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RESEARCH **Open Access**

Factors Associated with Early Child Development: A Pre-Screening Study

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Abstract

Early child development is a critical phase for lifelong health, resulting from the influence of various factors. The present study assessed the factors associated with children's deviant development. This cross-sectional study was conducted on 88 infants aged 6-12 months in six Public Health Centres in East Pontianak, West Kalimantan. Breastfeeding duration at each session, the frequency in a day and the length of breastfeeding in months, mothers' knowledge, behavior, and the habit of squeezing in children were the risk factors for early development. A chi-square analysis of the relationship between risk factors and children's development. Overall, the results indicated that shorter breastfeeding duration at each session (p=0.027), non-exclusive breastfeeding (p=0.050), and low mothers' knowledge (p=0.032) significantly affected children's development. These results suggested that exclusive breastfeeding and enough knowledge enhance infant development.

Keywords: Child Development, Exclusive Breastfeeding, Breastfeeding Duration, Mothers' Knowledge.

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1. INTRODUCTION

Early childhood development provides a critical phase for lifetime physical and mental health. It is estimated that over 31 million children under five in low and middle-income countries have developmental problems. There is an increasing prevalence worldwide, from 4.8% in 1990 to 6.1% in 2014.1 The same trend is also experienced in Indonesia, the fourth most populous country, which has growth and development disorders among children from 16.5% to 21.6% from 2007 to 2013 (Budiman et al., 2013).

Many variables influence child development and have multifactorial causes. It can be affected by economic, environmental, nutritional, and social factors during pregnancy and postnatal (Donald et al., 2019; Pem, 2016; Peni et al., 2020). Other factors that compromise overall development are parents' behavioral and dietary deficiencies, exclusive breastfeeding, inadequate feeding practices, and lack of stimulation (Rocha et al., 2021; Sania et al., 2019). The importance of those exposed to the growth and child developmental outcomes in low-middle-income countries is poorly understood (Fitriyah et al., 2021). Parents' knowledge also contributed to the child's developmental outcomes.

To determine the magnitude of the correlation linking early life exposures with children's development aged 6-12 months, we investigated six public health centers in East Pontianak, West Kalimantan. Although many studies have assessed the factors associated with early child development outcomes, to our knowledge, no study focuses on breastfeeding duration at each session. The present study addresses this factor as one of the independent variables to prove whether it affects an infant's development. We then examined the associations of early life risk factors on development among children aged 6-12 months, such as breastfeeding details (the length of each breastfeeding, breastfeeding duration in months, the frequency of breastfeeding in a day, and exclusive breastfeeding), mothers' knowledge and behavior, and the habit of squeezing in infants.

2. RESEARCH METHOD

A cross-sectional study was carried out from September until December 2019. The study was conducted in six Public Health Centres (Parit Mayor, Banjar Serasan, Tanjung Hulu, Tambilan Sampit, Saigon, and Kampung Dalam) located in East Pontianak, West Kalimantan, Indonesia. Before enrolment, all participants (mothers) provided written informed consent.

All infants aged 6-12 months and their mothers willing to be interviewed were included. Exception for infants with anomaly congenital or genetic syndrome (congenital heart disease), low birth weight, congenital physical defects, and premature less than 36 weeks. We calculated the minimum sample required in this study using the different proportion sampling formula for cross-sectional design (Patrick & Halcyon, 2016). A sample size of 88 was required to achieve a minimum of 95% statistical power.

The trained investigator interviewed each infant's mother using a detailed questionnaire. The independent variable of this study was breastfeeding (exclusive breastfeeding, duration, and frequency of breastfeeding), knowledge, and behavior. Child development was the outcome of the study. All the information was obtained from the mothers.

The average breastfeeding session was the mother feeding their babies every episode for one breast (in minutes). We categorized it into three groups: good if 15 minutes or longer, moderate 5-15 minutes, and less under than 5 minutes. Breastfeeding duration was the length of the infants breastfed from born until the data collection (Win et al., 2006). We also asked about the average daily breastfeeding frequency and whether the participants got exclusive breastfeeding (Kent et al., 2006).

Knowledge of the mother was assessed by asking a series of questions about complementary food. A lack of knowledge was identified for those with scores under 80—their

responses to giving complementary food determined mothers' behavior. A score of 80-100 identified as good behavior, 60-79 as moderate, and less than 60 meant less behavior.

Child development was assessed using the Child Development Pre-Screening Questionnaire10, a screening tool for child development aged 0 to 6 years, validated in Indonesia (Windiani et al., 2020; Simangunsong, Machfudz, & Sitaresmi, 2012). The interviewers were trained on the use of the questionnaire. In terms of scoring, the score was considered abnormal development of six to eight items answered yes.

Univariate analysis was conducted on the data description about the frequency distribution of various characteristics of studied variables, independent and dependent variables. Using Chi-Square, bivariate analysis was performed on the factors associated with the deviant's development.

The study was reviewed and approved by the Ethical Committee of the Faculty of Medicine, University of Tanjungpura (Approval Number No. 1712/UN22.9/DL/2019). The participants were informed about the study and could ask questions to provide informed decisions if they wished to participate before signing a consent.

3. RESULTS AND DISCUSSION

In this study, we involved 88 infants. Table 1 below describes the characteristics of infants, including sex, age, and child's order in the family.

Table 1. Characteristics of study participants.

Characteristics	Category	Frequency (n= 88)	%
Sex	Male	57	64.77
	Female	31	35.2
Age (months)	6	14	15.91
	7	12	13.63
	8	15	15.91
	9	17	19.32
	10	15	18.18
	11	5	5.68
	12	10	11.36
Childs' order in the family	First	45	51.14
	Second	25	28.41
	Third	14	14.77
	Fourth	4	5.68

Table 1 showed that most infants were males (64.77%), aged 9 months (19.32%), and the first child in their families (51.14%).

Table 2. Characteristics of parents' participants.

Characteristics	Category	Frequency (n= 88)	%
Age (years)			
Mother	25-30	38	43.18
	31-35	7	7.95
	36-41	10	11.36
Father	19-24	17	19.32
	25-30	42	47.73
	31-35	10	11.36
	36-41	12	13.64
	42-46	7	7.95

Occupation			
Mothers	Civil servant	1	1.14
	Private employee	3	3.41
	Housewife	84	95.45
Fathers	Civil servant	10	11.36
	Private employee	41	46.59
	Labor	28	31.82
	Entrepreneur	9	10.23
Income average per month (rupiah)			
Mothers	<1.5 million	85	96.59
	1.5 - 3 million	2	2.27
	3 - 5 million	1	1.14
Fathers	1.5 - 3 million	34	38.64
	3 - 5 million	44	50.00
	>5 million	10	11.36
Education			
Mother	Primary	2	2.3
	Middle	11	12.5
	Secondary	68	77.3
	Higher	7	7.9
Father	Primary	3	3.4
	Middle	8	9.1
	Secondary	54	61.4
	Higher	23	26.1

The characteristics of the parents' participants are presented in Table 2. According to age, the majority of fathers and mothers aged 25-30. Most mothers were housewives with no monthly income, while most fathers were private employees and earned around 2.1-3.5 million rupiah monthly. According to education level, over 50% of parents completed secondary school.

Table 3. Risk Factors of Child Development.

Factors	**Category**	**Child Development (N= 88)**		**p-value**
		Deviant [n (%)]	**Normal [n (%)]**	
Breastfeeding duration at each session	<5 minute	2 (40)	3 (60)	0.027*
	5-15 minute	19 (57.58)	14 (42.42)	
	>15 minute	14 (28)	36 (72)	
Breastfeeding duration (month)	<6	15 (51.72)	14 (48.28)	0.201
	6-9	30 (69.77)	13 (30.23)	
	10-12	8 (50)	8 (50)	
Frequency of breastfeeding in a day	≤6 times	8 (61.54)	5 (38.46)	0.082
	>6 times	27 (36)	48 (64)	
Status of breastfeeding	Non-exclusive	30 (45.45)	36 (54.55)	0.050*
	Exclusive	5 (22.73)	17 (77.27)	
Current breastfeeding	No	14 (48.28)	15 (51.72)	0.253
	Yes	21 (35.59)	38 (64.41)	
Parents' knowledge	Less	29 (51.79)	27 (48.21)	0.032*
	Good	8 (25)	24 (75)	
Parents' behavior	Less	8 (32)	17 (68)	0.593
	Mid	20 (44.44)	25 (55.56)	
	Good	7 (38.89)	11 (61.11)	
The habit of squeezing in infants	Yes	20 (41.67)	28 (58.33)	0.691
	No	15 (37.50)	25 (62.50)	

**) significant at p-value ≤ 0.05*

The association between breastfeeding (duration at each session, length in a month, frequency in a day, and exclusive breastfeeding), the habit of squeezing, knowledge, and behavior of mothers with child development outcomes are shown in Table 3. Breastfeeding duration at each session (p=0.027), the status of breastfeeding (p=0.050), and knowledge (p=0.032) were significantly associated with infants' deviant development.

In the present study, exclusive breastfeeding played a significant role in determining the normal development of infants aged 6-12 months. Infants who breastfed for 10 to 12 months showed a lower corresponding deviant development (50%) than infants who breastfed for less than 6 months (51.72%) and 6 to 9 months (69.77%). The same finding was that the proportion of children with developmental deviations was lower when breastfeeding was longer (Chiu et al., 2011). Children who have never breastfed experience more fine motor and social delays than children who are still breastfeeding for up to 6 months. Children who have never breastfed also experience fine motor delays compared to children who have breastfed for less than a month (Chiu et al., 2011). In addition, this result supports the WHO expert recommendations that exclusive breastfeeding for six months has beneficial effects on children's cognitive development and no observable deficits in growth (Jedrychowski et al., 2012; Kramer & Kakuma, 2012; Nurhayati, 2017; Onyango et al., 2022).

It is well-established that breastfeeding is a key component of optimal infant nutrition (Martin et al., 2016). It provides many essential health benefits to babies and mothers, including helping protect children against acute and chronic disorders. Previous studies examining the associations between breastfeeding and child development found a positive effect of prolonged breastfeeding on child development (Kramer et al., 2008; Mikšić et al., 2020; Oddy et al., 2012; Onyango et al., 2022) Unfortunately, most infants in this study were not received exclusive breastfeeding (75%). A woman's attitude and beliefs may influence this high number of non-exclusive breastfeeding regarding their breastfeeding performance (Mikšić et al., 2020). Moreover, a longer duration of exclusive breastfeeding was associated with a higher frequency of feeds, higher age, and a higher educational level of the parents (Hörnell et al., 1999; Jama et al., 2020; Specht et al., 2018). Given the importance of early child development, there should be a reasonable reason beyond the result that needs further investigation.

Although numerous studies prove that breastfeeding longer than the optimal duration delays child development, more references must be provided regarding the optimal time of each episode. This study found that breastfeeding for less than 5 minutes at each episode from one breast was not significantly affected child development. Although a previous study by Hornell et al defined one breastfeeding episode as the duration of suckling 2 minutes or longer, this does not consider whether the babies fed from one breast or both during the episode (Hörnell et al., 1999). Also, that study did not observe specific periods of increased feeding frequencies at certain times and appetite spurts. Many studies have also shown that the frequency, volume, and duration of feeds influence milk output and fat (Hector et al., 2012; Kent et al., 2006). Therefore, it is difficult to determine the causality between the optimal duration of breastfeeding episodes and infants' development.

In terms of knowledge, it was found that the children whose development deviated were more common in mothers with low knowledge of complementary feeding (77.1%) (Michaelsen, Grummer-Strawn, & Bégin, 2017). This result is consistent with the previous findings that early and late introduction of complementary feeding is associated with increased morbidity and nutritional deficiencies in children (Udoh & Amodu, 2016). It is one of the vital indicators to improve the nutritional status of children, which aims for proper growth and development. Initiation of complementary feeding within the early life of infants was associated with better development in general (Bimpong et al., 2020).

Inadequate mothers' knowledge regarding complementary feeding is essential. The nutritional needs of babies reaching the age of 6 months continue to exceed breast milk's nutrients, so complementary foods are needed to provide adequate nutrition for children. Food diversity in complementary foods has been recognized as an essential element in intake quality. Increasing the variety of food consumed can ensure the child's nutritional intake so that the child's growth and development are appropriate. However, most were unaware of the recommended time, frequency, or kind of complementary food (Venugopal S & Chandrashekar, 2016). Mothers' wrong beliefs, customs, and attitudes may distort the exact information (Al-Samarraie et al., 2020; Doğan et al., 2019). Furthermore, the age of giving complementary feeding is late due to inappropriate information, and the child does not want to receive it. This lack of knowledge may be caused by low socioeconomic status, rural areas, and education level, which were not assessed in the present study.

As for limitations, recall bias commonly seen in cross-sectional studies may also be an issue in this study. People may answer inaccurately for several reasons, such as a misunderstanding or a desire to appear favorably. Small sample size also may affect the reliability of a survey's results because it leads to a higher variability, which may lead to bias.

4. CONCLUSION

This study indicated that lack of knowledge regarding complementary feeding and non-exclusive breastfeeding were risk factors for suboptimal development outcomes in selected domains, not with shorter breastfeeding duration in every episode. As a result, these high-risk groups may benefit from improving education and compliance with breastfeeding. Compliance with breastfeeding in this study was low, and more attention should be given to increasing breastfeeding, especially exclusive breastfeeding, and monitoring trends. However, it is essential to note that integrated interventions to enhance knowledge and exclusive breastfeeding may also need to consider the culture and religion of the origin.

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