

AOGS MAIN RESEARCH ARTICLE

Adverse childhood experiences influence development of pain during pregnancy

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Key words

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Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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Abstract

Objective. To investigate the association between adverse childhood experiences (ACE) and pain with onset during pregnancy. **Design.** Cross-sectional study. **Setting.** Eighteen antenatal clinics in southern Mid-Sweden. **Sample.** Of 293 women invited to participate, 232 (79%) women agreed to participate in early pregnancy and were assessed in late pregnancy. **Methods.** Questionnaires were distributed in early and late pregnancy. The questionnaires sought information on socio-demography, ACE, pain location by pain drawing and pain intensity by visual analogue scales. Distribution of pain was coded in 41 predetermined areas. **Main outcome measures.** Pain in third trimester with onset during present pregnancy: intensity, location and number of pain locations. **Results.** In late pregnancy, 62% of the women reported any ACE and 72% reported any pain location with onset during the present pregnancy. Among women reporting any ACE the median pain intensity was higher compared with women without such an experience ($p = 0.01$). The accumulated ACE displayed a positive association with the number of reported pain locations in late pregnancy ($r_s = 0.19$, $p = 0.02$). This association remained significant after adjusting for background factors in multiple regression analysis ($p = 0.01$). When ACE was dichotomized the prevalence of pain did not differ between women with and without ACE. The subgroup of women reporting physical abuse as a child reported a higher prevalence of sacral and pelvic pain ($p = 0.0003$ and $p = 0.02$, respectively). **Conclusions.** Adverse childhood experiences were associated with higher pain intensities and larger pain distributions in late pregnancy, which are risk factors for transition to chronic pain postpartum.

Abbreviations: ACE, adverse childhood experiences; CPA, childhood physical abuse.

nitive functions with associated increased risk of developing health problems, certain diseases and premature death

Introduction

Adverse childhood experience (ACE) is a concept where a wide range of traumatic events during the first 18 years in life is assessed (1). Adverse childhood experience includes measures of emotional, sexual and physical abuse and also different forms of household dysfunction. ACE is believed to impair a person's social, emotional and cog-

Key Message

Adverse childhood experiences were associated with higher pain intensities and larger pain distributions in third trimester of pregnancy.

(2–4). Among both genders associations have been shown between accumulated ACE and stress, smoking habits, depression, anxiety, alcoholism, drug use, sexually transmitted disease, obesity, stroke, diabetes, ischemic cardiac disease, cancer and premature death, often in a dose–response relation (1,5–7).

Adult survivors of childhood physical abuse (CPA) and sexual abuse have also been shown to have more health problems and chronic pain (8). Among pregnant women exposed to childhood sexual abuse more obstetrical complications, backache, headache and leg cramps were reported during pregnancy and their risk of being hospitalized or of giving birth preterm was increased (9,10). In a small case–control study childhood abuse, including sexual and physical abuse, was reported to influence obstetric and neonatal complications such as preterm birth, depression and suicidal ideation (11). In the same study and in two large cohort studies it was reported that among pregnant women childhood sexual abuse was a traumatic event with greater negative long-term effects than other traumatic events (9,12,13).

During pregnancy, development of pain, especially of the low back and pelvis, is common. Disabling pain of the low back and pelvis has been reported by up to one in three women during pregnancy (14–16), with severity and duration of pain as suggested prognostic factors of pelvic pain besides emotional distress (17). However, the impact of the cumulative exposure of ACE on pain development during pregnancy is unknown. Searches on PubMed using words like “Adverse childhood experiences”, “pregnancy” and “pain” did not yield any articles.

The aim of the present study was to examine the association between accumulated ACE and pain developed during pregnancy. We hypothesized that ACE was positively associated with pain intensity, pain location and the number of reported pain areas in late pregnancy.

Material and methods

In Sweden, pregnant women have free antenatal health care at local antenatal clinics and more than 95% of women make use of this offer. This cross-sectional study was conducted at 18 antenatal clinics in southern Mid-Sweden. The antenatal clinics were selected by convenience: bigger cities as well as smaller towns were represented. Women were eligible for the study if they were able to understand and speak Swedish, were pregnant and came for enrolment at the antenatal clinic. Each clinic consecutively assessed women for eligibility until they had enrolled a certain amount of women ($n = 3$ to $n = 28$). Women were enrolled between October 2011 and April 2012. During the data acquisition, 392 pregnant women visited for enrolment at the antenatal clinics and 293

women were invited to participate. Language difficulties ($n = 46$), forgetting to ask ($n = 26$) and time constraints ($n = 10$) were the most common reasons why the midwives did not ask women about participation. Following informed consent, 232 (79%) women agreed to participate and answered the first questionnaire and 142 (61%) women answered the second.

The participating women were asked to reply to two separate questionnaires, the first in early pregnancy (mean 9.6 completed weeks of pregnancy, 5th and 95th centiles 6 and 13 weeks) and the second in late pregnancy (mean 32.7 completed weeks of pregnancy, 5th and 95th centiles 31 and 36 weeks). The first questionnaire was distributed by the midwife and filled out in the clinic’s waiting room or at the woman’s home. The second questionnaire was distributed by post to the participants, including two reminders, and was returned in a postage free envelope.

The first questionnaire collected information about age, level of education, occupation, household monthly income, country of birth, partner or not, smoking habits, number of previous pregnancies and gestational week. The second questionnaire collected detailed information about ACEs according to the Adverse Childhood Experience Study group (18). The questionnaire was translated by our research group from English to Swedish, and back-translated to English again to validate the translation. It was also face-validated by professionals and lay people. The 19 items used to identify ACEs involved questions within eight categories: emotional abuse, physical abuse, sexual abuse, mother being treated violently, household mental illness, living with a drug user/alcoholic/risk consumer of alcohol, parental separation, and incarcerated household member. All questions about ACE referred to the respondents’ first 18 years of life. The ACEs score was calculated as the sum of each experienced category of ACE, ranging from 0 to 8, with 0 meaning no reported ACE.

Both the first and second questionnaires included a drawing of the body to indicate any location of pain and time of onset of such pain. Indicated pain locations with onset before the present pregnancy were excluded. Furthermore, the women were requested to report the present pain intensity and the worst pain intensity during the past week using visual analogue scales, which ranged from 0 (no pain) to 100 mm (worst possible pain). Only the pain intensities reported in third trimester were used for analysis in this study. The distribution of pain on the pain drawing was coded by using 41 predetermined areas, not shown to the women (Figure 1). If the woman reported pain that extended over two or more of the predetermined areas, each involved area was counted as one pain area. If a woman drew more than one pain location

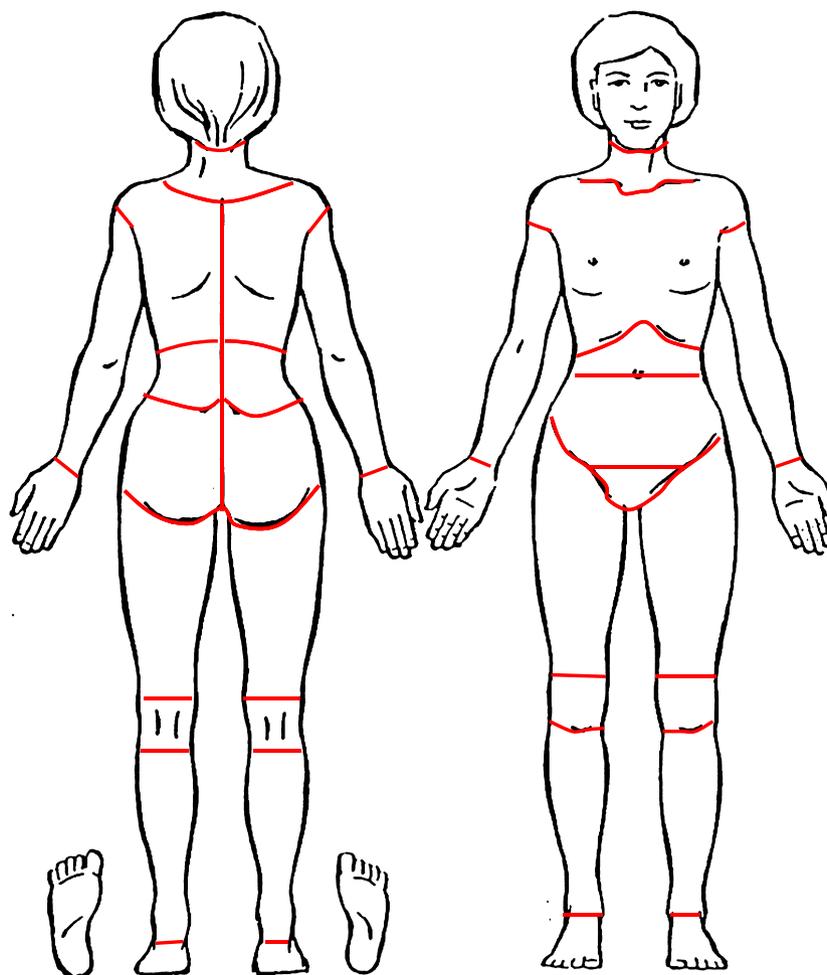


Figure 1. Pain drawing of a female body. The pain location area borders were not shown to the women.

within the same predetermined area, it was counted as one pain area. Having pain was defined as marking one or more pain areas (no/yes).

Personal data were handled in accordance with the Personal Data Act (9). The study was approved by the regional ethics committee (Dnr 2010/085). In the information letter the women were asked to contact the researchers responsible for the study or contact the midwives if they felt in need of support.

Statistical analyses

Summary statistics were computed using standard methods. Possible relations based on ordinal data were tested using Spearman's correlation coefficient. For tests based on nominal data the chi-squared test was used. The General Linear Model and logistic regression were used for regression analyses. The scale assigned for categorization of nominal and ordinal factors used in the regression

analyses was: Sweden as country of birth (yes/no) and highest completed education (none/primary school/secondary school/high school/university). Only two-tailed tests were used. A value of $p < 0.05$ was considered significant. Statistical analysis was performed using the SAS program package version 9.3 (SAS Institute, Cary, NC, USA).

Results

Characteristics of participating women in early pregnancy are presented in Table 1. The women were on average 30.7 years of age, 74% had completed university education, all had a partner, 15% were born outside Sweden, 45% reported pain with onset during present pregnancy and the mean monthly income was 25 000 SEK.

Six of ten women (88/142) reported any kind of ACE with a score ranging from 1 to 5 with a median of 2. The two most commonly reported ACE items were emotional

abuse (33%) and parental separation (32%). Physical abuse was reported by 20% and the two least reported were sexual abuse (4%) and incarcerated household member (1%) (Table 2). The combinations of reported emotional, physical or sexual abuse are presented in Figure 2.

In late pregnancy, any pain location was reported by 102 women (72%) and the prevalence of back pain, sacral pain, pelvic pain and leg pain was 37, 43, 57 and 46%, respectively. Among women reporting pain the median number of pain locations was 5 (range 1–36), the median pain intensity at present was 24 mm (range 0–79) and the median pain intensity as worst during the past week was 59 mm (range 0–98).

In late pregnancy, among women reporting any ACE, the median pain intensity described as worst during the past week was 48 mm, which was different compared with the 23 mm reported by women without any such experience ($p = 0.01$). Pain intensity at present showed no such difference between the groups ($p = 0.13$). In addition, the accumulated ACE score displayed a positive association with the number of reported pain locations in late pregnancy ($r_s = 0.19, p = 0.02$) (Figure 3). The prevalence of any reported pain, back pain, sacral pain, pelvic pain or leg pain among women reporting any ACE was not different from that of women without ACE, both including and excluding parental separation as an ACE category.

Table 1. Characteristics in early pregnancy of the women included in the study.

Characteristic	n	Mean (95% CI) or n (%)
Age (years)	140	30.7 (30.0–31.4)
Completed university education (%)	142	105 (74)
Having a partner (%)	141	141 (100)
Born outside Sweden (%)	142	15 (10)
Reported pain in early pregnancy	142	63 (45)
Monthly individual income (SEK)	133	25 443 (23 568–27 319)

Table 2. The number and proportion of women reporting a particular adverse childhood experience category (more than one experience could be reported).

Adverse childhood experience	n	%
Emotional abuse	47	33
Physical abuse	29	20
Sexual abuse	6	4
Mother treated violently	7	5
Household mental illness	22	16
Living with a drug user/alcohol risk consumer	17	12
Parental separation	45	32
Incarcerated household member	2	1

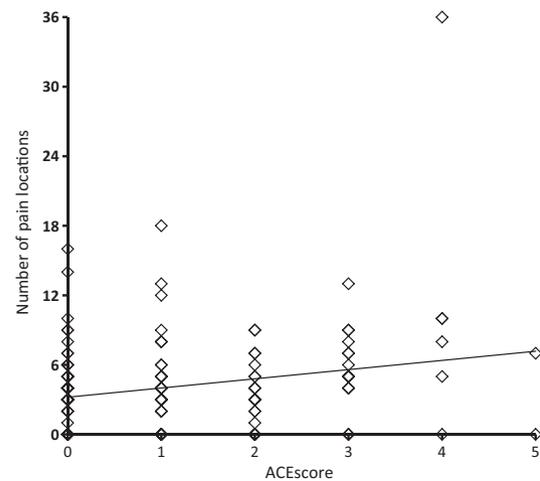


Figure 2. The number of women who reported emotional, physical or sexual abuse, separately or in combination, during childhood. Number of pain locations in late pregnancy by reported number of adverse childhood experiences.



Figure 3. Number of pain locations in late pregnancy by reported number of adverse childhood experiences. The number of women who reported emotional, physical or sexual abuse, separately or in combination, during childhood.

Among women reporting the ACE category CPA the prevalence of reported sacral pain was 72% and that of pelvic pain 76%, compared with 35% and 52% among women with no reported child physical abuse ($p = 0.0003$ and $p = 0.02$, respectively). The proportions of any reported pain (83% vs. 69%, $p = 0.14$), back pain (52% vs. 33%, $p = 0.06$) and leg pain (62% vs. 42%, $p = 0.06$) were not significantly different. No other separate ACE category showed differences in reported pain locations.

Possible associations between factors reported in early pregnancy and the number of pain locations reported in

Table 3. Association between factors reported in early pregnancy and the number of pain locations reported in late pregnancy.

Characteristic	Simple linear regression			Multiple linear regression	
	β -coefficient	R^2	p	β -coefficient	p
ACE score (0–8)	0.79	0.05	0.007	0.75	0.007
Reported pain in early pregnancy (no/yes)	3.00	0.11	<0.0001	2.7	0.0002
Country of birth (Sweden/other country)	–2.74	0.04	0.02	–2.2	0.05
Age (years)	–0.17	0.03	0.05		
Education (< 12 years/> 12 years)	–0.56	0.01	0.16		
Individual income (SEK)	0.00	0.00	0.82		

ACE, adverse childhood experience.

R^2 of the full model was 0.17, $p < 0.0001$.

late pregnancy are displayed in Table 3. In the simple regression analyses, the ACE score and reported pain in early pregnancy were positively, and country of birth was inversely, associated with the number of pain locations. A multivariable regression analysis was performed to find factors that were independently associated with the reported number of pain locations in late pregnancy, with significant factors from the simple regression analyses included as independent variables (Table 3). ACE score and reported pregnancy-related pain in early pregnancy were positively and independently associated with the number of pain locations in late pregnancy. The R^2 of the model was 0.17 and $p < 0.0001$.

Possible associations of factors reported in early pregnancy and sacral pain in late pregnancy were investigated in simple and multivariable logistic regression analyses with sacral pain in late pregnancy as the dependent variable and CPA, age, level of education, income and country of birth as independent variables. CPA was the only factor that significantly and independently was associated with sacral pain in late pregnancy with an odds ratio of 4.4 (95% CI 1.7–11.4), $p = 0.002$ and a concordance of 67 in the multiple analysis.

Discussion

Adverse childhood experience was commonly reported and associated with higher intensity and larger distribution of pain developed during pregnancy. This suggests that information about accumulated ACE in early preg-

nancy could be useful to identify women who are at risk of developing pain with higher intensity and large distributions later on, as these are known risk factors for transition to chronic pain (19–21). In addition, among women with pain during pregnancy, information about ACE is warranted because of previously described unfavorable pregnancy outcomes (9,11).

As this was a cross-sectional study, we were not able to make any causal inferences but only study the associations between accumulated ACE and pain development. The limited number of participants with small numbers of women within the ACE subgroups suggests that the results have to be interpreted with caution. In addition, the generalizability is limited because of selection bias, such as from high educational levels and high degrees of partnership. Possibly some women with no reported ACE will have experienced, but not remembered, ACE, which would lead to underestimation of the suggested association; whereas the differential recall of ACE among those who developed pain and those who did not might have given the opposite effect. Methodological strengths of this study include consecutive recruitment of the women, use of a back and forth translated version of the validated and extensively used original ACE questionnaire (1) and pain drawings for pain evaluation.

It has earlier been shown that ACEs increase the risk for suffering from a wide range of physical or mental health problems in adulthood (1,5,13). In previous studies the prevalence of any ACE could stretch to about two-thirds of the population, which is close to the 62% prevalence in this study (5). To the best of our knowledge, no previous study has investigated the relation between cumulative ACE and the development of pain during pregnancy or pain in general, while no etiologic role was shown for ACE on the development of rheumatoid arthritis (22). Onset of chronic widespread musculoskeletal pain has been linked to dysfunction of the hypothalamic–pituitary–adrenal stress axis (23), suggesting that a potential mechanism for the effect of ACE on pain development during pregnancy might be through a persistent autonomic nervous system hyper-reactivity as a consequence of ACE (24). Since victims of CPA and child sexual abuse are at higher risk for re-victimization (25–28), it may be likely that participants with ACE have experienced abuse to a greater extent than women without ACE. We had no information about abuse in adulthood in this study.

The finding that CPA had a strong association with pain during pregnancy corresponds well with previous research showing that the experience of CPA is associated with poor health status among young people (29) and that the association persists or presents in adulthood (30). Previous studies show that childhood abuse and

post-traumatic stress have an impact on the occurrence of chronic pain in general and childhood sexual abuse with chronic pelvic pain in particular (31–33).

Conclusions

Adverse childhood experiences were commonly reported and were associated with pain development during pregnancy in this population of pregnant women. Information about ACE in early pregnancy could be useful to identify women at risk of developing pain of higher intensity and larger distribution, which are in turn known risk factors for transition to chronic pain after childbirth.

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