcome—the effect of pharmacological pain relief on overall satisfaction with childbirth. Furthermore, inconsistency in study design, study population, timing of evaluation and methods to measure birth experience between the included studies resulted in downgrading of evidence.
Risk of bias assessment is supplied in Figures 3a and 3b and GRADE assessment in Table S5. Overall, the studies had moderate to high risk of bias (Figures 3a and 3b).

Discussion

In this systematic review, pharmacological pain relief was not shown to have a correlation with either improved or worsened birth satisfaction. The overall quality of evidence was downgraded due to heterogeneity of definitions of birth experience and of the study design, with the result that it was not possible to perform a meta-analysis in an adequate manner. In some of the included studies, no association was found between birth satisfaction and pharmacological pain relief after multiple logistic regression analysis, where only odds ratios for unadjusted data were presented. Therefore, these results could only be presented qualitatively, which is why the forest plot only includes 5 reports. The results of this systematic review do not state the degree to which pain relief is of general importance for women giving birth. However, we highlight the fact that satisfaction with childbirth involves more aspects of care than only pain relief. High quality research is needed to be able to correctly evaluate the effect of pain relief on overall birth satisfaction.

Interpretation

Unbearable pain has been shown to be an independent risk factor for a negative birth experience. When women have rated their birth experience after receiving pain relief, we cannot be sure whether their evaluations were based on their experience when they were at the peak of pain. This theory is supported by the multivariate analysis by Waldenström, who showed how pain, and not epidural analgesia, negatively affected satisfaction with birth. In addition, women with strong anxiety tend to use more pharmacological pain relief, and have more negative birth experiences regardless of receiving analgesia. The RCT in our review showed that combined spinal epidural (CSE) had a positive effect on birth satisfaction, even though the two groups reported the same baseline pain. This result reconfirms how pain can be a confounder in observational studies.

Clearly, there are ethical dilemmas in research involving pain relief during childbirth. A double-blinded randomisation to delivery with, compared to delivery without pain relief during childbirth, is not a possible option, which is why observational study designs prevail in the area.

We did not find a difference in birth satisfaction between studies assessing birth satisfaction within two months compared to after two months to three years after childbirth. This is not fully in accordance with previous results, where timing of assessing birth experience has been shown to be an influential factor. The discrepancy could be explained by the small number of included articles and heterogeneity of assessment tools. Authors refer to the Halo-effect, an initial overwhelming feeling of gratefulness for the baby, and possibly denial of the recent pain. This would explain the higher percentage of values correlating to “high satisfaction” directly after giving birth. According to some authors, most attention should be given to ratings lower than “very satisfied” in early evaluation, as these could indicate a less positive recall of the experience later.

Measuring childbirth experience is complex, evident by the large number of instruments and scales available. Most instruments aim to identify factors that can be controlled in this overwhelming event in a woman’s life, involving both medical interventions and expectations. The most important factors for a positive birth experience, as summarised by Hodnett et al., are continuous support from midwives and women’s involvement in decision-making in their own labour, which was confirmed by studies included in this review. If receiving pharmacological pain relief means less interaction with labour ward staff, it most likely affects the experience of childbirth negatively.

One important factor having an impact on women’s expectations is their cultural environment. This cultural environment encompasses previous birth experiences in the woman’s social circle, and what she believes is expected of her, from her family and caregivers. Some women believe that expressions of pain might be viewed as a sign of weakness. An example of subtle influence is that use of pharmacological pain relief in some studies is not considered part of natural birth. Other studies look at the connection...
between women’s expectations of their future labour and their actual experience of giving birth. In many cases, the disappointments and dissatisfaction may be the result of a lack of realistic information regarding both levels of pain and of the effect of available pain relief. Well-informed women with good support were more likely to be satisfied with their childbirth experience, with or without pharmacological pain relief. Pain relief should be available to every labouring woman upon request. Efforts should be made to avoid feelings of failure, regardless of what kind of pain relief the woman prefers.

The WHO’s recommendations for intra-partum care for a positive childbirth experience emphasise safety, equity and cost effectiveness of antenatal interventions. Pain relief in obstetric care demands a substantial part of available anaesthetic services. It is therefore important to confirm that we focus our medical interventions in the right direction and re-evaluate the outcomes.

Strengths and limitations

We conducted a thorough and systematic search, with repeated searches to include later reports. The limit for the date was set to 20 years, aiming to capture studies using relevant techniques for labour analgesia. The majority of data were retrieved from large cohort studies, altogether including more than 8800 women. Studies that did not include regression analyses were removed from the review to reduce risk of bias.

We did not contact authors for missing data. Where no regression analyses were performed, authors might have supplied complementing data of relevant confounders for which to control. More original data could have offered better material for a complete forest plot. No grey literature, pilot studies or unpublished papers were included. If these articles were homogenous in outcome, it could have changed our results.

In the search history, only the American English spelling “labor” was used, not the British English spelling “labour”. In one of the included studies, 42% of the women had a planned home birth, which was not reported separately. Homebirth is an important confounder, involving factors known to be associated with maternal satisfaction, such as close contact with midwife and familiar surroundings.

Implications for future research

We did not include reports comparing the effect on maternal satisfaction between different methods of pain relief. Future research relating to a possible ranking of methods would be of clinical interest.

Well-conducted research regarding when and how pain relief during labour should best be offered for a positive birth experience is warranted. Studies should be performed in a non-judgmental manner, directed towards a variety of populations. The request for a core outcome set for labour pain management has previously been raised in a systematic review by Tan. We further suggest a development of a standardised instrument for measuring birth satisfaction.

Conclusion

This systematic review could not demonstrate any association between pharmacological pain relief and women’s experiences of childbirth, mainly due to large heterogeneity between studies and a lack of uniform assessment tools. We highlight the importance of defining and standardising methods to measure birth satisfaction, for an increasing understanding of the connection with pain relief and other factors involved for a positive experience.

Disclosure of Interest

None declared

Contribution to authorship

MUE, HG and HB conceptualised the study and wrote the study protocol. MUE and HG identified eligible papers and extracted data. MUE and HG analysed the data. YC performed the statistical calculations. MUE wrote the first draft of the manuscript. All authors contributed to the final manuscript.
Details of ethics approval

None declared. This is a review of publicly available published data.

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Acknowledgements

Librarian, Liz Holmgren, assisted in formatting the searches in the medical databases.

Data Availability Statement

Data used in the study were extracted from published articles.

Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1: Search strategy
Table S2: Excluded articles, with reasons
Table S3: Table of instruments measuring birth satisfaction
Table S4: PRISMA statement and checklist
Table S5: GRADE evidence profile

Figure S1: Funnel plot

References


https://www.sbu.se/metodbok


Hosted file
220826_Table 1a+b Summary of included studies.docx available at https://authorea.com/users/509587/articles/586933-pharmacological-pain-relief-and-women-s-satisfaction-with-birth-experience-a-systematic-review
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Fig 1 PRISMA flow chart.docx available at https://authorea.com/users/509587/articles/586933-pharmacological-pain-relief-and-women-s-satisfaction-with-birth-experience-a-systematic-review

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Favors intervention Favors comparator

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Domains:
D1: Bias due to confounding.
D2: Bias due to selection of participants.
D3: Bias in classification of interventions.
D4: Bias due to deviations from intended interventions.
D5: Bias due to missing data.
D6: Bias in measurement of outcomes.
D7: Bias in selection of the reported result.

Judgement
- Serious
- Moderate
- Low
- Bias due to confounding
- Bias due to selection of participants
- Bias in classification of interventions
- Bias due to deviations from intended interventions
- Bias due to missing data
- Bias in measurement of outcomes
- Bias in selection of the reported results

Overall risk of bias

Low risk | Moderate risk | High risk