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Mini Review

Maternal Stress Level and Effects on Newborns -

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ABSTRACT

Empirical research is suggesting that maternal stress may have negative effects on fetal growth and perhaps may be a contributing factor to developmental issues and disorders. Specifically, maternal stress and anxiety during pregnancy has been associated with numerous negative outcomes including: higher incidence of preterm birth, lower birth weight, increased risk of miscarriage, and infant and child developmental problems, attention regulation, and emotional reactivity [1,2]. The maternal and infant biological interactions are enormously complicated. The empirical research supporting this connection is growing though there remains to be very objective ways to assess at what level the stress becomes detrimental to the fetus. Various mechanisms of action are thought to contribute to the effects on the fetus. Specifically, changes in the Hypothalamic Pituitary Adrenal (HPA) axis, hormonal systems, and neurotransmitters have been implicated. From a public health perspective there probably needs to be more public education regarding the potential risks of high maternal stress on infant health.

MATERNAL STRESS LEVEL AND EFFECTS ON NEWBORNS

Expectant mother's health issues affect infant health and neurodevelopment. A plethora of empirical research makes it clear that maternal stress may have adverse effects on the birth and fetal development. It is unclear where in the translational pipeline the research and interventions are to address this public health issue. There is a multifaceted and very complex relationship between maternal mental health and fetal health. There is a diverse range of research suggesting that high levels of maternal stress can potentially negatively affect the fetal immune system, Hypothalamic-Pituitary Adrenal Axis (HPA), hormonal systems, neurotransmitter levels, and the digestive tract. Evidence from prospective studies suggest that high levels of prenatal norepinephrine is associated with a substantially increased likelihood of the child suffering emotional or cognitive problems, including an increased risk of attentional deficit/hyperactivity, anxiety, and language delay. These findings are independent of any effects that could be attributable to maternal postpartum depression and anxiety. Though some large and obvious stresses such as marital conflict and low SES during pregnancy have been associated with developmental delays and Attention Deficit Hyperactivity Disorder (ADHD) in childhood, there is a growing body of research suggesting that many other forms of stress may carry similar risks [3]. Research suggests that there is a relation between antenatal maternal stress on infant temperament, development, and psychopathology, however these relationships need further investigation. There are several proposed pathophysiological mechanisms behind these relationships. Two small prospective studies examining the relationship between the Hypothalamic Pituitary Adrenal (HPA) axis, psychosocial status and premature delivery have reported a significant association between adverse psychosocial factors and levels of Adrenocorticotropic Hormone (ACTH), Corticotrophin Releasing Hormone (CRH) and Cortisol levels, and on the other hand, a significant correlation between CRH levels and premature delivery [4]. Animal models suggest that activity of the stress-responsive Hypothalamic Pituitary Adrenal (HPA) axis and its hormonal end-product of cortisol is the link between maternal stress and negative fetal outcomes. The fetal environment can be altered if stress in the mother changes her hormonal profile, and in humans, there is a strong correlation between maternal and fetal cortisol levels. One line of research focuses on how the maternal stress response helps set the newborns stress responses [5]. This is clearly supposed to be an adaptive maternal-infant interaction process, however larger infant cortisol response to the heel-stick procedure have been associated with exposure to elevated concentrations of maternal cortisol during the late second and third trimesters. Additionally, a slower rate of behavioral recovery from the painful stress of a heel-stick blood draw was predicted by elevated levels of maternal cortisol early in pregnancy as well as prenatal maternal [5]. Findings like this suggest that maternal stress may cause

infants to have a heightened physiological response to stress. Animal models suggest that activity of the stress-responsive Hypothalamic Pituitary Adrenal (HPA) axis and its hormonal end-product cortisol are involved in these effects in both mother and offspring. The fetal environment can be altered if stress in the mother changes her hormonal profile, and in humans, there is a strong correlation between maternal and fetal cortisol levels. However, many problems remain in understanding the mechanisms involved in this interaction. Ellman [6] established a relationship between specific periods during pregnancy in which human fetal exposure to stress hormones affects newborn physical and neuromuscular maturation. The two ways to look at stress management are to reduce potential stressors and/or to begin and increase the amount of stress reducing activities.

CONCLUSIONS

Being pregnant may cause various physical and psychological stresses that can be expected. A growing body of research is suggesting that at some level the maternal stress may have negative effects on fetal growth and perhaps may be a contributing factor to developmental and emotional disorders. The maternal and infant biological interactions are enormously complicated and although the mother may emerge from a stressful pregnancy well, the newborn may have some residual long-term risks resulting from the stressors of that pregnancy. The empirical research supporting this connection is growing though there remains to be very objective ways to assess at what level the stress becomes detrimental to the fetus. From a public health perspective, it seems enormously important that there be more public dissemination of this information. Moreover, it may be prudent for expectant mothers to be very diligent and cautious about reducing or managing their stress levels.

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