

## The causes of delayed speech and language development in children at out patient clinic of the pediatric department, King Chulalongkorn Memorial Hospital

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**Objective** : *To analyze the causes of delayed speech and language development in children at outpatient pediatric clinic*

**Setting** : *Outpatient clinic, Department of Pediatrics, King Chulalongkorn Memorial Hospital*

**Design** : *Crosssectional, descriptive study*

**Patients** : *Children presenting with delayed speech and language development to the pediatric outpatient clinic, King Chulalongkorn Memorial Hospital between September 1, 1999 to August 31, 2000.*

**Method** : *A complete history of prenatal, perinatal and postnatal risk factors, family history, illness, child rearing practices, parental education and income were taken by interviewing the parents. A complete physical examination, audiologic evaluation and developmental or intellectual test were done on all of the patients by the pediatrician, audiologist and psychiatrist, respectively.*

**Results** : *A total of 47 children completed the study. Male to female ratio was 3.2:1. The peak age incidence was 2-3 years with the mean age of  $28.8 \pm 5.8$  months old (mean  $\pm$  SD). Most of the patients had multiple causes of delayed*

*speech and language development. The most common causes was inadequate child rearing and improper stimulation (70.2 %). The others were mental retardation (46.8 %), autistic and pervasive developmental disorder (19.1 %), microcephaly (10.6 %) and hearing loss (8.5 %). Most of the parental income was in the range of 10,001-20,000 Bahts per month (43 %). 32 % of the fathers and 37 % of mothers had finished their education at the primary school level.*

**Conclusion** : *Most of the patients had multiple causes of delayed speech and language development and the most common cause were inadequate child rearing practice and improper stimulation.*

**Key words** : *Delayed speech and language development.*

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- วัตถุประสงค์** : เพื่อศึกษาสาเหตุของการพูดช้าในผู้ป่วยเด็กที่มาปรึกษาด้วยเรื่องพูดช้ากว่าวัยในคลินิกผู้ป่วยนอกแผนกกุมารเวชศาสตร์ โรงพยาบาลจุฬาลงกรณ์
- สถานที่ทำการศึกษา** : คลินิกผู้ป่วยนอก แผนกกุมารเวชศาสตร์ โรงพยาบาลจุฬาลงกรณ์
- รูปแบบการวิจัย** : การสำรวจแบบตัดขวาง
- ผู้ป่วยที่ทำการศึกษา** : เด็กที่มาปรึกษาเรื่องพูดช้ากว่าวัยที่คลินิกผู้ป่วยนอก ฝ่ายกุมารเวชศาสตร์ โรงพยาบาลจุฬาลงกรณ์ ตั้งแต่ 1 กันยายน พ.ศ. 2542 ถึง 31 สิงหาคม พ.ศ. 2543
- วิธีการศึกษา-วัดผล** : ทำการบันทึกข้อมูลด้านประวัติการตั้งครรภ์และการคลอด, ประวัติครอบครัว, การเจ็บป่วย, การเลี้ยงดู, รายได้ของครอบครัว และระดับการศึกษาของบิดามารดา ซึ่งผู้ป่วยทุกรายจะได้รับการตรวจร่างกาย, ส่งตรวจการได้ยิน และส่งตรวจวัดระดับสติปัญญา
- ผลการศึกษา** : จำนวนผู้ป่วยทั้งหมด 47 คน ชาย:หญิง = 3.2:1 อายุที่มาปรึกษามากคือ ช่วงอายุ 2-3 ปี โดยมีอายุเฉลี่ย  $28.8 \pm 5.8$  เดือน (ค่าเฉลี่ย  $\pm$  ค่าเบี่ยงเบนมาตรฐาน) ในผู้ป่วยส่วนใหญ่พบหลายสาเหตุร่วมกัน สาเหตุที่พบเรียงลำดับจากมากไปน้อย คือ การเลี้ยงดูไม่เหมาะสมและขาดการกระตุ้นจากสิ่งแวดล้อม (ร้อยละ 70.2), ระดับสติปัญญาต่ำกว่าเกณฑ์ (ร้อยละ 46.8) ออทิสติก (ร้อยละ 19.1), ศีรษะเล็กเมื่อเทียบกับอายุ (ร้อยละ 10.6) และปัญหาการได้ยิน (ร้อยละ 8.5) ครอบครัวส่วนใหญ่ (ร้อยละ 43) มีรายได้อยู่ในช่วง 10,001 - 20,000 บาทต่อเดือน และระดับการศึกษาสูงสุดของบิดามารดาส่วนใหญ่อยู่ในระดับประถมศึกษา (ร้อยละ 32 และร้อยละ 37 ตามลำดับ)
- สรุป** : ผู้ป่วยพูดช้ากว่าวัยส่วนใหญ่เกิดจากหลายสาเหตุร่วมกัน โดยมีสาเหตุที่พบมากที่สุด คือ การเลี้ยงดูไม่เหมาะสมและขาดการกระตุ้นจากสิ่งแวดล้อม

Parents frequently express concerns to pediatrician about their toddler's or preschooler's language. This is a relatively common problem that pediatricians can expect to confront in practices. Delayed development of speech and language are the most common symptoms of developmental disability in childhood.<sup>(1)</sup> The causes of delayed speech and language development are complex representing a close interaction between the biologic status of the child and the environment.<sup>(2)</sup> It may be due to disorders of input (hearing impairment, visual impairment), disorders of central nervous system processing (mental retardation, developmental language disorders, dysarthria) or disorders of output (anatomic abnormalities of the vocal tract).<sup>(1)</sup>

Direct assessment of speech and language development in the infant and toddler may be difficult. They are often subdued or fearful in the doctor's office. Therefore, obtaining a precise history of the infant's language milestones from the parents becomes most important.

At the out-patient clinic of the pediatric department, there are an increasing number of parents who bring their children for evaluation because of delayed speech and language development. It is interesting to know the causes of the problems so that early identification, early prevention and early intervention can be done.

### **Patients and method**

From September, 1999 to August 2000, all of new patients with delayed speech and language development who came to pediatric outpatient clinic were evaluated thoroughly. The indications of the

speech-language evaluation are shown in table 1.<sup>(3)</sup> A complete history of prenatal, perinatal and postnatal risk factors, family history, illness, family patterns regarding caretaking and language interactions, parental education and income were taken by interviewing the parents. The complete physical examination, audiologic evaluation and developmental or intellectual test were done on all of the patients by the pediatrician, audiologist and psychiatrist respectively. The developmental or intellectual test was done by using Gesell developmental schedule<sup>(4)</sup> or Stanford Binet form LM test. If DQ (Developmental Quotient) or IQ (Intellectual Quotient) was less than 75 (2 standard deviation below the mean and  $\pm 5$  for standard error of measurement), the diagnosis of delayed development or mental retardation was made. All of the patients were referred to a developmental pediatrician and also a speech pathologist for complete evaluation and early intervention.

The patients with major congenital malformations, chromosome abnormalities or cerebral palsy were excluded. The patients with delayed speech and language development who went directly to the out-patient clinic of psychiatric department because suspected of autism and patients who went to out-patient clinic of ENT department because suspected of hearing loss were also not included in the study.

During one year period of the study, 52 new patients with delayed speech and language development came to pediatric out-patient clinic. Five of them follow up were lost, but from their history and physical exams, there were no evidence of deafness or autism in these patients. A total of 47 patients completed the study.

**Table 1.** Indications for speech-language evaluation.<sup>(3)</sup>

Age at which Referral is indicated	Indication for referral
Birth - 6 months	No response to environmental sounds or voices
3 - 4 months	No cooing or comfort sounds, crying only
1 year	No response to the sound of people talking No babbling or stopped babbling
2 years	No comprehension when spoken to Fewer than 10-20 words
2 ½ years	No phrases of two or more words Very limited vocabulary Not beginning to answer simple questions Speech entirely unintelligible
3 years	No short sentences Not engaging in simple conversation Speech largely unintelligible
4 years	Difficulty learning new concepts Difficulty explaining events No complete sentences Difficulty following two-step directions Still echoing speech Speech unclear

## Result

### Health of the patients

Thirty-six patients were male and 11 were female, giving a ratio of male to female of 3.2:1. The peak age incidence was 2-3 years with the mean age of  $28.8 \pm 5.8$  months (mean  $\pm$  SD). The maximum age of the patient was 4 years and the minimum age was 1 year 8 months.(Table 2) There were 2 patients (4.25%) whose mothers had pregnancy complications: 1 with placenta previa and another one with premature contraction. The majority of the patients were born in good condition. Forty patients were born at term,

7 patients were born premature. Eleven patients (23%) weighed less than 2500 g.(Table 3). There were 4 patients (8.5%) with respiratory distress at birth which required an oxygen box (1 patient) and respirator (3 patients). Eleven patients (23.4%) had jaundice which required phototherapy. None of them had exchange transfusion. Post-natal complication included minor head trauma(7 patients, 14.9%), one episode of febrile convulsion (2 patients, 4.25%), acute otitis media (1 patient), reactive airway disease (1 patient) and thalassemia HbH with constant spring (1 patient).

**Table 2.** Number of patients included in the study by age and sex.

Age	Male	Female	Total	%
6 mo - 1yr	0	0	0	0
1 - 2 yr	10	1	11	23.4
2 - 3 yr	24	9	33	70.2
3 - 4 yr	2	1	3	6.4
<b>Total</b>	<b>36</b>	<b>11</b>	<b>47</b>	<b>100</b>

**Table 3.** Number of patients by birthweight.

Birthweight (g)	Number	%
1500-1999	4	9
2000-2499	7	15
2500-2999	13	28
3000-3499	15	32
3500-4000	8	17
<b>Total</b>	<b>47</b>	<b>100</b>

There were 6 patients with minor congenital anomalies, each patient had one anomaly including tongue tie (2 patients), small VSD, mild valvular aortic stenosis, imperforated anus and vascular ring.

### Family History

In terms of family history, 14 patients (30 %) had a positive family history of delayed speech and language development, 2 patients (4.25 %) had cousins with mental retardation. None had a family history of deafness. Most of the parental income was in the range of 10,001-20,000 Bahts per month (43 %). 32 % of the fathers and 37 % of mothers had finished their highest level of education at the primary school level. (Table 4, 5).

**Table 4.** Number of patient by paternal education.

Educational level	number of patients	%
≤ pratom 4	4	9
Pratom 5 - 7	11	23
Mathayom 1 - 3	7	15
Mathayom 4 - 6	8	17
Associated degree	5	11
≥ undergraduated	12	26
<b>Total</b>	<b>47</b>	<b>100</b>

**Table 5.** Number of patients by maternal education.

Educational level	number of patients	%
≤ pratom 4	5	11
Pratom 5 - 7	12	26
Mathayom 1 - 3	7	15
Mathayom 4 - 6	11	23
Associated degree	3	6
≥ undergraduated	9	19
<b>Total</b>	<b>47</b>	<b>100</b>

### Growth

Most of the patients had growth pattern comparable to a standard growth curve, except 5 patients (10.6 %) who had microcephaly (head circumference was less than two standard deviation below the mean)

### Autistic and pervasive developmental disorders :

The criteria from the Diagnostic and Statistical Manual of Mental disorders (DSM), Fourth edition<sup>(5)</sup> was used in making a diagnosis of autistic disorder and pervasive developmental disorders (PDDs). Observation of child's play alone during history-taking from the parents and observation of parents at play with

the child is helpful in identifying autistic patients. Nine patients (19.1%) were diagnosed as having autistic disorder in this study.

### Hearing Evaluation and developmental evaluation

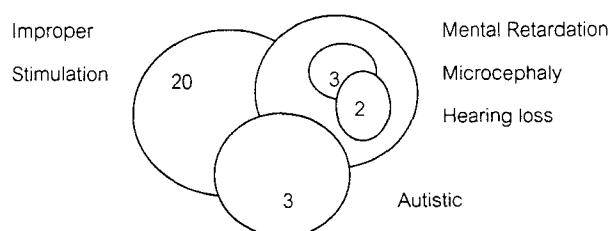
All of the patients received a hearing evaluation, forty-three patients (91.5 %) had normal results. Four patients (8.5 %) had severe bilateral sensorineural hearing loss. For developmental or intellectual quotient, 25 patients (53.2 %) had normal result, 22 patients (46.8 %) had DQ or IQ in the retardation ranges (score 50 - 75).

### Child rearing practices

Two languages (bilingual) were used regularly in 11 families (23 %), while 36 families (77 %) used only one language. Most of the patients (80.9 %) watched television more than 2 hours per day. Thirty two patients (70.2 %) were raised in the family with inadequate child rearing practices and improper stimulation ie, left the child to play alone for a long period of time, didn't have enough interaction with the child, didn't know how to stimulate the child to speak, used TV as a baby-sitter etc.

Overall, most of patients had multiple causes of delayed speech and language development. The most common causes was inadequate child rearing practices and improper stimulation (70.2 %). The others were mental retardation (46.8 %), autistic and pervasive developmental disorders (19.1%), microcephaly (10.6 %) and hearing loss (8.5 %) (Figure 1 and Table 6). In this study, there was no patient with diagnosis of developmental language disorders (DLD). Developmental language disorders are clinically heterogenous group of disorders

characterized by selective impairment of speech and/or language development in the absence of hearing impairment, mental retardation, dysarthria or anatomic abnormalities of vocal tract.<sup>(1,6)</sup>



**Figure 1.** Relationship of number of patients by the causes of delayed speech and language Development.

**Table 6.** Number of patients by the causes of delayed speech and language development.

Causes	Number of patients	%
1. Inadequate child rearing practices and improper stimulation	33	70.2
2. Mental retardation	22	46.8
3. Autistic and pervasive developmental disorder	9	19.1
4. Microcephaly	5	10.6
5. Hearing loss	4	8.5

### Discussion

In this study we found that the male to female ratio of patients with delayed speech and language development was 3.2:1, was similar to other studies<sup>(7-9)</sup> which found that it occurred in boys more than girls. Parents brought their children for evaluation at the age around 2-3 years. This may be because

during this time, parents were usually interested in progression of their child's language development. We found that most of the parents had their highest education level at the primary school level, comparable to Klackenburg study.<sup>(8)</sup> He reported that the education of the mother of patient with delayed speech was lower than normal speech patient's mother. Most of parents (43 %) had low income (10,001-20,000 Bahts per month), this was similar to the study of Klackenberg.<sup>(8)</sup> Children who come from lower class homes generally acquire language more slowly.<sup>(10)</sup> The association between low socioeconomic status-SES (family income, occupational status, or parental education level) and speech and language disorders has been described by several investigators.<sup>(8,11)</sup> Low SES is associated with many forms of disadvantage, which further complicates the relationship between low SES and language development.

In term of child rearing practices, 80.9 % of the patients watched TV more than 2 hours per day. This passive activity does very little to promote communication skill. Tantitanawat<sup>(12)</sup> found that 41 % of Thai children watched TV more than 15 hours a week and watching TV more than 1-2 hours a day would make children get decreasing interest in education.<sup>(13)</sup> 70.2 % of the patients were raised in a family with inadequate child rearing practices and improper stimulation. It is important to keep in mind that communication is an interactive social process but unfortunately, today's parents spend less and less time with their children. We think that this should be the most important factor in children with delayed speech and language development since normal language development requires proper environmental

stimulation and interactive participation between the child and the care-taker, Also, a child's language development is a function of both innate communication abilities and an environment that may or may not support their development.<sup>(14)</sup>

Capute<sup>(15)</sup> and Coplan<sup>(16)</sup> are doubtful that language deficits can result solely from decreased language stimulation. Further research should be done to answer this suspicion. It may also be interesting to know, how many children in a group of children with normal language development will have the same quality of care as we described as "improper stimulation".

When we looked at the correlation between in adequate child rearing practice and parental income, we found that in three groups of income; <10,000, 10,001-20,000 and > 20,000 Bahts per month, there were almost the same number of patients in each group, 36.3 %, 30.3 %, 33.4 % respectively. This may mean that even in the high income family, parents may not have enough knowledge of how to interactively communicate with their child to booster language development.

From our study, most of the patients had multiple causes of delayed speech and language development. Bax and colleagues<sup>(2)</sup> found that the causes were complicated by different factors.

Microcephaly may indicate the presence of a structural brain malformation and may be associate with mental retardation.<sup>(6)</sup> We found that 10.6 % of our patients had microcephaly and all of them had mental retardation. 46.8 % of our patients had globally delayed development or mental retardation. Delayed language development is universal among mentally retarded children,<sup>(1)</sup> therefore the child with delayed language



development should be monitored since the child may turn out to have mental retardation at a later age. In four patients (8.5 %) who had bilateral severe sensorineural hearing loss, one was born prematurely with a birth weight 1500 gm, two had microcephaly and all of the four patients had development in the retarded ranges. It is difficult to detect hearing loss in an infant or toddler in a pediatric office setting. Thus the medical history or physical examination will usually suggest the risk of hearing loss (eg, prematurity, meningitis, intrauterine growth retardation, microcephaly, abnormalities of external. ears, etc).<sup>(1)</sup> A family history of deafness and a history of delayed speech suggests the possibility of hearing loss. All such children should be referred for formal audiologic evaluation by the audiologist as soon as possible so that prompt intervention can be initiated. 4 of 9 patients who had autistic disorders also had improper stimulation as the causes of delayed speech and language development.

Delayed speech and language development is a relatively common problem in pediatric practices with complex causes , therefore, pediatricians should always be alert to parental concerns about delayed speech and language development and should include screening of speech and language skills in their regular well-child visit. Children who are at high risk for impairment in communication skills, such as those who were born prematurely or who have hearing loss or other developmental delays, should be assessed at regular intervals. Referral to a speech pathologist can then be made whenever a delay is suspected. With effective intervention and education of their families, most speech and language skills are more likely to improve.

Since the purpose of this study was to identify the causes of delayed speech and language development in the patients who came directly to the pediatric out-patient clinic, the findings were different from other studies as mentioned. Also as this study represented only a small number of patients, a longer-term and collaborative study are needed.

### Summary

In this study of new patients with delayed speech and language development at a pediatric out-patient clinic, the causes were multiple and different from other studies. The most common causes were improper stimulation and inadequate child rearing practices. The others were mental retardation, autistic and pervasive developmental disorders, microcephaly and hearing loss in a decreasing frequency as a cause of delayed speech and language development. However, further research to look at family patterns regarding caretaking and language interactions in a normal population is being planned.

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