Developmental delays among infants attending Paediatric out-patient department of a Medical College Hospital in West Bengal

Mridul Bansal[1], Dipta Kanti Mukhopadhyay[1*] and Prasenjit Halder[2]

[1]Department of Community Medicine and [2]Department of Pediatric, College of Medicine & Sagore Dutta Hospital, Kamarhati, Kolkata-700058, West Bengal, India

Abstract: *Background:* Early detection through screening and timely intervention can reduce the impact of developmental delay on lives of children and their parents. Routine screening in Paediatric out-patient department with a screener can be a feasible alternative. *Objectives:* To find out the developmental delay among infants attending the Paediatric out-patient department and the socio-demographic factors associated with it. *Methods:* In a descriptive, cross-sectional study, 180 infants were assessed using the age specific assessment sheet for monitoring of development designed by Pan American Health Organization (PAHO) and World Health Organization (WHO) in IMCI context. A pre-designed, pre-tested schedule was used which collected information regarding socio-demographic and environmental characteristics of infants. *Results:* The study found the prevalence of suspected developmental delay to be 6.7% and that of developmental alert/ normal development with risk factors was 25.0%. Female infants [AOR=2.18 (1.01-4.72)] were two times more likely to have developmental alert/ normal development with risk factors while duration of maternal education [AOR = 0.82 (0.73-0.93)] reduced the risk significantly. Increase in duration of maternal education [AOR = 0.73 (0.61-0.88)] and per capita monthly income [AOR = 0.998 (0.996-0.999)] by one unit significantly reduced the risk of suspected developmental delay. *Conclusion:* High prevalence of developmental delay/ alert highlighted the need for routine screening and early measure with focus to infants from disadvantaged sections.
Keywords: Developmental delay, Alert, Infants, Correlates, Assessment.

Introduction

Healthy children are one of the most important assets of a nation and a nation's future depends upon investment it makes for their holistic development. The most basic care given to the child is monitoring his growth and development. According to Mussen et al. development is defined as-systematic, long-lasting changes in physical, neurological, cognitive and behavioural structures [1]. Developmental delay is a condition whereby children fail to acquire the skills appropriate for their respective ages [2]. To become an active participant in day to day activities of daily life a child needs to acquire some skills from the very beginning of his/ her birth. Developmental delay has a great impact on the future of a child [2].

In developing countries, around 200 million children failed to reach their development potential in the first five years of life [3]. However; data regarding the true extent of development delays in children in India are scarce. Prevalence of developmental delay among graduates from Sick Newborn Care Unit (SNCU) of a district of West Bengal was reported to be 31.6% [4]. Proportion of children in India suffering from developmental delays was reported to be high in other studies [5-6]. Several risk factors were considered to be associated with delays in child development Biological risk factors were adverse events which occurred during pre-, peri-, and post-natal periods like prolonged labor, hemorrhage, birth asphyxia, kernicterus, meningitides, encephalitides and other infections. Adverse life experiences associated with family, environment and society like poor sanitary conditions, lack of social/ educational resources, family disintegration, and inadequate care are considered as social/ environmental risk factors [7].

In this context, Government of India has launched "Rashtriya Bal Swasthya Karyakram (RBSK)" a new initiative under National Health Mission (NHM), which aims at early

detection and management of developmental delays among children along with other three components related to child welfare. However, to take appropriate action, we need to know the magnitude of the problem and the vulnerable groups. In the context of scare information in this part of the country, the present study was conducted with the following objectives:

1. To find-out the proportion of infants attending Pediatric OPD of College of Medicine & Sagore Dutta Hospital, Kolkata having different grades of developmental delays
2. To identify socio-demographic characteristics of the infants those were associated with developmental delays among study population.

Material and Methods

Study type, setting and population: A descriptive, cross-sectional study was conducted in the paediatric out-patient department (OPD) of the medical college hospital in the suburban area of Kolkata during August-December 2016. Infants attending the paediatric OPD during the study period and born within the period of 1st August 2015 to 31st July 2016 were our study population. Those having any diagnosed genetic and neurological disorders which might affect development were excluded from the study.

Sample size and sampling technique: In absence of published scientific study from this part of the country, proportion of developmental delay among infants attending paediatric OPD of a tertiary care hospital was considered to be 0.5. Considering 95% confidence level and 0.075 absolute precision, the final sample size became 171. Considering 5% non-response rate, it was rounded off to 180. To collect information of 180 infants, 15 working days was chosen randomly. In each day, 12 infants was selected from the Paediatric OPD through systematic random sampling after estimating the approximate number of OPD attendant infants on each day from previous records. Mothers or in her absence, accompanying caretakers of the infants were the respondents.

Study tools: A pre-designed, pre-tested schedule was used for collection of information. The schedule consisted of two sections-

- *Section-I* was for collection of information regarding socio-demographic and environmental characteristics of infants from the accompanying mother /caregiver through interview.
- *Section-II* consisted of age specific assessment sheet for monitoring of development designed by Pan American Health Organization (PAHO) and World Health Organization (WHO) in IMCI context [1].

Based on presence or absence of risk factors for developmental delay, measurement of head circumference, three or more phenotypic alterations and presence or absence of age-related positions, skills, reflexes and behaviours, the infants were categorized in three categories:

1. Suspected developmental delay
2. Developmental alert/ Normal development with risk factors
3. Normal development.

Methods of data collection: After obtaining their written informed consent, mothers/ caretakers of the selected infants were interviewed in a separate room maintaining privacy. The infants were examined under the guidance of a qualified paediatrician in a calm environment. Head circumference was measured using non-stretchable metallic tape using standard procedure and was plotted in WHO chart for head circumference [1]. Body positions, skill and behaviours were observed using standard procedure [1]. The infants were examined for phenotypic alterations and reflexes [1].

Data analysis: Different grades of development were expressed in percentages. Multinomial regression was run with normal development as reference category to find out the socio-economic characteristics which were associated with developmental delay and developmental alert/ normal development with risk factors.

Ethics: The study obtained clearance from the Institutional Ethics Committee of the concerned teaching hospital. After having classification of developmental delay or developmental alert/ normal development

with risk factors, the respondents were informed about the management needed for the infants and necessary steps were taken.

Results

Out of 180 infants surveyed, 18.9% of them were below 2 months of age. Around 60% were male (59.4%) and belonged to Islam religion (60.0%). More than half of the study participants (54.4%) were born of first order of birth. Almost equal proportion of infants was from nuclear (51.7%) and joint (48.3%) families. Around 4.4% mothers of study infants had no formal schooling, 7.8% had primary education whereas 6.7% did graduation/ post-graduation. A small proportion of mothers 5.6% were reported to be working while the rest 94.4% were homemakers. It was

revealed from Table-1 that out of the 180 infants, 6.7% of them were classified to have suspected development delay, 15% of them had normal development with risk factors, 10% had developmental alert and the rest of them (68.3%) had normal development.

Table-1: Distribution of infants according to development status	
Developmental status	**No. (%)**
Suspected developmental delay	12 (6.7)
Normal development with risk factors	27 (15.0)
Developmental alert	18 (10.0)
Normal development	123 (68.3)
Total	**180 (100.0)**

Table-2: Socio-demographic factors associated with developmental alert or developmental delay				
Variables	**B (SE)**	**AOR**	**95% C.I.**	**P value**
Developmental alert/ normal development with risk factors vs. normal development				
Intercept	0.65 (0.84)			
Age ≥ 2 months	- 0.20 (0.51)	0.82	0.30 – 2.26	0.698
Female	0.78 (0.39)	**2.18**	**1.01 – 4.72**	**0.047**
Birth order≥ 2	0.57 (0.39)	1.77	0.82 – 3.81	0.143
Muslim	0.67 (0.42)	1.96	0.86 – 4.46	0.111
Nuclear Family	- 0.43 (0.40)	0.65	0.30 – 1.43	0.286
Duration of mothers' schooling	- 0.19 (0.06)	**0.82**	**0.73 – 0.93**	**0.001**
PCMI	- 0.0006 (0.0004)	0.999	0.998 – 1.00	0.111
Developmental delay vs. normal development				
Intercept	1.60 (1.44)			
Age ≥ 2 months	- 0.13 (0.93)	0.88	0.14 – 5.51	0.892
Female	0.10 (0.72)	1.10	0.27 – 4.51	0.892
Birth order≥ 2	1.09 (0.74)	2.97	0.70 – 12.55	0.139
Muslim	0.19 (0.78)	1.21	0.26 – 5.52	0.810
Nuclear Family	0.17 (0.71)	1.18	0.29 – 4.76	0.815
Duration of mothers' schooling	- 0.31 (0.09)	**0.73**	**0.61 – 0.88**	**0.0008**
PCMI	- 0.002 (0.0009)	**0.998**	**0.996 – 0.999**	**0.036**

In multinomial logistic regression with normal development as reference category, it was noted that the infants of female gender were two times more likely to have developmental alert/ normal development with risk factors. Similarly, with each year of increase in maternal schooling, there would be 18% reduction in chance of occurrence

of developmental alert/ normal development with risk factors (Table-2). The risk of developmental delay was found to be negatively associated with duration of maternal schooling and per capita monthly income (PCMI) of the family. With each year of increase in duration of maternal schooling,

the risk of developmental delay was likely to reduce by 27% while with increase of one rupee in PCMI, there would be o.02% reduction in occurrence of developmental delay (Table-2).

On further analysis, it was found that the risk of having developmental alert/ normal development with risk factors and developmental delay was higher among children who born out of second or more order of pregnancy or were Muslim, but the association was not significant. The risk of having developmental delay was also higher among children of female gender and nuclear family.

Discussion

In the present study a monitoring tool was used that was developed by Pan American Health Organization (PAHO) along with World Health Organization (WHO) in the context of Integrated Management of Childhood Illness (IMCI) [1]. In the present study, it was noted that 6.7% of children had suspected developmental delay. It was also found that another 25 % of children either had normal developmental with risk factors or developmental alert. These figures warrants urgent action from health care providers as their timely management could improve their performances or reduce their chances of progressing to developmental delay. In a community-based study, Sachdeva et al. reported that 7.1% of study participants were screened positive for global developmental delay [8].

Another study done in 2013 by Vora among attendees of well baby clinic reported the developmental delay to be at 7.5% [9]. A study in Latin America in 2010 by Guimarães AF reported that 19.2% children had probable developmental delay [10]. Probable reasons for difference in proportion of infants with developmental delay among the researchers could be due to use of different study tools in different study setting. As the present study was conducted in a tertiary care hospital, more number of children with developmental delays might attend in the specialist clinics. Many other clinic based studies from India also showed similar picture [8-9, 11].

Although earlier studies noted higher proportion of developmental delay in higher age group, the present study failed to elicit any significant association between age-group and developmental delay [11-12]. However, Sachdeva et al. noted that highest prevalence was in 0-12 month age group of infants than higher age-groups [8].

In contrast to the findings reported by other researchers, in this study, female infants had significantly higher proportion of developmental alert/ normal development with risk factors and slightly higher proportion of suspected developmental delay [8, 13]. Lower status of female child in the Indian socio-cultural setting might be a reason behind. Environmental factors, particularly stimulation at family level, were verified by Andrade et al. as important factors for proper development of older infants [12]. Infants born out of second and higher order of birth were at slightly higher risk of developmental delay. This finding was corroborated by other researchers [12, 14].

In the study it was seen that the proportion of developmental alert/ normal development with risk factors and suspected developmental delay was higher in Muslims infants than their Hindu counterparts, although the association was not significant. Practice like consanguineous marriage among Muslims in this part of the country, could be one of the reasons as consanguinity often leads to chromosomal disorders, an important risk factor for developmental delay [15].

Economic status was significantly associated with suspected developmental delay in the present study. Researchers like Chilton et al., Stephen et al. reported that poverty was linked to developmental delay [16-17]. Poverty is associated with sustained interruption to their nutrition and care which result in irreversible damage to their development. Beyond the nutritional deficiency, infectious diseases have devastating effect of child development in resource constrained setting [16, 18].

The present study showed that mothers' educational status was negatively associated with both developmental alert/ normal development with risk factors and suspected developmental delay. Child development is dependent on cognitive stimulation, sensitivity, responsiveness and attachment

with caregivers [18]. Activities and role engaged in by the mothers during early childhood played an important role in child development [19]. Quality and quantity of attachment and interaction are linked to maternal education [19]. A number of research studies had shown that maternal literacy was a reliable predictor for proper development in children [18-21].

Conclusion

This study highlighted the pervasiveness of the problem with 6.7% of study infants having suspected developmental delay and another 25% of infants were with either developmental alert or normal development with risk factors. Maternal education and poverty was significantly associated with developmental delays.

The study findings also emphasized the need for routine screening programme for identifying developmental delay in all public health institutions to take appropriate measures. The action-oriented monitoring tool for screening designed by PAHO/ WHO in IMCI context may be used for this purpose.

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*All correspondences to: Dr. Dipta Kanti Mukhopadhyay, Associate Professor, Department of Community Medicine, College of Medicine and Sagore Dutta Hospital, Kamarhati, Kolkata, West Bengal, India. E-mail: diptakanti@gmail.com