Effectiveness of Structured Teaching Programme on Knowledge Regarding Prevention of Developmental Disorders in Infants among Mothers: A Pre-Experimental Study

MS. Lidiya Jerome[1], Mrs. Sharadha[2]

[1]*Associate Professor, Department of Child Health Nursing, Sacred Heart College of Nursing, Bangalore, India*

[2]*Professor, Department of Child Health Nursing, Varalakshmi College of Nursing, Dasarhalli, Bangalore – 560057, Karnataka, India*

Abstract- Background: Developmental disorders represent a significant global health challenge, particularly in low- and middle-income settings where awareness among caregivers' remains limited. Maternal knowledge about the prevention of these disorders plays a vital role in early identification and timely intervention. However, evidence suggests that mothers of infants in semi-urban and rural areas of India often possess inadequate understanding of the causes, risk factors, and preventive strategies related to developmental disorders. Structured educational interventions have shown promise in bridging this knowledge gap across various clinical contexts, yet their application specifically to infant developmental disorders among Indian mothers remains underexplored.

Aim: This study was designed to evaluate whether a structured teaching programme could significantly improve the knowledge of mothers regarding the prevention of developmental disorders in infants.

Methods: A pre-experimental, one-group pre-test post-test design was adopted. Fifty mothers of infants (aged up to one year) residing in Nelamangala, Bangalore were recruited through purposive sampling. Data were gathered using a researcher-developed structured knowledge questionnaire comprising 28 items, validated by ten subject-matter experts (reliability coefficient r = 0.87 using the split-half method). The structured teaching programme was delivered immediately following the pre-test, and a post-test was administered seven days later. Data analysis involved descriptive statistics (mean, standard deviation, frequency, and percentage) and inferential statistics (paired t-test and chi-square test) at the 0.05 significance level.

Results: The mean pre-test knowledge score was 8.85 (SD = 1.13), indicating that 72.5% of mothers had below-average knowledge. Following the intervention, the mean post-test score rose to 17.10 (SD = 1.88), with 72.5% of mothers achieving average or above-average knowledge levels. The difference between pre-test and post-test scores was statistically significant ($t = 15.8$, $p < 0.05$). No significant association was observed between pre-test knowledge scores and selected demographic variables (age, education, occupation, income, area of residence, or type of family).

Conclusion: The structured teaching programme was effective in enhancing maternal knowledge on prevention of developmental disorders in infants. Findings underscore the value of nurse-led educational strategies in community health settings and highlight the need for scaling such interventions across primary healthcare centres.

Keywords: ***developmental disorders, structured teaching programme, maternal knowledge, infant health, pre-experimental study, nursing education, health promotion***

I.INTRODUCTION

Developmental disorders constitute a heterogeneous group of chronic conditions arising from mental and physical impairments that typically emerge during the early years of life and persist across the lifespan. These conditions encompass a broad clinical spectrum including intellectual disabilities, autism spectrum disorders, learning disorders, communication impairments, and motor function disturbances. Globally, the burden of developmental disorders is substantial, affecting approximately 15% of children

aged three to seventeen years in various forms and severity levels.[1]

The etiology of developmental disorders is multifactorial, involving genetic predisposition, environmental exposures during pregnancy, perinatal complications, nutritional deficiencies, and socio-economic determinants. Several of these risk factors are amenable to modification through timely maternal education and preventive health practices. For instance, periconceptional folic acid supplementation, avoidance of teratogenic substances during pregnancy, neonatal metabolic screening for conditions such as phenylketonuria, and genetic counselling for families with known heritable conditions all contribute meaningfully to risk reduction.[2,3]

In the Indian context, the incidence of developmental disorders has been reported at approximately 10.63% nationally, with regional variations observed across states. Karnataka records an incidence of around 6.3%, while Bangalore-specific estimates stand at roughly 4%.[4] Despite these considerable figures, awareness among mothers — who are the primary caregivers during the critical early months of infant development — remains disproportionately low, especially in semi-urban and rural communities where access to specialist healthcare services is limited.

Health education interventions, particularly structured teaching programmes delivered by trained nurses, have been widely recognised as cost-effective strategies for improving community health literacy. Previous studies have demonstrated the effectiveness of structured teaching programmes in improving knowledge among mothers on topics such as postnatal care, breastfeeding practices, and prevention of anaemia.[5,6,7] However, the application of such educational strategies to specifically address maternal knowledge about developmental disorder prevention in infants has received relatively limited research attention in Indian settings.

Given this gap, the present study was undertaken with the objective of assessing whether a structured teaching programme could produce a measurable improvement in mothers' knowledge regarding the prevention of developmental disorders in their infants. The conceptual basis for the study drew on Imogene King's Goal Attainment Model, which emphasises the interactive process between nurse and client as a pathway toward achieving mutually defined health goals.[8]

II.OBJECTIVES

The study was guided by the following objectives:

1. To assess the pre-test level of knowledge regarding prevention of developmental disorders among mothers of infants.

2. To evaluate the effectiveness of the structured teaching programme by comparing pre-test and post-test knowledge scores.

3. To determine the association between selected demographic variables (age, education, occupation, income, area of residence, and type of family) and pre-test knowledge scores.

Hypotheses

H^1: There will be a statistically significant difference between the mean pre-test and post-test knowledge scores of mothers regarding prevention of developmental disorders in infants.

H^2: There will be a statistically significant association between selected demographic variables and pre-test knowledge scores of mothers.

III.METHODS

Study Design and Setting

A pre-experimental, one-group pre-test post-test design was employed for this study. The research was conducted in Nelamangala, a semi-urban area located approximately 14 kilometres from Varalakshmi College of Nursing in Bangalore, Karnataka, India. The data collection period extended from 30 August to 26 September 2014. Ethical clearance was obtained from the institutional review board, and formal permission was secured from the Primary Health Centre at the study site prior to commencing data collection.

Participants and Sampling

The study population comprised mothers of infants (aged up to one year) residing in the selected area. A total of 50 mothers who met the inclusion criteria were recruited through purposive sampling. The inclusion criteria specified that participants must be mothers of

infants, willing to participate in the study, and able to read and write in Kannada or English. Mothers who were unwilling to participate were excluded. Written informed consent was obtained from each participant after explaining the purpose, procedures, and voluntary nature of the study.

Data Collection Instrument

The research instrument consisted of two sections. Section A captured demographic information through a baseline proforma covering six variables: age, educational status, occupation, monthly family income, area of residence, and type of family. Section B comprised a structured knowledge questionnaire with 28 multiple-choice items distributed across five content domains: general knowledge on developmental disorders, intellectual disorders, learning disabilities, communication disorders, and motor disorders. The items were distributed across three cognitive domains based on Bloom's taxonomy: knowledge (21.43%), comprehension (64.28%), and application (14.29%).

Content validity of the instrument was established through evaluation by ten experts drawn primarily from the field of child health nursing. Of the initial 31 items, 25 received 100% agreement, two items had 80% agreement, and one had 70% agreement, resulting in a refined 28-item final questionnaire. The reliability of the tool was determined using the split-half technique and the Spearman-Brown prophecy formula, yielding a reliability coefficient of 0.87.

Intervention

The structured teaching programme was developed based on an extensive review of the literature and was validated by subject experts. The programme content addressed the definition, types, causes, clinical features, and prevention of developmental disorders in infants. It was delivered in Kannada using flash cards as an audiovisual aid, and each teaching session lasted approximately 45 minutes. The programme was administered immediately following the pre-test, and data collection was carried out in four batches of ten mothers each over consecutive weeks.

Data Analysis

Collected data were coded, tabulated, and analysed using both descriptive and inferential statistics. Frequency and percentage distributions were computed for demographic variables. Mean, standard deviation, and mean percentage scores were used to summarise knowledge scores. The paired t-test was employed to compare pre-test and post-test knowledge scores, while the chi-square test was used to examine associations between demographic variables and pre-test knowledge scores. Statistical significance was set at the 0.05 level. A pilot study was conducted on eight mothers prior to the main study to confirm feasibility, and no modifications to the tool were deemed necessary following pilot testing.

IV.RESULTS

Demographic Profile of Participants

Among the 50 participating mothers, the largest proportion (36%) were below 20 years of age, followed by those aged 21–25 years (34%) and 26–30 years (30%). Regarding educational attainment, 40% had completed secondary education, 37.5% had primary-level education, and 22.5% held pre-university or higher qualifications. The majority of participants (67.5%) were homemakers. In terms of family income, 35% each reported monthly earnings of ₹4,000 or less and between ₹4,001 and ₹7,000 respectively. A substantial proportion (72.5%) resided in rural areas. Joint families accounted for 45% of respondents, nuclear families for 42.5%, and extended families for the remaining 12.5%.

Table 1. Demographic characteristics of the study participants (N = 50)

Variable	Frequency (n)	Percentage (%)
Age (years)		
< 20	18	36.0
21–25	17	34.0
26–30	15	30.0
Education		
Primary	15	37.5
Secondary	19	40.0
PUC and above	9	22.5
Occupation		
Homemaker	27	67.5
Government employee	3	7.5
Private employee	5	12.5
Other	5	12.5

Monthly income (₹)		
≤ 4,000	14	35.0
4,001–7,000	14	35.0
7,001–10,000	10	25.0
> 10,000	2	5.0
Area of residence		
Rural	29	72.5
Urban	11	27.5
Type of family		
Nuclear	17	42.5
Joint	18	45.0
Extended	5	12.5

Pre-test and Post-test Knowledge Scores

Before the intervention, the majority of mothers (72.5%) had below-average knowledge scores (range 0–9 out of 28), while 27.5% had average knowledge (range 10–18). None of the participants demonstrated good knowledge (score 19–28) during the pre-test. Following the structured teaching programme, the distribution shifted markedly: 72.5% of mothers achieved average knowledge and 27.5% achieved good knowledge in the post-test. No participant remained in the below-average category after the intervention.

Table 2. Distribution of pre-test and post-test knowledge scores (N = 50)

Knowledge Level	Pre-test (n)	Pre-test (%)	Post-test (n)	Post-test (%)
Good (19–28)	0	0.0	11	27.5
Average (10–18)	11	27.5	29	72.5
Below average (0–9)	29	72.5	0	0.0

Maximum possible score = 28

Table 3. Area-wise mean percentage of pre-test and post-test knowledge scores (N = 50)

Content Area	Max	Pre-test Mean%	Post-test Mean%	Actual Gain%
Developmental disorders	5	42.6	62.6	20.0
Intellectual disorders	5	25.6	64.6	39.0
Learning disabilities	6	31.6	55.8	24.2
Communication disorders	10	31.0	60.0	29.0
Motor disorders	2	25.0	70.0	45.0

Effectiveness of the Structured Teaching Programme

The overall pre-test knowledge score ranged from 7 to 12, with a mean of 8.85 (SD = 1.13) and a mean percentage of 31.61%. After the intervention, post-test scores ranged from 12 to 21, with a mean of 17.10 (SD = 1.88) and a mean percentage of 61.07%. The mean difference between post-test and pre-test scores was 8.25 (SD of difference = 0.75). The computed paired t-test value of 15.8 exceeded the critical table value ($t^{39} = 2.02$ at $p < 0.05$), establishing statistical significance and confirming the effectiveness of the structured teaching programme.

Table 4. Comparison of pre-test and post-test knowledge scores using paired t-test

(N = 50)

Test	Mean	SD	Mean Diff.	SD Diff.	t-value
Pre-test	8.85	1.13	8.25	0.75	15.8*
Post-test	17.10	1.88			

**Significant at p < 0.05; df = 39; table value = 2.02*

Association Between Demographic Variables and Pre-test Knowledge

Chi-square analysis revealed no statistically significant association between any of the selected demographic variables and the pre-test knowledge scores of mothers. The computed chi-square values for age ($\chi^2 = 0.0075$), education ($\chi^2 = 0.0043$), income ($\chi^2 = 1.143$), occupation ($\chi^2 = 2.670$), area of residence ($\chi^2 = 0.500$), and type of family ($\chi^2 = 0.056$) were all below the critical table value ($\chi^2 = 3.84$ at $p \leq 0.05$). Consequently, the null hypothesis was retained, indicating that baseline knowledge about developmental disorder prevention was uniformly low across all demographic subgroups.

V.DISCUSSION

The findings of this study clearly demonstrate that a structured teaching programme can serve as a potent educational tool for improving maternal knowledge about developmental disorder prevention. The substantial rise in mean knowledge scores from 8.85

to 17.10 following the intervention reflects a nearly twofold improvement, underscoring the responsiveness of participating mothers to well-organised health education. The statistically significant t-value of 15.8 leaves little doubt about the effectiveness of the intervention.

These results align closely with findings from comparable studies conducted in different health education contexts. Research on structured teaching programmes for postnatal care among antenatal mothers in Kerala reported similarly strong post-intervention knowledge gains ($t = 30.56$, $p \leq 0.01$).[5] Likewise, studies evaluating structured teaching on topics such as breast self-examination, anaemia prevention, and hand washing among food handlers have consistently documented significant improvements in knowledge scores following educational interventions.[6,7,9]

The area-wise analysis of knowledge gains offers additional insight. Motor disorders showed the greatest improvement (45% gain), followed by intellectual disorders (39% gain). This pattern is notable because these were the content areas where baseline knowledge was lowest (25% and 25.6% mean pre-test scores, respectively), suggesting that the structured teaching programme was particularly effective in addressing knowledge deficits in areas where mothers had the least prior awareness. Communication disorders, which had the highest item count in the questionnaire (10 items), showed a 29% gain, indicating consistent learning across all content domains.

The absence of a significant association between demographic variables and pre-test knowledge scores is worth noting. While one might expect factors such as education level or urban residence to be associated with higher baseline knowledge, the uniformly low pre-test scores across all subgroups suggest that knowledge about developmental disorders is not adequately disseminated through routine healthcare contacts or general education in this population. This finding reinforces the argument for targeted community-based educational programmes that reach mothers regardless of their socio-economic background.

The study's conceptual grounding in Imogene King's Goal Attainment Model proved relevant in practice. The interactive teaching approach, where the investigator and the mothers collaboratively worked toward the shared objective of knowledge enhancement, facilitated active engagement and appeared to contribute to the favourable learning outcomes observed.

Several limitations should be acknowledged when interpreting these results. The pre-experimental design, which lacked a control group, limits the ability to attribute knowledge improvement exclusively to the intervention, as other influences such as the Hawthorne effect or information seeking by participants between sessions cannot be ruled out. The sample of 50 mothers drawn from a single geographical area restricts the generalisability of findings. Additionally, the seven-day interval between intervention and post-test may reflect short-term knowledge retention rather than sustained learning. Future research employing randomised controlled designs, larger and more diverse samples, and longer follow-up periods would strengthen the evidence base.

VI.CONCLUSION

This study provides evidence that a structured teaching programme delivered by a nurse educator is effective in significantly improving the knowledge of mothers regarding prevention of developmental disorders in infants. The pre-test findings confirm that mothers in semi-urban and rural settings possess limited awareness of developmental disorder prevention, which underscores the pressing need for proactive health education initiatives. The uniformly low baseline knowledge across all demographic categories further emphasises that such educational interventions should be implemented broadly rather than targeted at specific population subgroups.

From a clinical and public health perspective, these findings carry several practical implications. First, structured teaching programmes on developmental disorder prevention can be readily integrated into existing maternal and child health services at the primary healthcare level. Second, nurse-led health education represents a feasible, low-cost strategy for community health promotion in resource-constrained settings. Third, the study findings support the development and dissemination of culturally appropriate health education materials on this topic.

Health administrators and nursing educators should consider incorporating such content into in-service training programmes and community outreach activities to maximise reach and impact.

DECLARATIONS

Funding: This study did not receive any funding from public, commercial, or not-for-profit agencies.

Conflicts of interest: The author declares no conflicts of interest.

Ethical approval: The study was approved by the institutional ethics committee and permission was obtained from the Primary Health Centre, Nelamangala, Bangalore. Written informed consent was obtained from all participants.

REFERENCES

[1] Centers for Disease Control and Prevention. Developmental disabilities. Available from: http://www.cdc.gov. Accessed October 2014.
[2] U.S. National Library of Medicine. Developmental disorders. MedlinePlus. Available from: http://www.nlm.nih.gov/medlineplus. Accessed October 2014.
[3] My Child Without Limits. Can autism be prevented? Available from: http://www.mychildwithoutlimits.org. Accessed September 2014.
[4] Developmental disorders and its incidence in India. Available from: http://scand.org. Accessed September 2014.
[5] Boonstra H. Effectiveness of structured teaching programme on postnatal care for antenatal mothers. International Journal of Medicine. 2009;56(9):43-45.
[6] Joseph P. Effectiveness of STP on the care of adolescent girls with regard to menstruation for mothers. International Journal of Medicine. 2009;56(9):43-45.
[7] Agboatwalla M, Akraro DS. Impact of health education on the knowledge and practices of mothers. Tropical Doctor. 2000;4(7):299-302.
[8] King IM. A Theory for Nursing: Systems, Concepts, Process. New York: John Wiley and Sons; 1981.
[9] Dhita, Badhup BP. Effectiveness of structured teaching programme on improving knowledge about elder mothers in menopause. Kathmandu University Medical Journal. 2005;(3):382-383.
[10] Goff DA, Luan X, Gerdes M, et al. Younger gestational age is associated with worse neurodevelopmental outcomes after cardiac surgery in infancy. Journal of Thoracic and Cardiovascular Surgery. 2012;143(3):535-542.
[11] Stoch YK, Williams CJ, Granich J, et al. Are prenatal ultrasound scans associated with the autism phenotype? Journal of Autism and Developmental Disorders. 2012; March 29.
[12] Macari SL, Campbell D, Gengoux GW, et al. Developmental status from 12 to 24 months in infants at risk for developmental disorder. Journal of Developmental Disorders. 2012; April 7.
[13] Kent AL, Wright IM, Abdel-Latif ME. Mortality and adverse neurologic outcomes are greater in preterm male infants. Pediatrics. 2012;129(1):124-131.
[14] Whitehouse AJ, Holt BJ, Serralha M, et al. Maternal serum vitamin D levels during pregnancy and offspring neurocognitive development. Pediatrics. 2012;129(3):485-493.
[15] Mazzucchelli TG, Sanders MR. Preventing behavioural and emotional problems in children who have a developmental disability: a public health approach. Journal of Pediatric Nursing. 2012;27(6):742-749.
[16] Sprung J, Flick RP, Katusic SK, et al. Attention-deficit/hyperactivity disorder after early exposure to procedures requiring general anesthesia. Mayo Clinic Proceedings. 2012;87(2):120-129.
[17] Basvanthappa BT. Nursing Research. New Delhi: Jaypee Brothers; 2003.
[18] Polit DF, Beck CT. Nursing Research: Principles and Methods. 8th ed. New Delhi: Williams and Wilkins; 2008.