



## Short Communication

## Epilepsy and eating disorders during pregnancy: Prevalence, complications and birth outcome



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## ABSTRACT

**Purpose:** The aim was to investigate the prevalence of eating disorders and its relation to pregnancy and delivery complications in childbearing women with epilepsy (WWE).

**Method:** This study is based on The Norwegian Mother and Child Cohort Study (MoBa) linked to the Medical Birth Registry of Norway. Epilepsy was reported in 706 pregnancies. The remaining cohort ( $n = 106,511$ ) served as the reference group. Eating disorders were diagnosed using DSM-IV criteria adjusted for pregnancy. The risk of preeclampsia, gestational hypertension, diabetes and weight gain during pregnancy as well as delivery outcome (small for gestational age, large for gestational age, ponderal index, low APGAR score, small head circumference) were calculated as odds ratios (ORs) with 95% confidence intervals (CIs) adjusted for maternal age, smoking, parity and socioeconomic factors.

**Results:** Pregnant WWE were significantly more likely to have binge eating disorder (6.5% vs. 4.7%,  $p < 0.05$ ). WWE and comorbid eating disorders had significantly more preeclampsia (7.9% vs. 3.7%,  $p < 0.05$ ), peripartum depression and/or anxiety (40.4% vs. 17.8%,  $p < 0.001$ ) and operative delivery (38.2% vs. 23.5%,  $p < 0.001$ ) than the reference group without epilepsy or eating disorders. After adjustment for confounders, a significantly increased risk of operative delivery (OR 1.96, CI 1.26–3.05) and peripartum depression and/or anxiety (OR 2.17, CI 1.40–3.36) was demonstrated.

**Conclusion:** Eating disorders in WWE contribute to the increased risk of pregnancy and delivery complications. Health personnel should be aware of eating disorders in WWE and refer them for treatment before pregnancy.

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## 1. Introduction

Antiepileptic drug (AED) treatment is used by 0.2–0.7% of pregnant women [1,2]. Several obstetrical complications such as preeclampsia, gestational hypertension, caesarian delivery, congenital malformations and low birth weight occur more frequently in these women than in women without epilepsy [3]. Adverse birth outcomes in women with epilepsy (WWE) are believed to be

mediated by AED use, although the exact mechanisms of action and the role of confounding factors remain unclear. Comorbid eating disorders (ED) are an unexplored potential contributor to pregnancy complications in WWE.

Using data from The Norwegian Mother and Child Cohort Study (MoBa), Reiter et al. [4] found an increased life time prevalence of self-reported, unspecified ED in pregnant WWE. Rai et al. also found an increased frequency of ED (OR 2.9) in non-pregnant persons with epilepsy [5].

Adverse pregnancy outcomes are more frequent in women with ED, especially for the subgroup with binge eating disorder (BED) [6]. Women with BED deliver babies that are large for gestational age and have an increased risk of caesarian section. An increased rate of miscarriages has been noted in both anorexia nervosa (AN)

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and bulimia nervosa (BN) [7,8]. ED have also been linked to an increased risk of stillbirth, low birth weight, low Apgar scores, breech presentation, lower weight-for-length offspring trajectories and cleft lip and palate [9,6,10].

As both epilepsy and ED increase the risk of complications during pregnancy and delivery, we investigated the prevalence and subtypes of this combination during pregnancy, and estimated possible impacts of ED in epilepsy on pregnancy and birth outcome in WWE.

## 2. Materials and methods

The Norwegian Mother and Child Cohort Study (MoBa) is a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health. Participants were recruited from all over Norway from 1999 to 2008. The women consented to participation in 40.6% of the pregnancies. The cohort now includes 114,500 children, 95,200 mothers and 75,200 fathers. The response rate was 45% [11]. The women received standardized questionnaires addressing information on maternal epilepsy, psychiatric symptoms and socioeconomic status. The MoBa database is linked to the Medical Birth Registry of Norway that contains information on pregnancy and delivery complications.

The MoBa database comprises 706 pregnancies in women with epilepsy and 106,508 pregnancies in women without epilepsy. Information concerning ED was available for 73,171 pregnancies. The MoBa epilepsy cohort has been validated [12,13].

The women answered questions in accordance with DSM-IV criteria for AN, BN and BED. The questions were slightly adjusted due to the cohort being pregnant, amenorrhea was not required in AN. We also evaluated “impaired bodyimage” defined as fulfilling the AN criteria, except for amenorrhea and low BMI criteria. The frequency of fasting, use of laxantia and vomiting during pregnancy was investigated. The rates of ED in the women without epilepsy in the MoBa study have been validated [14].

We investigated the relationship between epilepsy and any type of ED (except for impaired body image) and hypertension during pregnancy, diabetes during pregnancy, preeclampsia, peripartum depression and/or anxiety [15], excessive pregnancy weight gain (>16 kg), operative deliveries (caesarian section, use of vacuum or forceps), small for gestational age (<10th percentile), large for gestational age (>10th percentile), small head circumference (<10th percentile) [16], low Apgar score (<7 after 5 min) and

ponderal index (weight/length<sup>3</sup>, <10th percentile and >90th percentile). Neonatologists have preferentially used the ponderal index rather than small for gestational age as an indicator of nutritional status in the child, and the variable is a predictor of neonatal disease [17].

IBM SPSS Statistics version 21 was used. We investigated group differences using Student's *t* test and Pearson's  $\chi^2$  test (Fisher's exact test if any cross table cell had an expected count < 5). Binary logistic regression was used to estimate the odds ratio (OR) with 95% confidence interval (CI) for pregnancy and delivery complications adjusted for the confounding factors maternal age, parity, smoking and socioeconomic factors (low household income, low education or being a single mother).

The study was approved by the Regional Ethical Committee in Western Norway.

## 3. Results

WWE in the MoBa cohort more frequently had lower educational attainment, low income, single parenting, and were younger than women without epilepsy [15]. They also had significantly higher weight and BMI than the reference group (Table 1).

There was a significantly increased rate of BED and “impaired body image” during pregnancy in WWE compared to women without epilepsy (Table 1). “Impaired body image” was significantly increased in both women using AED monotherapy (6.9%,  $p < 0.05$ ,  $n = 266$ ) and polytherapy (9.4%,  $p < 0.05$ ,  $n = 72$ ), as compared with the reference group (3.6%). No difference in prevalence was found for bulimia or anorexia before or during pregnancy.

WWE and comorbid ED had significantly more often preeclampsia (7.9% vs. 3.7%), peripartum depression and/or anxiety (40.4% vs. 17.8%) and operative delivery (38.2% vs. 23.5%) than women without epilepsy and no ED (Fig. 1). WWE and comorbid ED had more peripartum depression and/or anxiety than WWE without ED (40.4% vs. 24.2%,  $p < 0.01$ ). No confounding factors were considered in this analysis.

After adjusting for confounding factors, WWE and comorbid ED had a significantly greater risk of peripartum depression and/or anxiety (OR = 2.17, CI 1.4–3.4,  $p < 0.001$ ) and operative delivery (OR = 1.96, CI 1.3–3.0,  $p < 0.01$ , Fig. 2). After additional adjustment for AED use, the risk of operative delivery was no longer significantly higher (OR 1.35, CI 0.7–2.5,  $p < 0.35$ ).

**Table 1**  
Weight, BMI and eating disorders in women with and without epilepsy.

	Reference <i>n</i> = 106,508	Epilepsy <i>n</i> = 706	No AED <sup>b</sup> <i>n</i> = 367	AED <i>n</i> = 338
Weight (SD)	68.0 (12.9)	69.5 (13.7)**	69.2 (13.0)*	69.7 (14.3)*
BMI (SD)	24.0 (4.3)	24.7 (4.6)***	24.6 (4.5)	24.8 (4.8)
Impaired bodyimage <sup>e</sup>	2356 (3.6%)	30 (6.1)**	13 (4.9%)	17 (7.5)**
BED <sup>a</sup> pre-pregnancy <sup>c</sup>	3165 (3.3%)	30 (4.5%)	13 (3.7%)	17 (5.3%)*
BED during pregnancy <sup>d</sup>	4298 (4.7%)	41 (6.5%)*	21 (6.3%)	20 (6.6%)
Bulimia pre-pregnancy <sup>c</sup>	1747 (1.7%)	7 (1.0%)	4 (1.1%)	3 (0.9%)
Bulimia during pregnancy <sup>d</sup>	466 (0.5%)	1 (0.1%)	1 (0.3%)	0 (0%)
Use of laxantia during pregnancy <sup>d,f</sup>	79 (0.1%)	0	0	0
Fasting during pregnancy <sup>d,f</sup>	60 (0.1%)	2 (0.3%)*	1 (0.3%)	1 (0.3%)
Vomiting during pregnancy <sup>d,f</sup>	392 (0.4%)	4 (0.7%)	2 (0.7%)	2 (0.6%)

<sup>a</sup> BED = binge eating disorder.

<sup>b</sup> AED = antiepileptic drugs.

<sup>c</sup> Pre-pregnancy = last 6 months before pregnancy.

<sup>d</sup> During pregnancy = gestation week 17–19.

<sup>e</sup> Impaired bodyimage = DSM-IV criteria for anorexia nervosa, but amenorrhea and BMI < 18.5 were not required.

<sup>f</sup> Use of laxantia, fasting or vomiting at least once a week with the purpose of controlling body weight.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$  vs. the reference group.

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