Epidural use among women with spontaneous onset of labour – an observational study using data from a cluster-randomised controlled trial

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A R T I C L E   I N F O
Keywords: Mindfetalness Epidural analgesia Fetal movements Randomised controlled trial Mindfulness

A B S T R A C T
Objective: To investigate whether the proportion of pregnant women who use epidural analgesia during birth differed between women registered at a maternity clinic randomised to Mindfetalness or to routine care.
Design: An observational study including women born in Sweden with singleton pregnancies, with spontaneous onset of labour from 32 weeks’ gestation. Data used from a cluster-randomised controlled trial applying the intention-to-treat principle in 67 maternity clinics where women were randomised to Mindfetalness or to routine care. ClinicalTrials.gov (NCT02865759).
Interventions: Midwives were instructed to distribute a leaflet about Mindfetalness to pregnant women at 25 weeks’ gestation. Mindfetalness is a self-assessment method for the woman to use to become familiar with the unborn baby’s fetal movement pattern. When practising the method in third trimester, the women are instructed to daily lie down on their side, when the baby is awake, and focus on the movements’ intensity, character and frequency (but not to count each movement).
Findings: Of the 18 501 women with spontaneous onset of labour, 47 percent used epidural during birth. Epidural was used to a lower extent among women registered at a maternity clinic randomised to Mindfetalness than women in the routine-care group (46.2% versus 47.8%, RR 0.97, CI 0.94–1.00, p = 0.04). Epidural was more common among primiparous women, women younger than 35 years, those with educational levels below university, with BMI ≥25 and with a history of receiving psychiatric care or psychological treatment for mental illness.
Conclusions and implications for practice: Pregnant women who were informed about a self-assessment method, with the aim of becoming familiar with the unborn baby’s fetal movement pattern, used epidural to a lower extent than women who were not informed about the method. Future studies are needed to investigate and understand the association between Mindfetalness and the reduced usage of epidural during birth.

Introduction

The birthing process is unique to every pregnant woman, as is the experience of pain (Whitburn et al. 2019). Unlike other acute pain, which is usually associated with injury or pathology, labour pain is part of a normal physiological process (Lowe, 2002; Whitburn et al., 2019). Epidural anaesthesia (EDA) is effective in reducing pain during labour and is used in up to 60 percent of all births in high-income countries (Anim-Somuah et al., 2018; Ruppen et al., 2006). However, the experience of pain is complex and multifactorial (Lowe, 2002). Women’s experiences of pain have previously been investigated in a randomized controlled trial (Waldenström and Nilsson, 1994). No differences in intensity of pain were seen in women giving birth in birth centres (a home-like environment and team midwifery with restricted use of pharmacological pain relief) compared to women in standard obstetric care, despite women in standard care using significantly more pharmacological pain relief (epidural, pethidine, nitrous oxide, pudendal block) (Waldenström and Nilsson, 1994). The use of EDA is more common among first-time mothers and among women within unfavourable social situations (low-qualified job or single) (Le Ray et al., 2008). The use of EDA is also more common among women with previous use of EDA and women who have a partner who prefers EDA (Jennifer et al., 2010). The need for EDA during birth is also associated with giving birth to a child with high birthweight (Ekéus et al., 2009). Further, the use of

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https://doi.org/10.1016/j.midw.2021.103156
Received 24 November 2020; Received in revised form 11 August 2021; Accepted 27 September 2021
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EDA during birth is related to psychological factors and maternal-fetal attachment (Smorti et al., 2020). Women who gave birth without EDA had lower levels of anxiety and lower levels of fear of childbirth during pregnancy than women who gave birth using EDA. Women who gave birth without using EDA had higher levels of prenatal attachment to the unborn child. Additionally, women giving birth in a midwife-led continuity care model are less likely to use EDA during labour and birth (Sandall et al., 2016).

The women’s choice of anaesthesia during birth affects their pain perception, but also the labour progress and outcome (Anim-Somuah et al., 2018). In a Cochrane review assessing the effectiveness and safety of EDA, the authors concluded that EDA is associated with prolonged first- and second-stage labour (Anim-Somuah et al., 2018); however, the evidence was drawn from low- to moderate-quality evidence. Further, they found that EDA is associated with higher risk of assisted births, but does not have an immediate effect on risk of low Apgar score or transfer to neonatal care (Anim-Somuah et al., 2018). Most of the studies included in the review compared EDA with opioids. However, more recent studies report an association between EDA and increased risk of low Apgar score and admission to neonatal care (Høtoft and Maimburg, 2020; Ravelli et al., 2020). Additionally, it has been reported that EDA can have an adverse effect on breastfeeding. The babies’ behaviour directly after birth differs where the mother had analgesia; the hand massage-like movements and sucking at the breast are reduced among babies to mothers who have used EDA during birth (Ransjö-Arvidsson et al., 2001; Riordan et al., 2000). However, this may be a dose-related effect (Brindley et al., 2015; National Library of Medicine, U.S. 2006). A systematic review found differing results, but an association between EDA and non-successful breastfeeding was found in the majority of the studies (French et al., 2016).

In Sweden, 38.8 percent of women giving birth use EDA (58.7 percent among nullipara and 24.4 among multipara). Large regional differences are seen in the use of EDA among first-time mothers in Sweden (38.9 percent to 71.0 percent) (Socialstyrelsen, 2018).

In a large cluster-randomised controlled trial, including 39 865 women, we evaluated Mindfetalness, a method for the pregnant woman to use to become familiar with the unborn baby’s fetal movement pattern (Akselsson et al., 2020). In the last trimester, the women in the study group were instructed to lie down on their side and focus on the unborn baby’s fetal movements, noting their intensity, character and frequency (but without counting each movement) (Radestad 2012). This observation was to be made daily, for 15 minutes, when the baby was awake. The women in the control group received routine antenatal care. We found that women registered at a maternity clinic randomised to Mindfetalness started their labour spontaneously to a higher extent than the routine care group. Additionally, the number of caesarean sections and labour inductions were lower in the Mindfetalness group. Mindfetalness can be defined as a form of Mindfulness, in which the unborn baby is included in the process. The theory behind the Mindfetalness-effect on spontaneous start of delivery is that the method reduces the level of stress among the women, which is advantageous for the hormones in the birth process (Uvnäs-Moberg et al., 2005). Thus, during periods of stress, a woman’s levels of catecholamines increase, which activates the sympathetic system and the body prepares for flight or flight (Kozlowska et al., 2015; Uvnäs-Moberg et al., 2005). This inhibits the birth hormone oxytocin, which is important for uterine contractility (Lederman et al., 1978; Sato et al., 1996). Mindfulness-based programmes are shown to reduce levels of stress, anxiety, and depression, and to increase a positive state of mind as well as childbirth self-efficacy scores (Lönnberg et al., 2019; Pan et al., 2019). Midwives in the intervention thought the women embraced the information about Mindfetalness positively and expressed perceived reduced stress and anxiety among the women (Radestad et al. 2020). Based on the evidence that exists regarding the association between the choice of labour anaesthesia and attachment, safety, anxiety and fear, the hypothesis was posed that Mindfetalness can influence women’s use of pain relief. The aim for this study was to investigate, in a sub-analysis from the cluster-randomised controlled trial, whether the proportion of pregnant women who use EDA during birth differed between women registered at a maternity clinic who were either randomized to Mindfetalness or to routine care.

Methods

The study base consists of women born in Sweden who gave birth from 32 weeks’ gestation with spontaneous onset of labour, included in a cluster-randomised controlled trial to evaluate the Mindfetalness method. Of the 67 maternity clinics in Stockholm, 33 were randomized to the intervention with Mindfetalness and 34 to routine care. Before randomization, the size of the clinic and its socio-economic area were taken into account. Further information about the randomization process can be found in previous papers (Akselsson et al., 2020; Radestad et al., 2016). One of the maternity clinics randomized to Mindfetalness declined participation but is included in the analysis, due to the intention-to-treat design. In the maternity clinics randomized to Mindfetalness, 19 639 women were registered, of whom 13 029 were born in Sweden. The corresponding figures for the routine-care group were 20 226 women, with 13 456 born in Sweden. The number of women with spontaneous onset of labour was 9238 in the Mindfetalness group, and 9263 in the routine care group. Fig. 1 shows the flow chart, illustrating the number of women registered at the clinics, during the time of the study.

The research coordinator (AA) started the intervention in August 2016 by holding a 30-minute lecture for the midwives at the maternity clinics randomised to Mindfetalness. The midwives working in these clinics were instructed to distribute a leaflet at a scheduled visit at 24 weeks’ gestation. The leaflet included general information about fetal movements and instructions on how to practise the Mindfetalness method from 28 weeks’ gestation (appendix). A website...
Table 1
Characteristics of 18 501 women born in Sweden with spontaneous onset of labour, 9238 registered at a maternity clinic randomised to Mindfetalness, and 9263 registered at a maternity clinic randomised to routine care.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mindfetalness (%)</th>
<th>Routine care (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;24</td>
<td>612 (6.6)</td>
<td>523 (5.6)</td>
</tr>
<tr>
<td>25–34</td>
<td>6352 (68.8)</td>
<td>6195 (66.9)</td>
</tr>
<tr>
<td>≥35</td>
<td>2274 (24.6)</td>
<td>2546 (27.5)</td>
</tr>
<tr>
<td>Education level¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 9 years/Elementary school</td>
<td>248 (2.8)</td>
<td>166 (1.9)</td>
</tr>
<tr>
<td>High school</td>
<td>2298 (26.0)</td>
<td>2131 (24.8)</td>
</tr>
<tr>
<td>University</td>
<td>6293 (71.2)</td>
<td>6282 (73.2)</td>
</tr>
<tr>
<td>Parity²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primipara</td>
<td>4197 (45.7)</td>
<td>4308 (46.7)</td>
</tr>
<tr>
<td>Multipara</td>
<td>4987 (54.3)</td>
<td>4914 (53.3)</td>
</tr>
<tr>
<td>Body Mass Index³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>267 (3.0)</td>
<td>211 (2.4)</td>
</tr>
<tr>
<td>18.5–24.9</td>
<td>6079 (68.9)</td>
<td>6072 (68.7)</td>
</tr>
<tr>
<td>≥25.0</td>
<td>2474 (28.0)</td>
<td>2560 (28.9)</td>
</tr>
<tr>
<td>Maternal diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric care</td>
<td>1395 (15.1)</td>
<td>1421 (15.3)</td>
</tr>
<tr>
<td>Medication or psychological treatment for mental illness</td>
<td>667 (7.2)</td>
<td>511 (8.2)</td>
</tr>
<tr>
<td>Gestation week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32+0–36+6</td>
<td>399 (4.3)</td>
<td>373 (4.0)</td>
</tr>
<tr>
<td>37+0–39+6</td>
<td>3748 (40.6)</td>
<td>3682 (39.7)</td>
</tr>
<tr>
<td>≥40+</td>
<td>5091 (55.1)</td>
<td>5208 (56.2)</td>
</tr>
<tr>
<td>Birthweight (mean grams)</td>
<td>3550.0</td>
<td>3552.3</td>
</tr>
</tbody>
</table>

¹ Missing: Total n=1083 Mindfetalness n=399 (4.3%); routine care n=684 (7.4%)  
² Missing: Total n=95 Mindfetalness n=54 (0.6%); routine care n=41 (0.4%)  
³ Missing: Tot n=838 Mindfetalness n= 418 (4.5%); routine care n=420 (4.5%)

(www.mindfetalness.com) with the same information was made available for anyone to access, and posters were visible in the waiting rooms. The routine care group did not receive any information about the study or the randomization. The midwives in these clinics continued with standard care according to new guidelines introduced by the Swedish National Board of Health and Welfare in October 2016 (at the time the intervention started), which state that all pregnant women should receive verbal information about fetal movements when attending a standard visit at 24 weeks’ gestation (Socialstyrelsen, 2016). Further, no written information was given to women included in the routine-care group. From August to October 2016, the midwives in all maternity clinics randomised to Mindfetalness started distributing leaflets during the run-in period, which was considered to be complete in November. The first four weeks after the women received information about Mindfetalness was determined to be a training period. The leaflets were distributed until 31 January 2018. When analysing, we included all women registered at the maternity clinics, with spontaneous onset of labour from 32 weeks’ gestation, who gave birth from 1 November 2016. All women who were registered until 31 January 2018 were followed until the birth of their baby.

The data were retrieved from The Swedish Pregnancy Register (The Swedish Pregnancy Register 2021), a population-based register including information from early pregnancy to a few months after birth. We used the ICD-10 codes (Internetmedicin, 2018) and combined the variable epidural- and spinal anaesthesia (usage of epidural/spinal anaesthesia during labour) into one variable when analysing data. We calculated descriptive statistics using percentages, and when comparing characteristics between groups we used Fischer’s exact test. We calculated rate ratios and 95% confidence intervals and, by using log-binomial regression models, we adjusted the rate ratios for potential confounders, one single variable at a time, and, additionally, all the variables combined. To further investigate and take into account any potential confounding effects, we divided the women according to their characteristics to evaluate the effect within different strata.

The cluster-randomized controlled trial which data were retrieved from were registered in ClinicalTrials.gov (NCT02865759) before start. Ethics approval was obtained from The Regional Ethics Committee in Stockholm, Sweden (Dnr 2015/2105-31/1). The women were informed by the midwives that it was voluntary for them to use the Mindfetalness method. Data were retrieved from a population-based quality register and informed consent regarding the use of data in research was obtained from the women when they were registered at the maternity clinics.

Results

Of the 26 485 Swedish women included in the randomized controlled trial, 18 501 (69.9%) started their labour spontaneously. Table 1 shows the characteristics for the women with spontaneous onset of labour who gave birth from 32 weeks’ gestation in the Mindfetalness-group and in the Routine-care group. The two compared groups are similar in characteristics, except for the category of women older than 35 years of age, where the Mindfetalness-group had a lower proportion.

Of the total 18 501 women who had a spontaneous onset of labour, 8696 (47.0%) used EDA. The usage of EDA differed between hospitals, with a range from 39.4 percent to 51.1 percent (not in table). As shown in Table 2, it was more common to use EDA among women younger than 35 years, women with an educational level below university, primipara women, women with BMI ≥25 and women with a history of receiving psychiatric care or psychological treatment for mental illness.

Further, it was more common to use EDA among women giving birth from 40 weeks’ gestation (n=5293, 60.9% versus n=5007, 51.1%, p-value <0.001). Women giving birth to a baby with higher weight used EDA more often, when compared to those who gave birth to a baby with a lower birthweight (mean birthweight 3575.1 grams versus 3529.9 grams, p-value <0.001). Oxytocin infusion due to labour dystocia was used to a higher extent among women with EDA than women without (n=5562, 64.0% versus n=1345, 13.7%, p-value <0.001).

Women registered at a maternity clinic randomised to Mindfetalness used EDA to a lower extent than women in the Routine-care group (n=4271, 46.2% versus n=4425, 47.8%, RR 0.97, CI 0.94–1.00, p-value 0.04). When adjusting for birthweight, birth clinic and age, the point estimates almost did not change (Table 3). Women in the Mindfetalness group breastfed with a correct technique two hours after birth to a
higher extent than women in the routine care group (81.8% vs. 80.7%, RR 1.02, CI 1.00–1.03, p-value 0.046).

Fig. 2 shows the use of EDA among the women randomized to Mindfetalness versus those in the routine-care group in relation to the women’s characteristics. In general, compared to routine care, the proportion of EDA is lower for all categories among women randomized to Mindfetalness, with two exceptions. In the educational level, “up to elementary school”, the proportion of women who used EDA was the same for both groups. Further, among women with low BMI (less than 18.5), 41.2 percent used EDA in the Mindfetalness group, and 39.8 percent used EDA in the routine care group.

Discussion

Pregnant women registered at a maternity clinic randomized to be informed about Mindfetalness used EDA during labour to a lower extent than pregnant women registered at a maternity clinic randomized to routine care. EDA use was more common among primiparous women and among women younger than 35 years of age, those with educational levels below university, with a body mass index of 25 or over and with psychiatric history or treatment for mental illness.

Women’s self-efficacy expectancy to cope with labour pain and a low level of anxiety is associated with reduced perception of pain and a decreased need of anaesthesia during labour (Lang et al., 2006; Manning and Wright, 1983; Reading and Cox, 1985). Mindfulness-based interventions reduce anxiety, depression and stress in the perinatal period (Lavender et al., 2016; Lever Taylor et al., 2016; Matvienko-Sikar et al., 2016). Mindfetalness can be perceived as a type of mindfulness method, which includes the unborn baby in the process. Both midwives and women describe the method as a tool for pregnant women to wind down, stay in the present and form an attachment with the unborn child (Akselsson et al., 2017; Rådestad et al., 2020). The pregnant women in our study were instructed to practise Mindfetalness for 15 minutes daily until birth from 28 weeks’ gestation. For a pregnancy that lasts until term, this means about 1260 minutes of practice (21 hours) if the woman follows the Mindfetalness method instructions. In a previous study, pregnant women were randomized to either an online mindfulness intervention, practising four times a week for three weeks, or to routine care. The women who practised mindfulness had significantly lower levels of prenatal stress and a reduction of the hormone cortisol on awakening and at evening time, compared to the women in the routine care group (Matvienko-Sikar and Dockrell, 2017). Thus, this intervention included a significantly shorter duration of engagement by the pregnant women than the Mindfetalness intervention applied here, but the method still provided clear effects in stress reduction.

The fact that women with psychiatric history or treatment for mental illness use EDA to a higher extent might be linked to their having higher levels of general anxiety and fear. Anxiety, depression and fear of birth reduce a woman’s ability to cope with pain and can affect the intensity of pain (Siras et al., 2017). The results of our study show that the largest reduction in use of EDA during labour, when comparing the Mindfetalness group with routine care group, occurred among women with psychiatric history, which indicates positive psychological effects in practising Mindfetalness.

In a study by Smorti et al. (2020), women giving birth without EDA rated their fear of birth lower when compared to women who gave birth with EDA. Further, they had higher scores on the CES-scale (Centrality of events), i.e., to what extent the pregnancy is a central event in life, than women who used EDA (Smorti et al., 2020). Mindfetalness could have had positive effects in women with anxiety, high stress levels and fear of birth, in lowering the need for EDA, as shown in Fig. 3.

The study also showed that women who did not use EDA during birth had higher scores in maternal-fetal attachment than women who gave birth with EDA (Smorti et al., 2020). The Prenatal Attachment Inventory scale (PAI), which is used to evaluate maternal-fetal attachment, includes, on several levels, the mother’s interactions with the unborn baby and knowledge about fetal movements. An association has been found between a high awareness of fetal movements and attachment (Malm et al., 2016). A possible association between high maternal-fetal attachment and gaining increased self-efficacy is also discussed by Smorti et al. (2020). The pregnant woman becomes more prone to per-

Table 2

<table>
<thead>
<tr>
<th>Characteristics of 18 501 women born in Sweden with spontaneous onset of labour, 8696 using EDA and 9805 without EDA.</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
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<tr>
<td>------</td>
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<tr>
<td>≤24</td>
</tr>
<tr>
<td>25–34</td>
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<tr>
<td>≥35</td>
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<tr>
<td>Education level</td>
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<td></td>
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<td></td>
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<tr>
<td>Parity</td>
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<tr>
<td>Body Mass Index</td>
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<tr>
<td>Maternal diseases</td>
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<td></td>
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</tbody>
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Notes: Missing: Total n=1083, EDA n=502 (5.8%), without EDA n=581 (5.9%)

Table 3

<table>
<thead>
<tr>
<th>EDA among women with spontaneous onset of labour in Mindfetalness-group compared to Routine-care group, adjusted for potential confounders.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDA</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Unadjusted</td>
</tr>
<tr>
<td>Adjusted for:</td>
</tr>
<tr>
<td>Birthweight</td>
</tr>
<tr>
<td>Birth clinic</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Birthweight, birth clinic and age</td>
</tr>
</tbody>
</table>
receive the birth as a condition in which her body is working to birth her baby and thus has less fear of birth, which leads to not wanting EDA during birth. Additionally, an association between sense of coherence (SOC) and the preference for using EDA during birth has been found (Jeschke et al., 2012). Women with high SOC more often preferred to give birth without EDA. Additionally, a woman’s degree of SOC is a strong predictor for well-being (Helga et al., 2004). Pregnant women with higher levels of SOC in life had better results relating to their well-being, anxiety and predisposition to depression (Helga et al., 2004).

Women in the Mindfetalness group breastfed, with a correct technique two hours after birth, to a higher extent. This may be an indirect effect due to the lower rate of EDA use during labour, as associations have been found between EDA and a negative effect on breastfeeding (French et al., 2016). However, it is also possible that increased maternal-fetal attachment through Mindfetalness affects breastfeeding. When investigating pregnant women’s intentions for infant feeding method in the third trimester, high maternal-fetal attachment was associated with intention to breastfeed (Huang et al., 2004). Additionally, in a systematic review, an association was found between higher levels of attachment and initiation of breastfeeding as well as preference for breastfeeding over bottle-feeding (Linde et al., 2020).

If some women choose to give birth with EDA due to fear and anxiety, the midwife needs to be aware of possible ways to support them to make an informed choice. By reducing stress, facilitating a positive state of mind and creating possibilities for the pregnant women to attach to their unborn baby through Mindfetalness, more women may feel confident to give birth and cope with pain during labour.

**Methodological considerations**

There are several strengths in the study design. The data were retrieved from a high-quality population-based register, and the randomization process minimizes the risk of confounding factors. By only including women with singleton pregnancies with spontaneous onset of labour, the compared groups are similar. Additionally, by only including women born in Sweden, any dilution effects are reduced, as the leaflets were distributed in nine languages, i.e., many women did not receive the information in their own language. However, a dilution effect is probably inevitable anyway, as we know from the original study that only 79 percent of the leaflets were distributed. Contamination between the two groups is also possible, as the website was open for anyone to use, and women and midwives talk to each other. Taking all of these issues into consideration, the effect we can see is probably stronger in reality. However, when conducting a sub-group analysis it is important to consider that it is a higher risk for false positive findings (Wang et al. 2007).

The use of EDA during labour is affected by many factors, physical as well as psychological. Other possible confounding factors that were not included in this analysis may have affected the results. Additionally, the factors that have been taken into consideration could have been associated with each other, for example, body mass index may be associated with parity, age and birth weight, and parity with educational level.

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**Fig. 2.** The use of EDA among women born in Sweden, with spontaneous start of labour after birth from 32 weeks’ gestation, in the Mindfetalness-group and the Routine-care group, respectively.

**Fig. 3.** Proposed theory of the effect of Mindfetalness on a woman’s need for EDA.
Determining the women’s preference for EDA and level of anxiety before they started to practise Mindfulness would have been valuable measurements when comparing that group with the routine-care group. Additionally, the professional support provided during birth may have affected the women's choice of EDA. It also would have been valuable to have measured the level of fear of birth in the two compared groups. Additionally, it is possible that the instruction of how to practice Mindfulness is in fact the mechanism behind the lower rate of epidural use, i.e. laying down on the side for 15 minutes a day contributed to reduced stress and anxiety.

Conclusion
In this observational study it has been shown that the method Mindfulness including laying down for 15 minutes a day in third trimester, focusing on the unborn baby, decreases the use of EDA during birth, especially among women with a psychiatric history. It is possible that practising Mindfulness in the third trimester can be advantageous for women’s self-efficacy in coping with labour pain, but future studies are needed to further investigate and understand the association between Mindfulness and the reduced usage of EDA during birth.

Ethical Approval
The Regional Ethics committee in Stockholm, Sweden (Dnr 2015/2105–31/1).

Funding Sources
The Swedish research council.

Clinical Trial Registry
ClinicalTrials.gov (NCT02865759).

Declaration of Competing Interest
None declared.

CRediT authorship contribution statement
Helena Lindgren: Writing – original draft, Writing – review & editing, Validation, Visualization. Ingela Rådestad: Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing, Visualization, Funding acquisition. Karin Pettersson: Validation, Writing – review & editing, Visualization. Viktor Skokic: Methodology, Data curation, Formal analysis, Writing – review & editing. Anna Akesson: Conceptualization, Methodology, Data curation, Validation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

Acknowledgments
A special thanks to the midwives participating in the trial and to the women who accepted to receive information. Thanks also to the Swedish Pregnancy Register for cooperation and to The Swedish research council for funding this research.

Supplemental materials
Supplementary material associated with this article can be found in the online version, at doi:10.1016/j.midw.2021.103156.

References