



Maternal dietary intake of fish and child neurodevelopment at 3 years: results from the Japan Environment and Children's Study

Hidekuni Inadera¹, Kenta Matsumura¹, Mariko Inoue¹, Akiko Tsuchida¹, Kei Hamazaki²

¹ University of Toyama, Japan, ² Gunma University, Japan

e-mail: inadera@med.u-toyama.ac.jp

1. Conclusions

- Fish consumption during pregnancy was associated with a reduced risk of neurodevelopmental delay in 3-year-olds, particularly in the fine motor, problem-solving, and personal-social developmental domains in the ASQ-3.
- Continued investigation beyond 3 years of age is warranted.

2. Introduction

- We previously found that children born to mothers who actively consumed fish during pregnancy had a reduced risk of developmental at 6 months and 1 year of age, using large-scale data obtained from the Japan Environment and Children's Study (JECS), an ongoing nationwide epidemiological study.
- Here, we aimed to clarify the relationship between maternal fish intake during pregnancy and the neurodevelopment of the child at the age of 3 years.



3. Methods

Participants

- A total of 91,909 mother-child pairs enrolled in the JECS.

Exposure

- Omega-3 PUFA intake during pregnancy, which was measured using the Food Frequency Questionnaire, which includes over 170 food and beverage items.

Outcomes

- The Ages and Stages Questionnaires, Third Edition (ASQ-3), which assess the children's neurodevelopment in five domains: communication, gross motor, fine motor, problem-solving, and personal-social.

Covariates

- A total of 14 carefully selected, pre-determined potential confounders: age; physical activity; previous deliveries; pre-pregnancy BMI; highest maternal education; annual household income; marital status; alcohol intake; smoking status; employment status; child's sex; presence of a major congenital anomaly at delivery and at age 1 month; use of EPA and /or DHA supplementation; and maternal psychological distress.

Analysis

- Calculation of adjusted odds ratio obtained by performing logistic regression analysis.
- Multiple imputation for missing values.

4. Results

		Quintile for fish intake ^a					p-value for trend *
		1 (low)	2	3	4	5 (high)	
Communication	Crude OR	1.00 —	0.88 (0.79–0.98)	0.89 (0.80–0.99)	0.90 (0.81–1.01)	0.90 (0.81–1.01)	0.126
	Adjusted OR	1.00 —	0.89 (0.80–0.996)	0.90 (0.80–1.002)	0.91 (0.81–1.01)	0.89 (0.80–0.998)	0.094
Gross motor	Crude OR	1.00 —	1.00 (0.90–1.11)	0.97 (0.87–1.08)	1.00 (0.89–1.11)	1.07 (0.97–1.19)	0.237
	Adjusted OR	1.00 —	0.99 (0.89–1.10)	0.96 (0.86–1.06)	0.97 (0.87–1.08)	1.04 (0.94–1.16)	0.573
Fine motor	Crude OR	1.00 —	0.97 (0.90–1.05)	0.90 (0.83–0.98)	0.85 (0.78–0.92)	0.87 (0.80–0.94)	<0.001
	Adjusted OR	1.00 —	1.01 (0.93–1.09)	0.94 (0.87–1.02)	0.89 (0.82–0.97)	0.90 (0.83–0.97)	<0.001
Problem-solving	Crude OR	1.00 —	0.90 (0.83–0.98)	0.86 (0.79–0.94)	0.89 (0.82–0.96)	0.87 (0.80–0.95)	0.002
	Adjusted OR	1.00 —	0.90 (0.83–0.98)	0.87 (0.80–0.94)	0.89 (0.82–0.96)	0.86 (0.80–0.94)	0.001
Personal-social	Crude OR	1.00 —	0.87 (0.77–0.98)	0.88 (0.78–0.99)	0.88 (0.78–0.99)	0.87 (0.78–0.98)	0.049
	Adjusted OR	1.00 —	0.88 (0.78–0.999)	0.89 (0.79–1.01)	0.88 (0.78–0.998)	0.87 (0.77–0.98)	0.037

Bold indicates significance. *Derived from logistic regression analysis—assigned categorical numbers to the quintile distributions and evaluated as continuous variables. Covariates were adjusted for mother's age, previous deliveries, pre-pregnancy BMI (kg/m²), highest maternal education level, annual household income, marital status, alcohol intake, smoking status, employment status, child's sex, presence of a congenital anomaly, use of EPA and/or DHA supplementation, and psychological distress. ^aEnergy-adjusted average dietary intake for the period after participants learned of the pregnancy up until mid-late pregnancy.

5. References

- Inoue M, Matsumura K, Hamazaki K, Tsuchida A, Inadera H, the JECS Group. 2023, *Frontiers in Public Health*, 11, 1267088. <https://doi.org/10.3389/fpubh.2023.1267088>

