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Developmental Status of Toddlers Aged 1–3 Years Assessed Using the Denver Developmental Screening Test at a Tertiary Care Hospital in Haryana, India

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Toddlers, Developmental delay, Denver Developmental Screening Test (DDST), Gross Motor, Language, Personal–Social, Fine Motor, Caregiver education.

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Abstract

Objectives: To assess the developmental status of toddlers aged 1–3 years using the Denver Developmental Screening Test (DDST) and examine its association with selected socio-demographic variables.

Methods: A descriptive cross-sectional study was conducted in the Pediatric Outpatient Department and Pediatric Medicine Ward of MMIMS&R Hospital, Mullana, Ambala, Haryana. Using purposive sampling, 110 toddlers aged 1–3 years were enrolled. Data were collected through a socio-demographic questionnaire and DDST performa. Descriptive statistics and Chi-square tests were applied for analysis.

Results: Most toddlers were 20–27 months old (38.2%); 52.7% were males. The majority were term-born (81.8%) with normal birth weight (83.6%). The highest mean DDST score was in Gross Motor (15.1 ± 1.9) and the lowest in Language (12.9 ± 2.8). Overall, 23% showed suspected developmental delay. Significant associations were found with gestational age ($p = 0.02$), birth weight ($p = 0.04$), and caregiver education ($p = 0.01$).

Conclusion: Nearly one-fourth of toddlers had suspected developmental delay, especially in language. Routine DDST screening is recommended for early detection and intervention.

Introduction

Early childhood development forms the foundation for lifelong health, learning, and behavior. The first three years of life represent a period of rapid brain development, during which children acquire essential motor, language, cognitive, and social skills. Any disruption during this sensitive period may result in developmental delay, leading to long-term academic and psychosocial difficulties.

Developmental delay is a significant public health concern, particularly in low- and middle-income countries. Factors such as prematurity, low birth weight, inadequate nutrition, and limited caregiver stimulation have been shown to adversely influence developmental outcomes. Early identification of children at risk is essential, as early intervention can significantly improve long-

term prognosis.

The Denver Developmental Screening Test (DDST) is one of the most widely used screening tools for children from birth to six years of age. It assesses development across four domains: Gross Motor, Fine Motor-Adaptive, Language, and Personal–Social skills. Despite its proven utility, routine developmental screening is not consistently practiced in many clinical settings in India.

Nurses play a crucial role in early identification of developmental delays through screening, parental education, and referral services. This study was undertaken to assess the developmental status of toddlers attending a tertiary care hospital in Haryana using DDST and to explore associations with selected socio-demographic variables.

Subjects and Methods

Study Design and Setting

A descriptive cross-sectional study was conducted in the Pediatric Outpatient Department (OPD) and Pediatric Medicine Ward of Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMS&R) Hospital, Mullana, Ambala, Haryana, India.

Study Population

The study population comprised toddlers aged 1–3 years attending the selected pediatric units during the data collection period.

Sample Size and Sampling Technique

A total of 110 toddlers were included in the study. Participants were selected using a purposive sampling technique based on predefined inclusion and exclusion criteria.

Inclusion Criteria

- Toddlers aged between 1 and 3 years
- Toddlers accompanied by a parent or primary caregiver
- Caregivers willing to provide informed consent

Exclusion Criteria

- Toddlers with diagnosed congenital anomalies or known neurological disorders
- Toddlers who were critically ill at the time of assessment
- Caregivers unwilling to participate in the study

Data Collection Tools

Data were collected using two tools:

1. **Socio-demographic questionnaire:** A self-structured questionnaire was used to collect information related to the toddler (age, gender, birth history, illness history) and caregiver characteristics (age, gender, education, occupation, and income).
2. **Denver Developmental Screening Test (DDST):** The DDST was used to assess developmental status across

four domains: Gross Motor, Fine Motor–Adaptive, Language, and Personal–Social skills. Based on DDST scoring criteria, toddlers were categorized as *normal* or *suspected developmental delay*.

Data Collection Procedure

After obtaining informed consent from caregivers, socio-demographic data were collected through interviews. The DDST was then administered individually to each toddler in a quiet and comfortable environment by the investigator following standard guidelines. The assessment was conducted either in the OPD, Pediatric Medicine Ward, or PICU as applicable.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of MMIMS&R. Written informed consent was taken from caregivers prior to data collection. Confidentiality and anonymity of participants were maintained throughout the study.

Statistical Analysis

Data were entered and analyzed using statistical software. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. Inferential statistics using the Chi-square test were applied to determine the association between developmental status and selected socio-demographic variables. A p-value of <0.05 was considered statistically significant.

Findings

Most toddlers belonged to the 20–27 months age group (38.2%), and males slightly outnumbered females (52.7%). Fever was the most common presenting illness (33.6%). Nearly half of the toddlers were first-born (46.4%). A majority were born at term (81.8%) and lived in joint families (52.7%).

Normal vaginal delivery was reported in 63.6% of cases, and 83.6% of toddlers had normal birth weight. Mothers were the primary caregivers in most cases (83.6%), and 34.5% of caregivers had secondary education. All toddlers had exposure to early stimulation.

Table 1.

Frequency And Percentage Distribution of Socio-Demographic Variable

N=110

S. No	Demographic Variables	f	%
1.Age of Toddler (months)			
1.1	12–19	35	31.8
1.2	20–27	42	38.2
1.3	Above 28	33	30
2.Gender of Toddler			

2.1	Male	58	52.7
2.2	Female	52	47.3

Domain-wise DDST analysis revealed that the Gross Motor domain had the highest mean score (15.1 ± 1.9), followed by the Personal–Social domain (14.2 ± 2.1). The Language domain showed the lowest mean score (12.9 ± 2.8) and the highest variability.

Table 2

Mean Midian and a standard deviation of DDST scale

Domain	Mean	Median	SD
Personal–Social	14.2	14.0	2.1
Fine Motor–Adaptive	13.6	14.0	2.4
Language	12.9	13.0	2.8
Gross Motor	15.1	15.0	1.9

Overall DDST assessment showed that 23% of toddlers had suspected developmental delay, while the majority were developmentally normal.

Table 3

Mean Midian and a standard deviation of Overall score DDST scale

Variable	Score (Coding)	Score Range (Min–Max)	Mean	Median	Standard Deviation (SD)
DDST Score	Normal = 0 Suspected Delay = 1	0 – 1	**0.23**	**0**	**0.42**

Chi-square analysis demonstrated significant associations between developmental status and gestational age at birth ($\chi^2 = 5.21$, $p = 0.02$), birth weight ($\chi^2 = 4.01$, $p = 0.04$), and caregiver educational qualification ($\chi^2 = 1.11$, $p = 0.01$). Other variables, including age and gender of the toddler, type of family, type of delivery, caregiver age, occupation, and income, did not show significant associations.

Table 4.4

Association Between Selected Variables and developmental status

S. No	Demographic Variables	Normal n (%)	Suspected n (%)	Untestable	χ^2	df	p value
5. **Gestational Age at Birth**							
5.1	Preterm	14 (12.7)	6 (5.5)	0	5.21	1	0.02*
5.2	Term	71 (64.5)	19 (17.3)	0			
8.Birth Weight							
8.1	Normal weight	72 (65.5)	20 (18.2)	0	4.01	1	0.04*
8.2	Underweight	13 (11.8)	5 (4.5)	0			
15. Educational Qualification							
15.2	Primary	24	9	0			
15.3	Secondary	31	7	0	1.11	3	0.01*
15.4	Higher Secondary	17	4	0			
15.5	Graduate & above	13	5	0			

Discussion

This study was conducted to assess the developmental status of toddlers aged 1 to 3 years using the Denver Developmental Screening Test (DDST) and to determine its association with selected demographic characteristics. The findings indicated that the majority of toddlers were developmentally normal, while nearly one-fourth were identified as having suspected developmental delay, highlighting the importance of routine developmental screening during early childhood.

Analysis of the DDST domain scores showed that toddlers performed best in the gross motor and personal–social areas, whereas the language domain recorded comparatively lower mean scores with greater variability. This suggests that language development was the most vulnerable area among the toddlers, consistent with the understanding that speech and language delays are commonly detected in early childhood. These observations align with a systematic review by **Pramod Kumar and Prof. S.P. Subashini (2024)**, which highlighted the DDST-II's utility in assessing gross motor, fine motor-adaptive, language, and personal-social domains for early detection of developmental delays, while also noting variability in sensitivity across cultural contexts.

The chi-square analysis revealed that gestational age at birth was significantly associated with developmental status ($p = 0.02$). A higher proportion of preterm toddlers were found to have suspected developmental delay compared with term-born children, supporting the hypothesis that prematurity increases the risk of developmental problems due to neurological immaturity and early life complications. Similarly, birth weight showed a significant association with developmental status ($p = 0.04$), with low-birth-weight toddlers more likely to exhibit suspected delay, emphasizing the role of intrauterine growth and neonatal health in later development.

Caregiver educational status was also significantly associated with developmental outcomes ($p = 0.01$), indicating that children of less-educated caregivers had higher rates of suspected developmental delay. This underscores the importance of caregiver knowledge, stimulation, and awareness in promoting optimal child development.

In contrast, variables such as age and gender of the toddler, history of illness, birth order, type of family, type of delivery, current diagnosis, caregiver relationship, caregiver's age and gender, monthly income, caregiver occupation, exposure to early stimulation, and area of DDST administration did not show statistically significant associations. These findings suggest that biological factors (gestational age, birth weight) and caregiver education have a stronger influence on developmental outcomes than most socio-

demographic factors in this population.

Overall, the study findings support the research hypothesis (H1) that there is a significant association between the developmental status of toddlers and selected demographic characteristics. The results emphasize the need for early identification and targeted interventions, particularly for preterm, low-birth-weight children and those from less-educated caregiver backgrounds, to promote healthy development during the critical early years of life. The findings are consistent with previous literature, including the systematic review by **Pramod Kumar and Prof. S.P. Subashini (2024)**, which reinforced the effectiveness of DDST-II in early detection while highlighting the need for supplementary tools in non-Western populations.

Conclusion

The present study concludes that most toddlers aged 1 to 3 years had normal developmental status; however, a considerable proportion showed suspected developmental delay, highlighting the need for routine developmental screening. The DDST proved to be an effective tool for identifying early developmental concerns, particularly in the language domain. Gestational age, birth weight, and caregiver's educational level were found to be significant factors influencing developmental outcomes. Preterm and low-birth-weight toddlers were more vulnerable to developmental delays. Early identification, parental awareness, and timely intervention are essential to promote optimal growth and development during early childhood.

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