International Journal of Integrative sciences, Innovation and Technology
(A Peer Review E-3 Journal of S*cience* I*nnovation* T*echnology*)
Section A – Basic Sciences; Section B –Applied and Technological Sciences; Section C – Allied Sciences
Available online at www.ijiit.net

Research Article

EFFECT OF MULTIMODAL STIMULATION ON PSYCHOMOTOR DEVELOPMENTAL OUTCOME OF LOW BIRTH WEIGHT INFANTS

DR. MANJULA G. KADAPATTI,
Assistant Professor Smt.Vhd Central Institute Of Home Science, Seshadri Road,Bangalore

ABSTRACT

Early years are the crucial years for the development of the child and each child needs an experientially rich environment for his/her development. The prevalence of low birth weight ranges from 2 to 30 per cent in India in contrast to 5-7 per cent in developed countries and Approximately 3 per cent of LBW infants and children are developmentally delayed. The strong influence of early environment marks the differences in the capacity of the privileged child. The proper development is brought about only when the environmental influences are fostered at the proper time which will prevent developmental lags in child's future. So need was felt to study the effect of intervention in enhancing the psychomotor development and to reduce the developmental delays among LBW infants. Four hospitals, two each government and private were selected. A sample of 20 low birth weight for experimental group, with 20 each formed control group I that is normal birth weight, control II is low birth weight. The intervention consisted of both hospital based and home based was given up to 6 months for both infants and infants mother. Types of early stimulation given were Vestibular stimulation, Taclile/kinesthetic stimulation, Auditory stimulation and Oral stimulation. Educational intervention was also imparted to mother regarding developmental milestone, health and hygiene, immunization and nutrition. The groups were post tested to know the effect of intervention on motor development after 6 months, using Bayley scale of infant development with required age appropriate tasks. Results revealed that intervention for LBW babies to enhance psychomotor development was found to be statistically significant. LBW infants had caught the growth equivalent to the normal birth weight infants. So multimodal stimulation has better out comes in terms of motor development of infants.

KEYWORDS: *Psychomotor, infants, multimodal*

INTRODUCTION

Infancy is a crucial period of life where the foundation for all the child's future development is laid. Development in infancy is comprised of changes in both body and behaviour. As the structure of the child's body mature, the child acquires an ability to function in increasingly complex ways. Mastery over various activities during infancy is important for two reasons. First sooner the baby gains control over his body, the earlier he becomes independent. Secondly mastery of these tasks provides the foundation on which later developmental tasks are built.

Development of the child in the early years is most rapid. It is during this period that the child learns to deal with the environment and satisfy its basic needs. The nurturing experience the infant receives in the early years of life serves as the foundation for subsequent learning. The early years are very plastic impressionable and formative for the growth and development of the child. Therefore, enrichment and deprivation during these years of life will be vital for the subsequent development of the child.

The strong influence of early environment marks the differences in the capacity of the privileged child. The proper development is brought about only when the environmental influences are fostered at the proper time.

Available research evidence indicates that about 50 per cent of the intellectual development takes place between conception to four years and about 80 per cent between 4-6 years. About 50 per cent of the level of vocabulary attained by 18 years of age is acquired during the first 8 years. About 50 per cent of child's general educational attainment at 18 years is attained by 9 years of age. Early years are thus crucial years for the development of the child and each child needs an experientially rich environment for his/her development (Muralidharan and Asthana, 1991).

The prevalence of low birth weight ranges from 2 to 30 per cent in India in contrast to 5-7 per cent in developed countries (Tandon et al., 2000). This low birth weight is partly due to higher incidence of pre-maturity but mostly due to fetal malnutrition or intra uterine growth retardation.

Low birth weight (LBW) is defined by the World Health Organization as babies born with a birth weight of <2500 g. It is governed by 2 major process a short gestational period i.e. the infant is born too soon and is qualified as premature who is <2500 g with a gestational age of 37 weeks or retarded growth (Norton, 1991). In developing countries intra uterine growth retardation (IUGR) accounts for the majority of low birth weight whereas in developed countries most LBW babies are premature as opposed to growth retarded (Norton, 1991).

A developmental delay occurs when child has the delayed achievement of one or more of his milestones which is not in accordance with their age. This affect child's speech, language his/her fine and gross motor skills and cognitive development. So delay or abnormal development may affect individual areas of development or child's overall development. Approximately 3 per cent of LBW infants and children are developmentally delayed (Fonald, 1991).

So, it is necessary to know the development of low birth weight children right from birth in order to optimize their development. So attempt was made to provide Intervention to prevent psychomotor developmental lags among low birth weight infants. However, just to survive is not enough to survive with a good quality of life is important. It is possible to improve certain aspects of the low birth weight infants by inter changing early environment in specific ways. So a need was felt to study the effect of intervention in enhancing the psychomotor development of low birth weight infants.

IMPORTANCE OF EARLY INTERVENTION

Early intervention is defined by Siegal (1972) as is the introduction of planned programming deliberately timed and arranged in order to alter the anticipated or projected course of development.

These programmes provide individualized care and training that help the child to achieve full potential. One of the basic factors to the rationale of early intervention is that much of what the child learns as an infant or very young child is important to the development of later competencies to say that early learning has a foundation to later learning. It is also known fact that effects of intervention on children with disability and handicap or at risk can be minimized or prevented if children can be identified early and helped through "early intervention" programmes. Thus early intervention can be preventive, curative and remedial.

NEED OF THE STUDY

It is necessary to know the development of LBW children right from birth in order to optimize their development. So attempt was made to provide Intervention to prevent psychomotor developmental lags among LBW infants.

OBJECTIVES

1. To study the effect of multimodal stimulation (Intervention) on developmental outcome and in reducing developmental delays among LBW infants.
2. To know the effect of intervention on psychomotor development of LBW children

HYPOTHESIS

Intervention would be beneficial in enhancing the psychomotor development of low birth weight infants.

LIMITATIONS:

Study is limited only on Psychomotor developmental area of LBW & NBW infants of Dharwad.

METHODOLOGY

PHASE- I - Research design

A survey method to study the birth status of newborns born in government and private hospitals and an experimental design to know the impact of intervention to overcome the developmental delays among infants was employed.

PHASE II :Tool used - Bayley scale for infant development (1993) was used to assess psychomotor and mental development.

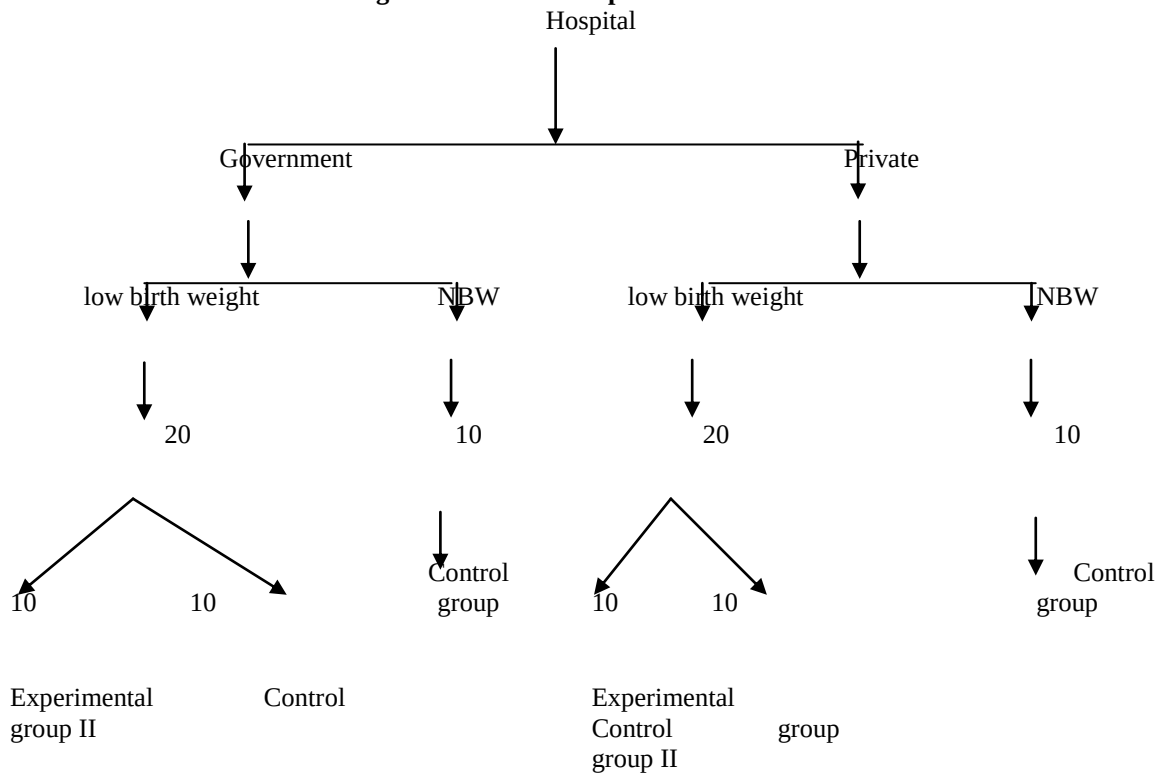
PHASE III- Selection of the sample

The list of government and private hospitals was obtained from district health office of Dharwad. There were totally 16 hospitals in dharwad city. Among them 14 were private hospitals and 2 were government hospitals. The fourteen private hospitals were contacted and two of these hospitals were selected on the basis of number of cases they admitted in their hospitals and who were cooperative. Both the government hospitals were selected (as the number of government hospitals were only two).

Concentrated effort of three months was made to visit the selected four hospitals. Where in mothers were interviewed with the help of interview

schedule after delivery to elicit the necessary information. From the birth register, case sheets and baby's information sheet, required information was collected. Newborn infant's length was measured with the help of infantometer on which markings were marked in centimetres. The data consisted of both primary and secondary sources. All the information was collected within 24 hours of birth.

Fig 1: Selection of sample for intervention



Note: low birth weight – Low birth weight NBW - Normal birth weight

So totally 20 LBW infants for experimental group, 20 NBW for control group I and 20 LBW for control group II were constituted sample for intervention (Fig-1).

PHASE – IV –Intervention

The intervention was carried out for a period of 6 months, once in a fortnight because some of the selected samples for experimental groups were from the rural area of Dharwad taluk.

Hospital based intervention

The intervention for the mothers was conducted with the help of infant development specialist in the NICU or in quiet private room when too many infants were admitted in NICU for at least once 2 days until discharge from hospitals. When the infant was found to be too sick intervention was provided was provided weekly once.

Types of early stimulation given were Vestibular stimulation, Taclile/kinesthetic stimulation, Auditory stimulation and Oral stimulation. The methods of Vestibular stimulation that were employed were rhythmic stimulation, spinning hammocks and rocking and holding method.

In rhythmic stimulation music toys with sounds were provided to infants which were placed on infants isolette and motivated the infants to hear sounds and to see objects as it helps their neurobehavioural development among low birth weight infants.

Natural stimulation was one of the way of vestibular stimulation consisting of skin to skin contact also known as 'kangroo care'. In this method the unclothed or diaper clod infants lies directly on the care giver's chest. This provided an opportunity for early physical contact between mother and their newborn baby by rooming in at least for an hour on each of the first 3 days after birth. Opportunities for direct visual contact and periodic talking with the infants were optimized.

In rocking and holding type of stimulation method the researcher left hand was placed behind the infants head and her right hand under the infants in

a sitting position. The infants body was rocked horizontally.

Touch (Tactile) stimulation is a massage therapy. Tactile and deep muscle stimulation provided through gentle head to toe massage, passive range of motion exercise. Precise sequence of steps were told to mother that included stroking the head, shoulder, arms, back and legs and the flexing and extending limbs. This type of stimulation facilitates weight gain, alert state, improved motor and state behaviour and minimise postnatal complications.

Varied toys producing different sounds were provided for auditory stimulation. Oral stimulation was given to infants to develop good sucking reflex.

Home based intervention

The activities were provided for the Motor development cognitive development, Language development, Personal and social development.

The visits were designed to assist parents in learning specific ways to foster their childs intellectual and physical development by providing them child development information and about developmental milestones of infants. Infants were provided with various stimulatory toys and opportunity was given to play with them. Knowledge was also imparted to the mother about infections as low birth weight infants are more susceptible. Knowledge on preventive measures and immediate care of sick infant was provided. Management of diarrhoea, health and hygiene and immunization was also imparted as LBW have low immunization levels.

Malnutrition is one of the causes of low birth weight infants. About nutrition and weaning foods, nutritious diet during pregnancy and obstetric care during pregnancy etc. information and knowledge was given in order to improve present health status and avoid later low birth weight infants.

Chi-square test of independence was applied to determine the association between dependent and independent variables. Two way ANOVA was used to know the impact of intervention on developmental outcomes of infants.

RESULTS AND DISCUSSION

Impact of intervention on psychomotor developmental milestones of infants

Impact of intervention on psychomotor developmental milestones of infants is presented in Table 1. Experimental group of infants (low birth weight group) performed well and their attainment of percentage was near to equal to control I group (normal birth weight group) and in some items the percentage of attainment has crossed. Among these group equal percentage was seen in the attainment of task on items like shifts weight on arms, sits alone momentarily. Sits alone for 30 seconds, sits alone steadily harm from back to stomach, grasp foot with hands. When compared these items score with control II group poorer performance was observed less than 50 per cent of infants attained some of these task and 50 per cent of them were delay in attaining these task. Similar findings were also found in NIMH Scale. The items like balances head and maintain head at 90° and lower with control more percentage of infants were delayed in attaining these tasks by control group. While, experimental group attained these tasks at 2½ to three months, efforts to sit was done at 4 month and sits with support at 4 month. When comparison was made between control and experimental group a more number of infants not attained the prone position and cannot pick up the objects. While experimental group (cent per cent) have attained these tasks and addition to this they attained travelling to get objects . In some of the items experimental group was performed better than control I group were maintains head at 90° lowers with control rotates wrist uses whole hand to grasp rod, uses pads of finger tips to grasp cube make early stepping movements and uses whole hand to grasp pellet. Among these more difference was observed with respect to percentage of attainment between experimental and control II group some the later items of above mentioned were not a single infant was performed.

Control I group attained a higher percentage in attainment of some of the items when compared with experimental group and control II group were keeps hand open; sits alone momentarity, reaches unilaterally, pulls to sitting position, sits alone while playing with toy only 5 per cent variation was observed in attainment of above these task between experimental group and control group I. While only 20.50 per cent of infants had attained only some of the above task in control II group.

Table 1: Impact of intervention on developmental milestones of infants at six months

Categories	Sl. No.	Items	Physical development index					
			Experimental (LBW) (n=20)		Control I (normal) (n=20)		Control II (LBW) (n=20)	
			Yes	No	Yes	No	Yes	No
Head control	1.	Lifts head (dorsal suspension)	20 (100.0)	0	20 (100.0)	0	20 (100.0)	0
	2.	Adjusts head to ventral suspension	20 (100.0)	0	20 (100.0)	0	20 (100.0)	0
	3.	Holds head steady while being moved	20 (100.0)	0	20 (100.0)	0	15 (75.0)	5 (25.0)
	4.	Holds head in midline position	20 (100.0)	0	20 (100.0)	0	15 (75.0)	5 (25.0)
	5.	Balances head	20 (100.0)	0	20 (100.0)	0	18 (90.0)	2 (10.0)
	6.	Maintains head at 45° and lowers with control	20 (100.0)	0	20 (100.0)	0	8 (40.0)	12 (60.0)
	7.	Maintains head at 90° and lowers with control	18 (90.0)	2 (10.0)	17 (85.0)	3 (15.0)	2 (10.0)	18 (90.0)
Body control	1.	Holds legs up for 2 seconds	20 (100.0)	0	20 (100.0)	0	20 (100.0)	0
	2.	Makes crawling movements	20 (100.0)	0	20 (100.0)	0	17 (85.0)	3 (15.0)
	3.	Turns from side to back	20 (100.0)	0	20 (100.0)	0	20 (100.0)	0
	4.	Displays symmetric movements	20 (100.0)	0	20 (100.0)	0	14 (70.0)	6 (30.0)
	5.	Elevates self by arms	20 (100.0)	0	20 (100.0)	0	16 (80.0)	4 (20.0)
	6.	Sits with support	20 (100.0)	0	20 (100.0)	0	14 (70.0)	6 (30.0)
	7.	Sits with slight support for 10 seconds	20 (100.0)	0	20 (100.0)	0	4 (20.0)	16 (80.0)
	8.	Shifts weight on arms	19 (95.0)	1 (5.0)	19 (95.0)	1 (5.0)	3 (15.0)	17 (85.0)
	9.	Turns from back to side	20 (100.0)	0	19 (95.0)	1 (5.0)	13 (65.0)	7 (35.0)
	10.	Sits alone momentarily	18 (90.0)	2 (10.0)	18 (90.0)	2 (10.0)	5 (25.0)	15 (75.0)
	11.	Pulls to sitting position	17 (85.0)	3 (15.0)	18 (90.0)	2 (10.0)		
	12.	Sits alone for 30 seconds	17 (85.0)	3 (15.0)	17 (85.0)	3 (15.0)		
	13.	Sits alone while playing with Toy	7 (35.0)	13 (65.0)	10 (50.0)	10 (50.0)		
	14.	Sits alone steadily	6 (30.0)	14 (70.0)	6 (30.0)	14 (70.0)		
	15.	Turns from back to stomach	9 (45.0)	11 (55.0)	9 (45.0)	11 (55.0)		
Grasping	1.	Attempts to bring hand to mouth	20 (100.0)	0	20 (100.0)	0	20 (100.0)	0
	2.	Retains ring	20 (100.0)	0	20 (100.0)	0	17 (85.00)	3 (15.0)
	3.	Keeps hands open	17 (85.0)	3 (15.0)	18 (90.0)	2 (10.0)	5 (25.0)	15 (75.0)
	4.	Rotates wrist	19 (95.0)	1 (5.0)	18 (90.0)	2 (10.0)	2 (10.0)	18 (90.0)
	5.	Uses whole hand to grasp rod	19 (95.0)	1 (5.0)	18 (90.0)	2 (10.0)		
	6.	Reaches unilaterally	17 (85.0)	3 (15.0)	18 (90.0)	2 (10.0)		
	7.	Uses partial thumb opposition of grasps cube	20 (100.0)	0	19 (95.0)	1		

	8.	Attempts to secure pellet	20 (100.0)	0	19 (95.0)	1 (5.0)	1 (5.0)	19 (95.0)
	9.	Uses pads of fingertips to grasp cube	6 (30.0)	14 (70.0)	3 (15.0)	17 (85.0)		
	10.	Grasps foot with hands	3 (15.0)	17 (85.0)	9 (45.0)	11 (55.0)		
	11.	Uses whole hand to grasp pellet	5 (25.0)	15 (75.0)	9 (45.0)	11 (55.0)		
Walking movements	1.	Makes early stepping movements	5 (25.0)	15 (75.0)	9 (45.0)	11 (55.0)		

Comparison of developmental indices between experimental and control group of infants

Comparison of developmental indices between experimental and control groups is shown in Table 2. With regards to PDI significant results was found between these groups. The mean value of experimental low birth weight was found more when compared with control low birth weight and only, 2.05 mean value difference was found with control I group PDI of experimental low birth weight group was found to be higher than control II of low birth weight. Thus from the results it can be said that intervention would be beneficial in enhancing the psychomotor development of low birth weight infants.

Table 2: Comparison of developmental indices between experimental and control groups

	Groups	N	Mean	SD	'F' value
PDI	Expt1 LBW	20	129.80	10.57	-
	Control Normal	20	127.75	10.98	189.62***
	Control LWB	20	76.10	7.79	-
	Total	60	-	-	-

**** Significant at 0.001 level of probability*

Coefficient of variance = 10.47 per cent

Factor	SEM	CD
Intervention groups	1.79	4.9
Developmental indices	1.47	4.1
Interactions	2.54	NS

CONCLUSION

Intervention for low birth weight babies to enhance psychomotor development of infants was found to be effective. Low LBW infants had caught the growth equivalent to the normal birth weight infants. So multimodal stimulation has better out come in terms of psychomotor development of infants.

REFERENCES

1. *Muralidharan and Asthana, 1991*
2. *Tandon et al., 2000*
3. *Norton, 1991*
4. *Fonald, 1991*
5. *Siegal (1972)*
6. *SAIGAL, S., 1986, The outcome of very low birth weight infants past present and future. Indian Journal of Pediatrics, **53** : 365-371.*
7. *FONALD, 1991, Profile of children's development, Pediatrics, 19:21-26.*