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RESEARCH ARTICLE

A COMMUNITY -BASED CROSS SECTIONAL STUDY ON DEVELOPMENTAL DELAY AND ITS DETERMINANTS AMONGST UNDER TWO YEAR OLD CHILDREN IN AN URBANIZED VILLAGE OF DELHI

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ABSTRACT

Introduction: Development is the process by which each child evolves from helpless infancy to independent adulthood Developmental delay if detected during early years of life can be prevented from causing further damage.

Methods: A community based cross sectional study was conducted in Aliganj, urban field practice area of Vardhmann Mahavir Medical College, Delhi. A pretested, semi-structured questionnaire was used for data collection, growth was assessed using WHO growth charts and Developmental delay was assessed by Ages and Stages Questionnaire, 3rd edition (ASQ-3). Data was entered into excel and analysis was done in SPSS.

Results: Out of 210 children studied, 50 (23.8%) children were underweight, 46 (21.9%) were stunted and 37 (17.6%) children were wasted and 10 (4.8%) had developmental delay. Illilterate father (p value 0.012), low birth weight child (p value= 0.001), place of delivery (p value = 0.049) underweight (p value =0.001), stunting (p value =0.003) and wasting (0.003) were found to be significantly associated with developmental delay**.**

Conclusion: Developmental delay is associated with underweight stunting and wasting among children

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INTRODUCTION

Development is the process by which each child evolves from helpless infancy to independent adulthood. Global Developmental delay (GDD) is a subset of developmental disability and defined as significant delay in two or more developmental domains (gross / fine motor / cognition / speech / language / personal / social activity). Development is considered to be delayed if impediment is more than 2 standard deviations below the mean in one or more of the following domains: gross and fine motor skills, speech and language, social and personal skills, activities of daily living and cognition (Bellman, 2013 and Ronald, 2012). The global prevalence of developmental delay in children is reported as 1-3%, while World Health Organization (WHO) estimates that 15% of the world's population lives with some form of disability (Ronald, 2012 and http://www.who.int/disabilities/world_report/2011/report.pdf). Prevalence of developmental and/or behavioral disorders in United States was found to be 12-16% of children under 18 years of age, childhood disability prevalence ranges from 8% in Bangladesh to 15% in Pakistan and Jamaica (Mackrides, 2011; Boyle, 2011; Newacheck, 1998). In India the prevalence of Developmental delay among under-5 year old children ranged from 2.3-19.8% as reported from various studies (Nair, 2009; Jacob, 2013; Dabar, 2016; Vora, 2013; Ali, 2011; Meenai, 2009). Earlier recognition of developmental delay would help in providing early intervention services especially children from birth through 3 years of age (36 months) learn important skills. Services include therapy to help the child talk, walk, and interact with others (CDC, 2017). Also would result in better inclusion of affected individuals in society, establishment of prevalence data, educated health policy, decision making and resource allocation at the government level. Thus the present study was an attempt to assess growth and development of children under 2 years of age and to identify associated determinants in an urbanized village of Delhi, India.

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MATERIALS AND METHODS

It was a community based cross sectional study conducted in Aliganj, an urbanized village of South Delhi during the period of Dec 2014 to May 2016. It is one of the field practice areas

under the Department of Community Medicine, Vardhman Mahavir Medical College & Safdarjung Hospital (VMMC & SJH), New Delhi, India. All the children under 2 years of age residing in Aliganj were tried to be included in the study. Mothers who did not gave consent, or house found locked on 2 consecutive visits were excluded from the study. A pretested, semi-structured, questionnaire was used, growth was assessed using WHO growth charts and Developmental delay was assessed by Ages and Stages Questionnaire, 3rd edition (ASQ 3),a screening tool with 30 items covering communication, gross motor, fine motor, problem solving and personal social domains ASQ scores. ASQ was validated against Developmental Scale for Assessment of Indian infants and found to have sensitivity of 83.3% and specificity of 75.4% so it can be used in Indian scenario (Juneja *et al*., 2011). The study was approved by The Institutional Ethical Committee of VMMC & SJH. Voluntary informed consent was taken from the mother/ caregiver of the children. Children who were assessed as having low ASQ score were referred to Dept. of Pediatrics, VMMC and SJH for appropriate management and routine follow up.

Statistical Analysis

The data was collected and entered in MS Excel and analyzed by using SPSS Version 21. Difference between the proportions was analyzed by Chi-square test/ Fisher exact test and for quantitative variables t test was applied. Multivariate analysis was used for finding out determinants of development. Significance level was taken as p value <0.05

RESULTS

A total of 210 children under 2yrs of age were enrolled in the study. There were 85 girls (40.5%) and 125 boys (59.5%) among the study participants. Majority of the children (123; 58.6%) belonged to the age group of 7 to 18 months, parents of most of the children were literate, belonged to lower middle socio-economic status, Hindu and joint family. (Table 1)

Table 1. Distribution of the study participants according to socio-demographic characteristics (N=210)

Socio-demographic characteristics	Number (%)
Sex	
Male	125 (59.5)
Female	85 (40.5)
Age (completed months)	
0-6	32 (15.7)
7-12	62 (29.6)
13-18	62 (29.0)
19-24	54 (25.7)
Education status Father	
Illiterate	4 (1.9)
Literate	206 (98.1)
Education status Mother	29 (13.8)
Illiterate Literate	181 (86.2)
Socioeconomic status *	
Upper class	2 (1.0)
Upper middle class	52 (24.8)
Lower middle class	90 (42.8)
Upper lower class	66 (31.4)
Religion	
Hindu	199 (95)
Others	11 (5)
Family type	
Joint	170 (81)
Nuclear	40 (19)

* Socio-economic status by revised Kuppuswamy scale

Most of the study participants were born full-term (200; 95.2%); vaginal (203; 96.7%), institutional deliveries (202; 96.2%). The average birth weight of the study subjects was 2.55 ± 0.35 Kg, majority of them (103; 49.0%) were of birth order 2 while only 37 (17.6%) were of birth order of 3 or more. Only 196 mothers, out of 210 were able to tell the birth weight of children by recall. Of which 153 (78.1%) had normal birth weight (≥ 2.5 Kg) while 43 (21.9%) had low birth weight (<2.5 Kg) (Table 2).

Table 2. Distribution of study participants according to Birth History (N=210)

Birth history	Number (%)
Gestational Age	
< 37 weeks	10 (4.8)
≥ 37 weeks	200 (95.2)
Type of Delivery	
Vaginal Delivery	203 (96.7)
Forceps/ caesarean	7 (3.3)
Place of Delivery	
Hospital	202 (96.2)
Home	8 (2.8)
Birth order	
1	70 (33.3)
2	103 (49.0)
≥3	37 (17.6)
Birth Weight (Kg)*	
<2500g	43 (21.9)
≥2500g	153 (78.1)

*Birth weight was known for 196 children

Out of 210 children studied, 50 (23.8%) children were underweight, 46 (21.9%) were stunted and 37 (17.6%) children were wasted. (Table 3)

Table 3. Distribution of study participants according nutritional status

Nutritional Status	Number (%)
Weight for age	
Normal	160 (76.2)
Underweight (<-2SD)	36 (17.1)
Severely Underweight (-3SD)	14 (6.7)
Height for Age	
Normal	164 (78.1)
Stunted (<-2SD)	31 (14.8)
Severely Stunted (-3SD)	15 (7.1)
Wasting	
No wasting	173 (82.3)
Wasted (<-2SD)	16 (7.6)
Severely Wasted (-3SD)	21 (10.0)
Total	210 (100)

Out of 210 under 2 year children 10 (4.8%) were found to have developmental delay. Upon Univariate analysis, being boy or a girl child, age, educational status of mother, being preterm or full term, birth order and place of delivery were not found to be associated with developmental delay.

However illiterate father (p value 0.012), low birth weight child (p value= 0.001), place of delivery (p value = 0.049) underweight (p value =0.001), stunting (p value =0.003) and wasting (0.003) were found to be significantly associated with developmental delay (Table 4). Hence these factors were included in multivariate analysis (logistic regression) (Table 5). After adjusting for confounders only stunting (AOR =16.1) and wasting (AOR=22.4) were found to significantly associated with developmental delay upon logistic regression. (Table 5).

Table 4. Determinants of developmental delay

Risk factors	Normal n (%)	Delayed n (%)	p value
Sex			
Male	121 (96.8)	4 (3.2)	
Female	79 (92.9)	6 (7.1)	0.322*
Age			
0-12	88 (93.6)	6 (6.4)	
13-24	112 (96.6)	4 (3.4)	0.348
Education of mother			
Illiterate	27 (93.1)	2 (6.9)	
Literate	173 (95.6)	8 (4.4)	0.632*
Education of father			
Illiterate	2 (50.0)	2 (50.0)	
Literate	198 (96.1)	8 (3.9)	0.012*
Birth weight			
<2.5	36 (83.7)	7 (16.3)	
≥ 2.5	150 (98.0)	3 (2.0)	0.001*
Gestational Age			
< 37 weeks	9 (90.0)	1 (10.0)	
≥ 37 weeks	191 (95.5)	9 (4.5)	0.393*
Mode of delivery (N=210)			
Vaginal delivery	193 (95.1)	10 (4.9)	
Forceps/ caesarean	7 (100.0)	(0.0)	0.100*
Place of delivery (N=210)			
Hospital	194 (96.0)	8 (4.0)	
Home	6 (75.0)	2 (25.0)	0.049*
Birth order (N=210)			
1	64 (91.4)	6 (8.7)	
2	101(98.0)	2 (2.0)	0.090*
≥3	35 (94.6)	2 (5.4)	
Weight for age			
Underweight	42 (84.0)	8 (16.0)	
Normal	158 (98.8)	2 (1.2)	<0.001*
Length for age			
Stunting	40 (87.0)	6 (13.0)	
Normal	160 (97.6)	4 (2.4)	0.003*
Weight for length			
Wasting	31 (83.8)	6 (16.2)	
Normal	169 (97.7)	4 (2.3)	0.003*

*fisher's exact test

Table 5. Relationship of Developmental delay with socio-demographic, birth and growth characteristics of study participants by Multiple Logistic Regression analysis

	n (%)	OR	95% CI	p value
Education of father				
Literate (reference)	8 (3.9)	95.9	0.9 - 10616	0.057
Illiterate	2 (50.0)			
Birth weight				
Normal birth weight (reference)	3 (2.0)	4.8	0.4 - 53.1	0.196
Low birth weight	7 (16.3)			
Place of delivery				
Hospital (reference)	8 (4.0)	1.4	0.1 - 28.6	0.839
Home	2 (25.0)			
Weight for Age				
Normal weight (reference)	2 (1.2)	1.2	0.1 – 13.5	0.869
Underweight	8 (16.0)			
Length for Age				
Normal length (reference)	4 (2.4)	16.1	1.1 - 225.4	0.039
Stunting	6 (13.0)			
Weight for Length				
Normal weight for length (reference)	4 (2.3)	22.4	1 – 323.9	0.023
Wasting	6 (16.2)			

DISCUSSION

Higher prevalence of developmental delay was found among children whose mother (6.9% Vs 4.4%) or father (50.0% Vs 3.9%) were illiterate and this was statistically significant (p = 0.012) in case of father's educational status. Study done by Deepti Dabar *et al* also found poor literacy status of mother and father was significantly associated with delay in development (Dabar, 2016). In the present study children of higher birth order (2 and more) had higher prevalence of developmental delay but this difference was not statistically significant. Similar findings were obtained by Naheed Vadia *et al*. (Vadia, 2013), found that children of first and second birth order attained developmental milestones earlier than those who had higher birth order. In our study low birth weight was found to be significantly associated with developmental delay. Similar finding of higher prevalence of developmental delay among low birth weight babies was reported by De Moura *et al*. (2010); Ajedrin I Bello *et al*. (2013). Developmental delay was found to be significantly associated with home deliveries in our study which could be because deliveries conducted at home are not completely safe, lack of proper resuscitation of newborns and no or few ANC visit so as to identify any predisposing risk factors. While De Moura *et al*. (2011) in his study found that mothers who had fewer than 6 antenatal care visits had higher prevalence of DD (1.70%). Developmental delay was observed to be significantly associated with underweight, stunting and wasting. Similar results were obtained among children who had weight and length less than three standard deviation by Deepti Dabar *et al* (Dabar, 2016) and Hetal Vora *et al*. (Vora, 2013).

Conclusion and Recommendations

The prevalence of developmental delay in the study subjects was observed to be 4.8%. An illiterate father, low birth weight, home deliveries, being underweight, stunting and wasting were associated statistically significantly with developmental delay upon univariate analysis among children. While only stunting and wasting came out to be significantly associated with developmental delay upon logistic regression, 16 and 22 folds respectively. This accentuates the importance of good antenatal care and institutional delivery followed by home based nutritional intervention to combat the developmental delay among the children

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