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RISK FACTORS IN CHILDREN PRESENTING WITH DEVELOPMENTAL DELAY

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ABSTRACT

Objective: To determine the risk factors in children presenting with developmental delay coming to the tertiary care hospital.

Study Design: Case control study.

Place and Duration of Study: The Children's Hospital and Institute of Child Health, Lahore, from Nov 2018 to Jan 2019.

Methodology: This was a case control study that included 280 children aged 6 months to 5 years. All children were assessed on ShaMaq Developmental Inventory in four equal groups of age ranges 6-10 months, 18-24 months, 3-3.5 years and 4-4.5 years. Demographic information was gathered through specially designed questionnaire that included risk factors such as gestational age, nutritional status of child, family income and others. Different risk factors were then compared between children with developmental delay and normal development.

Results: Results found that there were more delays in male children (p<0.05). Moderate to severe malnutrition was mostly present in children with developmental delay (p<0.01). Premature birth (gestational age <37 weeks), family income of less than PKR 12000 and rural background were found to be important risk factors for developmental delay (p<0.01). No significant association was found between developmental delay and cousin marriage.

Conclusion: Risk factors like prematurity, malnutrition, low socioeconomic status and habitat in rural areas had significant effect on child development.

Keywords: Child development, Developmental delay, Risk factors.

INTRODUCTION

Early child development makes the foundation of adult health and wellbeing[1]. Therefore early childhood development has been universally endorsed in the 2030 Sustainable Development Goals[2]. It is estimated that in low-income and middle-income countries about 250 million children (43%) younger than 5 years are at risk of not reaching their developmental potential[1] because of malnutrition, poverty, lack of stimulation and education, high rates of infection, thus adversely affecting their intellectual, social-emotional and motor development[3]. Most of children with developmental delay live in South Asia and Sub-Saharan Africa and many of them are exposed to multiple risks[4]. World has seen decrease in child mortality over the last few decades, so there has been increasing emphasis on improving child development[5].

Pakistan is one of those countries to have incorporated disability figures within its population census as the 1998 National Census of Pakistan[6] reported disability in 2.5% of the total population; of these 45% are children under the age of eighteen years but unfortunately disability details were not asked in 2017 National Census of Pakistan resulting in an ambiguity that there are only 0.48% that are disabled. A few cross-sectional studies in Pakistan showed that expected prevalence of disability is about 2 to 6%[7]. In one study it is found that prevalence of disability in Pakistan and Bangladesh is 15% and 8% respectively[8].

Conger *et al* (2011) found that factors like education, socio-economic status, income of parents and occupation are positively related

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with child development and measure different aspects of children's environment[9]. They also found that education of parents is associated with nonmaterial resources such as attitude towards education and understanding of child development, whereas house hold income is linked with the availability of material resources available to a child.

This study was design to determine different risk factors in children with developmental delay coming to the tertiary care hospital. The risk factors taken are gestational age, nutritional status of child, family income, habitat, consanguineous marriage, joint or nuclear family system and family history of developmental disability. In Pakistan limited studies are done on child development like a study was done on consanguinity as a risk factor for developmental delay[10]. This study aims to look for other relevant risk factor. The purpose of the study was to determine the risk factors in children presenting with developmental delay coming to the tertiary care hospital.

METHODOLOGY

Case control study design was used and a total sample of 280 children aged 6 months to 5 years were taken through purposive sampling. Sample was calculated through WHO calculator. Out of 280 children, 140 were developmentally delayed and 140 had normal development. Developmentally delayed children data was screened from filter clinic of tertiary care hospital. The study was conducted at Department of Developmental and Behavioral Pediatrics, The Children's Hospital and Institute of Child Health, Lahore, from 1st November 2018 to 31st January 2019.

Where as children with various syndromes, degenerative brain disorders, head trauma, brain infection, epilepsy and cerebral palsy were excluded from the study

ShaMaq Developmental Inventory was used as a tool for screening development of a child. It screens children of age ranges 6-10 months, 18-24 months, 3-3.5 years and 4-4.5 years. Each group has four domains: Gross motor and locomotion, vision and manipulation, hearing and speech, and socialization. Any child having total of four unsatisfactory score in all domains or one in each domain was considered as having developmental delay.

Demographic information was gathered through specially designed questionnaire that included risk factors such as gestational age, nutritional status of child, family income and others.

After approval from Ethical Review Board, permission was taken from respective authorities of selected tertiary care hospital for data collection. They were informed about the research topic, its purpose and significance. Children were enrolled in the present study after taking informed written consent from the parents. The participants were also given right to quit at any time or ask any question related to research. All children were assessed on ShaMaq Developmental Inventory and demographic form while maintaining confidentiality.

Data was analyzed using SPSS 21 where demographics were analyzed using frequency and percentages. The categorical variables were compared (bivariate analyses) using Pearson's Chi-square test. Association of variables with outcomes was expressed by odd ratio (OR) with 95% confidence interval (95% CI) to determine risk factors among delayed children.

RESULTS

It was found that males show predominance in both groups but more so in the developmental delay children (p<0.05) (table-I). Moderate to severe malnutrition was present in majority of children with developmental delay with (p<0.01). 35 children in delay group were born premature as compared to only 11 children in the control group (p<0.01). Similarly, 49 children in development delay group had household income of less than PKR 12000 compared to only 18 children in the control group (p<0.01). A statistically significant relation was found between child development and habitat as 58 children of developmental delay group resided in the village

compared to 31 children in the control group (p<0.01). No significant association was found in cousin marriage, family history of developmental delay and family system with child development.

Table-II shows possible risk factors in developmentally delayed children defined by odd ratio (OR) to illustrate group differences that were significant regarding residence, gestational age and gender. Children living in villages were more at risk for developmental delay (p<0.01). Similarly, premature birth was also a risk factor for developmental delay (p<0.01). It also showed that boys are at risk for developmental delay (p<0.05). No significant association was found in cousin marriage, family history of developmental delay and family system with child developmental.

Figure-1 & 2 shows household income of

Table-I: Comparison of demographic characteristics of children in both groups (n=280).

		Patient Category		X^2	p-value
		Normal (n=140)	Delay (n=140)		
Gender	Male	74	90	5.49	0.02
	Female	66	50		
Z score for malnutrition	Normal	84	64	32.14	0.01
	-1	27	24		
	-2	23	19		
	-3	6	18		
	-4	0	15		
Gestational age	Term	129	105	22.39	0.01
	Pre Term	11	35		
Income	<12000	18	49	36.50	0.01
	12000-25000	75	69		
	>25000	47	23		
Residence	City	109	82	13.01	0.01
	Village	31	58		
Cousin Marriage	Yes	94	90	0.14	0.71
	No	46	50		
Family history of developmental delay	Yes	20	21	0.17	0.68
	No	120	119		
Family system	Joint	103	104	0.03	0.86
	Nuclear	37	36		

Table-II: Risk factors in developmentally delayed children.

Variables		n=140		n=140		Odd Ratios		
		Control	%	Cases	%	OR	95% CI	p-value
Residence	City	109	77.86	82	58.57	2.34	1.47, 3.73	0.01
	Village	31	22.14	58	41.42			
Gestational age	Pre-Term	11	7.86	35	25	0.22	0.12, 0.43	0.01
	Term	129	92.14	105	75			
Gender	Male	74	52.85	90	64.29	0.59	0.39, 0.92	0.02
	Female	66	47.14	50	35.71			
Cousin marriage	Yes	94	67.14	90	64.29	1.09	0.70, 1.69	0.61
	No	46	32.86	50	35.71			
Family history of developmental delay	Yes	20	14.29	21	15	1.13	0.63, 2.01	0.77
	No	120	85.71	119	85			
Family system	Joint	103	73.57	104	74.28	0.96	0.63, 1.47	0.86
	Nuclear	37	26.42	36	25.71			

Note: (n=280). OR=Odd Ratio, CI=Confidence Interval, LL=Lower Limit, UL=Upper Limit, *p<0.05

families and nutritional status of children. It was found that household income of PKR<12000 and moderate to severe malnutrion are significant risk factors for developmental delay children.

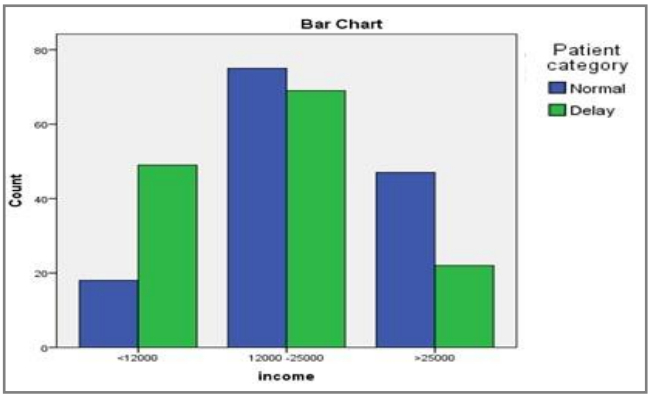

Figure-1: Comparison of income in normal and delayed children.

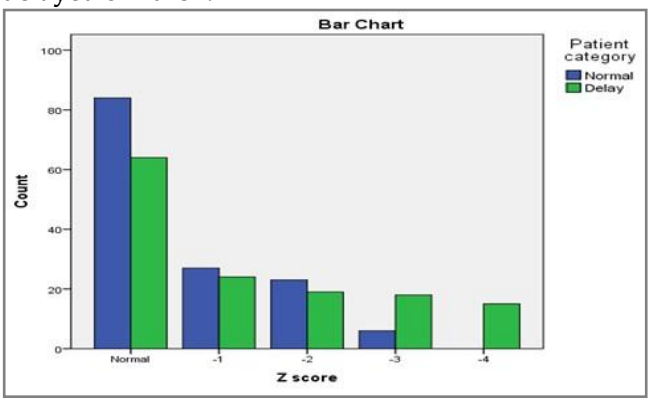

Figure-2: Comparison of Z score for malnutrition in normal and delayed children.

DISCUSSION

In this study we tried to identify different risk factors in children with developmental delay coming to tertiary care hospital. It was found that certain risk factors like male gender, malnutrition, prematurity, poor socioeconomic status and rural habitat were more in children with developmental delay.

Male gender was found to be associated more with developmental delay in children. This finding is also supported by Werling and Geschwind (2013) that showed male predominance in neuro developmental disorders[11]. Rebecca *et al* (2016) also mentioned male predominance in mental behavioural developmental disorders in their study[12].

Our study results showed that malnutrition was a risk factor for developmental delay. UNICEF -WHO joint report 2018 showed that almost 51 million children below 5 years were wasted and 16 million were severely wasted in 2017 worldwide. It shows huge burden of malnutrition in children predominantly in developing countries[13]. Our National Nutrition Survey 2017 also showed similar trends with 33% of all children being underweight, nearly 44% were stunted and 15% were wasted[14]. Black *et al* (2015) studied that young children with nurturing caregiving, adequate nutrition, and chances for prompt learning had the best chances of thriving[15]. Another study by McCoy *et al* (2016) showed that low development scores were mostly concentrated in regions of the world facing constant high exposure to risk factors such as poverty and malnutrition[16]. Keeping in view above the World Health Organization recommended incorporating child development activities into the management of malnourished children[17].

In our study prematurity was one of the risk factor to be associated with developmental delay. Yaghini *et al* (2015) also showed in their study that prematurity was a risk factor for developmental disorders[18].

Low socioeconomic status was associated with development delay as found in our study and this was supported by study conducted by McCoy *et al* (2016)[16] who found that the adverse effects of poverty on early child development and have also been shown in studies done in the slum areas of United States[15] and in LMICs, such as Bangladesh.

There is association of rural habitat and developmental delay in children. Significant effects of the physical environment on children and adolescents' cognitive and socioemotional development has been documented by a growing body of research in the United States and Western Europe[19].

Children exposed to multiple risk factors have a greater likelihood of poor adult health and wellbeing[20].

In present study no significant relationship was found between cousin marriage and developmental delay. Although consanguineous marriages are related with an increased risk for autosomal recessive inherited diseases and congenital malformations as shown in a study by Hamamy, 2011[21]. Fan *et al* (2013) detect about 3.5% of children with developmental disabilities having parental consanguinity in their study[22].

Also we found no association between previous histories of developmental delay in family or family system with child development. This is a new finding according to researcher's knowledge and needs to be further explored. Whereas, study by Singla *et al* (2015) showed that parenting involvements have been positively related in improving the compromised developmental potential among 39% of children younger than 5 years living in low-income and middle-income countries[23].

RECOMMENDATION

Though this is the first kind of study on relationship between risk factors and developmental delay in children in Pakistan to the best of researcher's knowledge but present study is only conducted in one tertiary care hospital. Therefore, the findings do not necessarily apply to all developmentally delayed children of Pakistan. So, further studies at a national level would be of value. Other risk factors like parental education, use of screen media should also be observed in some other studies.

CONCLUSION

This article provides an overview of the risk factors that influence development of children in our population. We know that the early years of child life are the basis for later development. Therefore multifocal policies should be made to reduce risk factors for early child development through interventions after doing further research on this issue.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Lu C, Black MM, Richter LM. Risk of poor development in young children in low-income and middle-income countries: an estimation and analysis at the global, regional, and country level.The Lancet Global Health 2016; 4(12): 916-922.
2. Black MM, Walker SP, Fernald LCH, Christopher Anderson, DiGirolamo AM, Lu C, et al. Early childhood development coming of age. Science through the life-course. Lancet 2017; 389(10067): 77-90.
3. Ali SS. A brief review of risk-factors for growth and developmental delay among preschool children in developing countries. J Adv Bio Res 2013; 2(1): 91-99.
4. Pem D. Factors affecting early childhood growth and development: golden 1000 days. J Adv Pract Nurs 2015; 1(1): 101-10.
5. Ford ND, Stein AD. Risk factors affecting child cognitive development: A summary of nutrition, environment, and maternal-child interaction indicators for sub-Saharan Africa. J Dev Orig of Health and Dis 2016; 7(2): 197–217.
6. Population Census Organisation. Pakistan Census Report. 1998. Government of Pakistan.
7. Ibrahim SH, Bhutta ZA. Prevalence of early childhood disability in a rural district of Sind, Pakistan. J Dev Med & Child Neuro 2013; 55(3): 357-63.
8. Poon JK, Larosa AC, Shashidhar-Pai G. Developmental delay: Timely identification and assessment. J Indian Pediatr 2010; 47(3): 415-23.
9. Conger RD,Conger KJ, Martin MJ. Socioeconomic Status, Family Processes, and Individual Development. J Marri Family 2010; 72: 685–704.
10. Ibrahim S, Habib Z, Hyder S, Azam IS, Ahmed R. Perinatal Consanguinity: a risk factor for developmental delay in pakistani children. J Pak Med Assoc 2001; 51(12): 418-22.
11. Werling DM, Geschwind DH. Sex differences in autism spectrum disorders. Curr Opin Neurol 2013; 26(2): 146-53.
12. BitskoRH, Holbrook JR, Robinson LR, Kaminski JW, Ghandour R, Smith C, et al. Health Care, family, and community factors associated with mental, behavioral, and developmental disorders in early childhood - United States, 2011–2012 Weekly. MMWR Morb Mortal Wkly Rep 2016; 65(9): 221–26.
13. UNICEF- WHO- The World Bank: Joint Child Malnutrition Estimates. 2018. Retrieved from: https://www.who.int/nutgrowthdb/estimates/en/
14. Muhammad A, Nawaz Y. Child Malnutrition in Pakistan: Evidence from Literature. Child 2018; 5(5): 60-9.
15. Black MM, Pérez-Escamilla R, Rao SF. Integrating nutrition and child development interventions: scientific basis, evidence of impact, and implementation considerations. Adv Nutr 2015; 6(6): 852-59.
16. McCoy DC, Peet ED, Ezzati M, Danaei G, Black MM, Sudfeld CR, et al. Early childhood developmental status in low- and middle-income countries: national, regional, and global prevalence estimates using predictive modeling. PLoS Med 2016; 13(6): 1-5.
17. Grantham-McGregor SM, Fernald LCH, Kagawa RMC, Walker S, Ann NY. Effects of integrated child development and nutrition interventions on child development and nutritional status. Acad Sci 2014; 1308: 11–32.
18. Yaghini O, Kelishadi R, Keikha M, Niknam N, Sadeghi S, Najafpour E, et al. Prevalence of developmental delay in apparently normal preschool children in isfahan, central Iran. Iran J Child Neurol 2015; 9(3): 17-23.
19. Hamadani JD, Tofail F, Huda SN, Alam DS, Ridout DA, Attanasio O, et al. Cognitive deficit and poverty in the

first 5 years of childhood in Bangladesh. J Pediatr 2014; 134(1): 1001-08.
20. Ferguson KT, Cassells RC, MacAllister JW, Evans, JW. The physical environment and child development: An international review. Int J Psychol 2013; 48(4): 437–68.
21. Hamamy H. Consanguineous marriages: Preconception consultation in primary health care settings. J Community Genet 2011; 3(3): 185-92.
22. Fan YS, Ouyang X, Peng J, Sacharow S, Tekin M, Barbouth D, et al. Frequent detection of parental consanguinity in children with developmental disabilities. Mol Cytogenet 2013; 6(1): 38-42.
23. Singla DR, Kumbakumba E, Aboud FE. Effects of a parenting intervention to address both maternal psychological wellbeing and child development and growth in rural Uganda: a community-based cluster randomised trial. Lancet Glob Health 2015; 1(1): 458–69.