



A Preliminary Report for the Touring Base Model Evaluation of the Children with Developmental Delay in Kinmen

Chin-Bin Yeh¹

¹Department of Psychiatry, National Defense Medical Center, Tri-Service General Hospital, Taipei, Taiwan, Republic of China

Background: The purpose of this study was to analyze the characteristics of the children with developmental delays (DDs) in Kinmen. The methods of evaluation for the children with DDs were also discussed as references for other rural areas in Taiwan.

Materials and Methods: There were 73 children recruited into our study in 2003 while starting the project of early evaluation for children with DDs in Kinmen. All the children were classified into 6 functional delay groups: Cognitive, speech, motor, social/emotional, pervasive, and nonspecific DDs. **Results:** Speech DD (46.7%) was the most frequently seen in all types of DDs. The second was the motor DD type (34.7%). Both the cognitive and pervasive types were the third frequent types of DDs (25.3%). It was shown that the speech DD types were the most frequently seen both in Taiwan and Kinmen, but the motor DD type was more frequent in Kinmen than in Taiwan. **Conclusions:** Our findings suggested that there are various factors related to the types of DDs. This result of our study could provide the future directions of the early evaluation program for the children with DD in rural areas.

Key words: Developmental delay, touring base model, children

INTRODUCTION

Developmental delay (DD) is referred to children do not achieve developmental milestones. Children with DD have a variety of developmental dysfunctions. It is important that identifying those children with DDs as early as possible to provide early intervention for them.¹

The law with regard to the child welfare including the early intervention for DD was edited in Taiwan in 1993. The early intervention programs began, and there were 10 developmental centers were setup since then to the year 2000. However, the center just started in Kinmen since 2003. Kinmen is an off-shore island nearby mainland China. The population was about 50,000. The advantage for this cross section study is that the referral of sample was mainly from school base that was in the community. Besides, this island was relatively conservatory environment since it was not allowed people to immigrate in the past 50 years due to the military requirement.

Besides, there was only an early intervention center. Therefore, the data might be more representative for the epidemiological investigation when compared to the data that were collected from the clinical cases that they might visit different medical centers and caused the overlapping and difficulty in the analysis of data.

Moreover, the report from the touring base model (TBM) for evaluation of DDs was very limited in Taiwan because of the more convenience of visiting pediatrician. The TBM was done in Kinmen not because of the far-reaching area to visit physicians but the lacking of trained experts there. The data from our results will be more comprehensive because of the strong motivation and more accessible of the children with DDs and their parents to receive evaluations. The method of doing the TBM in our study could also provide future direction of the early evaluation for the children with DDs in the rural area.

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Corresponding Author: Dr. Chin-Bin Yeh, Department of Psychiatry, Tri-Service General Hospital, No. 325, Section 2, Chenggung Road, Neihs District, Taipei 104, Taiwan, Republic of China. Tel: +886-87927220; Fax: +886-87927221. E-mail: chinbinyeh@gmail.com

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MATERIALS AND METHODS

The cases were referred to early intervention center for DDs by either parents, teacher, or physicians. The case managers will contact with the parents of the cases and collect the data in the first step. The second step is to arrange the evaluation in the center which was done by different trained experts including a pediatric neurologist, child psychiatrist, speech therapist, psychologist, physical therapist, and occupational therapist from Taiwan. The cases were evaluated alternatively by the above experts in the same day. All the children were classified into 6 functional delay groups: Cognitive, speech, motor, social/emotional, pervasive, and nonspecific DDs. The cognitive function delay were measured by psychologist with neuropsychological tests with Leiter International Performance Scale, Revised (Leiter-R), Bayley Scales of Infant Development. Speech DD indicated a deficit in articulation function, verbal expression, comprehension, or the mixtures of the above conditions. Motor DD were defined as a delay in fine and/or motor skills or the integration of the other developmental domains. Children with core features of observed qualitative deficits in social skills, nonverbal communication, and repetitive/restrictive patterns of behavior were placed in the social/emotional DD group. The children with visual, hearing and/or sensory integration (SI) dysfunction were placed in the nonspecific DD group. Children whose developmental quotients were <80% in 2 or more domains were placed in the pervasive DD group. All the data were collected again by case managers at the same time. Once the diagnosis was setup, the early intervention program was arranged for them after the discussion with their parents.

The children with DDs were brought to visit the physician either pediatric neurologist or child psychologist or the doctor of pediatric rehabilitation in the first stop. All the cases were referred to receive detailed investigation across specialized experts. The children with DDs were seen by physicians as the first evaluation step if they have brain/neuromuscular, psychological/mental, genetic or congenital, visual, hearing, and other diseases. The pediatric neurologist will visit the children with brain lesions such as cerebral palsy, hypoxic encephalopathy, microcephaly, central nervous system infection, traumatic brain injury, epilepsy, hydrocephalus, tumor, and motor neuron disease, peripheral neuropathy, myopathy, etc., The children with mental retardation, speech delay, articulation disorder, attention-deficit/hyperactive disorder, autism, SI dysfunction, and nonspecific psychomotor retardation were seen by child psychiatrist. Children with other chromosomal, genetic, congenital, metabolic, orthopedic, cardiovascular, digestive, or urinary pathologies were seen by a pediatrician. Those cases were brought to the doctor to survey

for the need of rehabilitation. They were alternatively referred to the psychologist, speech therapist, physical therapist, speech therapist, and occupational therapist for further evaluation and arrange the early intervention programs. All the physicians and therapists were coming from Taiwan. The evaluations were done on the weekend of each week.

RESULTS

The referral sources for the cases were analyzed. It showed that most cases were referred by teacher in the education system (82%). Only 6 of them (9%) referred by parents, 4 of them (5%) by physicians, 3 of them (4%) by their relatives. The types of DDs are shown in Table 1. There were 48 boys (66%) and 25 girls (34%) recruited. The children under age 6 were recorded 4410 in Kinmen (2321 boys and 2089 girls). The prevalence rate of DD under age 6 in Kinmen was around 1.7% (2.1% for boys and 1.2% for girls) in 2003. The prevalence rate in the boys was significantly higher than in the girls ($\chi^2 = 5.1$, $P = 0.025$). The age and gender distribution for the children with different DDs are shown in Tables 1 and 2, respectively.

Table 1: The age distribution of the children with different types of developmental delay

DD types	The number of children with DDs of different age							Total
	<1	1-2*	2-3	3-4	4-5	5-6	6-7	
Cognition	0	4	2	2	3	4	4	19
Speech	0	7	7	4	5	8	4	35
Motor	0	9	2	1	2	5	4	23
Social and emotional	0	0	0	1	0	2	2	5
Pervasive	2	6	0	3	2	4	2	19
Nonspecific	1	1	1	0	1	0	1	5

*1-2 means the age was older or equal to one but <2. DDs = Developmental delays

Table 2: The gender distribution of the children with different types of developmental delay

DD types	The number of children with DDs	
	Boys	Girls
Cognition	11	8
Speech	24	11
Motor	16	7
Social and emotional	3	2
Pervasive	8	11
Nonspecific	3	2

DDs = Developmental delays

From the point of view of the analysis of the process of evaluation, the children with DDs received 133 times for the evaluations and/or the early intervention programs in the year. 66 provided by child psychiatrists, 42 by child neurologists, 70 by pediatric rehabilitation physician, 156 by occupational therapist, 176 by physical therapist, 113 by speech therapist, and 49 by child psychologist.

The parenting skills training and the early intervention programs were also arranged for the parents and their families. There were 11 times of lectures arranged. The titles were worthy of reference as follows: The role of the medical therapist in the model of early intervention, the problems in child development, the perceptual-motor integration in children, The early detection of DD, the evaluation and early intervention of children with DD. The children with rare diseases, rehabilitation at home by parents with the ball, The physical therapy in the children with DDs, The speech therapy in the children with DDs, The role of social worker in the early intervention program, the cognitive developmental in the children with DDs.

DISCUSSION

The prevalence rate of DDs was found about 1.7% of children under age 6 in Kinmen was lower than the expected rate of about 3% reported by previous studies in other countries.^{2,4} It might indicate that there were still lots of children with DDs did not recruit into our study. There were only two cases under 1 year old recruited. The referral system may not good enough in sensitivity only by teachers or parents. Most children recruited into our study were recognized by their teacher instead of their parents. The previous study reported that about two third of children with functional delay did not recognized by their parents. The parents response better to the general type of questions than the functional problem.² As shown in the result of our study, the children with DDs in our study under age two were mostly motor developmental type. We were speculating that their parents or teachers could tell the difference of delay in motor development with the normal average level. In contrast to this, the speech DD type was distributed mostly among the age older than two. It might reflect that the parents' attitude of more tolerance to speech DD. From the view of normal child development, the speech was present after the age about 1 year old. The speech DD types could be recognized and referred to the parents or teachers had the ability of differentiation of the level between normal and abnormal. At the same time, we also found that the majority of speech DD group were boys but of motor DD group were girls [Table 2]. As we know, the girls were better and faster speech development than boys in normal population. It might represent the gender distribution of developmental stages

of normal child development.^{4,5} Therefore, the screening procedure should provide more sensitive method to detect the functional delay other than the speech domain before age two. In addition to the improvement of the instruments, the education for the knowledge of early intervention of DD to the parents is also important. Actually, we were doing another screening method to evaluate the children under age 6 in Kinmen with the more specific but short question about the functional development delay to each child from age 3–6 in kindergarten the next year after this study. The screening procedures were done by special teachers in a teamwork too. The children were brought to a center to screen by them in the first step. The children suspected to have DDs were evaluated by the tour base model in the second step. The screening step was done by trained teachers. The method became more active and was not dependent to the referral by teachers or parents. However, the cost was supposed to be more than before. We would like report the result in the future.

The functional delay types of the children with DDs in our study were different when compared to the results done in the medical center in Taiwan. The previous study showed that the majority of the cases were the global types.⁶ The result of our study showed the majority of cases were speech DD types. Furthermore, there was much more prevalence rate of cognitive development delay type in our study (19% vs. 2%).⁶ The difference might come from several reasons including the different in the classification of the functional delay, measurement tools, the evaluation process, the referral sources, and the investigators. The tools they used to survey were the Chinese Children Developmental Inventory, Peabody Developmental Motor Scale, Peabody Picture Vocabulary Test, Gross Motor Functional Measure, Wechsler Preschool and Primary Scale of Intelligence. The tools we used were Leiter International Performance Scale, Revised (Leiter-R), Bayley Scales of Infant Development, The test of visual motor integration (VMI). The tools used in our study as above could measure nonverbal rather than verbal performance. Therefore, it could lower the influence of speech delay to the evaluation of the cognitive development since lots of the children with DDs had the problems of delay in language development. Moreover, the advantage to use the VMI to measure the motor development is not only the gross or fine motor development but the level of the integration with perceptual function. The evaluation of the integration of perceptuomotor function meant to detect more subtle functional problems such as handwriting performance than the global motor development.^{7,8}

By the ways of the TBM, the children could be evaluated by different experts more efficiently and professionally. Instead of interviewing the parents with the screening question about the general delay, we could approach the children with more

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specific measurement tools. The previous study reported that only 17% of the children with functional delay could receive special service.² However, almost everyone recruited into our study could receive early intervention program. It might suggest that their parents' motivation to receive intervention was stronger compared to the Western country. In addition to the parent's attitude, the tour base model might be used for the rural area because the accessible and more specialization. There was study pointed out that the local quality of diagnosing developmental disorders can be improved by intensifying the cooperation between the experts of the different fields in the area far away from the medical center.⁹ Those experts were from different hospitals and had different specificity in our team. However, there were some issues related to the cooperation with regards to the different disciplines.⁹

To our knowledge, this is the first paper with regard to the study of early intervention program used in the off-shore island in Taiwan.

CONCLUSIONS

The results of our study could provide the future direction for the early evaluation and/or intervention program in the rural area in Taiwan. The TBM was one of the efficient and professional ways to overcome the problems of insufficient medical trained staff in the local area. The limitation of this study was the smaller sample size although this cross-section study was representative. There were studies indicated that the affective symptoms of the mother of children with DDs were common. The future prospective study should be designed to follow-up the cases to investigate the relationship between the different kinds of intervention and the course/outcome of the DD types.

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Conflicts of interest

There are no conflicts of interest.

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