Research Article

Impact Of Nurse Led Developmental Screening Program For Early Identification Of Developmental Delay Among Under-Five Year Children In Selected Hospital, Indore, M.P.

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Abstract

Background: Developmental delay in children under five years of age is a major public health concern because it affects cognitive, motor, language, and social development. Early identification through nurse-led developmental screening facilitates timely intervention and improves developmental outcomes. **Objectives:** To evaluate the effectiveness of the nurse-led developmental screening program in improving early identification. **Methodology:** A quantitative evaluative research approach with a one-group pretest-posttest design was adopted. Fifty under-five children attending OPD in SAIMS Hospital were selected through purposive sampling. Developmental screening was conducted using a structured developmental assessment checklist. Data were analyzed using descriptive and inferential statistics. **Results:** Before screening, only 14% of children with developmental delay had been previously identified by caregivers or health workers. Following the nurse-led screening program, 30% of children were identified with suspected developmental delay requiring referral. The mean identification score significantly improved from 4.62 ±1.58 to 8.54 ±1.26 ($t=15.48$, $p<0.001$). Significant association was observed between developmental delay and age as well as birth weight ($p<0.05$). **Conclusion:** Nurse-led developmental screening significantly improved early identification of developmental delay among under-five children. Routine developmental screening should become an integral component of child health services.

Keywords: Developmental delay, Nurse-led screening, Under-five children, Early identification.

Introduction

The first five years of life represent the most critical period for physical growth and neurological development. Nearly 250 million children worldwide are at risk of not achieving their developmental potential because of poverty, malnutrition, infections, and inadequate stimulation. Developmental delay refers to a significant lag in achieving age-appropriate developmental milestones in one or more domains including gross motor, fine motor, language, cognitive, and social skills. Early identification enables prompt intervention that can substantially improve developmental outcomes. Nurses are the first point of contact in maternal and child health services. A nurse-led developmental screening program ensures systematic assessment, parental counseling, referral, and follow-up of children at risk.

Objectives

1. To assess the pre-test knowledge score regarding developmental status among under-five children.
2. To identify developmental delay using nurse-led developmental screening among under-five year children.
3. To evaluate effectiveness of nurse-led developmental screening program for early identification of developmental delay among under-five year children.
4. To determine association between pre-test knowledge score regarding early identification of developmental delay among under-five year children with their selected demographic variables.

Hypotheses

H1: There is a significant difference between pretest and post-test knowledge score regarding early identification of developmental delay among under-five year children.
H2: There is significant association between pre-test knowledge score regarding early identification of developmental delay among under-five year children with their selected demographic variables.

Methodology

The present study adopted a quantitative research approach with a one-group pre-test and post-test evaluative research design to assess the impact of a nurse-led developmental screening program on the early identification of developmental delay among under-five children. The study was conducted in SAIMS Hospital. A total of 50 under-five children were selected using a non-probability purposive sampling technique based on the inclusion criteria. Children aged 6 months to 5 years whose parents or caregivers provided written informed consent were included in the study.

The independent variable of the study was the Nurse-Led Developmental Screening Program, while the dependent variable was the early identification of developmental delay among under-five children. Data were collected using a structured research tool consisting of two sections. Section A included demographic variables such as age of the child, gender, birth weight, and area of residence. Section B comprised a standardized developmental screening checklist designed to assess developmental milestones in the domains of gross motor, fine motor, language, cognitive, and personal-social development according to the child's age. Reliability of the screening checklist was determined using Cronbach's alpha, yielding a reliability coefficient of 0.89, indicating good internal consistency.

Ethical approval was obtained from the Institutional Ethics Committee, and formal administrative permission was secured from the concerned hospital. Written informed consent was obtained from the parents or caregivers of all participating children, and confidentiality and anonymity of the collected information were maintained throughout the study.

The study was carried out in three phases. During the pre-intervention phase, demographic information was collected, and baseline developmental screening was performed for each child using the standardized checklist. In the intervention phase, the investigator implemented the Nurse-Led Developmental Screening Program, which included comprehensive developmental assessment, parent education regarding age-appropriate developmental milestones, identification of developmental warning signs, counseling on developmental stimulation activities, documentation of findings, and referral of children with suspected developmental delay to appropriate pediatric and rehabilitation services for further evaluation and management. In the post-intervention phase, developmental screening outcomes and referral status were reviewed to evaluate the effectiveness of the nurse-led screening program in facilitating early identification of developmental delay.

The collected data were coded, entered, and analyzed using Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize demographic characteristics and developmental screening findings. Inferential statistics such as the paired t-test were used to compare pre-test and post-test identification scores, while the Chi-square test was applied to determine the association between developmental delay and selected demographic variables. A p-value of less than 0.05 was considered statistically significant.

Data Analysis and interpretation

Table 1 Frequency and percentage distribution of Age

Age (Months)	Frequency	Percentage
6–12	12	24%
13–24	16	32%
25–36	10	20%
37–60	12	24%

Interpretation

Among 50 children, the highest proportion (32%) belonged to 13–24 months, followed by 24% each in 6–12 months and 37–60 months, while 20% were between 25–36 months.

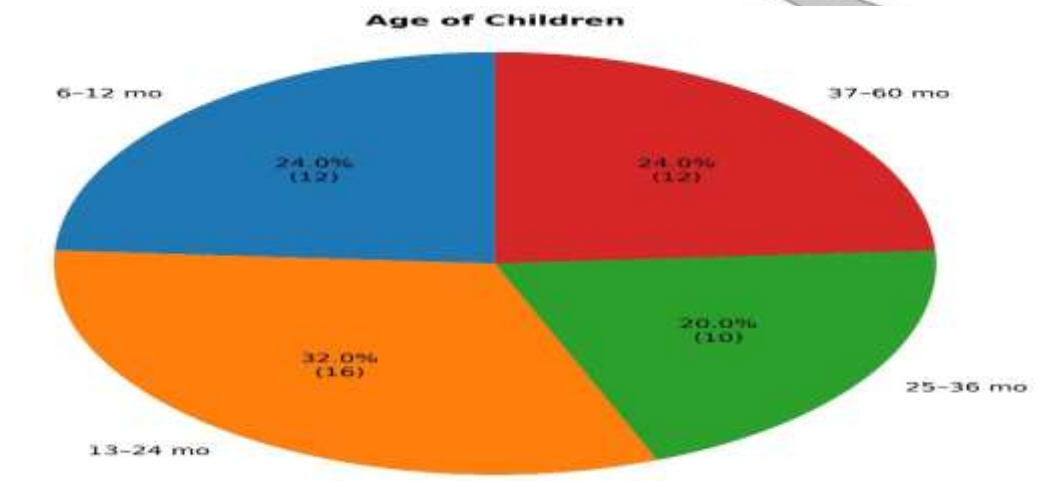

Figure-1 Pie Diagram Showing frequency and percentage distribution of age of under five year children

Table 2 Frequency and percentage distribution of Gender

Gender	Frequency	Percentage
Male	28	56%
Female	22	44%

Interpretation

The majority (56%) of children were male whereas 44% were female.

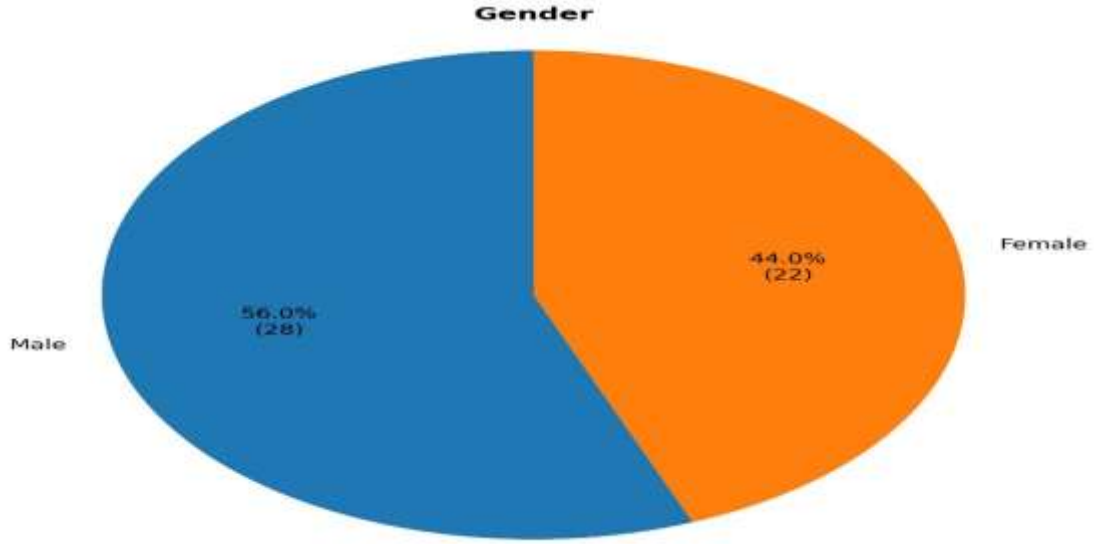

Figure-2 Pie Diagram Showing frequency and percentage distribution of gender of under five year children

Table 3 Frequency and percentage distribution of Birth Weight

Birth Weight	Frequency	Percentage
<2.5 kg	18	36%
≥2.5 kg	32	64%

Interpretation

Most children (64%) had normal birth weight while 36% had low birth weight.

Figure- 3 Pie Diagram Showing frequency and percentage distribution of birth weight of under five-year children

Table 4 Frequency and percentage distribution of Residence

Residence	Frequency	Percentage
Urban	22	44%
Rural	28	56%

Interpretation

Most participants belonged to rural areas (56%), while 22 (44%) belonged to urban areas.

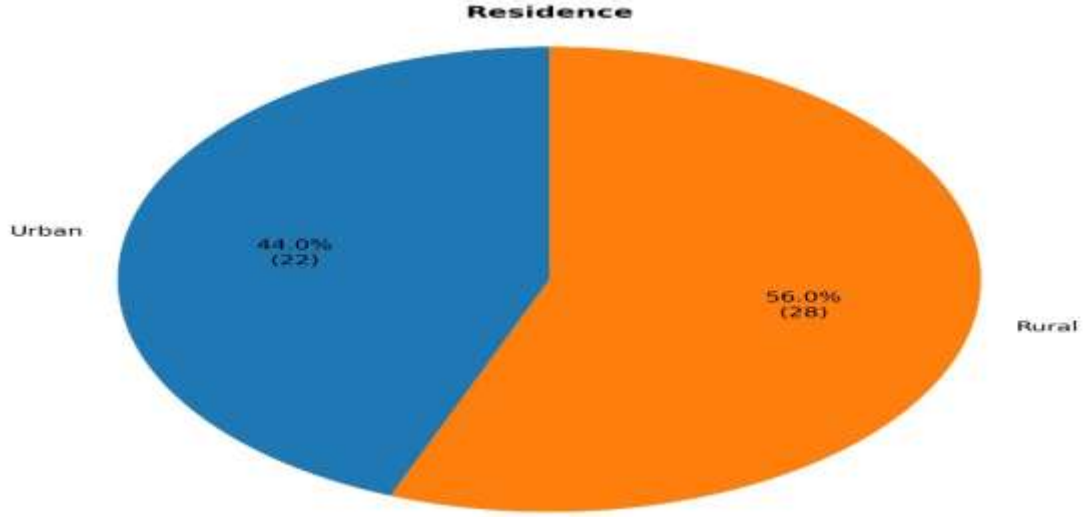

Figure-4 Pie Diagram Showing frequency and percentage distribution of residence of under five-year children

Table 5 Frequency and percentage distribution of Developmental Screening Findings

Status	Frequency	Percentage
Normal Development	35	70%
Suspected Developmental Delay	15	30%

Interpretation

Developmental screening identified 15 (30%) children with suspected developmental delay requiring referral, while 35 (70%) children with suspected normal development.

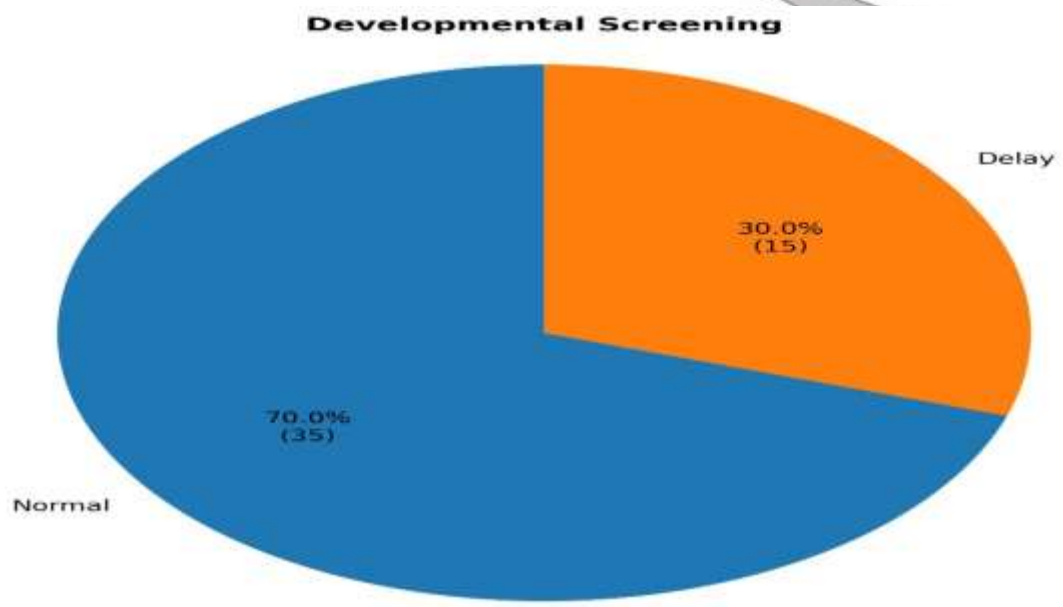

Figure-5 Pie Diagram Showing Developmental Screening score.

Table 6 Comparison of Identification Scores

Assessment	Mean	SD
Pretest	4.62	1.58
Posttest	8.54	1.26

Table 6 presents the comparison of the pre-test and post-test mean identification scores regarding the early identification of developmental delay among under-five children following the implementation of the Nurse-Led Developmental Screening Program.

The findings reveal that the mean pre-test score was 4.62 with a standard deviation (SD) of 1.58, indicating that the baseline level of early identification of developmental delay was relatively low before the implementation of the screening program. After the intervention, the mean post-test score increased substantially to 8.54 with a standard deviation of 1.26, demonstrating a marked improvement in the identification of developmental delay among the study participants.

The increase in the mean score from 4.62 to 8.54, with a mean difference of 3.92, indicates that the nurse-led developmental screening program had a positive impact on the early identification process. Furthermore, the lower standard deviation in the post-test suggests that participants' scores became more consistent after the intervention, reflecting the effectiveness of the standardized nurse-led screening approach.

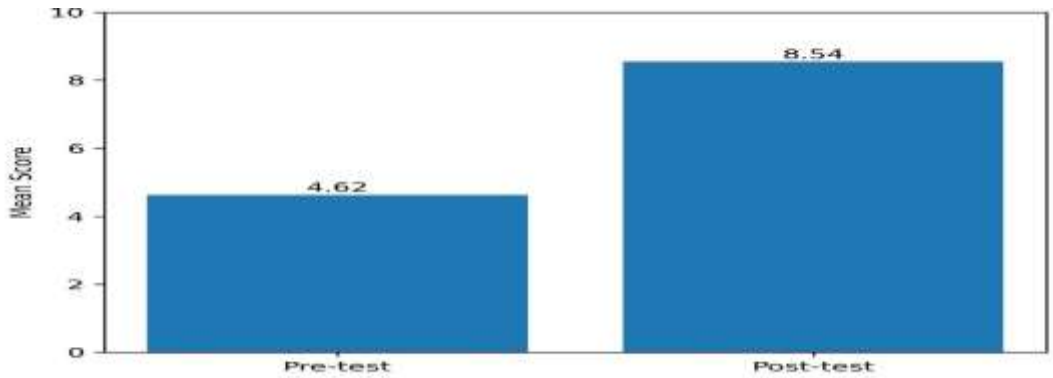

Figure-6 Bar Diagram Showing Comparison of Identification Scores

Table 7 Effectiveness of nurse-led developmental screening program (Paired t Test)

Comparison	Mean Difference	t value	p value
Pretest vs Posttest	3.92	15.48	<0.001

Interpretation

The calculated t-value (15.48) was highly significant (p<0.001), indicating that the nurse-led developmental screening program significantly improved early identification of developmental delay.

Table 8: Association between Developmental Delay and Selected Demographic Variables (N = 50)

S. No.	Demographic Variable	χ^2 Value	df	p-value	Level of Significance	Interpretation
1	Age of Child	8.42	3	0.038	Significant (p<0.05)	Significant association
2	Gender	0.12	1	0.729	Not Significant (p>0.05)	No significant association
3	Birth Weight	9.84	1	0.002	Significant (p<0.05)	Significant association
4	Area of Residence	1.26	1	0.262	Not Significant (p>0.05)	No significant association

Level of significance: $p < 0.05$

The association between developmental delay and selected demographic variables was analyzed using the Chi-square test. The findings revealed that age of the child ($\chi^2 = 8.42$, $p = 0.038$) and birth weight ($\chi^2 = 9.84$, $p = 0.002$) were significantly associated with developmental delay, indicating that younger age groups and children with low birth weight were more likely to exhibit suspected developmental delay. However, gender ($\chi^2 = 0.12$, $p = 0.729$) and area of residence ($\chi^2 = 1.26$, $p = 0.262$) did not show a statistically significant association with developmental delay.

Discussion

The present study was conducted to assess the impact of a nurse-led developmental screening program on the early identification of developmental delay among under-five children. The findings indicate that the nurse-led screening program was effective in identifying children at risk for developmental delay and facilitating timely referral for further assessment and intervention.

The demographic profile of the participants revealed that the highest proportion of children (32%) belonged to the 13–24 months age group, followed by equal proportions (24%) in the 6–12 months and 37–60 months age groups. Male children constituted 56% of the sample, while females accounted for 44%. Most children (64%) had a normal birth weight (≥2.5 kg), whereas 36% had low birth weight. More than half (56%) of the participants resided in rural areas. These findings reflect the diversity of the study population and are comparable with community-based pediatric studies conducted in India, where children attending immunization and well-child clinics represent a broad range of socioeconomic and demographic backgrounds.

Developmental screening identified that 30% of the children had suspected developmental delay, while 70% exhibited normal developmental milestones. This finding emphasizes that a considerable proportion of under-five children may have developmental concerns that remain unnoticed during routine health visits. Early identification through standardized screening is therefore essential to initiate timely intervention, which can improve developmental outcomes and reduce long-term disabilities. Similar findings have been reported in previous studies, which highlighted that systematic developmental screening by healthcare professionals significantly increases the detection of developmental delays compared with routine clinical observation alone.

The effectiveness of the nurse-led developmental screening program was demonstrated by the significant improvement in the identification scores. The mean score increased from 4.62 ± 1.58 during the pre-test to 8.54 ± 1.26 during the post-test. The calculated paired t-value of 15.48 ($p < 0.001$) indicated a highly statistically significant difference between pre-test and post-test scores. These findings confirm that the structured nurse-led developmental screening program substantially improved the early identification of developmental delay. The improvement may be attributed to the systematic use of developmental screening tools, comprehensive assessment by trained nurses, parental counseling, and appropriate referral practices.

The study also examined the association between developmental delay and selected demographic variables. A statistically significant association was observed between age of the child and developmental delay, indicating that developmental concerns were more frequently identified in younger age groups where developmental milestones rapidly emerge. Similarly, birth weight showed a significant association with developmental delay, suggesting that children with low birth weight are at greater risk of developmental problems and require closer

developmental surveillance. These findings are supported by existing literature, which identifies low birth weight as one of the strongest biological risk factors for developmental impairment.

No statistically significant association was found between gender and developmental delay, indicating that developmental delays affected male and female children similarly within the study population. Likewise, area of residence did not show a significant association, although a slightly higher proportion of developmental delay was observed among children from rural areas. This may reflect differences in access to health services, parental awareness, and environmental stimulation, but the observed difference was not statistically significant.

Overall, the study demonstrates that nurse-led developmental screening is an effective, feasible, and evidence-based strategy for the early detection of developmental delay among under-five children. Incorporating routine developmental screening into child health services can facilitate early diagnosis, prompt referral, parental education, and timely intervention, thereby improving the developmental potential and quality of life of children.

Major Findings

The major findings of the study are summarized as follows:

Demographic Characteristics

- Out of 50 under-five children, 16 (32%) were aged 13–24 months, which constituted the largest age group.
- 28 (56%) participants were male, while 22 (44%) were female.
- 32 (64%) children had a normal birth weight (≥2.5 kg), whereas 18 (36%) had low birth weight.
- 28 (56%) children belonged to rural areas, and 22 (44%) belonged to urban areas.

Developmental Screening Findings

- 35 (70%) children demonstrated normal developmental milestones.
- 15 (30%) children were identified with suspected developmental delay and were recommended for further evaluation and referral.

Effectiveness of the Nurse-Led Developmental Screening Program

- The mean developmental identification score increased from 4.62 ± 1.58 in the pre-test to 8.54 ± 1.26 in the post-test.
- The mean improvement score was 3.92.
- The calculated paired t-value was 15.48, which was statistically highly significant ($p < 0.001$).
- The findings indicate that the nurse-led developmental screening program was highly effective in improving the early identification of developmental delay among under-five children.
- Therefore, the research hypothesis (H_1) was accepted.

Association with Selected Demographic Variables

- A statistically significant association was found between age of the child and developmental delay ($\chi^2 = 8.42$, $p = 0.038$).
- A statistically significant association was observed between birth weight and developmental delay ($\chi^2 = 9.84$, $p = 0.002$).
- No statistically significant association was found between gender and developmental delay ($\chi^2 = 0.12$, $p = 0.729$).
- No statistically significant association was found between area of residence and developmental delay ($\chi^2 = 1.26$, $p = 0.262$).
- Hence, the research hypothesis (H_2) was partially accepted, as developmental delay was significantly associated with age and birth weight but not with gender or area of residence.

Limitations of the Study

The following limitations were identified during the conduct of the study:

1. The study was limited to a sample size of 50 under-five children, which may limit the generalizability of the findings.
2. The study was conducted in SAIMS Hospital.
3. A non-probability purposive sampling technique was used, which may have introduced selection bias.

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