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REVIEW ARTICLE

Antenatal and postpartum depression: effects on infant and young child health and feeding practices

SS Madlala[a]* and SM Kassier[a]

[a]*Dietetics and Human Nutrition, University of KwaZulu-Natal, Pietermaritzburg, South Africa*
**Corresponding author, email: ssmadlala@gmail.com*

Globally, anxiety and depression is the third leading cause of disease burden for women 14 to 44 years of age. The World Health Organisation reports that 15 to 57% of women in developing countries experience symptoms of depression. Maternal mental illness has a negative impact on infant and young child (IYC) growth, development and care, having serious health implications in terms of physical, cognitive and emotional well-being during crucial stages of the life span, such as the first 1000 days and early childhood. Various studies conducted in both developed and developing countries, have shown that maternal depression is associated with negative health outcomes such as: low birth weight, developmental delay, incomplete immunisation schedules, acute or chronic diarrhoea, somatic symptoms, disrupted sleep patterns and child abuse, as well as psychiatric and neuro-behavioural disorders. In addition, maternal depression impairs IYC care practices related to breastfeeding, health care, safety and development. It also contributes to inadequate nutrition during pregnancy as well as that of offspring during infancy and childhood, resulting in suboptimal brain development and inadequate growth. Infants with depressed mothers are not only vulnerable to becoming underweight, but also being stunted.

Keywords: antenatal depression, feeding practices, infant height, infant weight, maternal depression, postpartum depression

Introduction

The perinatal period is a physically and emotionally stressful time for women. If the additional burden of depression is present, it can have a serious impact on the wellbeing of mother and infant by contributing to preterm delivery and having an impact on the mother and infant bond. The latter can result in suboptimal physical, social and cognitive development.[1] Anxiety and depression is the third leading cause of disease burden for women between 14 to 44 years of age.[2] The World Health Organisation (WHO) reports that 15 to 57% of women in developing countries experience symptoms indicative of depression.[3] Depression during pregnancy is referred to as antenatal depression, while depression that manifests shortly after delivery, is referred to as postpartum depression (PPD).[4] Symptoms of maternal depression include: insomnia, fatigue, irritability, forgetfulness, headaches, abdominal pain and breast tenderness.[1]

In the past, maternal depression has largely been ignored in both developed and developing countries. However, it is now widely recognised and addressed,[5] as this complex disease impairs an individual's ability to function, make rational decisions, access health services and play a productive role in society.[6] As depressed women tend to lead unhealthy lifestyles during pregnancy,[7] one review stated that their infants are most likely to be undernourished and suffer from diarrhoea.[8] Maternal depression is also a risk factor for contracting HIV, tuberculosis and malaria,[9] and is associated with non-adherence to antiretroviral treatment.[10]

A population-based cohort study reported that antenatal depression is associated with negative effects on the physical development, mental aptitude and emotional well-being of the foetus and infant and young child (IYC).[11,12] Another prospective cohort study stated that, despite the benefits of breastfeeding for mother and child, many women experience difficulty with the initiation and continuation thereof, due to the presence of PPD, stress and anxiety.[13] The presence of PPD may lead to low rates of exclusive breastfeeding (EBF) and the early introduction of complementary foods resulting in the development of IYC under-nourishment.[14]

Evidence from randomised controlled trials and cohort studies shows that depressed mothers are inadequate care givers,[15,16] as PPD is associated with inadequate mother-infant interaction, poor infant attachment[17] and impairment of several parental care practices that include: sleep routines, child clinic visits and vaccinations,[18] as well as increasing the risk of infant and maternal mortality.[19] Failure to attain the Millennium Development Goal (MDG) four and five, is partially related to untreated maternal mental illness.[20] There is a paucity of data regarding the screening and/or treatment of antenatal depression and PPD in the South African primary health care system.[4,22] This is cause for concern as the most effective method for determining the risk for PPD and the treatment thereof is screening for its presence.[4]

Figure 1 illustrates the association between maternal depression and infant care, growth and development, as well as the factors that affect this association.

Methods

English, peer-reviewed papers published from 1996 to 2016 were accessed by using electronic databases. These databases were: Medline via PubMed, ScienceDirect, Google Scholar and Wiley Online Library. A secondary search was performed by scrutinising the reference list of papers. Keywords and/or combinations thereof used for electronic searches included: maternal depression, maternal mental health, maternal anxiety, antenatal depression, PPD, risk factors for antenatal depression and PPD, IYC feeding practices, IYC nutritional status and breastfeeding. The majority of studies used for the review were prospective cohort studies. Studies that primarily focused on chronic maternal depression and children older than five years were excluded. Table 1 outlines key focus points in this review.

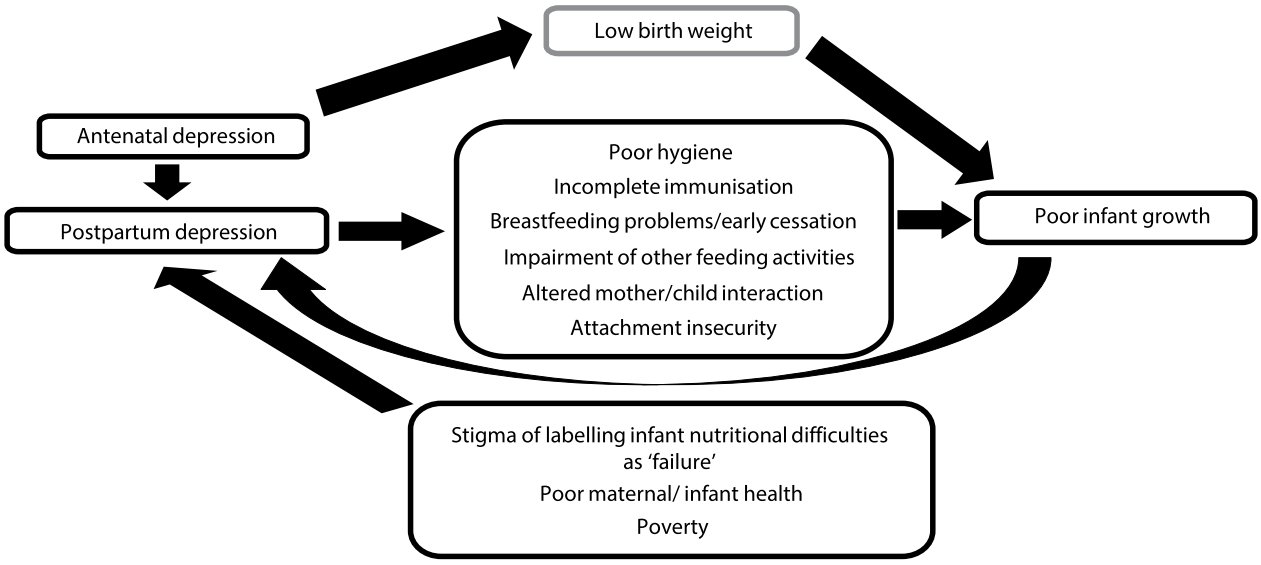

Figure 1: Potential interactions between maternal depression, infant growth and development (Adapted from[21]).

Table 1: Review objectives

Explore the global and local prevalence of maternal depression
List the risk factors associated with antenatal depression and PPD
Discuss the effects of untreated depression on the unborn foetus and IYC
Discuss the implications of maternal depression on IYC feeding practices, growth and care

Source: Adapted from Surkan *et al.*,[3] Leung and Kaplan,[19] Stewart.[21]

Prevalence of maternal depression

The global prevalence of antenatal depression and PPD is between an estimated 12% and 18%,[23] while one in eight women experience symptoms of depression within two weeks after delivery.[24] An estimated 12 to 20% of first time mothers develop PPD.[25] However, maternal mental disorders are three times more prevalent in low- and middle-income countries (LMICs) than high income countries (HICs).[26]

South African studies have shown that many women experience depression during the antenatal and postnatal period,[2] with the prevalence of depression and anxiety during the perinatal period being three to four times higher in South Africa than HICs.[27,28] In addition, mental illness is generally more prevalent in urban than rural areas.[29] A study conducted among rural pregnant women in KwaZulu-Natal found that 47% of women were depressed and 45% of those who were depressed had a HIV-positive status.[30] In contrast, in a peri-urban settlement outside Cape Town, the prevalence of antenatal depression and PPD was 39% and 34.7%, respectively.[32] A national study investigating the prevalence of PPD among HIV positive women reported a 45.1% prevalence of PPD symptomatology,[33] while a study conducted at a primary health care facility in Pretoria reported a 49% prevalence of PPD.[22]

Table 2 provides an overview of local and global risk factors for the maternal development of depression, as well as maternal outcomes during the antenatal and postpartum period. Infant outcomes are also reported. Epidemiologic studies report that the major risk factors for antenatal depression include: having a viral infection and/or chronic diseases, pregnancy resulting from rape, micronutrient deficiencies and unhealthy eating habits. The leading risk factors for PPD include: history of childhood abuse and developmental problems, as well as high parity and existing maternal illness. Domestic violence during pregnancy is rated as a low risk factor for PPD.

Maternal depression and infant feeding practices

An estimated one-third of IYC malnutrition is caused by inappropriate and inadequate feeding practices.[44] Apart from being the best way to ensure infant growth and health, breastfeeding enhances mother-infant attachment and bonding through interaction and increasing maternal self-esteem.[45] The latter results in enhanced maternal mental health, reduced stress levels and inflammatory responses.[45,46] PPD is associated with a shorter duration of EBF,[25,47] lack of initiation or delay of breastfeeding, as well as early cessation of breastfeeding. [48] A study conducted in the United States found that first time mothers with PPD practice EBF for 3.6 weeks, while those without PPD breastfed for 4.7 weeks.[25] Delayed initiation of breastfeeding is associated with increased neonatal mortality, recurrent infant diarrhea,[49] and unsuccessful breastfeeding.[50] A summary of studies regarding the relationship between breastfeeding and PPD are presented in Table 3.

Apart from breastfeeding cessation, maternal depression can result in the introduction of breastmilk substitutes and early introduction of complementary foods and liquids.[22,51] Prospective cohort studies reported that high levels of anxiety during pregnancy were associated with a maternal intention to formula feed.[52,53] A Middle-Eastern cohort study found that the majority of women who formula fed were more likely to be diagnosed with PPD,[54] possibly due to its association with a quieter infant and longer duration of sleeping at night.[55]

Women diagnosed with depression and formula feed may use unhygienic feeding practices, thereby increasing the risk of infectious diseases in their infants.[13] Women diagnosed with depression and formula feed are more likely to add cereal to feeding bottles,[55] which could result in excessive infant weight gain, compared to women who formula feed but are diagnosed

Table 2: Risk factors associated with the development of maternal depression and the outcomes for mother and infant

	Risk factors associated with maternal depression		
	South Africa	**Global risk factors: antenatal depression**	**Global risk factors: PPD**
A	_	Presence of viral infections and/or chronic diseases[3,37] Pregnancy resulting from rape[38]	History of childhood abuse and developmental problems[38]
B	Unplanned pregnancies[34]	Micronutrient deficiencies and unhealthy eating habits[39]	High parity[43] Existing maternal illness[43]
C	Delivery of female child[22] Lack of social support[22, 28, 29] Positive HIV status[22, 30, 31] Teenage pregnancy[27] Young maternal age[28] Domestic violence[31] Suicidal thoughts [31] Monthly household income <R2000[32] Stigma, discrimination and lack of social support in HIV positive women[33] Negative paternal attitude towards child[33] Presence of diabetes, hypertension and/or anaemia[35,36]	Poverty[37] Lack of education[37] Single marital status[37] Unhappy marriage[37] Difficult in-laws [37] Lack of social support[37] Substance abuse[37] Young maternal age[40] History of miscarriage and abortion[40] Pre-conception obesity[41]	Lack of social support[33] Stress[37] Use of anti-depressant during pregnancy[37] Poverty[37] Lack of education[40] Young maternal age[40] History of depression[40]
D	_	Stress[19]	Domestic violence during pregnancy[42]
	Maternal depression outcomes		
	During pregnancy[19]	**Postpartum[19]**	**Infant outcomes[19]**
D	Nausea Headache Stomach cramps Shortness of breath Increased risk of: • preeclampsia • gestational diabetes • suicide • miscarriage • haemorrhage • delivery via caesarean section • preterm delivery	↓social interaction ↑emotional withdrawal ↑suicidal thoughts ↑irritable bowel syndrome & heart disease	Low birth weight Increased risk of: • low Apgar score • lack of breastfeeding • poor mother-infant bonding • failure to thrive • delay in developmental milestones • poor motor tone activity • low imitative behaviour • disrupted sleep patterns & irritability • infant illness

A: Meta-analysis/systematic reviews.
B: Cohort studies.
C: Cross-sectional surveys.
D: Review.

as not suffering from depression.[55,56] Depression could impair the ability of mothers to provide nutritious meals for IYC, resulting in underweight or overweight IYC as convenience foods that are high in sugar and fat were offered.[50] As an estimated 57% of women of child-bearing age suffer from depression, maternal depression can contribute to the global increase in childhood obesity due to inappropriate feeding practices.[57]

Evidence from several prospective cohort studies (see Table 3) indicate that breastfeeding can decrease the risk of developing PPD. Despite a lack of evidence regarding an association between maternal depression and breastfeeding duration, a systematic review reported that seven out of ten studies found no relationship between antenatal anxiety, initiation of breastfeeding and continuation thereof. [58] Epidemiological studies provide evidence that maternal depression is associated with breastfeeding difficulties.

Maternal depression, infant and child growth

The environment into which a child is born or grows up, has an important influence on the risk for stunted growth and mental development.[69] Prospective cohort studies have reported that infants with mothers who suffer from depression, are at risk of becoming underweight and/or having a low height-for-age,[15,16] with stunting being the outcome of under-nutrition and infection in utero and since birth.[70] In LMICs, approximately 40% of depressed versus non-depressed mothers are more likely to have an underweight or stunted child.[3,26]

A longitudinal study conducted in a South African urban township found that women with PPD at six months post-delivery, were more likely to have stunted children by two years of age.[71] These findings concur with that of a randomised controlled trial in rural Bangladesh, where 36.9% of infants with depressed mothers were stunted at 12 months.[72] It has been

Table 3: Level of evidence of studies that report that breastfeeding may protect against PPD and the association between breastfeeding difficulty and maternal depression

Level	Studies on how breastfeeding decreases risk of PPD	Association between breastfeeding difficulties and maternal depression
A	• Skin to skin contact before breastfeeding initiation lowers maternal cortisol levels, thereby decreasing prevalence of depression.[59]	• Nipple pain when breastfeeding associated with high depression scores.[64] • Postpartum anxiety is indicative of breastfeeding difficulties as it is associated with delayed milk production.[58]
B	• Breastfeeding protects against PPD.[60] • EBF for at least three months can reduce prevalence of PPD. [61] • Early breastfeeding cessation results in a loss of maternal-infant bond, thereby increasing the risk for PPD.[62]	_
C	_	• Nipple pain and breast inflammation are stressors increasing the risk of PPD, due to the bidirectional relationship between inflammation and depression.[65,66] • Depressed women have low levels of prolactin and oxytocin, both of which have anti-inflammatory properties.[67]
D	• Breastfeeding protects against PPD.[63]	• Depressed women have low levels of prolactin and oxytocin which increase the likelihood of nipple pain and restricts the milk-ejection reflex, resulting in low milk production.[68]

A: Meta-analysis/systematic review/randomised control trial.
B: Cohort study.
C: Cross sectional surveys.
D: Review.

Table 4: Summary of studies on the effects of untreated antenatal and postpartum depression on foetus and IYC

Level	Formula feeding	Malnutrition (underweight/ overweight)	Stunting	Poor infant care and development	Illness
A	_	Depressed mothers more likely to have an underweight infant. [3,26]	Depressed mothers more likely to have a stunted infant.[3,26,72]	PPD associated with poor mother- infant attachment, disturbed infant sleep and incomplete immunisation schedules.[17,18]	_
B	Maternal depression associated with formula feeding and early introduction of complementary foods. [52-55]	Infants with depressed mothers at greater risk of becoming underweight.[15,16] Maternal depression associated with risk for childhood overweight/obesity.[73]	Infants with depressed mothers at a greater risk of low height-for-age.[15,16] Women with PPD more likely to have stunted children by two years of age.[71]	Antenatal depression associated with negative effects on physical, cognitive and emotional development of foetus and IYC.[11] Women with PPD less likely to engage in parenting or caregiving practices.[79]	_
C	_	Maternal depression associated with IYC under-nutrition.[14] Depressed women may be unable to provide nutritious meals for IYC, resulting in an increased risk for malnutrition.[50] Maternal depression associated with lower infant birth weight and shorter length.[75] Maternal depression is associated with poor growth at three to six months.[76]	Maternal depression associated with infant stunting.[77]	Infants with depressed mothers had incomplete vaccination schedules.[75]	PPD associated with more episodes of diarrhoea.[75]
D	_	Antenatal depression associated with low birth weight and PPD associated with underweight infant.[21]	Infants born to depressed mothers have double the risk of becoming stunted[78]	Antenatal depression and PPD associated with impaired cognitive development [12,80,81]	PPD associated with development of infectious and atopic diseases in infants.[8,81]

A: Meta-analysis/systematic review/randomised control trial.
B: Cohort study.
C: Cross sectional surveys.
D: Review.

proposed that if maternal depression is eradicated, IYC stunting can be reduced by 23 to 29%.[3] Epidemiologic studies show positive associations between maternal depression and IYC underweight and stunting.

It has also been suggested that maternal depression is a risk factor for childhood overweight/obesity. This is due to mothers with depression having inappropriate feeding practices (including early cessation of breastfeeding), an inability to

recognise satiety cues, failure to provide nutritionally-balanced meals, and not engaging in physical activities with the child.[73,74] However, evidence regarding maternal depression and childhood overweight/obesity is limited.

Table 4 provides an overview of studies that investigated the effects of untreated antenatal and PPD on the foetus and IYC.

Conclusion

Maternal depression may have a significant impact on IYC growth, health and nutritional status. Maternal depression could impair the ability of expectant mothers to adopt a healthy lifestyle, compromise breastfeeding and disrupt the caregiving roles of mothers during the postpartum period.

Recommendation

Evidence suggests that breastfeeding can prevent PPD. Therefore, expectant mothers should be encouraged to breastfeed as it facilitates the mental well-being of the mother and child. Based on the amount of evidence, it is recommended that women should be screened for antenatal depression and PPD to curb potential breastfeeding difficulties. Epidemiologic studies show positive associations between maternal depression and IYC malnutrition. Hence, identified mothers at risk for depression should receive more support and education, be encouraged to lead a healthy lifestyle during pregnancy, and to practice safe infant feeding and care. This may decrease the prevalence of IYC underweight, stunting and overweight/obesity. Further research regarding the relationship between maternal depression, formula feeding and IYC illnesses is needed, as there is a paucity of data regarding these aspects.

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