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EARNEST

EARly Nutrition programming- long term follow up of Efficacy and Safety Trials and integrated epidemiological, genetic, animal, consumer and economic research

Instrument: Integrated Project

Thematic Priority 5.4.3.1: Food Quality and Safety

Final public report on activity 2.3.2

Title of activity: Prenatal and postnatal dietary factors and cognitive development at 5 year

Period covered from 15.04.2005 to 14.10.2010

Start date of project: 15.04.2005 Duration: 5,5 Years

Organisation Name of Lead Contractor for this report: Danish Epidemiology Science Centre
Statens Serum Institut (now: Centre for Fetal Programming, Statens Serum Institut)

In the Danish National birth Cohort, a programme of cognitive testing at 5 years of a group of children, selected from the whole cohort on the basis of prenatal alcohol exposure, was ongoing. During 2004-2008, the EARNEST grant enabled expansion of this programme by including further 200 children selected on the basis of early dietary exposures.

Objective

This activity aimed at studying associations between maternal and infant dietary exposures on the one hand and cognitive development at 5 years of age on the other.

Tasks

The 200 children were selected the following way (the four criteria were applied simultaneously):
Fish: Group 1 (never eating fish), Group 2 (eating fish each month or less), Group 3 (hot meal each month, sandwich each week), Group 4 (hot meal and sandwich each week, low frequency) and Group 5 (hot meal and sandwich each week, high frequency). All groups have consistent intake in the 1st and 2nd telephone interview.
Iron from food: The estimated intake in mg/d (energy-adjusted) divided into quintiles based on the full Lifestyle During Pregnancy Study.
Iron from supplements: Iron intake from supplements in pregnancy: Group 0 (zero intake), Group 1 ($\leq$14mg), Group 2 (14mg< <50mg), Group 3 ($\geq$50mg).
Breastfeeding: Duration of (any) breastfeeding. Groups 1-5 ($\leq$1 months, 2-3 months, 4-6 months, 7-9 months, $\geq$10 months).
These were also the exposure categories used in the analyses.

Selected mothers were invited to participate in the study by letter approximately 3-10 weeks before the child's fifth birthday. A self-administered questionnaire for the parents regarding the child's general postnatal health and development as well as maternal and paternal postnatal lifestyle was mailed to the participants. When the child was 60-64 months old, a 3-hour assessment was carried out in one of four test sites located in Copenhagen, Aarhus, Odense and Aalborg, ensuring that assessment took place within a reasonable travel distance for all mothers and children. The assessment comprised a comprehensive neuropsychological test battery administered by a trained psychologist. Test procedures were standardized in detail and carried out by 10 trained psychologists blinded to the child's exposure status. Tester differences are taken into account by the inclusion of an indicator variable in all statistical analyses.

Intelligence was assessed with the Wechsler Primary and Preschool Scales of Intelligence-Revised (WPPSI-R) (Wechsler manual), one of the most widely used, standardized tests of intelligence for children of two to seven years. The WPPSI-R comprises 6 verbal subtests and 6 performance (non-verbal) subtests from which verbal (VIQ), performance (PIQ), and full scale (FSIQ) IQs are derived. To reduce the length of the test session, a short form including three verbal (Arithmetic, Information and Vocabulary) and three performance subtests (Block Design, Geometric Design and Object Assembly) was used. Standard procedures were used to prorate IQs from the shortened forms of the tests.

Results

For the dichotomized exposure measures, comparing the lowest intake groups with the others combined, the crude analysis indicated a 6.75 point lower IQ score for children in the lowest breastfeeding group (95%CI -11.97;-1.52), and a similar effect for the lowest fish intake group, albeit this was borderline statistically significant (-5.31 (95%Ci -10.76;0.14)). However, after adjustment for the core covariates selected a priori, the association regarding breastfeeding diminished (-3.97 (95%CI -9.14;1.20) and for the other exposures there were little indication of any effect on child IQ.

Analyses examining trends across exposure levels could not detect any association between the examined early dietary factors and child's IQ at 5 years of age, with adjusted regression coefficients ranging from 0.49 for fish intake to 0.66 for dietary iron intake, all confidence intervals comprising zero. Corresponding analyses using continuous exposures instead of categories (fish intake is substituted for estimated intake of DHA), showed no association between early dietary factors and child's IQ at 5 years of age.

Testing for an effect of each level change of early dietary exposure not assuming monotonous change in child IQ with exposure, we entered the four exposure measures into the model as indicator variables. For breastfeeding duration 7-9 months, we observed a nearly 5 point higher IQ score (adjusted regression coefficient 4.81 (95%CI 0.10;9.52)). There was some indication of an overall effect of breastfeeding, but the pattern is not clear. For fish and iron intake there was little evidence of any association with child IQ at the age of 5.

Conclusions

This study could detect no association between maternal intake of fish and iron during pregnancy and breastfeeding on the one hand, and offspring IQ measured when the child was 5 years old, on the other.

Next step

Next step is to combine the dataset which derived from the nutrient selections process with the dataset which derived from the selection process which was based on the reported alcohol intake in pregnancy (resulting in a total number of observations of 1783). The final paper will be based on the full dataset.