

How aware are mothers about early childhood developmental milestones? A cross-sectional study at a maternity hospital in rural South India

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ABSTRACT

Background: Identification and intervention are pivotal in improving outcomes in cases of early childhood developmental delays (DDs). Mothers, as primary caregivers, are at a vantage point to recognize these delays early and seek prompt care. **Objective:** The objective of the study was to assess the awareness of early childhood developmental milestones (ECDMs) and identify factors that influence awareness among mothers of young children at a maternity hospital in rural South India. **Materials and Methods:** This was a cross-sectional study among mothers with a child under the age of 3 years, availing health and immunization services at the rural hospital. The interview schedule included 4 items pertaining to risk factors associated with delayed milestones and 32 items regarding awareness of ECDM across four domains: Gross motor, fine motor, social, and language. Each correct answer was awarded 1 point. **Results:** Among 156 mothers, the mean ECDM awareness score was only 12.4 (± 3.6), out of a maximum of 36. Awareness of some of the first milestones to be achieved in infancy was found to be low. ECDM awareness score was significantly higher among mothers with higher levels of education ($p=0.014$) and among mothers who received health education on ECDM from community-level workers ($p=0.038$). **Conclusion:** Awareness among rural mothers regarding ECDM across all four developmental domains was found to be inadequate. Poor maternal awareness, of milestones that are the first to be achieved, is likely to result in delayed recognition and intervention for DD. Community-level workers must educate mothers regarding ECDM during immunization sessions and home visits, using the Mother and Child Protection Card as an educational tool.


Key words: Caregiver awareness, Early childhood development, Milestones

Early childhood period encompasses the first 3 years of life [1]. According to Harvard University's Center on the Developing Child, in their earliest years, babies' brains form new neural connections at an astounding rate of more than 1 million every single second; a pace never repeated [2]. The term "child development" indicates the advancement of the child to reach his or her optimal potential in all areas of human functioning – social, emotional, cognitive, communication, and movement [3]. A child's progress on the path of development across definite stages is marked by certain indicators called "developmental milestones," which indicate the age at which children are expected to perform certain tasks under four domains, namely, motor, language, social, and cognitive [4].

"Developmental delay (DD)" is defined as a lag in the development of normative milestones in the domains of

cognitive, language, social, emotional, and motor functioning [3]. Early DD is linked to poor attention and behavioral problems in young children, and low scholastic performance in school-going children, with subsequent mental, emotional social, and financial consequences as these children grow into adulthood [5,6]. With poorer health indicators in rural areas as compared to urban areas, due to lack of availability, accessibility, and utilization of health services [7], the resultant consequences in rural areas can be worse.

India has the largest number of children in the world and it is alarming that the Rashtriya Bal Swasthya Karyakram (RBSK), Government of India, estimates that 10% of children in India have a DD [4]. India is also said to suffer from a triple burden of disease, where there is a high prevalence of infectious diseases, non-infectious diseases, and malnutrition [8]. When nutritional deficiencies are paired with a lack of interactive play, it can contribute to DD [9]. Appropriate and timely

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neurological stimulation during the early years of life can help in synaptogenesis. Caregivers with better awareness provide a more nurturing environment for their children [2].

A favorable outcome of a child with DD is directly dependent on early diagnosis and appropriate treatment, which, in turn, is contingent on various factors such as availability and affordability of treatment, treatment-seeking behavior, and awareness of what constitutes normal developmental milestones among the primary caregivers, all of which are likely to be compromised in rural areas. Maternal awareness regarding early childhood development milestones (ECDMs) plays a key role in addressing the issue of childhood DDs [10-12].

There is a paucity of literature documenting maternal awareness of children's milestones in South India; especially, in rural areas. Our study, therefore, aimed to assess the awareness of ECDM and its associated factors among rural mothers with young children, which would help in identifying the gaps in their awareness of ECDM, and to develop targeted interventions to facilitate early detection and management of childhood DD.

MATERIALS AND METHODS

This was a cross-sectional study conducted in a maternity hospital in a village around 60 km from Bengaluru City, located in Ramanagara District, Karnataka, in the South of India. All mothers of children aged 3 years and below, who were availing health care and immunization services at the hospital, from May to July 2019, were invited to participate in the study. Based on a previous study [13], where adequate awareness of ECDM among mothers was found to be 47%, with 20% relative precision, 95% confidence limits, and 0% non-response rate, the sample size was estimated to be 130. However, as data were collected by multiple researchers simultaneously, the achieved sample exceeded the estimated sample size. Over a 2-month period in 2019, consecutive sampling was done to recruit study subjects, until the desired sample size was achieved. Mothers with a child below the age of 3 years were included in the study after obtaining their written informed consent. Mothers, whose children required critical care, were excluded from the study. Two such mothers were excluded from the study.

The participants were administered a face validated, pre-tested, structured interview schedule, in the local language Kannada, to capture sociodemographic details, relevant obstetric, and medical history. This also included 36 items regarding awareness of ECDM: 4 items pertaining to risk factors associated with delayed milestones and 32 items regarding awareness of key ECDM up to 3 years of age. The milestones were subdivided into the four developmental domains: Gross motor domain (11 items), fine motor (6), social (8), and language (7). The subject was asked to state when each milestone was expected to be attained. If the answer fell within the accepted age range, it was deemed a correct response and was awarded a score of one. The maximum possible overall awareness score was 36. The milestones awareness questions with answer key were developed using standard textbooks [14,15], Centers for Disease Control and Prevention guidelines [16], the Trivandrum Development Scale [17], and the Mother and Child Protection (MCP) Card, Ministry of Health and Family Welfare, Government

of India [18]. The socioeconomic class was determined using Modified BG Prasad Socioeconomic Classification [19].

Approval from the Institutional Ethics Committee was obtained. Data were analyzed using IBM SPSS version 17.0. The outcome variable in this study was the maternal ECDM awareness score. The exposure variables were sociodemographic, obstetric, and medical factors. The study variables were described using proportions, mean and standard deviation, median, and interquartile range. Data were tested for normality using the normality probability plot. Independent t-test and one-way analysis of variance (ANOVA) were performed for associating maternal ECDM awareness scores with various categorical exposure variables and Pearson's correlation coefficient test for continuous variables. Factors that were found to be statistically significant were included in a multilinear regression model. $p < 0.05$ was considered statistically significant for all analyses.

RESULTS

A total of 156 women participated in this study with a mean age of 23.8 ± 3.2 years. Most of them were educated up to Class 10 (36.5%) and Class 12 (41.7%). The median monthly per capita income was INR 3000 (2066, 4000). Most participants were homemakers and between 20 and 25 years of age (Table 1). Most of them reported that their sources of general health information were family members (40%) and community-level health workers (47.4%) such as Accredited Social Health Activist (ASHA), Anganwadi Worker (AWW), and Auxiliary Nurse Midwives (ANM), but only 17.3% had received health education regarding ECDM from any source, including 12 (7.7%) who received health education on ECDM by a community-level health worker. None of the mothers mentioned the National Health Mission's MCP Card as a source of information.

The mean total ECDM awareness score was found to be only 12.4 (± 3.6). Mean awareness across all four domains of development was low (Table 2). Most mothers knew the common reasons for delayed milestones. Knowledge of milestones that are among the first to be achieved in infancy was low, such as turns head to visually follow (23.1%), holds head steady (47.4%), recognizes mother (39.1%), social smile (26.3%), turning head toward sound (21.8%), and babbling (27.6%) (Fig. 1).

On bivariate analysis, those who received health education on ECDM by a health worker (ASHA, AWW, or ANM) during their pregnancy (Table 1) and those who had higher levels of education (Tables 3 and 4) had significantly higher awareness scores. Regression analysis showed that the higher levels of formal education and receiving health education on ECDM by health care workers were significantly associated with higher ECDM awareness scores ($p = 0.014$ and $p = 0.038$, respectively).

DISCUSSION

Maternal awareness regarding ECDM is pivotal in early identification of DDs and care-seeking. We assessed "awareness" rather than "knowledge" as in the knowledge domain, general

Table 1: Association between maternal ECDM awareness score and sociodemographic factors (n=156)

Variable	Categories	n (%)	Mean (±SD)	p-value
Age group in years	<20	26 (16.7)	13.08 (±3.94)	0.79‡
	20–25	90 (57.7)	12.42 (±3.42)	
	26–30	35 (22.4)	12.06 (±4.24)	
	>30	5 (3.2)	11.67 (±2.29)	
Occupation	Gainfully employed	6 (3.8)	12.33 (±2.4)	0.26†
	Homemaker	150 (96.2)	11.70 (±3.5)	
Socioeconomic class	Upper/upper middle	62 (39.7)	13.11 (±3.2)	0.46‡
	Middle	55 (35.3)	11.78 (±3.4)	
	Lower middle/lower	39 (30)	12.45 (±3.8)	
Type of family	Nuclear	33 (21.2)	11.22 (±3.2)	0.15†
	Joint	123 (78.8)	12.03 (±3.5)	
Consanguinity	Yes	36 (23.1)	11.86 (±2.9)	0.88†
	No	120 (76.9)	11.68 (±3.6)	
Number of children	1	97 (62.2)	12.06 (±3.28)	0.18†
	2 or more	59 (37.8)	12.85 (±3.98)	
Bad obstetric history§	Yes	13 (8.3)	11.85 (±3.4)	0.59†
	No	143 (91.7)	12.41 (±3.6)	
Know a child with developmental delay	Yes	3 (1.9)	15.33 (±2.1)	0.07†
	No	153 (98.1)	11.65 (±3.4)	
Received education on ECDM by health worker	Yes	12 (7.7)	15.25 (±3.6)	0.018†*
	No	144 (93.3)	12.12 (±3.5)	

ECDM: Early childhood developmental milestones, *indicates statistical significance at $p < 0.05$, †independent t-test, ‡one-way ANOVA, § any history of previous abortions, stillbirths, IUD, neonatal, infant, or child deaths. ANOVA: Analysis of variance

Table 2: Mean maternal ECDM awareness scores (n=156)

Variable	Maximum possible score	Mean (±SD)
Total ECDM awareness score	36	12.4 (±3.6)
Risk factors for DD	4	2.7 (±1.3)
Gross motor milestones	11	2.9 (±1.6)
Fine motor milestones	6	2.3 (±1.4)
Social milestones	8	2.0 (±1.3)
Language milestones	7	2.3 (±1.2)

ECDM: Early childhood developmental milestones, DD: Development delay

Table 3: Correlation between total maternal ECDM awareness score and sociodemographic factors (n=156)

Variable	Correlation coefficient†	p-value
Age of the participant	-0.074	0.12
Age at marriage	-0.148	0.07
Per capita monthly income	0.05	0.54
Years of formal education	0.130	0.007*

ECDM: Early childhood developmental milestones, *indicates statistical significance at $p < 0.05$, †Pearson correlation test

awareness sits at the lower end of the continuum, and knowledge which is considered detailed and specific sits at the higher end [20]. In our study, we found that the mothers had poor awareness regarding ECDM, with the mean ECDM awareness score lower than one-third of the maximum possible score. In a hospital-based study done in urban Ludhiana by David *et al.* [13], the mean awareness score for DD alone was 12.4, nearer to half of the maximum possible score of 26. While both studies showed

inadequate awareness, the mothers in our study were even less aware, probably due to the fact that they hailed from a rural background, with limited access to health-related information. In the Ludhiana study, mothers had better awareness in the language and gross motor domains.

Our study revealed low scores in the gross motor domain in comparison to other domains such as social and language. We wonder if it could be possible that language and social milestones are more rewarding as it helps the mother know that her affection and attention to her child is being reciprocated, and therefore, mothers focused on these domains, or if mothers in rural areas are not overly anxious about gross motor milestones and feel less pressure in having their infants demonstrate these milestones on time, as compared to infants of other mothers, which may be the case in urban or more elite groups. This finding is interesting and opens up a new possible path of enquiry into why mothers focus more on certain domains of development.

A Turkish study [21] found that higher maternal education and a lower number of children remained significantly associated with better ECDM awareness scores. In our study, though there was no link between the number of children and maternal awareness of ECDM, probably because women in our study had only one or two children, we did, however, find a significant association with increasing years of formal education. This was also found in a similar study across different sociocultural settings; in villages of Kanchipuram district, Tamil Nadu [22], and among Saudi mothers in the Middle East [23] as well as areas of conflict like Iraq [24]. It can be expected that a mother with better knowledge

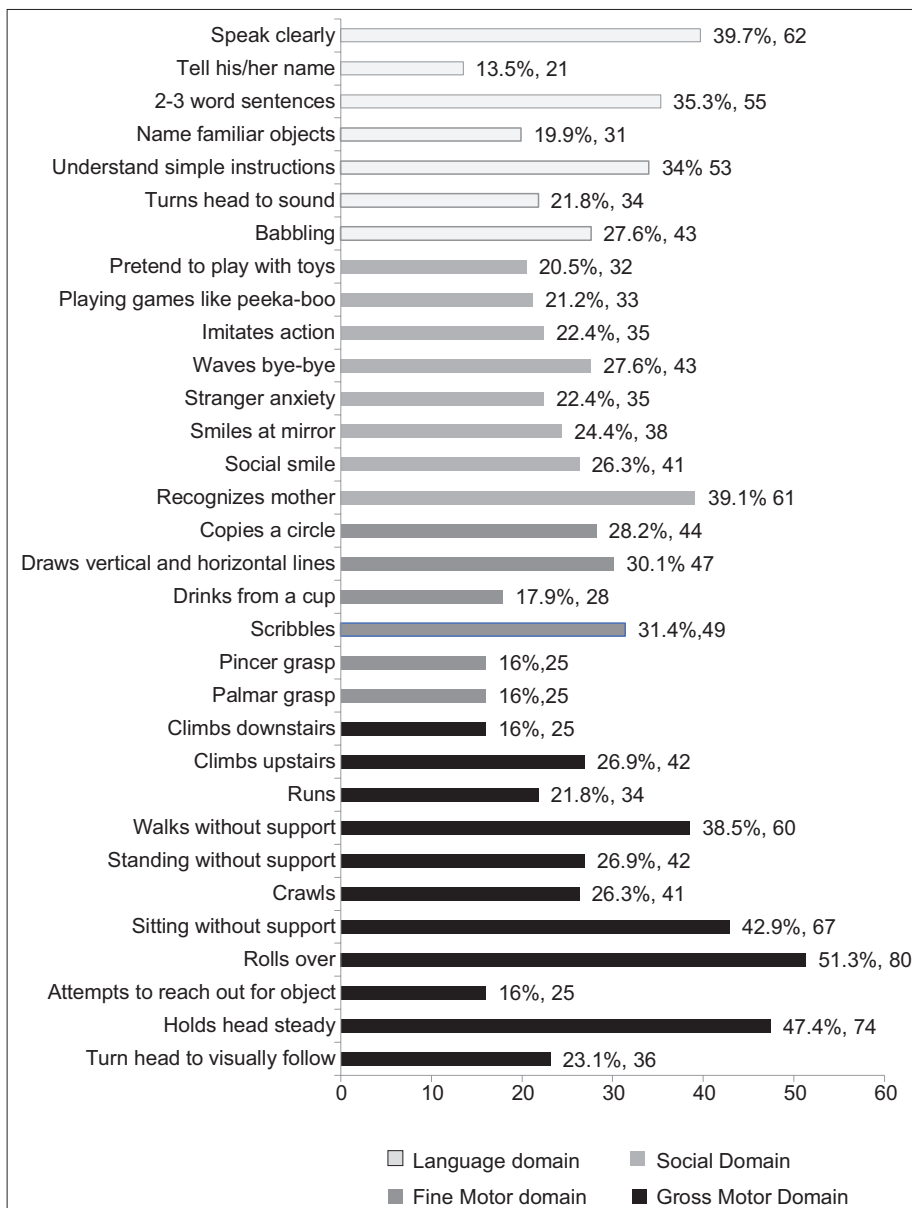


Figure 1: Maternal awareness of the four domains of early childhood developmental milestones

Table 4: Multilinear regression of factors associated with ECDM awareness (n=156)

Independent variable	Beta coefficient	p-value
Years of formal education	0.35	0.014*
Received education on ECDM by a health worker	2.40	0.038*

ECDM: Early childhood developmental milestones, *indicates statistical significance at p<0.05

regarding development would interact and stimulate the child more to improve the developmental outcome of her child [25,26].

Education has a strong link with the awareness of health and health-related issues, as evinced by many studies available in medical literature. Low maternal educational attainment has been also been shown to be a predictor of child health and development [27].

Knowledge of those milestones that are the first to be achieved in infancy was found to be low, such as turning head toward sound

and following objects visually. This finding suggests that timely recognition of delayed milestones may be a challenge in this rural setting. Early intervention is a key to dealing with delayed milestones, especially at an age when synaptic connections are still occurring. When mothers are not aware of when the first milestones are to be achieved, their index of suspicion regarding delayed milestones will be low, leading to poor care-seeking for their child.

Mothers in our study cited family members as a source of health information. A study done in Pakistan [27, 28] similarly reported that mothers cited informal interactions and experiences with family members as their usual sources of health information. Mothers also received general health-related information from ASHA, AWW, and ANM but not from the MCP Card. The latest MCP Card [18] has information regarding the approximate age by which the child should attain developmental milestones with pictorial representation. However, this resource was not utilized

for improving awareness about ECDM. In our study, mothers who had received health education on ECDM by community-level workers were found to have significantly higher awareness than those mothers who did not. Hence, health-care providers should utilize the opportunity during a child's regular growth monitoring and immunization sessions to engage with the mother and discuss early developmental milestones, preferably using the MCP Card as a tool for education and easy understanding.

The RBSK team is pivotal in the early identification of children with disabilities. Through this program, children are screened for DDs through dedicated mobile teams and followed up with corrective measures at specialized centers [4]. This study has limitations and being a hospital-based study, the results may not be generalizable to all mothers in the rural community.

CONCLUSION

Awareness among rural mothers of young children regarding ECDM was low across all four developmental domains. ECDM awareness score was significantly higher among mothers with higher levels of education ($p=0.014$) and among mothers who received health education on ECDM by community-level workers ($p=0.038$). Awareness of some of the first milestones to be achieved in infancy was found to be low. This study has revealed gaps in the awareness of ECDM that could lead to delayed identification of childhood DDs, which, in turn, could prevent early diagnosis and vital intervention in children. Health-care providers should educate mothers regarding ECDM, utilizing the opportunity afforded by immunization and growth monitoring sessions. The government issued MCP Card with pictorial depictions of ECDM can be a valuable tool for education and easy understanding.

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