DEVELOPMENTAL OUTCOMES OF INFANTS STIMULATED WITH SMART PHONES AND INDIGENOUS PLAY MATERIAL – A COMPARATIVE STUDY IN RURAL AND URBAN AREAS OF GUNTUR DISTRICT

BY

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B.Sc. (Hons) Home Science

THESIS SUBMITTED TO THE

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE IN HOME SCIENCE

(HUMAN DEVELOPMENT AND FAMILY STUDIES)

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2022

DECLARATION

I, **PERIKALA. ROSELIN RUTH**, hereby declare that the thesis entitled

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Place: Guntur (P.ROSELIN RUTH)

Date: I.D. No. GHM/2019-07

CERTIFICATE

Ms. **PERIKALA. ROSELIN RUTH** has satisfactorily prosecuted the course of research and that thesis entitled **"DEVELOPMENTAL OUTCOMES OF INFANTS STIMULATED WITH SMART PHONES AND INDIGENOUS PLAY MATERIALS : A COMPARATIVE STUDY IN RURAL AND URBAN AREAS OF GUNTUR DISTRICT "** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither nor its part therefore has been previously submitted by her for a degree of any University.

Date: **(PRASANTHI SEELAM)**

CHAIRPERSON

CERTIFICATE

This is to certify that the thesis entitled **"DEVELOPMENTAL OUTCOMES OF INFANTS STIMULATED WITH SMART PHONES AND INDIGENOUS PLAY MATERIALS : A COMPARATIVE STUDY IN RURAL AND URBAN AREAS OF GUNTUR DISTRICT"** submitted in partial fulfillment of the requirements for the degree of **'Master of Science in Home Science'** of the Acharya N.G. Ranga Agricultural University, Lam, Guntur is a record of the bonafide original research work carried out by **Ms. PERIKALA ROSELIN RUTH** under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

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ACKNOWLEDGEMENTS

First and foremost, would like to thank the Almighty God for giving me the external blessings, masterly guidance helped me in completing my Study bringing me to this momentous stage in my life and make everything fall at right place.

I would like to express my sincere gratitude to my Esteemed research guide and chairperson of my advisory committee Prof. ***Dr.S.Prasanthi*** *for her guidance, valuable suggestions and for her patience, immense knowledge, in completion of research and writing of this thesis.*

I equally owe to my second advisor with sincere thanks, heartfelt gratitude to ***Dr.Bilquis,*** *Associate Professor and Head, Department of Human development and Family Studies, providing me all the facilities and support encouragement during the course of work .*

Besides my advisors, I would like to thank to my minor advisor ***Dr. (M.S.Chaitanya kumari*** *for her Support.*

My Special gratitude goes to my family, Nothing in this world can reply the efforts, sacrifices inspiting guidance and support of my Parents. Special thanks go to: My Grand Mothers P.Hulda and D. Saramma My Grand Fathers P.Devasahayam and D.Padmarao my Father P.Bhaskar Hebel And My Mother P.Vanaja Without theses persons which not even single page of my thesis would have been a possibility of doing the work . At the Same time I would like to thank my ***Brother p.immanuel,***
For there unconditional love and support in critical situations. I would also extend my special thanks to ***Sri Harsha*** *and* ***D.Geetha Ramya*** *for helping me in my work and for emotional support.*

I would also like to express my heartfelt thanks and gratitude to all the ***Parents*** *for my data collection for their enthusiastic participation and kind cooperation made every moment of encounter pleasurable.*

I express my deep sense of gratitude to everyone who stood as a pillar of strength and affection which was the source of motivation of my life with lots of love, affection, blessings, moral support and constant encouragement.

I would like to thank all those who had helped directly and indirectly to complete my research with deep sense of reverence for all of them for their kind cooperation and generosity. And my sincere whole hearted thanks to ***Acharya N.G. Ranga Agricultural University.***

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Place:

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SYMBOLS AND ABBREVIATIONS

DQ : Developmental Quotient

% : Percentage

= : Is equal to

***et al*. : And other people**

f : Frequency

n : Sample size

N : Population size

DMQ : Developmental Motor Quotient

DMEQ: Developmental Mental Quotient

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Degree to which it is submitted	: **MASTER OF SCIENCE IN HOME SCIENCE**
Major Field	: **HUMAN DEVELOPMENT AND FAMILY STUDIES**
Faculty	: **COMMUNITY SCIENCE**
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University	: **ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY**
Year of submission	: **2022**

ABSTRACT

The initial year’s brain development of infant is sensitive, displaying a incredible ability to absorb information and adapt to the surroundings. Infant stimulation is a process of providing supplemental sensory stimulation in any or all of the sensory modalities which are visual, auditory, tactile, olfactory, gustatory (sense of taste) and vestibular (Body Balance) to an infant (Britannica). Playing is the instinct humans are born with just like eating and sleeping, playing is a survival instinct. During play, we develop social skills, learn about give and take interactions and test limits. The use of technology is not appropriate for infants under the age of 24 months in any circumstance. Time spent playing with a tablet or smart phone means the infant is not crawling, walking, climbing and exploring her environment.

Sample size for the present study is 120 which included 30 infants out of whom 15 were boys and 15 were girls and their respective mothers form rural area and 30 infants out of whom 15 were boys and 15 were girls and their respective mothers form urban area. Motor and mental developments areas of development using Developmental assessment scale for Indian infants (DASII).A 19 items questionnaire was developed by the investigator for

studying the infant stimulation by care taker. A 32 item questionnaire was developed by the investigator for studying the usage of smart phone for infant stimulation. A 24 item questionnaire was developed by the investigator for studying the usage of indigenous play material for infant stimulation. The score was converted into frequencies and percentages were used for understanding the independent and dependent variables of respondent's. Mean and Standard Deviation were used to study the age and gender differences among children with reference to dependent variables. T- test was administered to study the differences in the developmental outcomes of infants stimulated with smart phones and indigenous play materials. The results revealed that there is a impact on developmental status and significant differences in developmental outcomes of infants stimulated with smart phone and indigenous play material.

Introduction

Chapter I

INTRODUCTION

The initial year's brain development of infant is sensitive, displaying a incredible ability to absorb information and adapt to the surroundings. An early development of cognitive, non-cognitive domains is vital in infancy to attain academic, productivity and social functioning in adulthood. Infant stimulation is a process of providing supplemental sensory stimulation in any or all of the sensory modalities which are visual, auditory, tactile, olfactory, gustatory (sense of taste) and vestibular (Body Balance) to an infant (Britannica).

Stimulation cannot be a obligation for an infant; it should not be compulsory at any time. It is a fun time to learn and discover the world around them. Stimulation helps to engage infant mentally, helps develop their senses. Stimulating baby's senses will enable them to reach developmental milestones faster, as well as aid in the development of motor skills. It can help improve baby's attention span, memory, curiosity and nervous system development as well. During infancy it is essential to keep the child in a stimulating environment with interesting thing to see, hear and touch. It is best to understand the stimulation sessions as a play so that the child is more responsive. Thus play has become the basic approach with which infants learn how to move, communicate, socialize, and understand their surroundings.

Playing is the instinct humans are born with just like eating and sleeping, playing is a survival instinct. During play, we develop social skills, learn about give and take interactions and test limits. By engaging in negotiation during play, we build connections in the brain's executive control centre, which helps us regulate our emotions, make plans and solve problems. This kind of brain development is important to success in school and in life. Since play is an important part of healthy child development, it is important to provide children with plenty of opportunities to participate in different types of play, especially free play.

Recent developments in brain research have proven that an infant's environment has a dramatic effect on brain building and healthy development. It is this early stage of brain development that results in how, and how well, one thinks and learns—both as children and as adults. Before children begin formal schooling, a large portion of their time is spent in the home environment, environments created by their caregivers (Bornstein & Lansford, 2010).

Harden and Whittaker (2011) found that cognitive stimulation and emotional support present in the home was significantly related to later development, with especially strong correlations to cognitive and language functioning in preschool. High correlations were been recognized between academic and language stimulation, opportunities available in young children's homes and their performance on intelligence tests (Gottfried, 1984; Molfese, DiLalla, & Lovelace, 1996). The more opportunities provided within the home which expose infants to cognitive stimulation, the more likely they will achieve higher cognitive and language scores (Gottfried, 1984), as well as exhibit rarer behavioral problems (Harden & Whittaker, 2011). A relationship has been found between numbers of literacy opportunities available in homes and how children rate their own cognitive skill and interest in learning (Baker & Scher, 2002; Culp et al., 2000; Weigel, Martin, & Bennett, 2006).

Even though it is clear that the accessibility of mentally stimulating opportunities in home environments are vital to children's cognitive development, interactions between parents, particularly mothers, and children are also strongly related to later cognitive outcomes (Kelly, Morisset, Barnard, Hammond, & Booth, 1996). Disclosure to learning stimulation also improves every aspect of a child's development, regardless of the child's socioeconomic background, in addition to cognitive skills (Bradley et al., 2001).

Hands-on opportunities in appropriate environments require infants to use their sense of smell, touch, sight, hearing, and sometimes taste. These opportunities also involve the use of motor, cognitive, and emotional skills and often language and social skills, which are not utilized in passive screen time activities like TV, DVD, video, computer and mobile. The use of technology is not appropriate for infants under the age of 24 months in any circumstance. Time spent playing with a tablet or smart phone means the infant is not crawling, walking, climbing and exploring her environment.

Today infants are exposed to technology such as tabs, mobiles, computers and videos. But play contributes to child's mental and emotional development. Children who spend most of their time using technology are less physically active. Some studies show that children might be benefited from gadgets; however, studies also reveal that usage of gadgets might have negative effects on the growth and development of children

Rationale of the study:

The findings of research revealed that the young children who watch TV excessively or spend more time operating electronic items such as smart phones, and tablets are 6 more likely to experience problems in the acquisition of expressive language. Furthermore, these children also suffer from other cognitive delays and may be at increased risk of learning disabilities later in their lives [Sundus]. Another study found that children at 30 months of age watching Teletubbies were related to fewer vocabulary words and smaller expressive language scores [Zhaoping,&Meng]. On the other hand, Donna Hermawati, et al found that early exposure of electronic media (< 2 years old) impacts language. This study showed that children who spent viewing ≤ 3 hours per day had language delay and short attention span, while children who spent viewing ≥ 3 hours per day had a language delay, short attention span, and hyperactivity.

Many research studies concentrated on impact of television and electronic media on development children below 3 years but not focused on the impact of smart phone usage comparative to indigenous play material of infants. Though this study on attempt of highlighting to smart phones and play materials how it will help to infants in Andhra Pradesh state to be precise in Guntur District with following objectives.

Objectives of the Investigation:

1. To know the extent of usage of smart phones for stimulating the infants.
2. To assess the developmental outcomes of infants stimulated with smart phones.
3. To assess the developmental outcomes of infants stimulated with indigenous play materials.
4. To study the differences in the developmental outcomes of infants stimulated with smart phones and indigenous play materials.

Review of literature

CHAPTER – II

REVIEW OF LITERATURE

A comprehensive review of literature is crucial in any endeavour. An extensive review facilitates in making the investigator up to date with the research knowledge in the field of investigation. It also helps to determine the amount of theoretical and empirical work that has already been done in the same area. It not only helps the investigator to define the verge of the field but also helps in avoiding unintentional replication of the previous work done.

In this chapter, relevant literature having direct or indirect bearing on the present research has been reviewed and the available literature is presented under the following sections:

2.1 THEORETICAL PERSPECTIVES

2.2 STUDIES RELATED STIMULATION AND INFANT DEVELOPMENT

2.3 STUDIES RELATED IMPACT OF HOME ENVIRONMENT, PARENT CHILD INTERACTION ON DEVELOPMENT OF INFANTS

2.4 STUDIES RELATED TO ROLE OF TOYS IN DEVELOPMENT OF INFANTS

2.5 STUDIES RELATED TO IMPACT OF TECHNOLOGY OF DEVELOPMENT OF INFANTS

2.1 THEORETICAL PERSPECTIVES

Attachment theory:

Theory of attachment by john bowlby suggests that infants have an need to form an attachment bond with a caregiver. According to their theory secure attachment causes the parts of infants brain responsible for social and emotional development, communication and relationship to grow and develop in the best way possible.

John bowlby believed that the relationship between infant and his caregiver during first five years of life is most crucial to socialization. Disruption to emotional difficulties and anti social behavior.

Piaget's Cognitive Development Theory

Piaget believed that thinking was different during each stage of development. His theory explained mental operations This includes how children perceive, think, understand, and learn about their world. Piaget believed that children naturally attempt to understand what they do not know. Knowledge is gathered gradually during active involvement in real-life experiences. By physically handling objects young children discover that relationships exist between them. Terms Piaget used to describe these processes were schemata, adaptation assimilation, and accommodation. These processes occur during each stage of development.

As children receive new information, they are constantly creating modifying, organizing and reorganizing schemata. Adaptation is a term Piaget used for children mentally organizing what they perceive in their environment. When new information ne experiences occur, children must adapt to include this information in their thinking. If this new information does not fit with what children already know, a state of imbalance occurs. To return to balance, adaptation occurs through either assimilation or accommodation.

Assimilation is the process of taking in new information and adding to what the child already knows. Accommodation is adjusting what is already known to fit the new information. This process is how people organize their thoughts and develop intellectual structures. Piaget's stages of cognitive development are the same for all children. Most children proceed through the stages in order. Each stage builds on a previous stage. However, the age at which a child progresses through these stages is variable due an differences in maturation.

Infant stimulation can improve infant curiosity ,attention span memory and nervous system development. Infants who are stimulated reach developmental milestones faster, have better muscle coordination and more secure self image.

The sensory motor stage takes place between birth and two years of age. Infants use all their senses to explore and learn. In this way, sensory experiences and motor development promote cognitive development Baby's physical actions, such as sucking, grasping, and hitting, help them learn about their surroundings. Movements are random at first Gradually

they become intentional as behaviours are repeated. Children begin to learn that objects still exist even when they are out of sighs. This is known in object permanence. Though exploration and exposure to new experiences, now concepts are learned.

Classical Conditioning theory

Learning and conditioning, pioneered by Pavlov, modifies behavior by repeatedly pairing a neutral stimulus with an unconditioned stimulus that elicits the desired response Operant-conditioning builds on classical conditioning and focuses on the hypothesis that the frequency of a behaviour is determined by its consequences for reinforcements, Later (Skinner, 1938) Classical conditioning introduced concepts that have been particularly important in the design of health-related interventions, such as reinforcement, stimulus response relationships, modelling, cut to action, and expectancies. However, given the particular difficulty in maintaining behaviour changes, the relapse of behaviours that have been eliminated for "extinguished") by an intersection is of particular interest.

The Recreation Theory:

Lazarus and Sthaninthel (1978) formulated the "recreation theory of play". This theory holds that play is necessary in order to produce refreshment after arduous labour and play uses the energy of the fresh tracts of the nervous system and thus gives the exhausted ones, time and scope to recover their lost energy through anabolism.

This theory holds that the essential activities of life are extremely fatiguing and irksome and then an uninterruped pursuit of such activities is injurious to health. Therefore play is an inevitable need. This concept offers satisfaction to those who take themselves and life too seriously. To them play becomes a means of getting out of the rigors of life. This appears to be an adult point of view inserted into the philosophy of children's life.

Infants give opportunity to play stimulate their senses and help them learn and develop. Infant stimulation is playing with baby around babies Visual, Auditory, taste, touch , and smell.

Social Action Theory

In Social Action Theory, biology and social and environmental contexts determine the access of interventions to promote individual behaviour change (wart, 1991). Most behavioural research, however, his focused on individual strategies to facilitate desired changes, and social and other contextual that factors can be mobilized to promote behavior change. Social-Action Theory specifies mediating mechanisms that link organizational structures to personal health and incorporates key concepts from the earlier theoretical models including self-efficacy and outcome expectancies. Some applications of social action theory focus on the mechanisms and maintenance of behavior change again placing the focus on the influence of context on individual behavior .

Erikson's Psychosocial Theory :

Erik Erikson proposed a theory of psychosocial development. He believed development occurs throughout the lifespan. His theory provided new insights into the formation of a healthy personality It emphasizes the social and emotional aspects of growth Children's personalities develop in response to their social environment. The same is true of their skills for social interaction. Eriksson's theory includes eight stages. At stage, a social conflict or crisis occurs. These are not generally tragic situations. however, they require solutions that are satisfying both personally and socially. Erikson believed that each stage must be resolved before children can ascend to the next stage.

Maturity and social forces help in the resolution of the crisis or conflict. Therefore. Teachers and parents play a powerful role in recognizing each stage. By providing social opportunity and support, teachers and parents can help children overcome each crisis.

2.2 STUDIES RELATED STIMULATION AND INFANT DEVELOPMENT

Richards, J. E. (2003) examined the effect of attention in infants on the Even related potential (ERP) changes occurring during the recognition of briefly presented visual stimuli. Infants at ages 4.5, 6 and 7.5 months were presented with a Sesame Street movie that elicited periods of attention and inattention, and computer-generated stimuli were presented overlaid on the movie for 500 ms. One familiar stimulus was presented frequently to the infant, One stimulus was familiar to the infants and was presented

frequently, a second stimulus which also was familiar but presented infrequently, Similarly a set of 14 novel stimuli were presented infrequently. The observation of study showed that, an ERP component labelled the 'Nc' (Negative Central, about 450–550 ms after stimulus onset) was larger during attention than inattention and increased in magnitude over the three testing ages during attention. Late slow waves in the ERP (from 1000 to 2000 ms post-stimulus onset) consisted of a positive slow wave in response to the infrequent familiar stimulus at all three testing ages. The late slow wave in response to the infrequent novel stimulus during attention was a positive slow wave for the 4.5-month-old infants, to a positive-negative slow wave for the 6-month-old infants and a negative slow wave for the 7.5-month-old infants. These results depict that attention facilitates the brain response during infant recognition memory and showed that developmental changes in recognized memory are closely related to changes in attention.

Nair and Philip (2009) studied on the effectiveness of child development and early stimulation therapy ,"tested on first year postnatal life, in improving the developmental outcomes of at risk neonates of one and two years of age infants. Eight hundred babies were taken as sample for this study. They found that intervention group of babies had a statistically significant higher score for mental developmental index (MDI) and psychomotor developmental index (PDI). The beneficial effect also persisted at two years, without any additional interventions in the second year.

Hwang, Y. S.,et.al (2010). Studied the Effects of pre-feeding oral stimulation on feeding performance of preterm infants using cross over design and oral stimulation program on the feeding performance of preterm infants. Nineteen preterm infants who were in the transitional time to full oral feeding served as their own controls. A 5-min oral stimulation program was applied to infants prior to feeding in two of 4 feedings on two consecutive days. Feeding, behavioural state, and physiological parameters of infants in the intervention and control feeding conditions were compared using SPSS software. The two significant findings showed that Compared to the control condition, infants in the intervention condition achieved a greater intake rate in the initial 5 min of the feeding ($P = 0.021$).After receiving oral stimulation, a higher percentage of infants moved to the drowsy or quiet alert state from sleep or restlessness before feeding, both on Day 1 ($P= 0.016$) as well as Day 2 ($P = 0.016$). No significant differences were found in other feeding parameters, feeding-induced physiological changes (peripheral oxygen saturation levels and pulse rate) and behavioral states between two feeding conditions. Oral stimulation had a modulating effect

on the pre feeding behavioral states and short-lived beneficial effects on the feeding efficiency of preterm infants.

Reichman, N. E.et.al (2011), examined the outcome of preterm and term neonates in terms of cognitive, motor and behavioural aspects. The late-preterm neonates of 34–36 weeks of gestation were compared with the and healthy full-term neonates of 37–41 week when they reached 2 and 4 years of age. It was observed that the late preterm neonates had decreased cognitive function when compared to term neonates. It was concluded that early diagnosis and interventions may improve the cognitive development of the late preterm neonates.

Morris, J., et.al (2012) Studied the impact of combining a group-based psychosocial intervention with an existing emergency feeding program for internally displaced mothers in Northern Uganda. The intervention consisted of mother and baby group sessions and home visits for mothers attending 3 emergency feeding centers. Psychosocial outcomes were compared with a contrast group of mothers who received nutritional support alone. The outcomes investigated were infant stimulation and maternal mood. After controlling for the effects of interview site and baseline scores, mothers in the intervention group (n=70) showed greater involvement with their babies, more availability of play materials, and less sadness and worry at follow-up in comparison to the contrast group (n=77). The intervention was acceptable to the mothers and easily taught. A proportion of the mothers chose to continue the intervention spontaneously with other mothers in their neighbourhoods.

Jessica Marcelle et.al (2013) evaluated the physiological responses on auditory stimulation with classical music therapy among hospitalized preterm newborns. This study was a non-controlled clinical trial which comprises 120 preterm neonates with the gestational age of 36 weeks and impulsive breathing. The preterm infants experienced 15-minute sessions of classical music therapy twice a day (morning and afternoon) for three successive days. Results revealed that there was a reduction in the heart rate after the second session of music therapy and an upsurge at the end of the third session. Respiratory rate diminished during the fourth and fifth sessions. Regarding oxygen saturation, there was an upsurge after the fifth session. Thus the study showed that music therapy may change short-term physiological responses of hospitalized preterm newborn infants.

Petri Rahkonenet.al (2015) conducted a prospective study to identify atypical sensory processing in extremely low gestational age children. The sensory processing abilities of preterm infants were assessed with the Infant/Toddler Sensory Profile Questionnaire and the neuro developmental of preterm infants with a structured Hempel neurological examination, Griffiths Mental Developmental Scales and Bayley Scales of Infant and Toddler Development. The Results showed that atypical sensory processing in preterm infants was common, and children with neonatal neuro anatomical lesions tended to present specific behavioural responses to sensory stimuli.

Cabral et.al (2015) conducted a cross-sectional study and a comparative study on motor development and sensory processing between preterm and term infants. A sample size of 15 preterm infants and 15 term infants were assessed using the Test of Sensory Functions in Infants (TSFI) and the Alberta Infant Motor Scale (AIMS). The result revealed that all infants who presented definite alteration in tolerating tactile deep pressure and poor postural control are at risk in delayed gross motor development, there may be peculiarities not detected by the tests used that seem to establish some relationship between sensory processing and motor development.

Jenna N Adams et.al (2015) conducted a cross-sectional study on sensory processing in preterm preschoolers and its association with executive function. The sensory processing was assessed with the Short Sensory Profile. Executive function was assessed with parent ratings on the behaviour Rating Inventory of Executive Function a Preschool version. The adaptive function was assessed with the Vineland Adaptive Behaviour Scales-II. The result showed that a higher percentage of preterm than full term preschoolers had elevated numbers of sensory symptoms than full-term controlled babies.

Alexandra R. et.al (2015) conducted a study on eliciting auditory plasticity in the human brain before full gestation with mother's voice and heartbeat sounds. The study examined 40 infants born extremely prematurely between 25 to 32 week gestation in the first month of life. Newborns were randomized to receive auditory enrichment in the form of audio recordings of maternal sounds including their mother's voice and heartbeat and the control group had routine exposure to hospital environmental noise. Cranial ultrasonography measurements were obtained at 30 ± 3 days of life. The study identifies that newborns exposed to maternal sounds had a significantly larger auditory cortex (AC) bilaterally

compared with control newborns receiving standard care. This study provides evidence for experience-dependent plasticity in the primary AC before the brain has reached full-term maturation. The results highlight that despite the immaturity of the auditory pathways, the auditory cortex is more adaptive to maternal sounds than environmental noise.

Barbara et.al (2015) conducted a randomised controlled trial study on multisensory intervention for preterm infants improves sucking organisation. The aim of the study is to evaluate sucking organisation in premature infants following a preterm infant multisensory intervention, the Auditory, Tactile, Visual, and Vestibular (ATVV) intervention. A convenience sample of 183 healthy premature infants born 29- 34 weeks postmenstrual age (PMA) enrolled. Sucking organisation was measured at baseline, then weekly, during the infant's hospital stay. The results revealed that a quadratic trend was observed for number of sucks, sucks per burst, and maturity index with the intervention group increasing significantly faster by day 7 (model estimates for group × day: β= 13.69, P < 52 .01;

β = 1.16, P < .01; and β= 0.12, P < .05, respectively). Sucking pressure increased linearly over time, with significant between-group differences at day 14 (β= 45.66, P < .01). The experimental group infants exhibited improved sucking organisation during hospitalisation, suggesting that the intervention improves maturation of oral feeding.

Janneke dekker et.al (2018) Assessed the effect of tactile stimulation between the repetitive stimulation and standard stimulation group. The study was conducted in randomized controlled trail compared the effect of repetitive stimulation on respiratory effect during the first 4 min after birth with standard stimulation based on clinical indication in preterm infants with a gestational age of 27 – 32 weeks . Results showed that there was a significant increase in the oxygen saturation in the stimulated group than the control group and it was concluded that tactile stimulation improves breathing among preterm neonate at birth.

Flensborg-Madsen, T., et al. (2019) provides evidence of developmental continuity as the main predictor of milestones in the second and third years was the speed of development during the first year. The result showed that “pre- and postnatal factors were significantly associated with the timing of milestone attainment; especially parental social status, paternal age, sex, gestational age, birth weight, birth length, weight increase in the first year

of life, and motor development during the first year of life. The significant predictors explained 16.2% of the variance in the Overall mean of milestones and 20.3% of the variance in milestones related to Walking. The most influential individual factor for the timing of milestone attainment was previous motor development during the first year of life. Additionally, sex was an important factor as girls were generally faster at attaining milestones. Parental social status was a consistent, but relatively week predictor".

Hee Sun Shinet.al (2017), examined the effects of sensory stimulation in 33 premature infants admitted to NICU of D University Hospital in C city, Korea. The babies were randomly assigned in to Experimental group with 16 neonates and Control group with 17 neonates. Tactile and kinesthetic stimulation based on Field technique was performed to the experimental group for 2 times per day for 10 days. Vital parameters (Heart rate, respiration, and oxygen saturation) and the behavioural changes (by Anderson Behavioural State Scale (ABSS)) were measured. The result showed that there was a significant difference in the weight(F= 40.77, p= .0001) and frequency of 'inactive awake state (X2= 39.778, p= .001) between the two groups. It was also found there was a statistical significance in the mean heart rate and O2 saturation between the experimental and control group (t= -2.174, p= .037; t= 3.080, p= .005) and no difference in the mean respiration rate.

Worku et al (2018) Conducted a study on effects of home based play- assisted stimulation on developmental performances of children living in extreme poverty: a randomized single-blind controlled trail with a sample size of 78 (3 – 59 months). Denver11- jimma and ages and stages questionnaire: social – emotional (ASQ:SE) and the tools used for data collection are anthropometrics. The results showed statistically significant intervention for language, personal-social and socio-emotional performances. At the midline of the study, language and social-emotional benefits from the play – assisted stimulation have been observed for the children in the intervention group. For language., the intervention effect depended on the child's sex and for personal- social performance depended on family income.

Rodriguez Gonzalez, P., et.al (2021) Conducted a systematic review on effectiveness of Oral Sensory-Motor Stimulation in Premature Infants in the Neonatal Intensive Care Unit (NICU).The researcher tried to identify and assess the best evidence available on the effectiveness of oral sensory-motor stimulation in preterm infants in the neonatal intensive

care unit. A systematic review following the Preferred Reporting Items for Systematic Reviews (PRISMA) statements were performed .The sensory stimulation had impact on achieving independent feeding, maturation of the sucking pattern, transition to full feeding, motor function and length of hospital stay in most studies. It was evident to support the benefits of the use of oral sensory motor stimulation to achieve independent oral feeding in preterm infants, thereby reducing their stay in the Neonatal Intensive Care Unit.

2.3 STUDIES RELATED IMPACT OF HOME ENVIRONMENT, PARENT CHILD INTERACTION ON DEVELOPMENT OF INFANTS

Murray, A. D et.al (2000) A study Conducted by long term effects have been found on infants brain development. An enriching and stimulating home environment fosters healthy growth and brain development, but it must include love, emotional support and opportunities for learning and exploration on Competence in language at 24 months: Relations with attachment security and home stimulation. This study explored the interrelations among attachment, home stimulation, and language development in 58 toddlers (36 medically high risk and 22 low risk) at 24 months of age . The results indicated that there were additive effects of attachment and home stimulation on language competence, especially on receptive abilities. Mothers who had established secure relationships and provided stimulation home environments had children with the highest language scores.

Hoff E et.al (2003) studied the influence of socio-economic status over the early vocabulary development in the children via maternal speech. The study hypothesized that children whose families differ in socio-economic status differ in their rates of productive vocabulary development because they have different language learning experiences. In this study, naturalistic interaction between 33 high socio-economic status and 30 mid socio-economic status mothers and their 2 years old children was recorded once and repeated again after 10 weeks. The results showed that children of suggested that the high socio-economic status performed good vocabularies than the mid socio-economic status 40 children in the size of their productive vocabularies; properties of maternal speech that differed as a function of socio-economic status fully accounted for this difference.

Thubiha kolobe (2004) examined the relationship between maternal childrearing practices and behaviours and the developmental status of Mexican infants using Home observation scale and BSID scale. The result revealed that maternal nurturing behaviours, parent-child interaction, and quality of the home environment were positively correlated with the infant's cognitive development.

kumara et.al (2006) studied the effects of home stimulation programme on mental development of 12-1 month toddlers the children were pre and post tested on mental scale of BSID. Results revealed that though the performance of both groups was same at the time of pre testing, due to stimulation programme, experimental children rate of improvement in mental development was higher than that of control group.

Banerjee, P. N., et.al (2007) study examined the relative contributions of infants' persistence and mothers' teaching at 6 and 14 months to infants' cognitive development at 14 months in a sample of 65 low-income mother–infant dyads. Infants' persistence was assessed from a videotaped persistence task at 6 months and from the Behavior Record Scale of the Bayley Scales of Infant Development, 2nd ed. (BSID II) at 14 months. Mothers' teaching was assessed from a videotaped teaching interaction at 6 and 14 months using the Nursing Child Assessment Satellite Training (NCAST) teaching scale. Cognitive development at 14 months was based on the Mental Scale, BSID II. The results showed that Infants' persistence at both ages and mothers' teaching at 6 months each explained unique variance in infants' cognitive status at 14 months. Persistence appears to be a stable quality that can be measured early on, and both infants' early persistence and mothers' teaching are direct pathways to cognitive status at the start of the second year.

Laplante et al. (2007) investigated that, two years old were able to imitate both real life and pretend actions of adults in play situations. For example, they could pretend to drink from both a make-believe empty cup and a real one filled with water. One year olds were able to only imitate real adult actions- drinking actual water, for example-indicating that they were not yet able to engage in imaginary behaviour. These advances in play ability are influenced by both home and school environments. Toddlers whose families are under great stress experienced delays in acquiring these cognitively advanced play behaviours.

Rahman et al. (2008) developed Learning through Play Programme which Consists of a pictorial calendar depicting 8 successive stages of child development from birth to 3 years

with accompanying information of child play and other activities that promote parental involvement, learning and attachment. Significant benefits of intervention to mother's knowledge of child development were found.

Sharma and Nagar (2009) studied on influence of Home Environment on psychomotor development in Kangra District of Himachal Pradesh .A sample size of 145 male and female infants of age birth to 18 months from two villages, one of which served as experimental group and other control group. A modified version of Home inventory by Bradley and Caldwell was used to home environment in addition to the bayley's scale of infant development (BSID) which was used to assess motor development of infants . They revealed significant differences in home environment, motor age and psychomotor developmental indices between the experimental and control group infants. A significant association was also found between home environment and psychomotor developmental indices of infants.

Ging yang et.al (2021) conducted a meta analysis to evaluate relationship between home parenting environment and cognitive and psychomotor development in children under 5 years. A systematic search of the Chinese and English data bases from January 1 1990 to july 31 2021 was performed on articles related to relationship between home parenting environment and the cognitive and psychomotor development of children. The results showed a positive correlation between the home parenting environment and cognitive and psychomotor development of children below 5 years.

Johnson, Kayla (2013) The quality of the maternal-infant relationship has a significant influence on maternal mental health and infant well-being, development, and adaptation throughout life. Bonding is a unique and long-term emotional tie that begins with the first contact between the mother and infant and continues throughout the postpartum period. Postnatal separation has negative outcomes on the mother-infant bonding process. Mothers who participated in immediate skin-to-skin contact and initiated breastfeeding within two hours following childbirth were more sensitive to the infant's needs and the child seemed more content at one year. Inadequate mother-infant relationships result in long-term consequences for the child. Poor interactions affect the child's cognitive and socio-emotional development, physical health, and personal relationships.

Murray and Yingling (2015) in a study exploring the interrelations among attachment, home stimulation and language development in 58 toddlers of two-years of age, indicated that mothers who had established secure relationships and provided stimulating home environments had children with the highest language scores.

Rasheed, M. A. et.al (2016) conducted research on maternal scaffolding and home stimulation: Key mediators of early intervention effects on children's cognitive development. This study contributes to the understanding of how early parenting interventions implemented in low- and middle-income countries during the first 2 years of children's lives are sustained longitudinally to promote cognitive skills in preschoolers. We employed path analytic procedures to examine 2 family processes—the quality of home stimulation and maternal scaffolding behaviors—as underlying mechanisms through which a responsive stimulation intervention uniquely predicted children's verbal intelligence, performance intelligence, and executive functioning. The sample included 1,302 highly disadvantaged children and their mothers living in rural Pakistan, who from birth participated in a 2-year, community-based, cluster-randomized, controlled trial designed to promote sensitive and responsive care giving. Family processes were assessed at 2 developmental time points using parent reports, ratings of home environments, and observed parent–child interactions. Cognitive skills at age 4 were assessed using standardized tests. Controlling for socioeconomic risk (e.g., wealth, maternal education, food insecurity) and individual factors (e.g., gender, growth status), the quality of current home stimulation as well as both earlier and concurrent measures of maternal scaffolding independently mediated the intervention effects on cognitive skills at age 4. In addition, the intervention had a significant direct effect on executive functioning and performance intelligence over and above significant family processes and other covariates. We highlight implications for future program design and evaluation studies.

2.4 STUDIES RELATED TO ROLE OF TOYS IN DEVELOPMENT OF INFANTS

Bergen, D.,et.al (2009) studied the Effects of infant-parent play with a technology-enhanced toy Affordance-related actions and communicative interactions. Infant-parent play with toys is an early form of social communication, and the toy features (i.e., affordances), as well as the child's language competence, contribute to the developmental level of the play and the types of play actions that occur. This research was conducted in

cooperation with a toy manufacturer, investigated how the affordances of a technology-enhanced toy were used by 26 infant-parent pairs during six clinical sessions of play with the toy. The types of play, the features of the toy that elicited play, the humor elicited by the toy, and the communicative interactions of the parent and child were observed. Results indicated that certain affordances of the toy were used in exploration, practice play, and social games and were related to episodes of child laughter. The communicative interactions of the parents and the language patterns used in the sessions grew in complexity as the children's language facility increased. The affordances of the toy played a role in a variety of parent-child interactions and joint attention experiences.

Maulik and Darmstadt (2009) conducted a descriptive review of the evidence for the effectiveness of interventions targeting children from birth to age three by using low cost play material, reading books, music and tactile stimulation. From their review they concluded that play-based interventions were the most effective.

Anna V. Sasa (2015) Examine the Association of the type of **toy** used during play with the quantity and quality of parent – infant communication. Data is collected from 26 parent-infant aged (10 – 16 months). This experiment in a natural environment of parent- infant communication during play with 3 different toys sets. Results showed that playing with electronic toys is associated with decreased quality and quantity of language infant compared with traditional toys.

Wooldridge et.al (2012) study on play with electronic toys (battery-operated or digital) with a sample size of 25 mother- toddler (16-24 months old) parenting interactions with children: checklist of observations linked to outcomes PICCOLO checklist and family demographic and play pattern data were also collected , via self- report questionnaire were used for data collection. The result showed significantly lower scores in 87the electronic toy condition for three of the four domains of the PICCOLO. The data indicated that the play experiences of toddlers were compromised by the lower quality of parent- child interaction during joint play with electronic toys.

Boe, J. L., & Woods, R. J. (2018) Studied on Parents' influence on infants' gender-typed toy preferences Gender socialization influences children at early ages, shaping their developing identities. The toys provided by parents deliver some of the earliest gender-based messages by encouraging children to engage in activities associated with, for

example, dolls and trucks. In the current study, we measured the influence of parental socialization by assessing 5- and 12 ½-month-old infants' exposure to dolls and trucks and by experimentally manipulating parents' encouragement to play with these toys. Result showed that infants displayed gender-typical toy preferences at 12 ½.However, brief encouragement by a parent to play with toys from each category was ineffective in altering infants' preferences. Rather, the types of toys present in the home predicted preferences, suggested that at-home exposure to toys may be influential in the development of toy preferences. These findings reveal that socialization processes indeed play a role in the formation of early gender-typical toy preferences and highlight the importance of equal toy exposure during infancy to ensure optimal development.

Honauer, M., Moorthy, P., et.al . (2019) Studied on interactive Soft Toys for Infants and Toddlers-Design Recommendations for Age-appropriate Play. Very young children (below three) are characterized by sensory-motor exploration and pre-cognitive development. There is little work on interactive toys for this age group. This raises the question of what interactions are developmentally appropriate at this age. We here propose recommendations for designing meaningful interactive toys, gained from designing an interactive soft (textile) book prototype, testing it with children and discussion of observations with parents, as well as three expert interviews.

2.5 STUDIES RELATED TO IMPACT OF TECHNOLOGY OF DEVELOPMENT OF INFANTS

Laplante et al. (2007) investigated two years old on imitating both real life and pretend actions of adults in play situations. For example, they could pretend to drink from both a make-believe empty cup and a real one filled with water. One year olds were able to only imitate real adult actions- drinking actual water, but were not yet able to engage in imaginary behaviour. These advances in play ability are influenced by both home and school environments. Toddlers whose families are under great stress may experienced delay in acquiring these cognitively advanced play behaviours.

Linebarger, D. L., & Vaala, S. E. (2010) Studied on Screen media and language development in infants and toddlers: An ecological perspective. Two most important developmental competencies – abilities to understand and usage of language were assessed during first 3 years of life. Results showed that infants' and toddlers' who spent time with

media showed notably increased in languages developed (i.e., 1–2 h per day). The infants and toddlers were capable of learning from screen media. This learning is dependent upon the confluence of three distinct but interrelated factors: attributes of the child; characteristics of the screen media stimuli; and the varied environmental contexts surrounding the child's screen media use. A young child's language skills develop from the reciprocal transactions between the child and the broader environmental contexts in which a child is situated or operates. Screen media effects are dependent on the degree to which media content resembles infants' and toddlers' real-life experiences including the use of simple stories and familiar objects or routines. Repeated exposure also helps infants and toddlers learn both the format and the content of screen media and can even ameliorate negative effects associated with viewing particular content. Finally, the presence of a competent co-viewer appears to boost babies' language learning from screen media, much like the ways these processes facilitate learning in live scenarios.

Carret.al (2017) investigated the effects of **touch-screen tablets** on cognitive development of children aged between 24 and 36 months, In relation to the effects of technology on child development, such as attention, problem solving, short-term memory and concentration. Results revealed that the cognitive skills of children interested in toys developed more than those of children interested in tablets.

Gunuc and Atli (2018) investigated the effects of technology on the behaviours of infants aged between 18 and 24 months based on their mothers' views. In the study, it was found that the parents used technology for the development of their infants' behaviours in terms of eating, sleeping, speaking and keeping quiet.

Rothstein (2018) Study on the presence of smart phones and their impact on the quality of parent- child interactions with a sample size of 45 parent-children (Parents 18 years, and infants 13- 51 months). Parenting interactions with children: checklist of observations linked to outcomes (PICCOLO) were used for data collection. The results of this study show that the significant differences for affection , responsiveness, and encouragement in the current study indicate that the quality of the parent- child interaction decreases when the parent's smartphone is on . In regard to parenting behavior, when smartphones are turned off, parents display more affection towards their child.

Daria Kuss et al 2019 conducted study on Impact of parents' technology use on 18- to 24-month-old infants' adaptive behaviors The aim of this study is to investigate the relationship between adaptive behaviors of 18- to 24-month-old infants and their parents' use of technology. The sample consisted of 116 people who are 58 volunteering married couples with 18- to 24-month-old infants and were registered in family health centers in Turkey's Eastern Anatolia Region. Comparison analyses were conducted between parents' demographic variables (i.e., education background) and their use of technology (i.e., Internet, smart phone) and adaptive behaviors of their 18- to 24-month-old infants. Adaptive behaviors of infants were measured with ABAS-3 (Adaptive Behavior Assessment System, Third Edition) and the profiles of parents using technology were measured with a survey developed by the researchers. The results showed that parents' use of technology had an impact on adaptive behaviors of 18- to 24-month-old infants. Infants of mothers who did not engage in any Internet activity have higher adaptive behavior scores. The infants of mothers who engaged in activities such as games, videos, and music on the Internet together with their 18- to 24-month-old infants had low scores on adaptive behaviors in terms of concept, self-management, leisure, and communication.

Material and methods

CHAPTER-III

MATERIALS AND METHODS

The present study was undertaken to study the Developmental outcomes of infants stimulated with smart phones and indigenous play materials. This Chapter deals with the materials used and methods adopted in the study under the following subheadings.

3.1 RESEARCH DESIGN

Ex-post facto research design was adopted to study the developmental outcomes of infant as the investigator will have no direct control over the independent variables because the manifestation of these variables has already occurred or the researcher cannot manipulate them.

3.2 LOCALE OF THE STUDY

Rural and Urban Areas of Bapatla mandal, Guntur district, Andhra Pradesh was selected as locale for the present study.

3.3 SAMPLING PROCEDURE

Purposive sampling procedure was adopted in selecting the infants. The sampling procedure included the following.

3.3.1 Criteria for sample selection

3.3.2 Sample Size

3.3.1 Criteria for sample selection

Infants in the age range of **birth to 30 months** (Birth to 2 ½ years) residing in urban and rural areas of Bapatla mandal, Guntur district, Andhra Pradesh was drawn as basic criteria for sample selection.

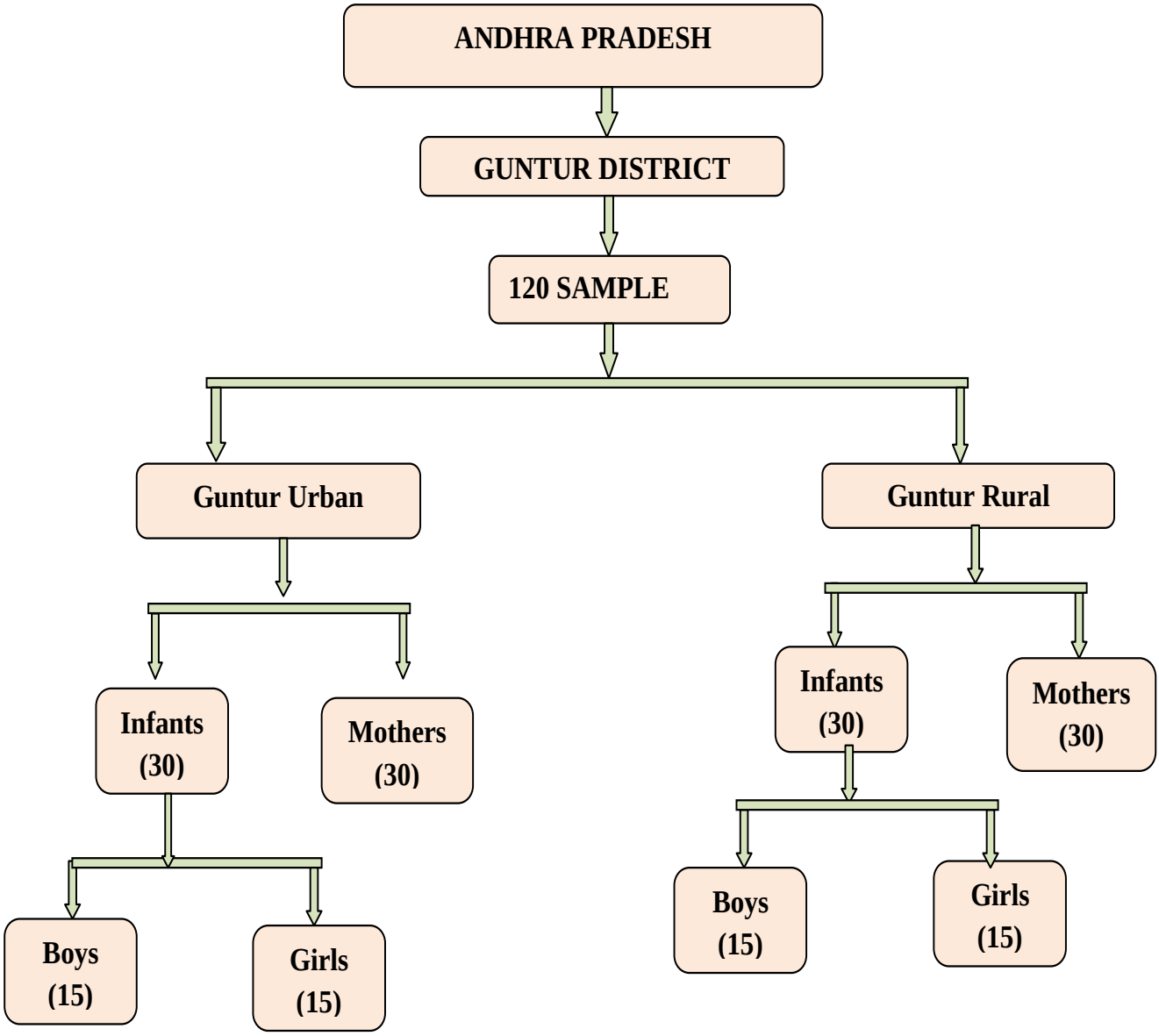
3.3.2 Sample Size

Sample size for the present study is 120 which included 30 infants out of whom 15 were boys and 15 were girls and their respective mothers form rural area and 30 infants out of whom 15 were boys and 15 were girls and their respective mothers form urban area.

Data collected from mothers:

The information related to child stimulatory practices was taken from the respective mothers of the infants included in the sample.

3.3.3 Distribution of sample



3.4 VARIABLES AND THEIR EMPIRICAL MEASUREMENT

The present study included both independent and dependent variables and the relationship between the independent variables and dependent variables are studied in the present investigation. The details of independent and dependent variables are given below.

S.No	OBJECTIVES	VARIABLES	TOOLS OF MEASUREMENT	ANALYSIS
1	To know the extent of usage of smart phones for stimulating the infants	General profile of infants and mothers	General information schedule	Frequencies and percentages, Mean, Standard deviation
2	To assess the developmental outcomes of infants stimulated with smart phones.	• Developmental outcomes (Cognitive, language and motor) • Smart phone usage • Child Variable (Age , gender) • Family variable (Parents educational status and occupational status)	• Bayley scale of infant development / Developmental assessment scale for Indian infants. • Smart phone usage schedule	Frequencies and percentages, Mean, Standard deviation
3	To assess the developmental outcomes of infants stimulated with indigenous play materials.	• Developmental outcomes (Cognitive, language and motor) • Indigenous play material usage • Child Variable (Age , gender) • Family variable (Parents educational status and occupational status)	• Bayley scale of infant development / Developmental assessment scale for Indian infants. • Indigenous play material usage schedule	Frequencies and percentages Mean, Standard deviation
4	To study the differences in the developmental outcomes of infants stimulated with smart phones and indigenous play materials.	• Developmental outcomes (Cognitive, language and motor) • Smart phone usage • Indigenous play material usage • Child Variable (Age , gender) • Family variable (Parents educational status and occupational status)	• Bayley scale of infant development / Developmental assessment scale for Indian infants • Smart phone usage schedule • Indigenous play material usage schedule	Mean, Standard deviation and T - test

3.4.1 Operational definitions:

3.4.1.1 Infant Variable

Age: It is the number of months completed by the infants at the time of investigation.

Gender:

3.4.1.2 Family variable

A. Parent Related

(a) Education: It was taken on a qualified scale as primary education, secondary education , graduation of the infants parents

(b) Employment / occupation: It was the job taken up by the infant's parents on a qualified scale as , Agriculture and Private Employee.

(c)Income: The total monthly income of the infants parents..

B. Type of family

It was considered in two types such as nuclear and joint family.

(a) Nuclear Family: Family in which Husband, wife and their unmarried children living together.

(b) Joint Family: Family in which Husband, wife and their unmarried children, in-laws, brothers, sisters living together.

3.4.1.3 Stimulation:

Early stimulation is the set of media, techniques, and science- based activities and applied systematically and sequentially, used for infants from birth to age 6, with the aim of optimizing their cognitive, physical, emotional and social development, to avoid undesired states in development and help parents effectively and autonomy in the care and development the infant.

3.4.1.4 Cognitive development:

Cognitive refers to the mental processes involved in gaining knowledge and comprehension. These processes include thinking, knowing, remembering, judging, and problem-solving. These are higher- level functions of the brain and encompass language, imagination, perception, and planning.

3.4.1.5 Language development:

Language development is the process by which children come to understand and communicate language during early childhood.

3.4.1.6 Motor development:

Motor development includes Gross and Fine motor skills. Gross motor skills generally refer to movements involving larger muscles, like those in the arms, legs, feet or the entire body (used for walking, jumping and so on). Fine motor skills generally refer to movements involving smaller muscles, like those in hands, wrists and fingers (holding a toy).

3.5 TOOLS AND TECHNIQUES USED

3.5.1 General information schedule developed by investigator

3.5.2 Developmental assessment scale for Indian infant

3.5.3 Infant Stimulation by care taker

3.5.4 Smart phone usage schedule by investigator

3.5.5 Indigenous play material usage schedule by investigator

3.5.1 General Information Schedule:

A general information schedule (Appendix-A) was developed by the investigator for collecting general information about infant, his/her parents and family related information like education, occupation and type of family. Score codes were given for each item

Child and family variables and their codes

Age	Code
6 – 18 months	1
19 – 30 Months	2
Gender	**Code**
Girl	1
Boy	2
Ordinal Position	**Code**
1st Child	1
2nd Child	2
3rd Child	3

Family variables and their codes

Employment	Code
Agriculture	1
Private employee	2
Income	**Code**
10,000-20,000	1
20,001-30,000	2
Type of family	**Code**
Nuclear	1
Joint	2

Parents Education	Code
Secondary	1
Primary	2
Graduation	3

3.5.2 Developmental assessment scale for Indian infants

The Developmental Assessment Scale for Indian Infants (DASII) was identified to study the developmental outcomes of infants which consist of Motor development and Mental development. The Scale comprises of 67 motor items and 163 mental items which have been classified into content clusters under different areas of development. The five clusters of motor items and the Ten of mental items. Motor clusters comprises of neck control, body control, coordinated movements, locomotion skills and manipulation. Mental clusters comprises of visual and auditory cognizance, reaching, manipulation, memory, social interaction and imitative behavior, language, understanding of relationship, differentiation and manual dexterity. Motor and mental Developmental quotients (MoDQ and MeDQ) are calculated from DASII and DQ less than 70 was considered as significant.

Scoring:

After assessment of children, motor development quotient (DMoQ) and mental development quotient (DMeQ) was calculated as per manual of DASII scale. The DASII provides scores for mental and motor development with a standardized mean of 1 00 and standard deviation of 16. Developmental delay was defined as development quotient (DQ) ≤70 (≤2SD) in either the mental or motor scale. Development was considered impaired if the scores were below 84. Scores~ 84 (mean -1 SO) were considered normal.

3.5.3 Infant stimulation by care taker schedule:

A 19 items questionnaire was developed by the investigator for studying the infant stimulation by care taker. The checklist was administered to the respondents in the regular situation. Instructions were taken by the investigator during the test conducted period, however, ensures better conditions for observing the respondents to the items of the Questionnaire. The answers are recorded by the investigator/researcher by observational method on the questionnaire protocol.

Reliability of the questionnaire developed:

For establishing Reliability, Test – Retest method was used, and the carl pearson correlation coefficient was also used to know the internal consistency. The reliability of the scale is 1.

Validity of the questionnaire developed:

The validity of the scale was tested against the judgment of five judges. The selection of items based on opinions of experts as well as highly significant discriminative indices of all the items was retained in the final format with the help of item validity.

3.5.4 Smart phone usage schedule by investigator:

A 32 item questionnaire was developed by the investigator for studying the usage of smart phone for infant stimulation. The checklist was administered to the respondents in the regular situation. Instructions were taken by the investigator during the test conducted period, however, ensures better conditions for observing the respondents to the items of the Questionnaire. The answers are recorded by the investigator/researcher by observational method on the questionnaire protocol. A score of 1 to always 2 sometimes 3 for rarely and 4 for never was given for analysis.

Reliability of the questionnaire developed:

For establishing Reliability, Test – Retest method was used, and the carl pearson correlation coefficient was also used to know the internal consistency. The reliability of the scale is 1

Validity of the questionnaire developed: The validity of the scale was tested against the judgment of five judges. The selection of items based on opinions of experts as well as highly significant discriminative indices of all the items was retained in the final format with the help of item validity.

3.5.5 Indigenous play material usage schedule by investigator

A 24 item questionnaire was developed by the investigator for studying the usage of indigenous play material for infant stimulation. The checklist was administered to the respondents in the regular situation. Instructions were taken by the investigator during the test conducted period, however, ensures better conditions for observing the respondents to the items of the Questionnaire. The answers are recorded by the investigator/researcher by observational method on the questionnaire protocol. A score of 1 to yes and 2 to No was given for analysis.

Reliability of the questionnaire developed:

For establishing Reliability, Test – Retest method was used, and the carl pearson correlation coefficient was also used to know the internal consistency. The reliability of the scale is 1.

Validity of the questionnaire developed:

The validity of the scale was tested against the judgment of five judges. The selection of items based on opinions of experts as well as highly significant discriminative indices of all the items was retained in the final format with the help of item validity.

3.6 METHODS OF DATA COLLECTION

Interview and observation methods were used for collecting data. Individual home visits were conducted for recording the information.

3.7 STATISTICAL ANALYSIS

3.7.1 Frequencies and Percentages

Frequencies and Percentages were used for understanding the independent and dependent variables of respondent's.

3.7.2 Mean, Standard Deviation and t - Test

Mean and Standard Deviation were used to study the age and gender differences among children with reference to dependent variables. T- test was administered to study the differences in the developmental outcomes of infants stimulated with smart phones and indigenous play materials.

3.8 CONCEPTUAL FRAMEWORK

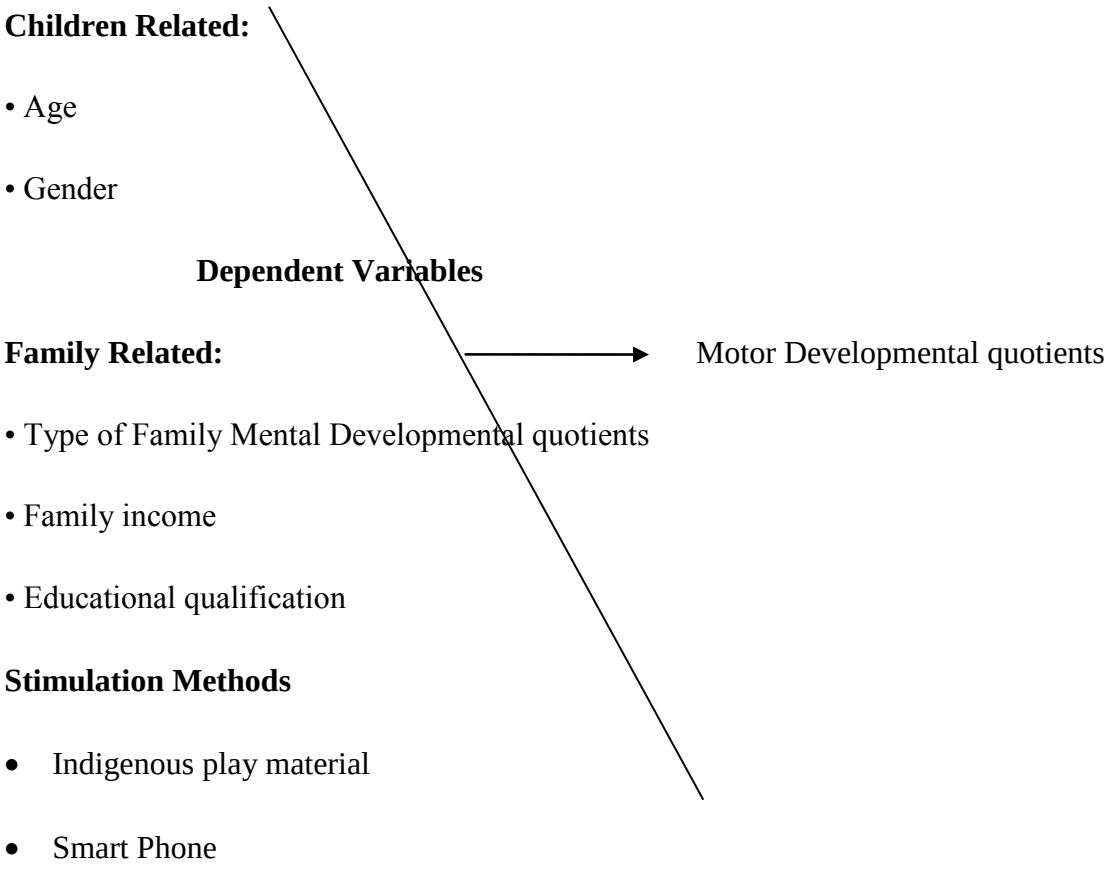


Figure 3.1.Conceptual framework of the study.

Results and discussion

CHAPTER -IV

RESULTS AND DISCUSSION

This chapter encompassed the detail description of the results of the study. The data obtained from the study was coded, consolidated, tabulated and analyzed by using appropriate statistical methods and are presented under the following heading

4.1 General profile of infants and infant families

4.2 Status of Infant Stimulation

4.2 Difference between rural and urban families in infant stimulation

4.3 Status of usage of Indigenous play material and smart phone for infant stimulation

4.4 Difference between rural and urban families in usage of indigenous play material and smart phone for infant stimulation

4.5 Developmental outcomes of Infants

4.6 Mean differences in Developmental outcomes of Infants

4.1 General profile of the Infants and infant Families

Table No. 4.1.1 General Information of selected Infants (N-60)

S.NO	Variables	Frequency	Percentage
1.	**Age of infant in Months**		
	6 Months – 18 Months	30	50%
	19 Months – 30 Months	30	50%
2.	**Gender**		
	Girls	30	50%
	Boys	30	50%
3.	**Ordinal Position**		
	1st Born	42	70%
	2nd Born	16	27%
	3rd Born	2	3%

Information related to general profile of identified infants sample living in rural and urban areas are given in the table no 4.1. 1. According to table no 4.1.1, equal number of infant both boys and girls (50 %) were selected as shown in fig 1 and who were in the age range of 6- 18 months and 19 – 30 months respectively as shown in fig no 2. Regarding ordinal position of the infants' majority of the sample were 1st born (70%) followed by 2nd born (27%) and 3rd born (3%) shown in fig no 3.

Fig No. 1 Age group of infants in Months

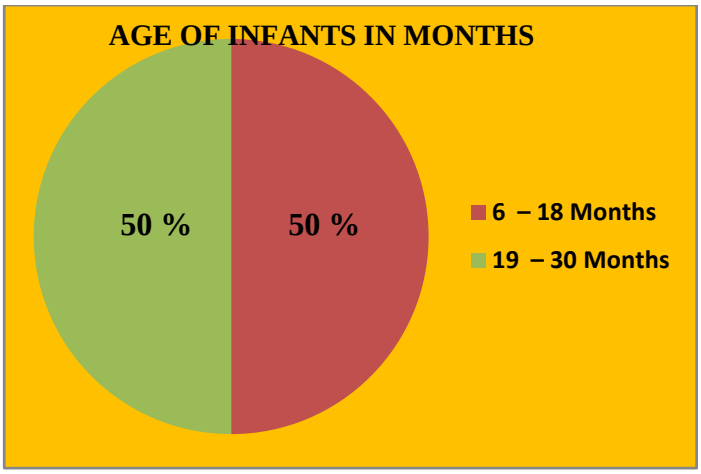


Fig No. 2 Gender of infants

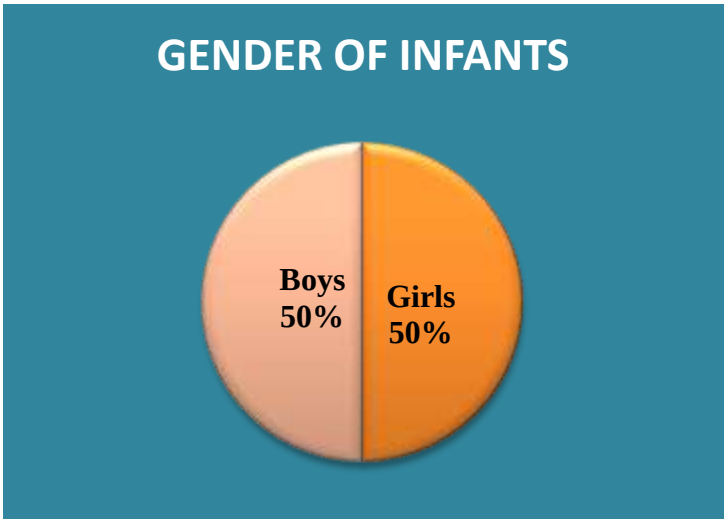


Fig No. 3 Ordinal Position of infants

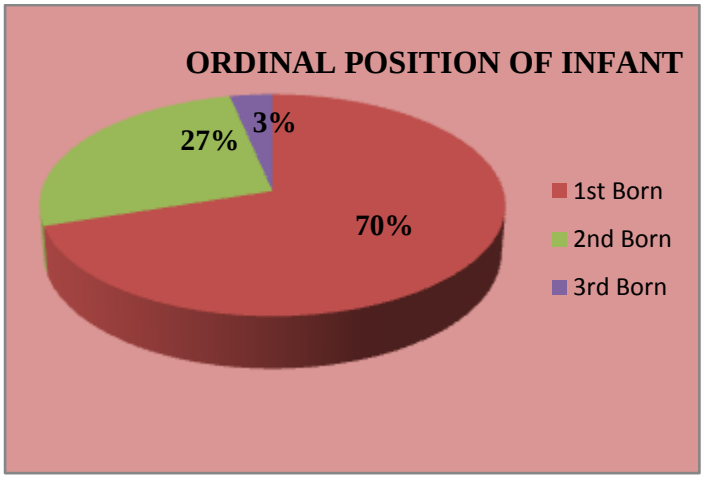


Table No. 4.1.2 Information Related to Infants Parents:

S.NO	Variables	Frequency	Percentage (%)
1	**Parents Education**		
	Secondary	7	12
	Primary	2	3
	Graduated	51	85
2	**Monthly Income**		
	10,000 – 20,000	45	75
	20,001 – 30,000	15	25
3	**Occupation**		
	Private Employees	28	47
	Agriculture	32	53
4	**Type of Family**		
	Nuclear	55	92
	Joint	5	8
5	**Residential area**		
	Rural	60	50
	Urban	60	50

The parental information are given in table no 4.1.2 according to which Majority of the infants parents were graduated (85%), less than one fourth of them completed followed by 12 percent of them studied up to secondary level and only 3 percent of the selected parents have completed primary level of education Fig no.4.

The table no. 4.1.2 depicts the information related to parents of selected infants. According to (Fig no:5) it is evident that three forth of parents monthly income (75 %) is between Rs.10,000 – Rs.20,000 three forth of parents monthly income (25%) fell in the range of Rs.20,000 to Rs.30,000.

Regarding occupation of parents (Fig no: 6) it was observed that more than half of the parents (53%) were agriculture farmers and only 47 percent of them were working in private companies. Fig No.7 shows that 92 percent of the selected infants belong to nuclear family and only 8 percent of them belong to joint family. As the sample were selected from rural and urban areas equal number of infants and their respective parents were living in villages (50%) and town (50%).

Fig No.4 Parents Education of infants (N-60)

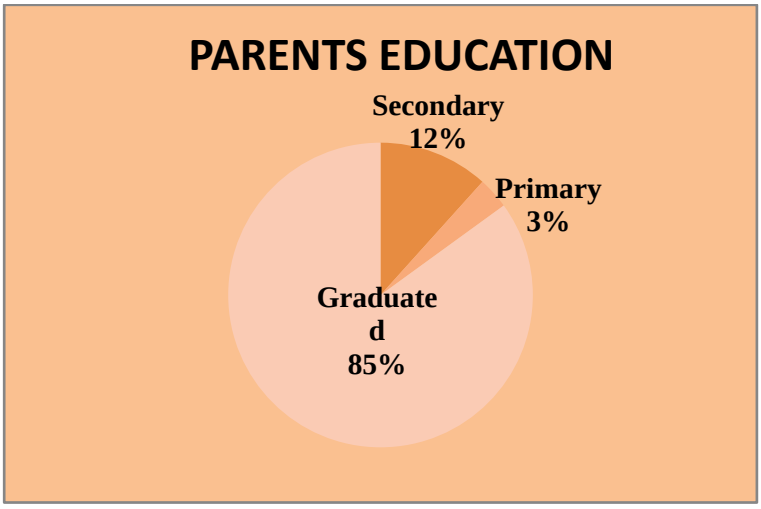


Fig.No.5 Monthly Income of Parents (N-60)

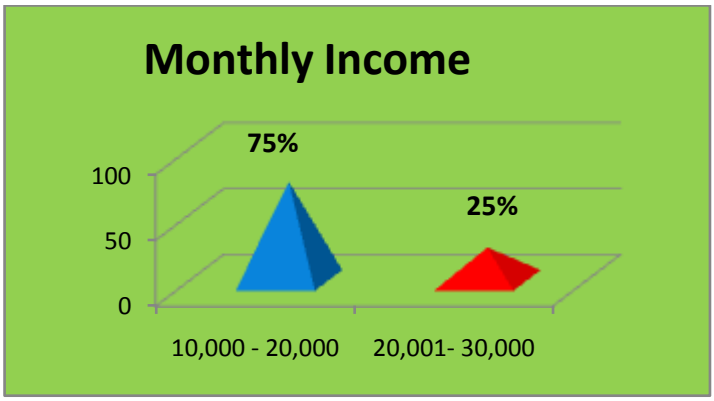


Fig.No.6 Occupational status of parents (N-60)

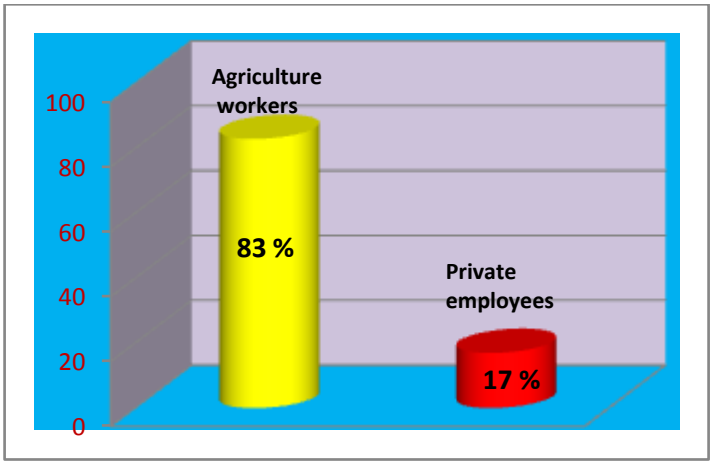
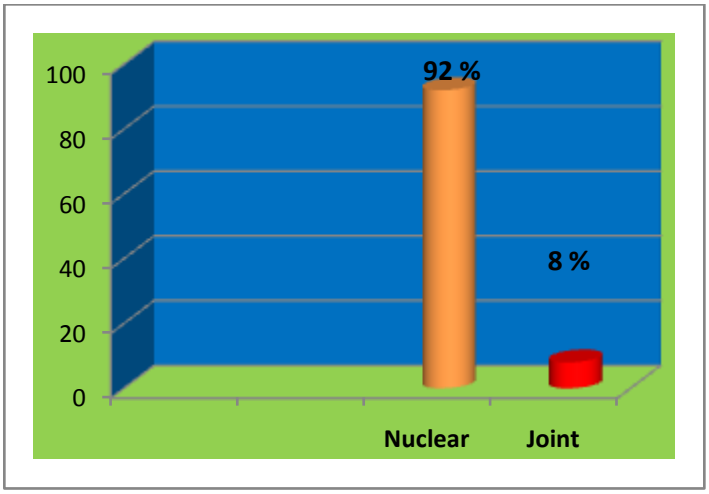


Fig.No.7 Type of Family N=60



4.2 Status of Infant Stimulation, Usage of indigenous play material and Smart Phone for Infants Stimulation:

From **table no.4.2.1** it is evident that rural and urban mothers concentrated on feeding their infant by holding and looking at their infant. 20 percent of rural and 23 percent of urban mothers gave colourful toys to the infants. Coming to showing picture book to infant only 17 percent of rural mothers and 23 percent of urban parents showed regularly were 20 percent of rural mothers showed rarely, only 30 percent of both rural and urban mothers did body massage to infant and 3 percent never did respectively. More than half of rural mother 67 percent never let their baby taste and smell different thing at a time. But all the urban mothers allowed their infant to taste and smell different thing. More than half of urban 60 percent and rural 63 percent parents change the toys when infant felt board.30percent of urban parents and 23 percent of rural parents used musical toys or radio for stimulation but 3 percent of both urban and rural parents did not use musical toys respectively. Higher percent of urban parents 30 percent read story book to their infant compare to rural 20 percent of parents.

The result are in line with one of the study by **Nair and Philip (2009)** studied on the effectiveness of child development and early stimulation therapy ,"tested on first year postnatal life, in improving the developmental outcomes of at risk neonates of one and two years of age infants. Eight hundred babies were taken as sample for this study. They found that intervention group of babies had a statistically significant higher score for mental developmental index (MDI) and psychomotor developmental index (PDI). The beneficial effect also persisted at two years, without any additional interventions in the second year.

The result are in line with one of the study by **Fagan et.al (1977)** found that infants were able to encode either the invariant form or color of a target as a basis for later recognition. Many experiments have demonstrated that infants are able to detect features of a stimulus which remain invariant from study to test.

Table no 4.2.2 – Revealed the usage of indigenous play material for infant stimulation. From the table it is evident that more than half of rural mothers prepared toys 60 percent during their pregnancy, purchased rattles 67 percent ,Prepared toys using waste material 60 percent , Prepared teeters 67 percent place available objects in reach of infants 67 percent

more than three fourth of care taker purchased toys for cradles 80 percent , Sticker pictures to walls 83 percent and placed pillow to support crawling 90 percent both the rural and urban parents were talking with baby while playing regularly. Only urban parents were playing peek-a-boo 93 percent compare to rural parents 43 percent were as majority of rural mothers 87 percent were doing auditory stimulation by making different sounds compared to urban mothers 43 percent. Majority of rural 97 percent and urban 90 percent parents allowed their infants to play with kitchen utensils. Both urban 97 percent and rural parents 93 percent played old traditional game (Annam, Pappu,Neyee) with their infant. Least percentage of rural 7 percent and urban 3 percent parents used color full pillows to help their infant while sitting. The results from the above Table 4.3 revealed that 30 percent of the infants from rural areas were found to be stimulated with high usage of Indigenous play material followed by 53 percent and 17 percent with medium and low levels of usage. Whereas in case of urban areas 23 percent were found to have high usage of indigenous play material followed 60 percent and 17 percent with medium and low levels of usage.

The result are in line with one of the study by ***Anna V.Sasa (2015)*** Examine the association of the type of toy used during play with the quantity and quality of parent-infant communication. Results showed that playing with electronic toys is associated with decreased quality and quantity of infant compared with traditional toys.

The result are in line with one of the study by **Sidiropoulou et.al. (2012)** Studied the motor developmental delays of institutionalized preschool-aged children. The study results revealed that the family reared children had better performance in both motor scales compared to children living in conventional institutions. The findings reinforce the need for the evaluation of motor performance in preschool- aged children raised in institutions, in order to change institution environments into more supportive ones for the most benefit of children's fine and gross motor development.

The result are in line with one of the study by **Jaswalet et.al (1996)** Studied on cognitive development of rural children and found that development of all cognitive tasks was found to be concurrent but not uniform. Sex differences were also noticed where males were more advanced than females in most cognitive tasks at all age levels.

Table no 4.2.3 – Revealed the usage of Smart phone for infant stimulation. From the table 4.2.3 all the rural and urban parents 100 percent making use of smart phone for their

infants. In urban 80 percent of the infants are using android and 20 percent are using Tabs from Rural area 100 percent are using android mobiles. Majority 70 percent of urban parents make infants use mobile in their absence and 53 percent of Rural parents make use of mobile in their absence .While baby cries 23 % of rural parents use mobile phone and from urban area 37 percent of them use smart phone while baby cries followed by 33 percent of urban parents use mobile phone while feeding coming to rural parents 13 percent use smart phone while feeding .60 percent of rural parents and 33 percent of urban parents give mobile phone when they have separate work to do. 70 percent of rural parents and 80 percent of urban parents give smart phone 6- 10 times in a week Majority of infants using more than 1 hr smart phone in a day from rural 77 percent and from urban 100 percent. Both urban and rural area 87 percent watch cartoon videos in mobile phone.

The result are in line with one of the study by ***Carr et.al.(2017)*** Investigated the effect of touch-screen tablets on cognitive development of children aged between 24 and 36 months, in relation to the effects of technology on child development, such as attention, problem solving, short time memory and concentration .Results shows that the cognitive skills of children interested in toys developed more than those of children interested in tablets.

Table No. 4.2.1 Information related to infant stimulation in Rural and Urban House Holds (N-60)

S.No	Infant stimulation activities	ALWAYS		SOMETIMES		RARELY		NEVER	
		Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	Hold and look at infant when Feeding infant	100%	100%	0%	0%	0%	0%	0%	0%
2	Gave colourful toys to infant	20%	23%	80%	77%	0%	0%	0%	0%
3	Hanged toys in the crib	50%	56%	23%	37%	0%	0%	27%	7%
4	Play peek-a-boo with the infant	30%	33%	70%	67%	0%	0%	0%	0%
5	Place an object or toy so that your infant can see and reach for them	3%	30%	97%	67%	0%	3%	0%	0%
6	Show picture books to your infant	17%	23%	63%	56%	20%	20%	0%	0%
7	Sing songs for your infant	30%	33%	40%	40%	30%	23%	0%	0%
8	Massage your infant	30%	30%	40%	40%	27%	23%	3%	3%
9	Play with the infant with different fabrics by stroking from head to toe	10%	10%	50%	43%	37%	43%	3%	0%
10	Do you Rouse your body-It imitates life in the womb	27%	27%	43%	40%	30%	33%	0%	0%
11	I let infant taste and smell different thing one at a time (Lemon, Honey, Biscuits)	17%	0%	17%	100%	0%	0%	67%	0%
12	Talk to your infant when awake	27%	30%	40%	40%	33%	30%	0%	0%
13	Play musical toys or radios to infant	23%	30%	53%	40%	20%	27%	3%	3%
14	Share a rattle or ring a bell from different areas of crib	10%	20%	60%	50%	30%	30%	0%	0%
15	Make different sounds to infant	30%	17%	47%	53%	23%	30%	0%	0%
16	Read a story to infant	20%	30%	47%	47%	33%	23%	0%	0%
17	Change toys so that infant doesn't get board	63%	23%	23%	47%	13%	30%	0%	0%
18	Tickle your infant	27%	60%	63%	27%	10%	13%	0%	0%
19	Does babbling along with infant	46%	30%	47%	60%	7%	10%	0%	0%

Table no. 4.2.2 Information related to usage of indigenous play material in rural and urban households

(N=60)

S.NO	Items	Doing		Not doing	
		Rural	Urban	Rural	Urban
1	Prepared of toys when Pregnant	60%	50%	40%	50%
2	Purchased play material when pregnant	33%	83%	67%	17%
3	Purchased toys to cradle	80%	97%	20%	3%
4	Purchased rattles for playing	67%	67%	33%	33%
5	Prepared of toys using waste material	60%	43%	40%	57%
6	Placed moving toys in front of infants	40%	87%	60%	13%
7	Stick pictures on walls	83%	87%	17%	13%
8	Placed pillows at his/her feet when tries to move forward	90%	60%	10%	40%
9	Placed colourful pillows besides while infant attempts to sit	7%	3%	93%	97%
10	Used homemade teether	3%	0%	97%	100%
11	Used plastic teether	67%	77%	33%	23%
12	Talks with infant regularly	100%	100%	0%	0%
13	Played peak-a-boo with infant	43%	93%	57%	7%
14	Placed toys of infant to see and reach for them	67%	67%	33%	33%
15	Stroke infant from head to toe with different fabrics/ feathers/ any other items	73%	80%	27%	20%
16	Trickle water over infant during bath time	90%	83%	10%	17%
17	Play Rice, dhal, Ghee game with infant	93%	97%	7%	3%
18	Gently exercise infant's arms and legs moving them smoothly and slowly	67%	83%	33%	17%
19	Play musical toys with infant	97%	100%	3%	0%-
20	Attach bells to legs or hip of infant	77%	90%	23%	10%
21	Make different sounds (car horn, laughing, animals etc.)	87%	43%	13%	57%
22	Allow infant to play with kitchen utensils	97%	90%	3%	10%
23	Gave pulling toys to infant	67%	60%	33%	40%
24	Gave 3 tier walker to infant	60%	50%	40%	50%

Table no. 4.2.3 Information related to usage of Smart phone in rural and urban households(N=60)

S.NO	Items	Yes		No	
		Rural	Urban	Rural	Urban
1	I don't give phone to play to my baby.	-	-	100%	100%
2	I don't use Basic model Mobile to play with infant.	100 %	100%	-	-
3	I don't use Android Mobile to play with infant.	-	20 %	100%	80%
4	I don't use Tab to play with infant.	100 %	80 %	-	20%
5	I don't allow baby to watch Smart Phone in our absence.	47 %	30 %	53 %	70%
6	I don't use mobile phone when my baby cries.	77 %	63 %	23%	37%
7	I don't use mobile phone while feeding baby.	87%	67 %	13%	33%
8	I don't use mobile phone while my baby is in play mood.	63 %	73 %	37%	27%
9	I don't give mobile phone to engage my baby when i have work to do.	40 %	67 %	60 %	33%
10	I give mobile phone to my baby once in a day.	30 %	20 %	70%	80%
11	I give mobile phone to my baby many times in a day.	70 %	80 %	30%	20%
12	I give mobile phone to my baby less than 5 times a week.	30 %	20 %	70%	80%
13	I give mobile phone to my baby 6-10 times a week.	70 %	80%	30%	20%
14	I give mobile phone to my baby once or twice a month.	30 %	20 %	70%	80%
15	I never allow my baby to play with phone.	-	-	100%	100%
16	On an average my baby plays with smart phone1 hour per day.	23 %	13 %	77%	87%
17	On an average my baby plays with smart phone 2 hour per day.	77 %	100 %	23%	-
18	On an average my baby plays with smart phone 3 hour per day.	-	-	100%	100%
19	On an average my baby plays with smart phone 0 hour per day.	-	-	100%	100%
20	Giving smart phone to baby is not Good for their development.	77%	50%	23%	50%
21	Giving smart phone to baby is Good for their development.	23%	50%	77%	50%
22	I allow baby to listen to songs on mobile phone.	77%	50%	23%	50%
23	I allow baby to talk with other family members on mobile phone.	100%	90%	-	10%
24	I allow baby to watch Rhymes on mobile phone.	90%	87%	10%	13%
25	I allow baby to viewing photos on mobile phone.	93 %	90%	7%	10%
26	I allow baby to watching cartoon videos 'on mobile phone.	87%	87%	14%	13%
27	I allow baby to watching Movies on mobile phone.	27%	97%	73%	3%
28	I never allow our baby watch mobile alone.	37%	23%	63%	77%
29	Any one of the family member will be there when baby is watching mobile.	23%	17%	77%	83%
30	I don't allow my baby to play with mobile alone.	10%	17%	90%	83%
31	I allow my baby to operate mobile by him/her self.	47%	70%	53%	30%
32	My baby has the habit of watching mobile phone before sleeping.	-	-	100%	100%

4.3 Difference in the status of Infant Stimulation, Usage of indigenous play material and Smart Phone for Infants Stimulation:

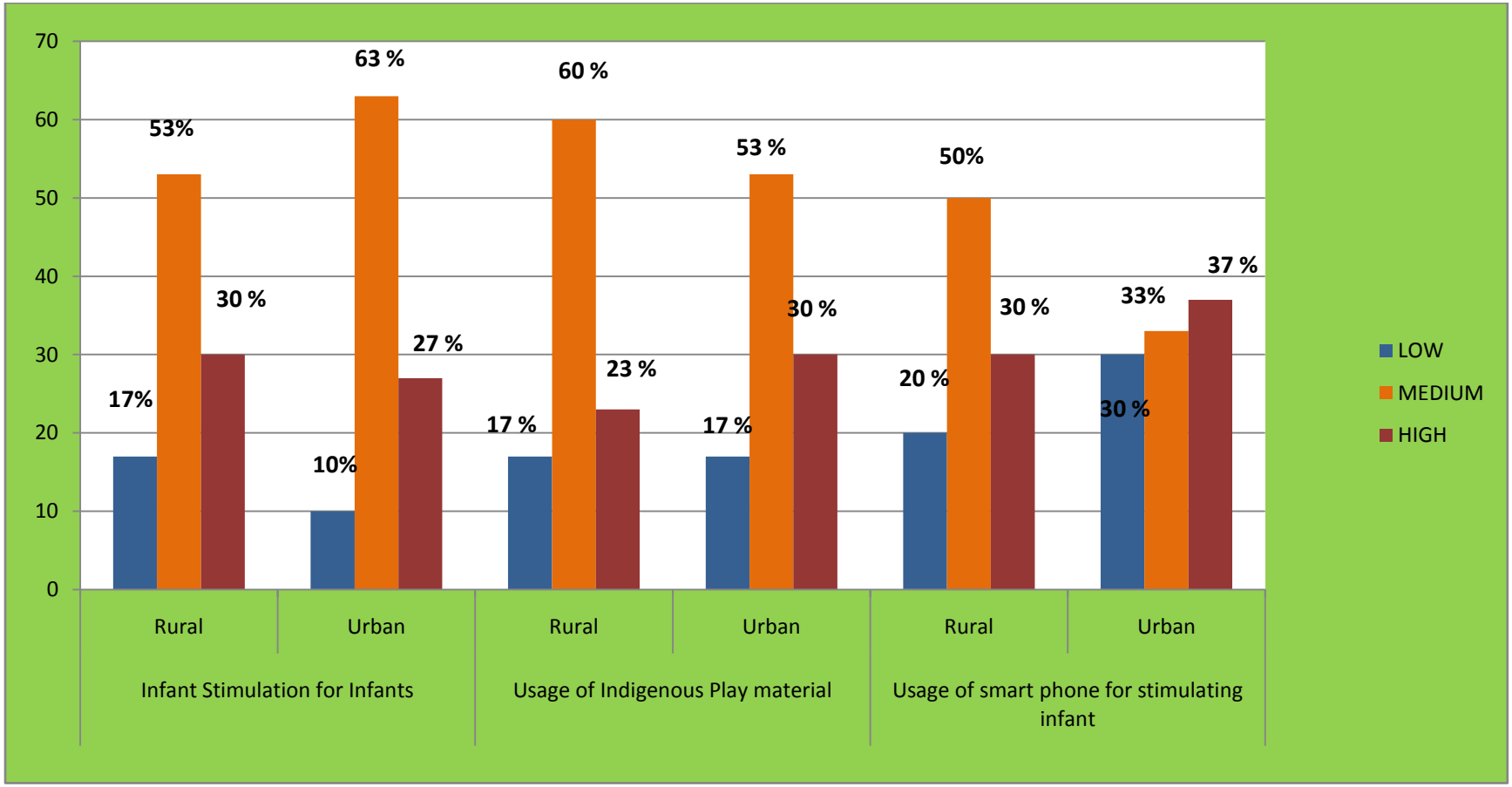
From the table no 4.4.1 it is evident that more than half of rural mothers (63%) were giving average levels of infant stimulation compared to urban mothers (53%)which indicates that rural mothers were spending time with their infants. Similarly 50 percent of rural mothers were using smart phone for infant stimulation moderate come to 33 percent of urban parents. This might be due to lack of knowledge in rural mothers about harmful effects of technology. Similarly 60 percent of rural parents use indigenous play material for infant stimulation and moderate level of urban parents' use 53 percent. This shows the lack of availability of stimulation material in rural areas and surplus availability in urban area.

On the whole rural mothers were spending more time with their infants, using more of indigenous play material. The mean values depict that there was not much difference in infant stimulation, usage of indigenous play material and usage of smart phones for stimulating infants between urban and rural areas.

Table no 4.3.1 Comparison between urban and Rural Parents use of Infant Stimulation, usage of indigenous play material and Smart Phone For Infants Stimulation (N=60)

S. No	Category	Infant Stimulation		Indigenous Play material		Smart phone for stimulating infant	
		Rural	Urban	Rural	Urban	Rural	Urban
1	Low	17	10	17	17	20	30
2	Medium	53	63	60	53	50	33
3	High	30	27	23	30	30	37
Mean		41	42	33.5	34.2	27	28
Standard Deviation		5.0	4.1	2.07	1.6	3.3	2.1

Fig.No.8: Comparison between Infant Stimulation, usage of indigenous play material and Smart Phone For Infants Stimulation (N-60)



4.4 Developmental outcomes of Infants

Results of developmental outcomes of selected infants are presented in table no 4.4.1 it is observed that all the infants (100%) from both urban and rural families were able to do 97% of items under neck control. Majority of rural baby boys (93%) and urban baby girl (87) attained 97% of body control .100 Percent of rural baby boys and baby girls were able to achieve locomotion-1 which includes walking down steps with help. Least percentage of rural baby girls (13%) and urban baby boys (7%) were able to perform 97% of locomotion-II activities i.e.; jumping from chair of 10 ^{11} height on both feet together.

The results related to mental development quotient are given in the table no.4.4.2.According to the table no 4.4.2 all the boys (100%) of rural and urban families were able to perform 97% of activities related to visual cognizance and auditory cognizance respectively. Coming to mental quotient cluster of memory all boys of rural and all girls of urban were able to perform 97% of activities respectively. Very least percentage of rural and urban baby girls (13%) and urban boys (12%) were able to understand relationship and perform tasks. Compare to rural baby boys 73 percent and urban girls 73 percent.

More than half of rural boys (60%) and urban girls (53%) were able to perform 97%of manual dexterity, were as only 7 percent of rural girls and 13 percent of urban boys were able to perform the same task. Overall result from the table no 4.4.2 depict the more than three fourth of rural boys and urban girls were able to perform 97% of mental development quotient.

The result are in line with one of the study by **Sharma and Nagar (2009)** studied on influence of Home Environment on psychomotor development in Kangra District of Himachal Pradesh .A sample size of 145 male and female infants of age birth to 18 months using bayley's scale of infant development (BSID) which was used to assess motor development of infants . They revealed significant differences in home environment, motor age and psychomotor developmental indices between the experimental and control group infants. A significant association was also found between home environment and psychomotor developmental indices of infants.

4.1 Developmental Assessment Test for Indian Infants

4.2 General Information Schedule of Mothers

4.3 Indigenous play material usage of infant

4.4 Indigenous play material usage of infant

4.5 Infant Stimulation of infant

4.6 Smart Phone usage of infant

Table no. 4.4.1 Developmental Motor Quotient of the sample (N-60)

S.NO	Developmental Motor Quotient(DMQ)	RURAL		URBAN	
		BOYS	GIRLS	BOYS	GIRLS
1	Neck Control	100%	100%	100%	100%
2	Body Control	93 %	86%	80 %	87%
3	Locomotion –I	100%	66%	60 %	100%
4	Locomotion – II	53 %	13 %	7 %	47%
5	Manipulation	100%	87%	80%	100%

Table no.4.4.2 Developmental Mental Quotient both boys and girls of Rural and Urban families (N-60)

S. No	Developmental Mental Quotient(DMQ)	RURAL		URBAN	
		BOYS	GIRLS	BOYS	GIRLS
1	Cognizance(visual)	100%	93%	93%	100%
2	Cognizance(Auditory)	100%	100%	100%	100%
3	Reaching & Manipulation	97%	86%	86%	97%
4	Memory	100%	80%	83%	100%
5	Social interaction& imitative behaviour	97 %	77%	73%	93%
6	Language 1 (Vocalization, speech and communication)	98%	76%	64%	97%
7	Language 2 (Vocabulary & Comprehension)	80%	26%	25%	77%
8	Understanding relationship	73%	13%	12%	73
9	Differentiation by use , shape and movements	87	27%	20%	67%
10	Manual Dexterity	60%	7%	13%	53%

4.5 Mean differences in Developmental outcomes of Infants

The data given in table 4.5.1 show the difference in Motor development quotients and mental development quotients of Rural and Urban Infants. It is clearly stated that rural infants had high mean scores in motor development quotients compared urban infants. Similarly rural infants had higher mean in mental development quotients. But no differences were found to be significant.

Table no. 4.5.1Mean Differences between developmental outcomes of infants in Urban and Rural Areas (N-60)

S. No	Area Of study	Motor Development Quotients		Mental Development Quotients		t- test	
		Mean	S.D	Mean	S.D	DMQ	DMEQ
1	Rural	109.4	12.04	101.9	13.7		
2	Urban	106.0	9.34	100.6	11.7	1.091^{NS}	0.493^{NS}

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

The data given in table 4.5.2 reveals the gender difference in Motor development quotients and mental development quotients. It is clearly stated that girls had high mean scores in Motor development quotients compared boys. But boys had higher mean scores in mental development quotients compared to girls. But no significant differences were found to be.

Table no. 4.5.2Gender wise differences between Developmental Outcomes of infants among Boys and Girls in Rural and Urban Areas (N=60)

S. No	Gender	Motor Development Quotients (DMQ)		Mental Development Quotients (DMEQ)		t- test	
		Mean	S.D	Mean	S.D	DMQ	DMEQ
1	Girls	108.4	10.96	101.1	12.9		
2	Boys	107.0	10.82	102	12.5	0.42^{NS}	0.104^{NS}

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

Table 4.5.3 indicates that Motor development quotients of Urban Infants stimulated with smart phone had higher mean scores compared to rural infants. Were as rural infants had higher Motor development quotients who have been stimulated with Indigenous play material .It is clearly stated that infants stimulated with indigenous play material had high

mean scores as compared stimulated with Smart Phone usage . However the differences were found to be significant.

Table no.4.5.3 Difference in Motor Development quotients of Rural and Urban infants Stimulated with smart Phone & Indigenous Play Material

S.No	Sample	DMQ in Infants stimulated with Smart Phone Stimulated		DMQ in Infants stimulated with Indigenous Play Material		t-test
		Mean	S.D	Mean	S.D	
1	Rural Infants	67.76	24.48	103.76	10.23	7.836**
2	Urban Infants	75.1	16.0	102.7	7.3	7.827 **

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

Table no.4.5.4 indicated that higher mean values in mental development quotients of urban Infants was more compared to rural infants. But higher DMEQ were observed in rural infants who were being stimulated with Indigenous play material compares to urban infants. A high mean scores was observed in urban infants stimulated with smart phone as compared rural infants. Data also depicts that infants stimulated with indigenous play material living in rural area had high DMEQ levels compared to urban infants and infants stimulated with smart phones. However the differences in usage of smart phone and indigenous were found to be significant at 0.01 level of significance.

4.5.4 Difference in Mental Development quotients of Rural infants and urban infants Stimulated with smart Phone & Indigenous Play material

S.NO	Sample	DMEQ in Infants stimulated with Smart Phone		DMEQ in Infants stimulated Indigenous Play Material		t-test
		Mean	S.D	Mean	S.D	
1	Rural Infants	78.5	26.1	102.3	11.6	4.908**
2	Urban Infants	81.0	12.6	89.6	12.3	2.69**

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

Gender differences in Motor Development quotients of Rural Infants Stimulated with Smart Phone and Indigenous Play Material is given in table no. 4.5.5. Results depict that girls living in rural area, stimulated with indigenous play material showed higher DMQ means levels compared with DMQ levels of boys of rural and urban area and girls of urban area. It

also evident from table that there is significant difference at 0.01 levels in DMQ levels of infants who were stimulated with smart phone and indigenous play material. When compared with boys girls showed higher DMQ levels in who were stimulated with both smart phone and indigenous play material.

Table No. 4.5.5 Gender differences in Motor Development quotients of Rural Infants Stimulated with Smart Phone and Indigenous Play Material N=30

S.No	Infants living in Rural Area	DMQ in Infants stimulated with Smart Phone Stimulated		DMQ in Infants stimulated with Indigenous Play Material(DMQ)		t – test
		Mean	S.D	Mean	S.D	
1	Boys	0.24	0.06	6.22	6.8	3.40**
2	Girls	23.7	29.8	48.1	39.7	3.49**

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

Gender differences in Motor Development quotients of Urban Infants Stimulated with Smart Phone and Indigenous Play Material is given in table no. 4.5.6. It's interesting to find out that girls living in urban area have higher DMO means stimulated with indigenous play material compared to boys. Were as boys of urban area had higher DMQ mean compared to girls who were allowed to be stimulated with smart phones compared to girls. It also evident that there is significant difference in DMO of infants at 0.01 levels based on gender stimulated with smart phone and indigenous play material.

This implies that urban girls had higher DMQ who more stimulation with indigenous play material and urban boys stimulated with smart phone had higher DMQ levels. And there is a significant difference at 0.01 level in the DMQ of both boys and girls stimulated with smart phone and indigenous play material.

Table no.4.5.6 Gender differences in Motor Development quotients of Urban Infants Stimulated with Smart Phone and Indigenous Play Material N=30

S.No	Infants living in Urban Area	DMQ in Infants stimulated with Smart Phone Stimulated		DMQ in Infants stimulated with Indigenous Play Material		t – test
		Mean	S.D	Mean	S.D	
1	Boys	34.2	41.9	4.02	5.7	2.77**
2	Girls	0.25	0.06	48.1	43.8	4.22**

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

Mental development quotient of urban boys and girls are given in table no.4.5.7. According to the table it is evident that DMEQ levels of girls had higher mean compared to boys in both usage of smart phone and indigenous play material. Urban boys are given more opportunity to get stimulated with smart phones compared to urban girls. Results also show that there is significant difference at 0.01 level in mental development quotient stimulated with smart phone and indigenous play material.

Table no 4.5.7 Gender differences in Mental Development quotients of rural Infants Stimulated with Smart Phone and Indigenous Play Material N=30

Note: **Significant at 0.01 level * Significant at 0.05 level Ns- Not significant

S.No	Gender	DMEQ in Infants stimulated with Smart Phone Stimulated		DMEQ in Infants stimulated with Indigenous Play Material		t - test
		Mean	S.D	Mean	S.D	
1	Boys	5.59	7.9	0.2	0.12	2.61**
2	Girls	0.25	0.06	6.95	8.53	3.03**

Table no.4.5.8 gives the data related to Mental development quotient of urban boys and girls. According to the data given table it is evident that urban girls had higher DMEQ mean levels

compared to DMEQ mean levels of boys stimulated with indigenous play material. Similar to urban boys are given more opportunity to get stimulated with smart phones compared to urban girls had higher DMEQ mean levels. Results also show that there is significant difference at 0.01 level in mental development quotient stimulated with smart phone and indigenous play material in both urban boys and girls..

Table no 4.5.8 Gender differences in Mental Development quotients of Urban Infants Stimulated with Smart Phone and Indigenous Play Material (N=30)

S.No	Gender	DMEQ in Infants stimulated with Smart Phone Stimulated		DMEQ in Infants stimulated with Indigenous Play Material		t – test
		Mean	S.D	Mean	S.D	
1	Boys	5.59	7.9	0.2	0.12	2.61**
2	Girls	0.25	0.06	6.95	8.53	3.03**

Note: **Significant at 0.01 level * Significant at 0.05 level Ns Not significant

The results showed that there is significant difference in usage of smart phone and indigenous play material used for stimulating infants. Boys were stimulated with smart phones compared with girls and girls were stimulated with indigenous play material. Over all developmental outs shows that boys of both urban and rural areas had higher motor development quotient compared to girls and urban girls showed higher level in mental development quotient when compared with urban boys, rural boys and rural girls.

Summary and conclusions

Chapter V

SUMMARY AND CONCLUSION

A smart phone is a versatile cell phone that has communication and network functions. The development and increased use of smart phones make it easier for infants to be exposure to smart phones, and it is possibility to access the internet every time and every were. Smart phone have a touch screen controlled by fingers and are manufactured in a simple way. This is why infants using a smart phone using easily. Therefore infants can be naturally exposed to smart phones at home with their parents.

The present study is taken up with the following objectives.

1. To know the extent of usage of smart phones for stimulating the infants.
2. To assess the developmental outcomes of infants stimulated with smart phones.
3. To assess the developmental outcomes of infants stimulated with indigenous play materials.
4. To study the differences in the developmental outcomes of infants stimulated with smart phones and indigenous play materials.

The present study "Developmental outcomes of infants stimulated with smart phones and indigenous play material: A comparative study", at rural and urban areas of Guntur district. An Ex- post research design was adopted for conducting the study. Systematic random sampling procedure was used to select 120 sample 60 infants and 60 parents and the infants age group of birth – 30 months.

Major findings of the study

- More than two third of the infants were first born followed by second (27%) and third (3%) born.
- Majority of the parents of selected infants (85%) were uneducated and only 15% of the parents were educated upto primary and secondary level.

- Majority of the respondents (92 %) belong to nuclear family and only 8 per cent of them belong to joint families.
- Majority of the respondents (53%) were agriculture and remaining 47 % of the parents were private employees.
- There is no significant difference in mean differences between developmental outcomes of infants in rural and urban areas
- There is no significant difference in gender difference between developmental outcomes of infants in rural and urban areas
- Significant difference was found in the motor development quotients of infants living in rural and urban areas. The rural infants who are stimulated with indigenous play material (103.7) were found to have better mental development quotients scores compare to smart phone usage (67.7). The urban infants who are stimulated with indigenous play material

  (102.7) were found to have better mental development quotient scores compared to smart phone usage (75.1).This clearly indicates that infants should be stimulated with indigenous play material.
- Significant differences was found in the mental development quotients of living in rural and urban areas. The rural infants who are stimulated with indigenous play material (102.3) were found to have better mental development quotient scores compared to smart phone usage (78.5). The urban infants who are stimulated with indigenous play material (89.6) were found to have better mental development quotients scores compare to smart phone usage (81.0).This clearly indicates that infants should be stimulated with indigenous play material.
- Significant differences was found in gender in motor development quotients of rural and urban infants stimulated with smart phones and indigenous play material
- Significant difference was found in gender in mental development quotients of rural and urban infants stimulated with smart phones and indigenous play material

Implications:

- The present study helps to understand the developmental status of rural and urban infants
- The present study helps to understand the importance to improve the developmental status of infants

- The present study helps to understand the effect of smart phone usage of developmental status of infants
- The study helps to understand the use of indigenous play material for developmental status of infants

Suggestions for future research

- The similar study can be conducted on large sample from different rural and urban groups
- A similar study can be conducted to know the developmental and academic achievement of rural , urban and tribal school children
- A similar study can be conducted to compare with tribal children

Conclusion

The study concludes that infant stimulatory practices are changing in rural and urban areas. The usage of smart phone was more in both rural and urban areas. The exposure to screen for long hours is effected the developmental outcomes of infants. The study inferred that infants who were stimulated with indigenous play material were developmentally superior than smart phone stimulated infants.

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Appendices

APPENDIX A

GENERAL PROFILE

Child Related

Name of the child :

Date of Birth :

Age :

Gender :

Family Related

Parent's Education :

Parent's occupation :

Parent's Monthly Income :

Type of Family :

Area of Study :

APPENDIX B

Questionnaire on infant stimulation

S.NO	INFANT STIMULATION ACTIVITIES	ALWAYS	SOMETIMES	RARELY	NEVER
1	Hold and look at infant when Feeding infant				
2	Gave colourful toys to infant				
3	Hanged toys in the crib				
4	Play peek-a-boo with the infant				
5	Place an object or toy so that your infant can see and reach for them				
6	Show picture books to your infant				
7	Sing songs for your infant				
8	Massage your infant				
9	Play with the infant with different fabrics by stroking from head to toe				
10	Do you Rouse your body-It imitates life in the womb				
11	I let infant taste and smell different thing one at a time (Lemon, Honey, Biscuits)				
12	Talk to your infant when awake				
13	Play musical toys or radios to infant				
14	Share a rattle or ring a bell from different areas of crib				
15	Make different sounds to infant				
16	Read a story to infant				
17	Change toys so that infant doesn't get board				
18	Tickle your infant				
19	Does babbling along with infant				

APPENDIX C

QUESTIONNAIRE ON USAGE OF INDEGINOUS PLAY MATERIAL

S.NO	ITEMS	YES	NO
1	Prepared of toys when Pregnant		
2	Purchased play material when pregnant		
3	Purchased toys to cradle		
4	Purchased rattles for playing		
5	Prepared of toys using waste material		
6	Placed moving toys in front of infants		
7	Stick pictures on walls		
8	Placed pillows at his/her feet when tries to move forward		
9	Placed colourful pillows besides while infant attempts to sit		
10	Used homemade teether		
11	Used plastic teether		
12	Talks with infant regularly		
13	Played peak-a-boo with infant		
14	Placed toys of infant to see and reach for them		
15	Stroke infant from head to toe with different fabrics/ feathers/ any other items		
16	Trickle water over infant during bath time		
17	Play Rice, dhal, Ghee game with infant		
18	Gently exercise infant's arms and legs moving them smoothly and slowly		
19	Play musical toys with infant		
20	Attach bells to legs or hip of infant		
21	Make different sounds (car horn, laughing, animals etc.)		
22	Allow infant to play with kitchen utensils		
23	Gave pulling toys to infant		
24	Gave 3 tier walker to infant		

APPENDIX D

QUESTIONNAIRE ON USAGE OF SMART PHONE

S.NO	ITEMS	YES	NO
1	I don't give phone to play to my baby.		
2	I don't use Basic model Mobile to play with infant.		
3	I don't use Android Mobile to play with infant.		
4	I don't use Tab to play with infant.		
5	I don't allow baby to watch Smart Phone in our absence.		
6	I don't use mobile phone when my baby cries.		
7	I don't use mobile phone while feeding baby.		
8	I don't use mobile phone while my baby is in play mood.		
9	I don't give mobile phone to engage my baby when i have work to do.		
10	I give mobile phone to my baby once in a day.		
11	I give mobile phone to my baby many times in a day.		
12	I give mobile phone to my baby less than 5 times a week.		
13	I give mobile phone to my baby 6-10 times a week.		
14	I give mobile phone to my baby once or twice a month.		
15	I never allow my baby to play with phone.		
16	On an average my baby plays with smart phone1 hour per day.		
17	On an average my baby plays with smart phone 2 hour per day.		
18	On an average my baby plays with smart phone 3 hour per day.		
19	On an average my baby plays with smart phone 0 hour per day.		
20	Giving smart phone to baby is not Good for their development.		
21	Giving smart phone to baby is Good for their development.		
22	I allow baby to listen to songs on mobile phone.		
23	I allow baby to talk with other family members on mobile phone.		
24	I allow baby to watch Rhymes on mobile phone.		
25	I allow baby to viewing photos on mobile phone.		
26	I allow baby to watching cartoon videos 'on mobile phone.		
27	I allow baby to watching Movies on mobile phone.		
28	I never allow our baby watch mobile alone.		
29	Any one of the family member will be there when baby is watching mobile.		
30	I don't allow my baby to play with mobile alone.		
31	I allow my baby to operate mobile by him/her self.		
32	My baby has the habit of watching mobile phone before sleeping.		

APPENDIX E

DEVELOPMENTAL ASSESSMENT SCALE FOR INDIAN INFANTS

CHECKLIST

MOTOR SCALE

ITEM NO	ITEM DESCRIPTION	CONTENT CLUSTER	PASS	FAIL
1	Lifts head off when at shoulder	**I**		
2	Prone-Lateral head movements	**I**		
3	Head erect and Vertical	**I**		
4	Dorsal Suspension-lifts head	**I**		
5	Head erect and steady 30 seconds (approx)	**I**		
6	Holds head Steady	**I**		
7	Head Balanced	**I**		
8	Postural Adjustments at shoulder	**II**		
9	Arms thrust in play	**II**		
10	Turns from side to back	**II**		
11	Sits with support	**II**		
12	Legs thrust in play	**II**		
13	Prone elevates self by arms	**II**		
14	Sits with slight support	**II**		
15	Turns from back to side	**II**		
16	Pulls to sitting position	**II**		
17	Effort to sit	**II**		
18	Sits alone momentarily	**II**		
19	Rolls from back to stomach	**II**		
20	Sits alone 30 seconds. Or more	**II**		
21	Pulls to standing position	**II**		
22	Sits alone steady	**II**		
23	Sits alone good-co-ordination	**II**		
24	Raises self to sitting	**II**		
25	Stands up by furniture	**II**		
26	Sits down	**II**		
27	Stands alone for a few moments	**II**		
28	Stands-up from supine position through rolling on stomach and on fours	**II**		
29	From supine to erect through sideways turn	**II**		
30	Supine to erect-without turning	**II**		
31	Prone -crawling movements	**III**		
32	Early stepping movements	**III**		
33	Pew-walking progression	**III**		
34	Stepping movements	**III**		

35	Walks with help	**III**		
36	Walks alone a few steps	**III**		
37	Walks sideways	**III**		
38	Walks backwards	**III**		
39	Climbs up steps with help	**III**		
40	Walks down steps with help	**III**		
41	Stands on Right - foot with help	**IV**		
42	Stands on Left - foot with help	**IV**		
43	Tries to stand on walking board	**IV**		
44	Climbs down alone- one step at a time	**IV**		
45	Walks on line- 10 feet general direction	**IV**		
46	Climbs up - alone step by step	**IV**		
47	Walks the board with one foot on	**IV**		
48	Stands on left foot alone	**IV**		
49	Stands on Right foot alone	**IV**		
50	Jumps off floor- both feet together	**IV**		
51	Stands on walking board with both feet on	**IV**		
52	Walks on tip-toe, 4-5 steps	**IV**		
53	Jumps off from chair- both feet together(ht.10")	**IV**		
54	Retains Red-ring	**V**		
55	Hands Predominantly Open	**V**		
56	Cube-Hold-Ulnar Palmer	**V**		
57	Partial thumb-apposition cube-hold-digital-palmer	**V**		
58	Rotates Wrist	**V**		
59	Unilateral reaching	**V**		
60	Attempts to secure pellet	**V**		
61	Cube-hold complete thumb-apposition (Radial Digital)	**V**		
62	Scoops pellet	**V**		
63	Partial finger prehension pellet	**V**		
64	Fine-Prehension-Pellet	**V**		
65	Combines cubes or spoons in Midline	**V**		
66	Pat-a-cake-Mid-line Skill	**V**		
67	Throws a ball-directed	**V**		

MENTAL SCALE

ITEM NO	ITEM DESCRIPTION	CONTENT CLUSTER	PASS	FAIL
1	Momentary regard of Red ring	**I**		
2	Regards a person momentarily (count 3)	**I**		
3	Horizontal eye co-ordination (Red ring)	**I**		
4	Circular eye co-ordination (Red ring)	**I**		
5	Follows moving Person	**I**		
6	Horizontal eye co-ordination-Red light (Torch)	**I**		
7	Vertical eye co-ordination-Red light (Torch)	**I**		
8	Vertical eye co-ordination-Red light	**I**		
9	Prolonged regard of Red-ring	**I**		
10	Free inspection of Surroundings	**I**		
11	Circular eye co-ordination-Red light (Torch)	**I**		
12	Turns eyes to Red ring	**I**		
13	Reacts to paper on face	**I**		
14	Turns eyes to light	**I**		
15	Blinks at shadow of hand	**I**		
16	Eyes follow pencil (Yellow)	**I**		
17	Regards cube (Red)	**I**		
18	Follows vanishing spoon	**I**		
19	Eyes follow ball across table	**I**		
20	Follows vanishing Dangling Red Ring	**I**		
21	Inspects own hands	**I**		
22	Regards pellet	**I**		
23	Sustained inspection of Red-ring	**I**		
24	Attends to Scribbling	**I**		
25	Looks at pictures in book	**I**		
26	Responds to sound of Bell	**II**		
27	Responds to sound of Rattle	**II**		
28	Responds to Voice	**II**		
29	Responds to sound of light Switch	**II**		
30	Searches with eyes for sound	**II**		
31	Turns head to sound of Bell	**II**		
32	Turns head to Sound of rattle	**II**		
33	Quites when picked-up	**III**		
34	Glances from one object to another	**III**		
	Manipulates Red-ring	**III**		
35	Reaches for dangling ring	**III**		
36	Simple Play with Rattle	**III**		
37	Fingers hands in play	**III**		
38	Manipulates Table edges slightly	**III**		
39	Carries Red ring to mouth	**III**		
40	Closes on dangling Red-ring	**III**		
41	Reaches for cube	**III**		

42	Exploratory paper play	**III**		
43	Retains two cubes	**III**		
44	Eye co-operation in reaching	**III**		
45	Picks up cubes	**III**		
46	Lifts cup	**III**		
47	Reaches Persistently	**III**		
48	Reaches for second cube	**III**		
49	Exploratory String Play	**III**		
50	Bangs in play	**III**		
51	Interest in sound production	**III**		
52	Transfers object hand to hand	**III**		
53	Picks up cube deftly and directly	**III**		
54	Lifts cup by handle	**III**		
55	Pulls string and secures Red ring	**III**		
56	Retains two of Three cubes offered	**III**		
57	Attempts to secure 3 cubes	**III**		
58	Manipulates bell-interest in details	**III**		
59	Fingers holes in peg-board	**III**		
60	Turns pages of book	**III**		
61	Uncovers square-box	**III**		
62	Places one peg repeatedly	**III**		
63	Builds tower of 2 cubes	**III**		
64	Closes round box	**III**		
65	Builds tower of 3 cubes	**III**		
66	Builds tower of 5 cubes	**III**		
67	Builds tower of 8 cubes	**III**		
68	Visually recognises mother	**IV**		
69	Reacts to disappearance of face	**IV**		
70	Aware of strange situation	**IV**		
71	Turns head after fallen spoon	**IV**		
72	Recovers rattle fallen from hand	**IV**		
73	Looks for fallen spoon	**IV**		
74	Uncovers toy	**IV**		
75	Picks up cup & secures toy	**IV**		
76	Looks for contents of box	**IV**		
77	Unwraps cube	**IV**		
78	Selects cup hiding the toy	**IV**		
79	Tester smiles child quites	**V**		
80	Anticipatory excitement to being lifted	**V**		
81	Social smile-T smiles, nods, talks- child smiles	**V**		
82	Vocalizes to T's social smile and talk	**V**		
83	Anticipatory adjustments to being lifted	**V**		
84	Mirror image – approach	**V**		
85	Active table edge manipulation	**V**		
86	Likes frolic play	**V**		
87	Discriminates strangers	**V**		

88	Smiles at mirror image	**V**		
89	Playful response to mirror	**V**		
90	Co-operates in games	**V**		
91	Repeats performance laughed at	**V**		
92	Stirs spoon in cup in imitation	**V**		
93	Attempts to initiate scribble	**V**		
94	Dangles red ring by string	**V**		
95	Imitates words	**V**		
96	Pats while doll in imitation	**V**		
97	Removes pellet from bottle	**V**		
98	Imitates stroke	**V**		
99	Train of cubes after model	**V**		
100	Folds paper(demonstration given)	**V**		
101	Vocalizes once –twice	**VI**		
102	Vocalizes more than three times	**VI**		
103	Vocalizes two syllables	**VI**		
104	Vocalizes attitudes	**VI**		
105	Vocalizes four different syllables	**VI**		
106	Says "da-da" or equivalent	**VI**		
107	Uses expressive JARGUN	**VI**		
108	Uses gestures to make wants known	**VI**		
109	Says TWO words	**VI**		
110	Uses words to make wants known	**VI**		
111	Speaks sentence of 2 words	**VI**		
112	Listens selectively to familiar words	**VII**		
113	Adjusts to words	**VII**		
114	Inhibits on command	**VII**		
115	Puts cube in cup on command	**VII**		
116	3 or more cubes in cup	**VII**		
117	Puts square- beads in square box through lid- hole (6 out of 8)	**VII**		
118	Shows shoes, or some other clothing or own toy	**VII**		
119	Follows directions – Doll	**VII**		
120	Names ONE Object	**VII**		
121	POINTS to 3 pictures	**VII**		
122	Names one pictures	**VII**		
123	Names 3 pictures	**VII**		
124	Names 2 objects	**VII**		
125	Points to 5 pictures	**VII**		
126	Names 3 objects	**VII**		
127	Points to 7 pictures	**VII**		
128	Concept of '1'	**VII**		
129	Names 5 pictures	**VII**		
130	Pulls string adaptively and secure Red ring	**VIII**		
131	Adjusts one round block in board for two- shapes repeated (BTSR)	**VIII**		
132	Adjusts round block in board with 3 shapes in a	**VIII**		

	line (BSOL)			
133	Attains toy with stick	**VIII**		
134	Adjusts round block in board with 3 shapes in two lines (BSTL)	**VIII**		
135	Adjusts two round blocks in board for 2 shapes repeated (BTSR)	**VIII**		
136	Points to body - Parts of doll	**VIII**		
137	Adjusts 2 round and squares in BTSR	**VIII**		
138	Completes BSTL	**VIII**		
139	Adjusts six blocks in BTSR	**VIII**		
140	Mends broken doll marginally	**VIII**		
141	Names watch at 4th picture card	**VIII**		
142	Understands 2 prepositions	**VIII**		
143	Completes BSTL in Reversed position	**VIII**		
144	Names watch at 2nd picture	**VIII**		
145	Mends broken doll approximately	**VIII**		
146	Understands 3 prepositions	**VIII**		
147	Mends broken doll- exactly	**VIII**		
148	Rings bells purposively	**IX**		
149	Holds colour stick adaptively	**IX**		
150	Pushes car alone	**IX**		
151	Spontaneous scribble	**IX**		
152	Differentiates a scrbble and a stroke	**IX**		
153	Discriminates between cup & plate out of 3 objects	**IX**		
154	Discrimination cup, plate and box	**IX**		
155	Imitates stroke - Vertical and horizontal	**IX**		
156	Pegs placed in 70 Seconds	**X**		
157	Pegs places in 42 seconds	**X**		
158	Pegs placed in 30 seconds	**X**		
159	Complete BTSR in 150 Seconds	**X**		
160	Complete BTSR in 90 seconds	**X**		
161	Complete BTSR in 60 Seconds	**X**		
162	Pegs placed in 22 Seconds	**X**		

RESULTS

DMQ : DMEQ :

Clusters Motor Mental

Cluster No	Motor Cluster and no. of items	Score	Cluster No	Mental Cluster and no. of items	Score
I	Neck control		**I**	Cognizance (visual)	
II	Body Control		**II**	Cognizance (Auditory)	
III	Locomotion-1		**III**	Reaching and Manipulation	
IV	Locomotion-11		**IV**	Memory	
V	Manipulation		**V**	Social interaction and imitative behaviour	
			VI	Language 1 (vocalization, speech and communication)	
			VII	Language 2 (Vocabulary and comprehension)	
			VIII	Understanding Relationship	
			IX	Differentiation by use, shape, and movements	
			X	Manual dexterity	

3 Kings - 0.1

APPENDIX V

RECORD FORM - DASII

Code no. _____ Tester : _____ Testing Date 3-1-2021

Name : Sana-Fus Hull Sex : F Birth Date : _____

Chrono. Age : _____

Address : _____

Scoring code : Pass : ✓ Fail : > Omitted : O Reported : R

Prior Pass : PP, Rest Fail : RF

A. MOTOR SCALES

ITEM NO	ITEM DESCRIPTION	AGE - PLACEMENTS				CONTENT CLUSTER
		50 %	3 %	97 %	97 % RANK	
1.	Lifts head off when at shoulder	.1	.1*	1.4	1	I
2.	Prone – Lateral head movements	.1	.1*	1.4	2	I
3.	Prone-Crawling movements	.3	.1*	1.4	3	III
4.	Postural adjustments at shoulder	.6	.1*	1.4	4	II
5.	Arms thrust in play	.7	.1*	1.4	5	II
6.	Turns from side to back	.7	.1*	1.4	6	II
7.	Head erect and vertical	.8	.1*	1.4	7	I
8.	Sits with support	.8	.1*	2.3	10	II
9.	Legs thrust in play	.9	.1*	1.4	8	II
10.	Retains Red-ring	.9	.1*	1.5	9	V
11.	Dorsal Suspension-lifts head	.9	.5*	2.5	12	I
12.	Prone Elevates self by arms	1.1	.7*	2.9	13	II
13.	Head erect and steady 30 seconds(approx)	1.4	.8	2.3	11	I
14	Holds head steady	1.5	1.1	3.3	14	I
15.	Sits with slight support	1.6	.9	3.3	15	II
16.	Hands predominantly open	2.0	.1	3.9	17	V
17.	Cube-hold – Ulnar Palmer	2.2	1.1	3.3	16	V
18.	Turns from back to side	2.6	1.1	4.7	18	II
19.	Head balanced	2.8	1.2	5.3	19	I
20.	Pulls to sitting-position	3.3	1.8	5.9	21	II
21.	Partial thumb-apposition Cube-hold - digital-palmer	3.4	1.8	5.9	22	V
22.	Effort to sit	3.5	1.8	5.5	20	II
23.	Sits alone momentarily	3.6	2.8	6.2	24	II

APPENDIX V (Contd.)

RECORD FORM (Contd.)

ITEM NO	ITEM DESCRIPTION	AGE - PLACEMENTS			97 % RANK	CONTENT CLUSTER
		50 %	3 %	97 %		
24.	Rotates Wrist	4.1	2.8	5.89	23	V
25.	Unilateral reaching	4.2	2.8	7.4	29	V
26.	Rolls from back to stomach	4.6	2.8	7.1	26	II
27.	Sits alone 30 sec. or more	4.9	3.9	7.1	27	II
28.	Attempts to secure pellet	4.9	3.9	7.4	30	V
29.	Pulls to standing position	5.2	3.9	7.1	28	II
30.	Sits alone Steady	5.6	4.1	6.4	25	II
31.	Sits alone Good –Co-ordination	5.7	4.3	7.5	33	II
32.	Cube-hold complete thumb - Apposition (Radial Digital)	5.7	4.0	7.5	34	V
33.	Early stepping Movements	5.7	4.8	7.4	31	III
34.	Pre-walking Progression	5.7	4.8	7.4	32	III
35.	Scoops pellet	6.4	4.9	7.6	35	V
36.	Partial finger prehension pellet	6.6	5.3	9.2	36	V
37.	Raises self to sitting	6.9	5.9	9.2	37	II
38.	Stepping movements	7.5	6.0	9.3	38	III
39.	Stands up by furniture	7.9	6.4	9.9	39	II
40.	Fine-Prehension-Pellet	8.3	6.9	10.0	41	V
41.	Combines cubes or spoons in Midline	8.5	6.1	9.9	40	V
42.	Walks with help	8.5	6.9	10.9	42	III
43.	Pat-a-cake – Mid-line Skill	8.7	6.4	10.1	43	V
44.	Sits down	9.3	7.0	12.2	44	II
45.	Stands alone for a few moments	10.1	7.1	12.2	45	II
46.	Stands-up from supine position through rolling on stomach and on fours	11.1	7.1	12.2	46	II
47.	Throws a ball - directed	11.6	9.8	15.2	48	V
48.	Walks alone a few steps	12.0	7.9	14.4	47	III
49.	Walks sideways	13.3	11.0	15.2	49	III
50.	Walks backwards	13.5	11.2	16.1	50	III
51.	Stands on right foot with help	13.9	11.2	17.3	51	IV
52.	Stands on left-foot with help	13.9	11.2	17.4	52	IV
53.	Climbs up steps with help	14.8	13.1	21.4	54	III
54.	Walks down steps with help	16.6	13.2	21.3	53	III

APPENDIX V (Contd.)

RECORD FORM (Contd.)

ITEM NO	ITEM DESCRIPTION	AGE - PLACEMENTS				CONTENT CLUSTER
		50 %	3 %	97 %	97 % RANK	
55.	Tries to stand on walking board	19.2	16.0	24.1	56	IV
56.	From supine to erect through sideways turn	19.2	16.3	23.5	55	II
57.	Climbs down alone- one step at a time	22.1	17.1	27.3	57	IV
58.	Walks on line – 10 feet general direction	22.2	20.8	28.4	61	IV
59.	Climbs up – alone step by step	22.9	19.2	29.4	62	IV
60.	Walks the board with one foot on	23.5	20.8	28.3	58	IV
61.	Stands on left foot alone	24.7	21.9	28.3	59	IV
62.	Stands on right foot alone	24.7	21.9	28.3	60	IV
63.	Jumps off floor – both feet together	25.7	22.0	29.4	63	IV
64.	Stands on walking board with both feet on	26.1	21.0	30.6	64	IV
65.	Walks on tip-toe, 4-5 steps	27.4	22.0	30.6+	65	IV
66.	Jumps off from chair – Both feet together (ht.10")	27.7	22.2	30.6+	66	IV
67.	Supine to erect – without turning	27.7	25.9	30.6+	67	II

4 - 6

APPENDIX V (Contd.)

RECORD FORM (Contd.)

B – MENTAL SCALES

ITEM NO	ITEM DESCRIPTION	AGE – PLACEMENTS			97 % RANK	CONTENT CLUSTER
		50 %	3 %	97 %		
1	Responds to sound of Bell	.1	.1*	1.4	1	II
2	Momentary regard of Red ring	.1	.1*	1.4	2	I
3	Quiets when picked – up	.1	.1*	1.4	3	V
4	Responds to sound of Rattle	.1	.1*	1.4	4	II
5	Responds to Voice	.1	.1*	1.4	5	II
6	Responds to sound of Light Switch	.1	.1*	1.4	6	II
7	Regards a person momentarily (count 3)	.2	.1*	1.4	7	I
8	Horizontal eye co-ordination (Red ring)	.6	.1*	1.4	8	I
9	Circular eye co-ordination (Red ring)	.6	.1*	2.5	15	I
10	Follows moving person	.7	.1*	1.4	9	I
11	Horizontal eye co-ordination - Red light (Torch)	.7	.1*	1.5	12	I
12	Vertical eye co-ordination – Red light (Torch)	.7	.1*	2.4	14	I
13	Vertical eye co-ordination – Red light	.7	.1*	2.5	16	I
14	Prolonged regard of Red – ring	.8	.1*	1.4	10	I
15	Vocalizes once – twice	.8	.1*	1.5	13	VI
16	Free inspection of surroundings	.8	.1*	1.4	11	I
17	Circular eye co-ordination – Red light (Torch)	1.0	.1	2.5	17	I
18	Turns eyes to Red ring	1.4	.6	2.6	18	I
19	Vocalizes more than three times	1.5	.2	2.6	19	VI
20	Tester smiles child quiets	1.6	.5	2.6	20	V
21	Anticipatory excitement to being lifted	1.6	.5	2.6	21	V
22	Reacts to paper on face	1.6	.1	2.6	22	I
23	Searches with eyes for sound	1.6	.2	2.6	23	II
24	Social smile – T smiles, nods, talks – child smiles	1.6	.5	2.6	24	V
25	Turns eyes to light	1.6	.6	2.6	25	I
26	Visually recognises mother	1.6	1.0	3.1	27	IV
27	Vocalizes to T's social smile and talk	1.7	.7	2.6	26	V
28	Anticipatory adjustments to being lifted	1.8	1.1	3.2	28	V
29	Vocalizes two syllables	2.0	.9	3.2	30	VI
30	Reacts to disappearance of face	2.0	1.0	3.3	29	IV

ITEM NOS 20 & 24 - ONLY ITEM DESCRIPTION TO BE INTERCHANGED

APPENDIX V (Contd.)

RECORD FORM (Contd.)

ITEM NO	ITEM DESCRIPTION	AGE – PLACEMENTS			97 % RANK	CONTENT CLUSTER
		50 %	3 %	97 %		
31	Blinks at shadow of hand	2.3	.6	3.3	31	I
32	Eyes follow pencil (Yellow)	2.3	.9	3.3	32	I
33	Regards cube (Red)	2.5	1.2	3.9	33	I
34	Glances from one object to another	2.5	1.2	3.9	34	III
35	Manipulates Red – ring	2.7	1.2	4.3	36	III
36	Reaches for dangling ring	2.7	1.4	4.3	37	III
37	Simple play with Rattle	2.7	1.1	4.2	35	III
38	Follows vanishing spoon	2.7	1.4	4.3	38	I
39	Aware of strange situation	2.7	1.4	4.3	39	IV
40	Eyes follow ball across table	2.7	1.4	4.3	40	I
41	Fingers hands in play	2.8	1.4	4.3	41	III
42	Manipulates Table edges slightly	2.8	1.7	4.3	42	III
43	Carries Red ring to mouth	2.9	1.7	4.3	43	III
44	Follows vanishing Dangling Red ring	2.96	1.4	4.3	44	I
45	Turns head to sound of Bell	3.2	1.8	4.7	45	II
46	Turns head to sound of rattle	3.2	1.6	4.7	46	II
47	Inspects own hands	3.3	1.8	5.3	48	I
48	Mirror image – approach	3.3	1.8	5.5	49	V
49	Active table edge manipulation	3.3	1.8	5.5	50	V
50	Closes on dangling Red – ring	3.5	1.8	4.7	47	III
51	Reaches for cube	3.6	1.8	5.5	51	III
52	Likes frolic play	3.9	2.8	5.8	55	V
53	Exploratory paper play	4.0	2.8	5.5	52	III
54	Regards pellet	4.0	2.8	5.5	53	I
55	Retains two cubes	4.0	2.8	5.8	56	III
56	Eye co – operation in reaching	4.1	2.6	5.6	54	III
57	Vocalizes attitudes	4.2	2.6	6.2	57	VI
58	Discriminates strangers	4.3	2.8	6.4	58	V
59	Picks up cubes	4.4	2.8	6.4	59	III
60	Sustained inspection of Red – ring	4.4	2.9	6.4	60	I
61	Turns head after fallen spoon	4.6	2.9	6.5	61	IV
62	Recovers rattle fallen from hand	4.7	3.1	6.5	62	IV
63	Lifts cup	4.7	3.5	6.5	63	III

APPENDIX V (Contd.)

RECORD FORM (Contd.)

ITEM NO	ITEM DESCRIPTION	AGE – PLACEMENTS			97 % RANK	CONTENT CLUSTER
		50 %	3 %	97 %		
64	Reaches persistently	4.8	3.1	6.5	64	III
65	Smiles at mirror image	4.8	3.8	6.5	65	V
66	Reaches for second cube	5.1	3.8	7.3	69	III
67	Exploratory string play	5.1	3.9	6.5	66	III
68	Bangs in play	5.3	3.9	6.6	67	III
69	Interest in sound production	5.3	3.9	6.6	68	III
70	Transfers object hand to hand	5.4	3.9	7.4	70	III
71	Picks up cube deftly and directly	5.6	3.9	7.4	71	III
72	Lifts cup by handle	5.6	4.0	7.4	72	III
73	Pulls string and secures Red ring	5.6	4.2	7.4	73	III
74	Looks for fallen spoon	5.7	4.7	7.4	74	IV
75	Retains two of Three cubes offered	5.7	4.7	7.4	75	III
76	Playful response to mirror	5.7	4.7	8.0	77	V
77	Attempts to secure 3 cubes	5.9	4.8	9.3	84	III
78	Co-operates in games	6.1	4.8	8.0	78	V
79	Manipulates bell – interest in details	6.2	4.8	7.5	76	III
80	Pulls string adaptively and secure Red ring	6.4	4.8	8.0	79	VIII
81	Listens selectively to familiar words	6.4	5.0	9.0	82	VII
82	Vocalizes four different syllables	6.4	4.9	8.5	80	VI
83	Uncovers toy	6.5	4.8	9.1	83	IV
84	Attends to scribbling	6.7	5.0	8.5	81	I
85	Rings bells purposively	7.4	6.0	9.3	85	IX
86	Says "da – da" or equivalent	8.1	6.4	9.8	88	VI
87	Picks up cup & secures Toy	8.1	6.8	9.4	86	IV
88	Adjusts to words	8.2	6.1	9.4	87	VII
89	Fingers holes in peg–board	8.7	6.4	11.1	90	III
90	Looks at pictures in Book	8.8	7.0	10.1	89	I
91	Looks for contents of box	8.9	7.0	11.1	91	IV
92	Inhibits on command	9.4	7.0	11.1	91	VII
93	Puts cube in cup on command	9.7	7.3	11.3	94	VII
94	Uses expressive JARGUN	9.9	7.0	11.2	93	VI
95	Repeats performance laughed at	10.0	7.3	12.2	98	V
96	Holds colour stick adaptively	10.0	7.3	11.3	95	IX

APPENDIX V (Contd.)

RECORD FORM (Contd.)

ITEM NO	ITEM DESCRIPTION	AGE – PLACEMENTS			97 % RANK	CONTENT CLUSTER
		50 %	3 %	97 %		
97	Unwraps cube	10.2	7.3	11.3	96	IV
98	Turns pages of book	10.4	8.3	11.3	97	III
99	Stirs spoon in cup in imitation	10.6	9.2	12.2	99	V
100	Attempts to initiate scribble	10.7	9.2	12.4	100	V
101	Dangles Red ring by string	10.7	8.4	12.4	101	V
102	3 or more cubes in cup	10.8	9.5	13.1	102	VII
103	Imitates words	10.9	9.8	14.3	104	V
104	Pushes car along	11.4	9.0	14.4	106	IX
105	Uncovers square – box	11.4	9.8	14.4	107	III
106	Puts square – beads in square box through lid – hole (6 out of 8)	11.4	9.8	14.3	105	VII
107	Pats while doll in imitation	11.6	9.9	13.4	103	V
108	Places one peg repeatedly	11.8	10.0	15.4	109	III
109	Removes pellet from bottle	12.4	9.9	15.5	110	V
110	Spontaneous scribble	13.2	10.0	15.2	108	IX
111	Uses gestures to make wants known	12.2	10.0	15.5	111	VI
112	Builds tower of 2 cubes	13.2	11.2	16.1	113	III
113	Closes round box	13.5	10.9	15.5	112	III
114	Says TWO words	14.3	11.2	17.1	116	VI
115	Shows shoes, or some other clothing or own toy	14.3	11.2	16.4	114	VII
116	Adjusts one round block in board for two – shapes repeated (BTSR)	14.3	11.2	17.4	117	VIII
117	Adjusts round block in Board with 3 shapes in a line (BSOL)	14.7	13.2	16.4	115	VIII
118	Attains toy with stick	14.7	13.1	18.4	118	VIII
119	Builds tower of 3 cubes	15.1	13.4	18.4	119	III
120	Imitates stroke	15.7	14.1	20.4	125	V
121	Pegs placed in 70 seconds	16.3	14.2	19.6	120	X
122	Adjusts round block in Board with 3 shapes in two lines (BSTL)	16.3	14.1	20.3	123	VIII
123	Pegs places in 42 seconds	16.7	14.9	20.1	121	X
124	Follows directions – Doll	16.9	15.0	22.2	122	VII
125	Adjusts two round blocks in Board for 2 shapes repeated (BTSR)	17.3	14.1	20.3	124	VIII
126	Uses words to make wants known	17.5	14.2	22.4	127	VI

APPENDIX V (Contd.)

RECORD FORM (Contd.)

ITEM NO	ITEM DESCRIPTION	AGE – PLACEMENTS			97 % RANK	CONTENT CLUSTER
		50 %	3 %	97 %		
127	Points to body – parts of doll	17.6	16.0	21.1	126	VIII
128	Adjusts 2 round and 2 squares in BTSR	18.3	16.1	23.2	129	VIII
129	Selects cup hiding the toy	19.0	18.0	23.5	130	IV
130	Differentiates a scribble and a stroke	19.5	18.0	22.5	128	IX
131	Names ONE object	19.8	17.0	23.5	131	VII
132	Completes BSTL	19.8	18.3	23.5	132	VIII
133	Adjusts six blocks in BTSR	19.9	17.0	23.5	133	VIII
134	Discriminates between cup & plate out of 3 objects	20.0	18.9	24.0	134	IX
135	POINTS to 3 pictures	20.2	18.9	24.1	135	VII
136	Pegs placed in 30 seconds	20.3	18.9	24.4	138	X
137	Names one picture	21.5	18.9	24.3	136	VII
138	Mends broken doll marginally	21.5	18.9	24.4	139	VIII
139	Discriminates cup, plate and box	21.8	18.9	24.3	137	IX
140	Speaks sentence of 2 words	22.1	19.6	24.4	140	VI
~~141~~	Names 3 pictures	22.3	21.2	27.1	147	VII
142	Builds tower of 5 cubes	22.3	18.9	27.4	149	III
143	Names 2 objects	22.5	19.2	25.4	141	VII
144	Complete BTSR in 150 seconds	22.8	19.2	25.4	142	X
145	Names watch at 4th picture card	23.0	19.2	26.5	145	VIII
146	Understands 2 prepositions	23.1	19.0	25.5	143	VIII
147	Points to 5 pictures	23.3	19.0	26.5	146	VII
148	Names 3 objects	23.5	19.4	27.4	150	VII
149	Train of cubes after model	23.5	20.1	26.1	144	V
150	Completes BSTL in Reversed position	24.0	19.2	27.4	151	VIII
151	Folds paper (demonstration given)	24.0	19.4	29.3	154	V
152	Imitates stroke – Vertical and Horizontal	24.1	19.9	29.3	155	IX
153	Names watch at 2nd picture	24.2	19.4	29.3	156	VIII
154	Completes BTSR in 90 seconds	24.4	20.9	27.1	148	X
155	Complete BTSR in 60 seconds	24.9	21.0	29.3	157	X
156	Mends broken doll approximately	25.4	22.0	27.9	152	VIII
157	Points to 7 pictures	25.8	20.9	30.7	161	VII
158	Concept of '1'.	25.8	21.0	29.3	158	VII
159	Pegs placed in 22 seconds	26.0	21.2	28.5	153	X
160	Understands 3 prepositions	26.5	23.1	30.4	159	VIII
161	Names 5 pictures	26.6	23.0	30.5	160	VII
162	Builds tower of 8 cubes	27.2	21.0	30.7 +	162	III
163	Mends broken doll – exactly	28.3	23.9	30.7 +	163	VIII

APPENDIX VI :

RESULTS

Code No. :_____

Name : _____

Testing date - _____

Birth date _____

Sex : F / M. C. A. _____

Total Scores : Motor Mental

Performance MoA MeA

50 % Pass

97 % Pass

Development DmoQ DMeQ

50 % Pass level

97 % Pass level

Deviation Quotients MoDQ MeDQ

Percentile Rank

Clusters Motor Mental

Cluster No.	Motor Clusters and no. of items	Score	Cluster No.	Mental Clusters and no. of items	Score
I	Neck Control (7)		I	Cognizance (Visual) (25)	
II	Body Control (23)		II	Cognizance (Auditory) (7)	
III	Locomotion – 1 (10)		III	Reaching & manipulation (36)	
IV	Locomotion – 2 (13)		IV	Memory (11)	
V	Manipulation (14)		V	Social interaction & imitative behavior (22)	
			VI	Language 1 (Vocalization, speech and communication) (11)	
			VII	Language 2 (Vocabulary & comprehension) (18)	
			VIII	Understanding relationship (18)	
			IX	Differentiation by Use, shape and movements (8)	
			X	Manual Dexterity (7)	

Interpretations