Perspective

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Viral Influences on Fetal Development, Umbilical Cord Abnormalities and Neurodevelopment

Jin Joseph*

Department of Obstetrics and Gynecology, Semmelweis University, Budapest, Hungary

Corresponding author: Jin Joseph, Department of Obstetrics and Gynecology, Semmelweis University, Budapest, Hungary, E-mail: jin@gmail.com

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Description

A group of clinical symptoms known as Congenital Zika Syndrome (CZS) may appear in newborns whose moms have the Zika virus. Long-term developmental consequences as well as changes to the nervous system, skeleton and system are characteristics linked to CZS. Microcephaly, a syndrome marked by a reduction in head circumference and cognitive difficulties, is one of the most commonly reported clinical conditions. However, it is still unclear how the many signaling pathways that underlie the phenotypes of CZS are related to one another. We have thoroughly examined the morphological abnormalities brought on by ZIKV infection as well as relevant genes and proteins from the available literature in order to provide light on CZS. We conducted computational analyses to investigate the cellular mechanisms, molecular pathways and molecular processes associated with ZIKV infection using this list of genes or proteins. Thus, we present a thorough description of the morphological anomalies resulting from congenital ZIKV infection in this review. Based on the previously mentioned study, we also suggest shared molecular pathways that are affected by ZIKV and may account for changes to the central nervous system as well as changes to the craniofacial skeleton. The effects of pregestational and early pregnancy SARS-CoV-2 infection on fetal development are unknown. While vertical transmission is uncommon, it is possible that it could have an impact on the developing fetal brain. However, due to insufficient tracking of infection history and methodological issues in published studies, strong evidence linking maternal SARS-CoV-2 infection to neonatal abnormalities is scarce. Limitations, such as restricted testing access and undetected infections, especially in low-and middle-income countries, exacerbate this further.

Congenital abnormalities

The majority of data are hospitalized women who are close to delivery first- and second-trimester infection data is missing. Therefore, it is vital to accurately determine how COVID-19 affects congenital abnormalities. It is important to note, nonetheless, that there is strong evidence demonstrating that immunization against COVID-19 before or during early pregnancy is not linked to malformations, excluding the possibility that COVID-19 vaccinations contribute to the elevated rates of congenital abnormalities. In an effort to lessen the impact of viral infections on early neurodevelopment, this point of view examines data from surveillance registries, draws attention to study limitation and makes research recom-mendations that will guide clinical guidelines and public health campaigns. Forty researchers from these interdisciplinary teams got together in November 2022 as the studies were almost finished to exchange experiences, talk about difficulties and decide how to go forward with incorporating sex and gender in research. Here, we offer a summary of the workshop's reflections along with some suggestions for i) how to design the studies (*e.g.,* how to define sex gender and their dimensions, justify the hypotheses, identify the data that can most effectively address the research question) ii) how to carry them out (*e.g.,* modify definitions).

Umbilical cord malformations

A higher frequency of some cord malformations than other fetal structural defects is seen. The most prevalent abnormalities are the velamentous insertion of the cord and the lack of an umbilical artery. Even in the absence of prenatal anatomical malformations, these anomalies raise the possibility of unfavorable perinatal outcomes, such as stillbirth and fetal growth limitation. Vasa previa is linked to the highest neonatal morbidity and death of all congenital umbilical chord defects when a prenatal diagnosis is not made. The majority of cases are detectable by ultrasonography as early as the second trimester and ought to be part of the standard mid-pregnancy ultrasound assessment. The location of the cord's insertion, the number of vessels in the cord and any further diseases found should all be included in the documentation. Transvaginal ultrasonography and color Doppler imaging should be used to check for vasa previa in pregnancies at elevated risk of velamentous cord insertion. An isolated solitary umbilical artery or velamentous cord insertion should prompt customized obstetric care and individualized follow-up during pregnancy. Dimensions, carry out pilot studies to guarantee appropriate terminology use and make revisions until agreement is reached and how to evaluate and present the results while taking into account any potential practical implications. An higher risk of pregnancy and postnatal problems is linked to congenital abnormalities of the umbilical cord.