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# Breastfed Impact on Intelligence Quotient in Children Attended To Pediatric Clinic in Al-Hussien Hospital at Cairo, Egypt

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## **Abstract**

**Background:** Both genetic background and environmental factors have an impact on children's intellectual development. One of the initial postpartum experiences is breastfeeding.

**Aim and objectives:** The main goal of this research was to compare the level of intelligence between breastfed children and non-breastfed and find if there is an impact of breastfed on IQ.

**Subjects & methods:** This cross-sectional research was conducted in **pediatric clinics at Al-Azhar University Hospitals**. Research was showed on 50 children.

**Results:** regarding Full-Scale Intelligence Quotient of Wechsler Intelligence Scale of studied children. Full-Scale Intelligence in breastfed group ranged from 75 to 99 with mean  $\pm$  SD =  $88.39 \pm 6.42$  while in non-breastfed group the Full-Scale Intelligence ranged from 64 to 92 with mean  $\pm$  SD =  $82.63 \pm 7.15$ .

**Conclusion:** The present study compare intelligence level between breastfed and non-breastfed children. We concluded that there was significant relation between high Wechsler Intelligence Scale score and breastfed.

**Key words:** Breastfed; IQ.

## **INTRODUCTION**

Both genetic inheritance and environmental factors have an impact on children's intellectual development. One of the early postnatal experiences of this kind is breastfeeding.

The Academy of Nutrition and Dietetics contends that for the first six months of life, breastfeeding exclusively offers the best nutrition and health protection and that from six months of age until at least 12 months of age, breastfeeding with complementary food is considered to provide the best nutrition for infants. [1]

In studies of young children, the advantages of breastfeeding seem to be the greatest. It has a wide range of anti-inflammatory, immunomodulatory, and antibacterial

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compounds that benefit children's cognitive and psychomotor development. [2]

A worldwide increase in Intelligence has been linked to improvements in nutritional policy. The brain's shape, behavior, and IQ are all correlated with prenatal and early nutrition. There is evidence that giving very preterm babies, especially boys, a high-nutrient diet will assist to lessen the loss of brain growth and IQ these babies frequently face. Low IQ can also be brought on by deficiencies in protein, iron, zinc, folate, iodine, and B12. [3]

It is now clear that the gut microbiome is important for a baby's growth and that the way a baby is fed can affect the microbial communities in their gastrointestinal tract. [4]

Little doses of formula milk can alter the composition and relative abundance of the bacterial communities that are typically present in a breastfed infant's gastrointestinal tract. By interfering with the colonisation and growth of the neonatal gut microbiome, formula feeding has the potential to lessen the advantages of feeding infants just human milk. [5]

### **Patients and methods**

Children attending pediatric clinics at Al-Azhar University Hospitals in the period of 1st of October 2021 to 31st of March 2022.

### **RESULTS**

**Table (1): Demographic & Clinical characteristics.**

	<b>Breastfed (n=23)</b>	<b>Non-breastfed (n=27)</b>	<b>P</b>
<b>Age (years)</b>			.219
Mean ± SD	7.96 ± 1.55	8.56 ± 1.81	
Range	6 – 12	6 – 13	
<b>Sex, n (%)</b>			.845
Male	13 (56.5%)	16 (59.3%)	
Female	10 (43.5%)	11 (40.7%)	
<b>Mother age (years)</b>			.326
Mean ± SD	30.57 ± 1.81	31.11 ± 2.04	
Range	27 – 34	26 – 36	

**Inclusion criteria:** children ranging from 6 to 14 years old and accepted to participate in this study, from both sex (male and female), the children who don't have no mental disorder or any syndrome or organic disease affecting the IQ level.

**Exclusion criteria:** children with any medical syndrome, children who have been injured during birth, children who had admitted to Neonatal ICU for any reason, children who have any psychiatric disorder affecting the mental function and the children who have any other organic disorder.

**Statistical Analysis:** SPSS 26.0 for Windows was used to gather, tabulate, and statistically analyse all of the data (SPSS Inc., Chicago, IL, USA). Chi-square (X<sup>2</sup>)

**test of significance:** was used to relate proportions among qualitative parameters.

**Independent T-test:** was used it in order to compare between two independent groups with parametric quantitative data.

To identify the relationship between an exposure and an outcome, odds ratios (OR) interpreted with 95% confidence intervals are used. These odds ratios show the likelihood that an outcome occurred given a specific exposure in comparison to the likelihood that the outcome would not have occurred without that exposure.

<b>Mother education, n (%)</b>			
Not educated	0	2 (7.4%)	.369
Elementary	2 (6.7%)	5 (18.5%)	
Intermediate	4 (17.4%)	5 (18.5%)	
Secondary	5 (21.7%)	8 (29.6%)	
University	9 (39.1%)	6 (22.2%)	
Postgraduate	3 (13.1%)	1 (3.7%)	
<b>Economic status, n (%)</b>			
Low	5 (21.7%)	4 (14.8%)	.252
Moderate	11 (47.8%)	19 (70.4%)	
High	7 (30.4%)	4 (14.8%)	
<b>Residence</b>			
Rural	10 (43.5%)	11 (40.7%)	.845
Urban	13 (56.5%)	16 (59.3%)	

This table showed that basic characteristics were comparable in both group but without statistically significant difference ( $P>0.05$ )

**Table (2): Wechsler Intelligence Scale for children and Full-Scale Intelligence Quotient of Wechsler Intelligence Scale of studied children.**

	<b>Breastfed (n=23)</b>	<b>Non-breastfed (n=27)</b>	<b>P</b>
<b>Verbal Comprehension Index</b>			<b>.044</b>
Mean ± SD	94.96 ± 6.68	90.74 ± 7.56	
Range	86 – 110	77 – 104	
<b>Perceptual Reasoning Index</b>			.151
Mean ± SD	83.26 ± 8.51	79.78 ± 8.35	
Range	69 – 100	64 – 96	
<b>Working Memory Index</b>			.319
Mean ± SD	91.7 ± 8.61	89.67 ± 5.51	
Range	76 – 106	74 – 101	
<b>Processing Speed Index</b>			.153
Mean ± SD	79.3 ± 8.82	76.1 ± 7.29	
Range	65 – 96	62 – 90	
<b>Full-Scale IQ</b>			<b>.005</b>
Mean ± SD	88.39 ± 6.42	82.63 ± 7.15	
Range	75 – 99	64 – 92	

Table (2) showed Verbal Comprehension Index and Full-Scale Intelligence were significantly higher among breastfed children ( $P<0.05$ ). However, perceptual reasoning index, working memory index, and processing speed index were higher among breastfed children but without statistically significant difference ( $P>0.05$ )

**Table (3): Association between breastfed and Wechsler Intelligence Scale score**

	OR	S.E.	Sig.	95% C.I.	
				Lower	Upper
Verbal Comprehension Index	.913	.058	<b>.031*</b>	.815	1.023
Perceptual Reasoning Index	.902	.048	.118	.821	.991
Working Memory Index	1.021	.058	.722	.911	1.145
Processing Speed Index	.911	.048	.053	.828	1.001
Full Scale IQ	.840	.066	<b>.008*</b>	.738	.956

OR: Odd Ratio. CI: Confidence interval. SE: standard error.

This table showed breastfeeding is significantly associated with higher Verbal Comprehension Index and full-scale IQ.

## **Discussion**

This cross-sectional study was conducted in pediatric clinics at Al-Azhar University Hospitals. This study was conducted on 50 children. All patients were divided into 2 groups: Breastfed group (n=23) and non-breastfed group (n=27).

All children in breastfed group have been got exclusive breast milk for 6 months with adding complementary food from 6 months until at least 12 months of age

All the 50 children participate in our study going to national schools in Cairo, Egypt and they are either at primary or secondary school according to their age

About the study's breastfed children's demographics. 13 cases, or 56.5% of the total population, were men. Children in the study cohort varied in age from 6 to 12, with a mean age and standard deviation of 7.96 1.55. Mothers' ages in the research population varied from 27 to 34, with a mean and SD of 30.57 and 1.81, respectively. There were 5 patients (21.7%) in the study population with low income.

As well as the demographic details of the research non-breastfed children. 16 patients, or 59.3% of the study group, were men. The study cohort included children aged 6 to 13; the mean age standard deviation was 8.56 1.81. Mothers' ages in the research population varied from 26 to 36, with a mean and SD

of 31.11 and 2.04, respectively. In the study population, there were 4 patients with low income levels (14.8%).

Verbal Comprehension in the breastfeeding group varied from 86 to 110, with a mean and standard deviation of 94.96 and 6.68 respectively. The range of Perceptual Reasoning in the sample population was 69–100, with a mean and standard deviation of 83.26–8.51. With a mean and standard deviation of 91.7 and 8.61, working memory in the study sample varied from 76 to 106. Processing Speed in the study population was 65–96, with a mean and standard deviation of 79.3–8.82. With a mean and standard deviation of 88.39 and 6.42, full-scale intelligence in the research population varied from 75 to 99.

In the non-breastfed group we found that Verbal Comprehension in the study population ranged from 77 to 104 with mean  $\pm$  SD = 90.74  $\pm$  7.56. Perceptual Reasoning in the study population ranged from 64 to 96 with mean  $\pm$  SD = 79.78  $\pm$  8.35. Working Memory in the study population ranged from 74 to 101 with mean  $\pm$  SD = 89.67  $\pm$  5.51. Processing Speed in the study population ranged from 62 to 90 with mean  $\pm$  SD = 76.1  $\pm$  7.29. Full-Scale IQ in the research sample varied from 64 to 92, with a mean and SD of 82.63 and 7.15, respectively.

(Lopez et al., 2021) argued that conflicting research on both positive and insignificant

impacts of breastfeeding on children's cognitive development. Factors related to breastfeeding, particularly the socioeconomic status and intelligence of the mother, may complicate a relationship. [6]

(Mychaleckyj et al., 2018) was that the hypothesised interaction effect of FADS2 and breastfeeding on IQ was not supported and that the reported benefits of breastfeeding on IQ represent differential likelihood of breastfeeding as a function of parental education. Current understanding of genotype-phenotype interactions generally suggests that, if there is a genetic propensity for some infants to benefit more from breastfeeding, it is likely polygenic, but additional research would be required to validate this. So, it may be inferred that breastfeeding may have a marginal impact on IQ, but that impact may be mitigated by confounding variables such as maternal intellect. [7]

However, a meta-analysis of prospective studies looking into the relationship between breastfeeding and IQ in 2006 found 431 references and a combined sample size of 5,475 kids. The research group concluded that breastfed had no significant effect on intelligence. [8]

However, a recent systematic review and meta-analysis that included 17 trials and a total of 17,046 healthy breastfed infants was published in 2015. Of these infants, 13,889 (81.5%) participated for 6.5 years. In both children and adolescents, IQ performance was favourably correlated with breastfeeding. Average participants who were breastfed had more high IQ participants than non-breastfed participants. [9] And these results line up with the conclusions of our investigation.

## **Conclusion**

This is comparative study compare the intelligence quotient between breastfed and non-breastfed children. We concluded that there was significant relation between high IQ on Wechsler Intelligence Scale and breastfed children.

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