Menstrual pain and sexual health in mothers—A cross-sectional study in the Danish National Birth Cohort

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Abstract

Introduction: Prevalence and consequences of menstrual pain have mainly been studied in younger women. We aimed to describe the prevalence of menstrual pain in mothers and its association with sexual problems.

Material and methods: A cross-sectional study using questionnaire data from the Maternal Follow Up (2013–2014) in the Danish National Birth Cohort (1996–2002). Of 82,569 eligible mothers, 43,639 (53%) completed the follow up. Of these, 24,000 women had a partner, and answered the questions on menstrual pain. Log binomial regression was used to calculate prevalence proportion ratios (PPR) with 95% CI for the association between menstrual pain and specific sexual problems.

Results: Menstrual pain was reported by 16,464 women (69%), and severe menstrual pain by 19%. Treatment had previously been requested by 19% of women with menstrual pain. The most common treatment was oral contraceptives, but for 18% of women seeking treatment, no treatment was given. Women with menstrual pain were more likely to report reduced sexual desire (PPR 1.22, 95% CI 1.15–1.29), vaginismus (PPR 1.31, 95% CI 0.96–1.78), and dyspareunia (PPR 1.63, 95% CI 1.47–1.81), in particular deep dyspareunia (PPR 1.92, 95% CI 1.67–2.20).

Conclusions: A majority of Danish mothers in mid-life experienced menstrual pain, and these women more often reported reduced sexual desire, vaginismus, and deep dyspareunia. Few women sought and received treatment for menstrual pain. Healthcare practitioners should be aware that menstrual pain can affect parous women and co-occurs with sexual problems. Future studies should identify barriers to seeking and receiving adequate treatment for menstrual pain.

KEYWORDS
Danish National Birth Cohort, dysmenorrhea, dyspareunia, menstrual pain, mothers, vaginismus
1 | INTRODUCTION

Primary dysmenorrhea is defined as pain during the menstrual period without underlying pathology.\(^1\)\(^2\) Menstrual pain reduces women’s quality of life, and may lead to sick leave, resulting in loss of productivity for society.\(^2\) The prevalence of menstrual pain in mid-life women (age 35 years until menopause) is about 20%–46%\(^3\)\(^4\) with 5%–23% reporting severe pain.\(^2\)\(^4\) Yet, the predictors and consequences of menstrual pain have primarily been investigated for adolescents and younger women.\(^1\) There is a common belief that menstrual pain is cured by childbirth,\(^5\) and some studies have found menstrual pain to decrease with parity.\(^1\)\(^3\)\(^\text{—}\)\(^4\) However, a recent study in a population-based sample of mid-life women did not find that parity affected the prevalence of menstrual pain (RR 0.97, 95% CI 0.79–1.28).\(^4\) Sexual health is important for quality of life,\(^6\) yet the prevalence of sexual problems among women in midlife is estimated to be around 40%.\(^7\)\(^8\) Endometriosis, the most common cause of secondary dysmenorrhea (with underlying pathology),\(^9\) affects sexual health negatively by increasing the risk of deep dyspareunia,\(^10\) but less is known about the association between menstrual pain and sexual health. One study found a risk ratio of 4.54 for dyspareunia in women with menstrual pain.\(^4\) It is unknown whether other sexual problems co-occur with menstrual pain.

In this study, we estimated the prevalence and correlates of menstrual pain, and its possible association with sexual problems in a cohort of mothers in midlife.

2 | MATERIAL AND METHODS

2.1 | Data sources and study sample

The study was based on data from the Danish National Birth Cohort.\(^11\) The cohort enrolled 91,386 women in early pregnancy between 1996 and 2002, about 30% of all births in that period.\(^12\) Women were recruited at the first pregnancy visit to their general practitioner.\(^11\) Among all general practitioners in Denmark, 50% agreed to invite women to the Danish National Birth Cohort, and 60% of the approached pregnant women agreed to participate.\(^11\)\(^\text{—}\)\(^12\) The first interview, conducted around week 16 of gestation, included information on health, lifestyle, and socio-occupational factors. Participants consented to use of their information from Danish health and social registries. Between December 2013 and December 2014, participants were invited to respond to a questionnaire on physical, mental, and sexual health (hereafter referred to as the Maternal Follow Up). Altogether, 53% (43,639 women) of eligible mothers participated.\(^13\) Only women who reported having periods (n = 31,120) were asked about menstrual pain in the Maternal Follow Up. This excluded 4641 women who had reached menopause, and 7878 women who had amenorrhea for other reasons (eg pregnancy, breastfeeding, hormonal contraception, or hysterectomy) (Figure 1). Women were excluded if they did not answer any questions on menstrual pain (n = 4320). Women without a partner (n = 2800) were also excluded, because some questions on sexual health concerned sexual activity with a partner.

2.2 | Exposure

In the Maternal Follow Up, women responded to questions on pain during menstrual periods, pain between periods and treatment for menstrual pain. Women were classified as having menstrual pain if they reported pain in the lower abdomen during periods “sometimes”, “often”, or “every time”. Severe menstrual pain was classified in accordance with Righarts et al.,\(^6\) if the women had pain at every period or reported that their pain was “pronounced” or “insufferable”. For both “any menstrual pain” and “severe menstrual pain”, the comparator was women who reported no pain during periods.

We also asked questions about pain in the lower abdomen between periods, whether pain in the lower abdomen had ever been so severe that the woman had sought treatment, and if so, the kind of treatment, her age at that point in time, and if the treatment had helped. The questions on menstrual pain are reported in Table 1.

2.3 | Outcome

The outcome was self-reported sexual problems. Five types of sexual difficulties were dichotomized into the presence or absence of a sexual problem in the past year, as reported previously.\(^8\) Reduced sexual desire was only considered present if the women considered it a problem. Reduced lubrication or difficulty in achieving orgasm were considered a problem if they occurred “often” or “always”, whereas vaginismus or dyspareunia were also considered a problem if they occurred “sometimes”. Dyspareunia was further classified by location, at the vaginal introitus (entry dyspareunia) and/or deep in the abdomen (deep dyspareunia). All five specific sexual problems (reduced sexual desire, reduced lubrication, difficulty in achieving orgasm, vaginismus, and dyspareunia) were analyzed separately, and also as a combined outcome, “the presence or absence of one or more sexual problems within the past year”. Questions were adapted from the Danish National Health Survey.\(^14\)
Potential covariates

Covariates for adjustment were chosen a priori based on a literature review, and depicted in directed acyclic graphs\textsuperscript{15,16} (Figure 2). Maternal age, parity, history of cesarean section, and years since last birth were obtained from the Medical Birth Registry.\textsuperscript{17} Socio-occupational position was obtained from the first pregnancy interview and categorized as high (four or more years of education after high school, or job as manager), middle (skilled manual work, office or service work), or low (unskilled work or unemployment).\textsuperscript{18} Smoking (never, current, or former), body mass index, ever use of hormonal contraceptives, physical activity, and symptoms of depression were obtained from the Maternal Follow Up. Leisure time physical activity was categorized according to the recommendations from the Danish Health Authority (at least 30 minutes of physical activity of moderate to high intensity per day, and 20 minutes of high-intensity physical activity at least twice per week)\textsuperscript{19} as "no activity", "activity below recommendations", and "activity at/above recommendations". Symptoms of depression were measured using the Center for Epidemiologic Studies Short Depression Scale\textsuperscript{20} with a score at or above 10 points considered depressive symptoms. We considered depression a potential confounder because previous studies have reported altered pain perception among people with depression.\textsuperscript{21} Life-time endometriosis was not evaluated as a potential covariate, but as a participant characteristic, because we considered endometriosis as part of the spectrum of menstrual pain. Information was self-reported in the first pregnancy interview and in the Maternal Follow Up.
2.5 | Statistical analyses

Participant characteristics were displayed as counts and frequencies by menstrual pain. To estimate the association between menstrual pain and the prevalence of sexual problems, log binomial regression was used to calculate prevalence proportion ratios (PPR) with 95% CI. The regression models were adjusted for age, year at last birth, parity, and body mass index as continuous variables, and socio-occupational status, depressive symptoms, exercise, smoking, and history of cesarean section as categorical variables. Only participants with complete information on exposure and outcome were analyzed. Missing data on covariates were handled using multivariate imputation by chained equations.

We performed three pre-planned sensitivity analyses. To test whether associations with sexual problems were stronger in women with severe pain, we repeated the analyses with severe menstrual pain as the exposure. To compare with the results from our imputations, we performed complete case analysis. To account for uncertainty in whether hormonal contraceptive use is a confounder or an intermediate factor, we did not adjust for hormonal contraception in the main analysis, but in a sensitivity analysis. In two exploratory post-hoc analyses, we adjusted for lower abdominal pain between periods, and restricted to women without self-reported endometriosis, respectively, to assess whether the associations with sexual problems were driven by chronic pain, which could be a marker of underlying pathology, or by endometriosis.

2.6 | Ethical approval

Under Danish law, ethical permission is not required for public registry-based studies. The Danish National Birth Cohort was initially approved by the Committee on Biomedical Research Ethics (reference no. [KF] 01-471/94) and all participants gave written, informed consent. This study was also approved by the Danish Data Protection Agency (approval no. 2014-41-2848).

3 | RESULTS

Of the 24 000 women included in the study, 16 464 (69%) reported menstrual pain (Table 1). Approximately half of the participants (45%)
FIGURE 2  Directed acyclic graph. (A) Hormonal contraceptive use considered as an intermediate factor, as in the main analysis. (B) Hormonal contraceptive use considered as a confounding factor. Reproductive history includes parity, years since last birth, and history of cesarean section.
reported period pain "sometimes", 10% "often", and 14% "every time". Of women with menstrual pain, 20% had "pronounced" or "insufferable" pain (Table 1). This corresponds to 14% of all participants. Severe menstrual pain, as defined by Righarts et al., was present in 19% of all participants. Pain between periods was reported by 28% of participants, and 10% of these women considered the pains "pronounced" or "insufferable". Treatment for menstrual pain had previously been sought by 8% of the women who reported no menstrual pain at the Maternal Follow Up, and 19% of the women who reported any menstrual pain at Maternal Follow Up. Approximately half of the women who sought treatment (53%), did so before the age of 25 years. The most common treatment was oral contraceptives (25%), followed by prescription (21%) and over-the-counter (20%) analgesics. In 18% of women seeking treatment, no treatment was given. This proportion did not differ between women with and without menstrual pain at Maternal Follow Up. Among the women who received treatment, 58% found the treatment effective, and 33% found it partially effective.

At the Maternal Follow Up, the mean age was 43.5 (standard deviation 3.8) years. Women with menstrual pain were younger, more likely to have a body mass index above 25 kg/m², and to be current or former smokers (Table 2). They more often reported depressive symptoms and were slightly more likely to have only one child. However, among women in the highest parity category (four or more children), menstrual pain was still reported by 66%. Among women with menstrual pain, 0.4% reported a life-time history of endometriosis, compared with 0.1% of women with no menstrual pain.

One or more sexual problems were reported by 35% of participants and were slightly more common in women with menstrual pain (PPR 1.13, 95% CI 1.08–1.17) (Table 3). There was no difference in the prevalence of reduced lubrication or difficulty in obtaining orgasm by menstrual pain status. Women with menstrual pain were more likely to report reduced sexual desire (PPR 1.22, 95% CI 1.15–1.29), vaginismus (PPR 1.31, 95% CI 0.96–1.78), and dyspareunia (PPR 1.63, 95% CI 1.47–1.81). The difference in dyspareunia between women with and without menstrual pain was mainly driven by deep dyspareunia (PPR 1.92, 95% CI 1.67–2.20). The results were not substantially altered in the complete case analysis (Table S1), or the sensitivity analysis with adjustment for history of hormonal contraceptive use (Table S2). For women with severe menstrual pain, the estimates of association for vaginismus, and dyspareunia were higher than in the main analysis (PPR 1.62, 95% CI 1.11–2.36, and PPR 2.02, 95% CI 1.78–2.28, respectively) (Table S3). Upon adjustment for pain between periods, we no longer saw an association between menstrual pain and vaginismus (PPR 1.09, 95% CI 0.79–1.50), and the point estimate for dyspareunia was attenuated (PPR 1.28, 95% CI 1.14–1.42) (Table S4). Restricting the analysis to women without endometriosis did not alter the estimates of association (Table S5).

4 | DISCUSSION

In this sample of 24 000 parous women in mid-life, 69% reported menstrual pain, and 14% had pain that they described as "pronounced" or "insufferable". Women with menstrual pain were more likely to report problems with reduced sexual desire, vaginismus preventing intercourse, and dyspareunia.

The prevalence of menstrual pain in this study was higher than what has been reported in previous studies on mid-life women. Contrary to the study by Righarts et al., but in accordance with studies in younger populations, we found that women with menstrual pain were slightly more likely to have only one child compared with women without menstrual pain. However, in opposition to the belief that menstrual pain is cured by childbirth, we found that the majority of mothers reported menstrual pain. This was also the case for the highest parity group.

In accordance with previous findings, women with menstrual pain were more likely to report dyspareunia, especially deep dyspareunia. The higher prevalence of vaginismus among women with menstrual pain appeared to be explained by pain in the lower abdomen between periods. The association for dyspareunia was also attenuated after adjustment for pain in the lower abdomen between periods, suggesting the possibility of undiagnosed pelvic pathology, like endometriosis, in some of these participants. In contrast, this adjustment did not alter the findings for reduced desire. However, the higher prevalence of reduced desire in women with menstrual pain could be explained by a cycle of pain and avoidance, starting with the experience of deep dyspareunia.

Strengths of this study include sample size and access to information on many important covariates. The main limitation is the selected sample, and the unknown prevalence of undiagnosed or unreported endometriosis. The participation rate in the Maternal Follow Up was 53%. A recent study found that participants in the Maternal Follow Up were older, and of higher socio-occupational status and healthier lifestyle than non-participants, but also that selected exposure–outcome associations were not substantially affected by selection bias. Although this supports the estimated associations between menstrual pain and sexual problems in the present study, the prevalence of menstrual pain may not apply to the general population of parous women. In this study, women with menstrual pain were more often of low socio-economic position, and more often smoked, suggesting that the prevalence of menstrual pain might be higher in the general population of mid-life mothers. However, it cannot be ruled out that women with health problems were more motivated to participate in the Maternal Follow up. Among participants in the Maternal Follow up, it is possible that women with menstrual pain were more motivated
### TABLE 2  Participant characteristics by menstrual pain among 24 000 Danish mothers in mid-life

|                         | Total | %   | Menstrual pain | %   | No menstrual pain | %   |
|-------------------------|-------|-----|----------------|-----|--------------------|-----|
| n                       | 24 000| 16 464 | 7536           |     |                    |     |

#### Background

**Age (years)**

| Age (years) | n   | %   | n   | %   | n   | %   |
|-------------|-----|-----|-----|-----|-----|-----|
| <40         | 4445| 18.5| 3279| 19.9| 1166| 15.5|
| 40-44       | 11 150| 46.5| 7722| 46.9| 3428| 45.5|
| 45-49       | 7321| 30.5| 4787| 29.1| 2534| 33.6|
| 50+         | 1084| 4.5 | 676 | 4.1 | 408 | 5.4 |

#### Socio-economic position

| Socio-economic position | n   | %   | n   | %   | n   | %   |
|-------------------------|-----|-----|-----|-----|-----|-----|
| Low                     | 1459| 6.5 | 1092| 7.0 | 367 | 5.2 |
| Middle                  | 7686| 34.0| 5400| 34.8| 2286| 32.2|
| High                    | 13 446| 59.5| 9003| 58.1| 4443| 62.6|
| Missing                 | 1409| 5.9 | 969 | 5.9 | 440 |     |

#### Reproductive history

| Reproductive history | n   | %   | n   | %   | n   | %   |
|----------------------|-----|-----|-----|-----|-----|-----|
| Ever hormonal contraception | 18 858| 78.6| 12 866| 78.1| 5992| 79.5|
| **Parity**           |     |     |     |     |     |     |
| 1                    | 1891| 7.9 | 1394| 8.5 | 497 | 6.6 |
| 2                    | 12 548| 52.3| 8580| 52.1| 3968| 52.7|
| 3                    | 7792| 32.5| 5321| 32.3| 2471| 32.8|
| 4+                   | 1769| 7.4 | 1169| 7.1 | 600 | 8.0 |
| **Years since last birth** |     |     |     |     |     |     |
| <5 years             | 1787| 7.4 | 1298| 7.9 | 489 | 6.5 |
| 5-9 years            | 7180| 29.9| 4939| 30.0| 2241| 29.7|
| 10-14 years          | 13 643| 56.8| 9307| 56.5| 4336| 57.5|
| 15+ years            | 1390| 5.8 | 920 | 5.6 | 470 | 6.2 |
| Ever cesarean section| 5505| 22.9| 3891| 23.6| 1614| 21.4|

#### Health/lifestyle

| Health/lifestyle | n   | %   | n   | %   | n   | %   |
|------------------|-----|-----|-----|-----|-----|-----|
| Body mass index (kg/m²) |     |     |     |     |     |     |
| <18.5            | 357 | 1.6 | 236 | 1.6 | 121 | 1.7 |
| 18.5-24.9        | 13 793| 62.6| 9188| 60.8| 4605| 66.6|
| 25.0-29.9        | 5326| 24.2| 3780| 25.0| 1546| 22.4|
| 30.0-34.9        | 1838| 8.3 | 1361| 9.0 | 477 | 6.9 |
| 35+              | 713 | 3.2 | 545 | 3.6 | 168 | 2.4 |
| Missing          | 1973| 5.3 | 1354| 8.6 | 619 |     |

#### Physical activity

| Physical activity | n   | %   | n   | %   | n   | %   |
|-------------------|-----|-----|-----|-----|-----|-----|
| None              | 1953| 8.4 | 1335| 8.4 | 618 | 8.4 |
| Below recommendations | 15 519| 66.6| 10 722| 67.3| 4797| 65.1|
| At/above recommendations | 5828| 25.0| 3874| 24.3| 1954| 26.5|
| Missing           | 700 | 3.2 | 533 | 3.2 | 167 |     |

#### Smoking

| Smoking | n   | %   | n   | %   | n   | %   |
|---------|-----|-----|-----|-----|-----|-----|
| Current smoker | 2926| 12.2| 2201| 13.4| 725 | 9.7 |
| Ex-smoker   | 7340| 30.7| 5229| 31.9| 2111| 28.2|
| Never smoked| 13 630| 57.0| 8970| 54.7| 4660| 62.2|
| Missing     | 104 | 0.4 | 64 | 0.4 | 40 | 0.5 |
| Depressive symptoms | 2910| 13.0| 2251| 14.7| 659 | 9.4 |
| Missing     | 1660| 1160| 500 |     |     |     |

(Continues)
to answer the questions on menstrual health. If none of the 4320 women with missing answers experienced menstrual pain, the prevalence of menstrual pain among women in the Maternal Follow Up could be as low as 53%. Furthermore, the questions about menstrual pain in the Maternal Follow up did not provide any guidance to the women as to how they should classify their pain (for example, that severe pain is pain requiring pain medication). This could have affected the comparability to studies using such...
guidance. Only women with periods were given the opportunity to answer questions on menstrual pain. We did not have information about the reasons for a woman's amenorrhea, apart from whether or not she had reached menopause. Premenopausal women without periods were more likely to have a history of hormonal contraceptive use and to report a diagnosis of endometriosis than women who did have periods (Table S6), suggesting that the prevalence of endometriosis was underestimated in this study. As women with severe menstrual pain may avoid periods by using hormonal contraception, the prevalence of severe menstrual pain could also have been underestimated in this study. The proportion of women who did not receive any treatment when seeking medical help for menstrual pain could, on the other hand, be overestimated, as women with treatment-induced amenorrhea would not have been included. Among women with no current periods, the proportion who had ever sought medical help for menstrual pain was higher than among participants. Finally, this study focused only on pain in the lower abdomen during and between periods. Some women may experience lower back pain without abdominal pain during periods, and some women suffer from menstrual migraines, so the overall morbidity due to menstruation is likely to have been underestimated. As no data were collected for women who do not have children, no inference can be made for nulliparous women based on the present study.

5 | CONCLUSION

A majority of menstruating Danish mothers in mid-life experienced menstrual pain and these women were more likely to report reduced sexual desire, vaginismus, and deep dyspareunia. Few women sought and received treatment for menstrual pain. Healthcare practitioners should be aware that menstrual pain can also affect parous women and co-occurs with sexual problems. If a woman seeks treatment for one, it might therefore be appropriate to enquire about the other. Future studies should investigate barriers to seeking and receiving adequate diagnosis and treatment for menstrual pain.

CONFLICT OF INTEREST

The authors have no conflicts of interests to declare.

AUTHOR CONTRIBUTIONS

All authors contributed to the design of the study. JO and EAN were responsible for the data collection. SH analyzed the data. All authors interpreted the results. SH wrote the first draft of the manuscript, and DR, AF, HK, JO, and EAN critically revised it. All authors approved the final manuscript. All authors are guarantors.

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