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Review article

Eating disorders and their impact during the gestational period

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Abstract

Introduction: Eating disorders can cause numerous problems for the physiology of the female body and consequences, such as infertility and difficulties during pregnancy and childbirth, can occur if they are present during a woman's reproductive age. Objective: The objective of this research was to analyze the impacts for mother and child that may be somehow related to the nutritional deficiency, whether active or not, of these women. Methodology: The methodology used was a bibliographic survey in the platforms PubMed, BIREME, SCIELO, using combinations of the following keywords in English: Eating Disorder AND Pregnancy, Anorexia, Bulimia. Result: According to the studies analyzed, the existence of some type of eating disorder, whether active or not, had a negative impact on the pregnancies of these women. Miscarriages, stillborn babies, premature birth, premature placental displacement, small newborn gestational age, umbilical cord knots and even neurological deficits could occur. Discussion: Low body mass index (BMI) was one of the main subjects of discussion in the studies, since it can increase the risk of pregnancy because the mother's nutrients are crucial for a healthy gestation. Conclusion: It was concluded that medical, nutritional and psychological follow-up are essential for women with eating disorders, regardless of type, to be able to have a safe pregnancy for themselves and their babies..

Keywords: Eating disorders; Mother-child impacts; Nervous bulimia; Anorexia nervosa; Gestational complications.

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Introduction

The standard of beauty is something that has been imposed by society, and this pressure has increased more and more over the years. It is mainly a result of social networks, in which many exalt a body and an appearance that, in most cases, are not even real. This can result in high demands and low self-esteem on the part of those involved.[1-3]

This combination of psychological, genetic, social and behavioral factors, both among females and males, results in eating disorders (EDs). Due to an overestimation of thinness and an extreme fear of gaining weight, the result is drastic forms of compensations, such as restrictive diets, excessive exercise, purgative means and even eating compulsions.[1,3-4]

Among the most common EDs, Anorexia Nervosa (AN) has the highest mortality rates when compared to other disorders, with a prevalence ranging from 0.5% to 3.7%, according to data compiled by Pizon & Nogueira.[5]

Characterized by a distortion of the perception of body image and an obsession with control over the amount and type of food that will be ingested, as well as, in many cases, meals that are not even eaten, AN can easily lead individuals to severe malnutrition, hormonal dysregulation, loss of lean body mass, anemia and the growth of fine protective hairs throughout the body, called lanugo. According to data from the Ambulatory of Bulimia and Eating Disorders (AMBULIM), between 0.5% and 4% of women are likely to have anorexia nervosa at some point in their lives.[1]

Another type of eating disorder is Bulimia Nervosa (BN), which is characterized by episodes of binge eating, followed by remorse, and efforts to get rid of ingested calories by inducing vomiting, using laxatives, engaging in extreme physical exercise and following highly restrictive diets. Like AN, BN can also be associated with mortality, with prevalence rates ranging from 1.1% to 4.2%, according to Pizon & Nogueira.[5] Among its most common consequences are the appearance of sensitivity in the teeth, inflammation in

the throat, esophagus and gastrointestinal problems, mainly caused by the stimulation of vomiting.[1,6-7]

In addition, eating disorders can also be classified as unspecified eating disorders, characterized by cases of chronic EDs, which can easily vary between the subtypes mentioned above. They are characterized by numerous functional disorders in women's bodies, such as weight gain or loss, feelings of inadequacy, sexual dysfunction, menstrual dysregulation and/or nullification, low bone mineral density, and even infertility.[8-10]

Moreover, when pregnancy eventually occurs, a low body mass index (BMI) can trigger obstetric complications in both the mother and the baby, because women who have some type of eating disorder must gain weight during pregnancy, which is a big challenge. Data show that pregnant women with EDs have increased intrapartum and postpartum risks, since these conditions favor bleeding, congenital malformation, intrauterine growth restriction (IUGR), miscarriage, premature birth, small newborn gestational age (SGA) and microcephaly, increased likelihood of infections, hypoglycemia, hypothermia, adverse neurological effects and even the death of both mother and child.[1,11-15]

According to studies, pregnant women with AN had a 60% increased risk of preterm birth when compared with pregnant women who had never been exposed to the disorder. Pregnant women with BN faced a greater probability of induced abortion, and pregnant women with eating disorders not otherwise specified (EDNOS) had a 70% increased risk of preterm birth.[6,3,10]

Research on the future consequences for children of mothers who had some contact with an eating disorder showed that the social and psychological factors affecting these children included difficulties in emotional functioning, such that these mothers perceived that their children to have a difficult temperament when compared to the offspring of healthy women. According to these studies, the EDs of these women caused impairment of the development of children's speech, cognitive and motor capacity, as well as impacts even on the eating behaviors of the children.[16-21]

Based on the studies examined, we highlight the importance of recognizing eating disorders before a possible pregnancy, in order to avoid the resulting complications from the beginning of pregnancy through to the development of these children.

The objective of this study is to analyze the impacts of Eating Disorders (EDs) on women in the gestational period.

Objectives

To analyze the impacts generated, both on mothers and their children, by Eating Disorders (EDs) on women during the gestational period.

Methodology

This study is a narrative/critical review of the literature evaluating bibliographies about the consequences for the mother and the fetus, in the case of women with past or active eating disorders. The articles for the research were duly selected on the platforms National Library of Medicine (PubMed) and the Latin American and Caribbean Center for Information on Health Sciences (BIREME), published between 2004 and 2020, using the following combinations of keywords to generate results: Eating Disorder AND Pregnancy; Anorexia Nervosa; Nervous bulimia; Types of Eating Disorder.

The articles selected (Table 1) were those that presented data from a resulting problem, in which comparisons of these impacts were highlighted between women who had eating disorders and those who never had any type of EDs.

Results

As a result, we obtained 618 articles on the BIREME platform and 1,554 on the PubMed platform, which, after filtering by year of publication and text format, resulted in 574 articles. The authors read titles and abstracts in order to exclude articles that did not match the objective of this study, resulting in the selection of a total of 30 articles.

We observed that the study by Lai and colleagues.[22] in the prenatal period (T1), showed that the majority (58%) of the women studied were primiparous. Participants were pregnant from 6 weeks to 40 weeks: 10% in the first trimester, 18% in the second trimester, and 72% in the third trimester. In terms of their history of pregnancy, 20% had a history of miscarriage, 18% had a miscarriage, 1% had a stillbirth, while 62% reported none of the aforementioned experiences. For the babies' conditions at birth, 6% were premature and 2% were born with low birth weight. Approximately 81% of the participants had their births assisted by both midwives and relatives.

The study by Sollid and colleagues[15] analyzed 302 women with a total of 504 children who were hospitalized with disorders before pregnancy and later followed up. The control group consisted of 900 women who had

Table 1. Authors, year of publication, study design and objectives found in the articles used as a review for the study

Reference	Place	Study Design	Objetives
Lai *et al.*,[22]	Hong Kong	Population-based study	Exploring the prevalence and social factors of eating disorders among Chinese new mothers in Hong Kong.
Sollid *et al.*,[15]	Denmark	Population-based study	To determine the association of an eating disorder that was diagnosed before pregnancy and preterm delivery and/or delivery of a low birth weight or small-for-gestational-age baby.
Aaron *et al.*,[23]	Missouri, USA	Missouri maternity cohort study (years 1989-1997)	Determine whether there is a relationship between pre-pregnancy and BMI with placental abruption.
Linna *et al.*,[14]	Helsinki, Finland	Population-based study	To evaluate how eating disorders are related to reproductive health outcomes.
Micali *et al.*,[24]	Denmark	Population-based longitudinal cohort study	Investigate whether eating disorders are associated with smaller birth size, symmetrical growth restriction, and preterm birth.
Watson *et al.*,[25]	Norway	Study MoBa, by the Norwegian Institute for Public Health	Determining whether maternal nutrition increases risk after analyzing the contribution of family transmission of perinatal diseases and events.
Barona *et al.*,[20]	United Kingdom	Longitudinal prospective study	To investigate neurobehavioral regulation and cognitive development in newborns and babies of mothers with EDs.
Eik-Nes *et al.*,[26]	Norway	Population-based study	Identify associations between lifetime EDs and obstetric outcomes.
Chan *et al.*,[27]	China	Prospective longitudinal study with a quantitative approach	To determine the prevalence and levels of eating disorders in the perinatal period, and to identify risk factors and adverse outcomes of eating disorders during pregnancy.
Mantel *et al.*,3	**Sweden**	**Population-based cohort study**	**To investigate the relative risk of adverse pregnancy and neonatal outcomes for women with eating disorders.**

Source: The authors (2022).

never had any type of eating disorder and who had 1552 children altogether. The study found that children of pregnant women with disorders were twice as likely to be born underweight compared to the control group. In addition, pregnant women with disorders also ran a higher risk of having premature births, and the prob-

ability of their babies being born small for gestational age increased from 70% to 80%.

The study by Aaron and colleagues[23] analyzed 439,235 women, of which 58,222 (13.3%) were underweight and 381,013 (86.7%) had normal weight. This work showed that underweight mothers had a 40% higher probability of placental abruption. The perinatal risks analyzed included low birth weight, morbidities related to preterm birth, neurological deficits and fetal death. However, there was a trend towards a decreased risk of placental abruption in those women who gained weight during pregnancy.

In Finland, Linna and colleagues[14] evaluated possible relations between eating disorders and reproductive health. They therefore studied a population base of women with Anorexia Nervosa (N=5,502), Atypical Anorexia Nervosa (N=5,365), Bulimia Nervosa (N=5,786), Atypical Bulimia Nervosa (N=5,445) and Binge Eating Disorder (N=5,149). In the prenatal period, the researchers noted an increased number of spontaneous and induced abortions in cases of Anorexia Nervosa (AN) and Bulimia Nervosa (BN). In relation to women with Binge Eating Disorder (BED), which was often accompanied by obesity, the study observed an association with an increased risk of miscarriage and an increased risk of stillbirth or neonatal death, such that miscarriages occurred in 46.7% of pregnancies. They found a similar trend in women with atypical BN, in which miscarriages were associated with 21.4% of pregnancies.

In cases of active Anorexia Nervosa, the study conducted by Micali and colleagues[24] found an association with lower weight, length, head and abdominal circumference, and ponderal index (PI) at birth. These babies were more likely to be small for gestational age and to be born prematurely. The study included women with Anorexia Nervosa (n=1,609), Bulimia Nervosa (n=1,693) and both (Anorexia + Bulimia nervosa, n=634), who were compared with women not exposed to Eating Disorders (n=76,724).

In Norway, a study by Watson and colleagues,[25] examined 70,881 pregnant women grouped in grandmother-mother-child triads for analysis of exposure to eating disorders during pregnancy and 52,348 for analysis of lifetime exposure to maternal eating disorders. Diabetes (gestational), preeclampsia, umbilical cord knot and bleeding during pregnancy were included in the study, and neonatal outcomes included (standardized) birth weight, birth length for age and sex <10th percentile, birth length for age and sex >90th percentile, preterm birth (<37 weeks), postmature birth (≥42 weeks), small for gestational age (SGA), and large for gestational age (LGA) for pregnant women with diabetes.

Barona and colleagues,[20] in a prospective longitudinal study, included women with active Eating Disorders (EDs), n=15; past EDs, n=20; and healthy women, n=28. The results showed that newborns of mothers with active EDs were more likely to achieve lower scores on autonomic stability. Exploratory analysis showed that babies of mothers with a diagnosis of Lifetime AN and BN were more likely to have lower overall cognitive development, poorer receptive language, general language, and gross motor development compared to babies of healthy mothers.

The study conducted by de Eik-nes and colleagues,[26] they[26] included women admitted between January 2003 and March 2015 and with at least one birth registered in the Norwegian Medical Birth Registry (MBRN) in the period from 1967 to 2015. In the reference cohort, 21,510 women and their 49,735 births were identified. Women with unspecified Eating Disorders and below-threshold EDs were more likely to have children with an Apgar score below 5 compared to women in the reference group. After adjusting for parity, maternity, marital status and year of delivery, women with a history of AN were more likely to have children who were SGA, and women with a history of BN were more likely to have a cesarean section. In the reference cohort, 508 (1.2%) perinatal deaths were recorded, 0.8% were stillborn or died within 7 days after birth (all of which children of women with a lifetime history of AN).

Another study carried out in China by Chan and colleagues[27] aimed to determine the prevalence and levels of eating disorders in the perinatal period, and to identify risk factors and adverse outcomes of eating disorders during pregnancy. A consecutive sample of 1,470 Chinese pregnant women from hospitals in Hong Kong was assessed using standardized instruments at five points in time, from the first trimester to 6 months postpartum. Compared with the normal birth weight groups, babies who were large for gestational age (LGA) were more likely to have mothers with higher levels of eating disorders in the second trimester ($p<0.05$) and third trimester ($p<0.05$). Small-for-gestational-age (SGA) babies were more likely to have mothers with higher levels of EDs at T2 ($p<0.01$), in addition, the study found that prenatal anxiety and depressive symptoms were independently associated with BED and BN throughout the three trimesters of pregnancy. These factors can have a long-term impact on child growth and development.

Another study, conducted by Mantel et al.[3] in Sweden, included 2,769 women with AN; 1,378 with BN; and 3,395 with BED. They were compared with 1,225,321 women without EDs. This study found that the risk of hyperemesis was approximately doubled for women with EDs. Maternal AN was associated with a 60% increased risk of bleeding, and women with BN or EDNOS received a diagnosis of anemia more often than healthy women, but this risk was doubled for women with active AN. Preeclampsia did not differ between exposed women with any of the ED subtypes and unexposed women. Women with all ED subtypes were at increased risk of preterm delivery, SGA and neonatal delivery with microcephaly, and those with AN and EDNOS had a reduced risk of instrument-assisted vaginal deliveries.

Discussion

According to the Hospital Santa Mônica,[1] using data from the Eating Disorders Treatment Program (Ambulim) of the Brazilian National Health Service, 0.5 to 4% of women will have EDs throughout their lives. However, when these women become pregnant, problems related to mother-child health can arise, increasing the chances of risky pregnancies.

The study by Lai and colleagues[22] sought to examine the prevalence of eating disorders among Chinese women during pregnancy (T1) and 6 months postpartum (T2). Participants completed questionnaire reports about themselves, attachment and concerns about the fetus. Finally, the overall prevalence of EDs during the study was 8.4% during pregnancy (T1) and 19.08% in the postnatal period (T2). Only a small percentage (3%) of mothers with EDs at T1 attained complete relief from their symptoms after delivery. In addition, from 25 to 50% of women reported a deterioration or resurgence of EDs after birth.

Sollid and colleagues[15] describe previous studies and case reports, which indicated that women with EDs are at greater risk of bearing a low birth weight child. Possible contributors to the causes of impaired fetal growth are weight control behaviors (such as restricted dieting, vomiting, and excessive exercise leading to malnutrition) and compromised flow of essential nutrients to the fetus in the maternal blood. Subnutrition can also cause compromised immune systems, which can lead to an increased risk of maternal infectious diseases, also contributing to preterm birth.

The risk of placental abruption due to the low BMI of these women was also confirmed in the study by Aaron and colleagues.[23] Weight gain during the gestational period contributed to a reduction in the chances of displacement. However, risk factors normally associated with obesity (e.g. hypertension, preeclampsia, ruptured membranes, and preterm delivery) were also strongly associated with placental abruption. One of the reported findings is that the nutrition of these women may have a protective effect in relation to placental displacement during pregnancy.

According to the study by Lina and colleagues,[14] induced abortions were more common in women with lifetime BN, while spontaneous abortions were the most common in women with lifetime BED. This study also prominently observed that women with AN had fewer children throughout their lives compared to reference women.

According to the study by Micali and colleagues,[24] the children of mothers who had AN showed the lowest birth weight, being 50-60% more likely to be small for gestational age (SGA). On average, these children were 297g lighter, 1.1cm smaller, and had a smaller head and abdominal circumference in comparison to women in the control sample.

Major complications in childbirth, such as prolonged labor, cesarean section and induced labor, were observed in all eating disorders in the study by Watson and colleagues.[25] The question of whether maternal EDs negatively influence perinatal outcomes or whether this is a result of generational factors that increase risk for both eating disorders and perinatal complications was also addressed. Preeclampsia and gestational diabetes were addressed as negative effects in BN and BED, which are also impairments and are associated with BMI and maternal death as well as a consequent increase in risks during the gestational period . However, this study has several limitations that also need to be taken into account.

No previous study known to Watson and colleagues,[25] with the exception of that of Bulik and colleagues,[28] reported on perinatal risks with lifetime assessments of EDs in the same individuals. Bulik and colleagues[28] compared women with AN and women who had recovered from AN with women from healthy controls and descriptively reported that lower birth weight and risk of cesarean section were similar and more common in the AN groups. Most studies on the associations between eating disorders and perinatal risks have used lifetime assessments.[14,24,29,30]

The initial hypothesis and previous research by Barona and colleagues[20] found that the newborns of women

with active EDs during pregnancy had worse autonomic and motor stability than other newborns, and also found it more difficult to stabilize their breathing and temperatures compared to babies borne by healthy mothers. As these children developed during their childhood, it was noticeable that their language skills were less developed and motor stability also continued to be impaired, but no previous study has actually investigated the neurological responses of these children.

The study by Eik-nes and colleagues,[26] showed that women with anorexia nervosa were more likely to have SGA children, but, this finding was not closely associated with AN during their research. The reason is that, although the population studied may overlap to some degree in the study, women with eating disorders may be less likely to participate in population studies overall. For example, only 28 women (8.5%) with EDs from the local patient registry agreed to participate in the MoBa. The inconsistency in the conclusions among the studies may be due to methodological differences, such as low statistics or a different classification of EDs. Since there was a lack of information, such as the duration of the disease of these women, it was impossible to assess the differences between the women, mothers in remission, compared with those with active EDs, which would result in different interpretations.

The aim of the study by Chan and colleagues[27] was to examine the course, risk factors and adverse outcomes of EDs at different stages of pregnancy, and their results showed an alleviation of eating disorders from pre-pregnancy to pregnancy. However, a worsening of these EDs was reported until the postpartum period, even though these variations may not be indicative of clinically significant changes. As expected, the results show that EDs vary across the trimesters, and that these are independently associated with depressive symptoms and prenatal anxiety, which were linked to BE and BN. In addition, the risk factors for babies born with abnormal weight and small or large for gestational age could, in the long term, lead to impaired child development.

Mantel and colleagues[3] reported that eating disorders were associated with an increased relative risk of multiple pregnancies and neonatal complications (which varied between subtypes and differed in strength depending on active or prior disease) compared with the control group. The pathophysiological mechanisms behind these observations are unknown, but several hypotheses were raised, such as maternal-fetal stress, which is considered a potential mechanism for preterm birth.

The basis of this hypothesis is findings that the stress hormone is increased in women with AN and BN, and that high cortisol levels have been associated with microcephaly among women with AN. An inadequate diet during pregnancy with nutritional deficiency would undoubtedly be associated with fetal growth restrictions, and certain nutritional deficiencies were also associated with an increased risk of preterm birth. This issue is also addressed by Aaron and colleagues[23] and Watson and colleagues.[25] Therefore, although they are not solutions, adequate nutrition and adequate psychological support are believed to be capable of preventing or reducing the impacts generated for these women during the gestational period, thus avoiding greater negative consequences for the mother-child binomial.

Conclusion

According to the studies analyzed, EDs can have negative impacts, both for the mother and for their offspring. These impacts can also be harmful in the long term, in addition to being associated with both prepartum and postpartum risks. When present, they can affect the development of these children, since maternal EDs result in nutritional impairment.

Low BMI was one of the main findings of the studies; it can increase the risks associated with pregnancy, since the nutrients of these mothers are a crucial factor for a healthy gestation. Therefore, the article concluded that medical, nutritional and psychological follow-up is essential for women with EDs, regardless of the type, in order to have a safe pregnancy for themselves and for their babies.

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