

THE EFFECTS OF EATING DISORDERS IN PREGNANCY ON MOTHER AND BABY: A REVIEW

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SUMMARY

The psychological and physiological interaction between anorexia and the pregnant state has a large intrapartum and postpartum impact on mother and baby. Current research has attempted to discern the short and long term effects of eating disorders (EDs) on pregnancy as well as mother and baby-related sequelae; however little is understood about which management strategies are likely to prove most successful in mitigating these risks. The incidence and effect of low pre-pregnancy body mass index (BMI) on obstetric outcomes, and possible health complications in the future child, has attracted widespread attention. Especially concerning is the fact that it has long been known that the incidence of EDs in women of childbearing age is not only the highest out of all age categories but also is on an increasing trajectory.

This paper aims to highlight the recent evidence underpinning the management of pregnant women with EDs in the light of the discussed short and long term effects of the disorders on mother and baby. We shall focus on those women who have a previous diagnosis of an ED prior to being pregnant.

Particular attention will be paid to those studies considering anorexia nervosa. We argue for the use of early intervention strategies for the management of pregnant women with eating disorders, and for the use of a multidisciplinary approach in the treatment of these patients with complex problems.

Key words: Eating Disorder – pregnancy - anorexia nervosa

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INTRODUCTION

The psychological and physiological interaction between anorexia and the pregnant state has considerable intrapartum and postpartum effects on mother and baby. Current research has attempted to discern the short and long term effects of eating disorders (EDs) on pregnancy as well as mother and baby-related sequelae; little however is understood about which management strategies are most likely to prove to be most successful in mitigating these risks. The incidence and effect of low pre-pregnancy body mass index (BMI) on obstetric outcomes, as well as possible health complications in the future child, have attracted widespread attention. Especially concerning is the fact that while it has long been known that the incidence of EDs in women of childbearing age is not only the highest out of all age categories but also is on an increasing trajectory.

This paper aims to highlight the recent evidence underpinning the management of pregnant women with EDs in the light of the discussed short and long term effects of the disorders on mother and baby. We shall focus on those women who have a previous diagnosis of an ED prior to being pregnant.

CURRENT PREVALENCE

Anorexia nervosa is present in 0.3-1% of the population and subthreshold disease is estimated to be present in 5-7% of the population, with increased incidence

in women of childbearing age. Pregnancy itself has been found to increase risk of EDs in some, including a 22% relapse rate (Koubaa 2005). In addition, according to Lowes et al. (2012) there is a sixfold increase in perinatal mortality associated with eating disorders. This highlights the significance of the issue and the importance of successful management to mitigate these risks.

EFFECTS ON MOTHER AND BABY

Before pregnancy, women with Eating Disorders may present with menstrual dysfunction, low bone density and sexual dysfunction (Andersen 2009). Once pregnant, these women are predisposed to obstetric complications such as miscarriage, preterm delivery, or low birth weight in offspring (Andersen 2009). Eating disorders may complicate pregnancy both in a direct and consequential manner (Paslakis 2019). Here we shall focus on those women who have a previous diagnosis of an eating disorder (ED) prior to being pregnant.

Thus those women with Eating Disorders presenting for the first time during pregnancy will not be discussed.

ADVERSE OBSTETRIC EFFECTS ON MOTHER

Current research shows that having an active eating disorder in pregnancy predisposes a multitude of unfavourable obstetric outcomes (Eik-Nes 2018). Linna has shown that patients with eating disorders were more

likely to be childless than controls (odds ratio (OR) 1.86; 95% confidence interval (CI) 1.62-2.13, $p < 0.001$) (Linna 2013). Pregnancy and childbirth rates have been shown to be lower among patients with eating disorders than among controls (Linna 2013). Linna has also shown that Bulimia Nervosa is associated with an increased risk of induced abortion compared to controls (OR 1.85; 95% CI 1.43-2.38, $p < 0.001$), whereas, by contrast, Binge Eating Disorder is associated with an elevated risk of miscarriage (OR 3.18; 95% CI 1.52-6.66, $p = 0.002$) (Linna 2013).

A recent study by Eik-Nes et al. (2018), solidifies this association and in particular pays attention to preeclampsia, preterm birth, perinatal deaths, small for gestational age (SGA) and large for gestational age (LGA) outcomes. The study confirmed an association between EDs and all of the above, with particular attention to the perceived increased incidence of SGA, Caesarian sections and low Apgar score at 5 minutes. However, not all research has demonstrated this effect, and in contrast to these results, Bulik et al. (2009) found no association between maternal self-reported Anorexia Nervosa and SGA in a large Norwegian study population (Bulik 2007).

Despite many studies opting to consider Eating Disorders as a general compilation, some studies have considered the interaction of specific types of eating disorder in pregnancy. Most of these choose to survey the interaction of anorexia nervosa and adverse obstetric outcomes. Dinas (2008) reports that patients with Anorexia Nervosa experience hypertension, miscarriage, difficult labour, and premature delivery.

Bulik (1999) analysed personal interview data from 66 women who had anorexia during pregnancy and met the diagnostic criteria. Those in the Eating Disorder (Anorexia) group were more likely to need a Caesarian section than those without any history of an Eating Disorder. Caesarian sections increased the risk of operative complications such as infection, postpartum haemorrhage, thrombus formation and anaesthetic complications. Furthermore Koubaa (2005) showed that women with a past or current eating disorder reported more hyperemesis gravidarum during the pregnancy. However, the confound of co-occurring bulimic tendencies cannot be ruled out in such a report, and future research needs to disentangle the effects of Eating Disorders on true hyperemesis gravidarum using reliable controls. Binge Eating Disorder, on the other hand, was associated positively with maternal hypertension and long duration of the first and second stage of labour (Linna 2014).

ADVERSE PSYCHOLOGICAL EFFECTS ON THE MOTHER

A prospective community based cohort study (Micali 2007) classified women into cohorts of recent or past Eating Disorder, obesity before pregnancy and a

general population group. The study showed that the women with a recent Eating Disorder reported more concerns regarding weight gain and body shape during pregnancy compared with the control groups. These women also dieted more, had an increased use of laxatives and participated in self-induced vomiting behaviours more than the control groups during pregnancy (Micali 2007) They also had an increased risk of hyperemesis ($P < 0.01$) (Koubaa 2005). Although not as prevalent, those women with a past Eating Disorder still showed similar Eating Disorder symptoms and behaviours during their pregnancy. This further highlights the need to identify and screen for increased Eating Disorder symptoms in patients with a history of current or active Eating Disorders during pregnancy.

ADVERSE EFFECTS ON THE BABY

With regards to the effect of eating disorders on the baby, several adverse outcomes have been observed. Kuobaa et al. (2005) list several complications associated with Eating Disorder in pregnancy as compared to controls such as: low birth weight ($P < 0.01$) (Koubaa 2005), smaller head circumference ($P < 0.001$) (Koubaa 2005), increased risk of microcephaly ($P < 0.05$) (Koubaa 2005) and infants being born small for gestational age (SGA) ($P < 0.05$) (Koubaa 2005). Linna et al. (2014) observed similar outcomes with the addition of anaemia, premature birth and perinatal death and other groups (Linna 2014, Eagles 2012, Dinas 2008) have also seen higher rates of Intra Uterine Growth Restriction.

Eagles (2012) reported that while Mothers with Anorexia Nervosa delivered lighter babies, this difference did not persist after adjusting for maternal body mass index (BMI) in early pregnancy. Standardized birthweight (SBW) scores suggested that the mothers with Anorexia Nervosa were more likely to produce babies with intrauterine growth restriction (relative risk (RR) 1.54, 95% confidence interval (CI) 1.11-2.13) (Eagles 2012). Eagles also noted that mothers with Anorexia Nervosa were more likely to experience ante-partum haemorrhage (RR 1.70, 95% CI 1.09-2.65) (Eagles 2012).

It is useful to compare outcomes of pregnant patients with Anorexia Nervosa with those with other eating disorders such as Bulimia Nervosa and Binge Eating Disorder.

According to Linna (2014) Women with Anorexia Nervosa and Bulimia Nervosa gave birth to babies with lower birthweight compared with unexposed women, but the opposite was observed in women with Binge Eating Disorder. Maternal Anorexia Nervosa was related to anaemia, slow fetal growth, premature contractions, short duration of the first stage of labour, very premature birth, small for gestational age, low birthweight, and perinatal death. Increased odds of premature contractions, resuscitation of the neonate, and very low Apgar score at 1 minute were observed in mothers

with Bulimia Nervosa. Binge Eating Disorder was associated positively with birth of large-for-gestational-age infants (Linna 2014).

Infants born with a low birth weight are more likely to develop insulin resistance, type 2 diabetes mellitus and hypertension in later life (Triunfo 2015), thus the long term effects on the child of an anorexic mother are both substantial and deleterious. A large study of over 50,000 women also concluded the effects of eating disorders in pregnancy are negative (Watson 2017). Thus, Watson found anorexia nervosa immediately prior to pregnancy was associated with smaller birth length (relative risk = 1.62; 95% CI (1.20, 2.14)), bulimia nervosa with induced labour (relative risk = 1.21; 95% CI (1.07, 1.36)), and binge-eating disorder with several delivery complications, larger birth length (relative risk = 1.25; 95% CI (1.17, 1.34)), and large-for-gestational-age (relative risk = 1.04; 95% CI (1.01, 1.06)). Maternal pregravid body mass index and gestational weight mediated most associations (Watson 2017).

CYCLE OF RISK

Despite the wealth of adverse outcomes relating directly to the mother and pregnancy, the effects of active maternal eating disorders are not limited to the pregnant period. Mothers with a lower pre-pregnancy BMI and poor nutritional intake during pregnancy have an increased risk of preterm birth which in itself predisposes anorexia nervosa in the unborn child (Bulik 2005). Bulik (2005) outlines this in his 'cycle of risk' algorithm, demonstrating the susceptibility for offspring to develop anorexia nervosa in their own development following their mother's own diagnosis. In order to break this perpetuating cycle, there is a need to implement measures that ensure adequate nutrition and support for women with Eating Disorders (especially anorexia nervosa) prior to and during pregnancy.

INTERVENTION STRATEGIES

The clinical and psychological effects of anorexia on mother, baby, and the pregnancy have important implications for resource allocation such as the need for mental health professionals, dieticians, and education of wider healthcare teams alike. The management of pregnant women who suffer from eating disorders requires the cooperation of a perinatologist, internist, nutritional therapist, psychiatrist or psychologist, with their ancillary staff. Therefore a multidisciplinary approach would most likely improve outcome (Kníže 2018), although more evidence is needed as to MDT effectiveness for maternal and fetal outcomes.

It is universally acknowledged that specialized mental health providers who treat women with ED should work together with obstetrical providers, as well as general practitioners to improve the care for women with Eating Disorder (Eik-Nes 2018). Earlier identi-

fication and treatment may be advised and as Linna et al. (2013) suggest reproductive counselling for those affected may be beneficial.

Additionally, Schmidt et al. (2017) performed several randomised controlled trials comparing the effectiveness of different intervention strategies in women with anorexia nervosa. In particular, it was found that psychological therapy improved outcomes in those treated as outpatients with Anorexia Nervosa and an email guided relapse prevention programme increased BMI and lowered distress at 12 months following discharge. We propose that such preventive interventions may be beneficial in pregnancy alongside the multidisciplinary approach.

CONCLUSION

Overall, evidence suggests that eating disorders in pregnancy are dangerous for the health of the mother and baby. Not only does this pose a risk to short term to the baby, but Eating Disorders affect the child's future health and the likelihood of developing an eating disorder themselves. Women with a recent or a history of Eating Disorder tend to continue to have some Eating Disorder symptoms in pregnancy, although usually they have fewer symptoms than before pregnancy (Micali 2007). Therefore, screening for Eating Disorder symptoms during pregnancy may provide a useful opportunity for engagement in treatment and to reduce behaviours that may be detrimental to the foetus (Micali 2007). Dinas (2008) points out that management of pregnancy complicated by anorexia nervosa, requires involvement of a multidisciplinary team and hospitalization in severe cases, given the complexity of the possible complications. Based on the reviewed articles, a multidisciplinary approach, aimed at early intervention in pregnancy is advisable for maintenance of psychological and physiological health for those with eating disorders in pregnancy.

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Contribution of individual authors:

Charlotte Arnold, Hayley Johnson & Ciara Mahon are joint first authors; they jointly carried out the search and drafted the paper.

Mark Agius supervised the project and improved the text.

References

1. Andersen AE, Ryan GL: *Eating disorders in the obstetric and gynecologic patient population. Obstet Gynecol* 2009; 114:1353-67
2. Bulik CM, Von Holle A, Hamer R, Knoph Berg C, Torgersen L, Magnus P, Stoltenberg C, Siega-Riz AM,

- Sullivan P, Reichborn-Kjennerud T: Patterns of remission, continuation and incidence of broadly defined eating disorders during early pregnancy in the Norwegian Mother and Child Cohort Study (MoBa). *Psychol Med* 2007; 37:1109-18
3. Bulik CM, Reba L, Siega-Riz AM, Reichborn-Kjennerud T: Anorexia nervosa: definition, epidemiology, and cycle of risk. *Int J Eat Disord* 2005; 37(Suppl S2-9):S20-1
 4. Bulik CM, Sullivan PF, Fear JL, Pickering A, Dawn A, McCullin M: Fertility and reproduction in women with anorexia nervosa: a controlled study. *J Clin Psychiatry* 1999; 60:130-5
 5. Dinas K, Daniilidis A, Sikou K, Tantanasis T, Kamas S, Tzafettas J: Anorexia nervosa in pregnancy: a case report and review of the literature. *Obstet Med* 2008; 1:97-8
 6. Eagles JM, Lee AJ, Raja EA, Millar HR, Bhattacharya S: Pregnancy outcomes of women with and without a history of anorexia nervosa. *Psychol Med* 2012; 42:2651-60
 7. Eik-Nes TT, Horn J, Strohmaier S, Holmen TL, Micali N, Bjørnelv S: Impact of eating disorders on obstetric outcomes in a large clinical sample: A comparison with the HUNT study. *Int J Eat Disord* 2018; 51:1134-1143
 8. Linna MS, Raevuori A, Haukka J, Suvisaari JM, Suokas JT, Gissler M: Pregnancy, obstetric, and perinatal health outcomes in eating disorders. *Am J Obstet Gynecol* 2014; 211:392.e1-8
 9. Linna MS, Raevuori A, Haukka J, Suvisaari JM, Suokas JT, Gissler M: Reproductive health outcomes in eating disorders. *Int J Eat Disord* 2013; 46:826-33
 10. Lowes H, Kopeika J, Micali N, Ash A: Anorexia nervosa in pregnancy. *The Obstetrician & Gynaecologist* 2012; 14:179-187
 11. Kníže M, Baraniková Z, Krejčová V, Fait T: Eating disorders in pregnancy. *Ceska Gynecol* 2018; 83:359-363
 12. Koubaa S, Hällström T, Lindholm C, Hirschberg AL: Pregnancy and neonatal outcomes in women with eating disorders. *Obstet Gynecol* 2005; 105:255-60
 13. Micali N, Treasure J, Simonoff E: Eating disorders symptoms in pregnancy: a longitudinal study of women with recent and past eating disorders and obesity. *J Psychosom Res* 2007; 63:297-303
 14. Paslakis G, de Zwaan M: Clinical management of females seeking fertility treatment and of pregnant females with eating disorders *European Eating Disorders Review* 2019; 27:215-223
 15. Schmidt U, Sharpe H, Bartholdy S, Bonin EM, Davies H, Easter A, Goddard E, Hibbs R, House J, Keyes A, Knightsmith P, Koskina A, Magill N, McClelland J, Micali N, Raenker S, Renwick B, Rhind C, Simic M, Sternheim L, Woerwag-Mehta S, Beecham J, Campbell IC, Eisler I, Landau S, Ringwood S, Startup H, Tchanturia K, Treasure J: Treatment of anorexia nervosa: a multimethod investigation translating experimental neuroscience into clinical practice. Southampton (UK): NIHR Journals Library, 2017 Aug
 16. Triunfo S, Lanzone A: Impact of maternal under nutrition on obstetric outcomes. *J Endocrinol Invest* 2015; 38:31-8
 17. Triunfo S, Lanzone A: Impact of overweight and obesity on obstetric outcomes. *J Endocrinol Invest* 2014; 37:323-9
 18. Watson HJ, Zerwas S, Torgersen L, Gustavson K, Diemer EW, Knudsen GP, Reichborn-Kjennerud T, Bulik CM: Maternal eating disorders and perinatal outcomes: A three-generation study in the Norwegian Mother and Child Cohort Study. *J Abnorm Psychol* 2017; 126:552-564

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