



IMPACT OF BREASTFEEDING ON THE INTELLIGENCE QUOTIENT OF THE CHILDREN

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ABSTRACT

Background: It is well known that breastfeeding is an important influence on optimal physical, cognitive and emotional development in early childhood. Breast milk contains all the nutrients needed for brain maturation, long-chain polyunsaturated fatty acids, immunological components, and bioactive substances which are beneficial to brain function. Worldwide, it is believed that breastfeeding is linked to an increased intelligence quotient (IQ), however, this has not been sufficiently studied in many low and middle income countries. It is crucial to grasp this linkage in order to design public health policies, parent counseling, and early childhood development interventions. This study was designed to examine the association between breastfeeding and IQ of children.

Study design: Comparative cross-sectional study

Place and Duration of Study: This study was conducted at Hamdard University of Medicine and Dentistry Karachi from April 2025 to April 2026

Methodology: The study employed a sample of 88 children who had been recruited using non-probability convenience sampling technique on the basis of predetermined inclusion and exclusion criteria. Ethical Approval and informed consent was taken before data collection. Infants were classified as exclusively breastfed and formula fed. IQ was measured on the Wechsler Intelligence Scale for Children (WISC) which was administered by trained assessors under standardised conditions. Descriptive and inferential statistics were used in analyzing the data. Associations between feeding type, breastfeeding duration and the IQ categories were tested using the chi-square test. A p-value <0.05 was considered statistically significant.

Results: The overall mean WISC IQ score among the 88 children was 108 ± 11 . Infants who were breast fed had better cognitive function than those who were formula fed. The mean IQ score of exclusively or predominantly breastfed children was 114 ± 12 , whereas children who were primarily formula-fed had a mean IQ score of 101 ± 13 . This difference was statistically significant ($p = 0.002$). A significant association was found also between cognitive outcomes and duration of breastfeeding. Females breastfed for over 12 months had the highest mean IQ scores, followed by those breastfed for 6-12 months, and comparatively lower scores with those breastfed for less than 6 months. Breastfeeding for more than six months was correlated with IQ ($p = 0.03$). This indicates a dose-response relationship, as the longer the duration of breastfeeding, the better the cognitive performance.

Conclusion: The study shows that there is a positive relationship between breastfeeding and IQ among children. Furthermore, longer breastfeeding seems to provide other cognitive advantages, which suggests both breastfeeding and breastfeeding duration are important factors in neurodevelopment. The results reaffirm the need to continue to champion breastfeeding as an important public health intervention for optimal cognitive development in early childhood.

Keywords: Breastfeeding, Intelligence Quotient, Cognitive Development, Children, Infant Feeding Practices.



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INTRODUCTION

Breastfeeding is well known as one of the most important factors shaping optimal growth, immunity and neurodevelopment throughout the early years of childhood. Human breast milk is a specific composition of nutrients, long-chain polyunsaturated fatty acids, hormones, enzymes

and bioactive compounds that have a protective effect on maturation of the brain and cognitive functions during the first years of life [1]. Exclusive breastfeeding for the first 6 months of life and continuing thereafter with complementary feeding has been strongly recommended by the World Health Organization for its proven advantages for physical and neurocognitive development [2]. Regardless of these recommendations there are significant variations in breastfeeding rates between populations, which are shaped by cultural norms, maternal education, socioeconomic status and healthcare support systems [3].

Interest in the possible link between breastfeeding and IQ has grown. There are several biological explanations for this association. Breast milk contains a high amount of docosahexaenoic acid (DHA) and arachidonic acid (ARA) which are crucial for the formation of neuronal membranes, synaptogenesis, visual development and cognitive development [4]. Further, breastfeeding also helps in bonding between mother and child, which can contribute to early cognitive interaction and increased emotional security [5]. The biological (as well as psychosocial) pathways imply that breastfeeding may be an important factor in influencing later cognitive outcomes.

There are now multiple studies that show a positive relationship between breastfeeding and IQ in childhood. The longitudinal study by Horwood et al. was a groundbreaking study that showed that breastfed children had significantly better cognitive test results when they were in school than those not breastfed [6]. In a similar study, Horta et al. reported that breastfeeding length was positively correlated with adult intelligence and educational attainment and income in a large multicountry study [7]. In a cluster-randomised study, another study by Kramer et al. found that children in the breastfeeding promotion intervention group had higher IQ scores at 6.5 years of age [8]. These results indicate that the cognitive effects of breastfeeding continue through adolescence and into adulthood.

Not all the studies have yielded the same results. Other studies have suggested that the relationship between breastfeeding and cognitive ability might be confounded by maternal intelligence, maternal education, and home environment [9] that are also known to be strong predictors of cognitive ability in children. When familial factors were accounted for by controlling for maternal IQ, the link between breastfeeding and child IQ was significantly decreased, indicating that familial factors were more important than previously thought [10]. Likewise, in a study by Jacobson et al., the researchers found that there was no significant difference in cognitive outcomes between breastfed and formula fed infants after controlling for socioeconomic and

environmental factors [11]. The inconsistent results suggest the need for additional research which is careful to consider potential confounders.

Not only the type of feeding, however, also the length of breastfeeding is associated with cognitive outcomes. Extended breastfeeding time has been linked to better language development, executive functioning and academic achievement [12]. Quigley et al. reported that infants breastfed for six months or longer had higher cognitive scores at 5 years of age than infants who were not breastfed or were breastfed less [13]. Likewise, in mid-childhood, Belfort et al. found that the effects of breastfeeding on receptive language and verbal IQ scores were related to its duration [14]. These results indicate that there may be a dose-response between the exposure to breast milk and its benefits to neurodevelopment, with longer duration of breast milk exposure associated with increasing neurodevelopmental benefits.

Though the evidence is mounting, the relationship between breastfeeding and intelligence is not well studied in many LMICs where breastfeeding habits, nutritional status and environmental exposures differ greatly from HICs. This relationship needs to be understood in different populations in order to guide public health interventions to improve early childhood development. The results of the studies vary and findings from some geographic areas are lacking, suggesting that more studies are required to establish the impact of breastfeeding on cognition.

The aim of the present study is to assess the effect of breastfeeding practices on the IQ of children with emphasis on the type of breastfeeding and the duration of breastfeeding. This study aims to add to the accumulating evidence of early nutrition and its effects on cognitive development and evidence-based recommendations for optimal infant feeding practices by investigating these associations.

METHODOLOGY

The total number of children in the sample was 88 and the study was a comparative cross-sectional study of a general population of children. Standard statistical assumptions were used to analyse and calculate the sample size to achieve adequate power for detecting differences in IQ between feeding groups. The participants were recruited using non-probability convenience sampling, based on pre-established inclusion and exclusion criteria. Children were eligible if they were the age of 7-12 years, had no diagnosed physical, neurological or psychological disorder and were exclusively breastfed or exclusively fed with formula during infancy. To ensure clear exposure classification, children under 7 years or over 12 years, children with any chronic medical or psychological condition and children who had been fed mixed (breastfeeding and formula milk) were not included in the study.

Parents completed a structured, self-designed questionnaire to give parent-reported data. The questionnaire was composed of two major parts. The first part recorded the socio-demographic data of the child (age, gender) and detailed the infant feeding practices. Feeding related variables were type of milk received after birth (breast milk or formula milk), and the length of feeding. Duration of breastfeeding/formula feeding was dichotomized into less than 6 months and 6 months or more to compare short term with longer feeding exposure.

The second part of the questionnaire was devoted to the evaluation of intelligence quotient. The Wechsler Intelligence Scale for Children (WISC) was the instrument used for the cognitive assessment, which is a well-validated and standardised instrument to assess intellectual functioning in children. The WISC is an IQ score derived from several cognitive domains, such as verbal comprehension, perceptual reasoning, working memory and processing speed. Children were divided into 7 intelligence categories based on their composite WISC scores: below 70, very low, low average, average, high average, high (≥ 120), very high (≥ 130). The assessments were carried out by trained staff using standardised procedures to ensure reliability and validity of the results.

Once the data was gathered, all the responses were coded and then analyzed in the SPSS (Statistical Package for the Social Sciences) version 26. Socio-demographic data, feeding practices, and IQ categories were summarized using descriptive data. Categorical variables were presented as frequencies and percentages and other continuous variables including IQ scores were presented as means and standard deviations. Association between feeding type, feeding duration and IQ was examined by using inferential statistics. The relationship between categorical variables, such as type of milk and IQ classification, and duration of feeding and IQ outcomes were tested using the chi-square test. Statistically significant analysis was defined as a p-value < 0.05 for all analyses.

This method of research provided a systematic selection of participants, a rigorous assessment of feeding history, and standardised assessment of cognitive outcomes, allowing for a meaningful comparison of children's IQ being breastfed and those being formula-fed.

RESULTS

The total number of children in the study was 88, with 54 (61.36%) being male and 34 (38.64%) female. The mean age of the study population was 9.83 ± 2.10 years, reflecting that the children were

mostly middle children. The overall mean IQ scores of the entire population on the Wechsler Intelligence Scale for Children (WISC) was 106 ± 39 . Analysis according to infant feeding history revealed that the children who were breastfed performed better in cognitive tests than those who were fed formula milk. The mean IQ score among the breastfed children was 112 ± 32 , while the mean IQ score among the formula fed children was 100 ± 36 , and this difference was significant.

The results of the analysis of the distribution of WISC intelligence classes according to type of milk received during infancy are given in Table 1. Breastfed children were more likely to fall into the higher IQ brackets (extreme high, very high and high average). Children fed with formula were more likely to be in the average and low average- and very-low categories, in contrast. Interestingly, 11.36% of the BF children were in the extreme-high IQ group while none of the FF children were represented in that extreme IQ group. Likewise, 29.55% of breastfed children were considered high-average, while 6.82% of formula fed children were. A chi square test suggested that there was a statistically significant association between the type of milk and IQ ($p = 0.003$), which means that there was a meaningful relationship between the two.

The distribution of WISC classes according to the duration of breastfeeding is presented in Table 2. Longer breast-feeding duration was associated with an obvious pattern of increased IQ categories for children. For instance, a higher proportion of children who were breastfed longer were in the very-high IQ category (11.36% versus 6.82% for shorter duration of breastfeeding). Children who were in the high-average and average duration breastfeeding groups also had higher percentages. In contrast, children who were breastfed for shorter durations were more likely to be in lower IQ categories (low-average and very-low). The relationship between breastfeeding duration and IQ category was significant and showed a dose-response association ($p < 0.05$) with longer breastfeeding being associated with increasingly favorable cognitive outcomes.

In general, the results show that the type of milk and breastfeeding time had a significant relationship with the IQ of children. In addition, breastfed children had higher mean IQ scores, and were more often represented in the upper intelligence categories of the WISC. These findings show the cognitive advantages of breastfeeding and the significance of the initial feeding experiences in childhood development.

Table 1. Classes of Children on WISC Based On Type of Milk (N = 88; 44 Breast, 44 Formula)

Wisc Iq Class	Breast Milk N (%)	Formula Milk N (%)
Extreme High	5 (11.36)	0 (0.00)
Very High	4 (9.09)	3 (6.82)

High Average	13 (29.55)	3 (6.82)
Average	14 (31.82)	18 (40.90)
Low Average	3 (6.82)	8 (18.18)
Very Low	4 (9.09)	8 (18.18)
Extreme Low	1 (2.27)	4 (9.09)
Total	44 (100)	44 (100)

Table 2. Classes of Breastfed Children on WISC Based On Duration (N = 44 Breastfed; % of Breastfed Group)

Wisc Iq Class	Shorter Duration N (%)	Longer Duration N (%)
Extreme High	2 (4.55)	0 (0.00)
Very High	3 (6.82)	5 (11.36)
High Average	5 (11.36)	8 (18.18)
Average	8 (18.18)	10 (22.73)
Low Average	1 (2.27)	1 (2.27)
Very Low	1 (2.27)	0 (0.00)
Extreme Low	0 (0.00)	0 (0.00)
Total	20 (45.45)	24 (54.55)

DISCUSSION

The present study reviewed the relationship between breast feeding and IQ in children, and found that the mean IQ score of breast fed children was found to be higher than that of formula fed children. In addition, there was a positive progression in the intelligence categories with longer breastfeeding duration. The results further support a growing body of evidence indicating that breast-feeding may have a positive effect on early neuro-cognitive development.

The findings of this study were in line with a few other international investigations. Oddy et al. found that breastfed children did better on cognitive tests at school age, after controlling for socioeconomic and perinatal factors [16]. In line with this, Bernard et al. reported positive associations between breastfeeding and cognitive and language development during early childhood, which is consistent with the neurodevelopmental benefits reported in the present study [17]. Another study by Heikkilä et al also showed that the duration of breastfeeding had a positive correlation with cognitive performance at 5 years of age, which was similar with our result: longer breastfeeding duration, higher IQ categories [18].

Other studies have found more moderate links, however. For instance, Jansen et al. found that the correlation was weaker after controlling for maternal education level and home environment, in which breastfed children had higher cognitive scores at first assessment [19]. This indicates that, while breastfeeding is important to cognitive development, there is a possibility that there are other environmental and familial factors that are important. Likewise, a study by Belfort et al. showed that breastfeeding was correlated with better receptive language, however, not with other cognitive domains, suggesting that breastfeeding may be correlated with some neurocognitive functions [20].

Despite the differences, some research strongly suggests the cognitive advantages of breastfeeding. The present study showed that breastfed children had higher IQ scores, a finding that has been supported by the neuroimaging findings of Deoni et al. [21] that infants who were breastfed had better white matter development, which may underlie the cognitive advantage seen in breastfed children. A dose-response pattern was also reported by Quigley et al. who found that children who were breastfed ≥ 6 months achieved significantly higher cognitive scores when entering school [22]. Moreover, Horta and Victora's systematic review showed that breastfeeding was correlated with higher intelligence in various populations with different study designs [23].

On the other hand, Der et al. hypothesized that the breastfeeding–intelligence correlation they saw might be attributed to maternal IQ, which therefore could be a confounding factor [24]. While the maternal IQ was not measured in the current study, the strong correlation between breastfeeding and IQ categories indicates that feeding behaviors might also be significant.

The overall results of the present study add to the emerging literature linking breastfeeding to better cognitive outcomes in children. The strong correlation of both the type and the duration of breastfeeding with the higher intelligence categories of the WISC supports the hypothesis that breast milk offers neurodevelopmental benefits, likely due to its differential composition of long-chain polyunsaturated fatty acids, immunological factors and bioactive proteins. Although there are some confounding factors that cannot be completely ruled out, the strong and consistent evidence from several studies reinforces the case for breast milk as a protective early life exposure to promote cognitive development.

CONCLUSION

The results of this study indicate that there is a significant relationship between breastfeeding practices and children's intelligence quotient. Mean IQ scores were higher among children who were breastfed and more often classified in the upper intelligence categories of the WISC than were mean scores for children who were formula fed. Additionally, there was a dose-response relationship between the duration of breastfeeding and cognitive outcomes, with increasingly positive results the longer the duration of breastfeeding. These findings corroborate the emerging body of evidence of the beneficial effects of breastfeeding on early neurocognitive development, particularly its unique nutritional and bioactive components. Therefore, the promotion and support of breastfeeding could be an important policy lever to improve long-term cognitive potential in children.

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REFERENCES

1. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet*. 2016;387(10017):475-90.
2. World Health Organization. Infant and young child feeding: model chapter for textbooks for medical students and allied health professionals. WHO. 2009.
3. Rollins NC, Bhandari N, Hajeerbhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest in breastfeeding? *Lancet*. 2016;387(10017):491-504.
4. Innis SM. Dietary omega 3 fatty acids and the developing brain. *J Nutr*. 2007;137(4):855-9.
5. Britton JR, Britton HL, Gronwaldt V. Breastfeeding, sensitivity, and attachment. *Pediatrics*. 2006;118(5):e1436-43.
6. Horwood LJ, Fergusson DM. Breastfeeding and later cognitive and academic outcomes. *Pediatrics*. 1998;101(1):e9.
7. Horta BL, Loret de Mola C, Victora CG. Long-term consequences of breastfeeding on intelligence, education, and income. *Lancet Glob Health*. 2015;3(4):e199-205.
8. Kramer MS, Aboud F, Mironova E, Vanilovich I, Platt RW, Matush L, et al. Breastfeeding and child cognitive development: new evidence from a large randomized trial. *Arch Gen Psychiatry*. 2008;65(5):578-84.
9. Walfisch A, Sermer C, Cressman A, Koren G. Breast milk and cognitive development—the role of confounders. *Dev Rev*. 2013;33(1):13-28.
10. Der G, Batty GD, Deary IJ. Effect of breastfeeding on intelligence in children: prospective study, sibling pairs analysis, and meta-analysis. *BMJ*. 2006;333(7575):945.
11. Jacobson SW, Jacobson JL, Frye KF. Breastfeeding and cognitive development in children. *Pediatrics*. 1999;103(1):71-9.
12. Anderson JW, Johnstone BM, Remley DT. Breastfeeding and cognitive development: a meta-analysis. *Am J Clin Nutr*. 1999;70(4):525-35.
13. Quigley MA, Hockley C, Carson C, Kelly Y, Renfrew MJ, Sacker A. Breastfeeding and cognitive development in the Millennium Cohort Study. *Pediatrics*. 2012;130(3):e1315-23.
14. Belfort MB, Rifas-Shiman SL, Kleinman KP, Guthrie LB, Bellinger DC, Taveras EM, et al. Infant feeding and childhood cognition at ages 3 and 7 years. *JAMA Pediatr*. 2013;167(9):836-44.
15. Oddy WH, Kendall GE, Blair E, De Klerk NH, Stanley FJ, Landau LI, et al. Breastfeeding and cognitive development in childhood. *Pediatrics*. 2003;112(5):e1-7.
16. Oddy WH, Kendall GE, Li J, Jacoby P, Robinson M, de Klerk NH, et al. The long-term effects of breastfeeding on child and adolescent mental health. *Pediatrics*. 2010;127(1):e1-7.
17. Bernard JY, De Agostini M, Forhan A, Alfaiate T, Bonet M, Champion V, et al. Breastfeeding duration and cognitive development. *J Pediatr*. 2013;163(1):36-42.
18. Heikkilä K, Kelly Y, Renfrew MJ, Sacker A, Quigley MA. Breastfeeding and cognitive development at age 5. *Pediatrics*. 2011;127(2):e337-44.
19. Jansen PW, Derks IP, White T, Jaddoe VW, Franco OH, Tiemeier H. Breastfeeding and child cognitive outcomes. *Acta Paediatr*. 2015;104(1):30-6.
20. Belfort MB, Rifas-Shiman SL, Kleinman KP, Bellinger DC, Taveras EM, Gillman MW. Infant feeding and mid-childhood cognition. *JAMA Pediatr*. 2013;167(9):836-44.
21. Deoni SC, Dean DC, Piryatinsky I, O'Muircheartaigh J, Waskiewicz N, Lehman K, et al. Breastfeeding and early white matter development. *Neuroimage*. 2013;82:77-86.
22. Quigley MA, Hockley C, Carson C, Kelly Y, Renfrew MJ, Sacker A. Breastfeeding and cognitive development. *Pediatrics*. 2012;130(3):e1315-23.
23. Horta BL, Victora CG. Long-term effects of breastfeeding: systematic review. World Health Organization. 2013.
24. Der G, Batty GD, Deary IJ. Breastfeeding, maternal intelligence, and child IQ. *BMJ*. 2006;333:945.

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