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Determinants of Developmental Delay in the First 5 Years of Children

Determinantes del Retraso en el Desarrollo en los Primeros 5 Años de los Niños

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SUMMARY

Background: *Developmental delay is quite common in children, but the detection of this disorder is still low. About 52.9 million children younger than five years were diagnosed with developmental delays worldwide. This study aimed to analyse the determinant of developmental delay in the first five years of children in Indonesia.*

Methods: *Analytical observation with a cross-sectional approach was used to identify developmental delay determinants in children aged 0-5 years. We applied total sampling to recruit 209 participants visiting clinical growth and developmental children in Malang, Indonesia. The sociodemographic and health-related factors were collected as variables. All data were analysed statistically using multivariate analysis with p>0.05.*

Results: *The total number of children who have been diagnosed with developmental delays is 52.15 %. From multivariate analysis, we found that several factors have been associated with the developmental delay in the first five years of children, namely being male (AOR=2.89; 95 % CI=1.46-5.72), children aged above two years (AOR=9.77; 95 % CI= 4.49-21.24), children who were born by caesarean section (AOR=5.01;95 % CI = 2.25-11.15), and children who were born to mothers age >35 years (AOR=4.42; 95 % CI= 1.79-10.90).*

Conclusion: *The present study has revealed four main factors related to developmental delays in the first five years of children, namely being male, younger children, the birth process, and younger mothers. To decrease the number of this disorder, a certain program related to child development should be considered to educate mothers, especially in primary healthcare services.*

Keywords: *Children, determinants, developmental delay.*

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RESUMEN

Antecedentes: *El retraso en el desarrollo es bastante común en los niños, pero la detección de este trastorno aún es baja. Alrededor de 52,9 millones de niños menores de cinco años fueron diagnosticados con retrasos en el desarrollo en todo el mundo. Este estudio tuvo como objetivo analizar el determinante*

del retraso en el desarrollo en los primeros cinco años de los niños en Indonesia.
Métodos: *Se utilizó la observación analítica con un enfoque transversal para identificar los determinantes del retraso en el desarrollo en niños de 0 a 5 años. Aplicamos un muestreo total para reclutar a 209 participantes que visitaron niños con desarrollo y crecimiento clínico en Malang, Indonesia. Se recogieron como variables los factores sociodemográficos y relacionados con la salud. Todos los datos se analizaron estadísticamente mediante análisis multivariado con p>0,05.*
Resultados: *El total de niños que han sido diagnosticados con retraso en el desarrollo es del 52,15 %. A partir del análisis multivariado, encontramos que varios factores se han asociado con el retraso en el desarrollo en los primeros cinco años de los niños, a saber, ser hombre (AOR = 2,89; IC 95 % = 1,46-5,72), niños mayores de dos años (AOR = 9,77 95 % IC= 4,49-21,24), niños nacidos por cesárea (AOR=5,01;95 % IC = 2,25-11,15), y niños nacidos de madres >35 años (AOR=4,42; 95 % IC = 1,79-10,90).*
Conclusión: *El presente estudio ha revelado cuatro factores principales relacionados con los retrasos en el desarrollo en los primeros cinco años de los niños, a saber, ser hombre, niños más pequeños, el proceso de nacimiento y madres más jóvenes. Para disminuir el número de este trastorno, se debe considerar un determinado programa relacionado con el desarrollo infantil para educar a las madres, especialmente en los servicios de atención primaria de salud.*

Palabras clave: *Niños, determinantes, retraso en el desarrollo.*

INTRODUCTION

Developmental delay defines as a condition when children fail to reach milestones that are caused by several domains, namely cognitive and performance, speech and language, gross and fine motor, psychological, sexual, and activities of daily living (ADL) (1-3). Although developmental delay is quite common in children, the detection of this disorder is still low (4,5).

Globally, there were 52.9 million children younger than five years, and 54 % of boys had a developmental disorder in 2016 (6,7) reduce the global maternal mortality ratio to less than 70 per 100 000 live births, 303 000 women died due to complications of pregnancy or childbirth in 2015. Almost all of these deaths occurred in low-and middle-income countries (99 %). About 95 % of children with developmental disabilities live in low- and middle-income countries (6). In the United States, the ratio of children between 3 to 12 years with developmental delays is calculated as many as 1:6 (8). In Indonesia, children with developmental delays have reached 12-18 % (4).

Children are in the golden age in the first five years where development will determine their learning, emotional, physical, and cognitive abilities (4,9). The quality of a child can be judged by growth and development, where the process of growth and development results from the interaction of genetic factors and environmental factors (10-12). Genetic/ hereditary factors are related to genes originating from the father and mother, while environmental factors include the biological, physical, psychological, and social environment (13-15).

Developmental delays are strongly associated with impaired psychosocial and intellectual development and learning abilities (8,10). Factors related to mother and child, are both related to child development, including socio-cultural, biological, and psycho-social factors (16-18). Maternal attendance in antenatal care and birth order, preterm status, birth weight, and Apgar score at birth have also been associated factors for child development (19-21). Maternal psychological disorders during pregnancy affect the infant's behavioural, cognitive, socio-emotional, and psychomotor development, while postpartum stress is known to contribute to cognitive and socio-emotional development (22,23). In addition, depression in pregnant adolescents was also associated with higher developmental delays in infants (8,10). Unfortunately, early detection of development in children in Indonesia has not been carried out routinely, where the main attention is often still focused on physical growth. This study aimed to analyse the characterisation and determinants of developmental delays in the first five years of children in Indonesia.

METHODS

Study Design

The study had an analytical observation with a cross-sectional design. The data was collected from clinical growth and developmental children in Malang, East Java, Indonesia, from 2020 to 2021. In total, 209 children aged 0-5 years were selected

as participants using a total sampling method. We have divided the sample into two categories: children without developmental delay (normal children) and children with developmental delay, including global developmental delays and speech delays. Before collecting the data, the informed consent was distributed to each participant, and the participants have been obtained information related to this study. To guarantee the participant's privacy, we have made the data anonymous.

Variables and Instruments

Primary data were analysed in this study, including the following demographic and health-related variables of children: gender, children's age, nutritional development, historical illness related to developmental delay, and nutritional status at birth. We also identified mother-related factors, such as the birth process, mother's age, historical illness of mother during pregnancy, sibling status of children, occupational status of the mother, educational mother, and childcare.

This study combined two sources of data, including primary data from interviewing the mothers using the questionnaire of Denver Development Screening Test (DDST) and secondary data from medical records of children in clinical growth and developmental children in Malang during the period of the year 2019-2020.

Data Analysis

All data were analysed statistically using SPSS 26.0 for Windows (SPSS, Inc., Chicago, IL, USA). To determine the developmental delays in children's first five years, we performed univariate analysis, chi-square test, and binary logistic regression to obtain adjusted odds ratios (AORs) and 95 % confidence intervals (CIs).

RESULTS

The sociodemographic and health-related factors data showed that the total number of children who have been diagnosed with developmental delays is 52.15 % (109). Male children have a 68.80 % proportion of experiencing developmental delays compared to female children. Moreover, older children are more likely to have developmental delays than those who are younger (88.10 %). In nutritional development, children with inadequate intake are less likely to bear developmental delays (25.70 %). In addition, children with historical illnesses tend to endure less likely developmental delays than those in healthy conditions (32.10 %). Meanwhile, children with abnormal nutritional status during birth have not shown less likely to influence developmental delays (18.30 %). Surprisingly, those born by caesarean section have a high rate of experiencing developmental delays (87.20 %).

Mother's related factors revealed that younger mothers are highly likely to have children with developmental delays than older mothers (89.00 %). During pregnancy, the historical illness of mothers indicates less likely influenced developmental delays among children (9.20 %). Children who have siblings are less likely to bear developmental delays (35.80 %) than those who do have not any siblings. Compared to working mothers, housewives' mothers are highly likely to have a high possibility of having children with developmental delays (68.80 %). Mothers with lower education are less likely to have children with developmental delays (11.00 %) than mothers who take care of their children. As a result, they have a low number of children with developmental delays (74.30 %).

The Chi-square test reported that four independent variables were significant ($p < 0.05$) in relation to developmental delays in children's first five years. Nonetheless, gender, children's age, the birth process, and mother's age were significant factors associated with the diagnosis of developmental delays (Table 1).

The multivariate analysis table shows the determinants of developmental delays in the first 5 years of children (Table 2). The data illustrate those male children were 2.89 times more likely to experience developmental delays than female children. While older children tend to have developmental delays more than younger children (AOR=9.77, 95 % CI=4.49-21.24). Based on the birth process, children born by caesarean section were more likely to have developmental delays than those born normally (AOR=5.01, 95 % CI=2.25-11.15). Mothers who are less than 35 years old have 4.42 times more likely to have children with developmental delays from mother-related factors.

Table 1

Sociodemographic and Health-related factor of Participants

	Developmental Diagnose				X2(p-value)
	sSuspect		Normal		
	n	%	n	%	
Gender					0.01* (6.18)
Male	75	68.80	51	51.00	
Female	34	31.20	49	49.00	
Children's Age					0,001** (34.11)
> 2 Years	96	88.10	50	50.00	
< 2 Years	13	11.90	50	50.00	
Nutritional Development					0.18 (1.72)
Abnormal	28	25.70	35	35.00	
Normal	81	74.30	65	65.00	
Historical illness related to developmental delays					0.76 (0.08)
Yes	35	32.10	35	35.00	
No	74	67.90	65	65.00	
Nutritional Status at Birth					0.50 (0.44)
Abnormal	20	18.30	14	14.00	
Normal	89	81.70	86	86.00	
Birth Process					0,001** (13.05)
Sectio Caesarea	95	87.20	65	65.0	
Normal	14	12.80	35	35.0	
Mother's Age					0.05* (3.85)
< 35 Years	97	89.00	78	78.00	
≥ 35 Years	12	11.00	22	22.00	
Historical illness of Mother during pregnancy					0.66 (0.19)
Yes	10	9.20	12	12.00	
No	99	90.80	88	88.00	
Sibling Status of Children					0.52 (0.40)
Yes	39	35.80	41	41.00	
No	70	64.20	59	59.00	
Occupational Status of the Mother					0.30 (1.07)
Housewife	75	68.80	61	61.00	
Working	34	31.20	39	39.00	
Educational Mother					0.51 (0.42)
Primary – Secondary School	12	11.00	15	15.00	
Higher Education	97	89.00	85	85.00	
Childcare					0.31 (1.01)
Mother	81	74.30	67	67.00	
Others	28	25.70	33	33.00	
Total	109	52.150	100	47.85	

*p<0.05; **p < 0.001

Table 2

Multivariate Analysis of developmental delays related factors

Variable	AOR	p	95 % CI
Gender			
Male	2.89	0.001**	1.46-5.72
Female	1		
Children's Age			
>2 years	9.77	0.001**	4.49-21.24
< 2 years	1		
Delivery Type			
Caesarean Section	5.01	0.001**	2.25-11.15
Vaginal	1		
Mother's Age			
< 35 Years	4.42	0.001**	1.79-10.90
≥ 35 Years	1		

*p<0.05; **p < 0.001

DISCUSSION

This study analysed that gender is correlated with developmental delays in the first five years of children, in which male children have a high risk of experiencing developmental delays. Several studies have confirmed the same result: in India (24), Brazil (14), China (25), and Iran (26), even though few studies revealed different outcomes in which female children showed a higher percentage (27,28). The gender difference in developmental delays risk can be associated with biological and genetic factors, such as the fragile x syndrome (29,30), and steroid hormones (31) that are more in males than females. Another rational reason is that the severity of brain inflammation varies according to gender since males with higher brain inflammation are more susceptible to neurologic disorders (32,33). Since gender factor is predicted to cause by uncontrolled factors (biological and genetic), hence early detection should be done by a parent to prevent the continuity the developmental delays in children, also children can have proper therapies sooner.

Older children tend to experience developmental delays more than those under two years old. On the contrary, studies in India (34), Nepal (17), and Indonesia(4) recorded that children between 6 and 24 months or under two years had developmental delays. A study by Hosseinpour et al. (2019) (28) found that the older children are, the more diagnosed with developmental delays, which is similar to our findings. The various findings related to children's age might be due to the different clusters of groups. Our study divided age groups into two categories, while other studies have grouped into more than one category. In addition, the age-related factor of developmental delays has been influenced by nutritional intake (34). However, other studies claimed that it is due to multifactorial genetic and environmental factors (16). Considering our findings and other studies, further studies about developmental delays in children focusing on age-related factors should be investigated to reveal more evidence about the age factor.

Our finding found that delivery type correlates with the developmental delays in children in which those born by caesarean section seemed to have more developmental delays than those born in the normal way. Supporting the current study, Hosseinpour (28) and Demirci & Kartal (18) have calculated that most children with developmental delays were born by caesarean section. The first one got statistically significant between delivery type, and developmental delays, and another showed no statistically significant. Contradictive finding in this study and previous studies indicates that we cannot use delivery type as an effective indicator of developmental delays risk. Nevertheless, the rational notion relays on the emergence of conditions, such as teenage pregnancy, high-risk pregnancy, preeclampsia, placental insufficiency, and pre-pregnancy BMI, which require caesarean section action (19). Further explanation, s prospective cohort study in China found that anxiety levels were greater in caesarean delivery than in vaginal delivery, which might impact the child's health, which means more emotional problems seem to be experienced by children born by caesarean section (35).

Lastly, younger mothers have a significant correlation to the incidence of children with developmental delays than older ones. The previous study aligned with our outcome; a mother's age around 26-35 was considered a low awareness of children's development (36,37). Younger mothers assume that children can develop in their way, so stimulating activities are not necessary (36).

The opposite finding was revealed by a study in Australia that developmental delays can increase as the rise of mothers age, or children who were born to mothers above 35 years will be highly likely to have developmental delays (38). In addition, several conditions that might appear during old pregnancy influence the children's development (38). Regarding our findings, we believe that the young mother's age is associated with the parenting style and maturity of the mother. Thus, the knowledge and experience of mothers can be domains that influence the risk of developmental delays in children. Therefore, we suggest that educating mothers about children's development should be considered a prevention program for developmental delays.

CONCLUSION

The present study revealed four main factors related to developmental delays in children's first five years, namely being male, younger children, the birth process, and younger mothers. Therefore, to decrease the incidence of developmental delays in the first five years, children should be prevented by reinforcing the antenatal, intra-natal, and post-natal programs to actively educate the mothers to care for their children. Moreover, mothers should be aware of their children's conditions by regularly doing early detection of developmental delays.

DATA AVAILABILITY

The dataset used in this study can be accessed by request to the corresponding author.

COMPETING INTERESTS

All authors declare no competing interests.

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