Risk Factors of Delayed Language Development among Preschool Children Attending Assiut University Hospitals

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Abstract

Background: To study the risk factors associated with Delayed Language Development (DLD) among children attending Outpatient Phoniatric Clinic of Assiut University hospitals.

Subjects and Methods: A case-control study was conducted on 150 cases with DLD aged 3-5 years attended Outpatient Phoniatric Clinic and 150 control children of the same age range with no DLD attended outpatient clinic of AssiuT University Children's Hospital. A structured interview questionnaire was used for collection of relevant data from children's caregivers.

Results: This study showed that urban residence, low birth weight, male gender, delivery by Cesarean section, parent consanguinity and presence cyanosis after birth were significantly associated with DLD.

Conclusion: It was concluded that male gender, history of perinatal events, and parent consanguinity are significant risk factors for DLD. Awareness about risk factors of DLD need to be raised among parents and health care providers for prevention, early detection and proper management.

Key Words: Delayed language development – Risk factors – Preschool children.

Introduction

LANGUAGE is defined as the conceptual processing on communication. It consists of receptive language (understanding) and expressive language (the capacity to convey information, ideas, feelings and thoughts). On the other hand, speech is a method of verbal language communication [1].

Language and speech delays as well as disorders are common, including an estimated prevalence within 5% to 12% (median, 6%) in children aged 2-5 years [2]. Delayed speech and language development are considered as the most common disabilities of children. Prevention of delayed speech and language disorder is considered a public health problem because of their high prevalence and economic cost [3].

Delayed speech and language children are those whosoever develops speech or language at a slower rate than expected however in the correct sequence, on the other hand speech disorders are defined as development of speech or language in a manner that is qualitatively beyond typical development [4].

Risk of learning disabilities is increased among speech and language delayed children once they reach school age [5].

Early detection of children at risk for speech and language impairments is important to provide early interventions essential to limit the negative impacts of delayed speech development [6]. Early examination of children at risk can lead to detection of large proportion children with delayed speech by age of 24-30 months [7].

Several factors affect language development, including birth order, premature delivery, birth weight, parental education, gender of the child, environmental factors, and family history of delayed language development [8].

This study focus on preschool children (3-5 years) which will allow for identification of those children at risk of having delayed speech to identify those in need of early intervention. A better understanding of the risk factors associated with delayed

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speech will help in the development of effective prevention program.

General objective: To promote proper health status among preschool children including proper speech and language development.

Specific objectives: To study the socio-demographic, obstetric and medical risk factors associated with delayed language development among preschool children (3-5 years) attending Outpatient Phoniatric Clinic of Assiut University Hospitals.

Subjects and Methods

Children attending the Phoniatric Outpatient Clinic of Assiut University Hospitals during the morning shift, during a four-month period, fulfilling the inclusion criteria-age range of 3-5 years and seeking medical advice for delayed language development was included in this study. The number of cases was 150. A control group of 150 children of the same age group (3-5 years) with normal language development (confirmed by physical examination) was taken from attendants of Outpatient Clinics of Assiut University Children's Hospital.

Exclusion criteria:
- Children outside the age range.
- Children previously diagnosed with neuro-developmental problems for example cerebral palsy and children with cognitive delays as autism.

Research design: A case-control study design was used.

Study setting: The study was conducted at the Outpatient Phoniatric Clinic of Assiut University Hospital and Outpatient Clinic of Assiut University Children's Hospital. The duration of data collection was 4 months, from February to May 2016.

Sample size: Sample size was calculated using EPI INFO version 3.5.1 (2008) for unmatched case control study. Sample size calculation was based on prevalence of risk factor among control children (for example male gender among children aged 3-5 years of 52% and odds ratio of 2.19) based on previous similar study [9]. With a power of 80% and confidence level of 95%, the sample size was found to be 120 for cases and 120 for controls. The sample was expanded to 150 for cases and 150 for controls.

Sampling technique: Total coverage of all cases attending the Phoniatric Outpatient Clinic of Assiut University Hospitals aged (3-5 years) of both sexes and diagnosed as DLD by phoniatrician during study period.

Control group of children of the same age group (3-5 years) of both sexes with normal language development (confirmed by physical examination of phoniatrician) was taken from attendants of Outpatient Clinics of Assiut University Children's Hospital.

Tool of the study: Data were collected from caregivers of children by using structured interview questionnaire. It covered the following items:

- *Socio-demographic characteristics of the child's family:* Residence, education and occupation of both parents, family type ...... etc.

- *Risk factors:* Whether prenatal as maternal age at birth, medical and obstetric history of mother during child pregnancy. Natal factors as delivery mode, birth attendance, place of delivery, birth trauma, birth weight, gestational age, hypoxia and cyanosis. Post-natal factors as jaundice, type of feeding after birth.

- *The child's medical history:* Age, gender, history of admission into incubator or hospital, history of meningitis and convulsions.

Socio-economic level of the families of the studied children was determined by using the socio-economic status scale developed by El-Gilany et al. [10].

Pilot study: A pilot study was conducted on 20 children to check for difficulties in the questionnaire that may arise during final data collection. Necessary modifications were applied before final data collection. Those children were not included in the final study.

Ethical consideration: Approval of the Ethical Review Committee of Faculty of Medicine, Assiut University was obtained. The necessary official permissions from different authorities were obtained before the conduction of the study. Explanation of the aim of the study to child's caregiver was performed. Informed consent to participate in the study was obtained from caregivers of children. Confidentiality of the data was assured.

Statistical analysis: Data were verified, coded, and entered by using SPSS program Version 20.

Chi square test was used for comparison between categorical variables and *t*-test for comparison between quantitative variables. Multi-variate logistic regression analysis was used for significant variables. *p*-value less than 0.05 was considered significant.

Results

Table (1) shows sociodemographic characteristics of studied children. Male gender was significantly higher among cases than control group (70% versus 51.3%, *p*<0.001). Cases had significantly higher percentage of urban residence than controls (26.7% versus 8%) (*p*<0.001). First birth orders among cases were significantly higher than controls (61.3% versus 38.7%) (*p*<0.001). Employed fathers and mothers were significantly higher among cases than controls (57.3% versus 47.3%, *p*=0.021 for fathers) (12% versus 3.3%, *p*=0.005 for mothers). Smoker fathers were significantly higher among cases than controls (68.7% vs. 57%, (*p*=0.025).

Table (2) shows that parents' consanguinity was significantly higher among cases than controls (60.7% versus 43.3%, *p*=0.003). Twin pregnancy and pre-eclampsia were significantly higher among cases than controls (*p*=0.004 and 0.003 respectively). Normal delivery was more common among controls than cases (64.7% versus 52%, *p*<0.001). Neonatal problems after delivery were more common among cases than controls (49.3% versus 17.3%). Breastfeeding was significantly higher among controls than cases (96.7% versus 78.7%, *p*<0.001). Admission into incubator was significantly higher among cases than controls (36.7% versus 19.3%, (*p*=0.001). Mean number of family members was significantly higher among cases than controls (4.3 versus 4.1) (*p*=0.025).

Table (3) shows that past history of chicken pox, convulsions and hospital admission was significantly higher among cases than controls (*p*= 0.032, 0.018 and 0.001 respectively). Family history of delayed speech among brothers, sisters or other family members was significantly higher among cases than controls (*p*=0.001 and <0.001 respectively).

Table (4) shows logistic regression analysis for variables related to delayed speech. Urban residence, low birth weight, male gender, delivery by Cesarean section, parents' consanguinity and presence cyanosis after birth were significantly associated with delayed speech development.

Table (1): Socio-demographic characteristics of the studied children, Assiut University Hospitals, 2016.

Characteristics	Cases (n=150)	Controls (n=150)	*p*-value	Odds ratio (95% CI)
• *Gender:*				
- Male	105 (70.0)	77 (51.3)	0.001	2.21
- Female	45 (30.0)	73 (49.7)		(1.38-3.55)
• *Age:*				
- (Mean ± SD)	49.2±5.8	48.9±10.2	1.00*	–
- Range	36-60	36-60		
• *Residence:*				
- Urban	40 (26.7)	12 (8.0)	<0.001	4.18
- Rural	110 (73.3)	138 (92.0)		(2.09-8.35)
• *Family type:*				
- Nuclear	122 (81.3)	126 (84.0)	0.542	–
- Extended	28 (18.7)	24 (16.0)		
• *Birth order:*				
- 1st	92 (61.3)	58 (38.7)	<0.001	–
- 2nd-3rd	34 (22.7)	48 (32.0)		
- 4th-5th	15 (10.0)	18 (12.0)		
- 6th and more	9 (6.0)	26 (17.3)		
• *Father's education:*				
- Illiterate/read & write	15 (10.0)	6 (4.0)	0.088	–
- Basic education	22 (14.7)	33 (22.0)		
- Secondary	28 (18.7)	32 (21.3)		
- University or higher	85 (56.7)	79 (52.7)		
• *Mother's education:*				
- Illiterate/Read & write	21 (14.0)	14 (9.3)	0.001	–
- Basic education	52 (34.7)	84 (56.0)		
- Secondary	37 (24.7)	32 (21.3)		
- University or higher	40 (26.7)	20 (13.3)		
• *Father' occupation:*				
- Employee	86 (57.3)	71 (47.3)	0.021	–
- Farmer	12 (8.0)	18 (12.0)		
- Skilled worker	14 (9.3)	23 (15.3)		
- Unskilled worker	38 (25.3)	38 (25.3)		
• *Mother's occupation:*				
- Employee	18 (12.0)	5 (3.3)	0.005	0.25
- Housewife	132 (88.0)	145 (96.7)		(0.09-0.70)
• Father's smoking (yes)	103 (68.7)	84 (56.0)	0.024	2.2 (1.13-4.5)
• *Socio-economic level:*				
- Low	26 (17.3)	26 (17.3)	0.182	–
- Middle	97 (64.7)	108 (72.0)		
- High	27 (18.0)	16 (10.7)		

Chi square test was used.
*: *t*-test was used.

Table (2): Pre-natal, natal and postnatal risk factors among studied children, Assiut University Hospitals, 2016.

Characteristics	Cases (n=150)	Controls (n=150)	p-value	Odds ratio (95% CI)
• Parents' consanguinity (yes).	91 (60.7)	65 (43.3)	0.003	2.02 (1.27-3.19)
• *Maternal age at birth:*				
- (Mean ± SD).	26.1±6.6	26.6±5.9	0.483**	–
• Twin/multiple pregnancy.	13 (8.7)	1 (0.7)	0.004	3.72 (1.70-9.81)
• Pre-eclampsia (yes).	17 (11.3)	4 (2.7)	0.003	4.66 (1.53-4.21)
• Preterm delivery (yes).	3 (2.0)	1 (0.7)	0.315	–
• *Delivery mode:*				
- Normal vaginal delivery.	78 (52.0)	97 (64.7)	<0.001	0.592 (0.372-0.941)
- Elective caesarian section.	39 (26.0)	10 (6.7)		
- Mandatory caesarian section.	33 (22.0)	43 (28.7)		
• *Birth attendance:*				
- Physician.	128 (85.3)	115 (76.7)	0.056	–
- Nurse/midwife.	22 (14.7)	35 (23.3)		
• *Place of delivery:*				
- Hospital.	76 (50.7)	75 (50.0)	0.103	–
- Private clinic.	52 (34.7)	40 (26.7)		
- Home.	22 (14.7)	35 (23.3)		
• Problems during delivery.	9 (6.0)	8 (5.3)	0.803	–
• Neonatal problems after delivery.	74 (49.3)	26 (17.3)	<0.001	14.14 (1.83-9.51)
• *Neonatal problems after delivery*:*				
- Did not cry immediately.	13 (8.7)	1 (0.7)	0.001	14.14 (1.83-9.51)
- Cyanosis.	12 (8.0)	1 (0.7)	0.002	12.95 (1.66-00.95)
- Low birth weight.	73 (48.7)	23 (15.3)	<0.001	5.24 (3.03-9.05)
- Difficulty breathing.	8 (5.3)	4 (2.7)	0.239	
• Breastfeeding.	118 (78.7)	145 (96.7)	<0.001	2.53 (1.64-4.12)
• Admission into incubator.	55 (36.7)	29 (19.3)	0.001	–
• *Neonatal problems*:*				
- Jaundice.	120 (80.0)	122 (81.3)	0.770	
- Recurrent vomiting.	61 (40.7)	31 (21.7)	<0.001	2.63 (1.58-4.39)
- Non feeding.	28 (18.7)	9 (6.0)	0.001	3.60 1.63-7.92)
• No. of family members (Mean ± SD).	4.3±1.5	4.1±1.4	0.025**	–
• Child lives with single parent.	21 (14.0)	15 (10.0)	0.286	0.68 (0.34-1.38)

*: More one cause or problem may be present.
Chi square test was used.
**: *t*-test was used.

Table (3): History of medical conditions among studied children, Assiut University Hospitals, 2016.

Past/family history	Cases (n=150)	Controls (n=150)	p-value	Odds ratio (95% CI)
• Chickenpox.	7 (4.7)	1 (0.7)	0.032	7.294 (0.886-60.029)
• Frequent throat inflammation.	140 (93.3)	144 (96.0)	0.304	
• Pneumonia.	20 (13.3)	14 (9.3)	0.274	–
• Meningitis.	4 (2.7)	2 (1.3)	0.409	–
• Bronchial asthma.	57 (38.0)	51 (34.0)	0.470	
• Convulsions.	10 (6.7)	2 (1.3)	0.018	5.28 (1.14-24.55)
• Head trauma.	1 (0.7)	2 (1.3)	0.652	–
• Hospital admission.	21 (14.0)	5 (3.3)	0.001	4.72 (1.73-12.88)
• Brothers or sisters had DLD.	10 (6.7)	0 (0.0)	0.001	2.071 (1.839-2.334)
• Other family member had DLD	51 (34.0)	3 (2.0)	<0.001	25.24 (7.66-83.13)
• Mother had mental or psychological disorder.	1 (0.7) 7	3 (2.0)	0.314	
• Father had mental or psychological disorder.	(4.7)	3 (2.0)	0.198	–
• Sitting for long time to watch TV (yes).	43 (28.7)	91 (60.7)	<0.001	0.26 (0.16-0.42)

Chi square test was used.

Table (4): Logistic regression analysis for variables related to delayed speech among studied children, Assiut University Hospitals, 2016.

Variables	OR (95% CI)	p-value
• Residence (urban).	8.549 (3.338-21.896)	0.000
• Low birth weight.	6.793 (3.408-13.540)	0.000
• Gender (males).	4.219 (1.355-12.956)	0.026
• *Delivery mode (normal):*		0.000
- Elective C.S.	2.600 (1.23 8-5.460)	0.012
- Mandatory C.S.	7.931 (2.93 9-21.404)	0.000
• Parent consanguinity.	3.621 (1.896-6.914)	0.000
• Birth order		0.013
- 1st	3.984 (1.480-10.724)	0.006
- 2nd-3rd	1.675 (0.603-4.657)	0.323
- 4th-5th	1.990 (0.609-6.499)	0.254
• Cyanosis	2.754 (1.292-5.870)	0.009
• Constant	0.026	0.000

R square: 44.3.

Discussion

The current study documented that dominance of speech delay in boys than girls. This gender discrepancy was found consistently in many studies [11-17]. Geschwind et al., (1985) revealed that boys are more vulnerable to delayed language development and explained this by slow maturation of the nervous system among boys and the negative impact of testosterone on the development of areas essential for the speech skills [18].

Moreover, this study revealed that urban participants were risky for delayed language development. This result was consistent with Mishra, 2015 [19]. This finding might be due to unsocial lifestyle in urban area compared to rural. Also, nowadays, urban people prefer indoor activities and excessive use of electronic devices which could be another reason. In addition, most of the mothers in urban areas do not have enough time to spend in playing and speaking with their children.

The current study revealed that significant association between low birth weight and delayed speech. Several studies documented the same findings [12,17,20-23].

In addition, our finding reported that children who were delivered by cesarean section was significantly at a greater risk to have delayed speech. The same finding was reported by other studies [24,25].

This study found that consanguineous marriage was significantly associated with DLD. Many studies documented the same result [26-28].

Furthermore, the current study showed that the first child was more vulnerable to DLD. The same was reported by different studies [13,17,29]. Eckstein, 2000 revealed that higher incidence of problematic behaviors and limitations in social skills of first child than others these characteristics may be due to parental over-protection and excessive monitoring [30].

The results of this study revealed that children exposed to cyanosis were significantly at a greater risk than noncyanotic children. Many studies reported the same findings [22,23,31,32]. This finding may be due to neonates who were exposed to asphyxia neonatorum are more vulnerable to DLD due to injury or malfunctioning of the brain [32].

On the otherhand, socioeconomic level was insignificantly associated with DLD. This finding was contestant with other studies [33,34] but other studies reported significant association [15,35]. This discrepancy could be due to the different place, socio demographic characteristics of participants or different scale of classification.

The results of this study showed that otitis media did not significantly increase the risk of DLD. This finding was consistent with other studies [35,36]. The effect of otitis media may depend on its frequency and severity and proper treatment.

Additionally, the result of this study revealed that family history of DLD was important risk factor (bivariate analysis), the same finding was recorded by many studies [8,14,16,33]. This finding may be due to genetic factor or because of family member exposed to the same environmental influences or to a combination of both.

The result of this study showed that preterm delivery was risk factor of DLD especially in the perinatal period (bivariate analysis), the same was recorded by other studies [14,22,36]. Which state that the delay in physiological and neurobiological maturation is accompanied by delay in language development. On the other hand, Nivedita et al., [33] recorded insignificant association of preterm and DLD.

Conclusion and Recommendations:

It was concluded that the significant risk factors of DLD are urban residence, low birth weight, male gender, delivery by Cesarean section, parent consanguinity and presence of cyanosis after birth.

It was recommended to raise the awareness about risk factors of DLD among parents, primary health care providers, pediatricians and phoniatric specialists for prevention, early detection and proper management.

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عوامل الخطورة للتآخر اللغوى بين آطفال ما قبل السن المدرسى المترددين على مستشفيات جامعة آسيوط

الأطفال ذوى التآخر اللغوى والكلام هم الآطفال الذين يتطور الكلام آو اللغة بمعدل آبطآ مما كان متوقعا ولكن فى التسلسل الصحيح. هدفت هذه الدراسة إلى دراسة عوامل الخطورة المرتبطة بتآخر اللغوى بين الآطفال المترددين على عيادة التخاطب الخارجية بمستشفيات جامعة آسيوط. وقد كان نوع الدراسة المستخدم دراسة مقارنة الحالات بالعينة الضابطة. وقد تمت مقارنة ١٥٠ حالة للتآخر اللغوى بين الآطفال الذين تتراوح آعمارهم بين ٣-٥ سنوات والمترددين على العيادات التخاطب الخارجية و١٥٠ طفلا من الآطفال من نفس الفئة العمرية المترددين على العيادات الخارجية لمستشفى آطفال جامعة آسيوط. وإستخدم إستبيان لجمع البيانات من مقدمى الرعاية للآطفال. وآظهرت نتائج هذه الدراسة آن الإقامة فى المناطق الحضرية، وإنخفاض الوزن عند الولادة، الذكور، الولادة القيصرية، قرابة الوالدين ووجود زرقة بعد الولادة ترتبط بشكل كبير مع التآخر اللغوى. وخلصت هذه الدراسة إلى آن الذكور والآحداث المرضية ما حول الولادة، قرابة الوالدين هى عوامل الخطورة للتآخر اللغوى. ولهذا يجب رفع الوعى حول عوامل الخطر بالتآخر اللغوى بين الآباء ومقدمى الرعاية الصحية للوقاية والكشف المبكر والعلاج السليم.