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The effect of Mediterranean diet on placental volume and function

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Objective

To investigate the effect of maternal Mediterranean diet (MedDiet) or stress reduction during pregnancy on placental volume and function in high-risk pregnancies from the IMPACT BCN trial.

Methods

In a randomized clinical trial with parallel group conducted at a University Hospital in Barcelona, Spain between 2017 and 2020 (the IMPACT BCN trial), 1221 pregnant women at high-risk for SGA were randomly allocated at 19-23 weeks' gestation into three groups: a MedDiet intervention, a stress reduction program or usual care. Participants in the MedDiet group (n=407) received monthly individual and group educational sessions, and free provision of extra-virgin olive oil and walnuts. Women in the stress reduction group (n=407) underwent an 8-week mindfulness-based program adapted for pregnancy. Placental volume and perfusion were assessed in a subgroup of randomly selected pregnant women (n=196) from the three study groups using magnetic resonance (MR) imaging, specifically Diffusion-weighted and Intravoxel incoherent motion (IVIM) during the third trimester of pregnancy.

Results

After quality control, MR data from 165 participants were analyzed including 52 MedDiet, 60 stress reduction and 53 usual care. The mean gestational age at the time of MR was 36 ± 1 weeks of gestation in all study groups. The mean placental volume and placental volume centiles were similar among the study groups. Small placental volume was defined as below the 10^{th} centile and calculated to be 649.9 cm3. Both interventions were associated with a significant reduction of the prevalence of small placental volume (MedDiet 3.9% vs Stress reduction 5% vs usual care 17%, $p<0.05$ for both intervention groups by multiple logistic regression). Logistic regression showed that small placental volume (below the 10^{th} centile) was associated with lower Mediterranean diet score (odds ratio (OR) 0.78, p=0.009) and a tendency of having lower cortisone/ cortisol ratio which is considered a surrogate of maternal stress -lower ratio related to more stress- (OR 0.19, p=0.10). IVIM parameters were not different in the intervention groups compared to the usual care group.

Conclusion

The results suggest that structured interventions during pregnancy based on MedDiet or stress reduction reduce the proportion of pregnancies with small placental volume. These effects could be mediating the previously demonstrated beneficial effect of both interventions on fetal growth.