

Predictors for sexual dysfunction in the first year postpartum: a systematic review and meta-analysis

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Abstract

Background Pregnancy and childbirth increase the risk for pelvic floor dysfunction, including sexual dysfunction. So far, the mechanisms and the extent to which certain risk factors play a role, remain unclear. **Objectives** In this systematic review of literature, we aimed to determine the risk factors for sexual dysfunction in the first year after delivery. **Search Strategy** We searched MEDLINE, Embase and CENTRAL using the search strategy: Sexual dysfunction AND Obstetric events. **Selection Criteria** We included original English, comparative studies that used validated questionnaires and the ICS/IUGA terminology for sexual dysfunction, dyspareunia and vaginal dryness. **Data Collection and Analysis** We assessed the quality and the risk of bias of the included studies with the Newcastle Ottawa Scale. We extracted the reported data and we performed random-effects meta-analysis to obtain the summary Odds Ratios (OR) with 95% Confidence Intervals. Heterogeneity across studies was assessed using the I² statistic. **Main Results** We found no significant difference in the odds for both sexual dysfunction and dyspareunia between cesarean section and spontaneous delivery (OR:1.17[0.88-1.57] and OR:0.75[0.53-1.07]) and between operative delivery and spontaneous delivery (OR:1.56[0.87-2.79] and OR:1.35[0.75-2.42]). Anal sphincter injury was associated with increased odds for both sexual dysfunction (OR:3.00[1.28-7.03]) and dyspareunia (OR:1.71[1.09-2.67]). Episiotomy was associated with dyspareunia (OR:1.65[1.20-2.29]) but not with sexual dysfunction (OR:1.90[0.94-3.84]). We retrieved one study of low quality which reported on vaginal dryness and found no significant association with obstetric events.

TITLE PAGE

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Short running title : Postpartum sexual dysfunction: systematic review

Authors' contribution to the Manuscript:

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ABSTRACT

Background Pregnancy and childbirth increase the risk for pelvic floor dysfunction, including sexual dysfunction. So far, the mechanisms and the extent to which certain risk factors play a role, remain unclear.

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Main Results We found no significant difference in the odds for both sexual dysfunction and dyspareunia between cesarean section and spontaneous delivery (OR:1.17[0.88-1.57] and OR:0.75[0.53-1.07]) and between operative delivery and spontaneous delivery (OR:1.56[0.87-2.79] and OR:1.35[0.75-2.42]). Anal sphincter injury was associated with increased odds for both sexual dysfunction (OR:3.00[1.28-7.03]) and dyspareunia (OR:1.71[1.09-2.67]). Episiotomy was associated with dyspareunia (OR:1.65[1.20-2.29]) but not with sexual dysfunction (OR:1.90[0.94-3.84]). We retrieved one study of low quality which reported on vaginal dryness and found no significant association with obstetric events.

Conclusions: Perineal trauma, rather than the mode of delivery, increases the odds for sexual dysfunction in the first year after delivery.

Keywords: sexual dysfunction, dyspareunia, childbirth, delivery, postpartum

Tweetable abstract: Perineal trauma, rather than mode of delivery, correlates with sexual dysfunction postpartum #dyspareunia #OASI #episiotomy

MAIN TEXT

Introduction

Sexual dysfunction is a broad term encompassing several symptoms which have been defined by the International Uro-Gynecology Association (IUGA) and the International Continence Society (ICS)(1). Some sexual symptoms are specific to pelvic floor dysfunction, such as dyspareunia and vaginal dryness(1). Pregnancy and childbirth are likely to lead to pelvic floor dysfunction, including sexual dysfunction(2). Previous studies showed that sexual dysfunction was common in the first year postpartum(3, 4). The reported prevalence of sexual dysfunction after childbirth reaches 83% at three months after delivery and it declines to 64% at six months(5). Sexual dysfunction also has a negative impact on the quality of life (5-7). Defining the possible risk factors can contribute to counsel and prepare women during the antenatal period on the possibility of sexual dysfunction after childbirth and also, theoretically its prevention. The relationship between obstetric events and sexual function after delivery has been well investigated, and operative delivery, perineal laceration and episiotomy are considered to negatively affect sexual function (8-11). Sexual function is thought to be related to a women's self-perceived body image, which may change around the time of delivery (12). However, the relationship between sexual function and self-perceived body image in the postpartum period has been poorly investigated.

Herein we aim to address which obstetric events are risk factors for *sexual dysfunction, dyspareunia and vaginal dryness* in women up to one year after delivery and what is their effect estimate. In addition, we attempt to answer whether there is a relationship between sexual dysfunction after delivery and *body image dissatisfaction*.

Materials and methods

Protocol and registration

The study was conducted in line with the PRISMA guidelines for systematic reviews(13). Its protocol was prospectively registered on PROSPERO (CRD42020135555).

Search strategy and selection of studies

We searched MEDLINE, Embase and CENTRAL from inception until 2019. We used a search strategy that combined MeSH terms for MEDLINE/Emtree terms for Embase and free text words. The search strings are available in Appendix S1. We used EndNote web to eliminate duplicates. Two authors (LC and LDM) independently assessed eligibility by screening study records by titles and abstracts, and the full-text manuscripts for final inclusion using Rayyan (Qatar Computing Research Institute, Doha, Qatar). In case of discrepancy, conflicts were resolved by discussion, and if not possible by arbitration with one of two senior authors (JB, JDP). In case of overlapping study populations, the largest and most complete dataset was included.

Eligibility criteria

We included all randomized clinical trials, controlled clinical trials, cohort, cross-sectional and case-control studies, comparing potential obstetric risk factors for developing sexual dysfunction up to one year after delivery. Duplicate records, reviews, case reports, incomplete reports, book chapters, conference abstracts, letters to the editor and comments were excluded. We used language restrictions due to the lack of resources for translation(14); only studies written in English were retrieved in the full text format. The PICO format was used to identify studies and data to be extracted(15).

PATIENT/POPULATION: All childbearing women without age and ethnicity restrictions.

INTERVENTION/EXPOSURE: Childbirth irrespective of the mode of delivery

COMPARATOR(S)/CONTROL(S) were the following categories:

- Delivery mode, either cesarean section, vacuum extraction, forceps extraction, instrumental delivery (if the previous is unknown), fundal pressure versus spontaneous vaginal delivery
- Obstetric anal sphincter injury (III-IV grade) versus no tear or minor vaginal tear (I-II grade)(9)
- Episiotomy: mediolateral or median versus no episiotomy
- Maternal age at first delivery, as a continuous variable or categorized as either ≥ 35 or < 35 years(16)
- Maternal BMI, categorized as either ≥ 30 kg/m²(obesity) or < 30 kg/m²(17)
- Pre-pregnancy dyspareunia present vs. not present
- Primiparous vs. multiparous
- Breastfeeding vs. no breastfeeding
- Contraception use vs. no contraception use
- Prolonged second stage of labour, including the definition used(18)

OUTCOMES: Primary outcomes were *sexual dysfunction* and *dyspareunia* consistent with the ICS/IUGA Terminology(1) and assessed with validated and standardized tools. Secondary outcomes were *vaginal dryness*(1) and *body image dissatisfaction*(19-21) . When Female Sexual Function Index (FSFI) scores were available, the total score was retrieved or calculated by addition of the separate subscores. An FSFI total score of ≥ 26.55 was used as a cut off for differentiating women with and without sexual dysfunction(22).

Data collection

LC and LDM extracted Odds Ratios (ORs) with 95% Confidence Intervals (CIs) and other usable data using a data extraction sheet on Excel, Microsoft Office 365 (Redmond, WA, USA). If other usable data were reported (e.g. count data), they were converted to ORs. When more than one study reported data from the same cohort, we used the most complete results. We extracted missing data from less complete results where suitable.

Quality assessment of studies

The quality of the studies was assessed with the Newcastle Ottawa scale (University of Ottawa, Ottawa, Ontario, Canada) using the appropriate forms for cohort studies (prospective/retrospective), cross-sectional and case-control studies (23). For ranking the adequacy of follow-up, we awarded one star to studies with the follow-up rate $\geq 70\%$ or description of those lost suggesting no difference from those followed. We considered

high-quality studies those ones with a total score [?]7 stars since standardized criteria for conversion have not been universally established(24, 25).

Strategy for data synthesis

We reported data using count data and ORs with 95% Confidence Intervals. We tested for statistical heterogeneity using the I^2 test. We only pooled studies that were sufficiently comparable in terms of study design, setting, population, intervention and comparator. The summary statistic was reported as a pooled OR with 95% confidence intervals (CIs) for sexual dysfunctions. We used the random-effects model and inverse variance method for meta-analysis. We performed a subgroup analysis for each outcome: *sexual dysfunction*, *dyspareunia*, *vaginal dryness* and *body image dissatisfaction*.

Funding

We received no funding to conduct this review.

Patient and public involvement

No patients or public were involved to conduct this systematic review.

Results

Literature search and study characteristics

The electronic search resulted in 8,546 articles of which 3,031 in MEDLINE, 2,029 in Embase and 3,086 in the Cochrane Library. We removed 3,620 duplicates, leaving 4,926 articles to be screened by title and abstract. 4,803 studies were excluded for the reasons displayed in Figure 1. This left 123 articles that were eligible for full-text analysis. During that process, another 82 articles were excluded for the reasons displayed in the supplement (table S1). As a result, there were 41 studies of which 25 had data that were not compatible with our methodology for quantitative analysis (Supplement, table S2). Most of these studies were comparing mean scores, making it impossible to extract or extrapolate ORs and quantitatively synthesize the findings. These studies were used at a later stage during the qualitative interpretation. Quantitative synthesis was therefore made, based on the remaining 16 articles (Supplement, table S3).

Risk of bias-assessment

Among the eligible studies, 7 (44%) were of high quality. Most studies were at low risk for selection bias (12/16, 75%) and all studies controlled for at least one confounding factor (maternal age, body mass index (BMI) and parity). Given we only considered studies using validated questionnaires for patient self-reporting, by definition we scored all studies at risk of bias for the assessment of outcome. Nine of the included studies for quantitative synthesis (9/16, 56%) were at high risk of bias for outcome/exposure domain, though. Details on quality assessment and risk of bias for individual studies are displayed in Appendix 2B.

Summary of results

1. **Cesarean section versus vaginal delivery**We found no significant difference in terms of sexual dysfunction (OR:1.17[0.88-1.57]) or dyspareunia following cesarean section (OR:0.79[0.58-1.07]) or vaginal delivery (Figure 2).
2. **Operative delivery versus spontaneous vaginal delivery**Not all studies discriminated between the type of operative delivery. Therefore, only results for the occurrence of sexual dysfunction are given (OR:1.56[0.87-2.79]). As for dyspareunia, a break down for type of delivery was possible, but again there was no significant difference for any specific type of assisted delivery (Figure 3).
3. **Perineal trauma**The occurrence of anal sphincter injury was associated with increased odds for both sexual dysfunction (OR:3.00[1.28-7.03]) and dyspareunia (OR:1.71[1.09-2.67])(Figure 4, analysis 2.1.1 and 2.1.2). Also episiotomy was associated with an increased odds for dyspareunia (OR:1.65[1.20-2.29]) (Figure 4, analysis 2.1.3 and 2.1.4).

A summary of the total ORs for sexual dysfunction, dyspareunia and vaginal dryness are displayed in Table 1. One can find the forest plots on additional risk factors for sexual dysfunction and dyspareunia are in the supplement (Figures S4-S8).

Discussion

Main findings

We systematically reviewed the literature on obstetric risk factors for sexual dysfunction up to one year after delivery, and assessed their effect estimate. Eligible studies were exclusively observational and we performed random-effect meta-analysis with subgroup analysis for sexual dysfunction, for the occurrence of dyspareunia and vaginal dryness. We did not find a significant effect of the mode of delivery. When assessing the effect of perineal trauma, we found that anal sphincter injury was associated with increased odds for both sexual dysfunction and dyspareunia, and that episiotomy was associated with dyspareunia. We found no association of vaginal dryness with any of the studied factors, neither between body image dissatisfaction and sexual function up to one year after delivery.

Strengths and limitations

This is the first *systematic* review with *critical appraisal* on sexual dysfunction including dyspareunia, vaginal dryness and body image dissatisfaction as outcomes. We focused on studies which used standardized validated tools and definitions consistent with the IUGA/ICS terminology for the assessment of sexual health in women with pelvic floor dysfunction, with the intention to pool comparable results(1). Nonetheless, we acknowledge some limitations. First, we could include only observational studies in the quantitative analysis. Among those, only 44% were of high quality. As a result, the level of the evidence is low. Second, we could include in the quantitative synthesis, only studies where the outcome measurements were presented as dichotomous. Studies reporting on sexual function as mean score were excluded from quantitative analysis, as the individual data could not be retrieved. A solution may be to conduct a meta-analysis with individual patient data (if available). Moreover, not all eligible studies performed multivariate analysis with logistic regression. Therefore, in our meta-analysis we reported summary ORs from count data and crude ORs, and the possible effect of confounders cannot be excluded. Third, we retrieved few studies that discriminated between elective and emergency cesarean section and among the types of operative delivery, and their association with sexual function after delivery (26-30). Fourth, there is only one study of low quality reporting on vaginal dryness after delivery (26). Furthermore, only two studies addressed body image dissatisfaction(26, 31). Their definition and methodology differ and their findings are inconclusive, which makes it difficult to make a statement about a possible correlation between sexual dysfunction and body image in the first year after delivery.

Interpretation

Under the assumption that the association of perineal trauma plays a causative role in the later occurrence of sexual dysfunction and dyspareunia, it would seem that perineal trauma needs to be avoided whenever possible. Obviously, this factor is not always that easily malleable, except for the trauma that is *iatrogenic* in nature: based on our observations, liberal use of episiotomy in non-instrumental deliveries, as a strategy to reduce sexual dysfunction, should not be recommended. Also, perineal trauma is more likely following instrumental vaginal delivery, therefore – if clinically feasible- women should be offered the opportunity to discuss the risks and benefits of instrumental delivery with their physician.

We found that cesarean section is not protective neither for sexual dysfunction, nor for dyspareunia occurring within the first year after delivery, when compared to spontaneous delivery. We did not anticipate this, as cesarean section typically makes perineal trauma very unlikely, hence should be protective. Apparently other factors than perineal trauma, may play a more important role in the development of pelvic floor sexual dysfunction. Also, the included studies may have measured dysfunction rather late after delivery (Median months after delivery [IQR]: 6.0 [5.1; 7.5]), by what time any difference according to delivery mode, may have faded out(32-35). Also, women who are at high risk for sexual dysfunction, may be more likely to

receive a cesarean section, because of that dysfunction – though the data we have do not allow us to make that conclusion.

It is difficult to make a firm statement on the different impact of elective or emergency cesarean section, as only three studies were included that report outcomes after elective and emergency section separately. Prado et al. who reported on sexual dysfunction at 6-8 months after delivery, did not find any difference between elective cesarean section and vaginal delivery (RR:1.23[0.87-1.74]; $p=0.26$), whereas *emergency* cesarean section was increasing the odds for sexual dysfunction (RR:1.68[1.14-2.48])(28). O'Malley et al. and Lipschuetz et al. reported on dyspareunia at 12 months after delivery(26, 27); we pooled their count data in the supplement (Figure S4). Apparently, elective cesarean section was protective for dyspareunia (OR:0.50[0.29-0.85]), though no difference was found between emergency cesarean section and vaginal delivery (OR:0.91[0.61-1.35]). Moreover, the effect of mode of delivery on sexual function, might be limited in time, and though this study looked a pre-existing dyspareunia, it did not report separately on *de novo* sexual dysfunction(26). In conclusion, our observations do not suggest the existence of obvious upfront risk factors for sexual dysfunction in relation to delivery mode, whereas perineal trauma is. This may however be a risk factor that is not easily modifiable. The occurrence of perineal trauma should alert the clinician for the later likelihood for sexual dysfunction, which should be brought up during postpartum surveillance and may benefit from active management(36).

Conclusion

Perineal trauma, including anal sphincter injury and episiotomy, is associated with sexual dysfunction after delivery, whereas delivery route seems to be less relevant. Further research should contribute to a better understanding of the former, and of vaginal dryness and body image satisfaction after childbirth.

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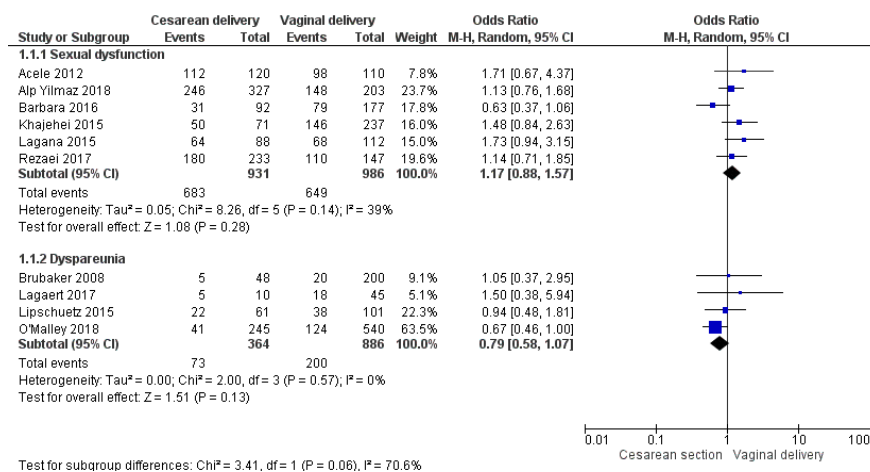
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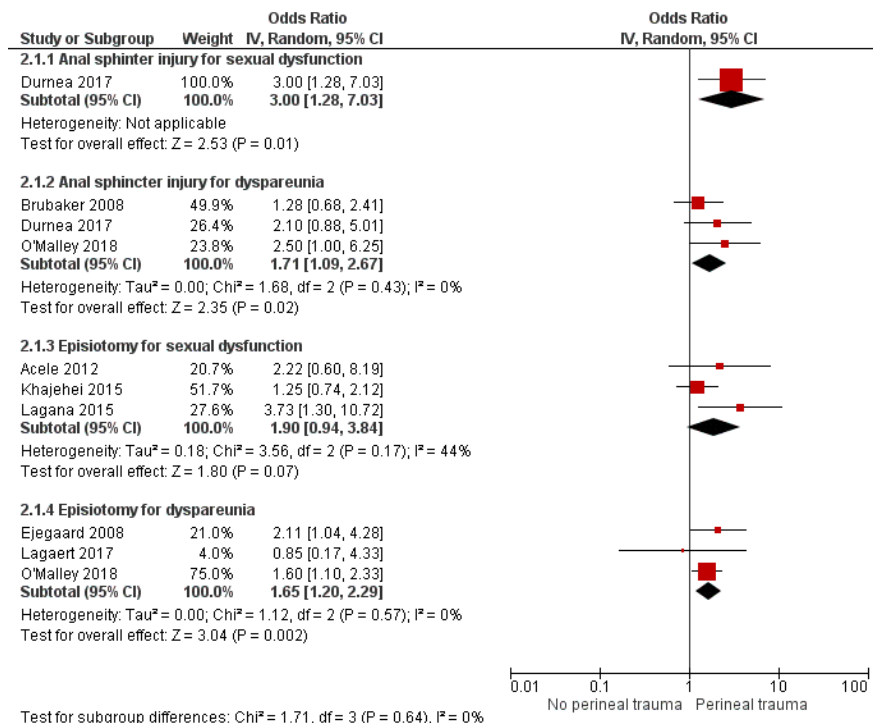
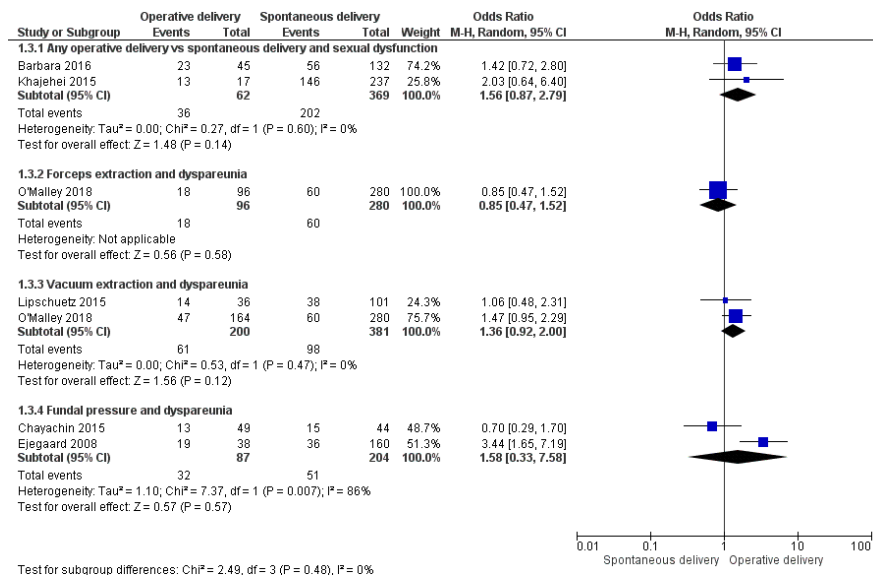
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