© UNIVERSAL RESEARCH REPORTS | REFEREED | PEER REVIEWED
ISSN : 2348 - 5612 | Volume : 05 , Issue : 03 | January – March 2018

Prenatal Development

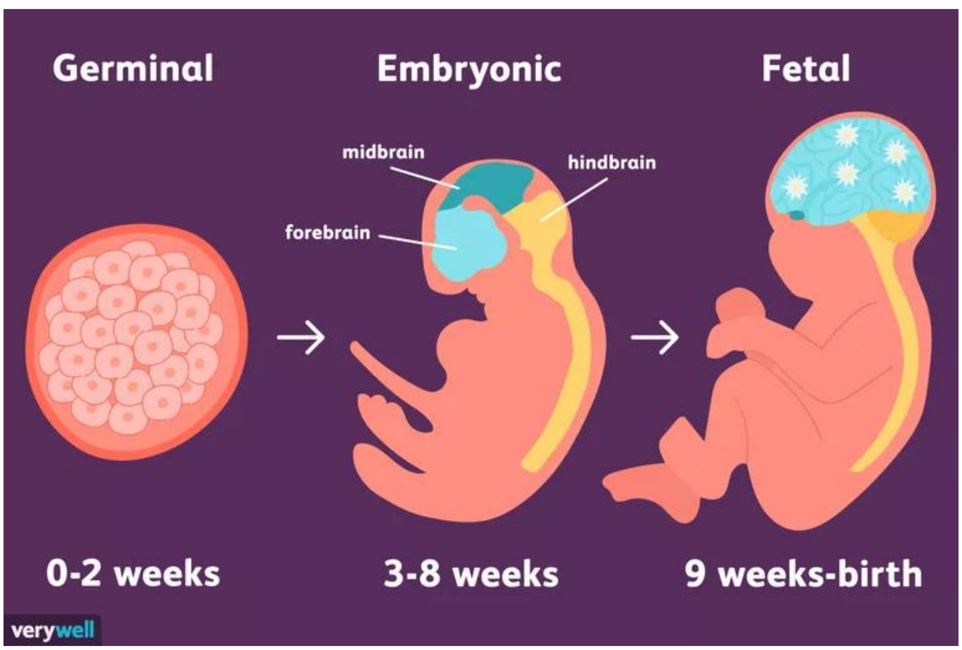
Gurjeet Singh "Net qualified June 2012" (Psychology)

Abstract: The notion that a woman's psychological state during pregnancy affects the fetus is a persistent cultural belief in many parts of the world. Recent results indicate that prenatal maternal distress in rodents and nonhuman primates negatively influences long-term learning, motor development, and behavior in their offspring. The applicability of these findings to human pregnancy and child development is considered in this article. Potential mechanisms through which maternal psychological functioning may alter development of the fetal nervous system are being identified by current research, but it is premature to conclude that maternal prenatal stress has negative consequences for child development. Mild stress may be a necessary condition for optimal development.

ISSN : 2348-5612 © URR

KEYWORDS—pregnancy; fetus; fetal development; stress,

Introduction: While you might think of child development as something that begins during infancy, the prenatal period is also considered an important part of the developmental process. Prenatal development is a time of remarkable change that helps set the stage for future psychological development. The brain develops over the course of the prenatal period, but it will continue to go through more changes during the early years of childhood Let's take a closer look at the major stages and events that take place during the prenatal period of development. The process of prenatal development occurs in three main stages. The first two weeks after conception are known as the germinal stage, the third through the eighth week are known as the embryonic period, and the time from the ninth week until birth is known as the fetal period.



Figure

Germinal Stage: The germinal stage begins at conception when the sperm and egg cell unite in one of the two fallopian tubes. The fertilized egg, known as a zygote, then moves toward the uterus, a journey that can take up to a week to complete. Cell division begins approximately 24 to 36 hours after conception. Within just a few hours after conception, the single-celled zygote begins making a journey down the fallopian tube to the uterus where it will begin the process of cell division and growth. Through the process of mitosis, the zygote first divides into two cells, then into four, eight, sixteen, and so on. A significant number of zygotes never progress past this early part of cell division, with as many as half of all zygote's surviving less than two weeks. Once the eight-cell point has been reached, the cells begin to differentiate and take on certain characteristics that will determine the type of cells they will eventually become. As the cells multiply, they will also separate into two distinctive masses: the outer cells will eventually become the placenta while the inner cells will form the embryo.

Cell division continues at a rapid rate and the cells then develop into what is known as a blastocyst. The blastocyst is made up of three layers:

- The ectoderm (which will become the skin and nervous system)
- The endoderm (which will become the digestive and respiratory systems)
- The mesoderm (which will become the muscle and skeletal systems).

Finally, the blastocyst arrives at the uterus and attached to the uterine wall, a process known as implantation. Implantation occurs when the cells nestle into the uterine lining and rupture tiny blood vessels. The connective web of blood vessels and membranes that form between them will provide nourishment for the developing being for the next nine months. Implantation is not always an automatic and sure-fire process.

Embryonic Stage: At this point, the mass of cells is now known as an embryo. The beginning of the third week after conception marks the start of the embryonic period, a time when the mass of cells becomes distinct as a human. The embryonic stage plays an important role in the development of the brain.

The embryo begins to divide into three layers each of which will become an important body system. Approximately 22 days after conception, the neural tube forms. This tube will later develop into the central nervous system including the spinal cord and brain.

The neural tube begins to form along an area known as the neural plate. The earliest signs of development of the neural tube are the emergence of two ridges that form along each side of the neural place. Over the next few days, more ridges form and fold inward until a hollow tube is formed. Once this tube is fully formed, the cells begin to form near the center. The tube begins to close and brain vesicles form. These vesicles will eventually develop into parts of the brain including the structures of the forebrain, midbrain, and hindbrain.

Around the fourth week, the head begins to form quickly followed by the eyes, nose, ears, and mouth. The cardiovascular system is where the earliest activity begins as the blood vessel that will become the heart start to pulse. During the fifth week, buds that will form the arms and legs appear. By the time the eighth week of development has been reached, the embryo has all of the basic organs and parts except those of the sex organs. It even has knees and elbows! At this point, the embryo weighs just one gram and is about one inch in length. By the end of the embryonic period, the basic structures of the brain and central nervous system have been established. At this point in development, the basic structure of the central and peripheral nervous system are also defined.

Fetal Stage: Once cell differentiation is mostly complete, the embryo enters the next stage and becomes known as a fetus. The fetal period of prenatal develop marks more important changes in the brain. This period of development begins during the ninth week and lasts until birth. The early body systems and structures established in the embryonic stage continue to develop. It is at this point in prenatal development that the neural tube develops into the brain and spinal cord and neurons continue to form. Once these neurons have formed, they begin to migrate to their correct locations. Synapses, or the connections between neurons, also begin to develop. It is during the period between the 9th and 12th week at the earliest reflexes begin to emerge and the fetus begins to make reflexive motions with his arms and legs.

DOES MATERNAL STRESS AFFECT DEVELOPMENT IN HUMANS: Several important factors make it difficult to generalize results based on animal studies to humans. First, there are substantial physiological differences inherent to pregnancies in different species. Second, researchers are unable to control the events that transpire after birth in humans. Women who are psychologically stressed before pregnancy are also likely to be stressed after pregnancy, so it is critical that the role of social influences after birth be carefully distinguished from pregnancy effects that are transmitted biologically. Finally, the nature of the prenatal stress studied in animals and humans is very different, and this may pose the greatest barrier to the ability to generalize. In animal research, stressors are external events that are controlled in terms of duration, frequency, and intensity. The closest parallel in human studies is found in the few studies that have taken advantage of specific events, including an earthquake and the World Trade Center disaster, to study the effects on pregnancy in women residing in physical proximity. No such study has examined children's cognitive or behavioral outcomes. However, what is measured in virtually all human studies of ''stress'' during pregnancy is women's affect, mood, and emotional responses to daily circumstances in their lives. Maternal anxiety and, to a lesser extent, depression are prominent foci of research. Both may reflect emotional responses to stressful circumstances, but they also represent more persistent features of personality. Thus, not only are the physiological consequences and nature of prenatal stress different between animal and human studies, but when human studies detect an association between mothers' prenatal anxiety, for example, and their children's later behavior, it may be the result of shared genes or childrearing practices related to maternal temperament.

CONCLUSIONS: At this time, there is too little scientific evidence to establish that a woman's psychological state during pregnancy affects her child's developmental outcomes. It is premature to extend findings from animal studies to women and children, particularly given the disparity in the way the animal and human studies are designed. The question of whether maternal stress and affect serve to accelerate or inhibit maturation of the fetal nervous system, and postnatal development in turn remains open. It has been proposed that a certain degree of stress during early childhood is required for optimal organization of the brain, because stress provokes periods of disruption to existing structures (Huether, 1998), and this may be true for the prenatal period as well. The relation between maternal stress and children's development may ultimately be found to mirror the relation between arousal and performance, which is characterized by an inverted U-shaped curve. This function, often called the Yerkes-Dodson law, posits that both low and high levels of arousal are associated with performance decrements, whereas a moderate level is associated with enhanced performance. This model has been applied to a spectrum of psychological observations, and a parallel with prenatal maternal stress may exist as well. In other words, too much or too little stress may impede development, but a moderate level may be formative or optimal. The current intensive investigation in this research area should provide better understanding of the importance of the prenatal period for postnatal life as investigators direct their efforts toward determining how maternal psychological signals are received by the fetus.

Reference:

- Clapp, J. (1996). Morphometric and neurodevelopmental outcome at age five years of the offspring of women who continued to exercise regularly throughout pregnancy. Journal of Pediatrics, 129, 856–863.
- DiPietro, J., Hilton, S., Hawkins, M., Costigan, K., & Pressman, E. (2002). Maternal stress and affect influence fetal neurobehavioral development. Developmental Psychology, 38, 659–668.
- DiPietro, J.A., Hodgson, D.M., Costigan, K.A., Hilton, S.C., & Johnson, T.R.B. (1996). Development of fetal movement-fetal heart rate coupling from 20 weeks through term. Early Human Development, 44, 139–151.
- Fujioka, T., Fujioka, A., Tan, N., Chowdhury, G., Mouri, H., Sakata, Y., & Nakamura, S. (2001). Mild prenatal stress enhances learning performance in the non-adopted rat offspring. Neuroscience, 103, 301–307.
- Gitau, R., Cameron, A., Fisk, N., & Glover, V. (1998). Fetal exposure to maternal cortisol. Lancet, 352, 707–708.
- Huether, G. (1998). Stress and the adaptive self-organization of neuronal connectivity during early childhood. International Journal of Neuroscience, 16, 297–306.
- Huizink, A., Robles de Medina, P., Mulder, E., Visser, G., & Buitelaar, J. (2002). Psychological measures of prenatal stress as predictors of infant temperament. Journal of the American Academy of Child & Adolescent Psychiatry, 41, 1078–1085.
- Martin, R., Noyes, J., Wisenbaker, J., & Huttunen, M. (2000). Prediction of early childhood negative emotionality and inhibition from maternal distress during pregnancy. Merrill-Palmer Quarterly, 45, 370–391.
- Novak, M., & Sackett, G. (1996). Reflexive and early neonatal development in offspring of pigtailed macaques exposed to prenatal psychosocial stress. Developmental Psychobiology, 29, 294.
- O'Connor, T., Heron, J., Golding, J., Beveridge, M., & Glover, V. (2002). Maternal antenatal anxiety and children's behavioural/emotional problems at 4 years. British Journal of Psychiatry, 180, 502–508.