Mental disorders are global problems in modern society, and they affect people across genders and ages, imposing significant barriers to a person's ability to function normally. The development of mental disorders is due to biological, psychological, and social factors, and these risk factors may manifest differently at different ages and stages in life, with some of these risks appearing as early as the perinatal period. During the perinatal period, the mother provides crucial substances for the fetus, and sugar is a key fuel source for the growth and development of the fetus. Maternal nutritional signals from food can determine the remodeling of fetal genes, and these effects can persist throughout fetal development. Foods that contain sugar such as glucose and fructose are an important source of energy for cells and crucial for the maintenance of the body's biochemical processes. Both glucose and fructose act as sweeteners and added sugars in many food products, such as fructose in high-fructose corn syrup or glucose in sugar-sweetened beverages. Importantly, the higher consumption of calories from added sugars is visible in developing societies where processed food consumption by children and adult is alarming. Clinical observations have indicated that sugar-rich foods are desirable during pregnancy and were overeaten during the study period, suggesting that many reproductive women are exposed to the adverse effects of sugars. Thus sugar overconsumption during pregnancy and lactation may cause fetal abnormalities and consequently predispose offspring to diseases in childhood and even adulthood. Although the effect of a maternal sugar diet has not been previously investigated, especially in clinical trials, it is well-studied that postnatal sugar intake by children and adolescent subjects evokes emotional disturbances such as stress, anxiety, depression, memory, and learning decline. In a few preclinical studies, maternal sugar or fructose intake during pregnancy and lactation caused anxiety-like, depressive-like behavior, and memory impairment in adolescent offspring rodents.

However, the relationship between maternal diet and offspring's emotional status is not yet well-known. Emotional changes observed at early life stages of offspring may indicate the influence of the maternal diet on the neurodevelopmental processes. Neurodevelopment is a crucial stage in that proliferation and differentiation into various nervous cell types occur in the neurogenesis step during embryonic development but it continues in adult life. In the hippocampus, the formation of newborn neurons persists lifelong, regulating learning, memory, and mood. The hippocampus is a highly sensitive brain region to environment-responsive factors and has long been implicated in neurodevelopmental psychiatric disorders. Moreover, the hippocampus is anatomically and functionally differentiated implying region-specific heterogeneity. The dorsal hippocampus is associated with learning and memory, while the ventral hippocampus is connected with stress and anxiety-like behavior. Adult neurogenesis expresses various time-frame genes and proteins such as brain-derived neurotrophic factor, glial fibrillary acidic protein, nestin, doublecortin, and NeuN that may play a role as psychiatric disorders markers.

Currently, no studies showed the impact of a maternal sugar diet on the neurodevelopment processes in the offspring. To explore this area, we will plan to use molecular (RT-qPCR) and neurochemical (ELISA) analysis to characterize specific neurogenesis markers expression in the ventral and dorsal regions of the hippocampus. *Ex vivo* screening into the neurodevelopmental processes in both dams and offspring following a perinatal monosaccharide diet will not only allow an understanding of the transgenerational correlation of simple sugar act in neurogenesis but also hippocampus regions participation. Since that neurodevelopmental processes may differ between the sex and age of the offspring, the molecular and neurochemical analysis will be performed in both adolescent and adult females and males. In conclusion, the project results will allow the determination of the role of maternal monosaccharide diet in neurodevelopmental processes and hippocampal contribution. Moreover, results will enable further exploration of this neuroscience area, especially in the treatment and prevention of mental disorders.