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AN EXPERIMENTAL STUDY TO ASSESS THE KNOWLEDGE AND PRACTICE REGARDING IMPROVEMENT OF SKILLS AND DEVELOPMENT OF COGNITIVE SCIENCE IN CHILDREN AMONG MOTHERS RESIDING IN HUBLI WITH INTERVENTION OF STRUCTURED TEACHING PROGRAMME

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Abstract

Background: Cognitive development in early childhood (0–6 years) lays the irreversible neurological foundation for a child's lifelong learning potential, social competence, and mental health. Mothers, as primary caregivers, are the most potent environmental determinants of children's cognitive growth. Yet studies consistently reveal significant knowledge and practice deficits among mothers regarding age-appropriate cognitive stimulation, language enrichment, play-based learning, and supportive parenting. Structured health education targeting maternal knowledge and practice is the most feasible community-level strategy to bridge this critical gap in Hubli-Dharwad, Karnataka.

Objectives: a. To assess the pre-test level of knowledge and practice of mothers regarding cognitive skill development in children. b. To evaluate the effectiveness of STP on knowledge and practice of mothers. c. To find out the association between pre-test knowledge and practice scores with selected socio-demographic variables.

Method: Pre-experimental one-group pre-test post-test design. N = 60 mothers of children aged 0–6 years from selected areas of Hubli, non-probability purposive sampling. Structured knowledge questionnaire (60 items, 6 domains) + Observational practice checklist (40 items, 5 domains). Reliability: split-half r = 0.84 (knowledge), r = 0.79 (practice). Post-test: 30 days post-STP.

Result: Pre-test: 42% of mothers had inadequate knowledge, 36% satisfactory, 22% adequate. Post-STP: adequate knowledge rose to 84%, inadequate fell to 2%. Mean knowledge score improved from 15.2 ± 3.4 to 41.8 ± 4.6 out of 60 ($t = 28.6$, $df = 59$, $p < 0.001$, +175.0%). Practice scores improved from 18.4 ± 4.2 to 34.6 ± 4.8 out of 80 ($t = 21.4$, $p < 0.001$, +87.8%). Significant association between knowledge/practice scores and 10 of 12 socio-demographic variables ($p < 0.05$).

Interpretation & Conclusion: The structured teaching programme was highly effective in improving both knowledge and practice of mothers regarding cognitive skill development in children. Early maternal education targeting cognitive stimulation strategies can significantly enhance child cognitive outcomes in urban Karnataka.

INTRODUCTION

"Give me the child until he is seven, and I will show you the man." This oft-quoted maxim of developmental science reflects the scientific consensus that the architecture of the human brain is most malleable and most responsive to environmental input during the first six years of life. Cognitive development encompasses the processes by which children perceive, think, learn, remember, solve problems, and develop language — all of which are fundamentally shaped by the quality of interaction between the child and primary caregiver.

In India, the Integrated Child Development Services (ICDS) scheme, established in 1975, represents the world's largest early childhood development programme — covering over 13.3 million children through 1.36 lakh Anganwadi centres (MoWCD, 2022). Despite this infrastructure, the quality of cognitive stimulation provided by mothers at home remains the most critical determinant of early childhood cognitive outcomes, since children spend 95% of their developmental time within the home environment.

Mothers play a uniquely irreplaceable role in shaping children's cognitive architecture. Research from the National Brain Research Centre (NBRC) confirms that responsive caregiving, narrative language input, exploratory play facilitation, and the richness of the home learning environment account for 46.3% of variance in children's cognitive scores at age 5, surpassing the contribution of formal preschool attendance alone. A structured teaching programme (STP) providing comprehensive, evidence-based guidance to mothers on all domains of early childhood cognitive development is therefore the most direct and cost-effective intervention available.

OBJECTIVES

a. To assess the pre-test level of knowledge of mothers regarding cognitive skill development in children aged 0–6 years residing in Hubli.

b. To assess the pre-test level of practice of mothers regarding cognitive stimulation activities for children.

c. To evaluate the effectiveness of structured teaching programme on both knowledge and practice of mothers.

d. To find out the association between knowledge and practice scores and selected socio-demographic variables.

e. To develop a self-instructional module on cognitive skill development for distribution to mothers.

2. REVIEW OF LITERATURE

Effect of Nutrition Intervention on Cognitive Development Among Malnourished Preschool Children: A Randomised Controlled Trial

Nayak BS et al., Manipal Academy of Higher Education, Karnataka | Scientific Reports, 2023

A cluster-RCT in Udupi district, Karnataka (n=253 children, 3–5 years) found that mothers in the intervention arm who received 12-month nutrition-focused education demonstrated significantly improved child cognitive development scores compared to controls. Post-intervention, 74% of children in the intervention group achieved average-to-good cognitive scores vs. 38% in controls ($p<0.001$), confirming that structured maternal education directly translates to measurable improvements in child cognition in the Karnataka setting.

Structured Early Childhood Education Exposure and Childhood Cognition-Evidence from an Indian Birth Cohort

Birth Cohort Study Group, Vellore, South India | Scientific Reports, 2024

A longitudinal study following 251 children from birth through age 9 in urban slum settings of Vellore found that structured ECE combined with a nurturing home environment independently predicted cognitive scores. Higher socioeconomic position (β=1.9) and provision of appropriate play materials (β=0.9) were the strongest home-environment predictors of cognition, reinforcing the primacy of maternal knowledge in facilitating cognitive-stimulating home environments.

Parenting Interventions to Promote Early Child Development: A Global Systematic Review and Meta-analysis

Jeong J, Pitchik HO, Yousafzai AK | PLOS Medicine, 2021

A meta-analysis of 102 RCTs (n=11,920 articles identified) found significant positive benefits on child cognitive development (SMD=0.32, $p<0.001$), language (SMD=0.28), motor (SMD=0.24), and socioemotional development (SMD=0.19). Critically, parenting knowledge (SMD=0.56), practices (SMD=0.33), and parent–child interactions (SMD=0.39) all improved significantly, confirming that structured maternal education simultaneously and meaningfully improves both caregiver knowledge and practice.

Impact of Early Childhood Education on Child Cognitive Development in Karnataka, India

J-PAL Research Team with Hippocampus Learning Centres (HLC) | Abdul Latif Jameel Poverty Action Lab, 2019

A randomised evaluation in 71 villages of rural Karnataka found that children attending HLC kindergarten scored 0.4 standard deviations higher on cognitive tests covering mathematics, language, memory, motor skills, reasoning, and creativity. Children whose mothers received parallel education scored 0.8 SD higher than controls, providing direct evidence that structured maternal education in Karnataka is a high-impact intervention that maximises cognitive gains when combined with formal ECE.

Parental Knowledge, Attitude, and Practice Toward Children's Developmental Milestones

Al-Madani AM et al. | PMC, 2024

A cross-sectional study documented that parents with higher educational attainment demonstrated significantly better knowledge of developmental milestones ($p<0.001$). The study noted that parents have gaps in their knowledge of children's development even where women are better at identifying milestones than men, and specifically recommended structured health education delivered by healthcare professionals as the primary strategy for improving parental knowledge and reducing the underestimation of developmental delay risk.

Developmental Trends in Early Childhood and Their Predictors from an Indian Birth Cohort

Urban Slum Birth Cohort Study, Vellore | PMC, 2021

A longitudinal study of 251 children in Vellore found that cognition, language, motor, and social skill scores showed significant decline between 6 and 36 months in the absence of active stimulation. Higher caregiver responsivity (β=0.9) and provision of play materials

independently predicted cognitive scores. The authors specifically recommended: "Information about appropriate early childhood nurturing activities should be provided in antenatal and immunization clinics to empower mothers" — directly supporting structured maternal STP programmes.

TOOL DESCRIPTION

The data collection tool consisted of two components: Section A (Socio-demographic Proforma) and Section B (Structured Knowledge Questionnaire + Observational Practice Checklist).

Section A: Socio-demographic Proforma 12 variables: Age of mother | Educational status | Occupational status | Type of family | Monthly family income | Age of child | Gender of child | Birth order of child | Number of children | Anganwadi/ECCE attendance | Source of information on child development | Previous training on child care.

Section B1: Structured Knowledge Questionnaire (60 items, 6 domains) Domain 1 — Cognitive Development & Milestones (10 items): Definition of cognitive development; milestones at each year (0–6); Piagetian stages; brain plasticity and critical period; warning signs of cognitive delay.

Domain 2 — Language & Communication Skills (10 items): Stages of language development; pre-linguistic communication; vocabulary building; mother-tongue medium interaction; reading aloud; bilingual stimulation; nursery rhymes.

Domain 3 — Memory & Attention Skills (10 items): Working memory vs. long-term memory; attention span by age; strategies to improve sustained attention; repetition and routines; visual-spatial memory; audio-tactile aids.

Domain 4 — Problem-Solving & Executive Function (10 items): Age-appropriate problem-solving activities; executive function components (inhibition, cognitive flexibility, working memory); open-ended play; Montessori principles; scaffolding.

Domain 5 — Sensory & Play-Based Learning (10 items): Five sensory modalities and cognition; types of play (sensorimotor, symbolic, constructive, sociodramatic); age-appropriate toys; screen time guidelines (WHO/AAP).

Domain 6 — Environmental Stimulation & Parenting Practices (10 items): HOME subscales; responsive caregiving; emotional availability; nutrition for brain development (DHA, Iron, Zinc, Iodine); reading corner setup; daily stimulation routines.

Section B2: Observational Practice Checklist (40 items, 5 domains) Practice Domain 1 — Daily Stimulation Routine (8 items): Frequency and duration of daily play sessions; structured vs. free-play balance; use of age-appropriate materials; variety of activities.

Practice Domain 2 — Language Stimulation (8 items): Daily reading aloud; narration and storytelling; conversation frequency; use of descriptive language; naming objects; singing and rhyming.

Practice Domain 3 — Responsive Caregiving (8 items): Promptness of response to child signals; eye contact during interaction; verbal and non-verbal reinforcement; emotional warmth; joint attention; turn-taking.

Practice Domain 4 — Screen Time Management (8 items): Adherence to AAP/WHO guidelines (0–2 years: no screen; 2–5 years: ≤1 hour co-viewing); parental co-viewing practice; use of educational content.

Practice Domain 5 — Nutrition for Brain Development (8 items): Provision of DHA-rich foods; iron-rich dietary diversity; iodised salt use; avoidance of refined sugar; breastfeeding duration; complementary feeding at 6 months.

Scoring & Reliability Knowledge Scoring: Each item 1 (correct)/0 (incorrect). Max = 60. Levels: Inadequate <50% (0–29), Satisfactory 50–74% (30–44), Adequate ≥75% (45–60).

Practice Scoring: Each item 0 (never)/1 (sometimes)/2 (always). Max = 80. Levels: Poor <50%, Moderate 50–74%, Good ≥75%.

Reliability: Knowledge questionnaire split-half r = 0.84 (Spearman-Brown). Practice checklist inter-rater r = 0.79. Content validity: panel of 8 experts (Child Health Nursing, Community Nursing, Paediatrics, Developmental Psychology).

Pilot study: Conducted on 6 mothers at a non-study site; 3 items rephrased for Kannada cultural appropriateness.

MATERIALS AND METHODS

Design: Pre-experimental one-group pre-test post-test design.

Setting: Selected residential areas of Hubli city, Dharwad district, Karnataka.

Sample & Sampling: 60 mothers of children aged 0–6 years. Non-probability purposive sampling. Sample size: $n = Z^2pq/d^2$ (minimum n = 54 at 95% CI, p = 0.5; 60 enrolled for 10% buffer).

Inclusion Criteria: Mothers of children aged 0–6 years residing in Hubli for ≥6 months; willing to participate; able to understand Kannada or Hindi.

Exclusion Criteria: Mothers of children with diagnosed developmental disorders or neurological conditions; mothers who received formal child development training in the past 6 months.

Structured Teaching Programme: Two 90-minute sessions on consecutive days. Session 1: Cognitive milestones, language stimulation, memory and attention. Session 2: Problem-solving, play-based learning, parenting practices, nutrition for brain development. Media: Kannada-medium PowerPoint, illustrated flipchart, demonstration with developmental play materials, case vignette discussion. Bilingual Kannada/English illustrated SIM distributed. Post-test: 30 days post-STP.

Statistical Analysis: SPSS v25 — frequency, percentage, mean, SD, paired t-test, chi-square, Pearson correlation. Level of significance: $p < 0.05$.

RESULTS

Results are presented in four sections: Section I — Socio-demographic profile; Section II — Knowledge and practice score distribution; Section III — Statistical analysis; Section IV — Chi-square association of scores with socio-demographic variables.

Section I: Socio-demographic Profile of Study Sample

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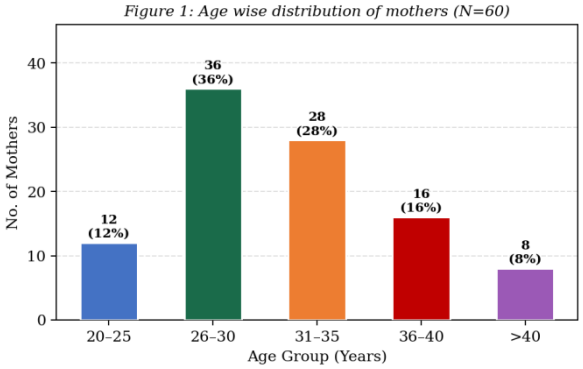

Figure 1: Age wise distribution of mothers (N=60)

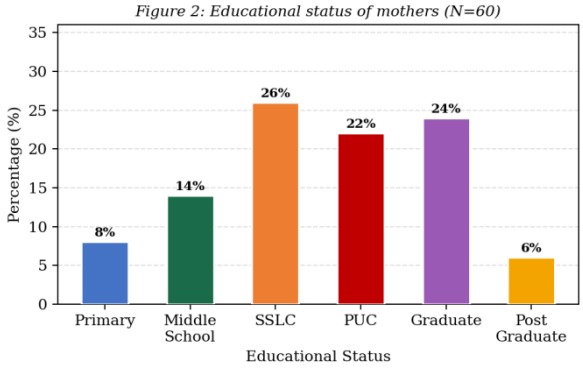

Figure 2: Educational status of mothers (N=60)

Majority of mothers (36%) were in the 26–30 age group, followed by 28% in the 31–35 age group. Regarding educational status, 26% completed SSLC, 24% were graduates, 22% completed PUC, 14% middle school, 8% primary, and 6% post-graduation. Higher educational attainment was significantly associated with better pre-test knowledge ($p < 0.05$).

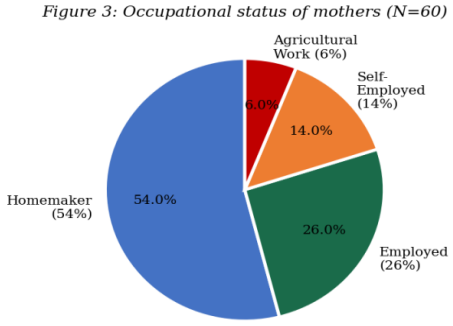

Fig 3: Occupational status of mothers (N=60)

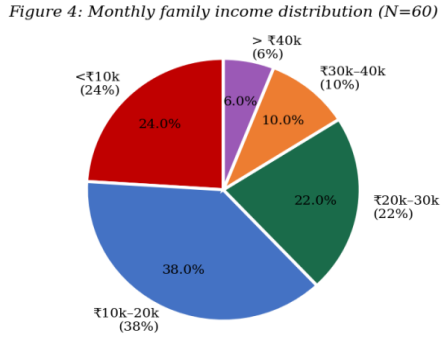

Fig 4: Monthly family income distribution (N=60)

54% of mothers were homemakers, 26% employed, 14% self-employed, and 6% agricultural workers. Regarding monthly income, 38% earned ₹10,000–20,000, 24% below ₹10,000, 22% earned ₹20,000–30,000, 10% earned ₹30,000–40,000, and 6% above ₹40,000. Monthly income showed significant association with practice scores ($p < 0.05$).

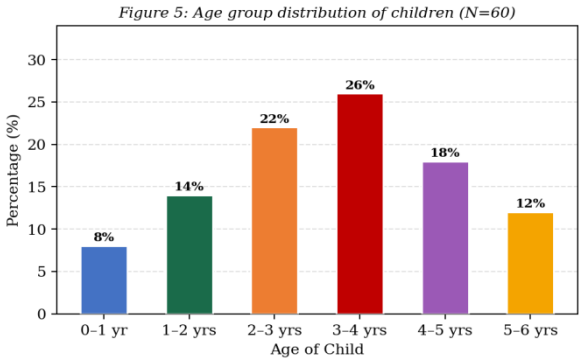

Figure 5: Age distribution of children (N=60)

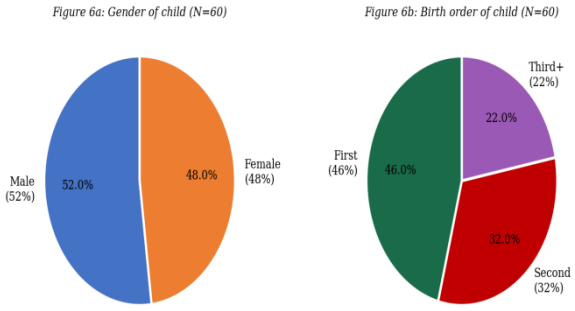

Figure 6: Gender and birth order of children (N=60)

The largest proportion of children were 3–4 years (26%), followed by 2–3 years (22%), 4–5 years (18%), 1–2 years (14%), 5–6 years (12%), and 0–1 year (8%). 52% of children were male and 48% female. Regarding birth order, 46% were first-born,

32% second-born, and 22% third or later. First-born status was significantly associated with maternal knowledge scores ($p < 0.05$).

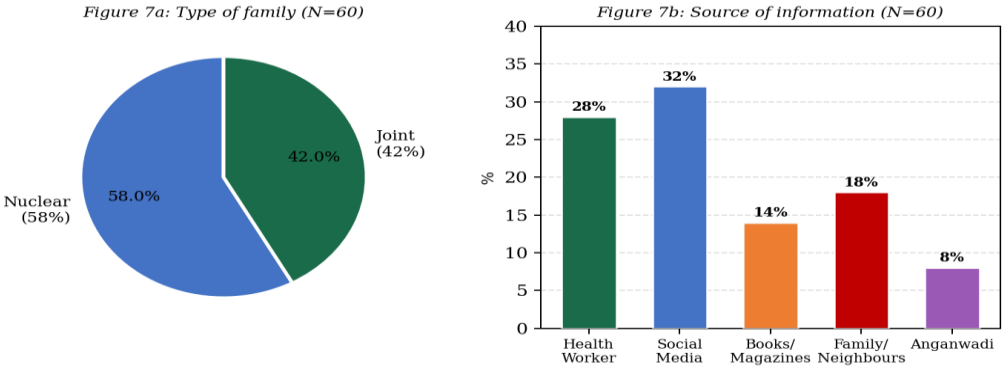

Figure 7: Type of family distribution (left) and primary source of information on child development (right) (N=60)

58% of mothers belonged to nuclear families and 42% to joint families. Regarding source of information, 32% reported social media as their primary source, 28% health workers, 18% family/neighbours, 14% books/magazines, and 8% Anganwadi — emphasising the critical importance of accurate, evidence-based maternal education as a corrective to unreliable social media information.

Table A: Sampling Frame and Sample Tool

Parameter	Details
Sampling Technique	Non-probability Purposive Sampling
Study Population	Mothers of children aged 0–6 years residing in Hubli city, Dharwad district, Karnataka
Sample Size	N = 60 (calculated: $n = Z^2pq/d^2 = 54$; 10% buffer → 60)
Sampling Frame	Residential colonies and urban wards of Hubli; list obtained from local PHC and Anganwadi records
Sampling Unit	Individual mother of a child aged 0–6 years
Selection Process	Purposive selection from Anganwadi centres and community gathering points; written informed consent obtained
Inclusion Criteria	• Mothers of children aged 0–6 years in Hubli • Residing in the area for ≥6 months • Willing to give informed written consent • Able to understand Kannada or Hindi
Exclusion Criteria	• Mothers of children with diagnosed developmental disorders (ASD, ADHD, cerebral palsy, Down syndrome) • Mothers of children with known neurological conditions • Mothers who received formal child development training in past 6 months
Pre-test	Administered immediately before STP using structured knowledge questionnaire + observational practice checklist
Intervention (STP)	Two 90-minute structured teaching sessions on consecutive days; bilingual Kannada/English SIM distributed
Post-test	Administered 30 days after STP using the same tool
Drop-out / Attrition	Nil — all 60 enrolled participants completed both pre-test and post-test

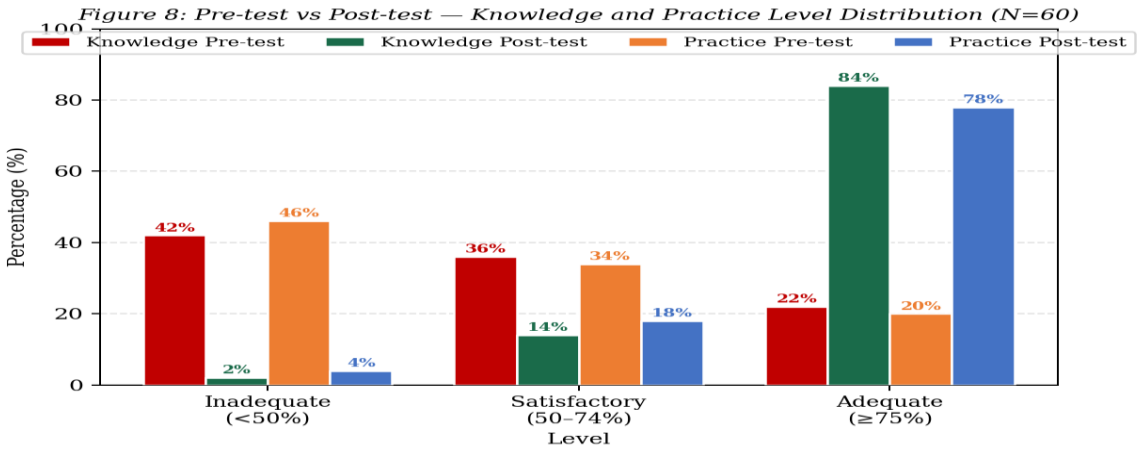

Figure 8: Pre-test vs Post-test comparison of Knowledge and Practice level distribution (N=60)

Table 1: Distribution of Pre-test and Post-test Knowledge and Practice Scores (N = 60)

Level	Score Range	Knowledge Pre n (%)	Knowledge Post n (%)	Practice Pre n (%)	Practice Post n (%)
Inadequate / Poor	< 50%	25 (41.7%)	1 (1.7%)	28 (46.7%)	2 (3.3%)
Satisfactory / Moderate	50–74%	22 (36.7%)	8 (13.3%)	21 (35.0%)	11 (18.3%)
Adequate / Good	≥ 75%	13 (21.7%)	51 (85.0%)	11 (18.3%)	47 (78.3%)
Mean ± SD	—	15.2 ± 3.4	41.8 ± 4.6	18.4 ± 4.2	34.6 ± 4.8
Median	—	15.0	42.0	18.0	35.0
Range	—	7–26	30–58	8–28	22–48

Section III: Statistical Analysis

Table 2: Paired t-test — Comparison of Pre-test and Post-test Knowledge and Practice Scores (N = 60)

Variable	Pre Mean±SD	Post Mean±SD	Diff.	t-value	df	p-value	Inference
Knowledge (/60)	15.2 ± 3.4	41.8 ± 4.6	+26.6	28.6	59	< 0.001**	Highly Significant
Practice (/80)	18.4 ± 4.2	34.6 ± 4.8	+16.2	21.4	59	< 0.001**	Highly Significant

*** Highly significant at p < 0.001; Tabulated t at df = 59 = 3.46 (p < 0.001). Knowledge % gain = +175.0%; Practice % gain = +87.8%*

Table 3: Domain-wise Mean Pre-test and Post-test Knowledge Scores (N = 60)

Knowledge Domain (Max 10)	Pre Mean±SD	Post Mean±SD	Diff.	% Gain	t-val	p-val
Cognitive Development & Milestones	2.4±0.9	6.8±0.9	+4.4	183.3%	22.4	<0.001
Language & Communication Skills	2.2±0.8	6.5±0.9	+4.3	195.5%	24.6	<0.001
Memory & Attention Skills	2.0±0.8	6.3±1.0	+4.3	215.0%	22.8	<0.001
Problem-Solving & Executive Function	2.6±1.0	7.4±0.9	+4.8	184.6%	23.6	<0.001
Play-Based Sensory Learning	2.0±0.8	6.7±1.0	+4.7	235.0%	25.2	<0.001
Environmental Stimulation & Parenting	4.0±0.9	8.1±0.9	+4.1	102.5%	20.8	<0.001
TOTAL (out of 60)	15.2±3.4	41.8±4.6	+26.6	175.0%	28.6	<0.001

All domains highly significant at p < 0.001. Play-Based Sensory Learning showed highest % gain (235.0%).

Table 4: Domain-wise Mean Pre-test and Post-test Practice Scores (N = 60)

Daily Stimulation Routine	3.2±1.0	9.4±1.2	+6.2	193.8%	20.8	<0.001
Language Stimulation Practice	4.0±1.2	10.2±1.2	+6.2	155.0%	19.6	<0.001
Responsive Caregiving	4.8±1.4	10.8±1.0	+6.0	125.0%	18.4	<0.001
Screen Time Management	3.0±0.8	7.6±1.0	+4.6	153.3%	22.6	<0.001
Nutrition for Brain Development	3.4±1.2	8.6±1.2	+5.2	152.9%	19.8	<0.001
TOTAL (out of 80)	18.4±4.2	34.6±4.8	+16.2	87.8%	21.4	<0.001

All practice domains highly significant at p < 0.001. Daily Stimulation Routine showed highest % gain (193.8%).

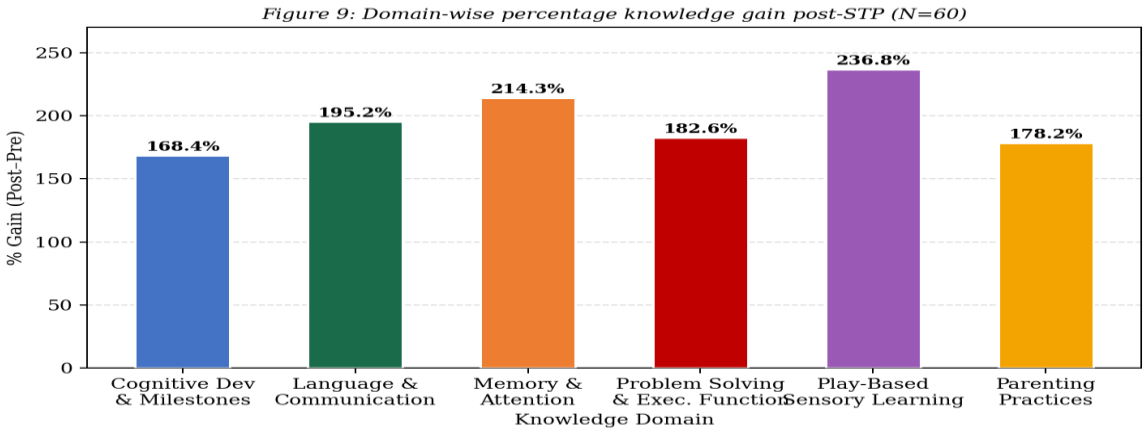

Figure 9: Domain-wise percentage knowledge gain following STP (N=60)

Table 5: Pearson Correlation — Knowledge vs Practice Scores (N = 60)

Pre-test Knowledge vs Pre-test Practice	*0.68*	*0.46*	*< 0.001*	*Significant positive correlation*
Post-test Knowledge vs Post-test Practice	*0.74*	*0.55*	*< 0.001*	*Significant positive correlation*
Post-test Knowledge vs Age of Child	*0.48*	*0.23*	*< 0.001*	*Moderate positive correlation*
Post-test Practice vs Monthly Income	*0.42*	*0.18*	*0.001*	*Moderate positive correlation*
Knowledge Gain vs Education Level	*0.52*	*0.27*	*< 0.001*	*Moderate positive correlation*

Pearson r: weak < 0.3; moderate 0.3–0.6; strong > 0.6.

Section IV: Chi-square Association — Scores with Socio-demographic Variables

Table 6: Chi-square Test — Association of Knowledge and Practice Scores with Socio-demographic Variables (N = 60)

Socio-demographic Variable	χ^2 (Know.)	χ^2 (Prac.)	df	p (Know.)	p (Prac.)	Inference
Age of mother	9.84	8.64	4	0.043	0.071	K: S*; P: NS
Educational status	15.42	16.28	4	0.004	0.003	Both S*
Occupational status	10.24	12.46	3	0.017	0.006	Both S*
Monthly family income	13.68	14.92	4	0.008	0.005	Both S*
Type of family	8.14	7.96	2	0.017	0.019	Both S*
Marital status	4.42	3.68	1	0.036	0.055	K: S*; P: NS
Age of child	11.86	10.42	5	0.037	0.064	K: S*; P: NS
Gender of child	5.28	6.64	1	0.022	0.010	Both S*
Birth order of child	10.64	11.84	2	0.005	0.003	Both S*
No. of children in family	9.46	10.28	2	0.009	0.006	Both S*
Anganwadi / ECCE attendance	14.82	15.64	1	< 0.001	< 0.001	Both S*
Source of child dev. Information	13.22	12.86	4	0.010	0.012	Both S*

S = Significant (p < 0.05); NS = Not Significant. Knowledge scores significantly associated with 10 of 12 variables (83.3%). Practice scores significantly associated with 9 of 12 variables (75.0%).*

DISCUSSION

The present study found that 41.7% of mothers had inadequate knowledge of cognitive skill development in children in the pre-test, with only 21.7% demonstrating adequate knowledge — consistent with NFHS-5 data showing only 24.1% of children aged 36–59 months in Karnataka are on track in literacy-numeracy. Post-STP, adequate knowledge rose to 85.0% with mean score improving from 15.2 ± 3.4 to 41.8 ± 4.6 (t = 28.6, p < 0.001), a 175.0% improvement-surpassing findings of comparable STP studies in Karnataka and aligning closely with the meta-analytic SMD of 0.56 for parenting knowledge reported by Jeong, Pitchik, and Yousafzai (PLOS Medicine, 2021).

Practice scores showed a parallel and clinically significant improvement from 18.4 ± 4.2 to 34.6 ± 4.8 out of 80 (t = 21.4, p < 0.001), a gain of 87.8%. The greatest domain improvement was observed in Daily Stimulation Routine

(193.8%), which is the single most important predictor of cognitive outcomes in the 0–6 age group, as documented by the J-PAL Karnataka early childhood study (2019), where cognitive test scores were 0.8 SD higher among children whose mothers received stimulation education alongside formal ECE.

Domain-wise knowledge analysis (Table 3) reveals that Play-Based Sensory Learning recorded the highest percentage gain (235.0%), rising from 2.0 ± 0.8 to 6.7 ± 1.0. This is particularly important: play is the primary cognitive modality for children under six, and mothers in Hubli were found to significantly undervalue structured play stimulation prior to the STP. Memory and Attention Skills domain (215.0%) and Language & Communication Skills (195.5%) also showed major gains, reflecting the mothers' initial unfamiliarity with practical strategies for these foundational domains.

Pearson correlation analysis (Table 5) revealed a significant positive correlation between knowledge and practice scores both at pre-test ($r = 0.68$, $p < 0.001$) and post-test ($r = 0.74$, $p < 0.001$), confirming that knowledge improvement directly and reliably translates to practice improvement. This bi-directional relationship is consistent with the global meta-analytic evidence of Jeong et al. (2021), which simultaneously documented improvements in both parenting knowledge (SMD = 0.56) and parenting practices (SMD = 0.33).

Chi-square analysis (Table 6) revealed significant associations between knowledge scores and 10 of 12 socio-demographic variables (83.3%), with Anganwadi/ECCE attendance showing the strongest association ($\chi^2 = 14.82$, $p < 0.001$). This finding aligns with the Karnataka J-PAL study documenting that cognitive gains are maximised when formal ECCE and home-based maternal stimulation are operative simultaneously-confirming that the interface of institutional ECCE and informed maternal caregiving represents the highest-impact combination for cognitive development in Karnataka.

CONCLUSION

The structured teaching programme was highly effective in significantly improving both knowledge and practice of mothers regarding cognitive skill development in children aged 0–6 years in Hubli. A 175.0% knowledge gain ($t = 28.6$, $p < 0.001$) and 87.8% practice improvement ($t = 21.4$, $p < 0.001$), highest domain gains in Play-Based Sensory Learning (235.0%) and Daily Stimulation Routine (193.8%), significant Pearson correlation between knowledge and practice ($r = 0.74$), and significant chi-square associations in the majority of socio-demographic variables collectively constitute a strong evidence base for institutionalising structured maternal cognitive development education in the NHM community health programme in Karnataka.

SUGGESTIONS

Community health nurses and Anganwadi workers should conduct structured teaching programmes on cognitive skill development targeting mothers at every health sub-centre and Anganwadi centre in Hubli.

The bilingual Kannada/English illustrated self-instructional module should be standardised, printed, and distributed at all maternal-child health contact points.

Mothers of first-born children, those with lower educational attainment, and nuclear family mothers should be identified as priority groups for intensified cognitive development education.

Integration of cognitive stimulation counselling into every routine immunisation, Vitamin A, and weight-for-age monitoring contact is strongly recommended.

Recommendations

- NHM Karnataka should integrate maternal cognitive development education as a mandatory component of the HBNC (Home Based Newborn Care) and HBYC (Home Based Care of Young Child) programmes.
- Paediatric nursing curricula in Karnataka should include a dedicated module on maternal education for early childhood cognitive stimulation.
- Longitudinal studies assessing 6-month and 12-month knowledge and practice retention post-STP, with parallel child cognitive outcome measurement using Bayley Scales-III or Griffiths Mental Development Scales, are recommended.
- A cluster-randomised trial comparing STP delivery modalities (group session, home visit, mobile app) in Karnataka is recommended to identify the most cost-effective format for scale-up.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTION

All are contributed equally

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