Full paper

Sains Humanika

Factors Associated with Diagnosis of Autism Spectrum Disorder (ASD) under the Age of 24 Months in Malaysia

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Abstract

A total of 79 mothers of children with autism spectrum disorder (ASD) who were born within the period of 1998 to 2008 in Malaysia, were selected to answer the questionnaire in this study. The Childhood Autism Rating Scale (CARS) was adapted for parents (CARS-P) to assess the degree of autistic symptoms perceived by mothers. Difficulty in learning to speak was the first symptom found by most of mothers (above 60%). The binary logical regression result found the higher CARS-P score (severity of autistic symptom perceived by mothers) as predictor of the higher probability on early diagnosis of ASD under the age of 24 months. Larger samples are suggested in future study.

Keywords: Autism spectrum disorder (ASD); 24 months; diagnosis

Abstrak

Sebanyak 79 orang ibu kepada kanak-kanak autisme yang dikenali sebagai *autism spectrum disorder (ASD)* yang lahir dalam tempoh 1998-2008 di Malaysia telah dipilih untuk menjawab soal selidik dalam kajian ini. Instrumen soal selidik Childhood Autism Rating Scale (CARS) telah diubah suai menjadi Childhood Autism Rating Scale for Parents (CARS-P) bagi mengukur kadar simptom autisme pada tanggapan ibu. Kesukaran dalam belajar bertutur merupakan simptom pertama yang dikenal pasti oleh kebanyakan ibu dengan kadar 60% ke atas. Keputusan *binary logical regression* mendapati skor CARS-P yang tinggi sebagai peramal yang lebih tinggi dalam menjalankan diagnosis awal bagi ASD di bawah usia 24 bulan. Sampel yang besar disarankan bagi kajian pada masa akan datang.

Kata kunci: Autism spectrum disorder (ASD); 24 bulan; diagnosis

1.0 INTRODUCTION

It is rare to diagnose ASD (Autism Spectrum Disorder) under three years old (Mandell, Walrath, Manteuffel, Sgro & Pinto- Martin, 2005). Diagnosis of ASD in early childhood is difficult. But increasing researches supported that the reliable diagnosis can be done before the age of two years old due to the progress of screening and assessment tools, techniques and increasing social awareness (Zwaigenbaum, Bryson, Lord, Rogers, Carter, Carver, Chawarska, Constantino, Dawson, Dobkins, Fein, Iverson, Klin, Landa, Messinger, Ozonoff, Sigman, Stone, Tager-Flusberg & Yirmiya, 2009; Chawarska, Klin, Paul & Volkmar, 2007; Eaves & Ho, 2004). The decrease in age of diagnosis was also found in some studies (Mandell, Novak & Zubritsky, 2005).

American Academy of Pediatrics suggested screening to identify autistic-specific symptoms should be attempted for all children at the age of 18 months, and repeated screening at the age of 24 months so that early diagnosis and intervention of ASD could be implemented (Johnson, Myers & American Academy of Pediatrics, 2007; American Academy of Pediatrics, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee & Medical Home Initiatives for Children With Special Needs Project Advisory Committee, 2006). A repeated evaluation on autism-specific screening at the age of 24 months and early diagnosis of ASD is important to raise parents' concerns for the need of access to services as early as possible for their children. The sooner ASD is identified and diagnosed, the sooner the time to start early intervention which is crucial and associated with improved developmental outcome (Lubetsky, McGonigle, & Handen, 2008; Gupta, Hyman, Johnson, Bryant, Byers, Kallen, Levy, Myers, Rosenblatt & Yeargin-Allsopp, 2007; Committee on Children with Disabilities, 2001; Rogers, 1998).

Various factors are associated with the age of a child when diagnosis of ASD was carried out. Previous researches to identify the factors associated with age of a child being diagnosed with ASD have been studied in different areas, which found various result. A race difference study found that black children tended to get late diagnosis compared to white children, which may be related to lower family income (Mandell, Listerud, Levy & Pinto-Martin, 2002). In a population-based study in California also found that non-white and Hispanic children with higher communication function, low SES were also diagnosed later; however ASD Children with white, old and well-educated parents were diagnosed earlier (Fountain, King & Peter Bearman, 2010). Research by Wiggins, Baio and Rice.

(2006) emphasized on the association between the degree of symptoms on autism and mean age of first diagnosis, which found that children with ASD were first evaluated at 48 months but usually diagnosed after 61 months, the severity of symptoms on ASD were the predictor of age at first evaluation and fist ASD diagnosis. A survey on 969 caregivers of children with ASD in Pennsylvania found that near-poor, presence of hearing impairment were associated with late diagnosis, however severe language deficits, hand flapping, toe walking, and sustained odd play were associated with the decrease in the age of diagnosis (Mandell, Novak & Zubritsky, 2005). Other findings identified male, having an IQ of 70 or lower, and having experienced developmental regression were factors associated with a younger age of identification (Shattuck, Durkin, Maenner, Newschaffer, Mandell ,Wiggins, Lee, Rice, Giarelli, Kirby R, Baio J, Pinto-Martin, & Cuniff, 2009).

Findings from previous researches as discussed above highlight the importance of early diagnosis of ASD and the clinical and home based factors associated with diagnosis age of ASD. But the result is not consistent and most were conducted in western context. The current study is to identify the factors associated with early diagnosis of ASD under the age of 24 months in Malaysia context.

■2.0 OBJECTIVES

The objectives of this study is firstly, to identify the first symptom found by mothers of children with ASD and secondly, to identify home and child related factors associated with early diagnosis of ASD under the age of 24 months.

■3.0 METHOD

This is a quantitative study using survey method. Data collection, instrument and statistical methods used in this study are illustrated below.

Table 1 Summary of sample composition

		diagnosis of ASD		chi square	p
		≤24 months	＞24 month		
age	3-5y	8	19	0.40	0.82
	6-9y	8	27		
	10-14y	4	13		

3.1 Data Collection

Mothers of children diagnosed with ASD who were born in the year 1998 to 2008, were selected to answer the questionnaire. A total of 79 mothers completed the questionnaire. Table 1 is the sample composition regarding the child's age and age at diagnosis of ASD before or after 24 months. Chi-square test showed that there is no difference on sample distribution between diagnosis of ASD before and after 24 months among the ages of three to five, six to nine and 10 to 14 years old.

3.2 Measurement

The Childhood Autism Rating Scale (CARS) (Schopler, Reichler & Renner, 1986) is a test intended for the diagnosis of autism for clinicians. The manual reports an average interrater reliability of 0.71 *(ri* = 280), and an internal consistency (coefficient alpha) of 0.94 (Schopler Reichler and Renner, 1986). The researcher has rephrased and modified some items for parents to respond easily.

3.3 Statistical Method

Descriptive analysis was applied to present the outline of data in this study. Two steps of logistic regression were conducted to identify the factors associated with diagnosis of ASD before or after 24 months. First is simple logistic regression to identify the potential factors, which was suggested to determine the significant P value at 0.25. Second, the potential factors found in the first step were introduced into the logistic regression to find out the significant factors.

■4.0 RESULTS

As shown in Table 2, speaking problem is found to be the first symptom of autism by 60% of the mothers with children diagnosed with ASD under the age of 24 months, followed by playing alone (45%), communication with parents (40%), odd behavior (35%), and self injury (5%). For mothers of children diagnosed with ASD after the age of 24 months, the highest report on first ASD symptom is still difficulty in learning to speak (69.49%), followed by odd behavior (37.29%), playing alone (32.20%), communication with parents (30.51%), and others (8.47%). However there is no report on self injury as the first ASD symptom at this stage. Simple logistic regression was applied to detect potential factors associated with early diagnosis of ASD, which only found the P value of mothers' age and CARS-P (The Childhood Autism Rating Scale modified for parents) total score is less than 0.25. The P value of the other four variables, time spent

with children, mothers' educational level, child's gender, family income are higher than 0.25 as shown in Table 3, which will not be introduced into the following binary logistic regression. As shown in Table 4, a binary logistic regression analysis was conducted to identify the factors associated with early diagnosis of ASD (before 24 months) for 79 children with ASD.

A test of the full model against a constant only model was statistically significant, indicating that the new model including all predictors was significant (chi square = 17.058, p = 0.002 with df = 4). The H-L goodness-of-fit test was not significant, which implied that the model prediction was a well-fitting model (chi square = 9.745, p = 0.283 with df = 8). Nagelkerke's R^2 of 0.278 indicated a moderate relationship between prediction and grouping. Prediction success overall was 81% (94.9% for diagnosis with ASD after 24 months and 40% for diagnosed with ASD before 24 months).

The Wald criterion demonstrated that CARS-P total score was the significant predictor (P=0.003), which indicated that when CARS score is raised by one unit, it is 0.93 times more likely to diagnose ASD after 24 months. In other words, when mothers perceived severe ASD symptoms in their children, their children were more likely to be diagnosed with ASD before 24 months. The Wald criterion of mothers' age showed that mothers between the age of 31 to 40 years old was the significant predictor (P= 0.05), which indicated that it is 17.97 times for children to diagnose with ASD after 24 months for mothers in that particular age range compared to mothers under 20 years old. Children with younger mothers were more likely to be diagnosed for ASD before 24 months.

Table 2 First ASD symptom found by mothers of children with ASD

first symptom (frequency/%)		**learning to speak**	**odd behavior**	**playing alone**	**communication with parents**	**self injury**	**others**
age diagnosis of ASD	≤24 months	12(60%)	7(35%)	9(45%)	8(40%)	1(5%)	0(0%)
	＞24 months	41(69.49%)	22(37.29%)	19(32.20%)	18(30.51%)	0(0%)	5(8.47%)

Table 3 Summary of independent variables and simple logistic regression result

Variables		**frequency (score)**	**percentage**	**simple logistic regression(Wald)**	***P***
time spent with children(hours)	≤3h	9	11.4	3.74	0.44
	4-6h	27	34.2		
	7-9h	12	15.2		
	9-12h	17	21.5		
	≥13h	14	17.7		
mother's age (years old)	≤20y	3	3.8	6.20	0.10*
	21-30y	13	16.5		
	31-40y	44	55.7		
	≥41	19	24.1		
educational level	below secondary school	17	21.5	1.75	0.63
	secondary/middle or high school	38	48.1		
	diploma, bachelor's degree	17	21.5		
	above bachelor's degree	7	8.9		
family income	≤RM2000	4	5.1	1.87	0.60
	RM2001-5000	40	50.6		
	RM5001-8000	20	25.3		
	＞RM8000	15	19.0		
child's gender	male	68	86.1	0.03	0.87
	female	11	13.9		
CARS-P total score	≤24months	54.85		8.99	0.003*
	＞24months	44.19			

*P≤0.25

Table 4 Binary logistic regression for early diagnosis of ASD (before 24 months)

		B	S.E.	Wald	df	Sig.	Exp (B)
Step1	Mothers' age			5.78	3	0.12	
	Mothers' age(1)	1.76	1.55	1.28	1	0.26	5.80
	Mother' age(2)	2.89	1.48	3.80	1	0.05	17.97
	Mothers' age(3)	2.88	1.55	3.46	1	0.06	17.89
	CARS-P	-0.08	0.03	8.68	1	0.003	0.93
	Constant	2.41	1.67	2.09	1	0.15	11.19

■5.0 DISCUSSION

Among the most common and often first noted symptom of children with ASD are delays in speech and language development, followed by an abnormal social responsively level, medical problem, and nonspecific difficulties related to sleeping, eating, and attention (Chawarska, Paul, Klin, Hannigen, Dichtel & Volkmar, 2007; De Giacomo & Fombonne, 1998). This study also found that speech and language problem were the most common symptoms reported by mothers. Babbling usually occurred at the age between three to six months for typically developing child, uttering the first words and using single words at about 10 to 13 months. Children are able to produce complete sentences between the age of two to three years old (Moreno, 2010). Language development is fast in early childhood and easily observed as compared to other developmental aspects such as motor skill. Usually children with higher communication skills begin their diagnosis of ASD late (Fountain, King & Peter Bearman, 2010; Mandell, Novak & Zubritsky, 2005). Speaking is one of the critical mean to communicate with others. Delay or total lack of the development of spoken language is the main symptom under the impairment of verbal and nonverbal communication in ASD diagnosis criterion according to DSM-IV-TR.

Different from previous research findings, this study did not find any significant association between early diagnosis of ASD and child's age, family income, and parents' educational level. Previous research studies indicated that lower family income was associated with late diagnosis (Fountain, King & Peter Bearman, 2010; Mandell, Listerud, Levy & Pinto-Martin, 2002; Mandell, Novak & Zubritsky, 2005). This different finding may be due to fewer samples in lower income. Most samples in this study were selected from special training centers or schools. Fountain, King and Peter Bearman (2010) found that children with old and well-educated parents were diagnosed earlier. This study did found the effect of mothers' age to early diagnosis of ASD, but on the contrary, it indicated that children with mothers at the age of 31 to 40 years old were more likely to get diagnosis of ASD late.

Degree of impairment, severe language deficits, as well as other ASD related symptoms were found as the significant predictors of early diagnosis of ASD (Mandell, Novak & Zubritsky, 2005; Wiggins, Baio & Rice, 2005). This study found the significant association between severe autistic symptoms (assessed by CARS-P) and early diagnosis of ASD. Children of mothers perceived their children with severe autistic symptoms tend to be diagnosed in the younger age. Parents' report is one of the important information to diagnose of ASD. The behaviour or symptoms observed by parents may not appear in the observation of professional or clinician. It is necessary to deliver the common knowledge of ASD which may help family to identify early their children's problems and obtain the intervention and resources when their children are still young in order to get improved developmental outcome (Lubetsky, McGonigle, & Handen, 2008; Gupta, Hyman, Johnson, Bryant, Byers, Kallen, Levy, Myers, Rosenblatt & Yeargin-Allsopp, 2007; Committee on Children with Disabilities, 2001).

■6.0 CONCLUSION AND FUTURE STUDY

This study found difficulty in learning to speak was the first symptom found by most of mothers (above 60%). The severity of autistic symptom perceived by mothers was significantly associated with early diagnosis of ASD under the age of 24 months. Larger samples and more variables are suggested in the future study.

Rujukan

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