

Growth, Developmental, and Behavioral Outcomes of HIV-Affected Preschool Children in Thailand

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In order to determine growth, developmental, and behavioral outcomes of Thai HIV-affected preschool children, a cross-sectional study was performed at Chiang Mai University Hospital. Thirty HIV-affected children aged 3 to 5 years and 35 of age-matched control with their respective caregivers participated. There was no difference in growth and behavioral outcome, as measured by a standardized Child Behavioral Checklist, between the two groups. Cognitive functioning, as measured by a Thai intellectual assessment score, was significantly lower in the HIV-affected group ($p = 0.03$). Twenty percent of the HIV-affected group had below average level IQ (≤ 89) compared to 11% in the control. The risk factors were low caregivers' family income and being brought up by relatives as opposed to biological parents. An early intervention program for these children should be promoted as a result.

Keywords: HIV-affected child, Growth, Development, Behavioral problems

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In Thailand, a total of 984,000 people (951,000 adults and 33,000 children) have been infected with human immunodeficiency virus (HIV) since 1984⁽¹⁾. Approximately 20% of HIV infected adults are females of childbearing age⁽²⁾. An estimation of between 15,000-23,000 children per year are born to HIV infected mothers^(3,4). Since the year 2000, an extensive perinatal HIV prevention program had been implemented in Thailand. This has led to a decline in HIV vertical transmission rate from 31% to 7%^(5,6). Therefore, the new resultant estimation of HIV uninfected children per year being born to HIV infected mothers (HIV-affected children) is 14,000-21,000. HIV-affected children may appear physically normal but the environment in which they grow up is often non-nurturing. In addition, their parents are constantly at risk of becoming seriously ill or worse, and dying from AIDS. While those who are still alive, frequently face financial problem due to unemployment and work discrimination. The impact of parental HIV/

AIDS on children may range from rejection, stigmatization, and discrimination. Not surprisingly, these children are more susceptible to a variety of problems such as growth and developmental delay, as well as, psychosocial and behavioral disorders. Previous studies have shown that HIV-affected school-aged children had higher rates of psychosocial and behavioral problems^(7,8). Also, they had lower cognitive functioning compared with the controls^(8,9). The most relevant factors are the loss of or separation from their parents, the absence of appropriate parenting, and uncertainty regarding the mother's health⁽¹⁰⁻¹³⁾.

In Thailand, HIV-affected children are often overlooked by health care personnel and social workers because they are not HIV infected. To compound the matter, there are very few data or studies addressing the impact of growth, developmental, psychosocial, and behavioral outcomes in HIV-affected preschool children in Thailand. In terms of their psychosocial, behavioral, and cognitive problems it is not fully established whether the onset occurs at school age or earlier. If these problems were found to develop during their first few years, then an early intervention program

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would prove crucial. Thus, the objective of the present study was to assess the growth, developmental, and behavioral outcomes of HIV-affected preschool children in Thailand.

Material and Method

Study population

Thirty HIV-affected children and 35 healthy children (control group), aged 3-5 years, were enrolled into the present study. All the children were accompanied by their caregivers. The groups were matched on the basis of age and gender. Eligibility criteria included children born at Chiang Mai University Hospital between June 1, 1998 and May 31, 2000. HIV-affected children were recruited from those children born to HIV-positive mothers, who attended the perinatal HIV prevention program. These children were seen in the Pediatrics Infectious Disease Clinic until the age of 18 months, at which point all reverted to HIV negative status. The controls were age-matched children born to HIV-negative mothers with no known preexisting conditions that might have interfered with growth and development such as congenital anomaly, congenital heart disease, congenital infection, chronic disease, and chromosome abnormality. The latter group attended the Child Health Clinic at Chiang Mai University Hospital for scheduled immunization and routine child care.

The present study was approved by the Ethics Committee of the Faculty of Medicine, Chiang Mai University. A signed consent form was obtained from the parents or caregivers before enrollment.

Data collection

Sociodemographic characteristics and perinatal history were obtained by interviewing the mothers and reviewing medical records. The child's physical growth was evaluated by a physician using anthropometric measurements including weight, height, and complete physical examination. Cognitive assessment was performed by a pediatrician using the Thai intellectual assessment⁽¹⁴⁾. The test is widely used to screen the abnormal developmental or learning problems for children aged 2-15 years in Thailand. Behavioral assessment was performed by asking the caregivers to complete the Child Behavioral Checklists (CBCL) for aged 1 -5 years⁽¹⁵⁾. The CBCL is a standardized method of obtaining data on behavioral and emotional problems observed by caregivers. Each caregiver rates on 3-point scales, 100 behavioral items. The majority of behavioral items belong to 3 subclasses, which are internalizing, externalizing, and total behavioral problems. Internaliz-

ing behavioral problems are emotionally reactive, anxious, depressed, somatic complaints, and withdrawn. Externalizing behavioral problems are attention problems and aggressive behavior. Total problems are internalizing and externalizing behavioral problems, sleep problems, and other problems. The clinical range of behavioral problems should be concerned with children whose scores are above 97 percentile.

Data analysis

The sample size for comparison between two proportions was calculated, with predicted behavioral problems in 25% of the HIV-affected group compared to 5% of the control group. To obtain a confidence level of 95% and a power of 80% when comparing these two proportions, at least 35 children had to be recruited into each group. The data were analyzed by using the SPSS 11.5 program. Comparison of baseline demographic and clinical data was made by means of the Student's t-test for continuous variables, and Chi-square test or Fisher's exact test for categorical variables. A P-value of less than 0.05 was considered statistically significant. For anthropometric data, the weight and height values were computed to obtain a weight-for-age Z-score (WAZ) and height-for-age Z-score (HAZ) using the Epi-info program.

Results

All caregivers were contacted by post in order to inform them of the purpose of the study program. Thirty out of 80 caregivers in HIV-affected group and 35 out of 90 in control group gave their consent.

Sociodemographic characteristics

Table 1 summarizes the sociodemographic characteristics of the study population. Subjects and controls were similar in matching variables, which were age and gender. Among the nonmatched sociodemographic characteristics, the parent's age was not different between the HIV-affected and control group. The family income and parental education were lower in the HIV-affected group than in the controls. More than fifty percent of the HIV-affected group lived with their relatives, due to the loss of their biological parents

Growth and developmental outcomes

The growth of HIV-affected children and normal children compared with the World Health Organization (WHO) standardize in a Z-score were not significantly different (Table 2). Both the HIV-affected and control children were healthy and up to date with their

Table 1. Sociodemographic characteristics of HIV-affected children and the control group

Characteristics	HIV-affected group (n = 30)	Control group (n = 35)	p value
Age (yr)	4.3 ± 0.5	4.0 ± 0.7	0.26
Gender: male	15 (50)	16 (46)	0.73
Father's age(yr)*	33.8 ± 5.2	35.8 ± 6.5	0.20
Mother's age(yr)*	31.9 ± 5.6	31.6 ± 7.2	0.87
Education (yr)			
Father	8.9 ± 3.0	11.1 ± 4.2	0.02
Mother	8.9 ± 3.3	10.6 ± 4.1	0.09
Family income/month ≤ 10,000 baht	25 (83)	19 (54)	0.01
Economic problem	20 (67)	11 (31)	0.005
Primary caregiver			
Both parents	3 (10)	22 (63)	<0.001
Either father or mother	10 (33)	10 (29)	
Relative	17 (57)	3 (8)	
Alive			
Father	20 (67)	35 (100)	<0.001
Mother	19 (63)	34 (97)	

Data presented in mean ± SD or number (%)

* For those parents who had died, the parent's age in the present study was based on the age they would have been at the time of the study if they were still alive

Economic problems refer to the family not having enough money and in debt

Table 2. Standardized growth parameters of HIV-affected and control children

Weight and height Z-score	HIV-affected group (n = 30)	Control group (n = 35)	p value
Weight for height Z-score	0.2 ± 1.4	0.0 ± 1.3	0.66
Weight for age Z-score	-0.2 ± 1.6	-0.2 ± 1.4	0.98
Height for age Z-score	-0.3 ± 1.3	-0.1 ± 1.1	0.57

Data presented in mean ± SD. Normal value ranged from -1.5 to +1.5

immunization. Cognitive functioning, however, was significantly lower in the HIV-affected group than control ($p = 0.03$), with 20% of the former attaining below average level ($IQ < 89$) compared to 11% in the latter (Table 3). The low cognitive functioning was associated to living with the relatives ($p = 0.03$) and low caregivers' family income ($p = 0.04$), as shown in Fig. A and B.

Behavioral outcomes

Although the behavioral problems assessed by CBCL seemed to be more common in the control than HIV-affected children but this difference was not significant (Table 4). Those children who demonstrated the clinical range scores of at least two subclasses or all behavioral problems in CBCL were re-evaluated by the developmental pediatrician. Initially, four HIV-af-

Table 3. Cognitive functioning of HIV-affected and control children

Intellectual quotient	HIV-affected group (n = 30)	Control group (n = 35)	p value
Above average (IQ \geq 110)	8 (27)	21 (60)	0.03
Average (IQ 90-109)	16 (53)	10 (29)	
Below average (IQ \leq 89)	6 (20)	4 (11)	

Data presented in number (%)

The handbook of intellectual assessment for children aged 2-15 years, Mental Health Unit, Department of Medical Service, Thai Ministry of Public Health⁽¹⁴⁾

Table 4. Number of HIV-affected and control children who had clinical range behavioral problems assessed by Child Behavioral Checklist

Behavioral problems	HIV-affected children (n = 30)	Controls (n = 35)	p value
Internalize behavior	5 (17)	10 (29)	0.44
Externalize behavior	2 (7)	5 (14)	0.26
Total behavioral problem	4 (13)	5 (14)	0.75

Data presented in number (%)

Child Behavioral Checklist age 1 -5; manual for the ASEBA Preschool Forms and Profile⁽¹⁵⁾

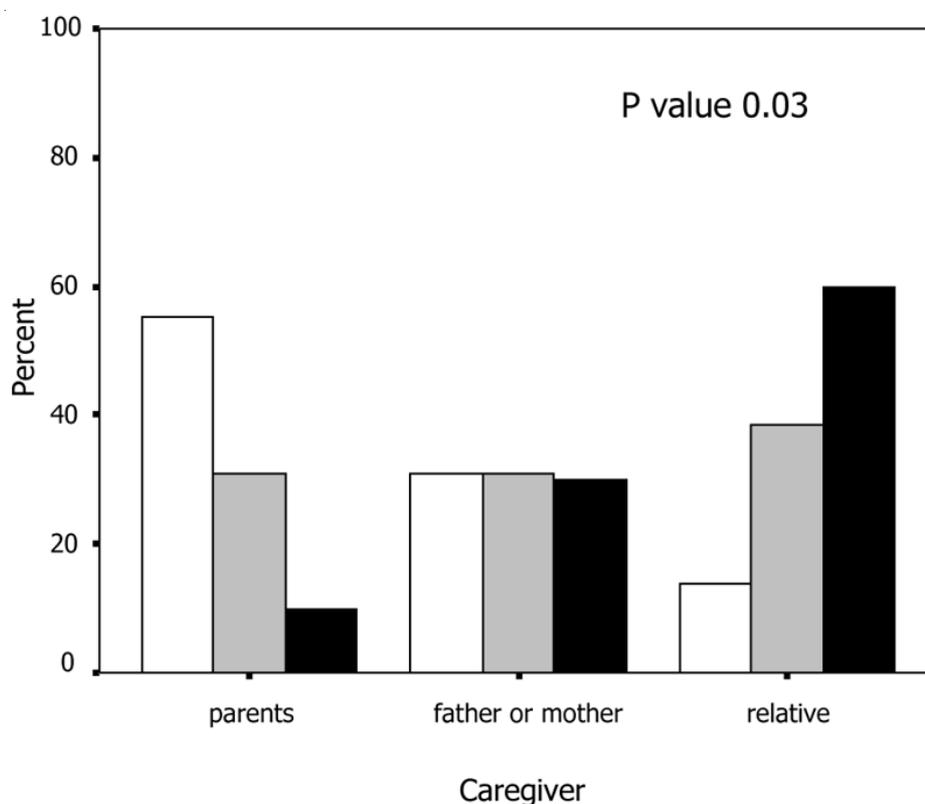


Fig. A The effect of caregiver on the child's cognitive functioning

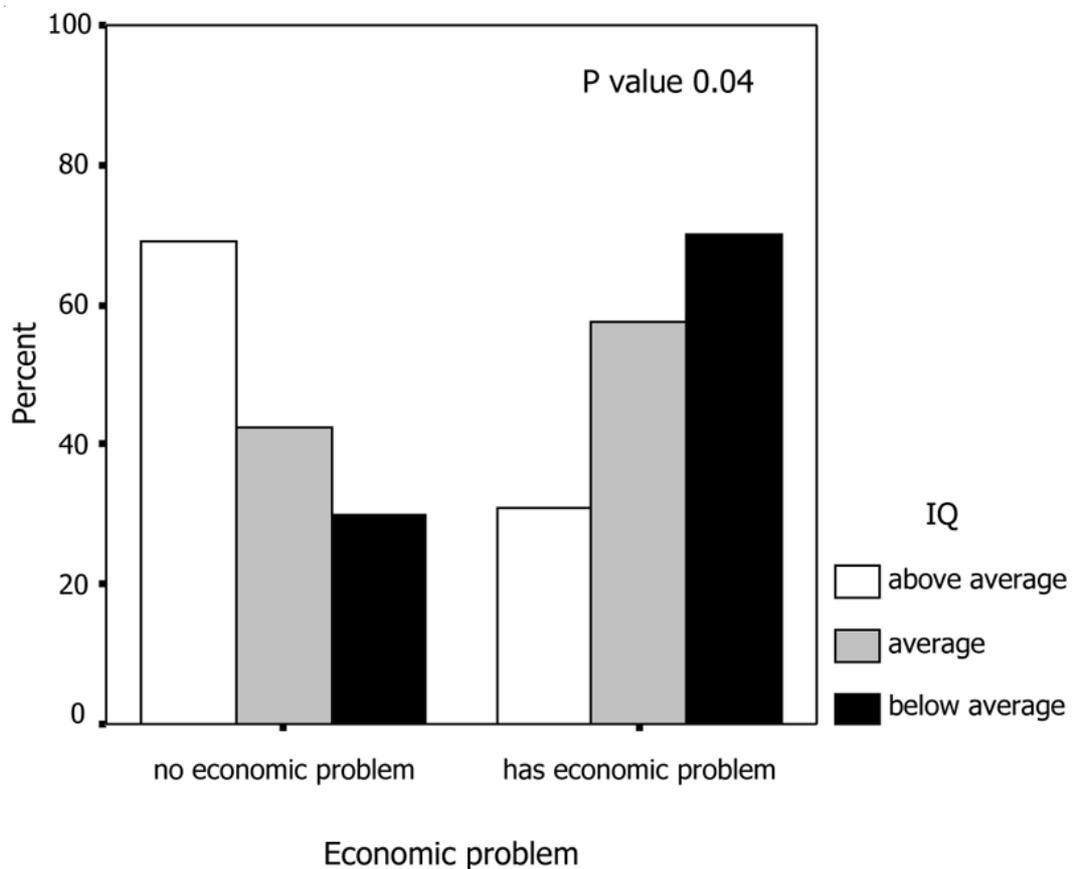


Fig. B The effect of economic problem on the child's cognitive functioning

affected and 8 control children fitted this pattern. After the re-evaluation, however, only 2 HIV-affected children and 3 control children continued to be classified with behavioral problems.

Discussion

The result of the present study showed no significant difference in growth and behavioral outcomes in HIV-affected preschool children compared with the control children. However, the intellectual level was significantly lower in the HIV-affected group than in the controls. The lower cognitive functioning was associated with rearing by relatives and low caregivers' family income.

There was no difference in characteristic backgrounds including age, gender, and the parent's age. However, parent's education and family income were significantly lower among HIV-affected children compared with the controls. According to a report from the Thai Ministry of Public Health, there is a higher

prevalence of HIV infection among low socioeconomic and educational groups⁽²⁾. Although most HIV-affected children are growing up in a non-nurturing environment, and some are orphans, the result of growth, morbidity and vaccination among the HIV-affected and control group was no different and similar to a previous study by Taha E and colleagues in Malawi⁽¹⁶⁾. In Thai society, children who lose their biological parents are usually cared for by their relatives or extended family members instead of being transferred to a foster care or orphanage. The cultural practice might explain why HIV-affected children exhibit unexpected normal growth.

From the cognitive functioning aspect the HIV-affected group illustrated a lower achievement level than controls. Twenty percent of the HIV-affected group had below average intellectual level compared to 11% in the controls. The low cognitive functioning was also noted in the children who lived with their relatives and/or come from low caregivers' family income. This deficiency may stem from insufficient

time spent with the children. Previous studies by The Family Health Project in United States of America and Puthanakit et al in Thailand showed a lower IQ in HIV-affected school-aged children compared with normal children^(8,9). At present, there is still no public policy or any intervention for HIV-affected children in Thailand. Therefore, the follow up of these children is essential in order to prevent developmental and learning problems by providing early identification and intervention programs.

The result of the present study showed no difference in behavioral problems in preschool children among both groups. Previous studies by Esposito et al and The Family Health Project highlighted a higher prevalence of behavioral problems in HIV-affected school-aged children compared with normal children^(7,8). However, behavioral and emotional problems may be difficult to evaluate in young children. The authors suggest that there should be a long term follow up until adolescence.

The result obtained from the present study reaffirms the need to acknowledge the crucial role of HIV-affected children caregivers. All the information derived must be used towards any specific clinical interventions as well as public policy and social support for these children. The work of medical personnel and policy makers should be focused not only to prolong the parents' life span but also to strive for a good health status. This will enable the parents, during the remaining years, to care for their children in the best possible way. It is without doubt that the use of antiretroviral therapy for the HIV-infected parents will contribute enormously towards such an objective. The government has the main responsibility for promoting and implementing the change. An important component of further research is aimed at conducting larger, prospective studies to evaluate HIV-affected children in their adolescent and adult years.

The authors recognize the limitations of the present study. The intellectual assessment used in the present study provides good sensitivity to detect developmental problems but is by no means comprehensive. In addition, the evaluation of behavioral problems in children should ideally involve the use of school report.

In conclusion, HIV-affected children demonstrated a lower intellectual level than those in the control group. Early intervention programs for preschool children should, therefore, be encouraged. However, no significant difference in behavioral problems between the two groups was noted. Nevertheless, a

long term follow up of these children until adolescence should prove beneficial.

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การเจริญเติบโต พัฒนาการและปัญหาพฤติกรรมในเด็กก่อนวัยเรียนที่เกิดจากมารดาติดเชื้อเอชไอวีในประเทศไทย

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งานวิจัยนี้เป็นการศึกษาแบบ *cross-sectional study* เพื่อศึกษาเกี่ยวกับการเจริญเติบโต พัฒนาการ และปัญหาพฤติกรรมในเด็กก่อนวัยเรียนที่เกิดจากมารดาที่ติดเชื้อเอชไอวี แต่เด็กไม่ติดเชื้อ (HIV-affected children) ณ โรงพยาบาลมหาราชนครเชียงใหม่ กลุ่มวิจัยเป็นเด็กที่เกิดจากมารดาติดเชื้อเอชไอวี แต่เด็กไม่ติดเชื้ออายุระหว่าง 3-5 ปี จำนวน 30 คน โดยมีเด็กปกติที่มีอายุเท่ากับกลุ่มวิจัย จำนวน 35 คนเป็นกลุ่มควบคุม ผลการศึกษาในด้านการเจริญเติบโต และปัญหาพฤติกรรมซึ่งประเมินจากแบบสำรวจพฤติกรรม ไม่พบความแตกต่างในระหว่าง 2 กลุ่มในด้านพัฒนาการซึ่งประเมินจาก *Thai intellectual assessment score* พบว่าเด็กที่เกิดจากมารดาติดเชื้อเอชไอวีนั้นมีระดับพัฒนาการต่ำกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p = 0.03$) โดยพบว่าร้อยละ 20 ของเด็กกลุ่มนี้มีระดับพัฒนาการต่ำกว่าเกณฑ์มาตรฐาน ($DQ \leq 89$) เมื่อเทียบกับกลุ่มควบคุมซึ่งพบเพียงร้อยละ 11 และปัจจัยเสี่ยงคือ รายได้ของครอบครัวที่ต่ำ และ ได้รับการเลี้ยงดูโดยญาติเมื่อเปรียบเทียบกับเด็กที่ได้รับการเลี้ยงดูโดยบิดามารดา ดังนั้นจึงควรส่งเสริมให้มีการกระตุ้นพัฒนาการในเด็กกลุ่มนี้