

Impact of Gestation and Birth on the Development of Chronic Diseases: Importance of Preconception and Prenatal Care as a Prevention Strategy

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According to the World Health Organization, chronic diseases such as cardiovascular and respiratory diseases, cancer, and diabetes are the main causes of mortality. These diseases are responsible for 68% of the world's deaths; half of those deaths occur in women and one-third of those women die before their 60s.

In turn, about 80% of deaths associated with chronic diseases are concentrated in low- and middle-income countries [1]. The last illustrates that these pathologies affect a high proportion of people in the world, generating not only high mortality, but also a high burden of years of life lost due to disability. In addition, this high disease burden associated with these pathologies represents an important public health problem, since the management and monitoring of these diseases generates important social and economic effects for the countries [2].

Current strategies for the prevention of these pathologies are mainly oriented to the stimulation of

healthy lifestyles in general population (primordial prevention) and decrease the risk of its development in susceptible population (primary prevention). However, these strategies have not been fully successful and their eradication and effective reduction is not yet possible [1].

Although it has been shown that the genetic factor is relevant in the production of chronic diseases, current evidence suggests that it is the interaction of this factor associated with environmental conditions what determines the genetic and phenotypic expression of chronic pathologies [3]. Increasingly, it has been demonstrated that there are critical periods of exposure, of which the periconceptional, embryonic, foetal and postnatal period have been described as high-vulnerability periods [4]. Thus, people's health - in short and long-term- could potentially be influenced by the health status of women during gestation. Furthermore, even women's prior health status could be generating a phenomenon of "intrauterine programming" that can be considered as an altered response at the cellular or systemic level, and as a result of an abnormal

environmental stimulus that occurs at a moment of development" [5].

On the other hand, the altered response of individuals can be "potentially engraved" in their genes, conditioning the transmission of that information to future generations [6].

In light of new research, current chronic noncommunicable diseases are giving way to the new concept of "transgenerational transmission", which would imply a new paradigm in the care of gestation and health of people, as new perspectives of levels of prevention in health. This "transgenerational transmission", as well as the impact of gestation on a person's health and illness, could be explained by epigenetic mechanisms that underlie an individual's genetic potential, regulating positively or negatively the expression of responsible and protective genes for the development of pathologies. Such mechanisms are potentially reversible, depending on the intervention performed to avoid or counteract its possible effect [7].

It has been shown that aspects such as nutritional status, perinatal stress, and even the type of birth, could condition an individual's healthy life potential, being described as relevant environmental factors capable of reprogramming the expression of an individual [6].

In the case of nutritional status, both obesity (overweight malnutrition) and undernutrition, could define the foetus's ability to respond to certain conditions in postnatal life [7,8]. Maternal obesity prior to gestation, as well as excessive weight gain during pregnancy, have been associated with a reprogramming of foetal plasticity that could induce epigenetic changes in the tissues of offspring metabolism, which result in permanent alterations in the function of genes associated with metabolism and obesity, increasing the risk of developing this during childhood and adult life.

In addition, the mother's nutrition during pregnancy would not only have direct effects on the foetus, but could also directly affect the developing oocytes of female foetuses and primordial germ cells of male foetuses, so it could also affect the offspring of affected foetuses [7].

Both maternal psychosocial stress and prenatal and postnatal maternal depression have been associated with the generation of an altered response to stress in childhood, mainly by reprogramming the regulation of the hypothalamic-pituitary-adrenal axis (HPA) of the foetus in

development. This has been aspired to a mechanism that would explain these alterations: the methylation of the NR3C1 gene (glucocorticoid receptor), which is sensitive to the emotional state of the mother [9].

With regard to birth, research has recently been based on the concept of EPIIC (Epigenetic Impact of Childbirth) [10]. These investigations aim at demonstrating that the type of delivery (specifically cesarean delivery), the interventions that take place during labor such as the use of exogenous oxytocin, antibiotics and pain management and emotional abuse, can produce epigenetic modifications that could condition -in the future- the production of psychiatric pathologies, immunological alterations and alterations of the development in the child and adult. Examples of this hypothesis are: the association of violence during delivery with posttraumatic stress and postpartum depression [11], the relationship between oxytocin use and autism spectrum disorders [12], the link between cesarean delivery and diabetes, obesity and autoimmune pathologies, among others [13].

In light of the above, it is necessary to reflect on the need to consider a previous level of intervention and whether it is necessary to reorient the strategies and proposals.

We strongly believe it is important to consider preconception care, care of pregnant women and birth as fundamental prevention strategies at all levels.

The early acquisition of healthy lifestyles, exclusive breastfeeding described as a powerful mechanism of epigenetic reversal, healthy nutrition and prevention of violence against women throughout their lives and mainly during gestation and birth are fundamental preventive strategies. These elements can be considered as part of a pre-primordial level of prevention regarding the acquisition of noncommunicable pathologies.

While health providers are aware of these strategies, proactive incorporation of them with awareness and risk approach to care, can be seen as fundamental and crosscutting strategies in the prevention of pathologies that are slowly and silently devastating the world population.

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