Causes of Global Developmental Delay in Children Welfare Teaching Hospital-Baghdad

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ABSTRACT:

BACKGROUND:

There are wide ranges of causes behind global developmental delay in Iraqi children but most of these causes were not diagnosed as a result of unavailable diagnostic tools.

OBJECTIVE:

To study the etiology of global developmental delay in Children Welfare Teaching Hospital / Baghdad.

PATIENTS AND METHODS:

A descriptive study was done on 75 patients, their age range from 8 months to 5.5 years with global developmental delay, who consult Children Welfare Teaching Hospital/Baghdad, from 1st of May 2010 to 1st of October 2010. A full history, thorough physical examination, and developmental assessment according to Denver Developmental Scale II were done to all cases. A group of selected investigations including neuroimaging (CT & MRI), EMG, EEG, visual and hearing assessment, screen for metabolic diseases, and thyroid function test were done as needed for the diagnosis.

RESULTS:

A total of 75(preschool) patients with age range from 8 months to 5.5 years were studied; 45(60%) of them were males and 30(40%) were females,9(12%) were preterm, 26(34.6%) were born with LBW, 3(4%) of patients acquired the infection with TORCH from their mothers [2(2.7%)CMV, 1(1.3%)toxoplasmosis], 8(10.7%) had their mothers complained from chronic diseases (hypertension and diabetes mellitus), 11(14.7%) suffered birth asphyxia, 2(2.7%) with high bilirubin level exceeding 20mg/dl, 2(2.7%) patients suffered RDS and 1(1.3%) suffered sepsis diagnosed by blood culture during neonatal period .Family history of developmental delay was reported in 11(14.7%) and consanguinity was reported in 46(61.3%) of cases, in 33(43.9%) no cause could be identified, CNS infections 9(12%), Down syndrome 7(9.3%), hypothyroidism 2(2.7%), intracranial hemorrhage 2(2.7%), infantile spasm 2(2.7%), phenylketonuria 2(2.7%), Myotonia Dystrophica 1(1.3%), and Seckel syndrome 1(1.3%).

CONCLUSION:

Global developmental delay in pediatric practice has wide etiology. The majority of cases were not diagnosed because of deficient diagnostic tools like cytogenetic analysis. High percent of perinatal etiology raises the importance of good maternal and neonatal care. Under diagnosis of inborn error of metabolism due to lack of routine screening in neonatal period, aggravated the problem.

KEYWORDS: global developmental.

INTRODUCTION:

Child development is an important determinant of health over the course of life. It is of great importance that children with developmental delays (DD) are identified as early as possible [(1)].

Developmental delay (DD) means significant delay in one or more of the following developmental domains: Gross motor; vision and fine motor; hearing, speech and language; and social, emotional, behavioral and intellectual function[(2)].Global developmental delay is significant delay (more than 2 SD) in two or more of the mentioned developmental domains[(3)]. It is estimated that developmental delay constitute between 2% and 10% of the pediatric population [(4)].

Many factors that may affect development including Nature versus nurture [(5)], environmental and biological risk factors [(6, 7)].

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To assess the patients for developmental disorders, we should follow the steps: - Thorough history and examination are vital to produce a formulation of child's problem and target investigations appropriately [8, 9]. The diagnosis may occasionally be immediately obvious from history and examination. More often time is needed to review clinical features, Denver Developmental Scale II , case notes, prior investigations, dysmorphology and neurogenetic data bases [8].

Many investigation may be needed to reach the diagnosis:-Full blood count[2], Chromosome analysis[10,11,12], Neuroimaging[2,10,13], Metabolic studies[2,10], Biochemistry, Creatinine Kinase [14].....etc.

AIM OF STUDY:

This study aimed to determine the causes of global developmental delay among the patient admitted to Children Welfare Teaching Hospital/Baghdad, and to compare the major factors with other studies in other parts of the world.

PATIENT AND METHODS:

Seventy five developmentally delayed children were included in this study, their age range from 8 months to 5.5 years; all of them were admitted to Children Welfare Teaching Hospital/Baghdad in the period between 1st of May 2010 to 1st of October 2010. Patients included were those with developmental delay with two developmental domains or more, according to Denver developmental scale II. The patient who were excluded from study those who lost during follow up. Each child was subjected to the following:- Thorough history taking with special concern on biologic risk due to perinatal insult , family history of developmental delay and consanguinity, environmental risk like maternal educational level, comprehensive physical examination, laboratory assessment which was performed depending on result of physical examination, developmental assessment was done according to Denver Developmental Scale II which is a test for screening cognitive and behavioral problems in preschool children.

The statistical analysis was done using statistical Package for Social Science version 17 (SPSS.v17) for data input and analysis. Discrete variables were expressed as numbers and percents. Chi square test was used to test the distribution of discrete variables.

RESULTS:

The total number of patients were 75, of them 45(60%) were males, and 30(40%) were females, with male to female ratio=1.5/1.

Sixty six (88%) patients were born term and 9(12%) were preterm.

Twenty six (34.7%) patients were born with birth weight less than 2.5kg, and those with birth weight equal or more than 2.5kg were 49(65.3%) .

The complications during pregnancy were as follow; 3(4%) mothers had TORCH infection, 2(2.7%) had CMV, 1(1.3%) had toxoplasmosis, 8 mothers (10.7%) developed diseases {include: 3(4%) gestational diabetes and 5(6.7%) hypertension} and the remaining 64(85.3%) did not develop any complication. History of developmental delay in family of 11(14.7%) patients and 46(61.3%) patients parents were consanguineous (Table-1).

Maternal educational level were as follow; illiterate 14(18.7%), elementary school 36(48%), secondary school 18(24%), and university graduates were 7(9.3%) (Table -2).

Perinatal complications include; asphyxia affect 11 patients (14.7%), deep jaundice with TSB level equal or more than 20 mg/dl affect 2(2.7%), 2(2.7%) RDS and 1(1.3%) sepsis, 59 patients (78.6%) did not develop any complication (Table-3).

Distribution of the sample according to the cause of the developmental delay include; unknown cause in 33(43.9%), asphyxia in 11(14.7%), meningitis or encephalitis in 9(12%), Down syndrome in 7(9.3%), hypothyroidism in 2(2.7%), intracranial hemorrhage in 2(2.7%), infantile spasm in 2(2.7%), phenylketonuria in 2(2.7%), Myotonia dystrophica in 1(1.3%), Seckel syndrome in 1(1.3%), kernicterus in 2(2.7%), TORCH 3(4.0%) {2(2.7%) with CMV, 1(1.3%) with toxoplasmosis}(table-4).

Table 1: Distribution of study sample according to different factors.

Factors	Details			Number		Percentage	
Sex	Male			45		60	
	Female			30		40	
Gestational age	Term			66		88	
	Preterm			9		12	
Birth weight	<2.5kg			26		34.7	
	2.5kg or more			49		65.3	
Course of pregnancy	Complicated pregnancy	TORCH	CMV	2	11	2.7	14.7
			Toxoplasmosis	1		1.3	
		Maternal diseases	Hypertension	5		6.7	
			D.M	3		4	
	Uncomplicated pregnancy			64		85.3	
Family history	Developmental delay			11		14.7	
	Consanguinity			46		61.3	

Table 2: Distribution of study sample according to maternal educational level.

Maternal educational level	Number (total no. =75)	Percent(%)
Illiterate	14	18.7
Elementary school	36	48
Secondary school	18	24
University graduate	7	9.3

Table 3: Distribution of sample according to natal and postnatal complications.

Type of complication		Number	Percent (%)
complicated cases	Asphyxia	11	14.7
	Jaundice (TSB=or>20mg/dl)	2	2.7
	Respiratory distress syndrome	2	2.7
	Sepsis	1	1.3
Total no. of complicated cases		16	21.4
No complications		59	78.6
Total		75	100%

Table 4: Distribution of study sample according to cause of their developmental delay.

Cause	Number(75)		Percent(%)
Unknown	33		43.9
Asphyxia	11		14.7
Meningitis or encephalitis	9		12.0
Down's Syndrome	7		9.3
Hypothyroidism	2		2.7
Intracranial hemorrhage	2		2.7
Infantile spasm	2		2.7
Phenylketonuria	2		2.7
Myotonia Dystrophica	1		1.3
Seckel Syndrome	1		1.3
Kernicterus	2		2.7
TORCH	3	Cytomegalovirus:2 (2.7)	4.0
		Toxoplasmosis:1(1.3)	

DISCUSSION:

This descriptive study showed the causes of developmental delay in 75 patients who were admitted to Children Welfare Teaching Hospital/Baghdad.

The higher male to female ratio of 1.5:1(60% versus 40%), agree with Ebtessam study(Egypt) who report male to female ratio of 1.2:1[14], Paramleen study(India) 2.4:1[15], Kyungsook study(Korea) 1.8:1[16], with Chun study(Taiwan) 1.5:1[17], with Margaret study(USA) 1.7:1[18], and with Amarjyothi(India) 1.8:1[19].

Nearly all developmental disorders are more common in boys than girls, one theory is that of Geschwind and Galaburda who suggests that the influence of testosterone is to delay maturation of specific processes within the brain[20].

This study showed that 12%were preterm, this agree with Paramleen study in 13% preterm[17], with Chun study 14.2% preterm[17], it also agree with Amarjyothi study 16.7 % preterm[19], ,and disagree with Kyungsook study 59% preterm[16]and Masri study (Jordan)[27] (38.8%). So this study showed relatively high percent of preterm as a risk factor. prematurity was significantly associated with Hypothermia ,Hypoglycemia , hypocalcaemia, respiratory distress syndrome , kernicterus and intraventricular brain hemorrhage with serious long-term effects all of these will increase risk for developmental problems[27] .

Low birth weight patients were 26(34.6%), it's proximal to Amarjyothi study result (28%) [19] and higher than Eun study (14.7%)[22] and Chun study (14.2%)[17]. This percent is significant, knowing that in Altuncu study (turkey) LBW represent (9.14%) of all liveborn [28] , and (12.6%)in Boo sudy (Malaysia) [29]

Complications during pregnancy occur in 11 patients (14.7%), it is lower than Valsamma study (22.4%)[23] and Kyungsook study (23.5%)[16] ,this is may be explained by improper antenatal care for some women in our society .

Perinatal complications occur in 16(21.4%) {14.7% for birth asphyxia, jaundice 2.7%, RDS 2.7%, sepsis 1.3%}, it is nearly approximate to Masri study[27].For birth asphyxia (13.2%) and lower for sepsis (4.4%), but it is more than what was reported in Valsamma study 10.3%[23] and lower than Paramleen study result 54%{37% for asphyxia, 3% for jaundice, 14% for other complications}[15] , these differences may be explained by geographical variations.

Family history of developmental delay is present in 14.7%, which is lower than Valsamma study result 31%[23] ,and this is may be due to the presence of other risk factors as an initiative to developmental delay.

Consanguineous parents in 61.3% patients are nearly similar to that of Masri study [27]. (62.5%) ,but higher than 40% result of Valsamma study[23], the high consanguinity percent may be due to cultural factors in our society.

About causes of developmental delay ,this study showed highest percentage for unknown causes 43.9% from the total. This goes with the result shown by Ebtessam study 36%[13] and Chun study 35.2%[16]. The risk of developmental delay depend on interaction between biological and psychosocial

variables[24] therefore it is difficult to identify specific etiology[25,26].also because of unavailability of many advanced sophisticated diagnostic equipments.

Maternal education level effect revealed the following results; illitrate14(18.7%), elementary school 36(48%), secondary school 18(24%) and university level of education was 7(9.3%), Valsamma study show approximately same percentage (17.3%)for illiterate mothers, lower percentage (13.7%)for elementary school level, higher for secondary school level (62%) and approximate percent for university level (7%)[23]. It is unlike Eun study which show 0% for illiterate mothers, (9%) for elementary level, (32.8%) for secondary school level, (46.3%) for university [22]. Also it is unlike Kyungsook study which reveal (0%) for illiterate and elementary school education level, (64.7%) for secondary and (35.3%) for university[16] , This difference in results may be related to the differences between societies that the study performed , as the last two mentioned studies done at Korea which is developed country. Maternal education has significant effect on birth weight and gestational age, also affect potential channels by which birth outcomes are improved such as the use of potential care[23].

Birth asphyxia constitute 14.7%, which agrees with result of Ebtessam study 16%[14],Masri study (13.2%)[27],and Chun study 13.4%[17].

CNS infections constitute 12% which is higher than Masri study (9.7%)[27], Ebtessam study (6.5%)[14], and much higher than Chun study (0.8%)[17],and this may reflect improper postnatal care.

Down syndrome constitute 9.3% which is proximal to Ebtessam study6 %[14] and Chun study 7.7%[17]. Various studies have reported that Down syndrome is the leading chromosomal cause of global developmental delay and mental retardation[24].

The cases of Down syndrome were diagnosed by chromosomal study, which is the only genetic study available in Iraq.

Hypothyroidism constitute 2.7% while it is (0.8%) in Masri study [27], 0% in both Ebtessam[14] and Chun[17] studies. These cases are due to congenital hypothyroidism, with delayed detection because of lack of neonatal screening program in Iraq.

Intracranial hemorrhage constitute 2.7% (reported in prematurely delivered patients during the neonatal period) which is lower than Ebtessam study 6%[14], similar to Masri study[27],and higher than Chun study 0%[17], those cases reported in prematurely delivered patients at neonatal period this is may be explained by differences in risk factors like congenital infections .

Infantile spasm constitute 2.7%, while it is not reported in all of Ebtessam study[14], Chun study[17], Masri study[27] and Roshan Koul study (Oman)[30] and this point may be explained by the presence of many risk factors in Iraqi society.

Phenylketonuria constitutes 2.7% while it is 0% in Ebtessam [14], Chun study [17], Masri study [27] and Roshan Koul study [30].

This finding occurs because of lack of neonatal screening program in Iraq.

Myotonia dystrophica show 1.3% which is 0% in Ebtessam [14], Chun study [17], Masri study [27] and Roshan Koul study [30].

Seckel syndrome show 1.3% which is 0% in Ebtessam [14], Chun study [17], Masri study [27] and Roshan Koul study [30]. This syndrome was diagnosed according to typical clinical and laboratory features that were judged by the neurologist of the Children Welfare Teaching Hospital/Baghdad with the advice of genetic specialist in Medical City/Baghdad.

kernicterus constitute 2.7%, it is lower than Masri study(5.5%)[27],Ebtessam study 9%[14], but it is not reported in both Chun study[17] and Roshan Koul study[30] and this may be explained by that medical advice is seeked more rapidly in well developed countries.

Maternally acquired TORCH infection constitute 4% which is proximal to Masri study(4.1%)[27] ,Ebtessam study 6%[14], and no case was reported in both Chun study[17] and Roshan Koul study[30] . Those cases were diagnosed by serological studies and this point may be explained by the presence of many risk factors in Middle East societies.

CONCLUSION:

- Global developmental delay in pediatric practice has wide etiology.
- The majority of cases were not diagnosed because of deficient diagnostic tools like cytogenetic analysis.
- High percent of perinatal etiology raises the importance of good maternal and neonatal care.
- Under diagnosis of inborn error of metabolism due to lack of routine screening in neonatal period aggravated the problem.

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