

THE RELATIONSHIP BETWEEN A HISTORY OF PRETERM BIRTH AND THE PREVALENCE OF INTELLECTUAL DISABILITY AMONG CHILDREN AT SPECIAL SCHOOLS IN MAKASSAR CITY

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ABSTRACT

Background: Intellectual disability is a neurocognitive developmental disorder that can be influenced by various perinatal factors, one of which is a history of preterm birth. Preterm birth risks disrupting the maturation of brain structure and function, thus impacting a child's intellectual abilities. This study aimed to analyze the relationship between a history of preterm birth and intellectual disability among children attending Special Schools in Makassar City.

Methods: This study employed an analytical observational cross-sectional design and was conducted from December 2025 to January 2026 at SLB Negeri 1 Makassar City and SLB C Yayasan Pembina Pendidikan Luar Biasa (YPPLB) Makassar City. A total of 82 respondents were selected using purposive sampling. Birth history was obtained through interviews with parents, while the level of intellectual disability was obtained from school documents. Analysis was performed using the Chi-Square test.

Results: Most respondents had no history of preterm birth (76.8%), while the majority of children had moderate intellectual disabilities (39.0%). Chi-square analysis demonstrated a significant relationship between a history of preterm birth and the prevalence of intellectual disability in children ($p=0.019$).

Conclusion: A history of preterm birth is significantly associated with the prevalence of intellectual disability in children at special schools in Makassar City. This finding highlights the importance of addressing perinatal factors as part of early detection and prevention efforts for developmental disorders.

Keywords: Preterm birth, intellectual disability, children, special school, children with special needs

INTRODUCTION

Intellectual disability (ID) is a neurodevelopmental disorder characterized by significant limitations in intellectual functioning and adaptive behavior that affect the conceptual, social, and practical skills needed for daily living. This disorder develops before age 18 and can impair learning, communication, social interaction, and independent functioning. Intellectual disability is caused by a complex interaction between genetic and environmental factors that occurs during the prenatal, perinatal, and

postnatal periods. Consequently, children with intellectual disabilities require comprehensive medical, educational, and psychosocial support to optimize their quality of life and developmental outcomes¹⁻³.

Among the environmental factors, perinatal conditions play an important role because they occur during a critical period of brain development. One major perinatal risk factor is preterm birth, defined as birth before 37 weeks of gestation. Preterm birth disrupts normal fetal brain maturation during the third trimester, when neuronal proliferation, synaptogenesis, cortical organization, and

myelination occur rapidly. As a result, preterm infants are more susceptible to structural and functional brain abnormalities that can lead to long-term neurodevelopmental disorders, including intellectual disability⁴⁻⁶.

Preterm birth remains a major public health problem worldwide. According to the World Health Organization (WHO), approximately 13.4 million babies were born preterm in 2020, representing nearly one in every ten live births globally. Indonesia also has a relatively high burden of preterm birth, which contributes substantially to neonatal morbidity and mortality, as well as long-term developmental impairment. Several studies have demonstrated that children born preterm are more likely to experience cognitive impairment and intellectual disability than children born full-term, and the risk increases with decreasing gestational age⁷⁻¹¹.

Previous studies have consistently reported a relationship between preterm birth and poor neurodevelopmental outcomes. Yin et al. demonstrated that decreased gestational age was associated with an increased risk of intellectual disability. Similarly, Leonard et al. identified prematurity as a key biological determinant of intellectual disability through a systematic review. However, evidence from Indonesia remains limited, particularly among school-aged children with a confirmed diagnosis of intellectual disability attending special schools (SLB). Furthermore, data on this association in Makassar City are scarce, indicating the need for further research in the local population^{5,6,12,14}.

Therefore, this study aimed to analyze the relationship between a history of preterm birth and the development of intellectual disability among children attending special schools in Makassar City. The findings of this study are expected to provide scientific evidence regarding the contribution of prematurity to intellectual disability and support early identification of perinatal risk factors, prevention strategies, and interventions to improve neurodevelopmental outcomes in children.

METHODS

This study was an analytical observational study with a cross-sectional approach that aimed to analyze the relationship between a history of preterm birth and the prevalence of intellectual disability in children at Public Elementary Schools (SLB) in Makassar City. This study was conducted from December 2025 to January 2026 at SLB Negeri 1 Makassar City and SLB C Yayasan Pembina Pendidikan Luar Biasa (YPPLB) Makassar City. This study has obtained ethical approval from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Alauddin State Islamic University Makassar with Number 149/KEPK/FKIK/XII/2025.

The target population in this study was all children with intellectual disabilities attending Special Schools

(SLB) in Makassar City. The accessible population was all children with intellectual disabilities enrolled as students at SLB Negeri 1 Makassar City and SLB C Yayasan Pembina Pendidikan Luar Biasa (YPPLB) Makassar City during the study period.

Participants were selected using purposive sampling based on predefined inclusion and exclusion criteria. Inclusion criteria included children aged 7–14 years, diagnosed with intellectual disability based on school documents or a doctor's certificate, enrolled as active students at the school studied, and having a parent or guardian willing to be a respondent and provide information about the child's birth history. Exclusion criteria included children diagnosed with a genetic syndrome or chromosomal abnormality known to be associated with intellectual disability, children with a history of severe head trauma, and respondents with incomplete birth history data.

The sampling process began with obtaining a list of students meeting the criteria from each school. Next, screening was conducted based on inclusion and exclusion criteria. Parents or guardians of students who met the criteria were contacted to obtain consent to participate in the study, and interviews were conducted regarding the child's birth history. After the entire selection process was completed, 82 children who met the criteria were selected and included in the study sample.

Data on preterm birth history were obtained through structured interviews with parents or guardians using an interview sheet prepared by the researchers. Birth history was categorized as preterm if the gestational age at delivery was less than 37 weeks and non-preterm if the gestational age was 37 weeks or more. Data on the level of intellectual disability were obtained from school documents, including medical examinations and diagnoses, and then classified as mild, moderate, and severe intellectual disability.

Data analysis was performed using Statistical Package for the Social Sciences (SPSS 29). Univariate analysis was used to describe respondent characteristics in the form of frequency distributions and percentages. The relationship between a history of preterm birth and the prevalence of intellectual disability was analyzed using the Chi-Square test, with a p-value <0.05 considered to indicate a statistically significant relationship.

RESULTS

This study involved 82 children with special needs attending SLB Negeri 1 Makassar City and SLB C YPPLB Makassar City. The following table shows the distribution of respondent characteristics based on age, gender, grade level, number of students, history of preterm birth, and type. Based on the results of univariate analysis, respondent characteristics include distribution by school and level of intellectual disability. The distribution of respondent characteristics is presented in Table 1.

Table 1. Distribution of characteristics of research respondents at SLB Negeri 1 Makassar and SLB C YPPLB Makassar City

Characteristics	SLBN 1 Makassar		SLB C YPPLB	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Age				
7 Years	5	10.6	1	2.9
8 Years	10	21.3	3	8.6
9 Years	6	12.8	5	14.3
10 Years	8	17	4	11.4
11 Years	8	17	3	8.6
12 Years	6	12.8	10	28.6
13 Years	3	6.4	8	22.9
14 Years	1	2.1	1	2.9
Gender				
Male	26	55.3	22	62.9
Female	21	44.7	13	37.1
Grade Level				
Grade 1	6	12.8	6	17.1
Grade 2	10	21.3	5	14.3
Grade 3	5	10.6	8	22.9
Grade 4	10	21.3	6	17.1
Grade 5	7	14.9	5	14.3
Grade 6	9	19.1	5	14.3
Number of Students	47	57.3	35	42.7

A total of 47 respondents (57.3%) came from SLB Negeri 1 Makassar and 35 respondents (42.7%) came from SLB C YPPLB Makassar City. Based on age group, respondents at SLB Negeri 1 Makassar were mostly 8 years old (21.3%), while at SLB C YPPLB Makassar City the majority were 12 years old (28.6%). Based on gender, most respondents at both schools were

male, namely 26 children (55.3%) at SLB Negeri 1 Makassar and 22 children (62.9%) at SLB C YPPLB Makassar City. Based on grade level, the distribution of respondents was spread across all elementary school grade levels.

Table 2. Distribution of Birth History of Research Respondents at SLBN 1 Makassar and SLB C YPPLB Makassar City

Birth History	SLBN 1 Makassar		SLB C YPPLB	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Preterm	10	21,3	9	25.7
Not Preterm	37	78,7	26	74.3
Total	47	100	35	100

Table 2 presents the distribution of birth histories of children with intellectual disabilities at SLB Negeri 1 Makassar and SLB C YPPLB Makassar City. The results of the univariate analysis indicate that at SLB Negeri 1 Makassar, the majority of respondents did not have a history of preterm birth (78.7%), while the remainder

did (21.3%). Meanwhile, at SLB C YPPLB Makassar City, the majority of respondents also did not have a history of preterm birth (74.3%), and 25.7% of respondents did have a history of preterm birth.

Table 3. Distribution of Types of Intellectual Disabilities of Research Respondents at SLBN 1 Makassar and SLB C YPPLB Makassar City

Intellectual Disability	SLBN 1 Makassar		SLB C YPPLB	
	Frequency	Percentage	Frequency	Percentage
	(n)	(%)	(n)	(%)
Mild	18	38.3	13	37.1
Moderate	17	36.2	15	42.9
Severe	12	25.5	7	20
Total	47	100	35	100

Table 3 presents the distribution of intellectual disability levels at SLB Negeri 1 Makassar, where the mild intellectual disability category is the most common (38.3%), followed by the moderate intellectual disability category (36.2%) and the severe intellectual disability

category (25.5%). Meanwhile, at SLB C YPPLB Makassar City, moderate intellectual disability is the most common (42.9%), followed by the mild intellectual disability category (37.1%) and the severe intellectual disability category (20.0%).

Table 4. The Relationship between History of Preterm Birth and the prevalence of Intellectual Disabilities at SLBN 1 Makassar and SLB C YPPLB Makassar City

History of preterm birth	Intellectual Disabilities			Total	p-value
	Mild	Moderate	Severe		
Yes	12	6	1	19	0.019
No	19	26	18	63	
Total	31	32	19	82	

These findings indicate that children with a history of preterm birth tended to have a different

distribution of intellectual disability severity compared with those born at term. Table 4 presents a statistical analysis of the relationship between a history of preterm birth and the prevalence of intellectual disability in children at the Makassar City Special School (SLB). According to the table, of the 19 children with a history of preterm birth, the majority (12) had mild intellectual disability, followed by 6 with moderate intellectual disability, and 1 with severe intellectual disability. Meanwhile, of the 63 children without a history of preterm birth, the majority (26) had moderate intellectual disability, followed by 19 with mild intellectual disability, and 18 with severe intellectual disability.

These findings suggest that the distribution of intellectual disability differed significantly according to the history of preterm birth. The chi-square test showed a p-value of 0.019 ($p < 0.05$), indicating a significant relationship between a history of preterm birth and the prevalence of intellectual disability in children at the Makassar City Special School (SLB).

DISCUSSION

This study showed a significant relationship between a history of preterm birth and the prevalence of intellectual disability in children at Makassar City Special Schools ($p = 0.019$). These findings suggest that preterm birth is an important perinatal factor associated with intellectual

disability among children at Special Schools in Makassar City. These results support the hypothesis that prematurity is a perinatal risk factor contributing to impaired neurocognitive development in children¹⁵.

In addition to demonstrating a link between preterm birth and intellectual disability, the study also found that the majority of respondents were male. This finding aligns with various studies reporting a higher prevalence of neurological developmental disorders, including intellectual disability, in males compared to females. Biologically, males have only one X chromosome, making them more susceptible to mutations in genes related to cognitive development. In contrast, females have two X chromosomes, which may provide a compensatory mechanism for some genetic disorders. In addition to genetic factors, differences in neurological development, emotional regulation, and adaptive behavior are also thought to contribute to the higher prevalence of intellectual disability in males¹⁶⁻¹⁸.

The relationship between a history of preterm birth and intellectual disability found in this study is biologically plausible. Most brain maturation processes occur during the third trimester of pregnancy, including neuron proliferation, synapse formation, axon myelination, and the development of white matter and the cerebral cortex. In infants born before 37 weeks' gestation, these processes are incomplete, and the immature central nervous system must adapt to the extrauterine environment. This preterm adaptation increases the risk of white matter injury, intraventricular hemorrhage, hypoxia, inflammation, and impaired neuronal connectivity, which can ultimately impair the child's intellectual development^{11,19,20}.

The findings of this study are consistent with a population-based cohort study by Yin et al., which reported that the risk of intellectual disability increases progressively with decreasing gestational age. The highest risk was found in infants born very preterm (<28 weeks), but an increased risk was also observed in infants born near term. These results suggest that each decrease in gestational age impacts the child's neurological development¹¹.

The results of this study also align with a systematic review by Leonard et al., which identified prematurity as a major biological determinant of intellectual disability in children. The review further concluded that the relationship between prematurity and intellectual disability is consistent across populations, although the risk is influenced by other factors such as low birth weight, neonatal complications, maternal age, socioeconomic status, and quality of healthcare during pregnancy²¹.

However, the results of this study also indicate that not all children with a history of preterm birth experience more severe intellectual disabilities. Most of the preterm children in this study actually fell into the category of mild intellectual disabilities. These findings suggest that intellectual disability is a multifactorial condition influenced not only by gestational age at birth but also by genetic factors, neonatal complications, birth weight, nutritional status, quality of developmental stimulation, family environment, parental education, and socioeconomic conditions. These factors were not analyzed in this study and therefore may still play a role as confounding factors in the associations found^{21,22}.

The differences in the distribution of intellectual disability rates between preterm and non-preterm infants also indicate that prematurity is not the sole cause of intellectual developmental disorders. Children born at term can still experience intellectual disability due to prenatal factors, such as chromosomal abnormalities, intrauterine infection, exposure to teratogens, or postnatal factors such as head trauma, malnutrition, or lack of developmental stimulation. Therefore, the results of this study should be interpreted as an relationship between a history of preterm birth and intellectual disability, not as a causal relationship²³.

This study has several limitations. First, the cross-sectional design does not allow researchers to determine a causal relationship between a history of preterm birth and the prevalence of intellectual disability. Second, information on birth history was obtained through interviews with parents, which is potentially subject to recall bias. Third, the study did not control for other factors that could potentially influence the prevalence of intellectual disability, such as birth weight, neonatal complications, quality of antenatal care, maternal illness during pregnancy, or genetic factors. Therefore, studies with prospective cohort designs or longitudinal studies are needed to more comprehensively evaluate this relationship.

Despite several limitations, this study provides local evidence on the relationship between a history of preterm birth and the prevalence of intellectual disability in children in Makassar City. These findings have important implications for clinical practice and public health, particularly in efforts to prevent preterm birth through improving the quality of antenatal care, early detection of high-risk pregnancies, and ongoing growth and development monitoring in children with a history of preterm birth. Early intervention is expected to reduce long-term impacts on cognitive development and improve children's quality of life.

CONCLUSION AND RECOMMENDATION

This study demonstrated a significant relationship between a history of preterm birth and intellectual disability among children at Special Schools in Makassar City. The findings indicate that a history of preterm birth is one of the perinatal factors associated with intellectual disability. Therefore, greater attention should be given to perinatal factors as part of efforts to prevent developmental disorders in children.

Therefore, it is necessary to increase efforts to prevent preterm birth through optimal antenatal care, early detection of high-risk pregnancies, and health education for pregnant women. In addition, children with a history of preterm birth need to receive regular monitoring of growth and neurocognitive development and appropriate early intervention to optimize development and minimize long-term impacts. Further research is recommended to consider other factors that potentially influence the prevalence of intellectual disability, such as birth weight, neonatal complications, genetic factors, nutritional status, and socioeconomic conditions.

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