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Original Article

Quality of home stimulation and language development in children aged 12-24 months living in orphanages and family homes

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Abstract

Background Language development is fundamental for children's intellectual development. Therefore, early stimulation in the first three years of life play an important role especially in disadvantaged communities such as foster homes.

Objective To determine the quality of home stimulation and language development, and their correlations in children living in orphanages and family homes.

Methods This study was conducted between December 2007 and January 2008. Subjects were recruited from several orphanages in Jakarta, Tangerang, Bogor, also three posyandus in Jakarta and Tangerang. The quality of home stimulation was assessed using Home Stimulation Observation for the Measurement of the Environment (HOME) scores, while language development was assessed using Clinical Linguistic and Auditory Milestone Scale Development Quotient (CLAMS DQ).

Results A total of 80 healthy children, consisting of 40 children in orphanages and 40 in family homes were enrolled. Inadequate stimulation and language delay were found to be significantly higher in the orphanage group (52.5% vs. 27.5%; P=0.022 and 57.5% vs. 10%; P<0.001, respectively). HOME Scores and CLAMS DQ were also significantly lower in the orphanage group compared to those in the family home group (25.6 vs 31.5; P<0.001 and 84.0 vs 110.7; P=0.002). Logistic regression revealed that caregiver-child attachment time was the only risk factor for language delay (OR 32.32; P<0.0001), in both orphanages and family homes.

Result The quality of home stimulation is lower in the orphanages, which results in a higher rate of language delay in children aged 12-24 months. **[Paediatr Indones. 2009;49:25-32]**.

Keywords: *home stimulation, language development, orphanages*

The first three years in children's life are increasingly recognized as an important time for brain growth and window of opportunity to optimize children's development in many ways.[1] Children's developmental trajectory is critically mediated by appropriate affective relationships with loving and consistent caregivers.[2] In the early childhood, the family provides the most significant attachments as well as the care and stimulation required for the children's growth and development.

Almost half (47%) of the children placed in foster care are less than five years old.[3] The high number is associated with several factors, including number of abused and neglected children, persistent poverty, homelessness, family violence, substance and alcohol drug abuse within the biological families.[4] Foster care placement is usually aimed to protect the child from physical harm. However, physical safety is not enough since young children also need responsive care with

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the alternative caregiver.[5] By their very nature, out of home placements offer less time for the child and caregiver to be attuned to each other. This in turn can affect the quality of relationship between the foster child and his or her caregiver.

Speech and language are the core skills in the development of young children. The American Academy of Pediatrics and Center for Disease Control and Prevention have recommended to evaluate speech and language routinely during toddler and preschool years. Early language development stages are sensitive indicators of developmental integrity since language is the core of cognitive and socio-emotional development process in children.[6]

Orphaned children are usually placed in orphanages where limited numbers of caregivers, home stimulation, and playing materials are creating disadvantageous environments for the children's growth and development. The study was aimed to test the effects of living environment on the quality of home stimulation and language development in children aged 12-24 months.

Methods

Study design and subjects

This was a cross sectional study carried out on healthy children aged 12-24 months living in orphanages and family homes. Study subjects were enrolled from three cities, namely Jakarta, Bogor, and Tangerang between December 2007 and January 2008. The subjects were included only if they were between 12 and 24 months of chronological age, and did not exhibit a significant neurological deficit, hearing impairment, congenital anomalies, severe malnutrition, severe illness, signs of mental retardation or global developmental delay. Informed consent was signed by the primary caregiver of each subject prior to the study. Subjects were recruited from 10 orphanages in Jakarta (Cipayung, Kramat Pela, Sunter, Cakung, Srengseng Sawah Sunter Subdistricts), Bogor (Parung Subdistrict), and Tangerang (Bintaro, Pamulang, Kreo Subdistricts) and three Integrated Health Posts (Posyandu) in Subdistricts of Cipayung, Kramat Pela, and Kreo. This study was approved by the Ethical Committee, Faculty of Medicine, University of Indonesia.

Characteristics of children, caregivers, and nature of nurturing

The children were characterized as first-/second-born and later born. The number of siblings aged less than five years and birth spacing were also recorded. The birth spacing was calculated between two siblings in the family homes or between two roommates in the orphanages. The characteristics of the caregivers were classified based on age group (below 20 years vs. 20 years or more), educational level (low – junior high school or less, moderate – senior high school, and high – college or university graduates), and employment status (part timer, full-timer, or unemployed). The characteristics of nurturing nature consisted of nurturing parents (biologic parents vs alternative caregiver), caregiver-child attachment time per day (less than 3 hours, 3-5 hours, or more than 5 hours), socioeconomic level (below or above poverty line, i.e. IDR 197,306 per month), and bilingualism (exposure to more than one language at home).

Assessment of home stimulation

The assessment of the quality and quantity of the home stimulation had been done using Home Observation for the Measurement of the Environment (HOME) Inventory. It is applicable for children in their first five years of life. The original version of HOME Inventory used in this study was the Infant Toddler-HOME (IT-HOME) for children aged 0-3 years. This tool composed of 45 items to be scored as YES or NO based on the observation and answers given during the interview with the primary caregiver. There were six subscales in HOME which included the following: emotional and verbal responsiveness of the caregiver, avoidance of restriction and punishment, organization of physical and temporal environment, availability of appropriate play materials and games, caregiver's involvement with the child, and opportunities for variety in daily stimulation. Higher total HOME scores indicated a more enriched home environment. There was no cut-off point specified in the manual, but literatures advised researchers to conduct their own measure for assessing their measurements of the child's development in a specific population.

In order to establish the interrater reliability, the kappa value of this study was 0.92.

Assessment of language development

Language development had been assessed in this study using Clinical Linguistic and Auditory Milestone Scale (CLAMS). CLAMS was applied separately to measure children's receptive and expressive language skills. This instrument was derived primarily from parental report and its test items were ranked by developmental age. The instrument gave quantitative developmental quotients (DQs) for language abilities. The language development was classified as 'normal' if the CLAMS DQ score was equal or greater than 85 points. A score less than 85 points indicated a 'delayed' language development.

Statistical analyses

The characteristics of the study subject were presented descriptively within their respective foster home and family home group. Characteristic differences between groups were determined using the chi-square or Fisher's exact tests. The differences in HOME Inventory and CLAMS mean scores for children living in foster homes and normal families were analyzed using the student *-t* or Mann-Whitney U tests. The Pearson's product moment correlations were used to evaluate the degree of association between the overall HOME Inventory score and CLAMS DQ. The statistical analyses in this study were done using the Statistical Package for Social Studies version 15.0 for Windows PC (SPSS Inc., Chicago, Illinois, USA).

Results

A total of 80 children aged 12-24 months, comprising 40 children from foster homes and 40 children from common home families, was recruited as subjects for this study. Their mean age was 18.5 (SD 3.83) months. More than half of the children were boys (56 %). The characteristics of the study subjects are presented in **Table 1**.

There were several significant differences in the children characteristics between the orphanage and family home groups, i.e. the birth order, the number of under-5-year siblings, and the birth spacing. Most of the children at the orphanages were later-born and had more than one under-5-year old siblings. Almost all children at the orphanages had a birth spacing less than three years relative to their roommates. Significant differences of caregivers' characteristics were also observed in this study. There was no mother aged less than 20 years, while eight caregivers at the orphanages were less than 20 years old. About 70%

Table 1. Characteristics of study subjects, caregiver and nurturing

Characteristics	Family homes (n=40)		Orpha-nages (n=40)	
	n	%	n	%
Age group				
12-18 months	21	53	20	50
19-24 months	19	47	20	50
Gender				
Male	19	48	26	65
Female	21	52	14	35
Nutritional status				
Undernourished	15	38	9	23
Well-nourished	23	58	27	67
Overweight	2	4	4	10
Birth order				
1st to 2nd	35	88	7	18
> 3	5	12	33	82
Under-5-year siblings at home				
0 to 1 child	40	100	0	0
> 2 children	0	0	40	100
Birth spacing				
< 3 years	26	65	39	98
> 3 years	14	35	1	2
Caregivers' age group				
<20 years	0	0	8	20
> 20 years	40	100	32	80
Caregivers' educational level				
low	12	30	23	58
middle	25	63	16	40
high	3	7	1	2
Caregivers' employment status				
Full-time worker	8	20	33	83
Part-time worker	2	5	7	17
Unemployed	30	75	0	0
Nurturing status				
Biological parents	40	100	0	0
Surrogate parents	0	0	40	100
Caregiver-child attachment time				
< 3 hours	0	0	27	68
3 – 5 hours	7	18	11	27
> hours	33	82	2	5
Socio-economic level				
Below poverty line	7	18	0	0
Above poverty line	33	82	40	100
Bilingualism				
Yes	13	33	5	13
No	27	67	35	87

^Chi-square test; #Fischer's exact test

Table 2. Quality of home stimulation and language development

Characteristics	Family homes (n=40)		Orphanages (n=40)		P value
HOME Score					
Mean (SD)	31.5	(4.77)	25.6	(5.99)	<0.001*
Median (Min – Max)	32.5	(20 – 39)	27.0	(13 – 35)	
Home stimulation					
Inadequate, n(%)	11	(27.5)	21	(52.5)	0.022^
Adequate, n(%)	29	(72.5)	19	(47.5)	
CLAMS DQs					
Mean (SD)	110.7	(19.19)	84.0	(28.00)	0.002*
Median (Min – Max)	110.8	(54.0 –130.0)	77.3	(39.5 –134.6)	
Language development					
Delayed, n(%)	4	(10.0)	23	(57.5)	<0.001^
Normal, n(%)	36	(90.0)	17	(42.5)	

^Chi-square test, *Mann-Whitney U test

of the children's mothers were at least high-school graduates, whereas more than half of the caregivers at the orphanages had a low level of education. The employment status of the caregivers had been excluded due to the inconsistency in meaning. All children at the family homes were nurtured by their biological mothers, while those living in the orphanages were taken care of by surrogate caregivers. There was also a significant difference in the caregiver-child attachment time between children at the family homes and orphanages. Bilingualism was practiced more significantly in the normal homes than in the orphanages.

The study further found that there were significantly more children receiving adequate home stimulation at the family homes. The mean HOME scores of the children living in the family homes were significantly higher than those of the children living in the orphanages. On the other hand, as indicated by the significantly lower CLAMS DQ scores, the prevalence of language delay was found to be more pronounced among children living in the orphanages **(Table 2).**

The differences of home stimulation quality were further analyzed using the HOME subscales. From the six subscales, there were significant differences in four subscales, i.e. responsivity, organization, involvement, and variety. Compared to caregivers at the orphanages, those in the family homes showed better emotional and verbal responsiveness, avoidance of restriction and punishment, organization of physical and temporal environment, involvement with the child, and opportunities of variety in daily stimulation **(Table 3)**.

Table 3. Psychometric properties of HOME scales

HOME Subscales	Mean (SD)		P value
	Family homes	Orphanages	
Emotional and verbal responsiveness of the mother/ caregiver (Responsivity)	7.35 (2.7)	5.25 (3.1)	0.002
Avoidance of restriction and punishment (Acceptance)	6.18 (0.7)	5.90 (0.8)	0.111
Organization of physical and temporal environment (Organization)	4.68 (1.1)	3.10 (0.9)	<0.001
Provision of appropriate play materials and games (Learning materials)	6.18 (1.9)	6.45 (2.5)	0.589
Mother's/ caregiver's involvement with child (Involvement)	4.23 (1.0)	3.68 (0.8)	0.008
Opportunity for variety of daily stimulation (Variety)	2.83 (1.3)	1.23 (1.1)	<0.001

Bivariate analysis correlating the language delay in children aged 12-24 months are presented in **Table 4**. The analysis revealed the following significant risk factors affecting language delay, i.e being a later born child, having more than one siblings below five years old, low level of primary caregivers' education, being nurtured by surrogate caregiver (in orphanages), less time of caregiver spent with the children, and inadequate quality of home stimulation.

A logistic regression model was constructed in this study to simultaneously evaluate the relationship among a number of possible covariates of delay in language development. The model showed that caregiver-child attachment time was the only

Table 4. Associations between characteristics of study subjects, caregiver, nurturing, and language development in orphanages and family homes

Characteristics	Language development				OR	P value
	Delay (n=27)		Normal (n=53)			
	n	%	n	%	(95% CI)	
Age group						
12-18 months	14	52	27	51	0.96	0.939^
19-24 months	13	48	26	49	(0.38 to 2.44)	
Gender						
Male	16	60	29	55	1.20	0.699^
Female	11	40	24	45	(0.47 to 3.08)	
Nutritional status						
Undernourished	9	33	15	28	1.27	0.642^
Well-nourished	18	67	38	72	0.47 to 3.44	
Birth order						
1st to 2nd	6	22	36	68	7.41	<0.0001^
> 3	21	78	17	32	(2.53 to 21.72)	
Under-5-year siblings						
0 to 1 child	4	15	36	68	12.18	<0.0001#
> 2 children	23	85	17	32	(3.64 to 40.77)	
Birth spacing						
< 3 years	25	93	40	76	4.06	0.076#
> 3 years	4	7	13	24	(0.85 to 19.53)	
Caregivers' age group						
<20 years	5	19	3	6	3.79	0.112#
> 20 years	22	81	50	94	(0.83 to 17.26)	
Caregivers' educational level						
Low	20	74	15	28	7.24	<0.0001^
High	7	26	38	72	(2.54 to 20.64)	
Nurturing status						
Biological parents (family homes)	4	15	36	68	12.18	<0.0001#
Surrogate parents (foster homes)	23	85	17	32	(3.64 to 40.77)	
Caregiver-child attachment time						
< 3 hours	22	82	5	9	42.24	<0.0001^
≥ 3 hours	5	18	48	91	(11.08 to 141.05)	
Quality of stimulation						
Inadequate	19	70	13	25	7.31	<0.0001^
Adequate	8	30	40	75	(2.59 to 20.59)	
Socio-economic level						
Below poverty line	0	0	7	13	0.63	0.089#
Above poverty line	27	100	46	87	(0.53 to 0.75)	
Bilingualism						
Yes	5	19	13	25	0.69	0.543^
No	22	81	40	75	(0.22 to 2.22)	

^Chi-square test; #Fischer's exact test

Table 5. Correlation between HOME Scores and CLAMS DQs

HOME Subscales	CLAMS DQ					
	Family homes		Orphanages		Total	
	r	P	r	P	r	P
Emotional and verbal responsiveness of the mother/ caregiver (Responsivity)	0.093	0.570	0.661	<0.001	0.530	<0.001
Avoidance of restriction and punishment (Acceptance)	-0.168	0.299	0.410	0.009	0.252	0.024
Organization of physical and temporal environment (Organization)	-0.148	0.364	0.151	0.352	0.312	0.005
Provision of appropriate play materials and games (Learning materials)	0.057	0.726	0.457	0.003	0.247	0.027
Mother's/ caregiver's involvement with child (Involvement)	0.025	0.878	0.146	0.370	0.216	0.054
Opportunity for variety of daily stimulation (Variety)	0.325	0.041	0.011	0.946	0.382	<0.001

variable that was significantly related to language delay (adjusted OR 32.32, 95% CI 1.66 to 630.78, P-value= 0.02)

Table 5 presents the correlations between the HOME Inventory Scores and CLAMS DQs. Positive, moderate correlation was observed between Responsivity Subscale and CLAMS DQ in the orphanages group. The Acceptance and Learning materials Subscales were weakly correlated with CLAMS DQ in the orphanages group. On the other hand, only Variety Subscale had a weak correlation with CLAMS DQ in the family homes group. Overall, there were moderate correlations in five out of the six HOME Subscales and the CLAMS DQs.

Discussion

The results of our study provide an assessment of home stimulation and language delay in children and highlight the importance of home environment for children development. Due to the nature of an orphanage, there were several significant differences in the children, caregiver, and nurturing characteristics that might potentially affect the study results. The birth order, spacing, and the number of siblings under five years old in the two groups were significantly different. The effects of birth order to language development had been reported inconsistently across studies.[7] Moreover, while the age difference between siblings or spacing needed to be considered in any family sibling studies, the spacing had not been found to be associated with the cognitive functioning in infants and young children.[8] And finally, the presence of siblings or other children younger than five years old was reported to yield poorer quality of home stimulation and might affect the child's development.[9]

The psychosocial status of the mother is another important factor for a child development. A study in Jamaica found that mothers from poorer homes had lower level of parenting self-esteem, were more depressed, had higher level of economic stress, and provided a less stimulating home environment.[10] A close and quality interaction with the mother is essential for a secure relationship and healthy development of the child. Parent-child relationship is affected directly by the quality of time the parents spend with their children rather than the quantity of time spent. Acceptance of the child behavior and organization of the temporal and physical environment are directly related to their attachment.[11]

A literature review indicates that HOME Inventory has been equivalenced and validated across different cultures. Zeitlin and Satoto (1990) used it for their research in Indonesia with modified subscales; however, a better Cronbach alpha from one report convinced the researchers that the original version of HOME is a better choice in their sample. In this study, the poor quality of home stimulation was reflected by the low HOME score of the children living in the orphanages. The quality of home stimulation was found to be better in family homes compared to that of the orphanage group. The mean total HOME score of the children in the family home group was similar to that found by other study in Little Rock (31.2 (SD 7.3)) and in Costa Rica (29.8 (SD 6.7)).[12] A cohort study of young children in the community showed that low expressive language was seen among children aged 18-23 months who came from environments characterized by low level of education, low level of expressiveness, poverty, and high level of parenting stress.[13]

Surprisingly, our study found an extremely high rate of language delay in the orphanages group (57.5%). The prevalence of language delay varied widely among studies. The US Preventive Services Task Force Study in children aged 2-4.5 years had reported a prevalence rate between 2.3 to 19%.[14] Among foster children, the estimated prevalence of language delay ranged from 35 to 75%.[15] Living in a foster care and prior traumatic incidents leading to the foster care placement can affect early child development.[16] In summary, foster care placement puts young children at an increased risk of delayed language development.[17]

The high rate of language delay in the present study may be explained by the significant characteristic differences between the groups of study subjects. These differences can serve as potential risk factors contributing to the increased risk of delayed language development, i.e. later-born child, more than one sibling aged less than five years in the family, low level of caregivers' education, surrogate caregivers (orphanages), less attachment time with the child, and inadequate quality of home stimulation.

Therefore, these results strongly support the role of the home-living environment in providing a healthy child development. The correlation test between HOME Subscales and CLAMS DQ in the current study gave a range of coefficient of correlation (r) between 0.247 and 0.530. This coefficient measured the effects of home stimulation on children language development. A higher coefficient indicated better quality of home stimulation, which led to a better language development. A study correlating the HOME score with the intelligent quotient (IQ) also found a similar range of 0.3 and 0.59.[18]

This study had several potential limitations. Consecutive sampling method had been employed due to technical difficulties in recruiting eligible subjects from registered orphanages. The usefulness of questionnaires as data-collecting tool was highly dependent on the honesty and subjectivity of the respondents. Furthermore, the power of a cross sectional study design, which simultaneously evaluated the cause and effect, was limited as it did not allow one to affirm whether the level of child's language development derived from the stimulation in a specific environment. A longitudinal design was the preferred method for further study investigating the causal relation between home environment and language development.

Our study concluded that the quality of home stimulation is lower in the orphanages, which results in a higher rate of language delay in children aged 12-24 months. Orphanages are at a disadvantage due to the presence of several potential risk factors contributing to high language delay, i.e. later-born child, more than one child aged less than five years in one room, nurtured by surrogate caregivers, low-level of caregivers' education, and less attachment time with the child. Interventional program, such as early stimulation, book reading, and capacity building for the caregivers, are recommended to reduce the prevalence of language delay in the orphanages.

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