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Future Perspectives in Nutritional Genomics to Investigate Non-Communicable Diseases in Pregnant Women and the Offspring in Qatar

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Editorial

Pregnancy and pre-pregnancy maternal nutritional status is an important predictor of delivery complications, infant birth weight and growing.

A complex of environmental factors influences pregnancy outcomes, such as food availability, physical activity, and infectious diseases. The quality of maternal food during pregnancy is linked to non-communicable diseases (NCDs) in the offspring, such as obesity, diabetes, and cardiovascular diseases [1,2]. The Similar impact has the infant feeding: breastfeeding is recognized as the gold standard for the first 6 months of life, and maternal milk has demonstrated to provide benefits for both the baby and the mother [3]. Breastfeeding reduces the risk of both acute and chronic diseases, such as neonatal enterocolitis, infectious diseases, obesity and other NCDs, suggesting an epigenetic mechanism [4].

Qatar is experiencing a great economic and cultural change in the last decade. As a consequence, also the women and child nutritional habits and lifestyle are impacted by the new socio-economic environment. The percentage of women and children overweight, obesity and diabetes increased dramatically in the last 20 years and it's one of the highest in the world [5-9]. Gestational diabetes and hypertension are two of the main pregnancy complications particularly in the older Qatari women [10]. Few preliminary studies in the Gulf region evaluated the practice of specific nutrients, such as vitamin D and folic acid, during the pregnancy, demonstrating low intake and low level of education on the topic among the Arab women [11,12]. Recently, the Qatari and Lebanese investigators are planning new cohort studies in order to deeply investigate the maternal and infant nutritional status and lifestyle, and the effects on the birth outcomes and the infant growth [13,14]. The results coming from these studies will open new perspectives to identify specific markers involved in pregnancy and delivery complications, and to reduce children NCDs in Qatar.

Nutritional genomics are sciences that study the interactions between dietary components and the genome as well as changes in gene expression, proteins and metabolite activities [15,16]. The nutritional genomics approach is successfully applied to other populations for both pregnancy and obesity [17-19], whether is still unexplored in Qatar where it could have big potentials because of the peculiar genetic background [20], and could address specific questions concerning the local high incidence of obesity and diabetes. Only few studies were completed investigating epigenetics and metabolomics of NCDsin adult Arab subjects [21,22]. According to our knowledge, no nutrigenomic study was performed in Arab pregnant women and offspring until now.

Gut microbiome analysis could be considered part of nutritional genomics because of diet effect on gut microbial composition. A consistent scientific literature demonstrated the influences of the maternal microbiome on offspring [23]. Maternal microbiome is an important source for infant microbiome, indeed microbiome composition is influenced by both delivery mode and breastfeeding [24-26]. Moreover, it has been reported that differences in gut microbiome in the first year of life may precede the onset of obesity [27]. Diet habits influence gut microbiome [28,29], and as a consequence, maternal diet can influence both her own and offspring microbiome composition. New studies just start to investigate about the effect of maternal diet on infant microbiome and NCDs [30]. Again, Middle East misses this kind of studies although the burning need to address the NCDs.

Conclusions

Recently, the personalized medicine is considered the best therapeutic approach to the complex diseases [31]. The Nutritional Genomics perfectly fits the personalized medicine, evaluating the interaction of diet and lifestyle with genes, gut microbiome and metabolic markers. The newly coined definition Personalized Nutrition addresses this kind of approach to the NCDs, such as obesity and diabetes [32,33]. In the Middle East region, the personalized nutrition is considered the winning approach because of the high incidence of NCDs and the peculiar genetic background. However, the nutritional genomics data are still absent and more nutrigenomics studies are required [34]. Our opinion is that the metabolic disorders in pregnant women and the offspring have a relevant place among all NCDs, and to apply the personalized nutrition to the pregnant women could be a useful tool to reduce obesity and diabetes in both young and adult populations in Qatar.

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